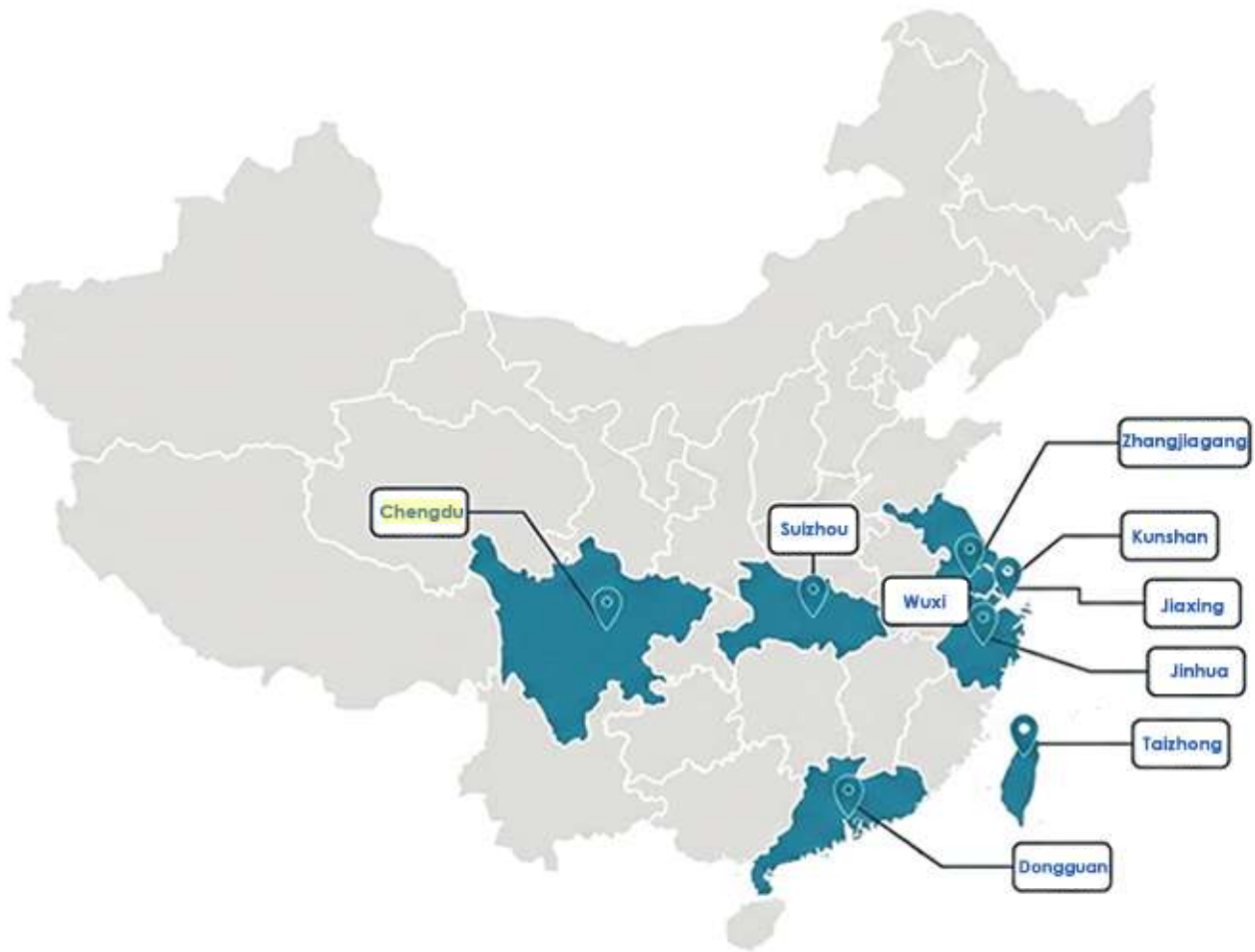




*Chengdu 2nd
Manufacturing Base*



Manufacturing Footprint Map



WTL has deeply established its expertise in electronic components, with five production bases strategically located across nine cities in five provinces in China. Our facilities are situated in key industrial hubs across South China, East China, Central China, Southwest China, as well as Taiwan, leveraging a coordinated multi-base production network to integrate a full spectrum of product resources.

Backed by a well-structured production layout and robust supply chain capabilities, WTL offers a comprehensive product portfolio, complete specifications, and ample production capacity. We are fully equipped to meet diverse industry needs and application scenarios through one-stop procurement and customized solutions, while delivering stable, diversified, and end-to-end integrated solutions to our customers.

Rooted in China, Serving the Globe



Juan Military Standard Production Line



Purification Zone Production Line



Purification room test line



ats



Advanced production testing equipment

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Quartz-Crystal Filter

The quartz crystal resonator is an electronic component that utilizes the inverse piezoelectric effect of quartz crystals for frequency selection and stabilization. It is widely employed in various electronic devices and systems, including satellites, navigation systems, radar, communications, broadcasting and television, instrumentation, and time and frequency standards. Due to the exceptional stability of quartz crystals in terms of their physical and chemical properties, quartz crystal resonators exhibit high stability.

I. Types of Quartz Crystal Resonators (Based on Packaging Form)

◎Resist welding SXR series, cold press welding SXC series:

Frequency range: 1.8432MHz~ 250MHz, Annual aging: $\pm 0.01\text{ppm}$ ~ $\pm 1\text{ppm}$.

◎Surface-mount SXM series:

Frequency range: 10MHz~120MHz, annual aging: $\pm 0.5\text{ppm}$ ~ $\pm 3\text{ppm}$.

II. Oscillation Patterns and Traders' Strategies

The primary vibration modes of quartz crystal resonators include: bending oscillations (XY and NT cuts), where the resonant frequency is determined by the length and width of the quartz crystal; compression vibration modes ($+5^\circ\text{X}$ cut); surface shear vibration modes (DT, CT, and SL cuts); and thickness shear vibration modes (AT and SC cuts), where the resonant frequency depends on the thickness of the quartz crystal.

The commonly used cutting types are AT cutting and SC cutting.

III. Frequency-Temperature Characteristics

The primary factors determining the frequency-temperature characteristics of quartz crystal resonators are the cutting shape and angle of the quartz wafer. The frequency-temperature characteristics of AT-cut and SC-cut resonators relative to the reference cutting angle are illustrated in Figures 1 and 2, respectively. By appropriately selecting the cutting angle and adjusting the two inflection points (ZTC points) of the cubic curve, the minimum temperature-frequency deviation can be achieved within a specific temperature range.

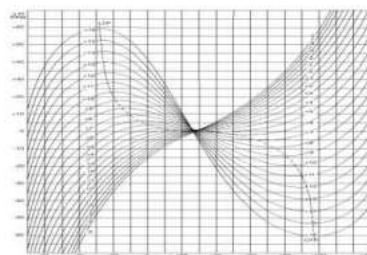


Figure 1: Frequency-Temperature Relationship of the AT-Cut Crystal Resonator

The Relationship Between Characteristics and Reference Bevel

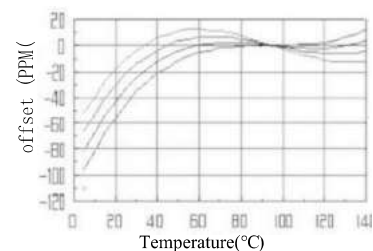


Figure 2: Relationship Between the Frequency-Temperature Characteristics of the SC Cut Crystal Resonator and the Reference Cut Angle

IV. Overtone Order

In AT-cut and SC-cut quartz crystals, the commonly used vibration modes include the fundamental frequency, third overtones, fifth overtones, seventh overtones, and ninth overtones. In addition, parasitic modes and the SC-cut B-mode also exist.

The key distinction between overtone frequencies and electrical harmonics lies in the following: Electrical harmonics are integer multiples of the fundamental frequency and coexist with it; whereas overtone frequencies approximately follow an odd-numbered relationship with the fundamental frequency.

V. Aging Characteristics of Quartz Crystal Resonators

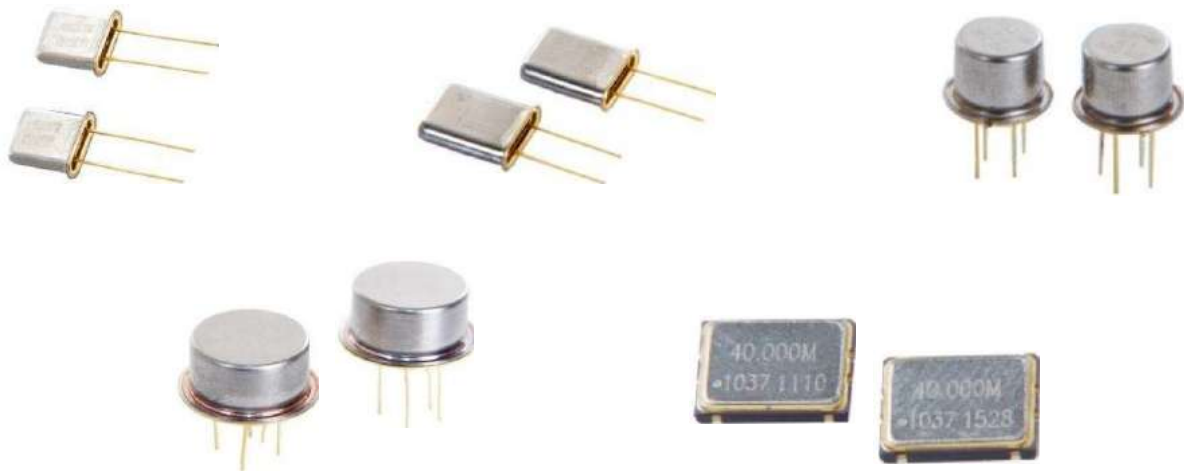
Aging refers to the time-dependent degradation of quartz crystal resonators. The primary causes of frequency aging can be categorized into two mechanisms: mass adsorption effects and stress relaxation effects. To mitigate product aging characteristics, numerous process improvements have been implemented, significantly reducing the aging rate of resonators. It is particularly noteworthy that due to the anisotropic nature of quartz crystal resonators, even resonators with identical designs and manufacturing processes exhibit varying aging behaviors. Generally, resonators demonstrate less aging at lower temperatures compared to higher temperatures, and exhibit superior aging performance under weaker excitation conditions compared to stronger ones.

Quick Selection Guide for Various Series of Quartz Crystal Resonators

Series	Package mm	Frequency range MHz	Load Electric Rong pF	Adjust frequency difference to ppm	Cut Type	Package	Page number
SXM53 series (Surface Mount)	5.0×3.2	8~60	12~30	±10~±30	AT	SMD5032	4
SXM32 series (Surface Mount)	3.2×2.5	8~60	12~30	±10~±30	AT	SMD3225	4
SXC01 series (vibration-resistant, low aging)	10.4×6.8 cm	40~120	12~30	±2.5~±10	SC	HC-35/U	5
SXC02 series (vibration-resistant, low aging)	15.3×6.7	5~40	12~30	±2.5~±10	SC	HC-37/U	5
SXC04 series (low aging)	13.0×11.0×4.5	5~120	12~30	±2.5~±20	AT/SC	HC-43U	6
SXC05 series (low aging)	8.9×8.5×3.7	10~150	12~30	±2.5~±20	AT/SC	HC-45U	6
SXR02 series (resistance welding)	11.5×4.65×3.5	3.6468~30	12~30	±10~±30	AT	HC-49/S	7
Note: ppm = 10 ⁶							

Naming Rules for SX Series Quartz Crystal Resonators

Model	SX	C01	E	100M	B	D	S	20
Meaning Explanation	Type : SX: piezoelectric resonator	Structure code: Refer to the specific product specifications	Temperature range: E: -55~85°C	Nominal frequency: 100 MHz 100MHz	Adjust frequency difference: Refer to the specific product specifications	Temperature frequency difference: Refer to the specific product specifications	Vibration Mode: A: A T Cut S: SC Cut	Load capacitor



1. resonance frequency

Under specified conditions, the electrical impedance of a crystal component corresponds to the lower of two resistive frequencies.

2. Load resonator frequency

Under specified conditions, the crystal element is connected in series or parallel with the load capacitor, resulting in a combined impedance that exhibits resistive characteristics at one of two frequencies.

3. equivalent resistance

Under specified conditions, the resonant resistance of a crystal element at its series or parallel resonant frequency.

4. Load capacitor (CL)

When a quartz crystal resonator is used in an oscillator, it is connected to the capacitance in the circuit. In this configuration, the effective external capacitance jointly determined by the quartz crystal resonator and the circuit is termed the load capacitance (CL). When CL is connected in parallel or series with the quartz crystal resonator, the resonator's actual frequency (f) is obtained.

It can be expressed by the following formula: (where is the series resonant frequency of fs) $f_s = f_n \left(1 + \frac{C_1}{2(C_0 + C_1)} \right)$

5. stimulation level

This refers to the power consumed by a quartz resonator during resonance. Both excessively high and low excitation levels during operation adversely affect the resonator's inherent performance. High excitation levels induce lattice distortion and surface thermal effects, compromising frequency stability and accuracy; in some cases, low-frequency quartz resonators may even fracture. Conversely, insufficient excitation levels can prevent resonance initiation or cause resonance cessation under certain conditions.

6. Static Capacitance (CO)

Static capacitance refers to the device capacitance between the leads of a quartz resonator, encompassing the capacitance formed by the electrodes and the base bracket.

7. The Q-value of a quartz crystal resonator

The Q value is a comprehensive intrinsic quality indicator, which can be expressed by the following formula: (where $w = 2\pi f$, L1 is the equivalent inductance, and R1 is the equivalent resistance).

resistance .) $Q = \frac{w L_1}{R_1}$

8. parasitic oscillation

No quartz resonator exhibits an absolutely singular frequency vibration mode; all possess parasitic vibration modes to varying degrees. Vibrations occurring at frequencies other than the dominant frequency are referred to as parasitic oscillations.

9. Accuracy of the initial frequency of the reference temperature

Under specified conditions—including nominal power supply voltage, nominal load impedance, reference temperature, and other prescribed parameters—the maximum deviation of the crystal oscillator's output frequency from its nominal frequency is defined as the f-T accuracy: (measured frequency – nominal frequency) / nominal frequency.

10. Frequency and Temperature Stability

All other conditions remain unchanged; the maximum deviation of the crystal oscillator's output frequency within the specified temperature range is as follows.

That is f-T stable slope = $\pm (f_{\max} - f_{\min}) / (f_{\max} + f_{\min})$

Instructions for Use of Quartz Crystal Resonator

1. Select appropriate parameters such as adjustment frequency difference (i.e., frequency accuracy at the 25°C reference temperature), temperature frequency difference, and equivalent resistance from the product manual.
2. For filter crystals, the parasitic suppression of the crystal resonator must be determined.
3. For the fundamental wave crystal, the load capacitance of the crystal resonator must be determined.
4. When using a crystal resonator, attention should be paid to the magnitude of the excitation level.
5. The company has corresponding product specifications for different operating environments (missile/arrow carrier, airborne, ground). When ordering products, users should select the specification that matches their actual operating environment.

Product Features and Applications/Features

- ◎SMD packaging: compact size, high reliability;
- ◎Vibration and impact resistant, suitable for high-vibration environments such as airborne, missile-mounted, and rocket-mounted applications;
- ◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB2138-94 "General Specification for Quartz Crystal Resonators"

Enterprise Standards: Q/TDJ09.006-2006 "General Acceptance Specification for Quartz Crystal Resonators"; Q/TD20245-2013 "Detailed Specification for SXM53 Type Quartz Crystal Resonator"

Quality Grade: Standard Military Grade

Technical Specifications

◎Electrical performance parameters

Parameter Name	Characteristic
Frequency range	8~60MHz
Typical frequency (MHz)	12、16、20、25、27、28、40、49.152
Mode of vibration	AT-cut
Adjust frequency difference	B: $\pm 20\text{ppm}$; C: $\pm 30\text{ppm}$
Equivalent resistance	SXM53 $\leq 50\ \Omega$ (base frequency); SXM32 $\leq 100\ \Omega$ (base frequency)
Static capacitance	$\leq 6.0\text{pF}$
Load capacitor	16pF, 20pF, 30pF (*Customizable)
Insulation resistance	500M Ω
Stimulation level	1 μW ~500 μW (max)
Age-related aging	$\pm 5\text{ppm}/\text{year}$
Working temperature	See the temperature frequency difference characteristics table
Storage Temperature	-55°C ~ $+125^\circ\text{C}$

◎Temperature Frequency Difference Characteristics Table

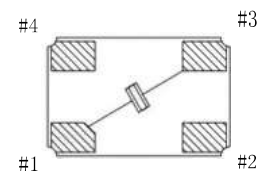
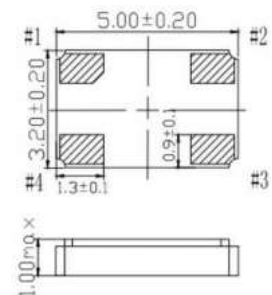
Operating temperature range	Temperature frequency difference (ppm)			
	C (± 20)	D (± 30)	E (± 50)	F (± 75)
D- 40°C ~ $+85^\circ\text{C}$	*custom made		●	
E- 55°C ~ $+85^\circ\text{C}$	1	*custom made	●	●
H- 55°C ~ $+105^\circ\text{C}$	1	*custom made	●	●
G- 55°C ~ $+125^\circ\text{C}$	1	1	*custom made	●

Order Instructions

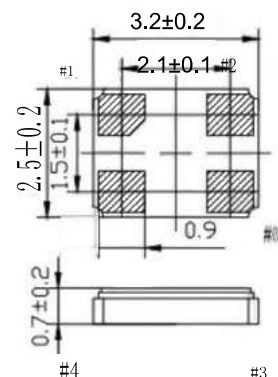
Model	SX	M53	E	20M	B	D	A	20	-C
Meaning Explanation	Piezoelectric resonator	Structure code: Refer to the external dimensions diagram	Temperature range: Refer to the temperature frequency difference characteristic table	Nominal frequency: 20 MHz (20 MHz)	Adjust frequency difference: Refer to the electrical performance parameter table	Temperature frequency difference: Refer to the temperature frequency difference characteristic table	Vibration Mode: A: A T Cut	Load capacitor	None: Standard Army Class C: Military-grade/Industrial-grade temperature



External dimensions and structural code



Structure Code: M53



Structure code: M32

Product Features and Applications/Features

- High reliability with excellent vibration and impact resistance; ● Vacuum cold press welding packaging; ● High precision and low aging; ● Widely applicable in military and civilian communications, navigation, radar, and related fields;
- Designed for high-vibration environments such as airborne, missile-mounted, and rocket-mounted applications.

Quality Specification/Quality Assurance

General Specification: GJB2138-94 "General Specification for Quartz Crystal Resonators"

Enterprise Specification: Q/TDJ09.006-2006 "General Acceptance Specification for Quartz Crystal Resonators"; Q/TD 20164-2010 "Detailed Specification for SXC02A Type Quartz Crystal Resonator"

Quality Grade: Standard Military Grade

Technical Specifications

◎Electrical performance parameters

Parameter Name	Characteristic
Frequency range	2MHz~200MHz (AT-cut) ; 8.192MHz~150MHz (SC-cut)
Mode of vibration	AT-cut、SC-cut
Adjust frequency difference	A: ± 2.5 ppm; B: ± 5.0 ppm; C: ± 7.5 ppm; D: ± 10 ppm; E: ± 20 ppm
ZTC (°C)	*Customized (AT-cut); 85 ± 7 * Customized (SC-cut)
Static capacitance	≤ 6.0 pF
Load capacitor	12pF, 20pF, 30pF (*Customizable)
Insulation resistance	500M Ω
Stimulation level	1 μ W~500 μ W (max)
Age-related aging	± 0.01 ppm/year $\sim \pm 1.0$ ppm/year
Working temperature	Applicable to AT-cut; refer to the temperature-frequency difference characteristic table.
Storage Temperature	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

◎Electrical performance parameters (equivalent resistance)

Frequency range	AT-cut	Frequency range	SC-cut
2~5MHz	$\leq 80\Omega$ (base frequency)	8~40MHz	$\leq 120\Omega$ (third overtone)
5~30MHz	$\leq 250\Omega$ (fundamental frequency)	40~100MHz	$\leq 70\Omega$ (third overtone)
10~100MHz	$\leq 50\Omega$ (third overtone)	80~150MHz	$\leq 120\Omega$ (5th overtone)
80~150MHz	$\leq 60\Omega$ (third overtone)		
140~200MHz	$\leq 120\Omega$ (7th harmonic)		

◎Temperature Frequency Difference Characteristic Table (AT-cut)

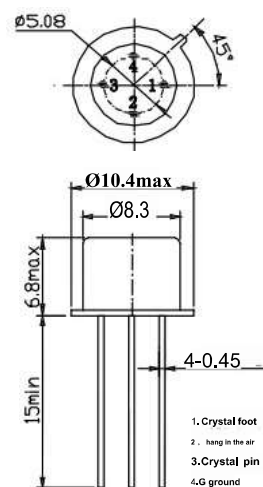
Operating temperature range	Temperature Frequency Difference			
	B (± 10)	C (± 20)	D (± 30)	E (± 50)
D- $40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	●	
E- $55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	●	
H- $55^{\circ}\text{C} \sim +105^{\circ}\text{C}$	*custom made	*custom made	*custom made	
G- $55^{\circ}\text{C} \sim +125^{\circ}\text{C}$	*custom made	*custom made	*custom made	*custom made

Order Instructions

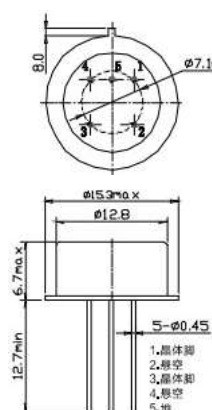
Model	SX	C01	E	20M	B	D	A	20	-C
Meaning Explanation	Type : SX: piezoelectric resonator	Structure code: Refer to the external dimensions diagram	Temperature range: Refer to the temperature frequency difference characteristic table	Nominal frequency: 20 MHz (20 MHz)	Adjust frequency difference: Refer to the electrical performance parameter table	Temperature frequency difference: Refer to the temperature frequency difference characteristic table	Vibration Mode: A: A T Cut S: SC Cut	Load capacitor	None: Standard Army Class C: Military-grade/ Industrial-grade temperature



External dimensions and structural code



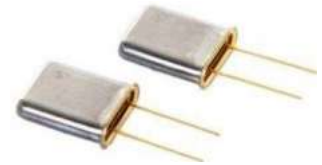
Structure Code: C01



Structure Code: C02

Product Features and Applications/Features

- ◎ Small size, vacuum cold press welding packaging; ◎ High precision with low aging; ◎ Widely applicable in military and civilian communications, navigation, radar, and related fields;
- ◎ Designed for high-vibration environments such as airborne, missile-mounted, and rocket-mounted applications.



Quality Specification/Quality Assurance External dimensions and structural code

General Specification: GJB2138-94 "General Specification for Quartz

Crystal Resonators"

Enterprise Standards: Q/TDJ09.006-2006 "General Acceptance Specification for Quartz Crystal Resonators"; Q/TD 20150-2009 "Detailed Specification for SXC04 Type Quartz Crystal Resonator"

Quality Grade: Standard Military Grade

Technical Specifications

Electrical performance parameters

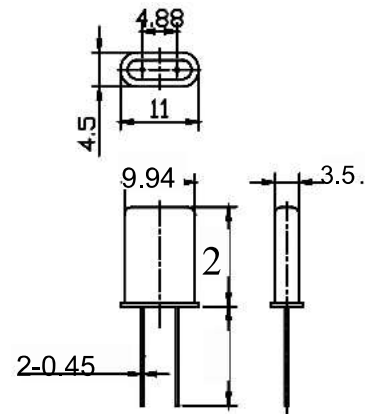
Parameter Name	Characteristic
Frequency range	2.5MHz~200MHz (AT-cut); 10MHz~150MHz (SC-cut)
Mode of vibration	AT-cut, SC-cut
Adjust frequency difference	A: ± 2.5 ppm; B: ± 5.0 ppm; C: ± 7.5 ppm; D: ± 10 ppm; E: ± 20 ppm
ZTC (°C)	*Customized (AT-cut); 85 ± 7 * Customized (SC-cut)
Static capacitance	≤ 6.0 pF
Load capacitor	12pF, 20pF, 30pF (*Customizable)
Insulation resistance	500M Ω
Stimulation level	1 μ W~500 μ W (max)
Age-related aging	± 0.02 ppm/year~ ± 1.0 ppm/year
Working temperature	Applicable to AT-cut; refer to the temperature-frequency difference characteristic table.
Storage Temperature	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

Electrical performance parameters (equivalent resistance)

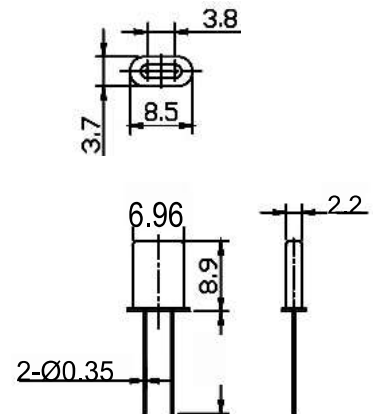
Frequency range	AT-cut	Frequency range	SC-cut
2~5MHz	$\leq 80\Omega$ (base frequency)	8~40MHz	$\leq 120\Omega$ (third overtone)
5~30MHz	$\leq 25\Omega$ (fundamental frequency)	40~100MHz	$\leq 70\Omega$ (third overtone)
10~100MHz	$\leq 50\Omega$ (third overtone)	80~150MHz	$\leq 120\Omega$ (5th overtone)
80~150MHz	$\leq 60\Omega$ (third overtone)		
140~200MHz	$\leq 120\Omega$ (7th harmonic)		

Temperature Frequency Difference Characteristic Table (AT-cut)

Operating temperature range	Temperature Frequency Difference			
	B (± 10)	C (± 20)	D (± 30)	E (± 50)
D-40°C~+85°C	1	1		
E-55°C~+85°C	1	1		
H-55°C~+105°C	*custom made	*custom made	*custom made	
G-55°C~+125°C	*custom made	*custom made	*custom made	*custom made



Structure Code: C04



Structure Code: C05

Order Instructions

Model	SX	C04	E	20M	B	D	A	20	-C
Meaning Explanation	Type : SX: piezoelectric resonator	Structure code: Refer to the external dimensions diagram	Temperature range: Refer to the temperature frequency difference characteristic table	Nominal frequency: 20 MHz 20MHz	Adjust frequency difference: Refer to the electrical performance parameter table	Temperature frequency difference: Refer to the temperature frequency difference characteristic table	Vibration Mode: A: A T Cut S: SC Cut	Load capacitor	None: General Army Class C: Military Temperature/Industrial Grade

Product Features and Applications/Features

- ◎High reliability, resistant to vibration and impact;
- ◎Resist welding packaging, compact in size;
- ◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB2138-94 "General Specification for Quartz Crystal Resonators"

Enterprise Specifications: Q/TD20274-2014 "Detailed Specifications for the SXR02 Type Quartz Crystal Resonator"; Q/TD20268-2013 "Detailed Specifications for the SXR02A Type Quartz Crystal Oscillator"

Quality Grade: Standard Military Grade

Technical Specifications

◎Electrical performance parameters

Parameter Name	Characteristic
Frequency range	3. 6864~30MHz
Mode of vibration	AT-cut (fundamental frequency)
Adjust frequency difference	A: $\pm 10\text{ppm}$; B: $\pm 20\text{ppm}$;
Equivalent resistance	$\leq 80\ \Omega$ (3. 6864MHz $\leq F < 5\text{MHz}$) $\leq 50\ \Omega$ (5 MHz $\leq F < 10\text{MHz}$) $\leq 30\ \Omega$ (10 MHz $\leq F \leq 30\text{MHz}$)
Load capacitor	16pF, 20pF, 30pF (*Customizable)
Insulation resistance	500M Ω
Stimulation level	1 μW ~500 μW (max)
Age-related aging	$\leq \pm 5\text{ppm/year}$
Working temperature	See the temperature frequency difference characteristics table
Storage Temperature	-55°C~+125°C

◎Temperature Frequency Difference Characteristic Table (AT-cut)

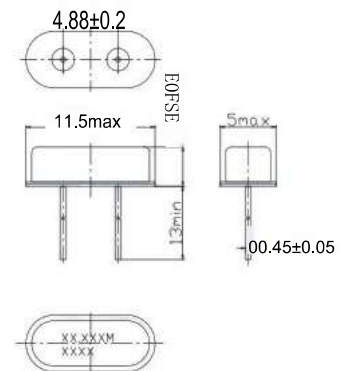
Operating temperature range	Temperature Frequency Difference			
	C (± 20)	D (± 30)	E (± 50)	F (± 75)
D-40°C~+85°C	●	●	●	
E-55°C~+85°C	1	●	●	●
H-55°C~+105°C	*custom made	*custom made	●	●
G-55°C~+125°C	*custom made	*custom made	*custom made	●

Order Instructions

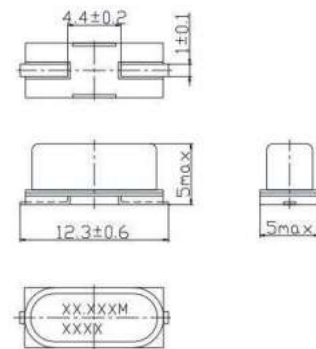
Model	SX	R02A	E	20M	B	D	A	20	C
Meaning Explanation	Type: SX: Crystal Resonator	Structure code: Refer to the external dimensions diagram	Temperature range: Refer to the temperature frequency difference characteristic table	Nominal frequency : 20 M means 20MHz	Adjust frequency difference: Refer to the electrical performance parameter table	Temperature frequency difference: Refer to the temperature frequency difference characteristic table	Vibration Mode: A: A T Cut	Load capacitor	None: Standard military grade; C: Military/Industrial grade



External dimensions and structural code



Structure Code: R02A



Structure Code: R02B

Quartz Crystal Oscillator

A quartz crystal oscillator consists of a quartz crystal resonator and an oscillation circuit, producing a stable frequency signal upon power supply. Based on the stability of its frequency output, quartz crystal oscillators are classified into general-purpose crystal oscillators, medium-precision crystal oscillators, and high-stability crystal oscillators.

The General Crystal Oscillator (SCXO) is a crystal oscillator that does not employ constant temperature or temperature compensation. Its frequency temperature characteristics primarily depend on the inherent frequency temperature properties of the quartz crystal resonator used, with frequency stability typically ranging from 10^{-5} to 10^{-6} across a wide temperature range. It features a compact size, low power consumption, and a frequency range generally spanning 0.5–250 MHz.

Medium-precision crystal oscillators can be categorized into constant-temperature crystal oscillators (OCXO) and temperature-compensated crystal oscillators (TCXO), the latter incorporating SMD temperature compensation. Constant-temperature crystal oscillators regulate the environmental temperature of the quartz crystal resonator through temperature control to enhance frequency temperature characteristics, while temperature-compensated crystal oscillators employ temperature compensation circuits for this purpose. Medium-precision crystal oscillators typically offer frequency stability ranging from 10^{-6} to 10^{-8} , characterized by compact size and high stability. Temperature-compensated crystal oscillators provide stable frequency signals upon power-on with low power consumption (typically below 20 mA), whereas constant-temperature crystal oscillators exhibit longer stabilization times (approximately 3 minutes) but higher power consumption (about 1.5 W at 25°C).

High-precision crystal oscillators are temperature-controlled crystal oscillators employing advanced technologies such as precise temperature regulation and intelligent compensation, achieving frequency stability typically ranging from 10^{-9} to 10^{-11} . Commonly used high-stability models include those with frequencies of 5 MHz and 10 MHz.



Quick Selection Guide for Various Series of Quartz Crystal Oscillator Products (1)

Naming Convention for Quartz Crystal Oscillators

Model	SOXO	16B	F	100M	C	S	G	U	-G	-D	-J
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency Temperature Stability	Output Wave form	Supply voltage	Phase noise / Three-state control / Frequency Voltage Control	Fully domestically produced Characteristic	Apply Environment	Quality grade
	SCXO: Standard crystal oscillator STXO: Warm-toned crystal oscillator SOXO: Temperature-stabilized crystal oscillator SPXO: Phase-Locked Crystal Oscillator SCMXO Tamed Crystal Oscillator SVXO: Voltage-controlled crystal oscillator	See details Size of product	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃ G: -55~+125℃ H: -55~+105℃ K: -40~+105℃	100M That is 100MHz	See the specific product specifications	S: Sine wave H: Square wave V: LVDS E: PECL	F: +15V G: +12V H: +5V I: +3.3V K: +25V L: +1.8V J: Others	See details Size of product ; None: No requirements	It's simply about achieving full domestic production. G: Fully domestically produced	Inorganic materials used for aircraft, vehicles, ships, and ground applications. D: Arrow Carrier E: Aerospace (S)/QJB(S)/CN grade	None: Military Level (B) J: Standard Army Class C: Military-grade/Industrial-grade temperature

SCXO Series Standard Crystal Oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Supply voltage	Working temperature Scope °C	Discharge waveform	Page number
SCXO11B series (SMD7050)	7.0*5.0	1~125	±20~±75	5.0/3.3/2.5/1.8	-55~125	H	15
SCXO20A series (SMD5032)	5.0*3.2	1~125	±20~±75	3.3/2.5/1.8	-55~125	H	15
SCXO19 series (SMD3225)	3.2*2.5	1~125	±20~±75	3.3/2.5/1.8	-55~125	H	15
SCXO23 series (SMD7050 differential)	7.0*5.0	20~300	±30~±100	3.3/2.5	-55~125	V/E/C	18
SCXO24 series (SMD5032 differential)	5.0*3.2	20~300	±30~±100	3.3/2.5	-55~125	V/E/C	18
SCXO25 series (SMD3225 differential)	3.2*2.5	20~300	±30~±100	3.3/2.5	-55~125	V/E/C	18

Note: ppm = 10⁻⁶; H: CMOS; V: LVDS; E: PECL; C: HC SL

STXO Series Thermosensitive Crystal Oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Phase Noise @1kHz/@100kHz dBc/Hz (typ)	Age-related aging rate ppm (max)	Discharge waveform	Page number
STXO25 series (SMD7050 high-precision)	7.0*5.0	5~52	±0.1~±1	-140/-150	±1	CS/H	20
STXO26C series (SMD 7050 wideband)	7.0*5.0	52~200	±0.28~±2	-110/-120	±1	H	22
STXO27 series (SMD5032)	5.0*3.2	5~52	±0.1~±2	-135/-145	±1	CS/H	24
STXO12 series (surface-mount, low phase noise)	27.5*18	10~125	±0.28~±2	-145/-160	±1	S/H	26
STXO13 series (surface-mount, low phase noise)	20*12.5	10~125	±0.28~±2	-145/-160	±1	S/H	28
STXO15 series (DIP14 high stability)	20.8*13.2	10~125	±0.14~±2	-135/-145	±1	S/H	31
STXO16 series (small surface-mount wideband)	14*9	0.2~200	±0.14~±2	-135/-145	±1	S/H	33

Note: ppm = 10⁻⁶; CS: Clipped Sinusoidal Wave; S: Sinusoidal Wave; H: CMOS

Spaceborne Series Crystal Oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Supply voltage V	Working temperature Scope °C	Discharge waveform	Page number
SCXO11B series (SMD7050)	7.0*5.0	1~125	±20~±75	5.0/3.3/2.5/1.8	-55~125	H	76
SCXO20A series (SMD5032)	5.0*3.2	1~125	±20~±75	3.3/2.5/1.8	-55~125	H	76
SCXO19 series (SMD3225)	3.2*2.5	1~125	±20~±75	3.3/2.5/1.8	-55~125	H	76
SCXO23 series (SMD7050 differential)	7.0*5.0	20~300	±30~±100	3.3/2.5	-55~125	VE/C	78
SCXO24 series (SMD5032 differential)	5.0*3.2	20~300	±30~±100	3.3/2.5	-55~125	VE/C	78
SCXO25 series (SMD3225 differential)	3.2*2.5	20~300	±30~±100	3.3/2.5	-55~125	VE/C	78
STXO25 series (SMD7050)	7.0*5.0	5~52	±0.5~±5.0	3.3	-55~105	SH	80
STXO27 series (SMD5032)	5.0*3.2	5~52	±0.5~±5.0	3.3	-55~105	SH	80
SOXO13X series (spaceborne)	50*50	5~125	±0.0005~±0.5	3V~15V	-55~+85	SH	82
SOXO14X series (spaceborne)	38*38	5~125	±0.0005~±0.5	3V~15V	-55~+85	SH	82
SOXO15X series (spaceborne)	36*27	5~125	±0.0005~±0.5	3V~15V	-55~+85	SH	82
SOXO16X series (spaceborne)	25.4*25.4	5~125	±0.0005~±0.5	3V~15V	-55~+85	SH	82
SOXO17X series (spaceborne)	20*20	5~125	±0.0005~±0.5	3V~15V	-55~+85	SH	82
Note: ppm = 10 ⁻⁶ ; H: CMOS; V: LVDS; E: PECL; C: HC SL							

Vibration-Resistant Series Crystal Oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Phase Noise @1kHz/@100kHz dBdHz (typ)	Age-related aging rate ppm (max)	Discharge waveform	Page number
STXO14V/16V series (vibration-resistant, low phase noise)	25.4*15.24	10~125	±0.28~±2	-140/-150 (static) -125/-150 (Dynamic)	±1	SH	85
STXO13LG series (small, vibration-resistant)	19.8*11.5	20~100	±0.28~±2	-140/-150 (static) -120/-150 (Dynamic)	±1	S/H	87
SOXO13V series (vibration-resistant, low phase noise)	50*50	10~160	±0.01~±0.5	-160/-170 (static) -150/-165 (Dynamic)	±0.05 (10MHz) ±0.5 (100MHz)	S	89
SOXO14V series (vibration-resistant, low phase noise)	38*38	10~160	±0.01~±0.5	-160/-170 (static) -145/-165 (Dynamic)	±0.05 (10MHz) ±0.5 (100MHz)	S	89
SOXO16V series (small vibration-resistant model)	25.4*25.4	40~160	±0.05~±0.5	-150/-160 (static) -140/-155 (Dynamic)	±0.5 (100MHz)	S	89
SOXO15LG series (vibration-resistant, low phase noise)	36*27	100	±0.05~±0.5	-155/-160 (static) -130/-155 (Dynamic)	±0.5 (100MHz)	S	91
SOXO16LG series (vibration-resistant, low phase noise)	25.4*25.4	100	±0.05~±0.5	-155/-160 (static) -125/-155 (Dynamic)	±0.5 (100MHz)	S	91
SOXO17LG series (vibration-resistant, low phase noise)	20*20	100	±0.05~±0.5	-155/-160 (static) -125/-155 (Dynamic)	±0.5 (100MHz)	S	91
Note: ppm = 10 ⁻⁶ ; CS: Clipped Sinewave; S: Sinewave; H: CM OS							

Quick Selection Guide for Various Series of Quartz Crystal Oscillator Products (2)

SPXO series phase-locking crystal oscillator

Series	Package mm	Frequency Scope MHz	Reference signal Frequency range MHz	Phase Noise @1kHz/@100kHz dBcHz (typ)	Lock metric Y/N	Discharge waveform	Page number
SPXO11 series (with built-in temperature-controlled crystal oscillator)	50*50	10~160	10~125	-160/-170	Y	S	57
SPXO16 series (with built-in temperature-controlled crystal oscillator)	25.4*25.4	60~120	10~100	-160/-165	Y	S	59
SPXO11V series (with built-in anti-vibration oscillator)	45*45	10~160	10~125	-160/-170 (static) -145/-165 (Dynamic)	Y	S	94

Note: S: Sine wave; H: CMOS

Taming Series Crystal Vibrator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Signal-to-noise ratio @1 kHz @100 kHz dBc Hz (typ)	Maintain μ s for 24 hours	Discharge waveform	Page number
SCMXO11 series (small size)	20*20	10~40	$\pm 0.001 \sim \pm 0.05$	-150/-155	$\leq \pm 10$	S/H	61
SCMXO12 series (high timing accuracy)	50*50	5~20	$\pm 0.0001 \sim \pm 0.005$	-150/-155	$\leq \pm 1.5$	S/H	63
SCMXO13 series (medium time accuracy)	30*25	5~125	$\pm 0.0005 \sim \pm 0.05$	-150/-155	$\leq \pm 5$	S/H	65
STMXO11 series (low-power, mild warming and tonifying)	16.5*11.9	10~50	$\pm 0.05 \sim \pm 0.5$	-140/-150	$\leq \pm 50$	S/H	67

Note: ppm = 10^{-6} ; S: Sine wave; H: CMOS

SVXO series voltage-controlled crystal oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Supply voltage	Working temperature Scope $^{\circ}\text{C}$	Discharge waveform	Page number
SVXO11B series (SMD7050)	7.0*5.0	40~125	$\pm 20 \sim \pm 50$	5.0/3.3	-55~85	H	69
SVXO16 series (surface-mount, low phase noise)	14.0*9.0	40~125	$\pm 20 \sim \pm 50$	5.0/3.3	-55~85	S/H	71
SVXO23 series (DIP8 low-phase noise)	12.7*12.7	40~125	$\pm 20 \sim \pm 50$	5.0/3.3	-55~85	S/H	73

Note: ppm = 10^{-6} ; S: Sine wave; H: CMOS

SOXO Series Constant Temperature Crystal Oscillator

Series	Package mm	Frequency Scope MHz	Frequency Temperature Stability ppm	Signal-to-noise ratio/short- term stability @1 kHz/@ 100 kHz dB CHz (typical)	Age-related aging rate ppm (max)	Output waveform	Page number
SOXO13 series (ultra-low phase noise)	50*50	5~200	$\pm 0.01 \sim \pm 0.5$	-165/-175 (10MHz) -165/-175 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S	35
SOXO14 series (low phase noise)	38*38	5~200	$\pm 0.01 \sim \pm 0.5$	-160/-170 (10MHz) -160/-170 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S	37
SOXO15 series (General High Stability)	36*27	5~200	$\pm 0.005 \sim \pm 0.5$	-160/-170 (10MHz) -160/-170 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S/H	39
SOXO16 series (general low-phase noise)	25.4*25.4	10~200	$\pm 0.005 \sim \pm 0.5$	-160/-165 (10MHz) -160/-170 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S/H	43
SOXO17 series (general low-phase noise)	20*20	10~200	$\pm 0.005 \sim \pm 0.5$	-155/-160 (10MHz) -160/-170 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S/H	47
SOXO18 series (DIP14 compact)	20.8*13.2	10~125	$\pm 0.01 \sim \pm 0.5$	-150/-155 (10MHz) -150/-155 (100MHz)	± 0.05 (10MHz) ± 0.5 (100MHz)	S/H	50
SOXO21 series (small, low-phase noise)	15*15	40~120	$\pm 0.05 \sim \pm 0.5$	-155/-165 (100MHz)	± 0.5 (100MHz)	S	52
SOXO23 series (DIP8 ultra-compact)	12.7*12.7	80~120	$\pm 0.05 \sim \pm 0.5$	-150/-160 (100MHz)	± 0.5 (100MHz)	S	54
Note: ppm = 10 ⁻⁶ ; S: Sine wave; H: CM OS; V: LV DS; E: PE CL							

1. Frequency adjustment range

Frequency adjustment typically involves both mechanical and electrical methods. Mechanical adjustment alters the output frequency range by modifying the variable components of the crystal oscillator, while electrical adjustment changes the frequency range through voltage regulation. However, a wider frequency adjustment range is not always optimal; excessive range width increases the oscillator's sensitivity to noise at the tuning input, leading to reduced stability and performance.

The functions of frequency regulation include:

- ① Set the output frequency to a predetermined value within this frequency range;
- ② Due to aging or other factors, the output frequency of the crystal oscillator deviates; adjust the output frequency to the preset value.

2. Voltage control characteristics

Including voltage-controlled frequency deviation, voltage-controlled sensitivity, and voltage-controlled linearity:

- ① Voltage-controlled frequency offset: the difference in output frequency when the control voltage varies from its specified maximum value to its minimum value.
- ② Voltage control sensitivity: The change in output frequency per unit of control voltage;
- ③ Pressure control linearity: A measure of pressure control characteristics compared to an ideal straight line, typically expressed as the percentage deviation from the ideal line within a specified range.

3. load characteristic

All other conditions remain unchanged; this refers to the permissible deviation of the crystal oscillator's output frequency within the specified variation range relative to its output frequency under nominal load conditions.

4. voltage characteristic

All other conditions remain unchanged; the allowable deviation of the crystal oscillator's output frequency relative to its nominal output frequency under specified voltage variations.

5. clutter suppression

The power ratio of discrete spectral components in the output signal that are free of harmonic relationships with the fundamental frequency to the fundamental frequency is expressed in dB.

6. harmonic suppression

The ratio of the harmonic component power P_i to the carrier power P_o is expressed in dB.

7. frequency aging

Under stable operating conditions, the systematic frequency drift of the output caused by component aging (primarily quartz crystal resonators) is typically measured as the frequency difference over a specified time interval, such as 10^9 days or 10^{71} years. The aging effect inherent in crystal oscillators persists regardless of whether they are powered or not.

8. Power-on Characteristics

The maximum frequency variation of a digital oscillator over a specified time interval after the designated preheating period is expressed as $V = (f_{\max} - f_{\min}) / f_o$.

9. phase noise

A frequency-domain measure of short-term stability, denoted by the ratio of single-sideband noise to carrier noise, $f(f)$, defined as the dBc/Hz value at a given frequency offset. The phase noise of a crystal oscillator at a specific frequency offset is the ratio of signal power within a 1 Hz bandwidth at that frequency to the total signal power.

10. shake

Jitter and phase noise represent two distinct quantitative approaches to the same phenomenon. Jitter is a time-domain concept, while phase noise is a frequency-domain concept. Essentially, jitter describes the deviation of a signal's period from its ideal value; it is typically measured in the time domain but can also be converted using phase noise.

Precautions for Use

1. The impact of the power supply

Typically, the ripple and noise requirements for power supplies should be less than 1% of the supply voltage. Power supplies with excessive ripple or noise can degrade the phase noise performance of crystal oscillators. It is recommended to connect a approximately 10 μ F tantalum capacitor or ceramic capacitor across the crystal oscillator's power input terminal. The lower the supply voltage or the thinner the PCB traces, the larger the capacitance value required to reduce ripple interference. Additionally, a 0.01–0.1 μ F ceramic decoupling capacitor should be connected at the power input terminal, preferably using same-layer connection to avoid interconnecting the power layer and ground layer via vias. For temperature-controlled crystal oscillator products, ensure that the power supply system meets the maximum power requirement specified for such devices.

2. The Influence of Voltage Control on Tuning Voltage

When the voltage controlled by the crystal oscillator changes, its frequency correspondingly varies. Excessive interference from the voltage-controlled tuning voltage can cause oscillator jitter or degrade phase noise. Typically, a low-pass filter circuit is incorporated into the crystal oscillator's voltage-controlled input to mitigate interference from voltage ripple at the tuning terminal. If voltage ripple at the voltage-controlled terminal is excessive, a low-pass filter may also be added externally to the voltage-controlled terminal.

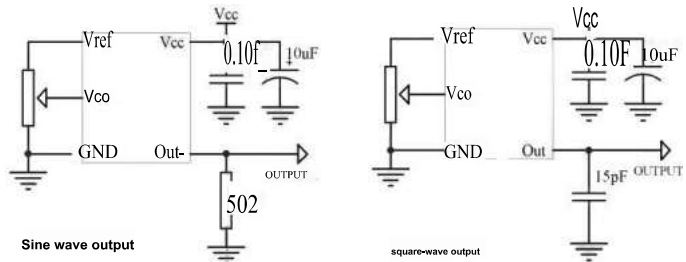
3. The impact of the crystal oscillator installation location

Since temperature fluctuations are the primary factor affecting the short-term stability of crystal oscillators, they should be positioned away from the chassis enclosure or components with significant temperature variations (e.g., fans), as well as from high-power RF devices (e.g., power amplifiers). In environments with vibration or acceleration changes, the mechanical stress on the oscillator must be considered to ensure uniform stress distribution and implement effective vibration mitigation measures. During PCB layout, high-frequency signal traces and digital circuits should be kept as far as possible from the oscillator, and digital ground should be separated from analog ground.

4. Crystal oscillator application circuits and load matching

① The typical application circuit of the crystal oscillator is shown in the figure below:

In the diagram, Vref denotes the reference voltage terminal of the crystal oscillator (some models lack this terminal), providing a stable reference voltage. When operating the oscillator, users can adjust its frequency by connecting a potentiometer with resistance greater than 20 k Ω between the Vref terminal, the Vco (voltage-controlled) terminal, and ground; alternatively, they may directly apply a control voltage to the Vco terminal for frequency adjustment. The reference voltage terminal can also serve as a voltage reference for other devices, provided that the load current at this terminal remains below 1 mA.



The voltage control terminal of the crystal oscillator typically contains built-in bias voltage. If the user does not require the voltage control terminal for frequency adjustment, keep both the voltage control terminal and the reference voltage terminal unconnected and avoid grounding them; otherwise, it may cause abnormal output frequency or product failure.

② Crystal oscillator output load matching requirements:

Use the crystal oscillator under the recommended load conditions: a sine wave typically corresponds to a 50 Ω load, while a square wave corresponds to a 15pF load. The maximum allowable deviation under these conditions is generally $\pm 10\%$. Although the product incorporates redundant design for load characteristic tolerances, severe load mismatch at the oscillator output may degrade its performance parameters, such as changes in output frequency, reduced output power, or altered harmonic suppression. Therefore, it is advisable to employ peripheral circuits that match the oscillator's rated output impedance during operation.

Additionally, note that since the square wave output contains a DC signal, the signal output terminal must not be shorted to ground.

5. Working temperature requirements

The crystal oscillator must be operated within the specified temperature range. Prolonged operation outside this range may degrade its performance, shorten its lifespan, or even cause failure.

6. electrostatic protection

The SCXO series surface-mount crystal oscillator products are electrostatic-sensitive devices. Their ESD (Electrostatic Discharge) protection rating is Level 2 (>2000 V). Proper electrostatic protection measures must be implemented during transportation, storage, and use.

Product Features and Application

- ◎ **High reliability, resistant to vibration and impact;**
- ◎ **SMD ceramic-metal packaging, compact in size;**
- ◎ **It is widely applicable in military and civilian communications, navigation, radar, and other fields.**



Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specifications: Q/TD50000-2022 "Detailed Specifications for ZA519(SCXO11B) Type Quartz Crystal Oscillator";

Q/TD20134A-2013 "Detailed Specifications for SCXO11B Type Quartz Crystal Oscillator (For Airborne Applications)";

Q/TD20114A-2017 "Detailed Specification for SCXO11B Type Quartz Crystal Oscillator (For Rocket Launch Vehicles)";

Q/TD20205-2011 "Detailed Specification for SCXO11B-G Type Quartz Crystal Oscillator (For Airborne Applications)";

Q/TD50002-2022 "Detailed Specification for ZA521(SCXO20A) Quartz Crystal Oscillator";

Q/TD20330-2017 "Detailed Specifications for SCXO20A Type Quartz Crystal Oscillator (For Aviation Applications)";

Q/TD20346-2018 "Detailed Specifications for SCXO20A Quartz Crystal Oscillator (For Rocket Launch Vehicles)";

Q/TD50004-2022 "Detailed Specifications for ZA523(SCXO19) Type Quartz Crystal Oscillator"

Quality Grades: Military Grade(B), Standard Military Grade, Military Temperature Grade, Industrial Grade

Technical Specifications

◎ Electrical performance parameters

Parameters			Characteristic
Parameter Name			
Frequency Range			Typical
Frequency (MHz)			1~125MHz
			1.024,2.048,4.096,8.192,10,11.0592,16.384,18.432,20,30,32.512,40,40.96,50,60,80,100,120,125
Stability of power supply voltage frequency			; 1.8 V/2.5 V/3.3 V/5 V ±5% VDD – Refer to the Frequency and Temperature Stability Table
Output	CMOS	VS. Duty cycle of temperature rise and fall edges	Temperature Stability Table
			≤6ns
			50%±5%
Current			25mA (Max)(3.3V) 50mA (Max)(5.0V)
Working temperature range:			40mA(Max)(3.3V) 50mA(Max)(5.0V)
			Frequency and Temperature Stability Table
Three-state control			T:Yes N:No
Storage temperature range:			from -55°C to +125°C
Packaging dimensions:			refer to the dimensional specifications.
Load:			15pF

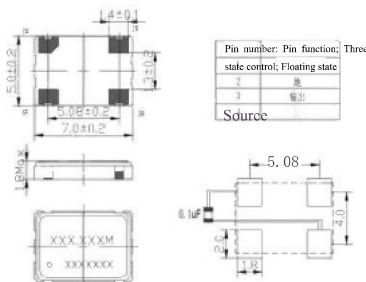
◎ Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)			
	A (± 20)	B (± 30)	C (± 50)	D (± 75)
D -40°C ~ +85°C	*custom made			
E -55°C ~ +85°C	1	* custom made	● 1	●
H -55°C ~ +105°C	1	1	* custom made	
G -55°C ~ +125°C				

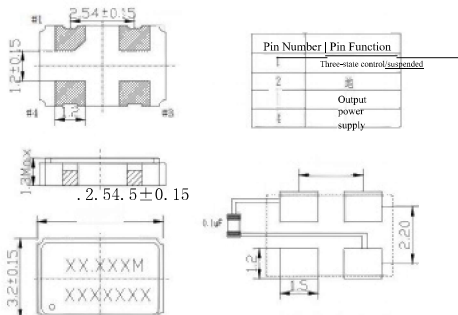
Order Instructions

Model	SCX0	11B	G	10M	D	H	I	T	-G	-D	-J
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Three States Control	National production label	Apply Environment	Quality Grade
	Conventional crystal oscillator	11B: (SMD7050) 20A: (SMD5032) 19: (SMD3225)	D: -40~+85℃ E: -55~+85℃ H: -55~+105℃ G: -55~+125℃	10M means 10MHz	A: ±20ppm B: ±30ppm C: ±50ppm D: ±75ppm	H: square wave	H: +5V I: +3.3V K: +2.5V L: +1.8V	T: have N: not have	None: Not domestically produced (ZZKK-C grade) G: Fully domestically produced (ZZKK-A Grade)	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier	Not have : Military level (B) J: Common Military level C: armed forces Temperature/Work Industry Level

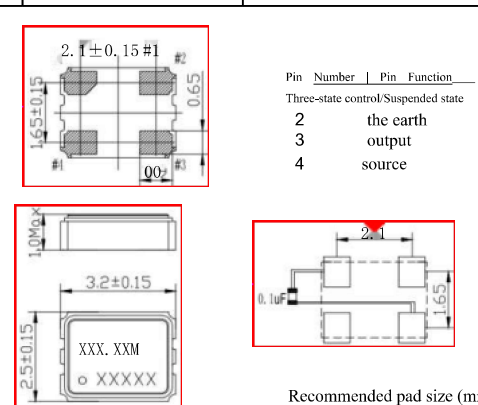
Product Specifications for the Shelf

Range of models	Sell	Voltage	Frequency and Temperature Stability (ppm)	Discharge waveform	Three-state control	Model (Mouth as frequency point)	National production model (frequency point as the mouth)	Shelf frequency/MHz
SCX011BE	-55℃ +85℃	5V	≤±30	CMOS	Have	SCX011BE □MBHIT	SCX011BE □MBHIT-G	8、10、11.0592、12、25、33.333、50、100
			≤±50	CMOS	Have	SCX011BE □MCHIT	SCX011BE □MCHIT-G	10、14、7456、16、16、768、18.432、20、24、40、50、80、100
		3.3V	≤±30	CMOS	Have	SCX011BE □MBHIT	SCX011BE □MBHIT-G	1.024、4、8、11.0592、14、7456、16、384、20、22、1184、24、25、30、32、512、32、768、33、33、33、33、35、35.2512、40、48、50、66、88、100、125
			≤±50	CMOS	Have	SCX011BE □MCHIT	SCX011BE □MCHIT-G	1.8432、2、2.048、4.9152、8、8.192、9.8304、10、11.0592、12、12.288、14.7456、15.36、16、16.384、18.432、19、20、20.48、22.1184、24、24.576、25、27.29.4、30、32、33、33.333、35、40、48、50、60、63、64、66、66.666、66.6666、75、80、98.304、100、120、125
		2.5V	≤±50	CMOS	Have	SCX011BE □MDHKT	SCX011BE □MDHKT-G	25
		1.8V	≤±50	CMOS	Have	SCX011BE □MDHLT	SCX011BE □MDHLT-G	3.6864、8、10、16、17.768、20、24、30、33、64
SCX011BG	-55℃ +125℃	5V	≤±75	CMOS	Have	SCX011BG □MDHIT	SCX011BG □MDHIT-G	1、2、3.6864、8、8.192、12.14、7456、16、16.777123、19.6608、20、27.008、33、40、64
			≤±50	CMOS	Have	SCX011BG □MCHIT	SCX011BG □MCHIT-G	5、10、14.7456、25、40、50、66、80、98.304、100、125
		3.3V	≤±75	CMOS	Have	SCX011BG □MDHIT	SCX011BG □MDHIT-G	1、3.6864、8、10、11.0592、12、12.288、14.31818、14.7456、16、20、24、24.9973、24.9999、25、27、29.9973、30、32、32.9973、32.9999、33、33.33、35、40、48、50、58.9824、64、66、66.666、100、125
			≤±50	CMOS	Have	SCX011BG □MDHIT	SCX011BG □MDHIT-G	
		2.5V	≤±75	CMOS	Have	SCX011BG □MDHKT	SCX011BG □MDHKT-G	25
		1.8V	≤±50	CMOS	Have	SCX011BG □MDHLT	SCX011BG □MDHLT-G	14.7456、24、50
≤±75	CMOS		Have	SCX011BG □MDHLT	SCX011BG □MDHLT-G	20、24、25、27、30、33、48、49.152、50、66、100		
Structure Code: 1 1 B			 Pin number: Pin function; Three-state control; Floating state Source Recommended pad size (mm) External dimensions (mm) (Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)					

Product Specifications for the Shelf

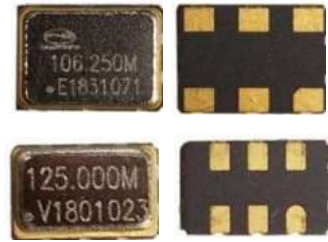
Model	Working temperature	Voltage	Frequency Temperature Stability (ppm)	Discharge waveform	Three-state control	Model (□(For frequency points))	National production model (□(For frequency points))	Shelf frequency/MHz
SCX020AE	-55° ℃ +85℃	3. 3V	≤ ± 30	CMOS	Have	SCX020AE□MBHIT	SCX020AE□MBHIT-G	1、 8、 10、 20、 25、 48、 50、 66、 80
			≤ ± 50	CMOS	Have	SCX020AE□MCHIT	SCX020AE□MCHIT-G	1、 8、 10、 14. 7456、 16. 384、 20、 25、 27、 30、 33、 33. 33、 40、 48、 50、 66、 100、 125
		2. 5V	≤ ± 50	CMOS	Have	SCX020AE□MCHKT	SCX020AE□MCHKT-G	25
		1. 8V	≤ ± 50	CMOS	Have	SCX020AE□MCHLT	SCX020AE□MCHLT-G	25、 27、 30、 33、 48、 50、 100
SCX020AG	-55℃ +125℃	5V	≤ ± 75	CMOS	Have	SCX020AG□MDHHT	SCX020AG□MDHHT-G	16
		3. 3V	≤ ± 75	CMOS	Have	SCX020AGOMDHIT	SCX020AGOMDHIT-G	1、 8、 10、 14. 7456、 16、 20、 22. 1184、 25、 27、 30、 33、 40、 48、 50、 66、 66. 66、 100、 125
		2. 5V	≤ ± 75	CMOS	Have	SCX020AGOMDHKT	SCX020AGOMDHKT-G	25
		1. 8V	≤ ± 75	CMOS	Have	SCX020AGOMDHLT	SCX020AG□MDHLT-G	25、 48、 50、 66. 66、 80
Structure Code: 2 0 A			 Recommended pad size (mm) External dimensions (mm) (Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)					

Product Specifications for the Shelf

Range of models	Working temperature	Voltage		Discharge waveform	Three-state control	Model (Mouth as frequency point)	National production model (□(For frequency points))	Shelf frequency/MHz
SCX019E	-55℃ ~ +85℃	3.3V	$\leq \pm 50$	CMOS	Have	SCX019E□MCHIT	SCX019E□MCHIT-G	10059、11.0592、24、25、 28.636、30、48、50、100、 125
		2.5V	$\leq \pm 50$	CMOS	Have	SCX019E□MCHKT	SCX019E□MCHKT-G	30
Scx019G	-55℃ ~ +125℃	3.3V	$\leq \pm 75$	CMOS	Have	SCX019G□MDHIT	ScX019G□MDHIT-G	10.059、11.0592、24、25、 28.636、30、48、50、100、 125
Structure Code: 1 9			 Recommended pad size (mm) Outline dimension (mm) (Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)					

Product Features and Application

- ◎ High reliability, resistant to vibration and impact;
- ◎ Differential signal output with low phase jitter;
- ◎ It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specifications: Q/TD50001-2022 "Detailed Specification for ZA520(SCXO23) Type Quartz Crystal Oscillator"

Q/TD20209-2011 "Detailed Specification for SCXO23 Type Quartz Crystal Oscillator (For Airborne Applications)"

Q/TD20229-2012 "Detailed Specification for SCXO23G Type Quartz Crystal Oscillator (For Airborne Applications)"

Q/TD20316-2016 "Detailed Specification for SCXO23 Type Quartz Crystal Oscillator (For Missile Systems)"

Q/TD50003-2022 "Detailed Specification for ZA522(SCXO24) Type Quartz Crystal Oscillator"

Q/TD20340-2018 "Detailed Specification for SCXO24 Type Quartz Crystal Oscillator (For Airborne Applications)"

Quality Grade: Military Grade(B), Standard Military Grade, Military Temperature Grade, Industrial Grade

Technical Specifications

◎ Electrical performance parameters

Parameter Name		Characteristic
Frequency range		50~250MHz
Typical frequency (MHz)		50、75、100、106.25、125、156.25、159.375、171.875、200、212.5、250
Supply voltage		2.5V/3.3V
Frequency stability	VS. temperature	Frequency and Temperature Stability Table
Trig Input Go Out	E: PECL	Rising/falling edge
	V: LVDS	
	C: HCSL	Duty Cycle
Current		LVDS/HCSL: 90mA(Max)
		PECL: 100mA(Max)
Operating temperature range		Frequency and Temperature Stability Table
Three-state control		T: Yes; N: No; T1: 1-pin tri-state control; T2: 2-pin tri-state control;
RMS phase jitter		0.6ps(Max)(12KHz~20MHz)
Storage temperature range		-55℃~+125℃
Packaging size		Refer to the external dimensions diagram

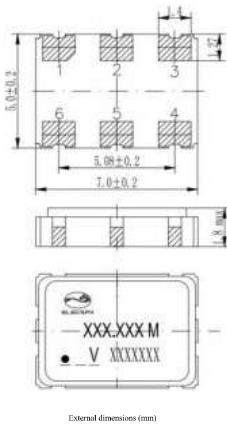
◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	A(±30)	B(±50)	C(±100)
D-40℃~+85℃	●	●	●
E-55℃~+85℃	-	●	●
H-55℃~+105℃	-	* custom made	●
G-55℃~+125℃	-	* custom made	●

Order Instructions

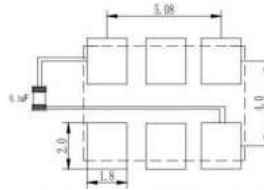
Model	SCX0	23	G	100M	C	V		T1	-G	-D	-J
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Three States Control	National production label	Apply Environment	Quality, etc. Level
	Conventional crystal oscillator	23: (SMD7050 differential) 24: (SMD5032 differential) 25: (SMD3225 differential)	D: $-40^{\circ}\sim+85^{\circ}\text{C}$ E: $-55^{\circ}\sim+85^{\circ}\text{C}$ H: $-55^{\circ}\sim+105^{\circ}\text{C}$ G: $-55^{\circ}\sim+125^{\circ}\text{C}$	100M means 100MHz	A: $\pm 30\text{ppm}$ B: 50ppm C: $\pm 100\text{ppm}$	E: PECL V: LVDS C: HCSL	I: $+33\text{V}$ K: $+25\text{V}$	T1: 1 foot Control T2: 2 pins Control N: not have	No localization ZZKK – Class C) G: Fully domestically produced (ZZKK – Grade A)	Inorganic airborne For use on vehicles/ships /Ground, etc. D: Single arrow load	None: Military level (B) J: Standard Army Class C: Military-grade industrial temperature

External dimensions and structural code



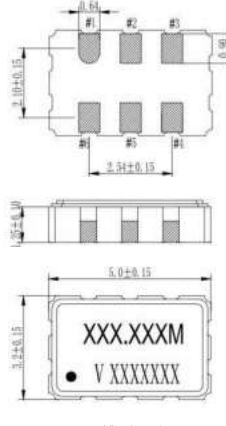
External dimensions (mm)

Pin number	Pin Function
1	Three-state control/Suspended state
2	Hang in the air
3	The earth
4	Output
5	Output
6	Source



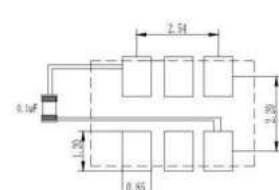
Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 6 of the crystal oscillator.)



External dimensions (mm)

Pin number	Pin Function
1	Three-state control/Suspended state
2	Hang in the air
3	The earth
4	Output
5	Output
6	Source

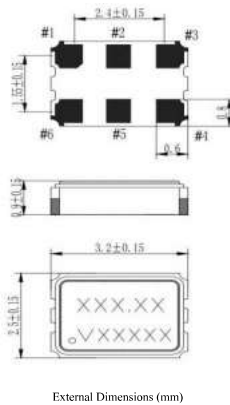


Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 6 of the crystal oscillator.)

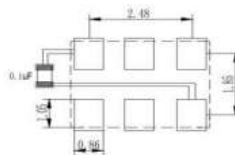
Structure Code: 23

Structure Code: 24



External Dimensions (mm)

Pin number	Pin Function
1	Three-state control/Suspended state
2	Hang in the air
3	The earth
4	Output
5	Output
6	Source



Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 6 of the crystal oscillator.)

Structure Code: 25

Product Features and Applications/Features

- ◎Extremely wide operating temperature range: -55°C to 105°C;
- ◎High-frequency temperature stability: ± 0.1 ppm;
- ◎Widely applicable in 5G communications, military missile systems, airborne applications, and related fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Corporate Standards: Q/TD20299A-2021 "Detailed Specification for Surface-Mount Temperature-Tuned Crystal Oscillators (For Aircraft Applications)", Q/TD 20304A-2021 "Detailed Specification for Surface-Mount Temperature-Tuned Crystal Oscillators (For Missile Systems)", Q/TD50008-2023 "Detailed Specification for ZC543 (STXO25D) Type Quartz Crystal Oscillator".

Quality grade: Military-grade (B), Military temperature grade, Industrial-grade

Technical Specifications

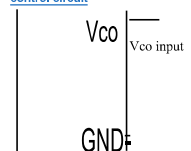
◎Electrical performance parameters

Parameter Name			Characteristic
Frequency range			5~52MHz
Typical frequency (MHz)			10、12.8、16.384、19.2、20、38.88、40
Supply voltage			3.3V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	S: quasi-sine-wave	Output level	Vpp≥0.8V
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise (20 MHz)			≤-140dBc/Hz@1kHz
			≤-150dBc/Hz@100kHz
Frequency Voltage Control			N: None V: Yes
			Range of adjustment: ≥±3 ppm (customizable)
Age-related aging			±1ppm/y
Current			20mA (Max)
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+125℃
Packaging size			Refer to the external dimensions diagram

◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)				
	R(± 0.1)	J(± 0.14)	K(± 0.28)	A(± 0.5)	B(± 1.0)
D-40°C~+85°C	*custom made	●	●	●	●
E-55°C~+85°C	1	1	*custom made	●	●
K-40°C~+105°C	1	1	*custom made	●	●
H-55°C~+105°C	1	1	*custom made	●	●

Reference method for voltage control circuit



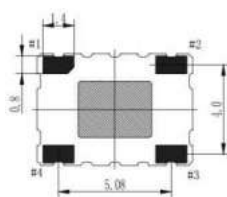
External voltage

Note: The voltage control end has no built-in bias; the voltage control voltage must be adjusted to the center voltage (1.5 V) position.

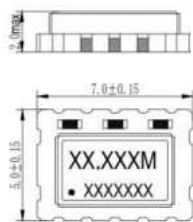
Order Instructions

Model	STX0	25D	K	10M	K	H	I	N	-D	-C
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Frequency Voltage Control	Apply Environment	Quality, etc. Level
	Warning and Testifying Crystal Oscillator	(SMD7050) 25D:H=2.0mm 25E:H=2.1mm 25F:H=1.6mm	D: -40~+85℃ E: -55~+85℃ K: -40~+105℃ H: -55~+105℃	10 MHz equals 10 MHz	R: ±0.1ppm J: ±0.14ppm K: ±0.28ppm A: ±0.5ppm B: ±1.0ppm	S: Nearly correct Sinusoidal Wave H: square wave	H: +5V I: +3.3V	V: Pressure-controlled N: No pressure control	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier	None: Military Level (B) C: Military temperature / industry Level

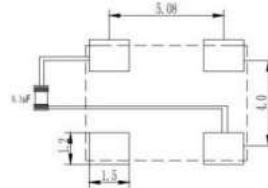
External dimensions and structural code



Pin number	Pin Function
1	Suspended Pressure-controlled
2	The earth
3	Output
4	source

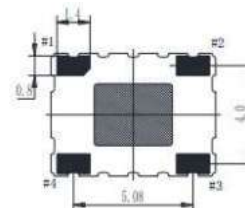


External dimensions (mm)

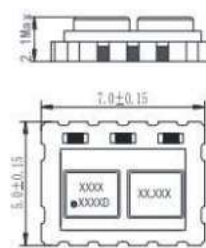


Recommended pad size (mm)

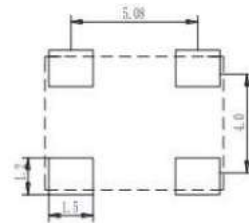
(Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)



Reference number	Pin Function
1	Voltage Control
2	The earth
3	Output
4	source

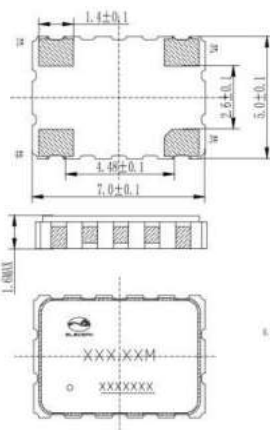


External dimensions(mm)

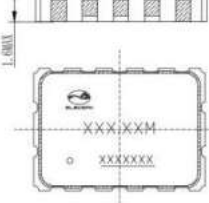


Recommended pad size (mm)

Structure Code: 25D



Pin number	Pin Function
1	Suspended Pressure-controlled
2	The earth
3	Output
4	source



Recommended pad size (mm)

External dimensions(mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)

Structure Code: 25E

Structure Code: 25F

Product Features and Applications/Features

- ◎Wide frequency coverage range of 52~200 MHz;
- ◎SMD ceramic-metal packaging, compact in size;
- ◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specifications: Q/TD20299A-2021 "Detailed Specification for Surface-Mount Thermosensitive Crystal Oscillators (For Airborne Applications)" and Q/TD20304A-2021 "Detailed Specification for Surface-Mount Thermosensitive Crystal Oscillators (For Missile Systems)"

Quality grade: Military-grade (B), Military temperature grade, Industrial-grade

Technical Specifications

◎Electrical performance parameters

Parameter Name		Characteristic
Frequency range		52~200MHz
Typical frequency (MHz)		60、80、80、100、120、200
Supply voltage		3.3V
Frequency stability	VS. temperature	Frequency and Temperature Stability Table
Output	H:TTL/HCMOS	上升/下降沿 $\leq 6\text{ns}$ ($f_o \geq 5\text{MHz}$)
	Duty Cycle	$50\% \pm 5\%$
Phase noise ($f_o = 100\text{MHz}$)		$\leq -110\text{dBc/Hz@1kHz}$
Frequency Voltage Control		N: None V: Yes
		Range of adjustment: $\geq \pm 3\text{ppm}$ (customizable)
Age-related aging		$\pm 0.5\text{ppm/y} \sim \pm 2\text{ppm/y}$
Current		50mA (Max)
Operating temperature range		Frequency and Temperature Stability Table
Storage temperature range		$-55^\circ\text{C} \sim +125^\circ\text{C}$
Packaging size		Refer to the external dimensions diagram

◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	K(± 0.28)	A(± 0.5)	B(± 1.0)
D- $-40^\circ\text{C} \sim +85^\circ\text{C}$	*custom made	●	●
E- $-55^\circ\text{C} \sim +85^\circ\text{C}$	1	*custom made	●
K- $-40^\circ\text{C} \sim +105^\circ\text{C}$	1	*custom made	●
H- $-55^\circ\text{C} \sim +105^\circ\text{C}$	1	*custom made	●

Reference connection method for the voltage control circuit

Vco Vco Input

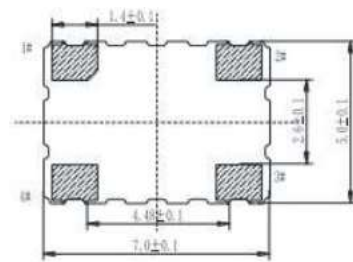
GND External voltage

Note: The voltage control terminal has no built-in bias; the voltage control voltage must be adjusted to the center voltage (1.5 V).

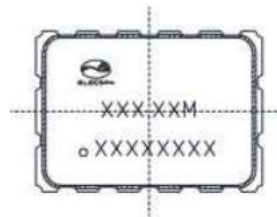
Order Instructions

Model	STX0	26C	D	100M	A	H	I	N	-D	-C
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Frequency Voltage Control	Apply Environment	Quality grade
	Warning and Timing Crystal Oscillator	SMD7050 Broadband	D: -40~+85℃ E: -55~+85℃ K: -40~105℃ H: -55~105℃	100 M, which is 100 MHz	K: ± 0.28 ppm A: ± 0.5 ppm B: ± 1.0 ppm	H: square wave	I: +3.3V	V: Pressure-controlled N: No pressure control	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier	None: Military level (B) C: Military temperature/ Industrial Industry Level

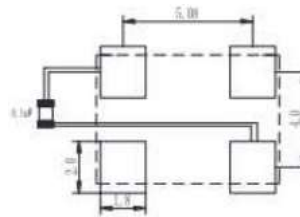
External dimensions and structural code



Pin number	Pin Function
1	Suspend/Pressure-controlled
2	The earth
3	Output
4	source



outline dimension (mm)



Recommended pad size (mm)

(Note: The 0.1 μ F capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)

Structure code: 26C

Product Features and Applications/Features

- ◎ High reliability, resistant to vibration and impact;
- ◎ SMD ceramic-metal packaging, compact in size;
- ◎ It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Standards/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specifications: Q/TD20299A-2021 "Detailed Specification for Surface-Mount Thermosensitive Crystal Oscillators (For Airborne Applications)" and Q/TD20304A-2021 "Detailed Specification for Surface-Mount Thermosensitive Crystal Oscillators (For Missile Systems)"

Quality grade: Military-grade (B), Military temperature grade, Industrial-grade

Technical Specifications

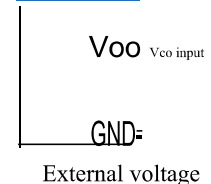
◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			5~52MHz
Typical frequency (MHz)			10、12.8、13、19.2、20、25、26、30、40、50
Supply voltage			3.3V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	S: quasi-sine-wave	Output level	Vpp≥0.8V
	H: CMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise (20 MHz)			≤-130dBc/Hz@1kHz
Frequency Voltage Control			N: None V: Yes
			Range of adjustment: ≥±3 ppm (customizable)
Age-related aging			±0.5ppm/y~±2ppm/y
Current			10mA (Max)
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+125℃
Packaging size			Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)				
	R(± 0.1)	J(± 0.14)	K(± 0.28)	A(± 0.5)	B(± 1.0)
D- $-40^{\circ}C \sim +85^{\circ}C$	*custom made	●	●	●	●
E- $-55^{\circ}C \sim +85^{\circ}C$	1	*custom made	●	●	●
K- $-40^{\circ}C \sim +105^{\circ}C$	1	*custom made	●	●	●
H- $-55^{\circ}C \sim +105^{\circ}C$	1	1	*custom made	●	●

Reference connection method for the voltage control circuit

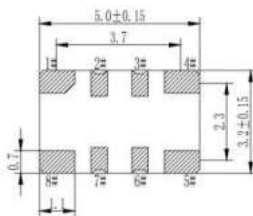


Note: The voltage control terminal has no built-in bias; the voltage control voltage must be adjusted to the center voltage (1.5 V).

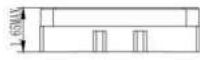
Order Instructions

Model	STX0	27A	D	10M	A	H		N	-D	-C
	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Frequency Voltage Control	Application environment	Quality grade
Meaning explanation	Warning and Tuning Crystal Oscillator	(SMD5032) 27A: (H=1.65 mm) 27C: (H=1.4 mm)	D: -40~+85℃ E: -55~+85℃ K: -40~+105℃ H: -55~+105℃	10M means 10MHz Z	R: ±0.1ppm J: ±0.14ppm K: ±0.28ppm A: ±0.5ppm B: ±1.0ppm	S: Nearly correct Chord H: square wave	H: +5.0V I: +3.3V	V: Pressure-controlled N: No pressure control	Inorganic airborne/vehicle-mounted/ Carrier-borne / Ground and other surfaces D: Arrow Carrier	None: Military level (B) C: Military-grade/ Industrial-grade temperature

External dimensions and structural code

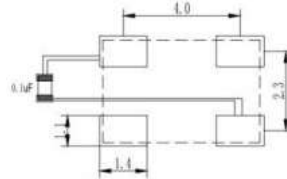


Pin number	Pin Function
1	Voltage Control/Suspended
2, 3, 6, 7	Hang in the air
4	The earth
5	Output
8	Source



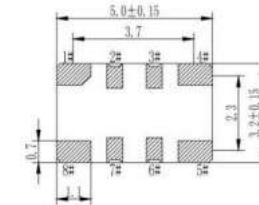
XX.XXXM
0XXXXXXXXXX

External dimensions (mm)

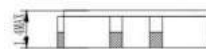


Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 8 of the crystal oscillator.)

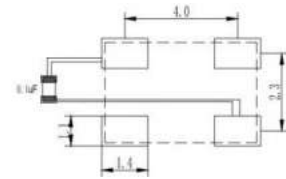


Pin number	Pin Function
1	Voltage Control/Suspended
2, 3, 6, 7	Hang in the air
4	The earth
5	Output
8	Source



XX.XXXM

External dimensions (mm)



Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 8 of the crystal oscillator.)

Structure Code: 27A

Structure code: 27C

Product Features and Applications/Features

- ◎Low phase noise: optimal ≤ -150 dBc/Hz at 1 kHz;
- ◎High frequency stability: 10^{-6} to 10^{-7} ;
- ◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based Thermally Compensated Quartz Crystal Oscillators"; Q/TD20127B-2016 "Product Specification for Thermally Compensated Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

Output

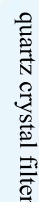
Parameter Name	Characteristic
Frequency range	10~125MHz
Typical frequency (MHz)	10、40、50、80、100、120
Supply voltage	3. 3V/5V
Frequency stability	vs. temperature
Output power	Frequency and Temperature Stability Table
Sinusoidal wave	Harmonic distortion clutter
上升/下降沿	TTL/HCMOS
Duty Cycle	
Phase noise (100 MHz)	
Age-related aging	
Current	
Operating temperature range	Frequency and Temperature Stability Table
Storage temperature range	
Frequency Adjustment	
Packaging size	

◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A (± 0.28)	B (± 0.5)	C (± 1)	D (± 2)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●	●
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made		●	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	* custom made		●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$		●	●	

quartz-crystal filter

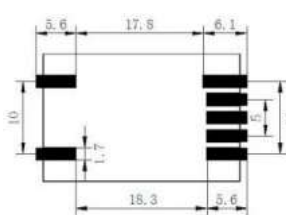
Quartz crystal oscillator



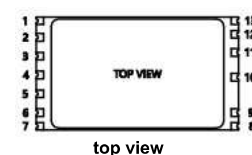
Electrical frequency-damping filter

Mechanical Filter

Clock and Signal Processing Chips



Recommended pad size

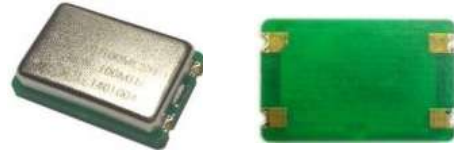


Recommended pad size

Structure code: 12D (* Manual welding recommended)

Product Features and Applications/Features

- ◎ Surface-mount structure, compatible with DIP14 pins;
- ◎ Low phase noise: optimal ≤ -150 dBc/Hz at 1 kHz;
- ◎ High frequency stability: 10^6 to 10^7 ;
- ◎ It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20288-2015 "Product Specification for STXO13 Series Quartz Crystal Oscillators"

Quality Grade: Military Grade (B)

Technical Specifications

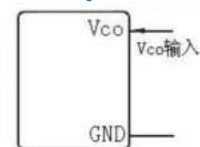
◎ Electrical Performance Parameters

Parameter Name		characteristic
Frequency range		$10^{\sim}125$ MHz
Typical frequency (MHz)		10、40、50、80、100、120
Supply voltage		3.3V/5V
Frequency stability	VS. temperature	Frequency and Temperature Stability Table
Output power		≥ 5 dBm (customizable)
Sinusoidal wave	Harmonic distortion	≤ -25 dBc
	Clutter	≤ -70 dBc
	上升/下降沿	≤ 6 ns
TTL/HCMOS	Occupancy Ratio	$50\% \pm 5\%$
Phase noise (100 MHz)		≤ -145 dBc/Hz@1kHz
		≤ -160 dBc/Hz@100kHz
Age-related Aging		$\leq \pm 1$ ppm
Current		30mA (Max)
Operating temperature range		Frequency and Temperature Stability Table
Storage temperature range		$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency Adjustment		$\geq \pm 2$ ppm (customizable)
Packaging size		Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

Frequency and Temperature Stability (ppm)				
Temperature range	A (± 0.28)	B (± 0.5)	C (± 1)	D (± 2)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	●
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●	●
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	* custom made	●	●	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	* custom made	●	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●		●	●

Reference connection method for the voltage control circuit

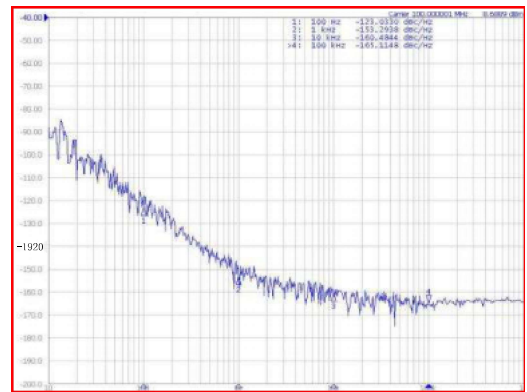


External voltage

Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz) (typical value at 100 MHz)				
	A	B	C	D	F
1kHz	-135	-140	-145	-150	*custom made
10kHz	-145	-150	-155	-160	
100kHz	-150	-155	-160	-165	

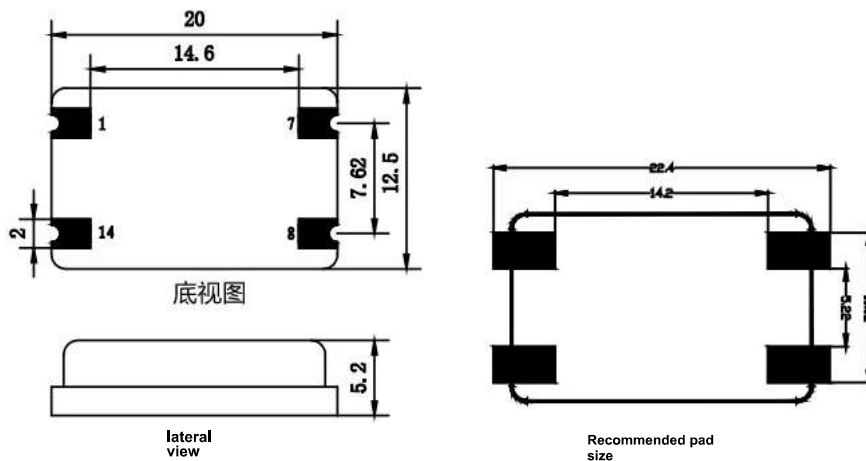


Typical phase noise curve for a 100 MHz crystal oscillator

Order Instructions

Model	STX0	13	D	100M	C	S	H	B	-G	-D
Meaning Explain	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Phase Noise	Domestication logo	Apply Environment
	Warning and Temifying Crystal Oscillator	(20*12.5)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±0.28ppm B: ±0.5ppm C: ±1ppm D: ±2ppm	S: Sine wave H: Square wave	H: +5V I: +3.3V	Phase detection Noise Table	None: No Fully domestically produced G: Fully domestically produced	None: Onboard Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

External dimensions and structural code



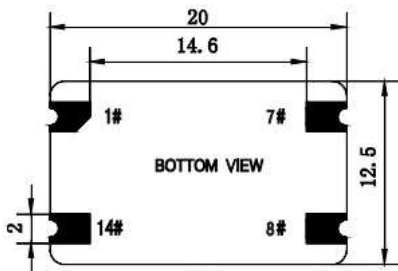
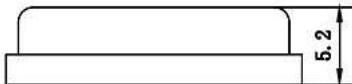
1.7. Voltage Control 8. Ground 14. Output 15. Power Supply

Structure code: 13 (*Recommended manual welding)

Recommend products

Low-phase noise temperature crystal oscillator

Product Name: Low-Phase Noise Temperature Crystal Oscillator Product model: STXO13D100MCSHB

Technical Indicator Items		Specification Requirements	
Nominal frequency		☒ 100MHz	Other recommended frequencies 60MHz、80MHz、120MHz
Outline dimension		20×12.5×5.2mm ³	Product weight □5g (Max)
Temperature range		Working temperature	☒ -40℃~+85℃
		Storage temperature	☒ -55℃~+85℃
Quality grade		Military-grade (B), implementation specification: "STXO13 Series Quartz Crystal Oscillator Product Specification" Q/TD20288-2015	
		-D Military-grade (B), Implementation specification: "STXO13 Series Quartz Crystal Oscillator Product Specification" Q/TD20288-2015	
Supply voltage	5V±5%	Working Current	☒ ≤25mA
Output		Wave form	☒ sinusoidal wave
		Output power	☒ ≥7dBm (50ohm)
		Harmonic wave	☒ ≤-30dBc
		Clutter	☒ ≤-70dBc
Frequency accuracy		Initial accuracy at the reference temperature	☒ ≤±1.0ppm@25℃±2℃ vco=1.5V
Frequency stability		Frequency and Temperature Stability	☒ ≤±1.0ppm(-40℃~+85℃)
Frequency regulation		Frequency adjustment range	☒ ≥±3.0ppm @vco=0~3V
Phase noise (100 MHz)		☒ ≤-140dBc/Hz@1kHz; ☒ ≤-150dBc/Hz@10kHz	
Age		□≤±1 ppm/year	
外形 diagram and pin definition			
Pin number	Pin Function	 Bottom view  Top view  Lateral view	
1	Voltage Controlled/ Suspended (VCO/NC)		
7	Ground (GND)		
8	Output (OUT)		
14	Power Source (VCC)		
Note: The dot on the front of the crystal oscillator corresponds to Pin 1 (#1, voltage-controlled). Keep the crystal oscillator pin #1 (voltage-controlled) free when not in use.			
Remarks		1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection.□Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。	

Product Features and Applications/Features

◎High frequency stability: 10^{-6} to 10^{-7} ;

◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.

Quality Standards/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based 温補石英 Crystal Oscillators"

Q/TD20127B-2016 "Product Specification for Warm-Compensated Quartz Crystal Oscillators for Missile and Arrow Applications" Quality Grade: Military Grade (B)



Technical Specifications

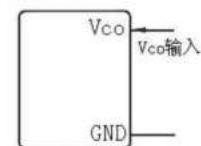
◎Electrical performance parameters

Parameter Name		Range
indput	Frequency Range Typical Frequency Point (MHz) Power Supply Voltage	10–125 MHz 10、40、50、80、100、120 3.3V/5V
	frequency stability	VS. Temperature, Output Power, Harmonic Distortion, Noise
	sinusoidal wave	The frequency and temperature stability table specifies a range of ≥ 5 dBm (customizable) to ≤ -25 dBc. ≤ -70 dBc
	TTL/HCMOS	上升/下降沿占空比 ≤ 6 ns $50\% \pm 5\%$
	Phase noise (100 MHz)	≤ -145 dBc/Hz@1kHz ≤ -160 dBc/Hz@100kHz $\pm$
Ageing current operating temperature range; Storage temperature range; Frequency adjustment; Packaging dimensions		0.5 ppm $\sim$ ± 2 ppm 25mA (Max) Frequency and Temperature Stability Table -55°C to +85°C with an accuracy of $\geq \pm 2$ ppm (customizable); refer to the dimensional specifications diagram.

◎Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)				
	M(± 0.1)	R(± 0.2)	A(± 0.28)	B(± 0.5)	C(± 1)
C-20°C ~ +70°C	●	●	●	●	●
D-40°C ~ +85°C	●	●	●	●	●
E-55°C ~ +85°C	1	* custom made	* custom made	●	●
F-40°C ~ +70°C	●			●	●

Reference connection method for the voltage control circuit



External voltage

Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

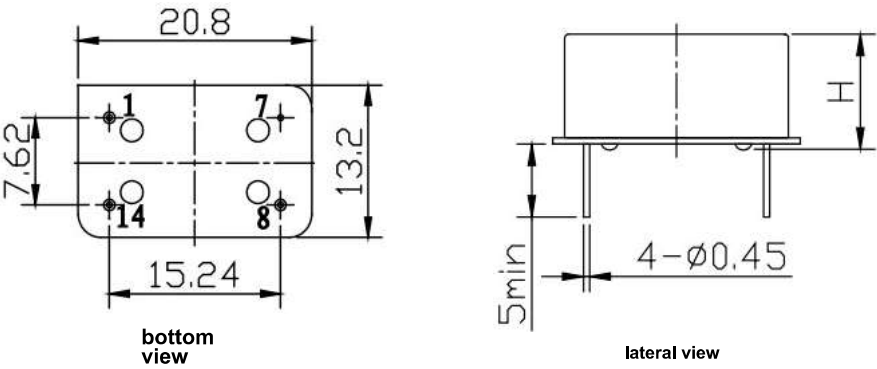
Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz) (typical value at 100 MHz)				
	A	B	C	D	F
1kHz	-135	-140	-145	-150	*custom made
10kHz	-145	-150	-155	-160	
100kHz	-150	-155	-160	-165	

Order Instructions

Model	STX0	15B	D	100M	C	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Warning and Tontifying Crystal Oscillator	(DIP14) 15A: (H=8) 15B: (H=10)	C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M, which is 100 MHz	M: ±0.1ppm R: ±0.2ppm A: ±0.28ppm B: ±0.5ppm C: ±1ppm	S: the first month of the lunar year Sinusoidal Wave H: Fang Wave	H: +5V I: +3.3V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

External dimensions and structural code



1. Voltage Control 7. Ground 8. Output 14. Power Supply

Structural code: 15A(H=8)/15B (H=10)

Product Features and Applications/Features

- ◎ Ultra-small surface-mount structure SMD: 14×9×5 mm³;
- ◎ The frequency range is wide, from 0.2 to 200 MHz.
- ◎ It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based Thermally Compensated Quartz Crystal Oscillators"; Q/TD20127B-2016 "Product Specification for Thermally Compensated Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Output	Parameter Name		Characteristic
	Frequency range		0.2~200MHz
	Typical frequency (MHz)		10、21.4、25、40、100
	Supply voltage		3.3V/5V
	Frequency stability	VS. temperature	The frequency and temperature stability table shows a value of ≥ 5 dBm (customizable).
	Output power		
	Sinusoidal wave	Harmonic distortion clutter	≤ -30 dBc ≤ -70 dBc
	上升/下降沿	TTL/HCMOS	≤ 6 ns
	Duty Cycle		50%±5%
	Phase noise (40 MHz)		≤ -135 dBc/Hz@1kHz
	Age-related aging		
	Current		$\leq \pm 1$ ppm 30mA (Max)
	Operating temperature range		Frequency and Temperature Stability Table
	Storage temperature range		-55℃~+85℃
	Frequency Adjustment		$\geq \pm 2$ ppm (customizable); refer to the dimensional diagram.
	Packaging size		

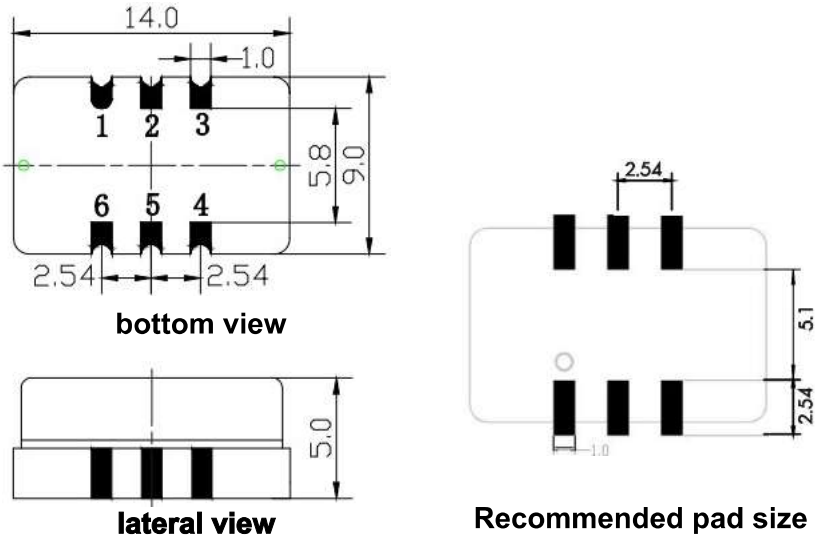
◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)				Reference connection method for the voltage control circuit
	A (±0.28)	B (±0.5)	C (±1)	D (±2)	
A 0℃~+50℃	●	●	●		V _{co}
B -10℃~+60℃	●	●	●	●	V _{co} import
C -20℃~+70℃	●		●	●	GND
age D: 40℃ to +85℃	●	●	●	●	External volt-
E -55℃~+85℃	1	*Customized	●		
● Note: The voltage control terminal is equipped with a built-in bias voltage. No frequency calibration is required for F-40℃ to +70℃ ● In this case, keep the voltage control input terminal free.					

Order Instructions

Model	STX0	16	D	100M	C	S	H	-G	1 D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Warming and Tonifying Crystal Oscillator	(14*9*5)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	1 0 0 M, which is 100 MHz	A: ±0. 28ppm B: ±0. 5ppm C: ± 1ppm D: ±2ppm	S: Sine wave H: Square wave	H: +5V I: +3. 3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airborne/ Vehicle-mounted/ For shipboard/ ground use, etc. D: Arrow Carrier

External dimensions and structural code



Structure code: 16 (*Recommended manual welding)

10 Isothermal Crystal Oscillator SOXO13A13B/13C

Product Features and Applications/Features

© Ultra-low phase noise: optimal ≤ -178 dBc/Hz at 100 kHz;

© Ultra-low short-term stability: $2E-13/1s$;

© It is widely applicable in military and civilian communications, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129 B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

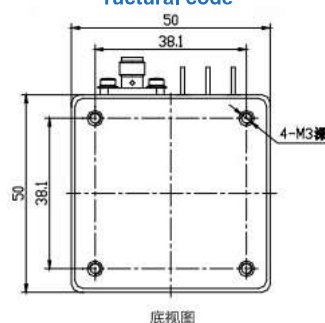
Quality Grade: Military Grade (B)

Technical Specifications

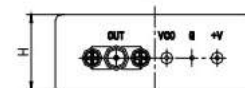
© Electrical performance parameters

Parameter Name		Characteristic	
Frequency range		10~200MHz	
Typical frequency (MHz)		10、40、80、100、120	
Supply voltage		12V/15V	
Frequency stability	VS. temperature	Frequency and Temperature Stability Table	
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
Phase noise		Phase Noise Meter	
Age-related aging		±0. 05ppm~±0. 5ppm	
Power consumption (on/off/stable)		6W/3W (Max) @25℃	
Operating temperature range		Frequency and Temperature Stability Table	
Storage temperature range		-55℃~+85℃	
Frequency Adjustment		≥±1 ppm (customizable)	
Packaging size		Refer to the external dimensions diagram	

External dimensions and structural code



底视图



lateral view

Structural code: 13A(H=16)/13B (H=19)/13C (H=25)

© Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppb) (10): $f_0 < 40$ MHz				
	S(± 0.5)	A(± 1)	B(± 5)	C(± 10)	D(± 50)
C- $20^{\circ}\text{C} \sim +70^{\circ}\text{C}$		●		●	
D- $40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●	●	●
E- $55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	●	●	●	●
F- $40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	*custom made	●		●	●
Temperature range	Frequency and Temperature Stability (ppm) (10): $f_0 \geq 40$ MHz				
	S(± 0.005)	A(± 0.01)	B(± 0.05)	C(± 0.1)	D(± 0.5)
C- $20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	*custom made	●		●	●
D- $40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	*custom made	●	●
E- $55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	*custom made	*custom made	●
F- $40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	1	*custom made	●	●	

Reference connection method for the voltage control circuit

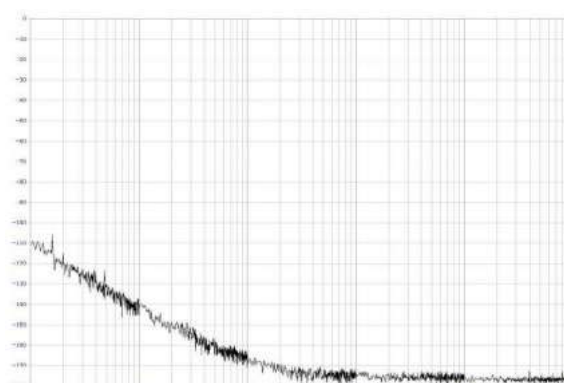
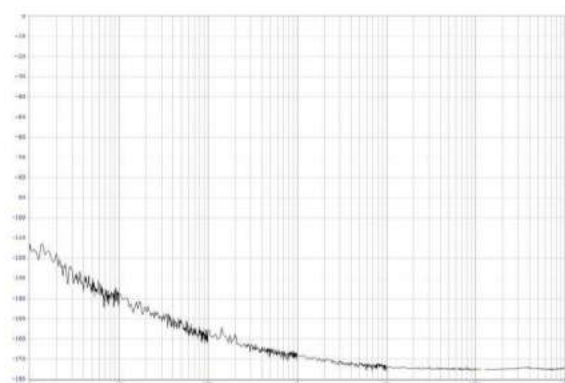
Vco Vco Input

GND
External voltage

Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)						
Deviation from the carrier frequency	C	D	U	S	L	F
1Hz	-100	-105	-110	-115	-118	*custom made
10Hz	-130	-135	-140	-143	-145	
100Hz	-150	-155	-156	-157	-158	
1kHz	-160	-165	-165	-165	-165	
10kHz	-165	-170	-170	-170	-170	
100kHz	-165	-170	-170	-170	-170	
Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)						
Deviation from the carrier frequency	C	D	U	S	L	F
10Hz	-95	-100	-105	-110	-113	*custom made
100Hz	-125	-130	-135	-140	-143	
1kHz	-155	-160	-165	-168	-168	
10kHz	-165	-170	-170	-175	-178	
100kHz	-165	-170	-175	-175	-178	



10 MHz Crystal Frequency Typical Phase Noise Curve

1,000 MHz Crystal Frequency Typical Phase Noise Curve

Order Instructions

Model	S0xo	13B	F	100M	D	S	G	U	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	(50#50) 13 A: (H=16) 13B: (H=19) 13C: (H=25)	C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	See the specific product specifications	S: sinusoidal wave	F: +15V G: +12V	See Phase Position Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Year

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -175 dBc/Hz at 100 kHz;
- ◎ High frequency stability: 10^{-7} to 10^{-9} ;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

Q/TD20129B-2016 "Constant-Temperature Quartz Crystal Oscillator for Missile and Arrow Applications"

Product

Specification Quality
Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

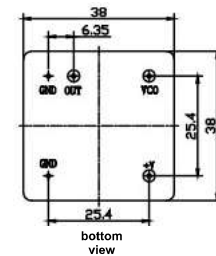
Parameter Name			Characteristic
Frequency range			5~200MHz
Typical frequency (MHz)			10、40、80、100、120
Supply voltage			5V/12V/15V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise			Phase Noise Meter
Age-related aging			±0.05ppm~±0.5ppm
Power consumption (stable on startup)			5W/2.5W (Max) @25℃
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+85℃
Frequency Adjustment			≥±1 ppm (customizable)
Packaging size			Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

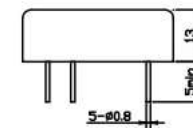
Temperature range	Frequency and Temperature Stability (ppm)				
	S(± 0.005) (< 40 MHz)	A(± 0.01)	B(± 0.05)	C(± 0.1)	D(± 0.5)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	●	●
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●	●	●
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●	●	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●	●	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$		●	●	●	●



External dimensions and structural code

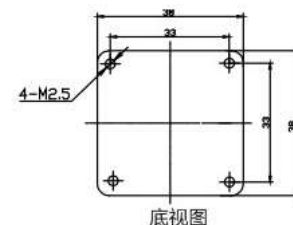


bottom view

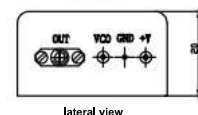


lateral view

Structure Code: 14A



底视图



lateral view

Structure Code: 14B

Reference connection method for the voltage control circuit

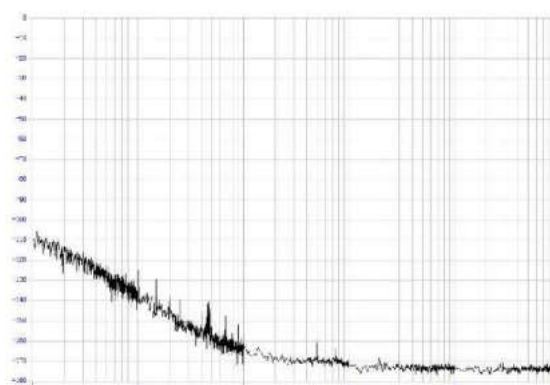
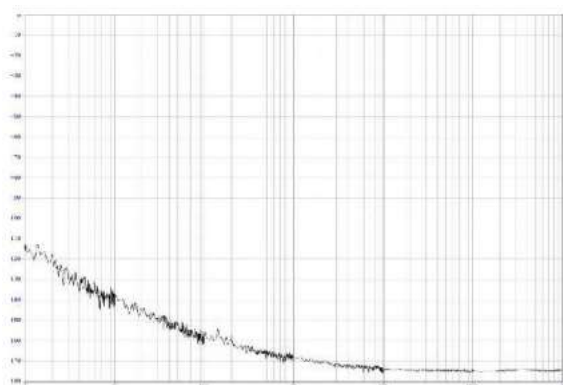
Vco Vco Input

GND External voltage

Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)					
	C	D	U	S	L	F
1Hz	-95	-100	-105	-110	-115	*custom made
10Hz	-125	-130	-135	-140	-143	
100Hz	-145	-150	-155	-156	-157	
1kHz	-155	-160	-165	-165	-165	
10kHz	-160	-165	-170	-170	-170	
100kHz	-160	-165	-170	-170	-170	
Deviation from the carrier frequency	Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)					
	C	D	U	S	L	F
10Hz	-90	-95	-100	-105	-110	*custom made
100Hz	-120	-125	-130	-135	-140	
1kHz	-150	-155	-160	-165	-165	
10kHz	-160	-165	-170	-172	-172	
100kHz	-160	-165	-170	-170	-170	



10 MHz Crystal Frequency Typical Phase Noise Curve

1,000 MHz Crystal Frequency Typical Phase Noise Curve

Order Instructions

Model	S0x0	14A	F	10M	A	S	G	U	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	14A: (38*38*13) 14B: (38*38*20)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	10 M equals 10 MHz	See the specific product specifications	S: Sine Wave H: square wave	F: +15V G: +12V H: +5V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -120 dBc/Hz at 1 Hz;
- ◎ High frequency stability: 10^{-7} to 10^{-9} ;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

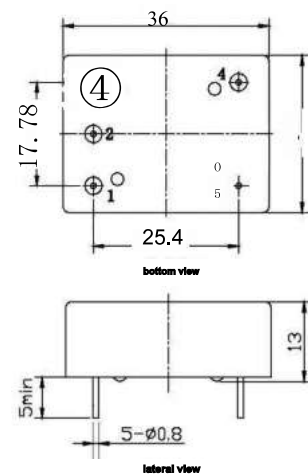
Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name		Characteristic
Output	Frequency Range: Typical Frequency (MHz)	5~200MHz 10、20、40、80、100 5V/12V/15V
	Supply voltage	
	Frequency stability	VS. Temperature Output Power
	Sinusoidal wave	Harmonic distortion noise
	TTL/HCMO	上升/下降沿
	S	Occupancy Ratio
	Phase noise aging	
	Power consumption (on/off/stable); Operating temperature range; Storage temperature range; Frequency adjustment;	
	Package size	

External dimensions and structural code



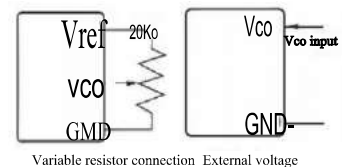
1. Voltage Control 2 Reference Voltage/Suspended
3. Power supply 5. Ground

Structure code: 15 (H=13)/15B (H=15)

◎ Frequency and Temperature Stability Table

Temperature range S (± 0.005) (<40MHz)		Frequency and Temperature Stability (ppm)			
		A (± 0.01)	B (± 0.05)	C (± 0.1)	D (± 0.5)
A0°C~+50°C	●	●	●	●	●
B-1°C~+60°C	●	●	●	●	●
C-2°C~+70°C	●	●	●	●	●
D-4°C~+85°C	* custom made	●	●	●	●
E-5°C~+85°C	* custom made	●	●	●	●
F-4°C~+70°C	●	●	●	●	●

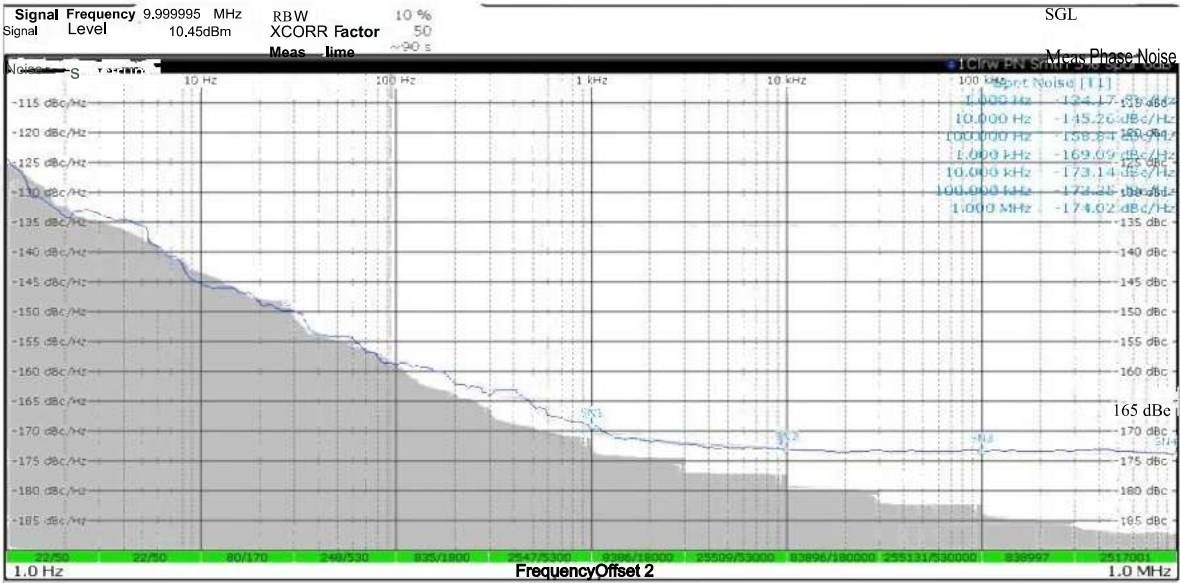
Reference connection method for the voltage control circuit



Note: The voltage control terminal already has built-in bias voltage. When no frequency calibration is required, keep the reference voltage terminal and voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)					
	C	D	U	S	L	F
1Hz	-95	-100	-105	-110	-115	*custom made
10Hz	-125	-130	-135	-140	-143	
100Hz	-145	-150	-155	-156	-157	
1kHz	-155	-160	-165	-165	-165	
10kHz	-160	-165	-170	-170	-170	
100kHz	-160	-165	-170	-170	-170	
Deviation from the carrier frequency	Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)					
	B	C	D	U	S	F
10Hz	-90	-95	-100	-100	-105	*custom made
100Hz	-120	-125	-130	-130	-135	
1kHz	-150	-155	-155	-160	-165	
10kHz	-160	-165	-165	-170	-172	
100kHz	-160	-165	-165	-170	-175	



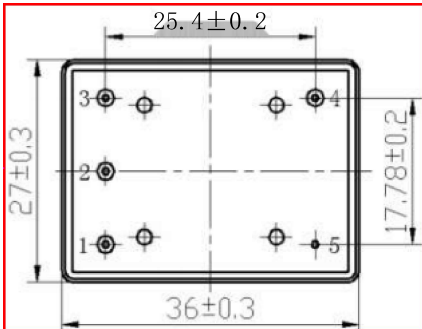
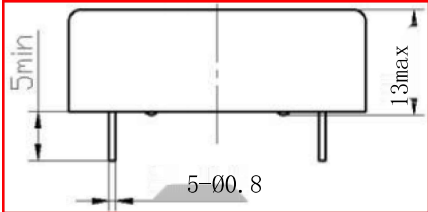
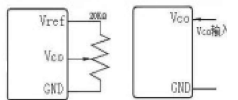
1 0 MHz: Ultra-Low Phase Noise; Typical Phase Noise Curve

Order Instructions

Model	8	15	F	10M	S	S	G	U	-G	-D
Meaning Explain	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	(36*27*13)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	1 0 M equals 10 MHz	See the specific product specifications	S: Sine wave H: Square wave	F: +15V G: +12V H: +5V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

Recommended Product (1) Low-Phase Noise Constant-Temperature Crystal Oscillator

Product Name: Low-Phase Noise Temperature-Stabilized Crystal Oscillator Product model: SOXO15F10MSSGU

Technical Indicator Items			Specification Requirements	
Typical Frequency		☒ 10MHz	Other recommended frequencies	10. 23MHz、20MHz
Outline dimension		36×27×13mm ³	Product weight	□30g (Max)
Temperature range		Working temperature	☒ -40℃~+70℃	
		Storage temperature	☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016		
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016		
Supply voltage	12V±5%	Working Current	Initial status	☒ ≤350mA (@25±2℃)
			Stable state	☒ ≤150mA (@25±2℃)
Output		Wave form	☒ sinusoidal wave	
		Output power	☒ ≥10dBm (50ohm)	
		Harmonic wave	☒ ≤-30dBc	
		Clutter	☒ ≤-80dBc	
Frequency accuracy		Initial accuracy at the reference temperature	☒ ≤±0. 05ppm (25℃±2℃)	
Frequency stability		Frequency and Temperature Stability	☒ ≤±5ppb (-40℃~+70℃)	
		Frequency and Voltage Stability	□≤±0.5 ppb (voltage variation ±5%)	
		Frequency Load Stability	□≤±0.5 ppb (load variation ±10%)	
		Short-term stability	□≤3×10 ^{-1 2} /1s	
Frequency regulation		Frequency adjustment range	☒ ≥±0. 5ppm (0~5V)	
Phase noise (10 MHz)		☒ ≤-105dBc/Hz@1Hz;	☒ ≤-135dBc/Hz@10Hz;	
		☒ ≤-155dBc/Hz@100Hz;	☒ ≤-165dBc/Hz@1kHz;	
		☒ ≤-170dBc/Hz@10kHz;	☒ ≤-170dBc/Hz@100kHz。	
Age		☒ ≤±0.5 ppb/day		
		□≤±0.05 ppm/year		
外形 diagram and pin definition				
Pin number	Pin Function		  Bottom view Lateral view	
1	VCO (Voltage Control)			
2	Reference Voltage/Suspended (VREF)			
3	Power Source (VCC)			
4	Output (RFOUT)			
5	Ground (GND)			
Voltage Control Circuit Reference Method  External variable resistor with external voltage input: The voltage control terminal has built-in bias, eliminating the need for frequency calibration.				
Remarks		1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. □Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。		

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

Electrical frequency modulation and hopping filter

Mechanical Filter

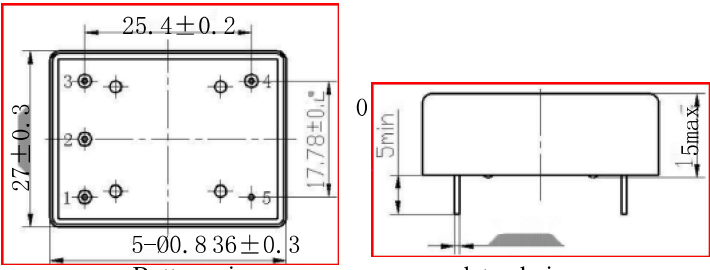
Clock and Signal Processing Chip

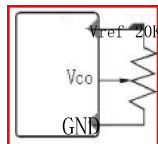
Recommended Product (2) Ultra-Low Phase Noise Constant Temperature Crystal Oscillator

Product Name: Ultra-low Phase Noise Constant-Temperature Crystal Oscillator 96X105BC10MASGF

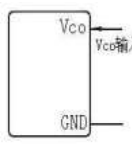
Technical Indicator Items				Specification Requirements	
Nominal frequency		10MHz		Product weight	☐ 30g (Max)
Outline dimension		36×27×15mm ³			
Temperature range		Working temperature		-20℃~+70℃	
		Storage temperature		-55℃~+85℃	
Quality grade		Military-grade (B), compliance standard: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
Supply voltage	12V±5%	Working Current	Initial status	☒ ≤400mA (@25±2℃)	
			Stable state	☒ ≤150mA (@25±2℃)	
Output	Wave form		☒ sinusoidal wave		
	Output power		☒ ≥7dBm (50ohm)		
	Harmonic wave		☒ ≤-30dBc		
	Clutter		☒ ≤-80dBc		
Frequency stability	Initial accuracy of the reference temperature		☐ ≤±0.05 ppm (@25℃ ± 2℃, VCO = 2.5 V ± 0.5 V, within 90 days after factory delivery)		
	Frequency and Temperature Stability		☒ ≤± 10ppb (-20℃ ~+70℃)		
	Short-term stability		☐ ≤1×10 ^{-1 2} /1s		
Frequency regulation		☒ ≥±0.3 ppm (VCO = 0 V~5 V; within 90 days after factory delivery, relative to the nominal frequency)			
Phase noise (10 MHz)		☒ ≤-120dBc/Hz@1Hz;		☒ ≤-145dBc/Hz@10Hz;	
		☒ ≤-157dBc/Hz@100Hz;		☒ ≤-165dBc/Hz@1kHz;	
		☒ ≤-166dBc/Hz@10kHz;		☒ ≤-167dBc/Hz@100kHz。	
Age		☒ ≤±0.5 ppb/day			
		☐ ≤±0.05 ppm/year			

外形 diagram and pin definition

Pin number	Pin Function		
1	VCO (Voltage Control)		
2	Reference voltage/float (VREF)		
3	Power Source (VCC)		
4	Output (RFOUT)		
5	Ground (GND)		



Variable resistor connection



External voltage

Reference connection method for the voltage control circuit:

- Note: 1. The voltage control terminal lacks built-in bias; frequency calibration of the input voltage must be performed during operation.
2. To ensure the noise specifications of the crystal oscillator output signal, provide a low-noise voltage input as much as possible, and **perform proper filtering on the supply voltages at the voltage control terminal and power supply terminal**;
3. The 外形 diagram specifies a tolerance of $\pm 0.5 \text{ mm}$, with the elevated insulating glass beads shown at a schematic position.

Remarks

- 1、☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance;
2、 $1\text{ppm}=1\text{E}-6$; $1\text{ppb}=1\text{E}-9$.
3、 This product is constructed using discrete components and features a non-sealed design, making it unsuitable for PIND tests, seal integrity testing, or internal gas composition analysis.

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -185 dBc/Hz at 100 kHz;
- ◎ High frequency stability: 10^{-7} to 10^{-9} ;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Isothermal Quartz Crystal Oscillators" Q/TD 20129B-2016 "Product Specification for Missile and Spearborne Isothermal Quartz Crystal Oscillators"

Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

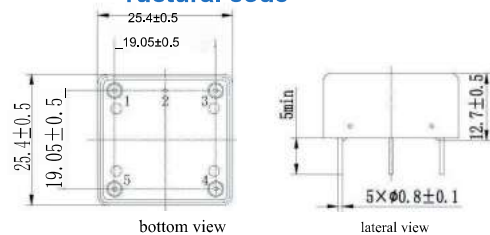
Parameter Name		Characteristic	
Frequency range		10~200MHz	
Typical frequency (MHz)		10、40、80、100、120	
Supply voltage		3. 3V/5V/12V/15V	
Frequency stability	VS. temperature	Frequency and Temperature Stability Table	
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise		Phase Noise Meter	
Age-related aging		±0. 05ppm~±0. 5ppm	
Power consumption (stable on startup)		3. 6W/1. 5W (Max)@25℃	
Operating temperature range		Frequency and Temperature Stability Table	
Storage temperature range		-55℃~+85℃	
Frequency Adjustment		≥±1 ppm (customizable)	
Packaging size		Refer to the external dimensions diagram	

◎Frequency and Temperature Stability Table

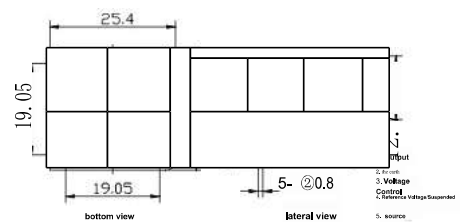
Temperature range	Frequency and Temperature Stability (ppm)						
	R (± 0.0005) (< 40 MHz)	H (± 0.001) (< 40 MHz)	S(± 0.005) (< 40 MHz)	A (± 0.01)	B (± 0.05)	C (± 0.1)	D (± 0.5)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	●	●	●	
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●	●	●	●	●
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●	●	●	●	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●	●	●	●	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$		●	●	●	●	●	●



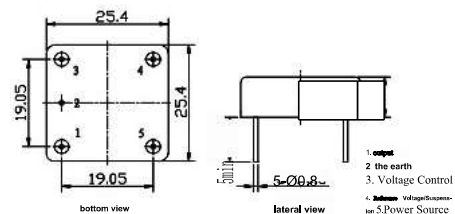
External dimensions and structural code



Structure Code: 16A



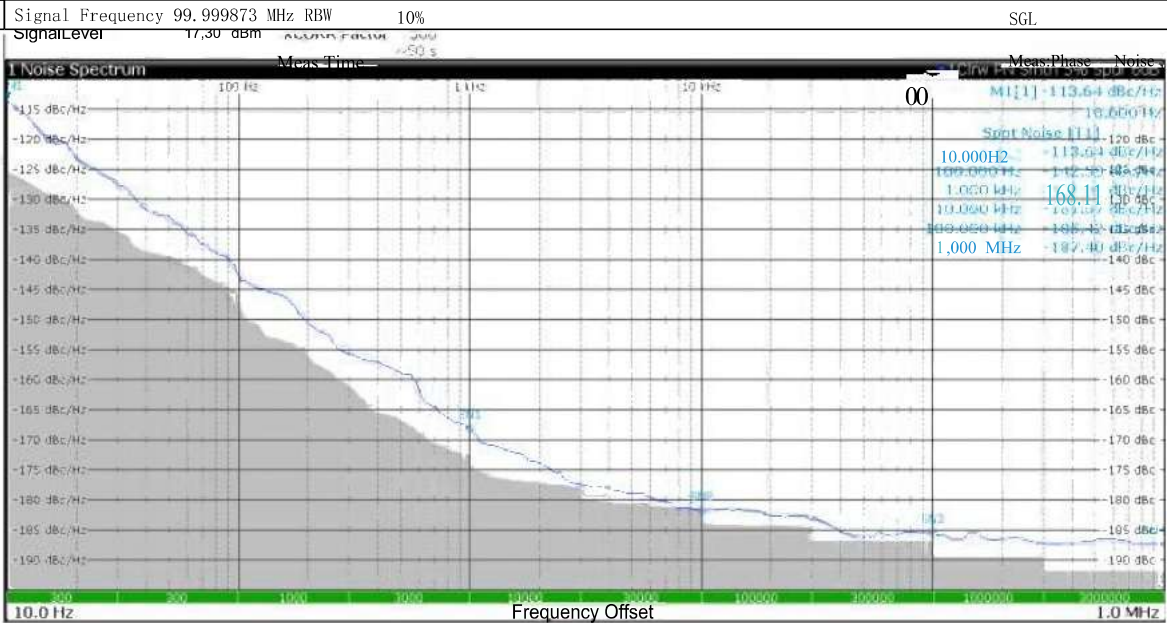
Structure Code: 16B



Structure code: 16C

Phase Noise Meter

Deviation from the carrier frequency		Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)					
		B	C	D	U	S	F
1Hz		-90	-95	-100	-105	-110	*custom made
10Hz		-120	-125	-130	-135	-140	
100Hz		-140	-145	-150	-155	-156	
1kHz		-150	-155	-160	-165	-165	
10kHz		-155	-160	-165	-170	-170	
100kHz		-155	-160	-165	-170	-170	
Deviation from the carrier frequency		Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)					
		B	C	D	U	S	F
10Hz		-90	-95	-100	-100	-105	*custom made
100Hz		-120	-125	-130	-130	-135	
1kHz		-150	-155	-155	-160	-165	
10kHz		-160	-165	-165	-170	-172	
100kHz		-160	-165	-165	-170	-175	
	Signal Frequency 99.999873 MHz RBW 10%	SGL					



1 0 0 MHz: Ultra-Low Phase Noise; Typical Phase Noise Curve

Order Instructions

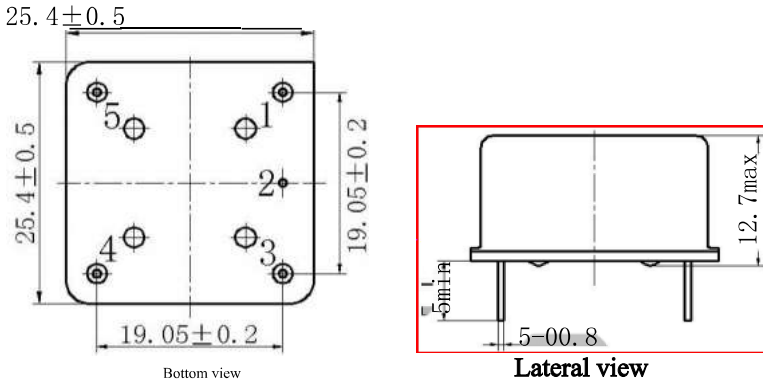
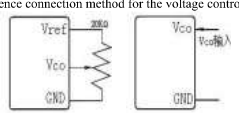
Model	SOX0	16B	F	100M	C	S	G	U	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Phase Noise	Domestic-ation logo	Apply Environment
	Thermostatic crystal oscillator	16A: (25. 4*25. 4*12. 7) 16B: (25. 4*25. 4*12. 7) 16C: (25. 4*25. 4*9)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	1 0 0 M, which is 100 MHz	See the specific product specifications	S: Sine wave H: Square wave	F: +15V G: +12V H: +5V I: +3. 3V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

Recommended Product (1) Low-Phase Noise Constant-Temperature Crystal Oscillator

Product Name: Low-Phase Noise Temperature Control Crystal Oscillator Product model: SOXO16BF100MCSGU

Technical Indicator Items				Specification Requirements	
Nominal frequency		☑100MHz		Other recommended frequencies	50MHz、80MHz、120MHz
Outline dimension		25.4×25.4×12.7mm ³		Product weight	☐20g (Max)
Temperature range		Working temperature		☑-40℃~+70℃	
		Storage temperature		☑-55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016			
Supply voltage	12V±5%	Working	Initial status	☑≤300mA (@25±2℃)	
		Current	Stable state	☑≤100mA (@25±2℃)	
Output		Wave form		☑sinusoidal wave	
		Output power		☑≥10dBm (50ohm)	
		Harmonic wave		☑≤-30dBc	
		Clutter		☑≤-80dBc	
Frequency accuracy		Initial accuracy at the reference temperature		☑≤±0.05ppm (25℃±2℃)	
Frequency stability		Frequency and Temperature Stability		☑≤±0.1ppm (-40℃~+70℃)	
		Frequency and Voltage Stability		☐≤±0.01 ppm (voltage variation ±5%)	
		Frequency Load Stability		☐≤±0.01 ppm (load variation ±10%)	
Frequency regulation		Frequency adjustment range		☑≥±1ppm (0~8V)	
Phase noise (100 MHz)		☑≤-100dBc/Hz@10Hz ;		☑≤-130dBc/Hz@100Hz ;	
		☑≤-160dBc/Hz@1kHz ;		☑≤-170dBc/Hz@10kHz ;	
		☑≤-170dBc/Hz@100kHz 。			
Age		☑≤+5 ppb/day			
		☐≤±0.3 ppm/year			

外形 diagram and pin definition

Pin number	Pin Function	
1	Output (RFOUT)	
2	Ground (GND)	
3	VCO (Voltage Control)	
4	Reference Voltage/Suspended (VREF)	
5	Source (VCC)	
Reference connection method for the voltage control circuit  External variable resistor; External voltage Note: The voltage control terminal has built-in bias, eliminating the need for frequency calibration.		Bottom view Lateral view
Remarks		1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

Electrical frequency modulation and hopping filter

Mechanical Filter

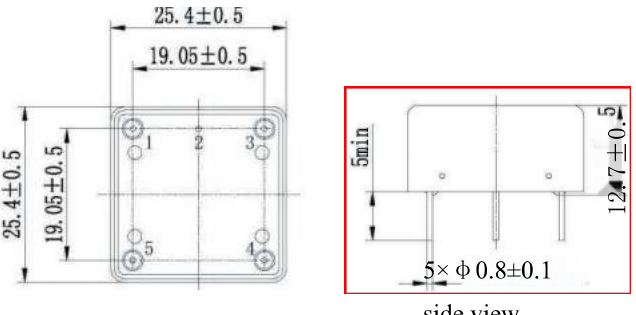
Clock and Signal Processing Chip

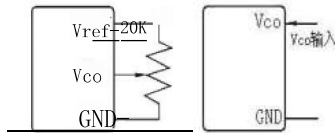
Recommended Product (2) Ultra-Low Phase Noise Constant Temperature Crystal Oscillator

Product Name: Ultra-low Phase Noise Constant-Temperature Quartz Crystal Oscillator Model: SDO-16A-F100MDSHF

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Product weight	☐ 30g (Max)
Outline dimension		25.4×25.4×12.7mm ³			
Temperature range		Working temperature		-40℃~+70℃	
		Storage temperature		-55℃~+85℃	
Quality grade		Military-grade (B), compliance standard: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
Supply voltage	5V±5%	Working Current	Initial status	☒ ≤800mA (@25±2℃)	
			Stable state	☒ ≤400mA (@25±2℃)	
Output	Wave form		☒ sinusoidal wave		
	Output power		☒ ≥15 dBm (load: 50 ohms)		
	Harmonic wave		☒ ≤-30dBc		
	Clutter		☒ ≤-80dBc		
	Reference voltage (Vref)		☐ 4.2±0.3 V (load current less than 1 mA)		
Frequency stability		Initial accuracy of the reference temperature		□≤±0.1 ppm at 25℃ ±2℃; VCO = 5 V ±2 V; valid for 90 days from factory delivery	
		Frequency and Temperature Stability		☒ ≤±0.5ppm (-40℃~+70℃)	
Frequency regulation		☒ ≥±0.5 ppm (OV~10V, within 90 days after factory delivery, relative to nominal frequency)			
Phase noise (100 MHz)		☒ ≤-105dBc/Hz@10Hz;		☒ ≤-138dBc/Hz@100Hz;	
		☒ ≤-165dBc/Hz@1kHz;		☒ ≤-180dBc/Hz@10kHz;	
		☒ ≤-185dBc/Hz@100kHz。		☒ ≤-185dBc/Hz@1MHz。	
Age		☒ ≤±5 ppb/day			
		☐ ≤±0.3 ppm/year			

外形 diagram and pin definition

Pin number	Pin Function	 Bottom view side view
1	Output (OUTPUT)	
2	Ground (GND)	
3	Voltage control voltage (Vco)	
4	Reference voltage/float (Vref)	
5	Power supply voltage (VCC)	



Reference connection method for the voltage control circuit:

Note: 1. The voltage control terminal lacks built-in bias; frequency calibration of the input voltage must be performed.

2. To ensure the noise specifications of the crystal oscillator output signal, provide a low-noise voltage input whenever possible, and implement effective filtering for the supply voltages at both the voltage control terminal and the power supply terminal.

3. The reference voltage terminal must not be grounded, as this could damage the crystal oscillator.

4. The外形 diagram specifies a tolerance of ±0.5 mm, with the elevated insulating glass beads shown at a schematic position.

Remarks

- 1、☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance;
- 2、1ppm=1E-6; 1ppb=1E-9。
- 3、This product is constructed using discrete components and features a non-sealed design, making it unsuitable for PIND tests, seal integrity testing, or internal gas composition analysis.

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -175 dBc/Hz at 100 kHz;
- ◎ High frequency stability: 10^{-7} to 10^{-9} ;
- ◎ It is widely applicable in military and civilian communications fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

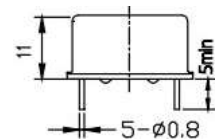
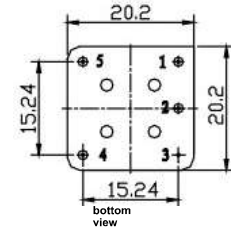
Parameter Name			Characteristic
Frequency range			10~200MHz
Typical frequency (MHz)			10、40、80、100、120
Supply voltage			3. 3V/5V/12V/15V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise			Phase Noise Meter
Age-related aging			±0. 05ppm~±0. 5ppm
Power consumption (on/off/stable)			3. 6W/1. 5W (Max) @25℃
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+85℃
Frequency Adjustment			≥±1 ppm (customizable)
Packaging size			Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

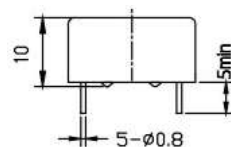
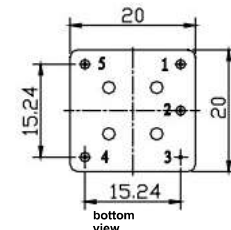
Temperature range	Frequency and Temperature Stability (ppm)					
	(±0001) (<40MH)	S (±0005) (<40M)	A (±001)	B (±0.05)	C(±0.1)	D (±0.5)
A0°C~+50°C	●	●	●	●	●	●
B-10°C~+60°C	●	●	●	●	●	●
C-20°C~+70°C	●	●	●	●	●	●
D-40°C~+85°C	*custom made	●	●	●	●	●
E-55°C~+85°C	*custom made	●	●	●	●	●
F-40°C~+70°C	●	●	●	●	●	●



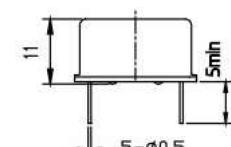
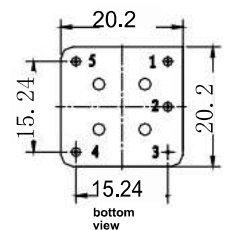
External dimensions and structural code



Side view 1. Voltage control 2. Reference voltage/ Suspended 3. Ground 4. Output 5. Power structure code: 17A



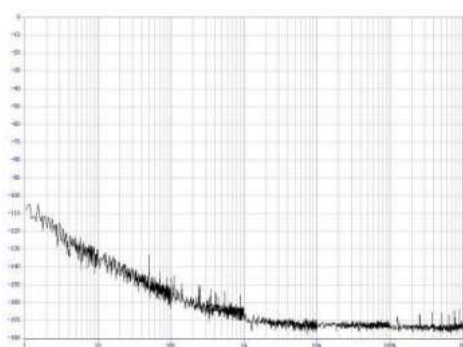
lateral view 1. Voltage Control 2. Reference Voltage/Suspended 3. Load 4. Output 5. Power Source Structure Code: 17B



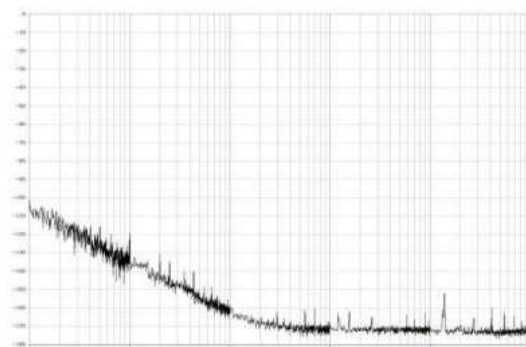
lateral view 1. Voltage Control 2. Reference Voltage/Suspended 4. Output 5. Power Supply Structure code: 17C

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)					F
	B	C	D	U		
1Hz	-90	-95	-100	-105		*custom made
10Hz	-120	-125	-130	-135		
100Hz	-140	-145	-150	-155		
1kHz	-150	-155	-160	-165		
10kHz	-155	-160	-165	-170		
100kHz	-155	-160	-165	-170		
Deviation from the carrier frequency	Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)					F
	B	C	D	U	S	
10Hz	-90	-95	-100	-100	-105	*custom made
100Hz	-120	-125	-130	-130	-135	
1kHz	-150	-155	-155	-160	-165	
10kHz	-160	-165	-165	-170	-172	
100kHz	-160	-165	-165	-170	-175	



10 MHz Crystal Frequency Typical Phase Noise Curve



1,000 MHz Crystal Frequency Typical Phase Noise Curve

Order Instructions

Model	S0xo	17A	F	100M	C	S	G	U	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency Temperature Stability	Output Wave form	Supply voltage	Phase noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	17A: (20. 2*20. 2*11) 00. 8 17B: (20*20*10) ϕ 0. 8 17C: (20. 2*20. 2*11) ϕ 0. 5	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100 M, which is 100 MHz	See the specific product specifications	S: Sine wave H: Square wave	F: +15V G: +12V H: +5V I: +3.3V	Phase Noise Meter	None: Not domestically produced G: Fully domestically produced	None: Machine Year / Vehicle / Carrier-borne / The earth's surface Class D: Arrow Arrow Carrier

Recommended Product: Low Phase Noise Temperature-Stabilized Crystal Oscillator

Product Name: Low-Phase Noise Temperature-Stabilized Crystal Oscillator Product model: SOXO17AF100MCSGU

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Other recommended frequencies	50MHz、80MHz、120MHz
Outline dimension		20×20×11mm ³		Product weight	☐ 20g (Max)
Temperature range		Working temperature		☒ -40℃~+70℃	
		Storage temperature		☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016			
Supply voltage	12V±5%	Working	Initial status	☒ ≤300mA (@25±2℃)	
		Current	Stable state	☒ ≤100mA (@25±2℃)	
Output		Wave form		☒ sinusoidal wave	
		Output power		☒ ≥10dBm (50ohm)	
		Harmonic wave		☒ ≤-30dBc	
		Clutter		☒ ≤-80dBc	
Frequency accuracy		Initial accuracy at the reference temperature		☒ ≤±0.05ppm (25℃±2℃)	
Frequency stability		Frequency and Temperature Stability		☒ ≤±0.1ppm (-40℃~+70℃)	
		Frequency and Voltage Stability		☐ ≤±0.01 ppm (voltage variation ±5%)	
		Frequency Load Stability		☐ ≤±0.01 ppm (load variation ±10%)	
Frequency regulation		Frequency adjustment range		☒ ≥±1ppm (0~8V)	
Phase noise (100 MHz)		☒ ≤-100dBc/Hz@10Hz ;		☒ ≤-130dBc/Hz@100Hz ;	
		☒ ≤-160dBc/Hz@1kHz ;		☒ ≤-170dBc/Hz@10kHz ;	
		☒ ≤-170dBc/Hz@100kHz。			
Age		☒ ≤±5 ppb/day			
		☐ ≤±0.3 ppm/year			
外形 diagram and pin definition					
Pin number	Pin Function		20.2±0.5 15.24±0.2 15.24±0.2 Top view 5min 5-00.8 11max Lateral view		
1	VCO (Voltage Control)				
2	Reference voltage (VREF)				
3	Ground (GND)				
4	Output (RFOUT)				
5	Power Source (VCC)				
Reference connection method for the voltage control circuit					
Vref Vco GND Vco Vco GND					
External variable resistor with external voltage input: Note: The voltage control terminal has built-in bias; when no frequency calibration is required, leave the reference voltage and voltage control input terminals unconnected.					
Remarks			1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6;1ppb=1E-9。		

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

Electrical frequency modulation and hopping filter

Mechanical Filter

Clock and Signal Processing Chip

Product Features and Applications/Features

- ◎ Small size, DIP14 structure;
- ◎ Low power consumption, fast and stable;
- ◎ It is widely applicable in military and civilian communications, testing and measurement, and other fields.



Quality Standards/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

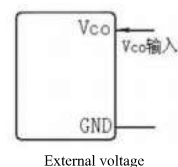
◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			10~125MHz
Typical frequency (MHz)			10、40、80、100、120
Supply voltage			3.3V/5V/12V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
	Phase noise		
Age-related aging			±0.05ppm~±0.5ppm
Power consumption (on/off/stable)			2.5W/1W(Max)@25℃
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+85℃
Frequency Adjustment			≥±1 ppm (customizable)
Packaging size			Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A (± 0.01) (< 40 MHz)	B (± 0.05)	C (± 0.1)	D (± 0.5)
A 0°C ~ +50°C	●	●	●	●
B -10°C ~ +60°C	●	●	●	●
C -20°C ~ +70°C	●	●	●	●
D -40°C ~ +85°C	1	●	●	●
E -55°C ~ +85°C	1	●	●	●
F -40°C ~ +70°C	*custom made	●	●	●

Reference connection method for the voltage control circuit



Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

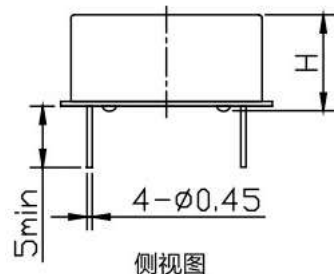
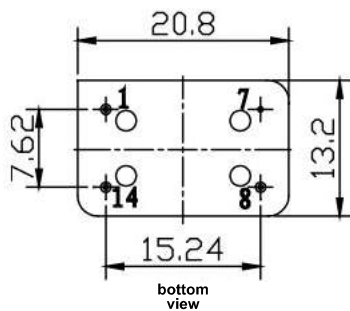
Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)				
	A	B	C	D	F
10Hz	-100	-110	-120	-125	*custom made
100Hz	-125	-130	-140	-145	
1kHz	-140	-145	-150	-155	
10kHz	-145	-150	-155	-160	
100kHz	-150	-155	-160	-165	
Deviation from the carrier frequency	Phase noise (dBc/Hz) ≥40 MHz (typical value: 100 MHz)				
	A	B	C	D	F
10Hz	-80	-85	-90	-95	*custom made
100Hz	-110	-115	-120	-125	
1kHz	-140	-145	-150	-155	
10kHz	-145	-150	-155	-160	
100kHz	-150	-155	-160	-165	

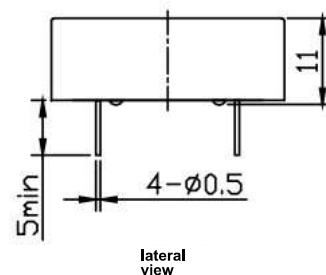
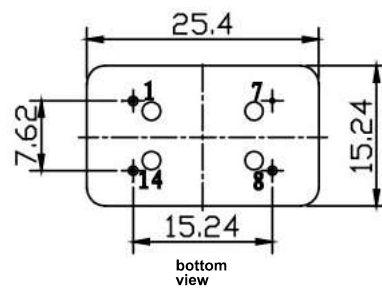
Order Instructions

Model	S0x0	18B	F	100M	C	S	G	U	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency Temperature Stability	Output Wave form	Supply voltage	Phase noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	(20.8*13.2) 18 A: (H=8) 18B: (H=10) 18C: (H=11) 18D: (25.4*15.24*11)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100 M, which is 100 MHz	See the specific product specifications	S: Sine wave H: Square wave	G: +12V H: +5V I: +3.3V	Phase Noise Meter	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

External dimensions and structural code



1. 7. Voltage Control 8. Ground 9. Output 10. Power Supply 11. Output 12. Power Supply



14. source

Structural code: 18A(H=8)/18B (H=10)/18C (H=11)

Structure Code: 18D

Product Features and Applications/Features

- ◎ Optimal low-phase noise ≤ -170 dBc/Hz at 100 kHz;
- ◎ Ultra-small packaging structure: $15 \times 15 \times 6$ mm³;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

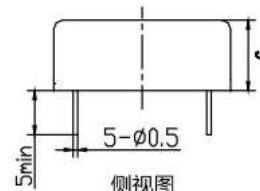
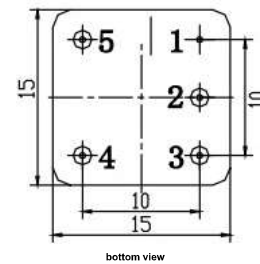
Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name	Characteristic
Frequency range	40~120MHz
Typical frequency (MHz)	80、100、120
Supply voltage	3.3V/5V/12V
Frequency stability	VS. temperature
Output power	Frequency and Temperature Stability Table
Sinusoidal wave	≥ 7 dBm (customizable)
Clutter	Harmonic distortion
Phase noise	≤ -30 dBc
Age-related aging	≤ -80 dBc
Power consumption (on/off/stable)	Phase Noise Meter
Operating temperature range	± 0.1 ppm $\sim \pm 0.5$ ppm
Storage temperature range	± 0.1 ppm $\sim \pm 0.5$ ppm
Frequency Adjustment	2.5W/1W (Max) @25°C
Packaging size	Frequency and Temperature Stability Table
	$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
	$\geq \pm 0.5$ ppm (customizable)
	Refer to the external dimensions diagram

External dimensions and structural code



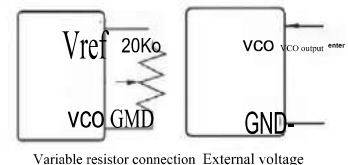
2.Reference voltage/overhang

structure code:21

◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A(± 0.01)	B(± 0.05)	C(± 0.1)	D(± 05)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$ *Customizable		●	●	●
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	* custom made	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	1	* custom made	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	1	*custom made		●

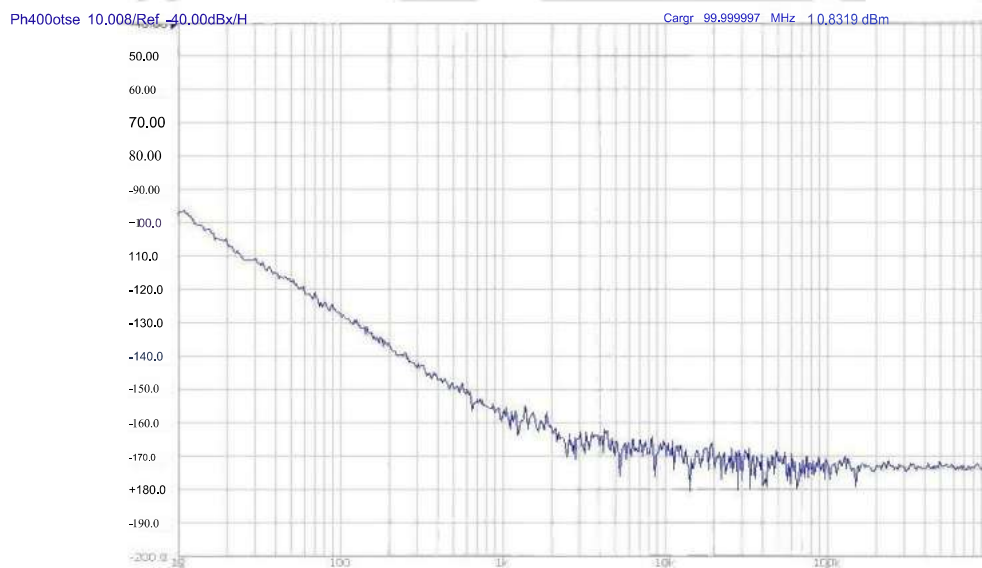
Reference connection method for the voltage control circuit



Note: The voltage control terminal already has built-in bias voltage. When no frequency calibration is required, keep the reference voltage terminal and voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 10 MHz)				
	A	B	C	U	F
10Hz	-85	-90	-95	-100	*custom made
100Hz	-115	-120	-125	-130	
1kHz	-145	-150	-155	-160	
10kHz	-155	-160	-165	-170	
100kHz	-155	-160	-165	-170	



100 Typical phase noise curve of an MHz crystal oscillator

Order Instructions

Model	SOX0	21	F	100M	C	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	(15*15*6)	A: 0~+50°C B: -10~+60°C C: -20~+70°C D: -40~+85°C E: -55~+85°C F: -40~+70°C	100M means 100MHz	A: ±0.01ppm B: ±0.05ppm C: ±0.1ppm D: ±0.5ppm	S: Sine wave H: Square wave	G: +12V H: +5V I: +3.3V	Phase detection Noise Table	None: No Fully domestically produced G: Fully domestically produced	None: Machine Year / Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Arrow Carrier

Product Features and Applications/Features

- ◎ **Ultra-small structure** DIP8 12.7×12.7×5mm³;
- ◎ **Stable power consumption** is ≤0.4W, with a preheating time of ≤30s;
- ◎ **It is widely applicable** in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

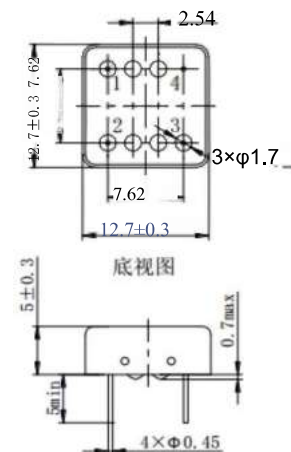
Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name	Characteristic
Frequency range	80~120MHz
Typical frequency (MHz)	80、100、120
Supply voltage	3.3V/5V
Frequency stability	VS. temperature Frequency and Temperature Stability Table
Output power	≥7 dBm (customizable)
Sinusoidal wave	Harmonic distortion ≤-30dBc
Clutter	≤-80dBc
TTL/HCMO rising and falling edges	≤6ns
S Duty Cycle	50%±5%
Phase noise	Phase Noise Meter ±0.5ppm~±1ppm
Age-related aging	±0.5ppm~±1ppm
Power consumption (on/off/stable)	1.5W/0.5W (Max) @25°C
Operating temperature range	Frequency and Temperature Stability Table
Storage temperature range	-55°C~+85°C
Frequency Adjustment	≥±0.5 ppm (customizable)
Packaging size	Refer to the external dimensions diagram

External dimensions and structural code

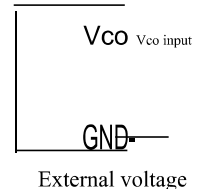


Side view **Structure code: 23**

◎ Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)			
	A(±0.01)	B(±0.05)	C(±0.1)	D(±05)
A0°C~+50°C	•	•	•	•
B-10°C~+60°C *Customizable		•	•	•
C-20°C~+70°C	1	•	•	•
D-40°C~+85°C		* custom made	•	•
E-55°C~+85°C	1	1	* custom made	•
F-40°C~+70°C	1	* custom made		•

Reference connection method for the voltage control circuit



Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Phase noise (dBc/Hz) (typical value at 10 MHz)				
	A	B	C	U	E
10Hz	-85	-90	-95	-100	*custom made
100Hz	-115	-120	-125	-130	
1kHz	-145	-150	-155	-160	
10kHz	-155	-160	-165	-170	
100kHz	-155	-160	-165	-170	



100 Typical phase noise curve of an MHz crystal oscillator

Order Instructions

Model	S0x0	23	F	100M	C	S	H	B	G	-D
Meaning Explain	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	(127*12. 7*5)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±0. 01ppm B: ±0. 05ppm C: ±0. 1ppm D: ±0. 5ppm	S: Sine wave H: Square wave	H: +5V : +3. 3V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

Recommended Product : Ultra-Compact, Fast, Stable, Temperature-Controlled Crystal Oscillator

Product Name: Ultra-compact, Rapid, Stable, Temperature-Regulated Crystal Oscillator Product model: SOXO23F100MCSHB

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Other recommended frequencies	80MHz、120MHz
Outline dimension		12. 7×12. 7×5mm ³		Product weight	☐ 10g (Max)
Temperature range		Working temperature		☒ -40℃~+70℃	
		Storage temperature		☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016			
Supply voltage	5V±5%	Working Current	Initial status	☒ ≤350mA (@25±2℃)	
			Stable state	☒ ≤100mA (@25±2℃)	
Output		Wave form		☒ sinusoidal wave	
		Output power		☒ ≥7 dBm (load: 50 ohms)	
		Harmonic wave		☒ ≤-30dBc	
		Clutter		☒ ≤-80dBc	
Preheating time (to achieve initial accuracy of ±0.5 ppm at baseline temperature)				☐ ≤30s (25℃±2℃)	
Frequency stability		Initial accuracy of the reference temperature		☒ ≤±0. 5ppm (25℃±2℃)	
		Frequency and Temperature Stability		☒ ≤±0. 1ppm (-40℃~+70℃)	
Frequency regulation		Frequency adjustment range		☒ ≥±0.5 ppm (0-5 V) (relative center frequency)	
Phase noise		☒ ≤-90dBc/Hz@10Hz ;		☒ ≤-120dBc/Hz@100Hz ;	
		☒ ≤-150dBc/Hz@1kHz ;		☒ ≤-165dBc/Hz@10kHz ;	
		☒ ≤-165dBc/Hz@100kHz 。			
Age		☒ ≤±5.0 ppb/day			
		☐ ≤±0.5 ppm/year			
外形 diagram and pin definition					
Pin number	Pin Function		Bottom view 4×Φ0.45 side view		
1	VCO (Voltage Control)				
2	Supply voltage (VCC)				
3	Output (OUT)				
4	Landing (GND)				
Note: 1. The voltage control terminal is pre-set with a bias voltage; when no frequency calibration is required, leave the voltage control input terminal unconnected.					
2. No tolerance specified: ±0.3 mm.					
Remarks			1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。		

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -170 dBc/Hz at 100 kHz;
- ◎ Integrated low-phase-noise constant-temperature crystal oscillator;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

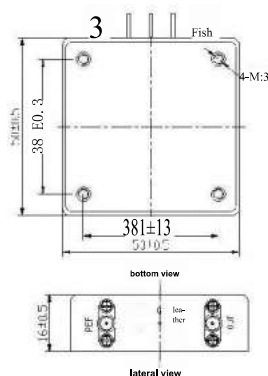
Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

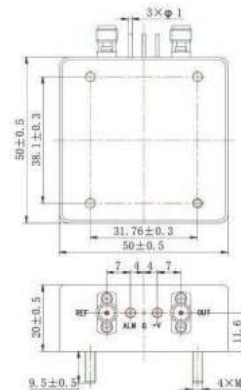
◎ Electrical performance parameters

Parameter Name			Characteristic
Input frequency range			10~125MHz
Output frequency range			10~160MHz
Supply voltage			12V/15V
Output	Sinusoidal wave	Output power	≥5 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
Phase noise (100 MHz)			≤-160dBc/Hz@1kHz
			≤-170dBc/Hz@100kHz
Power consumption (on/off/stable)			5W/2W (Max) @25℃
Lock instruction			≥3V@When locked
Operating temperature range			-55℃~+85℃
Storage temperature range			-55℃~+85℃
Packaging size			Refer to the external dimensions diagram

External dimensions and structural code



Structure code: 11/(11A is a detachable SMA)



Structure Code: 11C

**Recommended Product: Phase-Locked Loop
Thermostatic Crystal Oscillator**

Product Name: Phase-Locked Loop Thermostatic Crystal Oscillator Product model: SPXO11-10M-100M

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Other recommended frequencies	80MHz、120MHz
Outline dimension		50×50×16mm ³		Product weight	☐ 100g (Max)
Temperature range		Working temperature		☒ -40℃~+70℃	
		Storage temperature		☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" / TD20129 B-2016			
Supply voltage	12V±5%	Working Current	Initial status	☒ ≤400mA (@25±2℃)	
			Stable state	☒ ≤200mA (@25±2℃)	
Output		Wave form		☒ sinusoidal wave	
		Output power		☒ ≥8 dBm (load: 50 ohms)	
		Harmonic wave		☒ ≤-30dBc	
		Clutter		☒ ≤-70dBc	
Locking indicator level				☐ ≥3V when locked	
Steady-state phase noise (room temperature, locked)		☒ ≤-100dBc/Hz@10Hz ; ☒ ≤-160dBc/Hz@1kHz ; ☒ ≤-170dBc/Hz@100kHz 。 ☒ ≤-130dBc/Hz@100Hz ; ☒ ≤-170dBc/Hz@10kHz ;			
Age		☐ ≤±0.3 ppm/year (internal crystal oscillator specification)			
Requirements for the reference input signal					
Reference frequency		10MHz			
Frequency accuracy		≤±0.5ppm			
Signal power		0~5dBm			
Phase noise		≤-130dBc/Hz@10Hz			
外形 diagram and pin definition					
Pin number	Pin Function		Bottom view lateral view		
REF	Reference Signal Input				
ALM	Lock instruction				
G	The earth				
+V	Source				
OUT	Output				
Note: The signal input and output ports use SMA negative connectors.					
Remarks			1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These serve as mandatory requirements to be met and provide the basis for product inspection; they also act as reference indicators for design assurance. 3、1ppm=1E-6;1ppb=1E-9。		

Product Features and Applications/Features

- ◎ Ultra-low phase noise: optimal ≤ -165 dBc/Hz at 1 kHz;
- ◎ Integrated low-phase-noise constant-temperature crystal oscillator;
- ◎ It is widely applicable in military and civilian communications, radar, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

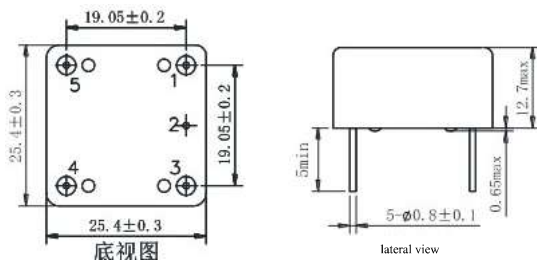
Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name			Characteristic
Input frequency range			10~120MHz
Output frequency range			60~120MHz
Supply voltage			5V/12V
Output	Sinusoidal wave	Output power	≥5 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
Phase noise (100 MHz)			≤-160dBc/Hz@1kHz
			≤-170dBc/Hz@100kHz
Power consumption (on/off/stable)			3.6W/1.8W (Max) @25℃
Lock instruction			≥3V@When locked
Operating temperature range			-55℃~+85℃
Storage temperature range			-55℃~+85℃
Packaging size			Refer to the external dimensions diagram

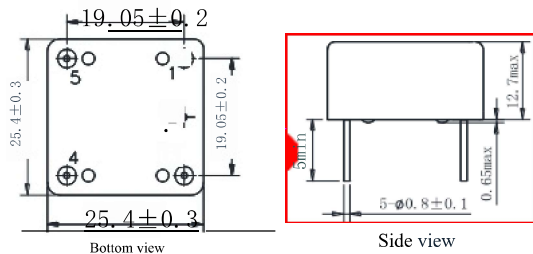
External dimensions and structural code



Pin number	Pin Function
1	Signal Output (RF OUT)
2	The earth (GND)
3	Lockout Indicator (ALM)
4	Reference Input (REF)
5	Source (VCC)

Structure Code: 16

Product Name: Phase-Locked Loop Thermostatic Crystal Oscillator Product model: SPXO16A-10M-100M-G

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Other recommended frequencies	80MHz、120MHz
Outline dimension		25.4×25.4×12.7mm ³		Product weight	☐ 50g (Max)
Temperature range		Working temperature		☒ -55℃~+85℃	
		Storage temperature		☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016			
Supply voltage	5V±5%	Working Current	Initial status	☒ ≤750mA (@25±2℃)	
			Stable state	☒ ≤250mA (@25±2℃)	
Output		Wave form		☒ sinusoidal wave	
		Output power		☒ 5 dBm to 10 dBm (load: 50 ohms)	
		Harmonic wave		☒ ≤-25dBc	
		Clutter		☒ ≤-80dBc	
Locking indicator level				☐ ≥3V when locked	
Steady-state phase noise (room temperature, locked)		☒ ≤-95dBc/Hz@10Hz; ☒ ≤-155dBc/Hz@1kHz; ☒ ≤-165dBc/Hz@100kHz。 ☒ ≤-125dBc/Hz@100Hz; ☒ ≤-160dBc/Hz@10kHz;			
Age		☐ ≤±0.5 ppm/year (internal crystal oscillator specification)			
Requirements for the reference input signal					
Reference frequency		10MHz			
Frequency accuracy		≤±0.5ppm			
Signal power		0~5dBm			
Phase noise		≤-130dBc/Hz@10Hz			
外形 diagram and pin definition					
Pin number	Pin Function		 Bottom viewSide view		
1	Signal Output (RF OUT)				
2	The earth (GND)				
3	Lockout Indicator (ALM)				
4	Reference Input (REF)				
5	Source (VCC)				
Remarks		1、The product model number is supplemented with the "D" designation, indicating it is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。			

Product Features and Applications/Features

- ◎The small package dimensions are 20.2×20.2×12 mm³;
- ◎High timing accuracy $\leq \pm 10 \mu\text{s}/24 \text{ h}$;
- ◎It is widely applicable in military and civilian communications, measurement and control, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

Parameter Name		Characteristic	
Frequency range		10~125MHz	
Typical frequency (MHz)		10MHz、20MHz	
Supply voltage		3. 3V/5V	
Frequency stability		VS. temperature	
Output	Sinusoidal wave	Frequency and Temperature Stability Table	
		Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise (typically 10 MHz)		-150dBc/Hz@1kHz	
Timekeeping accuracy		±5us~±20us (24h)	
Frequency accuracy		≤±1E-11 (average value after 24 hours of locking)	
Age-related aging		±0. 1ppm	
Power consumption (stable on startup)		2. 5W/1W (Max) @25℃	
Operating temperature range		Frequency and Temperature Stability Table	
Storage temperature range		-55℃~+85℃	
Packaging size		Refer to the external dimensions diagram	

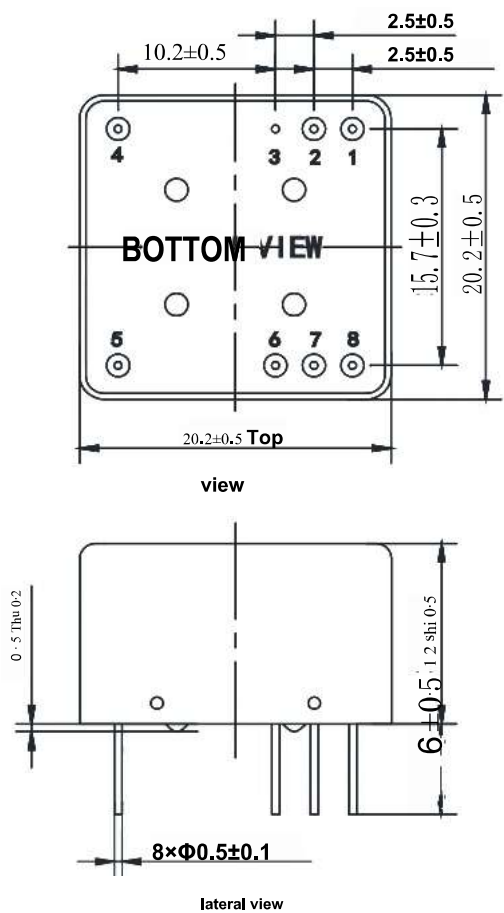
◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)				
	H(± 0.001)	S(± 0.005)	A(± 0.01)	B(± 0.05)	(± 0.1)
A $0^\circ\text{C} \sim +50^\circ\text{C}$	●		●		
B $-10^\circ\text{C} \sim +60^\circ\text{C}$	●	●	●	●	
C $-20^\circ\text{C} \sim +70^\circ\text{C}$	●	●	●	●	
D $-40^\circ\text{C} \sim +85^\circ\text{C}$	●	●	●	●	
E $-55^\circ\text{C} \sim +85^\circ\text{C}$	*custom made	*custom made	●	●	●
F $-40^\circ\text{C} \sim +70^\circ\text{C}$			●	●	

Order Instructions

Model	SCMX0	11	D	10M	A	H		-G	-D
Meaning Explain	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Tamed Crystal Oscillator	(20. 2*20. 2*12)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	1 0 M equals 10 MHz	H: ±0. 001ppm S: ±0. 005ppm A: ±0. 01ppm B: ±0. 05ppm C: ±0. 1ppm	S: Sine wave H: Square wave	H: +5V 1: +3. 3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airborne/ Vehicle-mounted/ Carrier-borne / Ground and other surfaces D: Arrow Carrier

External dimensions and structural code



Pin number	Pin Function
1	State Input (STATE)
2	Power supply voltage (VCC)
3	Landing (GND)
4	1PPS input (1PPS IN)
5	Serial port RXD (RXD)
6	Serial port TXD (TXD)
7	1PPS output (1PPSOUT)
8	10MHz output (OUT)

Structure Code: 11

Product Features and Applications/Features

◎ Ultra-high timing accuracy: $\leq \pm 1.5 \mu\text{s}/24\text{h}$;

◎ Ultra-high temperature stability: $\pm 1 \text{E-10}$;

◎ It is widely applicable in military and civilian communications, measurement and control, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			5~20MHz
Typical frequency (MHz)			10MHz
Supply voltage			3.3V/5V/12V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
	Phase noise (typically 10 MHz)		
Timekeeping accuracy			±1.5us~±10us (24h)
Frequency accuracy			≤±1E-12 (average value after 24 hours of locking)
Age-related aging			±0.1ppm~±0.05ppm
Power consumption (stable on startup)			5W/2W (Max) @25℃
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+85℃
Packaging size			Refer to the external dimensions diagram

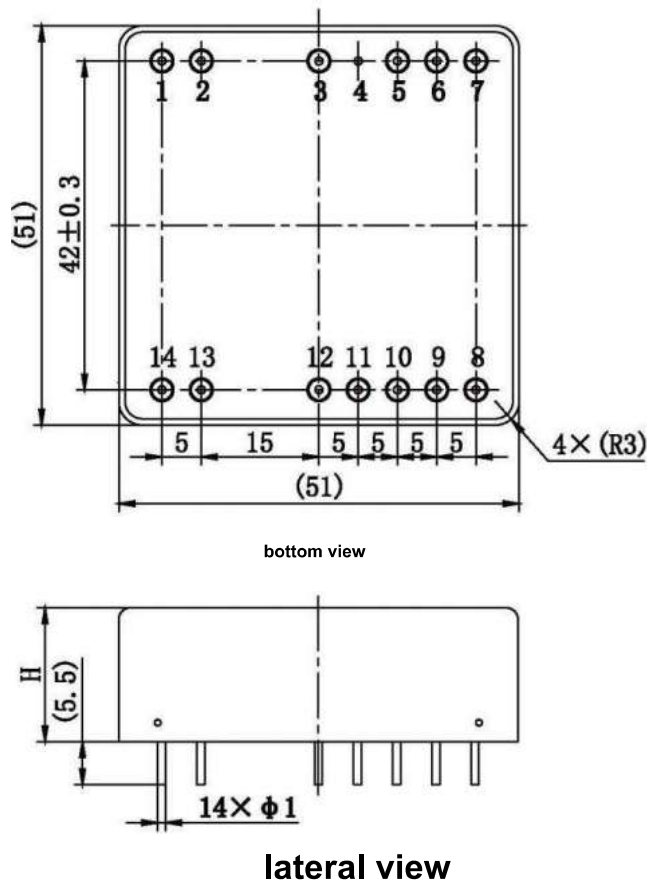
◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppb)				
	H(± 0.1)	S(± 0.2)	A(± 0.5)	B(± 1)	C(± 3)
A $0^\circ\text{C} \sim +50^\circ\text{C}$					
B $-10^\circ\text{C} \sim +60^\circ\text{C}$	●	●		●	
C $-20^\circ\text{C} \sim +70^\circ\text{C}$		●		●	
D $-40^\circ\text{C} \sim +85^\circ\text{C}$	*custom made	*custom made	●	●	
E $-55^\circ\text{C} \sim +85^\circ\text{C}$	1	*custom made	*custom made	●	●
F $-40^\circ\text{C} \sim +70^\circ\text{C}$	●	●		●	

Order Instructions

Model	SCMXO	12	F	10M	S	H	H	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Tamed Crystal Oscillator	(51*51*13)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	1 0 M equals 10 MHz	H: ±0. 1ppb S: ±0. 2ppb A: ±0. 5ppb B: ±1ppb C: ±3ppb	S: Sine wave H: Square wave	H: +5V 1: +3. 3V	None: Not domestically produced G: Fully domestically produced	None: Airborne/ Vehicle-mounted/ Carrier-borne / Ground and other surfaces D: Arrow Carrier

External dimensions and structural code



Pin number	Pin Function
3	Supply electricity
5	Lock Status
6	Serial Input
7	Serial output
8	Pattern
10	Second-level input
12	Second Output
14	Signal output
1、2、9	Hang in the air
4、11、13	The earth

Structure code: 12 (H=13)/12A (H=18)

Product Features and Applications/Features

- ◎The compact package dimensions are 30×25×15 mm³;
- ◎High timing accuracy $\leq \pm 5 \mu\text{s}/24\text{h}$;
- ◎It is widely applicable in military and civilian communications, measurement and control, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Ammunition and Arrow Systems" Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

Parameter Name	Characteristic
Frequency range	10~125MHz
Typical frequency (MHz)	10MHz、100MHz
Supply voltage	3.3V/5V
Frequency stability	VS. temperature Frequency and Temperature Stability Table
Output power	$\geq 7 \text{ dBm}$ (customizable)
Sinusoidal wave	Harmonic distortion $\leq -30 \text{ dBc}$
Clutter	$\leq -70 \text{ dBc}$
TTL/HCMOS	上升/下降沿 $\leq 6 \text{ ns}$
Duty Cycle	$50\% \pm 5\%$
Phase noise (typically 10 MHz)	-150 dBc/Hz@1kHz
Timekeeping accuracy	$\pm 1.5 \mu\text{s} \sim \pm 20 \mu\text{s}$ (24h)
Frequency accuracy	$\leq \pm 1 \text{ E-11}$ (average value after 24 hours of locking)
Age-related aging	$\pm 0.1 \text{ ppm}$
Power consumption (on/off/stable)	4W/1.5W (Max) @25℃
Operating temperature range	Frequency and Temperature Stability Table
Storage temperature range	$-55^\circ\text{C} \sim +85^\circ\text{C}$
Packaging size	Refer to the external dimensions diagram

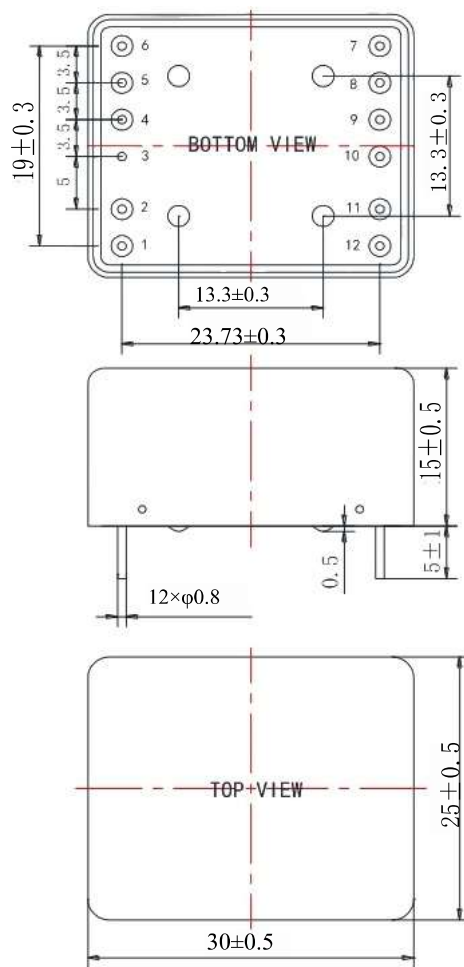
◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppb)				
	H (± 0.5)	S (± 1)	A (± 5)	B (± 50)	C (± 100)
A0℃~+50℃ B-10		●			
℃~+60℃ C-20		●	●		
℃~+70℃ D-40		●	●		
℃~+85℃ E-55		●	●	●	
℃~+85℃ F-40	*custom made	*custom made	●	●	
℃~+70℃			●	●	

Order Instructions

Model	SCMX0	13	D	10M	A	H	I	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Tuned Crystal Oscillator	(30*25*15)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	10M means 10 MHz	H: ±0.5ppb S: ±1ppb A: ±5ppb B: ±50ppb C: ±100ppb	S: Sine wave H: Square wave	H: +5V I: +3.3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airborne/ Vehicle-mounted/ Carrier-borne / Ground and other surfaces D: Arrow Carrier

External Dimensions and Structural Code



Pin number	Pin Function
1	State Input (STATE IN)
2	1PPS input (1PPS IN)
3	Next Step (GND)
4	Suspended (NC)
5	1PPS output (1PPS OUT)
6	Frequency Output OUT
7	Power supply voltage(VCC)
8	String Port RXD(RXD)
9	Serial port TXD (TXD)
10	Hang in the air (NC)
11	Hang in the air (NC)
12	State Output (STATE OUT)

Structure Code: 13

23 Tamed Warm-Tonic Crystal Oscillator

STMX011

Product Features and Applications /Features

- ◎The small surface-mount dimensions are 16.5×11.9×4 mm³;
- ◎Quickly tamed;
- ◎Low power consumption ≤25 mA;
- ◎It is widely applicable in military and civilian communications, measurement and control, and other fields.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based 温補石英 Crystal Oscillators"

Q/TD20127B-2016 "Product Specification for Temperature-Tolerant Quartz Crystal Oscillators for Missile and Arrow Applications" Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

Parameter Name		characteristic
input	Frequency Range Typical Frequency Point (MHz) Power Supply Voltage	10~50MHz 10MHz、16. 384MHz、24. 576MHz 3. 3V/5V
	frequency stability	VS. Temperature, Output Power, Harmonic Distortion, Noise
	sinusoidal wave	The frequency-temperature stability table specifies a range of ≥7 dBm (customizable) to ≤-30 dBc.
	TTL/HCMOS	≤-70dBc
	沿占空比	≤6ns
	Phase noise (typically 10 MHz)	50%±5%
	Timekeeping accuracy; Frequency accuracy; Annual aging test; Operating current; Operating temperature range; Storage temperature range; Packaging dimensions	-140dBc/Hz@1kHz ± 50us~±500us (24h)
		≤±1×10 ⁻¹⁰ (average value after 24 hours of locking) ±0.5 ppm
		≤25mA@25℃
		Frequency and Temperature Stability Table

For temperatures ranging from -55℃ to +85℃, refer to the dimensional specifications.

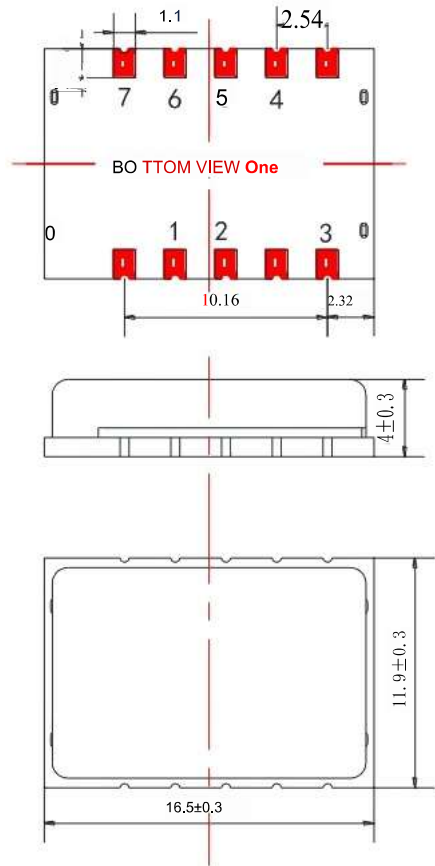
◎Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)			
	A (±0. 01)	B (±0. 05)	C (±0. 1)	D (±0. 28)
A0℃~+50℃ B				
-10℃~+60℃ C	●	●	●●	
-20℃~+70℃ D	*custom made	*custom made		
-40℃~+85℃ E			●	
-55℃~+85℃ F			*custom made	
-40℃~+70℃		*custom made	*custom made	

Order Instructions

Model	STMX0	11	D	10M	B	H	I	-G	-D
Meaning Explan- ation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temp- erature Stability	Output Wave form	Supply vo- ltage	Domestic produc- tion Characteristic	Application environment
	Tuned and warming crystal oscillator	(16.5*11.9*4)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	10M means 10MHz	A: ±0.01ppm B: ±0.05ppm C: ±0.1ppm D: ±0.28ppm	S: Sine wave H: Square wave	H: +5V I: +3.3V	None: Not compl- ete Domestic produc- tion G: nationwide Industrialization	None: Airborne/ Vehicle- mounted/ Carrier-borne / Ground and other surfaces D: Arrow Carrier

External Dimensions and Structural Code



Pin number	Pin Function
1	Frequency Output(OUT)
2	Power supply voltage (VCC)
3	Landing (GND)
4	Serial port RXD (RXD)
5	Serial port TXD (TXD)
6	1PPS input (1PPS IN)
7	1PPS output(1PPS OUT)

Structure Code: 11

Product Features and Applications /Features

- ◎ **Surface Mount Device SMD**, dimensions: 7.0 mm × 5.0 mm × 1.8 mm;
- ◎ **The frequency range is wide, covering 40–125 MHz.**
- ◎ **It is widely applicable in military and civilian communications, navigation, radar, and other fields.**



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20128-2008 "Product Specification for Ordinary Quartz Crystal Oscillators for Airborne and Ground Applications"

Q/TD20134A-2013 "Product Specification for SCXO11B Quartz Crystal Oscillator" Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical Performance Parameters

Parameter Name	characteristic
Frequency Range Typical	40~125MHz
Frequency Point (MHz) Power Supply Voltage	100 3. 3V/ 5V
frequency stability	VS. Temperature waveform CMOS Frequency-Frequency Temperature Stability Table
output	≤6ns 上升/下降沿占空比
Age-related aging	50% ± 5% ≤ ±3 ppm (first year)
Current operating temperature range	50mA (Max)
Storage temperature range	Frequency and Temperature Stability Table
Frequency adjustment range	-55°C to +85°C; ≥±50 ppm; refer to the dimensional specifications diagram.
Packaging dimensions	

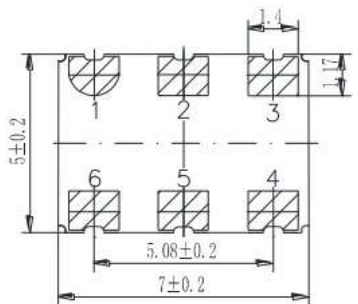
◎Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)		
	A (±20)	B (±30)	C (±50)
C-20°C~+70°C	●	●	●
D-40°C~+85°C	●	●	●
E-55°C~+85°C	1	●	●
F-40°C~+70°C	●	●	●

Order Instructions

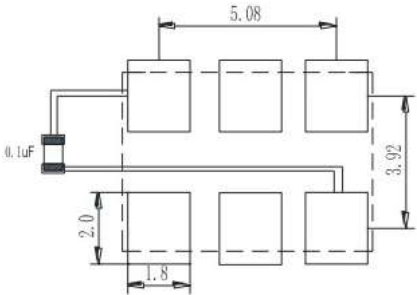
Model	SVX0	11B	E	100M	B	H	I	-G	-D
Meaning Explana- tion	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temp- erature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Voltage-controlled crystal oscillator	7. 0*5. 0*1. 8	C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±20ppm B: ±30ppm C: ±50ppm	H: square wave	H: +5V I: +3. 3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airborne/ Vehicle- mounted/ Carrier-borne / Ground and other su- rfaces D: Arrow Carrier

External Dimensions and Structural Code



External dimensions (mm)

Pin Number	Pin Function
1	Voltage Control
2	Suspended/Three-state control
3	the earth
4	output
5	hang in the air
6	Power Source



Recommended pad size (mm)

(Note: The 0.1 uF capacitor should be placed as close as possible to pin 6 of the crystal oscillator.)**Structure code: 11B**

Product Features and Applications/Features

- ◎ Ultra-small surface-mount structure SMD, 14 mm × 9 mm;
- ◎ The frequency range is wide, covering 40–125 MHz.
- ◎ Optimal low-phase noise ≤ -170 dBc/Hz at 100 kHz;
- ◎ It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20128-2008 "Product Specification for Ordinary Quartz Crystal Oscillators for Airborne and Ground Applications"

Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name		Characteristic
Output	Frequency range	40~125MHz
	Typical frequency (MHz)	100
	Supply voltage	3.3V/5V
	Frequency stability VS. temperature	Frequency and Temperature Stability Table
	Output power	≥ 5 dBm (customizable)
	Sinusoidal wave Harmonic distortion	≤ -30 dBc
	Clutter	≤ -80 dBc
	TTL/HCMOS 上升/下降沿	≤ 6 ns
	Duty Cycle	$50\% \pm 5\%$
	Phase noise (100 MHz)	≤ -140 dBc/Hz@1kHz
Age-related aging		$\leq \pm 3$ ppm (first year)
Current		30mA (Max)
Operating temperature range		Frequency and Temperature Stability Table
Storage temperature range		$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency Adjustment		$\geq \pm 20$ ppm (covering temperature characteristics and minimum 10-year aging)
Packaging size		Refer to the external dimensions diagram

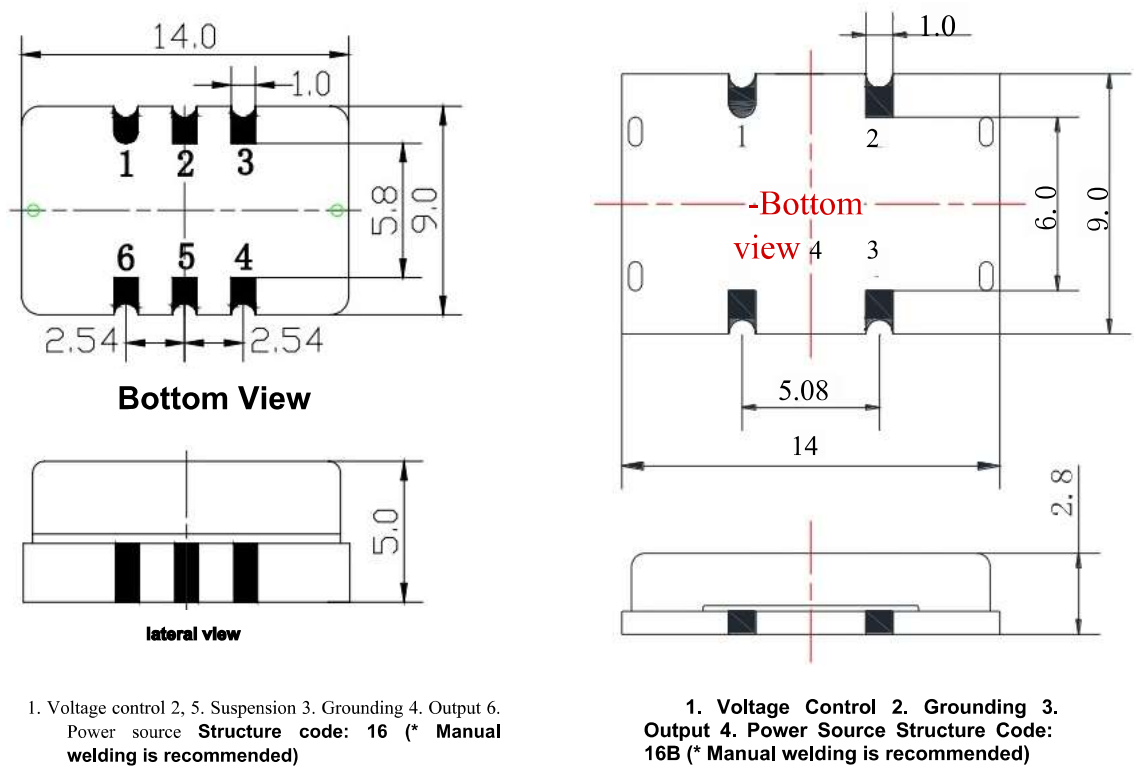
◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	A (± 20)	B (± 30)	C (± 50)
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	●	●	
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	●	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●

Order Instructions

Model	SVX0	16	E	100M	B	S	I	-G	-D
Meaning Explana- tion	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Te- mperature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Voltage-controlled crystal oscillator	(14*9*5)	C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±20ppm B: ±30ppm C: ±50ppm	S: Sine wave H: Square wave	H: +5V I: +3.3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airbo- rne/Vehicle- mounted/ Carrier-borne / Ground and other surfa- ces D: Arrow Carrier

External dimensions and structural code



Product Features and Applications/Features

- ◎Ultra-small structure DIP: 812.7 mm × 12.7 mm × 5 mm;
- ◎The frequency range is wide, covering 40–125 MHz.
- ◎Optimal low-phase noise ≤ -170 dBc/Hz at 100 kHz;
- ◎It is widely applicable in military and civilian communications, navigation, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20128-2008 "Product Specification for Ordinary Quartz Crystal Oscillators for Airborne and Ground Applications"

Quality Grade: Military Grade (B)

Technical Specifications

◎Electrical performance parameters

Parameter Name		Characteristic
Output	Frequency range	40~125MHz
	Typical frequency (MHz)	100
	Supply voltage	3.3V/5V
	Frequency stability VS. temperature	Frequency and Temperature Stability Table
	Output power	≥ 5 dBm (customizable)
	Sinusoidal wave Harmonic distortion	≤ -30 dBc
	Clutter	≤ -80 dBc
	TTL/HCMOS 上升/下降沿	≤ 6 ns
	Duty Cycle	$50\% \pm 5\%$
	Phase noise (100 MHz)	≤ -140 dBc/Hz@1kHz
Age-related aging		$\leq \pm 3$ ppm (first year)
Current		30mA (Max)
Operating temperature range		Frequency and Temperature Stability Table
Storage temperature range		$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency Adjustment		$\geq \pm 20$ ppm (covering temperature characteristics and minimum 10-year aging)
Packaging size		Refer to the external dimensions diagram

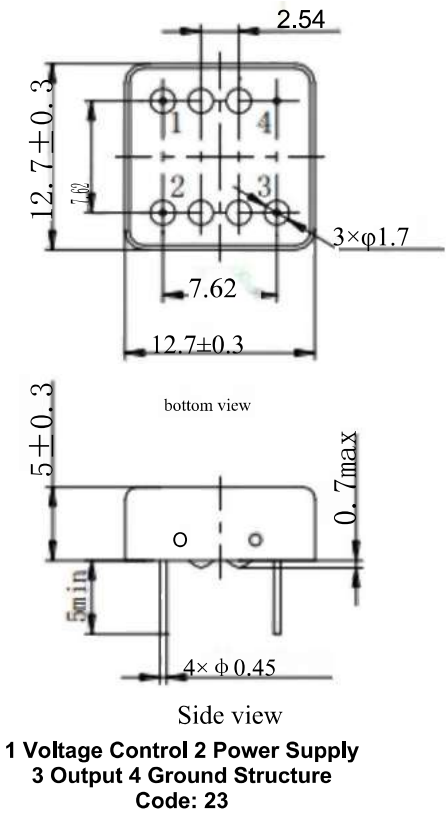
◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	A (± 20)	B (± 30)	C (± 50)
C- $20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●		
D- $40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	●	●	
E- $55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	●	●
F- $40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●

Order Instructions

Model	SVX0	23	E	100M	B	S	I	-G	-D
Meaning Explana- tion	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temp- erature Stability	Output Wave form	Supply voltage	Domestic production Characteristic	Application environment
	Voltage-controlled crystal oscillator	(12. 7*12. 7*5)	C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±20ppm B: ±30ppm C: ±50ppm	S: Sine wave H: Square wave	H: +5V I: +3. 3V	None: Not complete Domestic production G: nationwide Industrialization	None: Airborne/ Vehicle- mounted/ Carrier-borne / Ground and other su- rfaces D: Arrow Carrier

External dimensions and structural code



Product Features and Applications/Features

©Multiple frequency points and multiple output channels;

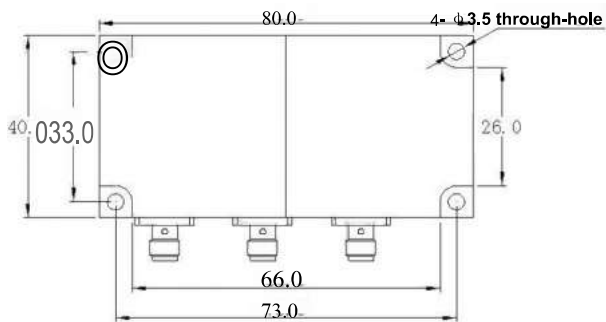
©Customized packaging and functionality.

Partial custom product

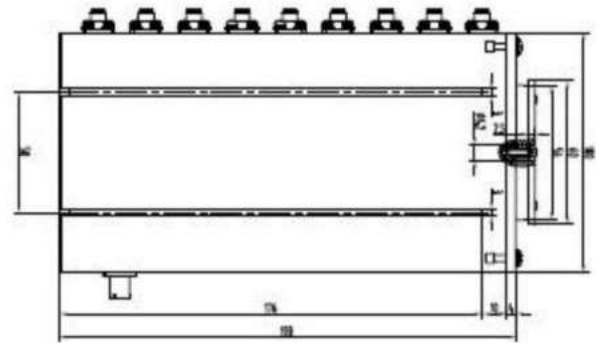
192±1									
6	6	60	609	60	6	2			
		0	60	00	00				
⑧	④	⑧	④	⑧	④				
609	600	+0	0	60G	60				
6	09	600	09	609	6				
⑥	⑨	⑥	⑨	④	⑥				

50 MHz to 51.4 MHz, 0.2 MHz stepwise multi-channel high-isolation programmable output

Ultra-low phase noise

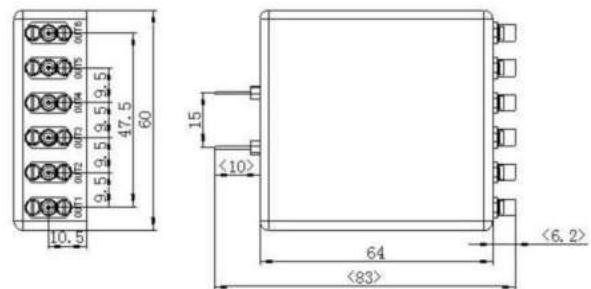


20 MHz-2.5 GHz high-isolation output with built-in micro-shock absorber, ultra-low dynamic phase noise, and high stability

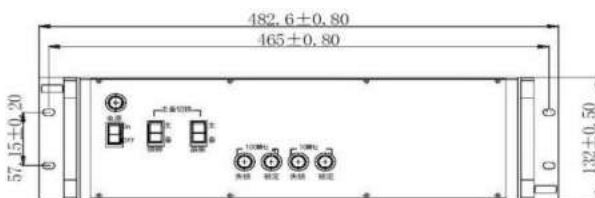


The 9-channel high-isolation output features an integrated anti-vibration, highly stable reference source with a robust anti-vibration design.

Low-phase noise

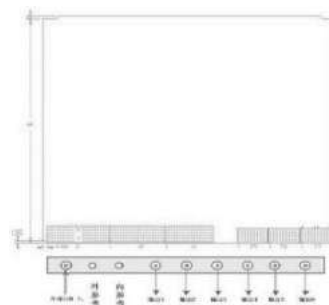


100 MHz, 6-channel high-isolation output with high stray suppression and ultra-low phase noise



The high-stability reference frequency standard device incorporates a highly stable rubidium clock and crystal oscillator reference.

10 MHz, 100MHz, 500MHz multiple outputs



CPC | The standard 6U card features a highly stable built-in crystal oscillator reference, automatically switching between internal and external references

6-channel high isolation output

Aerospace-Grade Crystal Oscillator

1

Spaceborne surface-mount standard crystal oscillator SCXO11B/20A/19

Product Features and Applications/Features

- ◎ High reliability, resistant to vibration and impact;
- ◎ SMD ceramic-metal packaging, compact in size;
- ◎ Total anti-irradiation dose ≥ 100 krad (Si);
- ◎ Suitable for military and civilian aerospace engineering;
- ◎ Detailed technical specifications can be customized according to user requirements.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: KJZ/61040101-2017 "Detailed Specification for SCXO11B-E Series Quartz Crystal Oscillators"

Q/TD20430-2024 "Detailed Specifications for SCXO Series Surface-Mount Crystal Oscillators" Quality Grades: Aerospace Grade (S Grade), QJB (S), CN Grade

Technical Specifications

◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			1~125MHz
Typical frequency (MHz)			1、10、20、25、50、60、100、120、125
Supply voltage			1.8V/2.5V/3.3V/5V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	CMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±10%
Current			25mA (Max) (1.8V) 30mA (Max) (2.5V) 40mA (Max) (3.3V) 50mA (Max) (5.0V)
Operating temperature range			Frequency and Temperature Stability Table
Three-state control			T: Yes N: No
Storage temperature range			-55℃~+125℃
Packaging size			Refer to the external dimensions diagram
Load			15pF

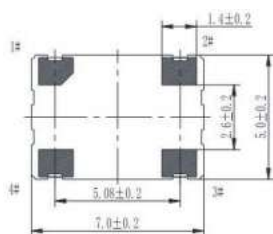
◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A (± 20)	B (± 30)	C (± 50)	D (± 75)
D- $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made		●	
E- $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	*custom made	●	
H- $-55^{\circ}\text{C} \sim +105^{\circ}\text{C}$	1	1	●	
G- $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$	1	1	*custom made	●

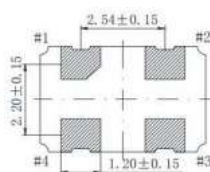
Order Instructions

Model	SCX0	11B	G	10M	D	H	I	T	-E
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Source Voltage	Three States Control	Quality grade
	Conventional crystal oscillator	11B: (SMD7050) 20A: (SMD5032) 19: (SMD3225)	D: -40~+85℃ E: -55~+85℃ H: -55~+105℃ G: -55~+125℃	10M means 10MHz	B: ±30ppm C: ±50ppm D: ±75ppm	H: square wave	H: +5V I: +3.3V K: +2.5V L: +1.8V	T: have N: not have	E: astronaut navigation (S) /QJB (S) / CN class

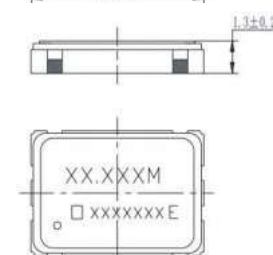
External dimensions and structural code



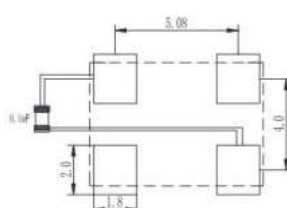
Pin number	Pin Function
1	Three-state control/Suspended state
2	The earth
3	Output
4	Source



Pin number	Pin Function
1	Three-state control/Suspended state
2	The earth
3	Output
4	Source

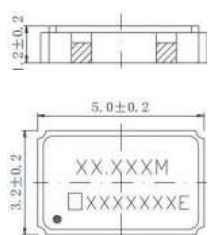


External dimensions (mm)

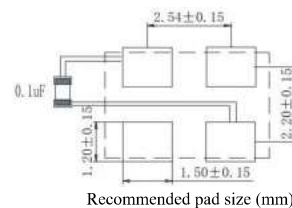


Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)



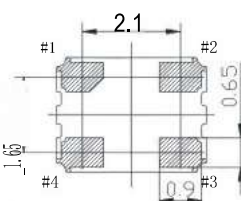
External dimensions (mm)



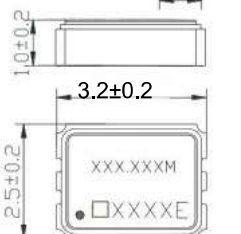
Recommended pad size (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)

Structure Code: 11B

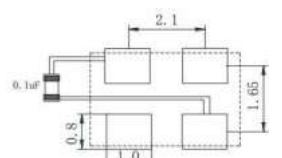


Pin number	Pin Function
1	Three-state control/Suspended state
2	The earth
3	Output
4	Source



External dimensions (mm)

(Note: The 0.1 μF capacitor should be placed as close as possible to pin 4 of the crystal oscillator.)



Recommended pad size (mm)

Structure Code: 20A

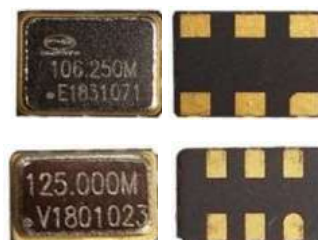
Structure Code: 19

Product Features and Applications/Features

◎High reliability, resistant to vibration and impact;

◎Differential signal output with low phase jitter;

◎Applicable to military and civilian aerospace engineering.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20431-2024 "Detailed Specification for SCXO Series Label-Doped Differential Crystal Oscillators"

Quality grade:QJB (S)grade,CN grade

Technical Specifications

◎Electrical performance parameters

Parameter Name			Characteristic
Frequency range			50~250MHz
Typical frequency (MHz)			50、75、100、106.25、125、156.25、159.375、171.875、200、212.5、250
Supply voltage			2.5V/3.3V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	E:PECL	上升/下降沿	2ns (Max)
	V:LVDS	Duty Cycle	50%±5%
	C:HCSL		
Current			LVDS/HCSL:90mA (Max)
			PECL:100mA (Max)
Operating temperature range			Frequency and Temperature Stability Table
Three-state control			T: Yes; N: No; T1: 1-pin tri-state control; T2: 2-pin tri-state control;
RMS phase jitter			0.6ps (Max) (12KHz~20MHz)
Storage temperature range			-55℃~+125℃
Packaging size			Refer to the external dimensions diagram

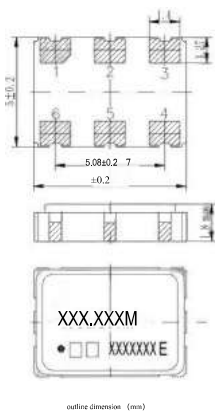
◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	A (±30)	B (±50)	C (±100)
D-40℃~+85℃			
E-55℃~+85℃	1		
H-55℃~+105℃	1	*custom made	•
G-55℃~+125℃	1	*custom made	

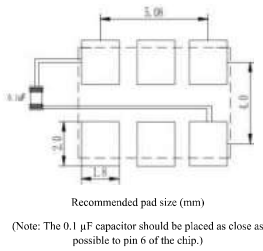
Order Instructions

Model	SCX0	23	G	100M	C	V	I	T1	-E
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Te- mperature Stability	Output Wave form	Source Voltage	Three States Control	Quality grade
	Conventional crystal oscillator	23: (SMD7050 differential) 24: (SMD5032 differential) 25: (SMD3225 differential)	D: -40~+85℃ E: -55~+85℃ H: -55~+105℃ G: -55~+125℃	100M means 100MHz	A: ±30ppm B: ±50ppm C: ±100ppm	E: PECL V: LVDS C: HCSL	I: +3.3V K: +2.5V	T1: 1 foot Control T2: 2 pins Control N: not have	E: astronavigation (S) /QJB(S)/ CN level

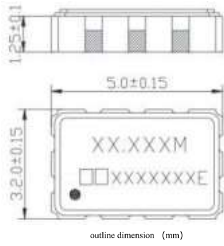
External dimensions and structural code



Pin number	Pin Function
1	Three-state control/Suspended state
2	Suspended Three-State Control
3	The earth
4	Output
5	Output
6	Source



0.64



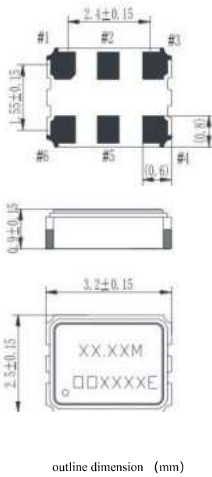
Pin number	Pin Function
1	Three-state control/Suspended state
2	Hang in the air
3	The earth
4	Output
5	Output
6	Source

2.54

0.85

Recommended pad size (mm)
(Note: The 0.1 μF capacitor should be placed as close as possible to pin 6 of the crystal oscillator.)

Structure Code: 23



Pin number	Pin Function
1	Three-state control/Suspended state
2	Hang in the air
3	The earth
4	Output
5	Output
6	Source



Structure Code: 24

Structure Code: 25

Product Features and Applications/Features

- ◎High reliability, resistant to vibration and impact;
- ◎SMD ceramic-metal packaging, compact in size;
- ◎Applicable to military and civilian aerospace engineering.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20433-2024 "Detailed Specification for STXO2 Series Temperature-Tuned Quartz Crystal Oscillator"

Quality grade:QJB (S)grade,CN grade

Technical Specifications

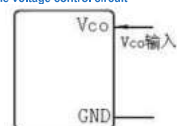
◎Electrical performance parameters

Electrical performance parameters			
Parameter Name			Characteristic
Frequency range			5~52MHz
Typical frequency (MHz)			10、12.8、13、19.2、20、25、26、30、40、50
Supply voltage			3.3V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	S: quasi-sine-wave	Output level	Vpp≥0.8V
	H: CMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise (20 MHz)			≤-130dBc/Hz@1kHz
Frequency Voltage Control			N: None V: Yes
			Range of adjustment: ≥±3 ppm (customizable)
Age-related aging			±0.5ppm/y~±2ppm/y
Current			10mA (Max)
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+125℃
Packaging size			Refer to the external dimensions diagram

◎Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)		
	K(± 0.28)	A(± 0.5)	B(± 1.0)
D- $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	●	●
E- $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	*custom made	*custom made	●
K- $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$	*custom made	*custom made	●
H- $-55^{\circ}\text{C} \sim +105^{\circ}\text{C}$	*custom made	*custom made	●

Reference connection method for the voltage control circuit

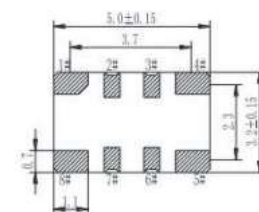


External voltage **Note:**
The voltage control terminal has no built-in bias; adjust the voltage control voltage to the center voltage (1.5 V).

Silicon Crystal Harmonic Generator

Silicon Crystal Vibration Device

Silicon Crystal Filter



Pin number	Pin Function
1	Voltage Control/Suspend
2、3、6、7	Hang in the air
	The earth
5	Output
8	Source

XX.XXXM
XXXXXXXXXE

Electrical frequency-dumping filter

Mechanical Filter

Clock and Signal Processing Chip

Product Features and Applications/Features

- ◎ Low-phase noise;
- ◎ Total anti-irradiation dose: $\geq 100\text{krad}(\text{Si})$, $\geq 15\text{krad}(\text{Si})$ etc.;
- ◎ Meet the requirements of aerospace engineering applications such as satellites;
- ◎ Detailed technical specifications can be customized according to user requirements.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20421-2024 "Detailed Specification for SOXO13X Series Isothermal Quartz Crystal Oscillators" Q/TD20422-2024 "Detailed Specification for SOXO14X Series Isothermal Quartz Crystal Oscillators"

Q/TD20423-2024 "Detailed Specifications for SOXO15X Series Isothermal Quartz Crystal Oscillators"

Q/TD20424-2024 "Detailed Specifications for SOXO16X Series Isothermal Quartz Crystal Oscillators"

Q/TD20425-2024 "Detailed Specifications for SOXO17X Series Isothermal Quartz Crystal Oscillators" **Quality Grade: Aerospace-grade(S), QJB(S), CN**

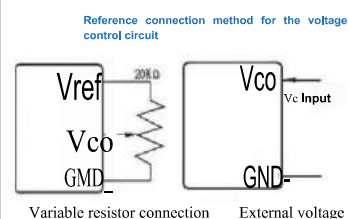
Technical Specifications

◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			5~125MHz
Typical frequency (MHz)			10、80、100、120
Supply voltage			3V~15V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥7 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-80dBc
Phase noise (100 MHz)			Phase Noise Meter
Power consumption (on/off/stable)			5W/2W (Max) @25℃
Operating temperature range			Frequency and Temperature Stability Table
Storage temperature range			-55℃~+85℃
Frequency Adjustment			≥±0.3 ppm (customizable)
Packaging size			Refer to the external dimensions diagram

©Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A(± 0.01)	B(± 0.05)	C(± 0.1)	D(± 0.5)
A-0°C~+50°C	●	●	●	
B-10°C~+60°C	●	●	●	
C-20°C~+70°C	●	●	●	●
D-40°C~+85°C	*custom made	●	●	●
E-55°C~+85°C	*custom made	●	●	●
F-40°C~+70°C			●	

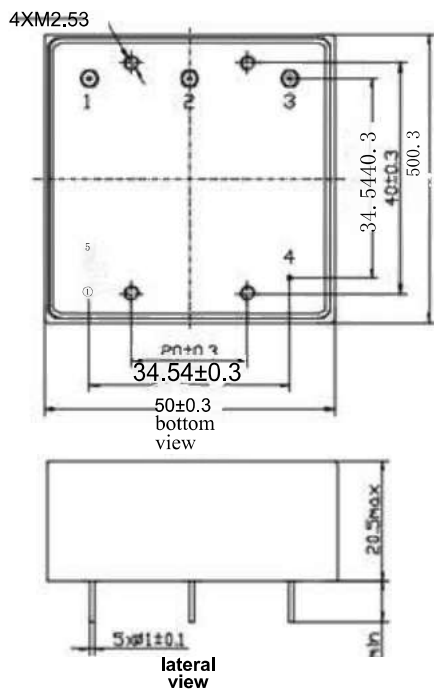


Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

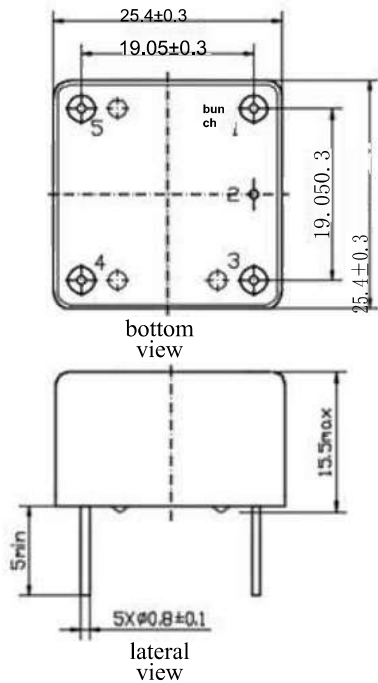
Deviation from the carrier frequency	Phase noise (dBc/Hz): fo <40 MHz (typical value: 10 MHz)				
	B	C	D	U	F
1Hz	-95	-100	-105	-110	*custom made
10Hz	-120	-125	-130	-135	
100Hz	-135	-140	-145	-150	
1kHz	-140	-145	-150	-155	
10kHz	-145	-150	-155	-160	
100kHz	-150	-155	-160	-165	
Deviation from the carrier frequency	Phase noise (dBc/Hz): fo ≥ 40 MHz (typical value: 100 MHz)				
	B	C	D	U	F
10Hz	-90	-95	-100	-105	*custom made
100Hz	-120	-125	-130	-135	
1kHz	-145	-150	-155	-160	
10kHz	-150	-155	-160	-165	
100kHz	-155	-160	-165	-165	

External dimensions and structural code

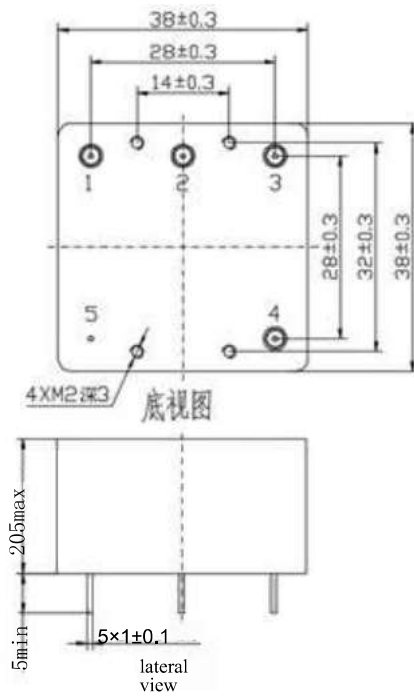


1. Voltage-Controlled or Floating 2. Reference Voltage or Floating
3. Output 4, Ground 5, Power Source

Structure Code: 13X

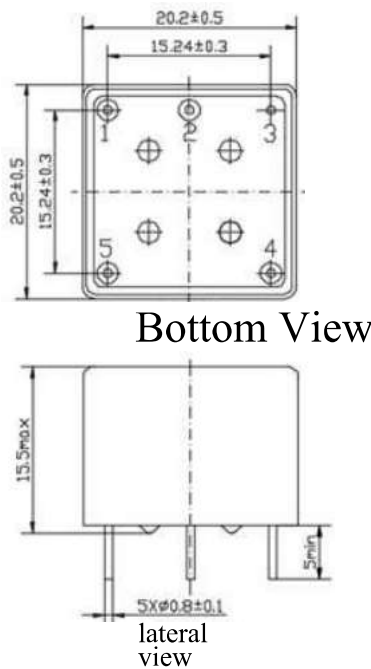


1. Output 2, Ground 3, Pressure Control
or Suspension
4. Reference voltage or floating 5, power
supply structure code:16X



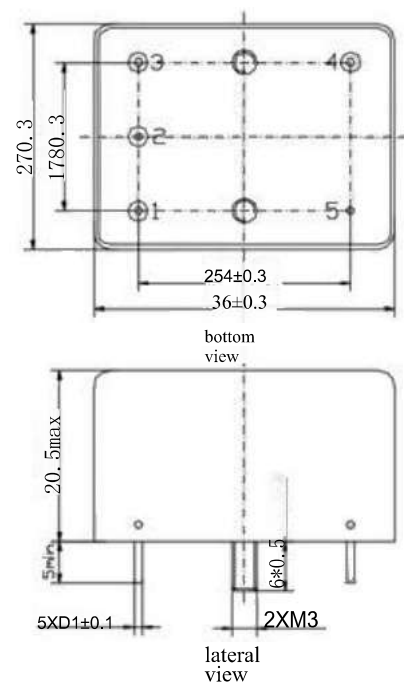
1. Voltage-Controlled or Floating 2. Reference Voltage or Floating
3. Power Source 4, Output 5, Ground

Structure Code: 14X



1. voltage-controlled or floating 2. Reference voltage or floating
3. 4. Output 5. Power Supply

Structure Code: 17X



1. Voltage-Controlled or Floating 2. Reference Voltage or Floating

3. Power Source 4, Output 5, Ground

Structure Code: 15X

Vibration-Resistant Crystal Oscillator

1 Vibration-Resistant, Temperature-Compensated Crystal Oscillator STXO 14V/16V

Product Features and Applications/Features

- © Low vibration phase noise, with an optimal value of ≤ -135 dBc/Hz at 1 kHz;
- © High frequency stability;
- © Designed for high-vibration environments such as airborne and missile-mounted applications.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"
Enterprise Standards: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based Thermally Compensated Quartz Crystal Oscillators"; Q/TD20127B-2016 "Product Specification for Thermally Compensated Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

© Electrical Performance Parameters

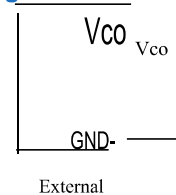
Parameter Name		Particular	Value
Frequency range			50~120MHz
Typical frequency (MHz)			50、60、80、100、120
Supply voltage			5V/12V
Frequency stability	VS. temperature	Frequency and Temperature Stability Table	
	Output power		≥ 5 dBm (customizable)
Sinusoidal wave	Harmonic distortion		≤ -30 dBc
	Clutter		≤ -70 dBc
TTL/HCMOS	上升/下降沿		≤ 6 ns
	Occupancy Ratio		$50\% \pm 5\%$
Phase noise (1 0 0 MHz)		Static:	≤ -145 dBc/Hz@1 kHz
		Dynamic:	≤ -125 dBc/Hz@1 kHz
Power dissipation			0.25W (Max) @25°C
Storage temperature range			$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency Adjustment			$\geq \pm 1$ ppm (customizable)
Packaging size			Refer to the external dimensions diagram

© Frequency and Temperature Stability Table

Frequency and Temperature Stability (ppm)

temperature range	A (± 0.28)	B (± 0.5)	C (± 1)	D (± 2)
input A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●	
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$		●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●	●
voltage D: 40°C to $+85^{\circ}\text{C}$	* custom made	●	●	●
end has built-in bias, E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	*Customized	●	●
required for F -40°C to $+70^{\circ}\text{C}$	●	●	●	●

Reference connection method for the voltage control circuit



Note: The voltage control

No frequency calibration is required for F -40°C to $+70^{\circ}\text{C}$. In this case, keep the voltage control input terminal free.

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

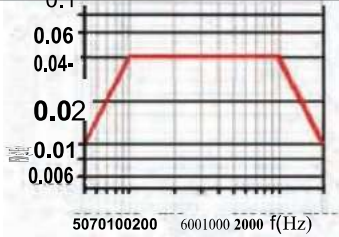
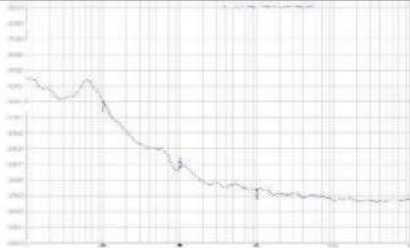
Electrical frequency modulation and hopping filter

Mechanical Filter

Clock and Signal Processing Chip

Phase Noise Meter

Deviation from the carrier frequency	Dynamic phase noise (dBc/Hz)				Note: 1. Dynamic phase noise is tested under vibration conditions. In the absence of special requirements, the vibration conditions shall comply with the random vibration method specified in GJB360B-2009, Section 214. Condition I-B specifies the vibration requirements; the remaining vibration conditions can be customized. 2. For static phase noise, refer to the phase noise specifications of the STX013 temperature-compensated crystal oscillator.
	A	B	C	E	
1kHz	-120	-125	-130	*custom made	

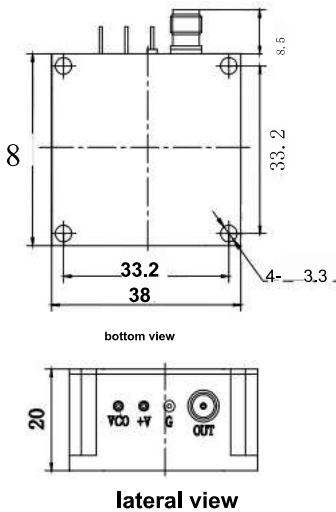


Typical dynamic phase noise curve for a 100 MHz crystal oscillator 1,000 MHz crystal vibration spectrum line graph

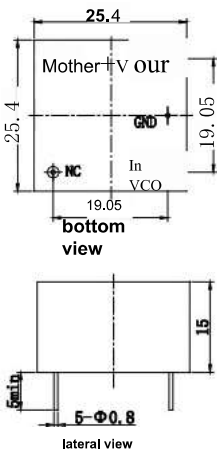
Order Instructions

Model	STX0	14V	E	100M	D	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Warming and Timing Crystal Oscillator	14V: (38*38*20) 16 V: (25.4*25.4*15)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M, which is 100 MHz	A: ±0.28ppm B: ±0.5ppm C: ±1ppm D: ±2ppm	S: Sine wave H: Square wave	H: +5V I: +3.3V	See Phase Noise Table	None: Not nationwide Industrialization G: Fully domestically produced Chemicalization	None: Onboard / Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Year

External dimensions and structural code



Structure code: 14V



Structure code: 16V

Product Features and Applications/Features

◎The physical vibration isolation method is employed, achieving an optimal phase-noise level of ≤ -150 dBc/Hz at 1 kHz.

◎High frequency stability: 10^{-7} to 10^{-8} ;

◎ Suitable for high-vibration environments such as airborne, missile-mounted, and rocket-mounted applications.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"
Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

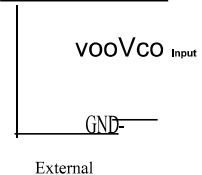
◎ Electrical Performance Parameters

Parameter Name	Characteristic
Frequency range	10~160MHz
Typical frequency (MHz)	10、40、80、100、120
Supply voltage	5V/12V/15V
Frequency stability	VS. temperature
Output power	Frequency and Temperature Stability Table
Sinusoidal wave	≥ 7 dBm (customizable)
Harmonic distortion	≤ -30 dBc
Clutter	≤ -80 dBc
Phase noise (1 0 0 MHz)	Static: ≤ -160 dBc/Hz@1 kHz
Age-related Aging	Dynamic: ≤ -145 dBc/Hz@1 kHz
Power consumption (on/off/stable)	± 0.05 ppm $\sim \pm 0.5$ ppm
Operating temperature range	± 0.6 W/1.5 W (Max) @25°C
Storage temperature range	Frequency and Temperature Stability Table
Frequency Adjustment	$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Packaging size	$\geq \pm 1$ ppm (customizable)
	Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

temperature range	A (± 0.01)	Frequency and Temperature Stability (ppm): B (± 0.05), C (± 0.1)	D (± 0.5)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	●
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	●	●	●
voltage D: 40°C to $+85^{\circ}\text{C}$	1	* custom made	●
end has built-in bias, E: $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	*Customized	●
required for F: -40°C to $+70^{\circ}\text{C}$	*Customized	●	●

Reference method for voltage control circuit



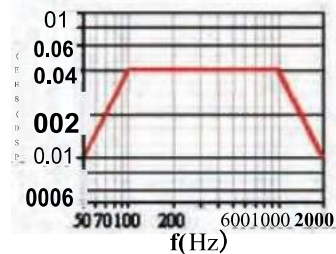
Note: The voltage control

No frequency calibration is

• In this case, keep the voltage control input terminal free.

Phase Noise Meter

Deviation from the carrier frequency	Dynamic phase noise (dBc/Hz)					Note: 1. Dynamic phase noise is tested under vibration conditions. Unless otherwise specified, the vibration conditions shall comply with Condition I-B of Article 214 in the GJB360B-2009 Random Vibration Method; other vibration conditions may be customized as required. 2. For static phase noise, refer to the phase noise specifications of the SOX017 constant temperature crystal oscillator.
	A	B	C	D	E	
1kHz	-135	-140	-145	-150	*custom made	

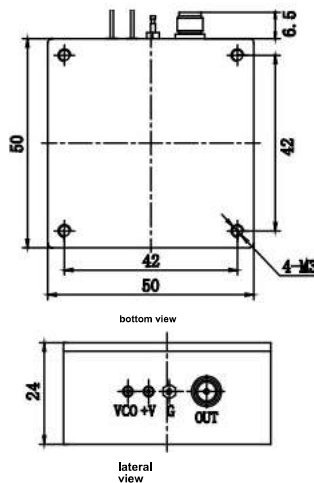


Typical dynamic phase noise curve for a 100 MHz crystal oscillator 1,000 MHz crystal vibration spectrum line graph

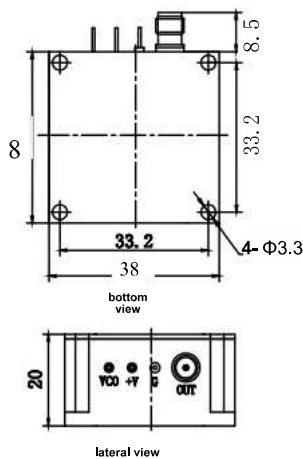
Order Instructions

Model	SOXo	14V	F	100M	C	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermostatic crystal oscillator	13V: (50*50*24) 14V (38*38*20) 16V: (254*254*15)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±0.01ppm B: ±0.05ppm C: ±0.1ppm ±0.5ppm	S: sinusoidal wave	F: +15V G: +12V H: +5V 1+3.3V	Phase detection Noise Table	None: No Fully domestically produced G: Fully domestically produced	None: Onboard / Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Year

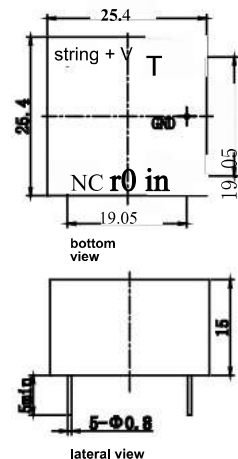
External dimensions and structural code



Structure code: 13V



Structure code: 14V



Structure code: 16V

Product Features and Applications/Features

- ◎ Low vibration phase noise, with an optimal value of ≤ -120 dBc/Hz at 1 kHz;
- ◎ The circuit compensation method is adopted, resulting in high frequency stability.
- ◎ Designed for high-vibration environments such as airborne and missile-mounted applications.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20126B-2016 "Product Specification for Airborne and Ground-Based 温補石英 Crystal Oscillators"

Q/TD20127B-2016 "Product Specification for Warm-Compensated Quartz Crystal Oscillators for Missile and Arrow Applications" Quality Grade: Military Grade (B)

Technical Specifications

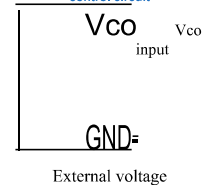
◎ Electrical performance parameters

Parameter Name			Characteristic
Frequency range			20~120MHz
Typical frequency (MHz)			20、40、60、80、100、120
Supply voltage			3.3V/5V
Frequency stability		VS. temperature	Frequency and Temperature Stability Table
Output	Sinusoidal wave	Output power	≥5 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
	TTL/HCMOS	上升/下降沿	≤6ns
		Duty Cycle	50%±5%
Phase noise (100 MHz)			Static: ≤-140 dBc/Hz at 1 kHz
			Dynamic range: ≤-120 dBc/Hz at 1 kHz
Power dissipation			0.25W (Max) @25℃
Storage temperature range			-55℃~+85℃
Frequency Adjustment			≥±1 ppm (customizable)
Packaging size			Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

Temperature range	Frequency and Temperature Stability (ppm)			
	A (± 0.28)	B (± 0.5)	C (± 1)	D (± 2)
A 0°C~+50°C	●	●	●	●
B -10°C~+60°C	●	●	●	●
C -20°C~+70°C	●	●	●	●
D -40°C~+85°C	*custom made	●	●	●
E -55°C~+85°C	1	*custom made	●	●
F -40°C~+70°C	*custom made	●	●	●

Reference connection method for the voltage control circuit



Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Dynamic phase noise (dBc/Hz)				Note:1,dynamic phase noise is measured under vibration conditions.In the absence of special requirements, the acceleration spectral density is 0.06 g ² /Hz; other vibration conditions can be customized according to the GJB 1032A-2020 classical spectral profile. 2、 For static phase noise, refer to the phase noise specifications of the STXO13 temperature-compensated crystal oscillator.
	A	B	C	E	
1kHz	-110	-115	-120	*custom made	



100 Typical dynamic phase noise curve of an MHz crystal oscillator

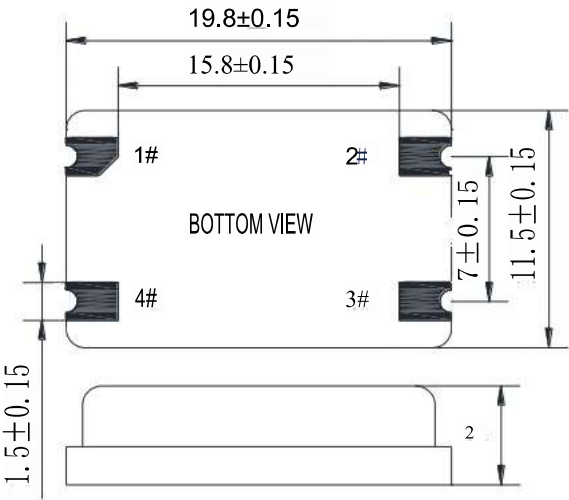
Frequency (Hz)	Spectrum density (g ² /Hz)
20~80	+3dB/oct
80~350	0.06
350~2000	-3dB/oct

100 MHz oscillator vibration conditions

Order Instructions

Model	STX0	13LG	E	100M	D	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domes-tication logo	Apply Environment
	Warning and Tolerating Crystal Oscillator	-	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100M means 100MHz	A: ±0.28ppm B: ±0.5ppm C: ±1ppm D: ±2ppm	S: Sine wave H: Square wave	H: +5V I: +3.3V	See Phase Position Noise Table	None: Not nationwide Industrialization G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Year

External dimensions and structural code



For frequencies up to 50MHz,H=7mm;for frequencies beyond 50MHz,H=4.5mm.

Product Features and Applications/Features

- ◎ Using circuit compensation, the vibration phase noise is low, with an optimal value of ≤ -110 dBc/Hz at 100 Hz and ≤ -130 dBc/Hz at 1 kHz.
- ◎ High frequency stability: 10^{-7} to 10^{-8} ;
- ◎ Suitable for environments with intense vibrations and impacts, such as airborne, missile-mounted, and rocket-mounted applications.

Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Standards: Q/TD20125A-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne and Ground Applications"; Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Systems"

Quality Grade: Military Grade (B)

Technical Specifications

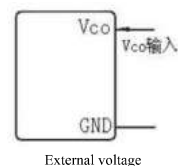
◎ Electrical performance parameters

Parameter Name	Characteristic
Frequency range	100MHz
Typical frequency (MHz)	100
Supply voltage	5V/12V/15V
Frequency stability VS. temperature	Frequency and Temperature Stability Table
Output power	≥ 7 dBm (customizable)
Sinusoidal wave harmonic distortion	≤ -30 dBc
Clutter	≤ -80 dBc
Phase noise (100 MHz)	Static: ≤ -160 dBc/Hz@1 kHz Dynamic: ≤ -130 dBc/Hz@1 kHz
Age-related aging	± 0.05 ppm $\sim \pm 0.5$ ppm
Power consumption (on/off/stable)	5.4W/1.8W (Max) @25°C
Operating temperature range	Frequency and Temperature Stability Table
Storage temperature range	$-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Frequency Adjustment	$\geq \pm 1$ ppm (customizable)
Packaging size	Refer to the external dimensions diagram

◎ Frequency and Temperature Stability Table

temperature range	Frequency and Temperature Stability (ppm)			
	A (± 0.01)	B (± 0.05)	C (± 0.1)	D (± 0.5)
A $0^{\circ}\text{C} \sim +50^{\circ}\text{C}$	●	●	● ● ●	● ●
B $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$	●	●	●	●
C $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$				
D $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	* custom made	●	●
E $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$	1	* custom made	●	●
F $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$	*custom made	●	●	●

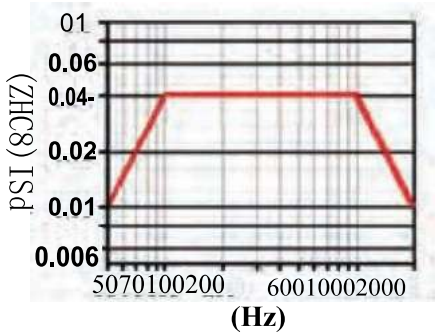
Reference connection method for the voltage control circuit



Note: The voltage control terminal is pre-set with a bias voltage. When no frequency calibration is required, leave the voltage control input terminal unconnected.

Phase Noise Meter

Deviation from the carrier frequency	Dynamic phase noise (dBc/Hz)					Note: 1. Dynamic phase noise is tested under vibration conditions. Unless otherwise specified, the vibration conditions shall comply with Condition I-B of Article 214 in the GJB360B-2009 Random Vibration Method; other vibration conditions may be customized as required. 2. For static phase noise, refer to the phase noise specifications of the SOX016 constant temperature crystal oscillator.
	A	B	C	D	E	
1kHz	-115	-120	-125	-130	*custom made	

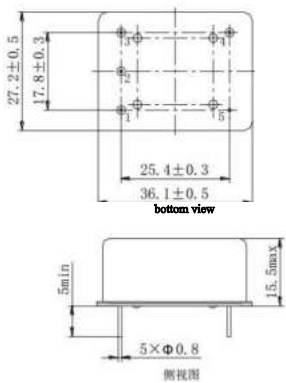


Typical dynamic phase noise curve for a 100 MHz crystal oscillator 1,000 MHz crystal vibration spectrum line graph

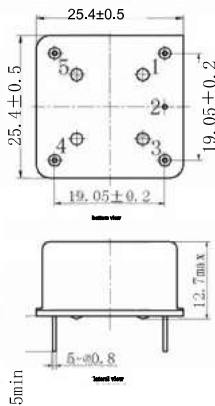
Order Instructions

Model	S0xo	14V	F	100M	C	S	H	B	-G	-D
Meaning Explanation	Crystal oscillator type	Structure Code	Temperature range	Nominal Frequency	Frequency and Temperature Stability	Output Wave form	Supply voltage	Phase Noise	Domestication logo	Apply Environment
	Thermosensitive crystal oscillator	15LG: (36*27*15.5) 16LG: (25.4*25.4*12.7) 17LG: (20*20*11)	A: 0~+50℃ B: -10~+60℃ C: -20~+70℃ D: -40~+85℃ E: -55~+85℃ F: -40~+70℃	100 M, which is 100 MHz	A: ±0.01ppm B: ±0.05ppm C: ±0.1ppm D: ±0.5ppm	S: sinusoidal wave	G: +12V H: +5V	Phase detection Noise Table	None: Not domestically produced G: Fully domestically produced	None: Onboard/ Vehicle / Carrier-borne / Ground and other surfaces D: Arrow Carrier

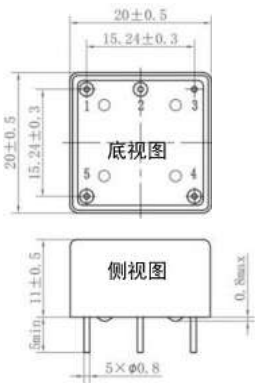
External dimensions and structural code



Structure code: 15LG



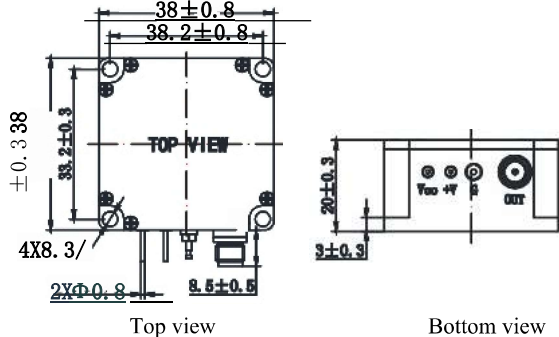
Structure code: 16LG



Structure code: 17LG

Recommended Product (1)Vibration-Resistant, Low-Phase Noise Constant Temperature Crystal Oscillator

Product Name: Vibration-Resistant, Low-Phase Noise, Constant-Temperature Crystal Oscillator Product model: SOXO14VF100MCSG

Technical Indicator Items				Specification Requirements	
Nominal frequency		☒ 100MHz		Other recommended frequencies	80MHz、120MHz
Outline dimension		38×38×20mm ³		Product weight	☐ 100g (Max)
Temperature range		Working temperature		☒ -40℃~+70℃	
		Storage temperature		☒ -55℃~+85℃	
Quality grade		Military-grade (B), implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD 20125A-2016			
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016			
Supply voltage	12V±5%	Working	Initial status	☒ ≤300mA (@25±2℃)	
		Current	Stable state	☒ ≤100mA (@25±2℃)	
Output		Wave form		☒ sinusoidal wave	
		Output power		☒ ≥8 dBm (load: 50 ohms)	
		Harmonic wave		☒ ≤-30dBc	
		Clutter		☒ ≤-80dBc	
Frequency accuracy		Initial accuracy at the reference temperature		☒ ≤±0.5ppm (25℃±2℃)	
Frequency stability		Frequency and Temperature Stability		☒ ≤±0.1ppm (-40℃~+70℃)	
		Frequency and Voltage Stability		☐ ≤±0.01 ppm (voltage variation ±5%)	
Frequency regulation		Frequency adjustment range		☒ ≥±1ppm (0~8V)	
Phase noise (100 MHz)		Steady state			Dynamic (GJB360B Method 214 Condition 1-B)
		☒ ≤-160dBc/Hz@1kHz;			☒ ≤-145dBc/Hz@1kHz;
		☒ ≤-165dBc/Hz@10kHz;			☒ ≤-160dBc/Hz@10kHz;
		☒ ≤-170dBc/Hz@100kHz。			☒ ≤-165dBc/Hz@100kHz。
Age		☒ ≤±5 ppb/day			
		☐ ≤±0.3 ppm/year			
外形 diagram and pin definition					
Pin number	Pin Function		 Top view Bottom view		
+V	Source (VCC)				
G	Ground (GND)				
OUT	Output (RFOUT)				
VCO	VCO (Voltage Control)				
The signal output is via the SMA interface.					
Remarks		1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6;1ppb=1E-9。			

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

Electrical frequency-dumping filter

Mechanical Filter

Clock and Signal Processing Chip

Product Features and Applications/Features

◎ Optimal vibration phase noise ≤ -150 dBc/Hz at 1 kHz;

◎ Integrated low-noise phase-locked loop;

◎ It is widely applicable in military and civilian communications, radar, and other fields.



Quality Specification/Quality Assurance

General Specification: GJB1648A-2011 "General Specification for Crystal Oscillators"

Enterprise Specification: Q/TD20125A-2016 "Product Specification for Airborne and Ground-Based Constant-Temperature Quartz Crystal Oscillators"

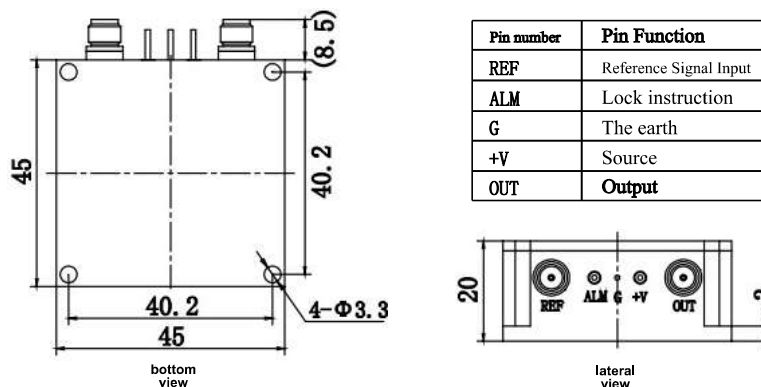
Q/TD20129B-2016 "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missiles and Arrows" Quality Grade: Military Grade (B)

Technical Specifications

◎ Electrical performance parameters

Parameter Name			Characteristic
Input frequency range			10~125MHz
Output frequency range			10~160MHz
Supply voltage			12V/15V
Output	Sinusoidal wave	Output power	≥5 dBm (customizable)
		Harmonic distortion	≤-30dBc
		Clutter	≤-70dBc
Phase noise (100 MHz)			Static: ≤-160 dBc/Hz @ 1 kHz
			Dynamic range: ≤-145 dBc/Hz at 1 kHz
Power consumption (on/off/stable)			5W/2W (Max) @25℃
Lock instruction			≥3V@When locked
Operating temperature range			-55℃~+85℃
Storage temperature range			-55℃~+85℃
Packaging size			Refer to the external dimensions diagram

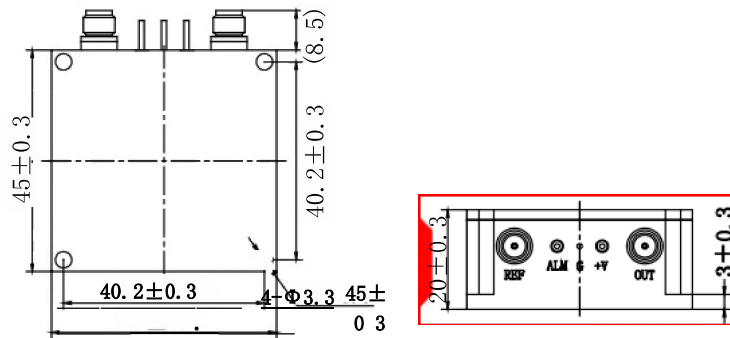
External dimensions and structural code



Structure code: 11V

Recommended Product : Vibration-Resistant Phase-Locked Loop Thermostable Crystal Oscillator

Product Name: Vibration-Absorbing Phase-Locked Loop Thermostable Crystal Oscillator Product model: SPXO11V-10M-100M

Technical Indicator Items			Specification Requirements	
Nominal frequency		☒ 100MHz	Other recommended frequencies	80MHz、120MHz
Outline dimension		45×45×20mm ³	Product weight	☐ 100g (Max)
Temperature range		Working temperature	☒ -40℃~+70℃	
		Storage temperature	☒ -55℃~+85℃	
Quality grade		Military-grade (B), compliance standard: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Airborne, Ground, and Other Applications" Q/TD20125A-2016		
		-D Military-grade (B), Implementation specification: "Product Specification for Constant-Temperature Quartz Crystal Oscillators for Missile and Arrow Applications" Q/TD20129B-2016		
Supply voltage	12V±5%	Working	Initial status	☒ ≤350mA (@25±2℃)
		Current	Stable state	☒ ≤150mA (@25±2℃)
Output		Wave form		☒ sinusoidal wave
		Output power		☒ ≥10 dBm (load: 50 ohms)
		Harmonic wave		☒ ≤-30dBc
		Clutter		☒ ≤-70dBc
Locking indicator level		☐ ≥3V when locked		
Steady-state phase noise (room temperature, locked)		Steady state		Dynamic (GJB360B Method 214 Condition 1-B)
		☒ ≤-160dBc/Hz@1kHz ;		☒ ≤-145dBc/Hz@1kHz ;
		☒ ≤-165dBc/Hz@10kHz ;		☒ ≤-160dBc/Hz@10kHz ;
		☒ ≤-170dBc/Hz@100kHz。		☒ ≤-165dBc/Hz@100kHz。
Age		☐ ≤±0.3 ppm/year (internal crystal oscillator specification)		
Requirements for the reference input signal				
Reference frequency		10MHz		
Frequency accuracy		≤±0.5ppm		
Signal power		0~10dBm		
Phase noise		≤-120dBc/Hz@10Hz		
外形 diagram and pin definition				
Pin number	Pin Function			
REF	Reference Signal Input			
ALM	Lock instruction			
G	The earth			
+V	Source			
OUT	Output			
Note: The signal input and output ports use SMA negative connectors.				
Remarks		1、The addition of the "D" designation after the product model indicates that the product is designed for use in explosive or projectile environments. 2、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for design assurance; 3、1ppm=1E-6; 1ppb=1E-9。		

quartz-crystal filter

Quartz crystal oscillator

quartz crystal filter

Electrical frequency modulation and hopping filter

Mechanical Filter

Clock and Signal Processing Chip

Quartz Crystal Filter

The crystal filter is an electrical filter that employs a high-Q quartz crystal resonator as its core component, featuring high selectivity and excellent frequency-temperature stability. It holds a unique position within the frequency range of 5 MHz to 250 MHz, with a relative bandwidth of 0.009% to 2%. The company possesses proprietary mid-bandwidth design technology and smooth group delay design technology, boasting years of technical expertise in high-frequency crystal filters.

The company boasts over 50 years of extensive history in developing and manufacturing crystal filters. Its numerous products have achieved internationally advanced and domestically leading standards, finding widespread application in military electronic communication systems across maritime, terrestrial, aerial, and space domains. The company has long provided development and production support for national key projects and military equipment, including manned spacecraft, launch vehicles, and military communications systems. Currently, its crystal filter products—including high-frequency compact narrowband series, medium-bandwidth series, smooth group delay series, and spectrum purification series—are being mass-produced with an annual output exceeding ten thousand units. Throughout the Ninth, Tenth, Eleventh, Twelfth, and Thirteenth Five-Year Plan periods, the company has consistently undertaken new product initiatives, pre-research projects, product portfolio development programs, and standardization efforts commissioned by the final assembly authorities. The developed crystal filters now achieve maximum frequencies exceeding 250 MHz, relative bandwidths of 1.8%, and group delay fluctuations within the passband of less than 1 μ s.

The crystal filter products developed by the company comply with the relevant standards of the national military standard GJB1508A and the detailed requirements of enterprise military standards. The product quality grades include Grade C (general military use), Grade M (high-reliability military use), enterprise military standards, and CAST C.

The crystal filters developed by the company are widely used in military and civilian electronic communication equipment such as wired carrier communications, radio communications, broadcasting, and remote sensing and telemetry systems. In these systems, they primarily serve to perform intermediate-frequency filtering, improve the signal-to-noise ratio, and reduce phase noise.



List of Typical Products Series

List of Typical Products from the Bandpass Crystal Filter

Quality Grade: Class C, Class M, Enterprise Military Standard Product Specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009

Frequency f_0 MHz	Product model	Band width kHz	All dB	Group time Move us	Square ratio	Stop band Dissipation dB	Temperat- ure °C	Structural dimens- ion mm ³
10	STXF05D10M5K/70	$BW_2=5\sim 6$	≤ 2.5	/	$BW/BW_3 \leq 4$	≥ 80	$-10\sim +70$	$25 \times 15 \times 10$
	SPXF5035SE10-10MHz	$BW_1 < 10$	≤ 3	/	/	≥ 60	$-55\sim +85$	$30 \times 20 \times 12$ (SMA)
	SPXF5035SE0.5/60-10MHz	$BW_1 \leq 0.5$	≤ 4	/	/	≥ 70	$-40\sim +85$	$30 \times 20 \times 12$ (SMA)
10.7	SPXF5050C100/40-10.7MHzV	$BW_3 \geq 100$	≤ 5	/	$BW_4/BW_3 \leq 2.5$	≥ 40	$-20\sim +70$	$25 \times 15 \times 13$
15	STXF05D15M5K/70	$BW_3=5\sim 6$	≤ 2.5	/	$BW_5/BW_3 \leq 4$	≥ 80	$-10\sim +70$	$25 \times 15 \times 10$
	SPXF5050-0.6/40-15MHz	$BW_1 \leq 0.7$	≤ 6	/	/	≥ 40	$+10\sim +60$	$25 \times 15 \times 13$
21.4	STXFA03-E21.4M5-60	$BW_6 \geq \pm 2.78$	≤ 4	/	$BW_6/BW_6 \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	STXFA06A-B21.4M10-55	$BW_3 \geq \pm 5$	≤ 4	/	$BW_6/BW_3 \leq 3$	≥ 60	$-55\sim +85$	$25 \times 15 \times 10.5$
	STXFA06A-E21.4M25-70	$BW_3 \geq 25$	≤ 4	1	$BW_6/BW_3 \leq 2$	≥ 70	$-55\sim +85$	$25 \times 15 \times 10.5$
	STXFA06A-B21.4M38-55	$BW_6 \geq 38$	≤ 4	/	$BW_6/BW_6 \leq 2.5$	≥ 60	$-55\sim +85$	$25 \times 15 \times 10.5$
	STXFB02E-E21.4M70-60	$BW_1 \geq 70$	≤ 5	/	$BW/BW_1 \leq 2.7$	≥ 60	$-55\sim +85$	$36 \times 16 \times 10.5$
	STXFC01E21.4M70K/90	$BW_3 \geq 60$	≤ 3	≤ 1	$BW_4/BW_3 \leq 3.5$	≥ 80	$-40\sim +85$	$38 \times 19 \times 12.5$
	STXFB02D-E21.4M70-70	$BW_3 \geq \pm 35$	≤ 4.5	≤ 1	$BW_6/BW_3 \leq 10$	≥ 70	$-55\sim +85$	$36 \times 16 \times 10$
50	SPXF5035SE5/60-50MHz	$BW_1 \leq 5$	≤ 4	/	/	≥ 70	$-55\sim +85$	$30 \times 20 \times 12$ (SMA)
	SPXF5051F55/70-50MHzV	$BW_1=55+5$	≤ 5	/	/	≥ 70	$-55\sim +85$	$25 \times 15 \times 10$
69.088	LST-6	$BW_6 \geq 68$	≤ 4	≤ 10	$BW_6/BW_3 \leq 2.5$	≥ 60	$-55\sim +85$	$25 \times 15 \times 13$
	STXF08-F69.088M38-60	$BW_6 \geq 38$	≤ 4	≤ 23	$BW_6/BW_3 \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	STXF08-F69.088M70-60	$BW_{12} \geq 70$	≤ 4	≤ 10	$BW_6/BW_{12} \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
70	STXF08-F70M38-60	$BW_6 \geq 38$	≤ 4	≤ 23	$BW_6/BW_3 \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	STXF08-F70M70-60	$BW_{12} \geq 70$	≤ 4	≤ 10	$BW_6/BW_{12} \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	STXF08-F70M10-60	$BW_3 \geq 10$	≤ 5	/	$BW_6/BW_3 \leq 4$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	SPXF5035S-B100/40-70MHz10	$BW_1=100 \pm 10$	≤ 4	Phase deviation $\leq \pm 5^\circ\text{C}$	$BW_4/BW_3 \leq 2.5$	≥ 70	$-55\sim +85$	$30 \times 20 \times 12$ (SMA)
	STXA03A-E70M38-60	$BW_6 \geq 38$	≤ 4	≤ 23	$BW_6/BW_3 \leq 2.5$	≥ 60	$-10\sim +60$	$35 \times 16 \times 8.5$
	STXA03A-E70M70-60	$BW_{12} \geq 70$	≤ 4	≤ 10	$BW_6/BW_{12} \leq 2.5$	≥ 60	$-55\sim +85$	$35 \times 16 \times 8.5$
	STXFB01-E70M200-70	$BW_3 \geq 200$	≤ 6	1	$BW_6/BW_3 \leq 2.75$	≥ 60	$-55\sim +85$	$38 \times 19 \times 12.5$
100	SPXF5035SF10/60-100MHz	$BW_1 \leq 10$	≤ 4	/	/	≥ 70	$-55\sim +85$	$30 \times 20 \times 12$ (SMA)
122.4	STXFC06B-D122.4M70k	$BW_3 \geq \pm 35$	≤ 3	≤ 1.5	$BW_4/BW_3 \leq 5$	≥ 60	$-55\sim +85$	$25 \times 15 \times 10$
124.8	STXF04E124.8M70K/80	$BW_3 \geq 60$	≤ 3	≤ 1	$BW_4/BW_3 \leq 4$	≥ 80	$-40\sim +55$	$36 \times 16 \times 12.5$
	STXF04E124.8M70K/80-A	$BW_3 \geq 60$	≤ 3	≤ 1	$BW_4/BW_3 \leq 4.5$	≥ 80	$-40\sim +70$	$36 \times 16 \times 12.5$
	STXF04E124.8M70K/80-B	$BW_3 \geq 70$	≤ 3	≤ 1	$BW_4/BW_3 \leq 4.5$	≥ 80	$-40\sim +70$	$36 \times 16 \times 12.5$
	STXF04E124.8M70K/80-C	$BW_3 \geq 60$	≤ 3	≤ 2	$BW_4/BW_3 \leq 4.5$	≥ 75	$-40\sim +70$	$36 \times 16 \times 12.5$
	STXFC15D124.8M	$BW_3 \geq 60$	≤ 3	≤ 1	$BW_4/BW_3 \leq 4.5$	≥ 60	$-40\sim +70$	$25 \times 15 \times 10$
	STXFB02-E124.8M200-70	$BW_3 \geq 200\text{kHz}$	≤ 6	≤ 1	$BW_4/BW_3 \leq 3$	≥ 70	$-40\sim +70$	$36 \times 16 \times 12.5$
140	STXFA19A-E140M200-50-B	$BW_{os} \geq 200\text{kHz}$	≤ 6.5	/	$BW_2/BW_{a5} \leq 1.9$	≥ 50	$-55\sim +85$	$42 \times 20 \times 7.8$
200	SPXF5035F15/60-200MHzV	$BW_1 \geq 15$	≤ 4	/	/	≥ 60	$-55\sim +85$	$30 \times 20 \times 12$ (SMA)

Note: The "-" and "+" in the passband width denote the lower and upper limits of the bandwidth deviation from the central frequency f_0 .

Silicon Crystal Harmonic Generator

Silicon Crystal Vibration Device

Silicon Crystal Filter

Electrical frequency-lumping filter

mechanical filter

Clock and Signal Processing Chip

1. band width

The frequency bandwidth when the relative attenuation is less than a specified value. Typically, 3 dB or 6 dB is used as the reference, referred to as the 3 dB passband width or 6 dB passband width, respectively.

2. Passband fluctuation

The difference between the maximum peak and trough attenuation values within the measured passband is defined as the in-band ripple.

3. insertion loss

The logarithm of the ratio between the power delivered to the load impedance before filter insertion and the power delivered after insertion serves as an indicator of the filter's power loss magnitude.

Typically, the insertion loss of a filter is measured at the frequency corresponding to the maximum output level in its passband, when measured at the filter's specified termination impedance.

4. Bandgap width

The attenuation closest to the nominal frequency of the pitch filter equals the interval between the two edge frequencies of the passband corresponding to specified values (e. g., 40 dB, 50 dB, 60 dB, etc.).

5. square ratio

It refers to the ratio of the specified stopband width to the passband width, serving as an indicator for evaluating a filter's selectivity.

6. Bandgap attenuation

The difference between the attenuation value within a specified passband frequency range and the reference attenuation value at the designated reference frequency in the passband.

7. Inhibition of ectoparasites

The minimum attenuation value of other vibration modes, excluding the desired vibration mode, within the specified stopband frequency range.

8. Central frequency deviation

The maximum frequency deviation between the actual center frequency and the nominal frequency under specified operating conditions. This includes precision errors due to manufacturing adjustments and the actual center frequency drift caused by filter passband drift within the operating temperature range.

9. matched impedance

To ensure proper filter operation, the input and output terminals must have matching impedance values. During testing and use, the termination impedance at both ends of the filter must comply with the required matching impedance specifications.

10. linear phase shift

For frequencies around the center frequency within 70% of the passband width, linear phase shift occurs when the phase shift varies by $\leq \pm 3^\circ$ with frequency.

11. group delay

This refers to the delay induced by wave packet or envelope propagation. Its value is the first derivative of the phase-shift diagonal frequency, expressed in radians, between the signal source and the output sine wave of the filter at a given frequency.

12. Minimum Phase Shift

Around the central frequency, within a specific frequency range, the relative change of phase shift with frequency must not exceed a predetermined value.

13. Group delay fluctuation

The group delay fluctuation within a specific frequency range is defined as the difference between the maximum and minimum group delays at that frequency. In practical engineering applications, "group delay fluctuation" is commonly used to characterize the minimum phase shift value.

1. Capacitors for DC blocking should be installed at the input and output terminals of the crystal filter to prevent DC signals from damaging the filter.

2. The filter's input and output impedance matching is typically 50 Ω . When properly matched, it delivers optimal filtering performance.

3. The filter features a pin-type solder-sealed structure, typically manufactured through manual welding. Excessive external force should not be applied to the product or its pins to avoid damage to the pins and solder seal. The filter must not be cleaned by immersion; instead, it should be wiped clean using cotton balls.

4. Grounding measures for filters are crucial. Proper grounding of filters during operation can effectively enhance passband attenuation; however, direct high-temperature welding of the enclosure for grounding must be avoided to prevent the formation of foreign particles.

5. A crystal filter is a passive network designed for small signal operating conditions, with a recommended input power range of -40 dBm to 0 dBm. Excessively low signal levels may compromise the filter's performance characteristics, while excessively high signals can shorten its service life.

6. Handle the crystal filter gently during transportation, installation, and use to prevent damage from chip fragmentation inside the filter.

7. When abnormalities are detected during filter operation, on-site testing and analysis can be conducted to identify the cause of the fault. If it is confirmed to be a filter malfunction, the entire filter should be removed and replaced.

8. When in use, the filter must be securely mounted to meet requirements for resisting vibration, impact, and other harsh environmental conditions.

Product Features and Applications/Features

- ◎ Good selectivity ($K_{603} \leq 2.5$);
- ◎ High band-stop suppression (90 dB);
- ◎ Widely applicable in wired carrier communication, radio communication, broadcasting and television, remote sensing, and telemetry applications.



Quality Specification/Quality Assurance

General Specification: GJB1508A-2021 "General Specification for Crystal Filters"

Enterprise Standards: Q/TD20133A-2009 "Product Specification for Quartz Crystal Filters for Airborne and Ground Applications"; Q/TD20131A-2009 "Product Specification for Quartz Crystal Filters for Missile and Arrow Systems"

Quality grades: Grade C, Grade M, Enterprise Military Standard

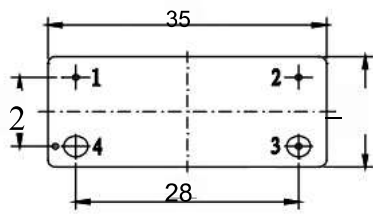
Technical Specifications

Model	Structural dimension mm ³	Frequency range MHz	3 dB relative bandwidth	Square ratio	Impedance Ω
STXFA01	38×19×12.5	10~200	0.05~0.15%	$K_{Go^3} \leq 2.0$	50 or customized
STXFA03	35×16×8.5	10~200	0.05~0.15%	$K_{60/3} \leq 2.5$	50 or customized
STXFA05	30×20×12.5	10~200	0.05~0.15%	$K_{60/3} \leq 2.5$	50 or customized
STXFA06	25×15×12.5	10~200	0.05~0.15%	$K_{60/3} \leq 2.5$	50 or customized
STXFA06A	25×15×10	10~200	0.05~0.15%	$K_{s0^3} \leq 4.0$	50 or customized

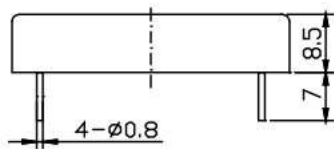
Measured performance indicators for a typical product (70 MHz)

Performance index	Symbol	Measured parameters	Unit	Conditions/Notes
3dB bandwidth	BW_3	39	kHz	
60 dB bandwidth	BW_{60}	91	kHz	
Passband fluctuation	bR	0.1	dB	
Insertion loss	b	2	dB	
Square ratio	$K_{60/3}$	2.3	/	
Bandgap attenuation	bA	90	dB	Input/Output Isolation
Working temperature		-55~+85	°C	
Structure size		35×16×8.5	mm ³	L×W×H
End impedance		50	Ω	
Interior input power		-40~0	dBm	

External dimensions and structural code



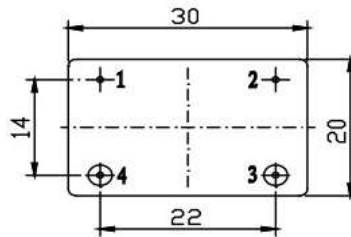
bottom view



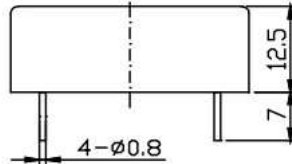
lateral view

1. Grounding 2. Grounding 3. Output 4. Input

Structure Code: 03

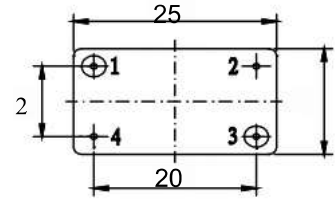


bottom view

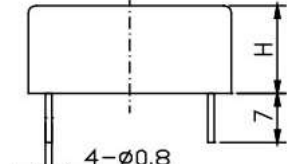


lateral view

Structure Code: 05



bottom view



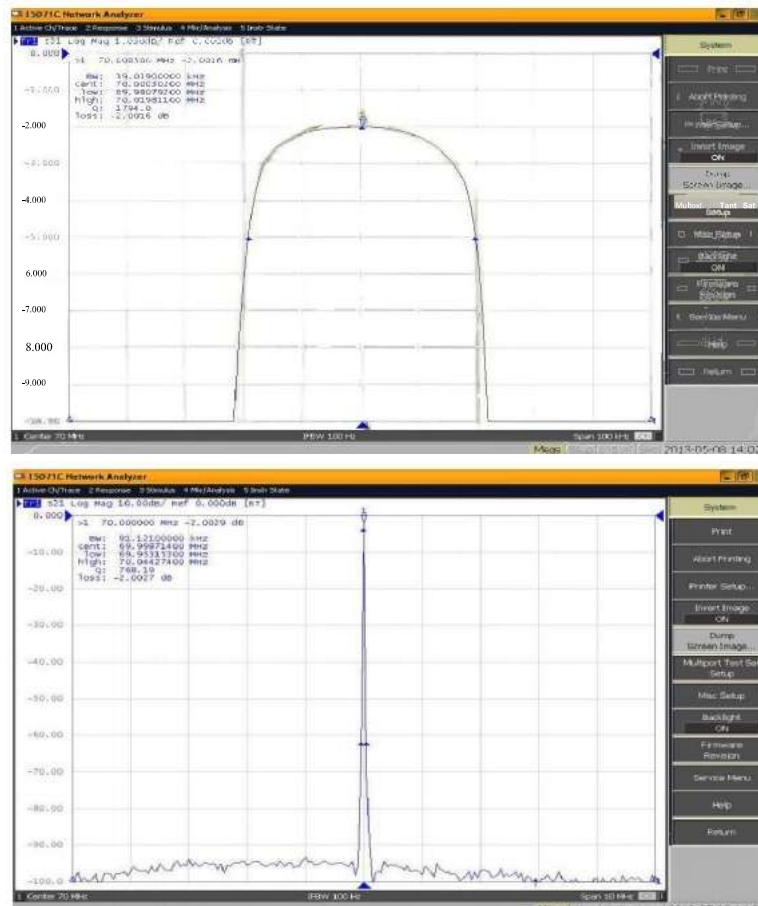
lateral view

1. Input 2. Grounding 3. Output 4. Grounding

Structure Code: 06 (H=12.5)

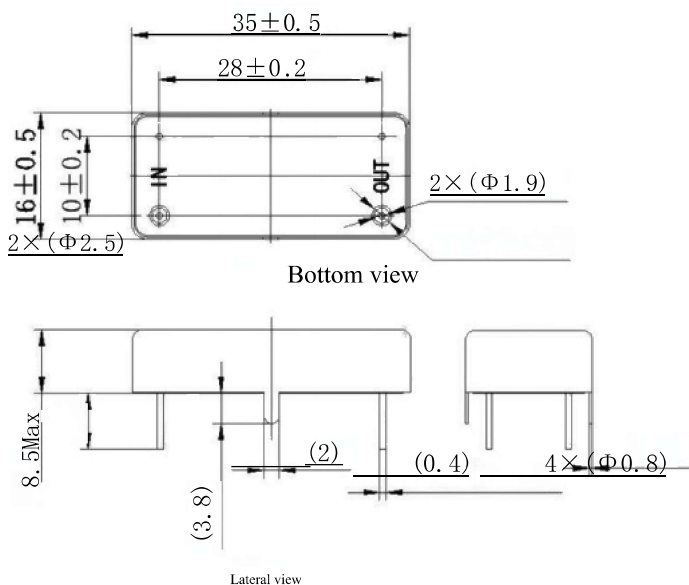
106A (H=10)

Experimental Measurement of the Passband and Stopband Characteristics of a 70 MHz Narrowband Crystal Filter



Product Name: Crystal Filter

Product model: STXFA030M70-60

Technical Indicator Items		Specification Requirements	
Nominal frequency fo	☑69.088MHz、70MHz	Product weight	☐30g (Max)
Outline dimension	35mm×16mm×8.5mm		
Temperature range	Working temperature	☐-55℃~+85℃	
	Storage temperature	☐-55℃~+85℃	
Quality grade	Military-grade standard (vibration-resistant type), compliance specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009		
Passband width BW12	☑≥±35kHz		
Passband fluctuation	☑≤1 dB (measured in-band ripple)		
Insertion loss	☑≤4dB		
Group delay fluctuation	☑≤8us (fo±25kHz) ; ≤13us (fo±34kHz)		
Bandgap width BW6o	☑≤190kHz		
Bandgap attenuation	☑≥60 dB (network analyzer Span set to 2 MHz)		
Recommended input power range	☐-40dBm~0dBm		
Input/Output Impedance	☐50 Ω /50 Ω		
External Shape Structure			
			
Note: The dimensions indicated in parentheses are guaranteed by the manufacturing process and are not subject to inspection requirements.			
Remarks	1、☑These serve as mandatory requirements to be met and provide the basis for product inspection; they also function as reference indicators for testing conditions or design assurance. 2、The engraving number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 3、Product documentation: Certificate of Conformity, test data, or relevant inspection reports; 4、This device is a non-sealed unit; immersion cleaning or water cleaning is prohibited. It is recommended to clean it using cotton balls. 5、This device is packaged in DIP solder joint format; current-carrying soldering is prohibited, and manual soldering is recommended.		

Product Features and Applications/Features

- ◎ Broad bandwidth (with a maximum relative bandwidth of up to 2%);
- ◎ Low insertion loss (3.2 dB);
- ◎ Widely applicable in wired carrier communication, radio communication, broadcasting and television, remote sensing, and telemetry applications.



Quality Specification/Quality Assurance

General Specification: GJB1508A-2021 "General Specification for Crystal Filters"

Enterprise Specification: Q/TD20133A-2009 "Product Specification for Quartz Crystal Filters for Airborne and Ground Applications"

Q/TD20131A-2009 "Product Specification for Quartz Crystal Filters for Ammunition and Arrow Systems" Quality Grades: Grade C, Grade M, Enterprise Military Standard

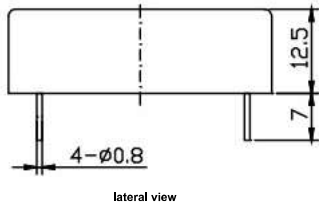
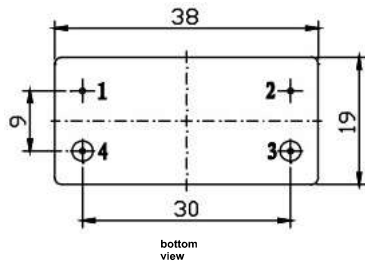
Technical Specifications

Model	Structural dimension mm ³	Frequency range MHz	3 dB relative bandwidth	Square ratio	Impedance Ω
STXFB01	38×19×12.5	10~200	0.15%~2%	$K60_3 \leq 2.5$	50 or customized
STXFB02	36×16×12.5	10~200	0.15%~2%	$K60_3 \leq 2.5$	50 or customized
STXFB04	33.6×16.3×12.6	10~200	0.15%~2%	$K40_3 \leq 3.0$	50 or customized
STXFB06	25×15×12.5	10~200	0.15%~2%	$K40_3 \leq 3.0$	50 or customized

Measured performance indicators for a typical product (70 MHz)

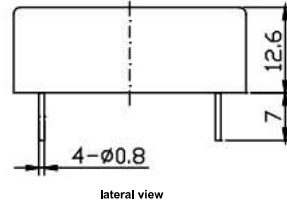
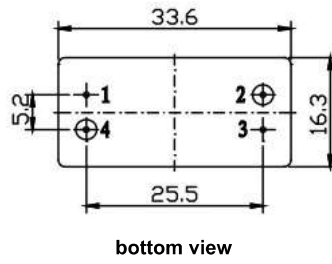
Performance index	Symbol	Measured parameters	Unit	Conditions/Notes
3dB bandwidth	BW ₃	214	kHz	
60 dB bandwidth	BW ₆₀	497	kHz	
Passband fluctuation	DR	0	dB	
Insertion loss	b	3.5	dB	
Square ratio	K60/3	2.3	/	
Bandgap attenuation	bA	70	dB	Input/Output Isolation
Working temperature		-55~+85	°C	
Structure size		38×19×12.5	mm ³	L×W×H
End impedance		50	Ω	
Interior input power		-40~0	dBm	

External dimensions and structural code



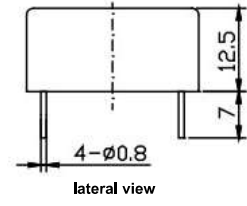
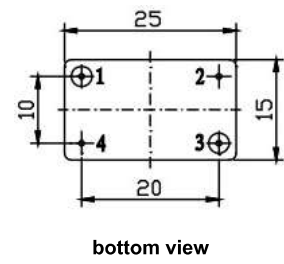
1. Grounding 2. Grounding 3. Output 4. Input

Structure Code: 01



1. Ground 2. Output 3. Ground 4. Input

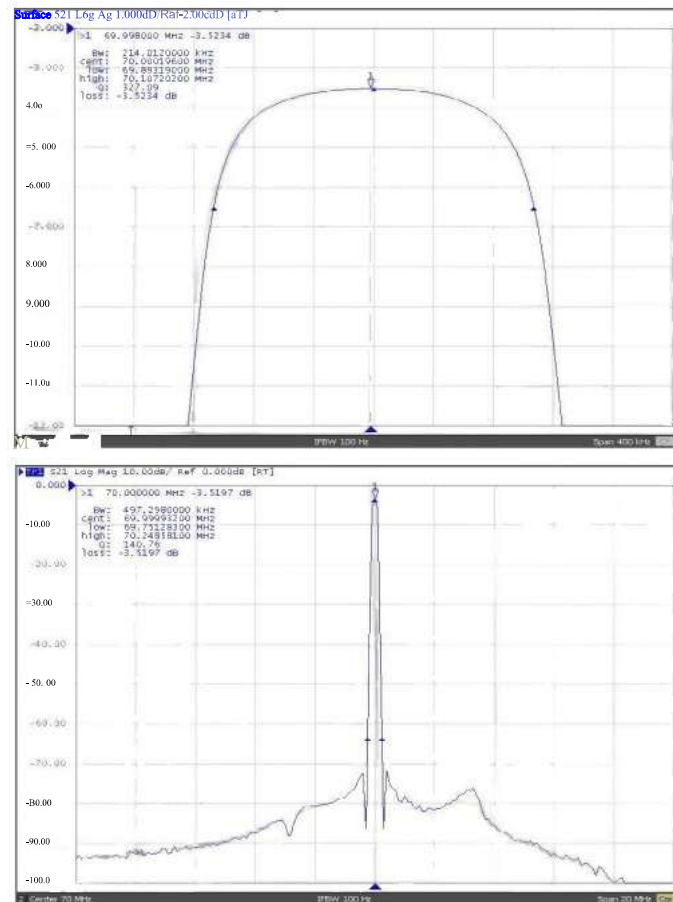
Structure Code: 04



1. Input 2. Grounding 3. Output 4. Grounding

Structure Code: 06

Experimental Measurement of the Passband and Stopband Characteristics of a 70 MHz Medium-Bandwidth Crystal Filter

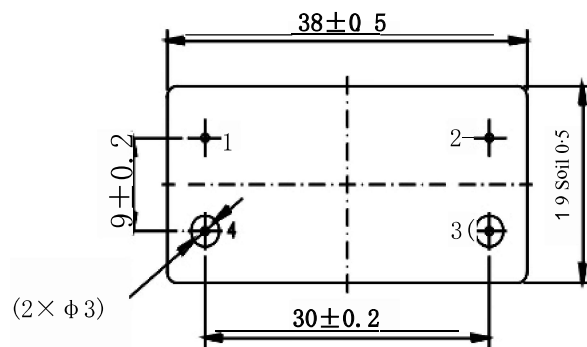


Medium-bandwidth crystal filter

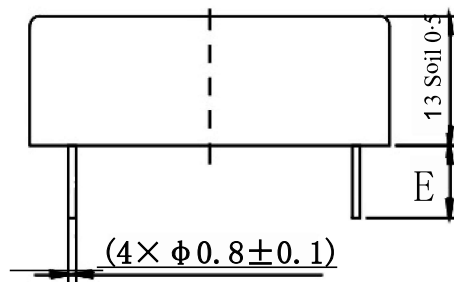
Product model: STXFB01-E□M200-70

Technical Indicator Items		Specification Requirements	
Nominal frequency fo	☒ 70MHz、124. 8MHz、140MHz	Product weight	☐ 30g (Max)
Outline dimension	38mm×19mm×13mm		
Temperature range	Working temperature	☐ -55℃~+85℃	
	Storage temperature	☐ -55℃~+85℃	
Quality grade	Enterprise military standard, implementation specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009		
Passband width BW3	☒ ≥200kHz		
Passband fluctuation	☒ ≤1 dB (measured in-band ripple)		
Insertion loss IL	☒ ≤6dB		
Bandgap width BW60	☒ ≤550kHz		
Bandgap attenuation	☒ ≥60 dB (network analyzer Span set to 10 MHz)		
Recommended input power range	☐ -40dBm~0dBm		
Input/Output Impedance	☐ 50 Ω /50 Ω		

External Shape Structure



Bottom view



Lateral view

1. G ND grounding 2. G ND grounding 3. OUT output 3. IN input Note: The dimensions indicated in parentheses are guaranteed by the manufacturing process and are not subject to inspection requirements.

Remarks	1、☒These conditions must be met and serve as the basis for product inspection.☐Reference indicators for testing conditions or design assurance; 2、The engraving number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 3、Product documentation: Certificate of Conformity, test data, or relevant inspection reports; 4、This device is a non-sealed unit; immersion cleaning or water cleaning is prohibited. It is recommended to clean it using cotton balls. 5、This device is packaged in DIP solder joint format: current-carrying soldering is prohibited, and manual soldering is recommended.	
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Product Features and Applications/Features

- ◎The group delay exhibits minimal fluctuation ($0.5 \mu s$);
- ◎High band-stop attenuation (80 dB);
- ◎Widely applicable in wired carrier communication, radio communication, broadcasting and television, remote sensing, and telemetry applications.

Quality Specification/Quality Assurance

General Specification: GJB1508A-2021 "General Specification for Crystal Filters"

Enterprise Standards: Q/TD20133A-2009 "Product Specification for Quartz Crystal Filters for Airborne and Ground Applications"; Q/TD20131A-2009 "Product Specification for Quartz Crystal Filters for Missile and Arrow Systems"

Quality grades: Grade C, Grade M, Enterprise Military Standard



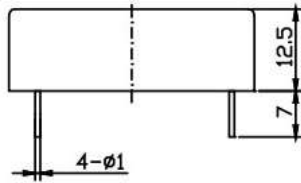
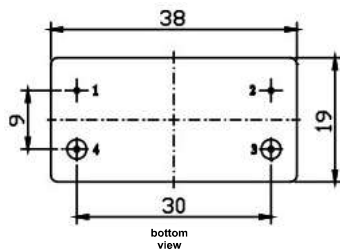
Technical Specifications

Model	Structural dimension mm ³	Frequency range MHz	Group delay fluctuation: μs	Square ratio	Impedance Ω
STXFC01	$38 \times 19 \times 12.5$	$10 \sim 200$	≤ 1	$K603 \leq 6.0$	50 or customized
STXFC02	$36 \times 16 \times 12.5$	$10 \sim 200$	≤ 1	$K603 \leq 4.0$	50 or customized
STXFC06B	$25 \times 15 \times 10$	$10 \sim 200$	≤ 1.5	$K40/3 \leq 4.0$	50 or customized

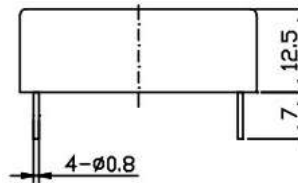
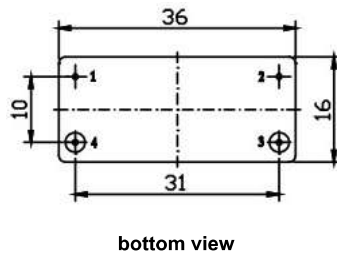
Actual test parameters for a typical product (124.8 MHz)

Performance index	Symbol	Measured parameters	Unit	Conditions/Notes
3dB bandwidth	BW_3	70	kHz	
40 dB bandwidth	BW_{40}	260	kHz	
Group delay fluctuation	ΔT	0.5	μs	
Passband fluctuation	bR	0.1	dB	
Insertion loss	b	2.5	dB	
Bandgap attenuation	bA	80	dB	Input/Output Isolation
Working temperature	$-40 \sim +70$		$^{\circ}C$	
Structure size	$36 \times 16 \times 12.5$		mm^3	$L \times W \times H$
End impedance	50		Ω	
Interior input power	$-40 \sim 0$		dBm	

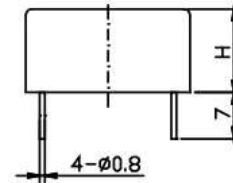
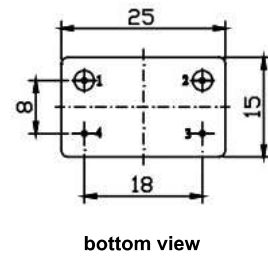
External dimensions and structural code



1. Grounding 2. Grounding 3. Output 4. Input



1. Grounding 2. Grounding 3. Output 4. Input



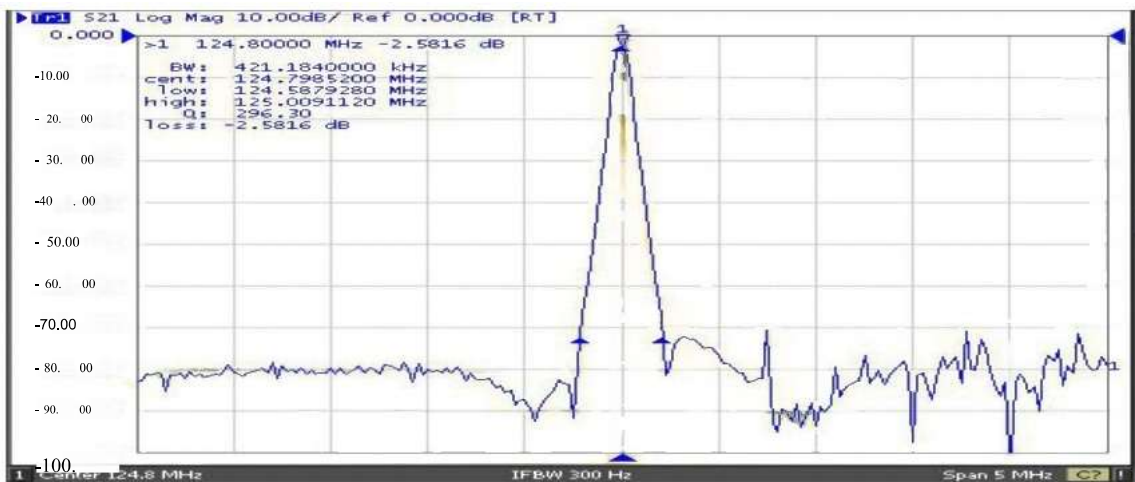
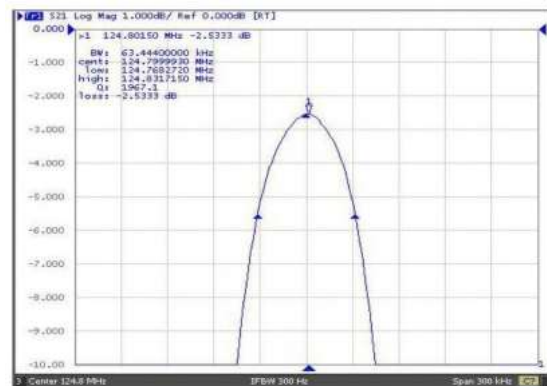
1. Input 2. Output 3. Grounding 4. Grounding

Structure Code: 01

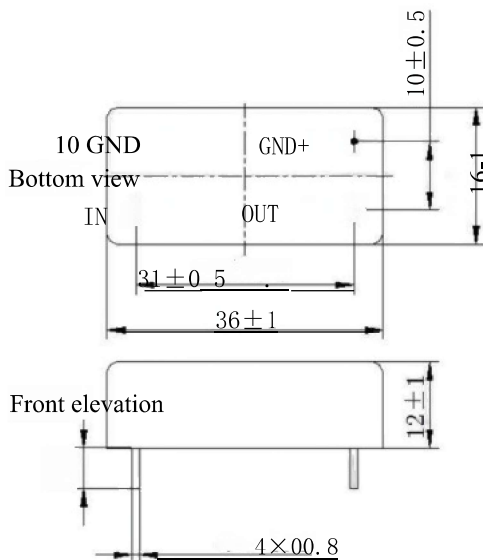
Structure Code: 02

Structure code: 06B (H = 10)

Measured Passband and Stopband Characteristics of the 124.8 MHz Smooth Group Delay Crystal Filter



Product Name: Linear Phase Shift or Smooth Group Delay Crystal Filter

Technical Indicator Items		Specification Requirements	
Nominal frequency fo	☑70MHz、122.4MHz、124.8MHz	Product weight	☐30g (Max)
Outline dimension	36mm×16mm×12.5mm		
Temperature range	Working temperature	☐-40℃~+70℃	
	Storage temperature	☐-55℃~+85℃	
Quality grade	Enterprise military standard, implementation specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009		
Passband width BW3	☑≥±30kHz		
Passband fluctuation	☑≤0.5 dB (measured in-band ripple)		
Insertion loss	☑≤3dB		
Group delay fluctuation	☑≤1us (fo±25kHz) ; ≤2.5us (fo±35kHz)		
Bandgap width BW4	☑≤±133kHz		
The bandgap width BW7 o	☑≤±350kHz		
Bandgap attenuation	☑≥80 dB (network analyzer Span set to 5 MHz)		
Parasitic suppression	☑≥60 dB (network analyzer Span set to 5 MHz)		
Recommended input power range	☐-40dBm~0dBm		
Input/Output Impedance	☐50 Ω /50 Ω		
External Shape Structure			
			
Remarks	1、☑These conditions must be met and serve as the basis for product inspection.☐Reference indicators for testing conditions or design assurance; 2、The engraving number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 3、Product documentation: Certificate of Conformity, test data, or relevant inspection reports; 4、This device is a non-sealed unit; immersion cleaning or water cleaning is prohibited. It is recommended to clean it using cotton balls. 5、This device is packaged in DIP solder joint format; current-carrying soldering is prohibited, and manual soldering is recommended.		

Product Features and Applications/Features

- ◎Narrow bandwidth (the narrowest relative bandwidth can be as low as 0.009%);
- ◎High attenuation in the far-end stopband (85 dB);
- ◎Low insertion loss (3.0 dB);
- ◎Widely applicable in wired carrier communication, radio communication, broadcasting and television, remote sensing, and telemetry applications.



Quality Specification/Quality Assurance

General Specification: GJB1508A-2021 "General Specification for Crystal Filters"

-2009 "Product Specification for Airborne and Ground-Use Quartz Crystal Filters

and 2009-TD20131A/Q"Enterprise Specification: Q/TD20133A

"Spear-Borne Quartz Crystal Filter Product Specification

Quality grades: Grade C, Grade M, Enterprise Military Standard

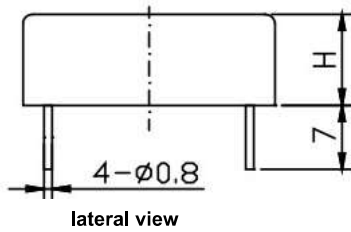
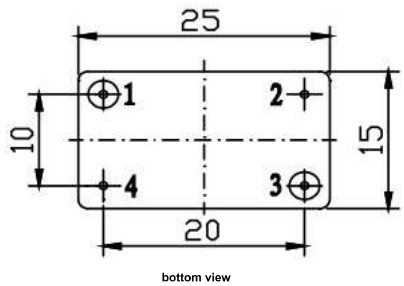
Technical Specifications

Model	Structural dimension mm ³	Frequency range MHz	3 dB relative bandwidth	Bandgap attenuation (dB)	Impedance Ω
STXFD06	25 × 15 × 12.5	10~250	0.009%~0.05%	≥70	50 or customized
STXFD06A	25 × 15 × 10	10~250	0.009%~0.05%	≥60	50 or customized
STXFD08	30 × 20 × 12 (SMA)	10~250	0.009%~0.05%	≥80	50 or customized

Actual test parameters for a typical product (95 MHz)

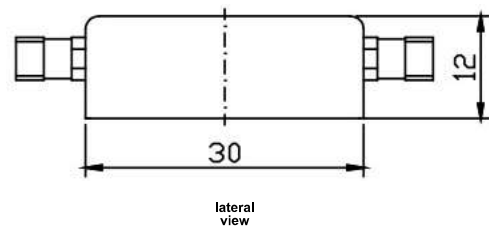
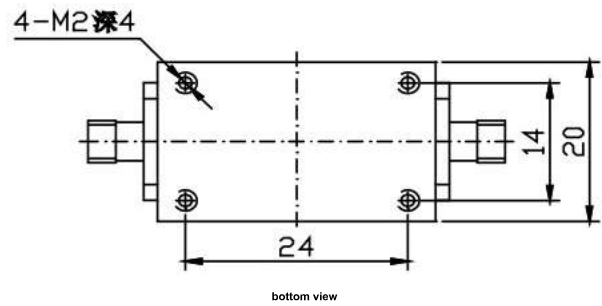
Performance index	Symbol	Measured parameters	Unit	Conditions/Notes
3dB bandwidth	BW ₃	9	kHz	
15 dB bandwidth	BW ₁₅	35	kHz	
Passband fluctuation	bR	0.1	dB	
Insertion loss	b	2.0	dB	
Square ratio	K6013	/	1	
Bandgap attenuation	bA	85	dB	Input/Output Isolation
Working temperature	-55~+85		°C	
Structure size	25 × 15 × 10		mm ³	L × W × H
End impedance	50		Ω	
Interiorinput power	-40~0		dBm	

External dimensions and structural code



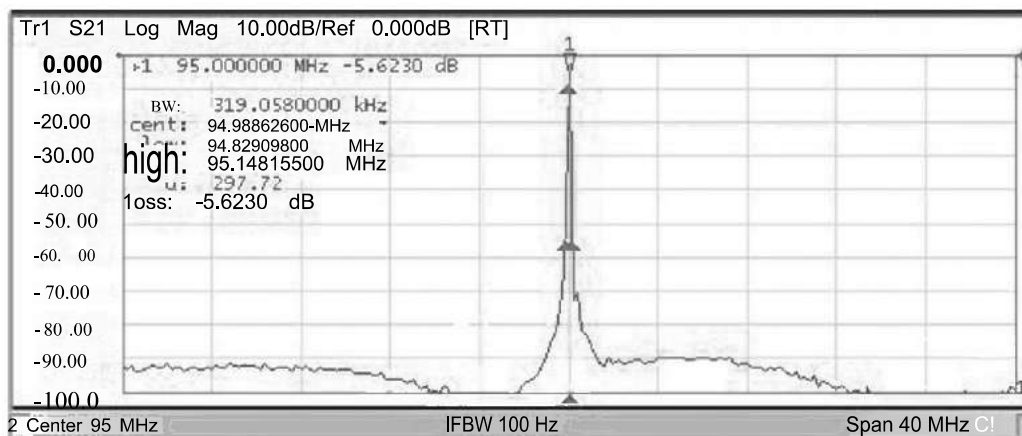
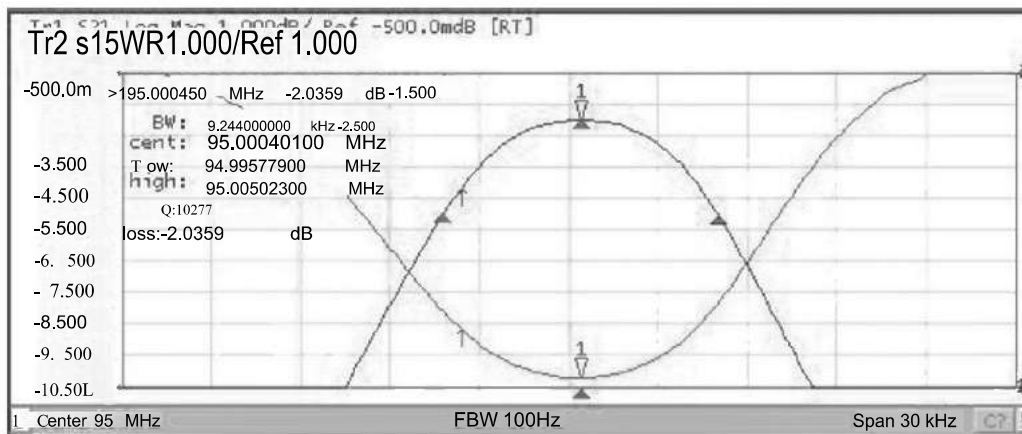
1.2. Ground 3. Output 4. Ground

Structure code: 06 (H=12.5)/06A (H=10)



Structure Code: 08

Experimental Measurement of the Passband and Stopband Characteristics of a 95 MHz Spectrum Purification Crystal Filter



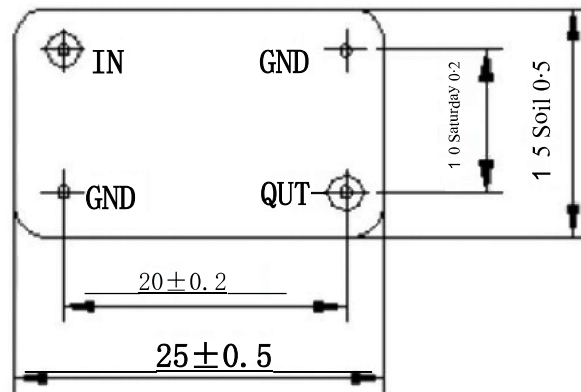
Product Name: Crystal Filter

Product model: STXFD06A-E□M10-70

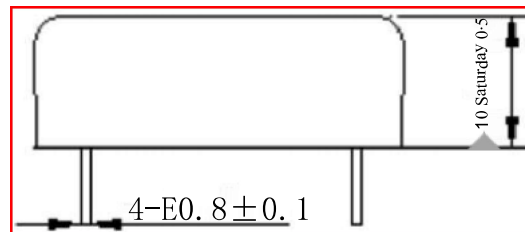
Technical Indicator Items		Specification Requirements	
Nominal frequency fo	☒ 10MHz、50MHz、100MHz	Product weight	☐ 30g (Max)
Outline dimension	25mm×15mm×10mm		
Temperature range	Working temperature	☐ -55℃~+85℃	
	Storage temperature	☐ -55℃~+85℃	
Quality grade	Enterprise military standard, implementation specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009		
Central frequency deviation	☒ ≤±4kHz		
Passband width BW1	☒ ≤10kHz		
Insertion loss IL	☒ ≤4dB		
Passband fluctuation	☒ ≤1 dB (measured in-band ripple)		
Standing wave ratio	☒ ≤2 (@nominal frequency fo)		
Bandgap attenuation	☒ ≥70 dB (within the range of ±1 MHz to ±10 MHz at the nominal frequency fo)		
Input signal power range	☐ -40dBm~0dBm		
Input/Output Impedance	☐ 50 Ω /50 Ω		

External Shape Structure

Bottom view



Lateral view



Remarks

- 1、☒ These serve as mandatory requirements to be met and provide the basis for product inspection; they also function as reference indicators for testing conditions or design assurance.
- 2、The engraving number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number.
- 3、Product documentation: Certificate of Conformity, test data, or relevant inspection reports;
- 4、This device is a non-sealed unit; immersion cleaning or water cleaning is prohibited. It is recommended to clean it using cotton balls.
- 5、This device is packaged in DIP solder joint format; current-carrying soldering is prohibited, and manual soldering is recommended.

Product Features and Applications/Features

©High stability and high reliability;

©High-quality level;

©It is widely used in fields such as satellites, missiles, remote sensing, and telemetry.



Quality Specification/Quality Assurance

General Specification: GJB1508A-2021 "General Specification for Crystal Filters"

Enterprise Specifications: CASTPS14/854-2006 "Procurement Specification for STXF06-D21.4M200-40 Crystal Filters for Space Vehicles"; CASTPS14/1380-2012 "Procurement Specification for STXFA01C162.025M25-60 Crystal Filters for Space Vehicles"; CASTPS503Z14/001-2013 "Procurement Specification for STXFA01 F20.665M36k-75 Crystal Filters for Space Vehicles"

standard »

CASTPS14/1531-2015 "Procurement Specification for STXFB Series Crystal Filters for Space Vehicles" Quality Grade: Aerospace Grade

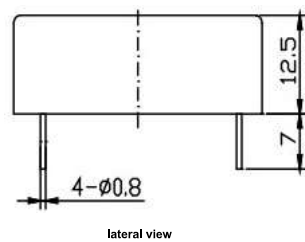
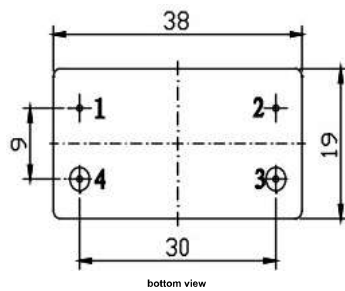
Technical Specifications

Model	Structural dimension mm ³	Frequency range MHz	3 dB relative bandwidth	Bandgap attenuation (dB)	Impedance Ω
STXFB04	33.6 × 16.3 × 12.6	10~200	0.01%~1%	≥60	50 or customized
STXFB01	38 × 19 × 12.5	10~200	0.01%~1%	≥70	50 or customized

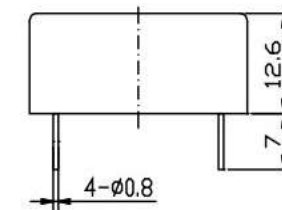
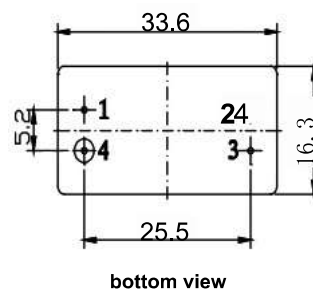
Actual test metrics for a typical product (20.665 MHz)

Performance index	Symbol	Measured parameters	Unit	Conditions/Notes
1 dB bandwidth	BW ₃	46.454	kHz	
60 dB bandwidth	BW ₆₀	129.639	kHz	
Passband fluctuation	bR	0.1	dB	
Insertion loss	b	1.02	dB	
Square ratio	K ₆₀ M1	2.79	/	
Bandgap attenuation	bA	80	dB	Input/Output Isolation
Working temperature		-40~+70	°C	
Structure size		38 × 19 × 12.5	mm ³	L × W × H
End impedance		50	Ω	
Interior input power		-40~0	dBm	

External dimensions and structural code

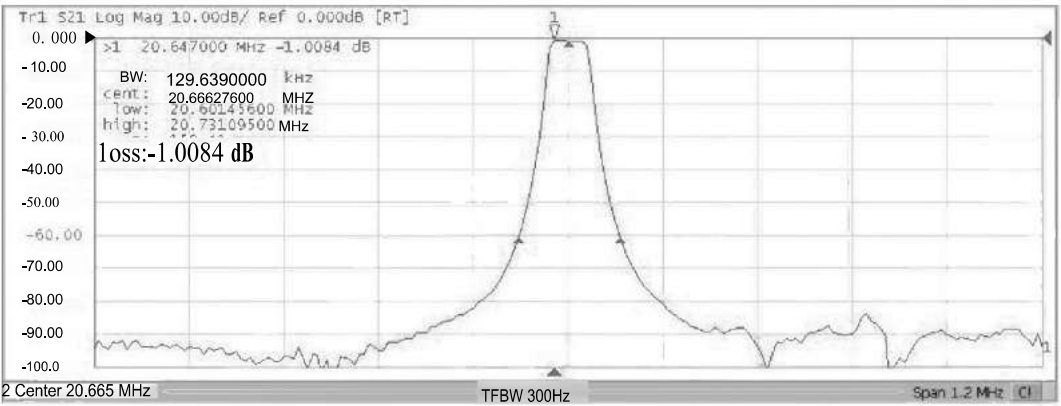
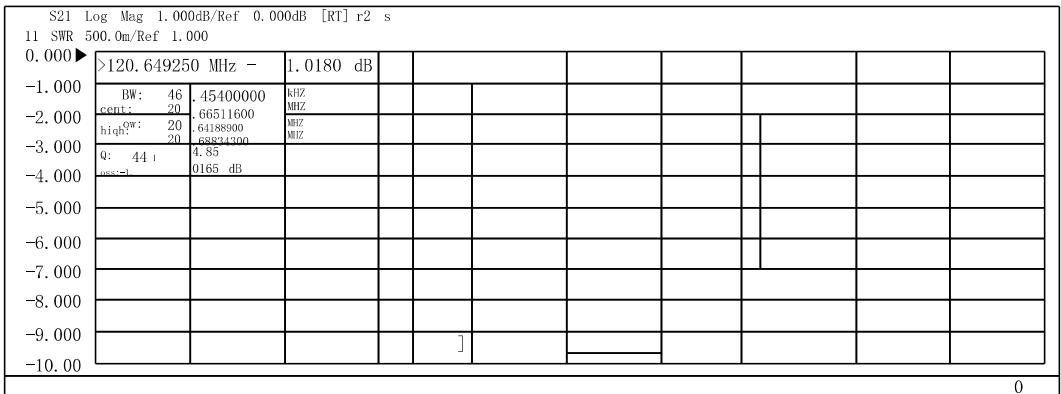


1 . Grounding 2. Grounding 3. Output
4. Input **Structure Code:01**



1. Grounding 2. Output 3. Grounding 4. Input
Structure Code: 04

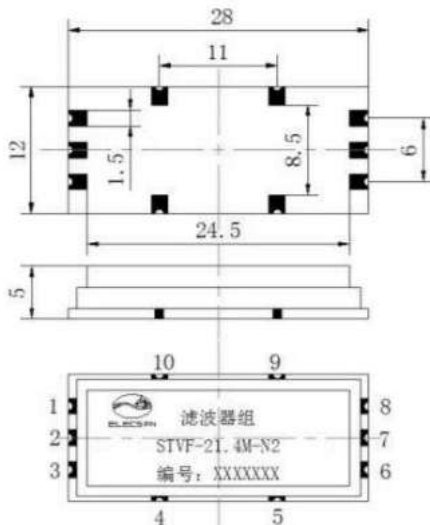
Measured Passband and Stopband Characteristics of the 20.665 MHz CASTC-Class Crystal Filter



Recommended Product (1) Two-Channel Filter Group

Product Name: Filter Set

Product model: STVF-21.4M-N2

Technical Indicator Items		Project Requirements																			
		Channel 1	Channel 2																		
1、Nominal frequency F (MHz)		☐ 21. 4	☐ 21. 4																		
2、 -1 dB bandwidth (MHz)		☒ ≥0. 2MHz	☒ ≥2. 0MHz																		
3、 -3dB bandwidth		☒ ≥0. 4MHz	☒ ≥3. 0MHz																		
4、 -40 dB bandwidth		☒ ≤1. 8MHz	☒ ≤7. 5MHz																		
5、 Band内的波动dB		☒ ≤0. 5	☒ ≤0. 5																		
6、 Differential bandpass suppression dB		☒ ≥40 (outside the Fo±1 MHz range)	☒ ≥45 (outside the Fo ±4.5 MHz range)																		
7、 Group delay fluctuation: nS		☒ ≤0. 5uS (Fo±100kHz)	☒ ≤50nS (Fo±800kHz)																		
8、 Rectangularity Coefficient K403		☒ ≤3. 5	☒ ≤2. 3																		
9、 insertion loss dB		☒ ≤12	☒ ≤12																		
10、 Input/Output Standing Wave		☒ ≤2	☒ ≤2																		
11、 Input/Output Impedance		☐ 50 Ω	☐ 50 Ω																		
12、 maximum input signal		☐ 10dBm	☐ 20dBm																		
13、 working temperature		☒ -40℃~+70℃																			
14、 storage temperature		☐ -55℃~+85℃																			
15、 Control Method and Power Supply		☐ AO output level (TTL level: 3.3 V), operating voltage: 3.3 V																			
16、 outline dimension		☒ 28×12×5. 0mm																			
Schematic diagram of the external structure																					
Band Control		Bottom view Lateral view Top view  <table><tr><th colspan="2">Pin Definition</th></tr><tr><td>1</td><td>AO</td></tr><tr><td>2</td><td>GND</td></tr><tr><td>3</td><td>RF</td></tr><tr><td>4-5</td><td>GND</td></tr><tr><td>6</td><td>RF</td></tr><tr><td>7</td><td>GND</td></tr><tr><td>8</td><td>+3.3V</td></tr><tr><td>9-10</td><td>GND</td></tr></table>		Pin Definition		1	AO	2	GND	3	RF	4-5	GND	6	RF	7	GND	8	+3.3V	9-10	GND
Pin Definition																					
1	AO																				
2	GND																				
3	RF																				
4-5	GND																				
6	RF																				
7	GND																				
8	+3.3V																				
9-10	GND																				
A1	Band gating																				
1	Channel 1																				
0	Channel 2																				
Remarks		1、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for testing conditions or design assurance; 2、 The number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 3、 The filter component is a non-sealed device and cannot be cleaned by immersion; wiping is recommended. 4、 The product is a counterfeit watch band and should not undergo overcurrent soldering or reflow soldering. Preferably, perform manual soldering or use low-temperature solder paste for current-carrying soldering.																			

Product Name: Filter Set

Product model: STVF-21.4M-70M-N4

Product Name: Filter Set			Project Requirements			
			Channel 1	Channel 2	Channel 3	Channel 4
1、Nominal frequency F ₀			☐ 21.4MHz	☐ 21.4MHz	☐ 70MHz	☐ 70MHz
2、-1dB bandwidth			/	☒ ≥5MHz	☒ ≥10MHz	☒ ≥20MHz
3、-3dB bandwidth			☒ ≥70kHz	☒ ≥6MHz	☒ ≥12MHz	☒ ≥24MHz
4、-40 dB bandwidth			☒ ≤±155kHz	☒ ≤±8MHz	☒ ≤±16MHz	☒ ≤±32MHz
5、-60 dB bandwidth			☒ ≤±300kHz	/	/	/
6、Band内的波动dB			☒ ≤0.5	☒ ≤0.5 (F ₀ ±2.5MHz)	☒ ≤0.5 (F ₀ ±5MHz)	☒ ≤0.5 (F ₀ ±10MHz)
7、Group delay fluctuation			☒ ≤2.5uS@F ₀ ±35kHz	☒ ≤30nS (F ₀ ±3MHz)	☒ ≤20nS (F ₀ ±6MHz)	☒ ≤10nS (F ₀ ±12MHz)
8、insertion loss dB			☒ ≤7 dB; Inter-channel insertion loss consistency ≤1 dB (across four channels)			
9、standing wave			☒ ≤2	☒ ≤1.5	☒ ≤1.5	☒ ≤1.5
10、impedance			☐ 50 Ω	☐ 50 Ω	☐ 50 Ω	☐ 50 Ω
11、incoming signal			☐ Maximum: 10 dBm	☐ Maximum: 20 dBm	☐ Maximum: 20 dBm	☐ Maximum: 20 dBm
12、working temperature			☒ -40℃~+75℃			
13、storage temperature			☐ -55℃~+85℃			
14、Control and Power Supply			☐ A, B dual-level (TTL level: 3.3 V), operating voltage: 3.3 V ≤ 10 mA			
15、outline dimension			☒ 26×26×5.3mm			
Schematic diagram of the external structure						
Band Control						
A	B	Xilinx				
0	0	Channel 1				
0	1	Channel 2				
1	0	Channel 3				
1	1	Channel 4				
Remarks			1、 ☒ These conditions must be met and serve as the basis for product inspection. ☐ Reference indicators for testing conditions or design assurance; 2、The number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 3、The filter component is a non-sealed device and cannot be cleaned by immersion; wiping is recommended. 4、This surface mount product cannot be soldered using conventional processes with overload current flow soldering or reflow soldering. Preferably, perform manual soldering or use low-temperature solder paste for current flow soldering.			

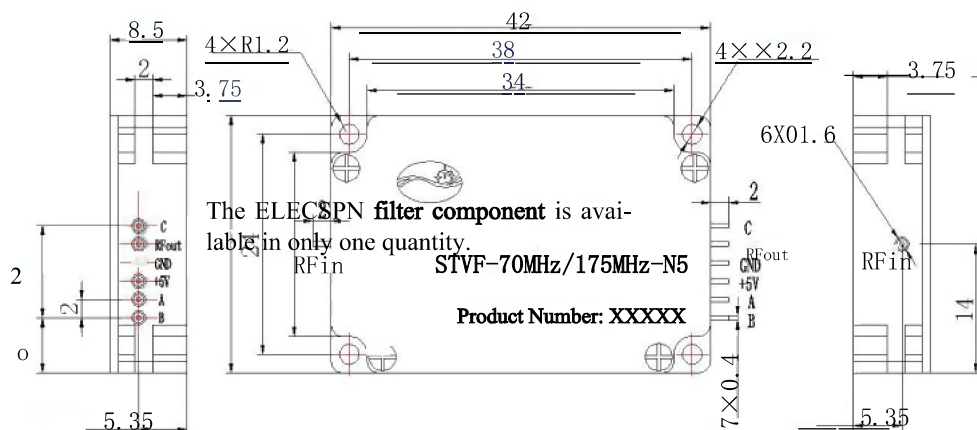
Recommended Product (3)Five-Channel Filter Group

Product Name: Filter Component

Product model: STVF 70MHz/175MHz

Technical Indicator Items	Project Requirements				
Nominal frequency F ₀	☐ 70MHz、175MHz		Product weight	☐ 50g (Max)	
Outline dimension	☐ 42×28×8.5 mm ³ (see the figure below for details)				
Temperature range	Working temperature	☐ -55℃~+85℃	Storage temperature	☐ -55℃~+85℃	
Quality grade	Enterprise military standard, implementation specification: "Product Specification for Airborne and Ground-Use Quartz Crystal Filters" Q/TD20133A-2009				
Technical Project	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5
1、nominal frequency fo	70MHz	70MHz	175MHz	175MHz	70MHz
2、3dB bandwidth	73kHz±5kHz	10MHz±1.5MHz	20.5MHz±1.5MHz	43MHz±3MHz	650kHz±150kHz
3、Band interior irregularity	--	--	--	≤1.8dB@f±20MHz	--
4、square ratio	BW _{60B} /BW _{3B} ≤3	BW _{0B} /BW ₃₈ ≤3	BW _{0B} /BW _{3B} ≤3	BW _{6S} /BW _{3B} ≤3	--
5、Extracellular inhibition	≥20dBc@fo±50kHz ≥The distal end at 70 BC	≥40dBc@fo±10.8M ≥The distal end at 70 BC	--	--	≥35dBc@fo±750kHz
6、Group delay fluctuation	≤8uS @fo±25kHz	≤50nS @fo±3MHz	≤50nS@fo ±10MHz	≤20nS@fo±20MHz	--
7、insertion loss	≤7 dB; (Inter-channel insertion loss inconsistency ≤1 dB)				≤11.5dB
8、standing wave	≤1.8	≤1.5	≤1.5	≤1.5	≤2.0
9、impedance	50 Ω				
10、Control and Power Supply	☐ A~C port (TTL level 0/3.3V), operating voltage 5V (≤5mA)				

Schematic diagram of the external structure



Band Control	B	A	C	Band gating
	0		1	Channel 1
	0		0	Channel 2
	1		0	Channel 4
	1			Channel 3
	0	1	1	Channel 5
Remarks	1、The number consists of 7 digits: the first 4 digits represent the batch number, and the last 3 digits represent the serial number. 2、The crystal resonator component in the product is fragile; handle it with care and avoid dropping it directly without proper protection. 3、During installation and use, the bottom of the filter must be properly grounded over a large area.			

Electrical Frequency Modulation and Hopping Filter

As filtering components at the transmitter system terminal and pre-selective devices at the receiver system front end, frequency-hopping filters directly influence the quality of signal transmission and reception within the system, playing a critical role in frequency-hopping signal processing. The frequency-hopping filters developed and manufactured by the company fall into two main categories: one is an electrically tunable filter implemented using high-Q-value varactor diodes, featuring compact size, simple design, and continuously adjustable center frequency; the other is a numerically controlled frequency-hopping filter that utilizes PIN transistors with forward/reverse conduction or cutoff characteristics to select capacitors of varying capacitance values, offering high technical specifications, rapid frequency-hopping speed, stable performance, compact size, and ease of digital control.

1

Small-Scale Variable Frequency Filter (SVF) Series

Product Features and Applications/Features

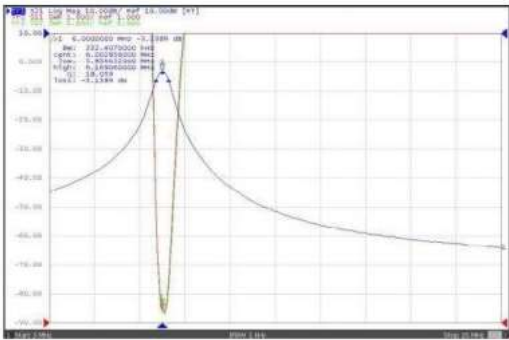
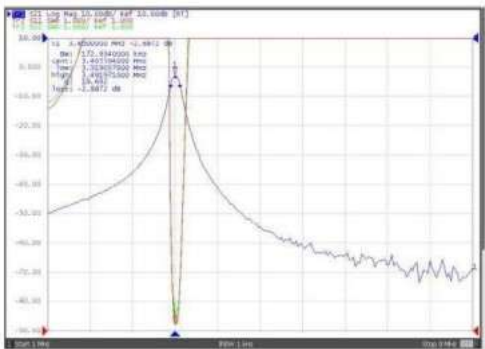
- ◎Bimode tuning with a 0.1 dB Chebyshev response;
- ◎High-Q varactor for rapid tuning;
- ◎A typical range of 2 to 3 times the frequency band, covering segments from 1.6 MHz to 2000 MHz.
- ◎Widely used as the receiver front-end for various types of radio stations.



Technical Specifications

Parameter Name	Characteristic	Product series segmentation: SVF1. 6~4.4 (1.6~4.4MHz) SVF4. 4~12.4 (4.4~12.4MHz) SVF12. 4~30 (12.4~30MHz) SVF30~90 (30~90MHz) SVF90~200 (90~200 MHz); SVF 200~400 (200~400 MHz). Note: Products for other frequency bands are customizable.
3dB fractional bandwidth	3~10%	
Central insertion loss	2~6dB	
Fluctuations in insertion loss across different sections	≤1.5dB	
Maximum Standing Wave Ratio (VSWR)	2.0:1 max	
Electrical control voltage (VT)	1~28 V (customizable by user)	
Input/Output Impedance Zo	50 Ω	

Actual test characteristic curve of the product

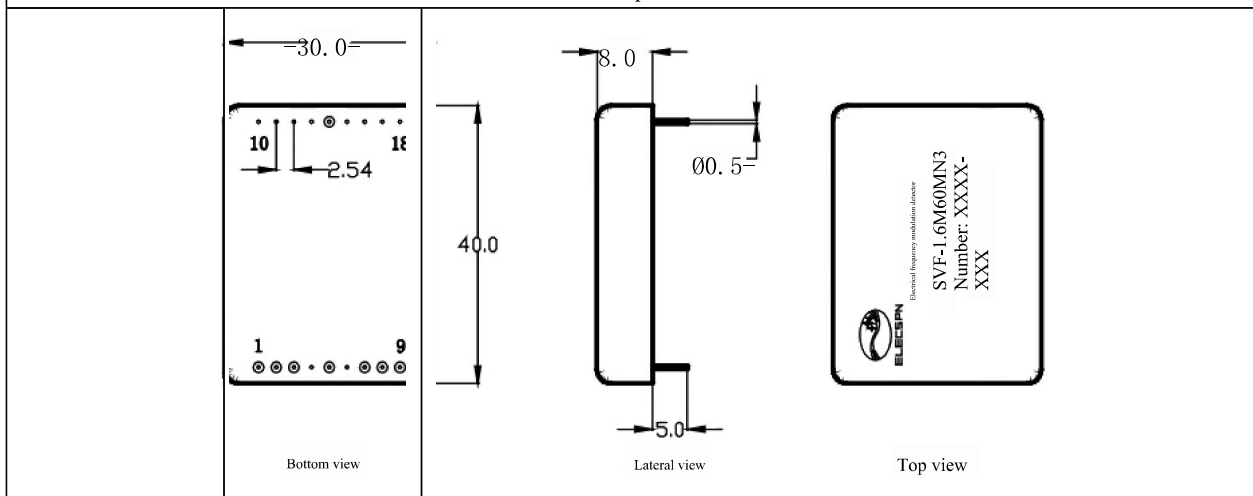


Product Name: Electric Điều chỉnh và Bộ lọc (Filter)

Product model: SVF-1.6M-30M-N2

Technical Indicator Items	Item parameter
Frequency range f_0	1.6MHz~30MHz (1.6~4.4MHz、4.4~12.4MHz、12.4~30MHz)
3 dB bandwidth (BW): 3 dB	(4%~6%) f_0
Rectangularity coefficient BW30dB/BW3B	<7
Tuning voltage V	1~10.5V
Central frequency power loss IL	≤ 5.0 dB
Fluctuations in insertion loss across different sections	≤ 1.5 dB
Interpolation loss fluctuation within the segment	≤ 1.0 dB
Input/Output Standing Wave Ratio (VSWR)	$\leq 2:1$
Distal inhibition	≥ 55 dBc@2 f_0
Input/output impedance Z_n/Z_{out}	50 Ω
Power Supply Source V	5V
Operating temperature range	-40℃~+70℃
Storage temperature range	-50℃~+75℃
Band Control	A, B, T, TL level: 3.3 V
Outline dimension	40×30×8mm

External Shape Structure



Pin Defini- tion	1	2	3	4	5	6	7	8	9	10~13	14	15~18
	B	A	5V	GND	RF	GND	D3	D2	D1	GND	RF	GND
	Band Control		Vcc		Import		Electrical Investigation				Output	
Band Co- ntrol Table	A			B			Wave band					
	0			0			1.6~4.4MHz (D1)					
	1			0			4.4~12.4MHz (D2)					
	0			1			12.4~30MHz (D3)					
	1			1			Direct connection					

Product Features and Applications/Features

- ◎ **Super compact and lightweight:** 50% smaller than traditional series products;
- ◎ **Ultra-low power consumption:** Operates solely on low-voltage power supply ($+3.3V \leq 40mA$), requiring no reverse-biased high voltage.
- ◎ **Rapid tuning:** $5 \mu s$, a 50% improvement over traditional series products;
- ◎ **High P1dB compression level:** $\geq +33 \text{ dBm}$; a 50% improvement over traditional series products.
- ◎ **A typical range of 2 to 3 times the frequency band,** covering segments from 30 MHz to 1000 MHz.
- ◎ **Widely used in various frequency-hopping communication radios.**

Technical Specifications

Order number	Parameter Name	Typical Characteristics
1	Frequency range	30~1000MHz
2	3dB fractional bandwidth	3~12%
3	Central insertion loss	2~7dB
4	Maximum Standing Wave Ratio (VSWR)	≤ 2
5	Power supply parameter Vcc	$+3.3V/+5V \leq 40mA$
6	Frequency hopping rate	5uS (typical)
7	P1dB compression point	$\geq +33 \text{ dBm}$
8	Maximum input power	$\geq +35 \text{ dBm}$
9	Input/Output Impedance Zo	50 Ω
Typical product series segmentation: STVFS 30~90 (30~90MHz) STVFS 90~225 (90~225MHz) STVFS 225~512 (225~512MHz) STVFS 512~678 (512~678 MHz). Note: Products for other frequency bands are customizable.		

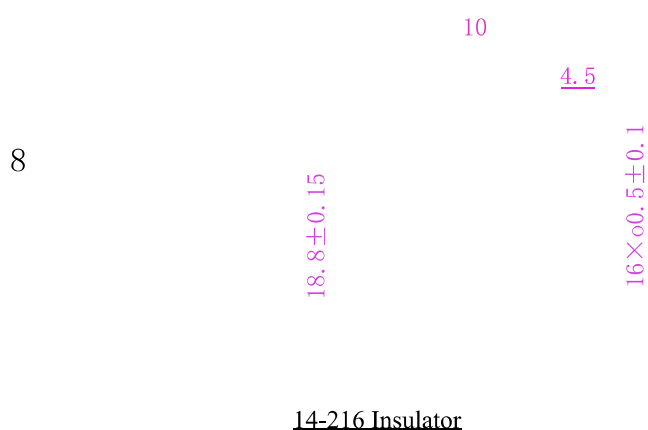
Recommended Product (1) Frequency Hopping Filter S-N1 Series

Product Name: Frequency Hopping Filter

Product model: STVFS108M-174M-16-N1

Technical Indicator Items	Item parameter
Single-section series, frequency range (fo)	Single-band customization is available within the frequency range of 30 MHz to 1000 MHz.
Frequency range (fo)	108MHz~174MHz
Insertion loss (IL)	≤6.0dB
3 dB bandwidth (BW3dB)	≥3.5%×fo
Selectivity	≥30dBc@fo±10%fo;
Input signal power (Pm)	≥+33 dBm (P1dB compression point)
Tuning time (Tv)	≤5μs
Input/Output Standing Wave Ratio (VSWR)	≤2.0
Address Code (Address)	Eight parallel binary codes A0–A7, compatible with CMOS and TTL levels
Power Supply Voltage	Vac+3.3V/+5V≤25mA
Input/output impedance (Z.IZou)	50 Ω
Central frequency drift	≤80ppm/°C
Operating temperature range	–55°C~+85°C
Storage temperature range	–55°C~+105°C
Outline dimension	23×23×10mm ³

External Shape Structure



Pin Definition	
1	A0
2	A1
3	A2
4	A3
5	A4
6	A5
7	A6
8	A7
9	RF
10	NC
11	NC
12	GND
13	GND
14	NC
15	+3.3V
16	RF

Address code calculation formula: $\{(f - f_{low}) / (f_{high} - f_{low})\} \times 250$. Here, f represents the center frequency to be tuned within the segment; f_{low} represents the lowest frequency within the segment; f_{high} represents the highest frequency within the segment; and 250 represents the total number of steps within the segment.

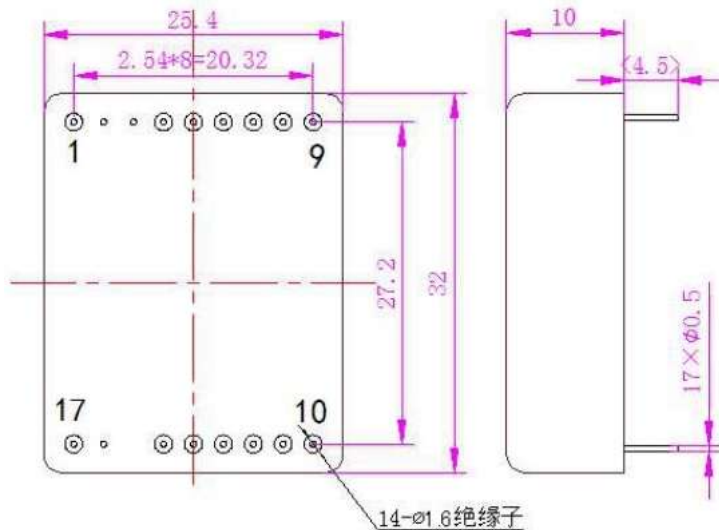
*This package can be customized for other single-band products within the frequency range of 30 MHz to 1000 MHz.

Recommended Product (2) Frequency Hopping Filter SN2 Series

Product Name: Frequency Hopping Filter Product model: STVFS-108M-400M-16-N2

Technical Indicator Items	Item parameter
Two-stage series, frequency range (fo)	The device supports customizable dual-band operation within the frequency range of 30 MHz to 678 MHz.
Frequency range (fo)	108MHz~400MHz (V: 108~174MHz, U: 225~400MHz)
Insertion loss (IL)	≤6.0 dB (including switching losses)
Resident in Bosnia (VSWR)	≤2:1
3 dB bandwidth (BW3dB)	≥3.5%×fo
Selectivity	≥27dBc@fo×(1±10%)
Tuning time (Tv)	≤5us;
P1dB compression point	≥+33 dBm (P1dB compression point)
Input signal power (Pn)	+35dBm (max)
Input/output impedance (Z1/Zut)	50 Ω
Power Supply Voltage	Vac+3.3V/+5V≤35mA
Central frequency drift	≤80ppm/°C
Operating temperature range	-55°C~+85°C
Storage temperature range	-55°C~+105°C
Outline dimension	32×25.4×10mm ³

External Shape Structure



Pin Definition	
1	RF
2-3	GND
4	A8
5	A7
6	A6
7	A5
8	GND
9	NC
10	Vcc
11	A0
12	A1
13	A2
14	A3
15	A4
16	GND
17	RF

Address code calculation formula: $\{[(f-f_{low})/(f_{high}-f_{low})] \times 250\}$, where f is the center frequency to be tuned within the segment; f_{low} is the lowest frequency within the segment; f_{high} is the highest frequency within the segment; and 250 represents the total number of steps within the segment.

*This package can be customized for other dual-band products operating within the frequency range of 30 MHz to 678 MHz.

Recommended Product (3) Frequency Hopping Filter SN4 Series

Product Name: Frequency Hopping Filter Product model: STVFS-108M-512M-17-N4

Technical Indicator Items	Item parameter
Two-stage series, frequency range (fo)	The device supports customizable dual-band operation within the frequency range of 108 MHz to 678 MHz.
Frequency range (fo)	108MHz~512MHz (V:108~174MHz, U:225~512MHz)
Insertion loss (IL)	≤7.0 dB (including switching losses)
Resident in Bosnia (VSWR)	≤2:1
1 dB bandwidth (BW1)	≥4.0MHz (fo±2MHz) (108M~512MHz)
Selectivity	≥40dBc@fo×(1±10%)
Tuning time (Tv)	≤5us;
P1dB compression point	≥+33 dBm (P1B compression point)
Input signal power (Pm)	+35dBm (max)
Input/output impedance (Z./Zou)	50 Ω
Power Supply Voltage	Vcc+3.3V/+5V≤45mA
Central frequency drift	≤80ppm/°C
Operating temperature range	-55°C~+85°C
Storage temperature range	-55°C~+105°C
Outline dimension	50.8×25.4×10mm ³

External Shape Structure

Pin Definition	
1	RF
2-3	GND
4	A8
5	A7
6	A6
7	A5
8	GND
9	NC
10	Vcc
11	A0
12	A1
13	A2
14	A3
15	A4
16	GND
17	RF

14-21.6 Insulator

Address code calculation formula: $\{((f-f_{low})/(f_{high}-f_{low}))\} \times 250$

fx is the center frequency to be tuned within the segment; flow is the lowest frequency within the segment; fngh is the highest frequency within the segment; and 250 is the total number of steps within the segment.

*This package can be customized for other dual-band products operating within the frequency range of 108 MHz to 678 MHz.

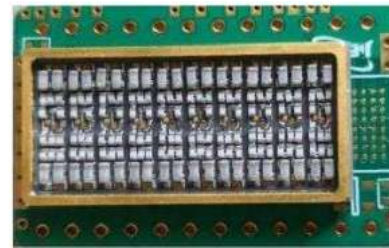
Product Features and Applications/Features

- ◎Small in size and light in weight;
- ◎The PIN switch capacitor array requires rapid tuning and must be subjected to reverse-biased high voltage.
- ◎Eight parallel code tuning control (supporting up to 251-point small-step linear frequency hopping);
- ◎The P1dB compression point is $\geq +30$ dBm;
- ◎A typical range of 2 to 3 times the frequency band, covering segments from 30 to 1000 MHz.
- ◎Widely used in various frequency-hopping communication radios.

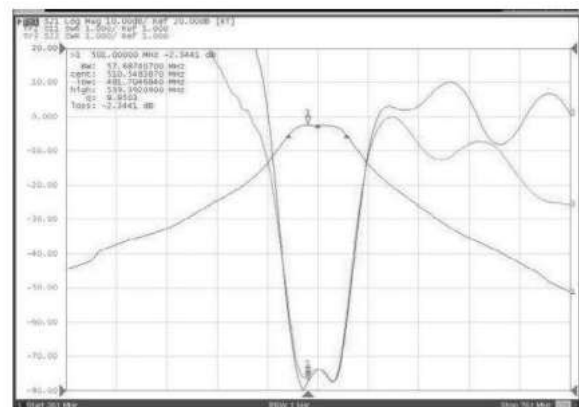
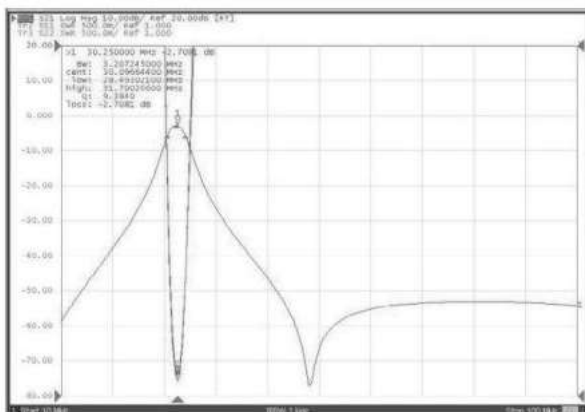


Technical Specifications

Parameter Name	Characteristic
3dB fractional bandwidth	3~12%
Central insertion loss	2~6dB
Fluctuations in insertion loss across different sections	≤ 1.5 dB
Maximum Standing Wave Ratio (VSWR)	2.0:1max
Power supply parameter Vcc	3.3V/5V ≤ 120 mA
Power Parameter V	+100V ≤ 2 mA
Input/Output Impedance Zo	50 Ω
Product series segmentation:	
STVFD30~88 (30~88MHz)	
STVFD 30~90 (30~90MHz)	
STVFD 90~225 (90~225MHz)	
STVFD 225~512 (225~512MHz)	
Note: Products in other frequency bands are customizable.	



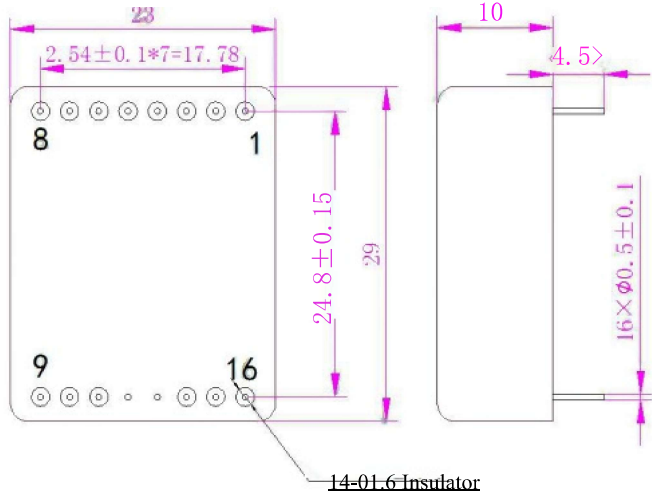
Actual test characteristic curve of the product



Recommended Product (1) Frequency Hopping Filter DN2 Series

Product Name: Frequency Hopping Filter

Product model: STVFD30M-88M-16-N2

Technical Indicator Items	Item parameter																																		
Frequency range (fo)	30MHz~88MHz																																		
Insertion loss (IL)	≤6.0 dB (low temperature, room temperature); ≤6.5 dB (high temperature)																																		
3 dB bandwidth (BW3dB)	≥2% × fo																																		
Selectivity	≥30dBc@fo ± 10%fo;																																		
Input signal power (Pn)	≥+30 dBm (P1dB compression point)																																		
Tuning time (Tv)	≤40uS																																		
Input/Output Standing Wave Ratio (VSWR)	≤1.7																																		
Address Code (Address)	Eight parallel binary codes A0–A7, compatible with CMOS and TTL levels																																		
Power Supply Voltage	Vac+5V≤120mA Vbb+130V≤2mA																																		
Input/output impedance (Z/Zut)	50 Ω																																		
Central frequency drift	≤80ppm/°C																																		
Operating temperature range	–55°C~+85°C																																		
Storage temperature range	–55°C~+105°C																																		
Outline dimension	29×23×10mm																																		
External Shape Structure																																			
 14-01.6 Insulator Address code calculation formula: $\{((f_x - f_{low}) / (f_{high} - f_{low}))\} \times 250$ where f_x is the center frequency to be tuned within the segment; f_{low} is the lowest frequency within the segment; f_{high} is the highest frequency within the segment; and 250 is the total number of steps within the segment.																																			
<table border="1"> <thead> <tr> <th colspan="2">Pin Definition</th> </tr> </thead> <tbody> <tr><td>1</td><td>A0</td></tr> <tr><td>2</td><td>A1</td></tr> <tr><td>3</td><td>A2</td></tr> <tr><td>4</td><td>A3</td></tr> <tr><td>5</td><td>A4</td></tr> <tr><td>6</td><td>A5</td></tr> <tr><td>7</td><td>A6</td></tr> <tr><td>8</td><td>A7</td></tr> <tr><td>9</td><td>RF</td></tr> <tr><td>10</td><td>NC</td></tr> <tr><td>11</td><td>Vbb</td></tr> <tr><td>12</td><td>GND</td></tr> <tr><td>13</td><td>GND</td></tr> <tr><td>14</td><td>NC</td></tr> <tr><td>15</td><td>Vcc</td></tr> <tr><td>16</td><td>RF</td></tr> </tbody> </table>		Pin Definition		1	A0	2	A1	3	A2	4	A3	5	A4	6	A5	7	A6	8	A7	9	RF	10	NC	11	Vbb	12	GND	13	GND	14	NC	15	Vcc	16	RF
Pin Definition																																			
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12	GND																																		
13	GND																																		
14	NC																																		
15	Vcc																																		
16	RF																																		

*This package can be customized for other single-band products within the frequency range of 30 MHz to 1000 MHz.

Recommended Product (2) Frequency Hopping Filter DN4 Series

Product Name: Frequency Hopping Filter

Product model: STVFD-108M-512M-16-N4

Technical Indicator Items	Item parameter
Frequency range (fo)	108 MHz to 512 MHz (V: 108–174 MHz; U: 225–512 MHz; Through)
Insertion loss (IL)	≤6.0 dB (including switching losses); ≤1.2 dB (through-pass)
Standing wave ratio (VSWR)	≤2:1
1 dB bandwidth (BW1)	≥4.0MHz (fo±2MHz) (108M~512MHz)
Selectivity	≥40dBc@f×(1±10%)
Tuning time (Tv)	≤5us@+20dBm; ≤7us@+30dBm; ≤10us@+33dBm;
Group delay (Th)	≤180nS (fo±2MHz)
Group delay fluctuation (△Th)	≤50nS (fo±2MHz)
Group Delay Consistency	≤20nS (fo±2MHz)
Input signal power (Pm)	≥+33 dBm (P1B compression point)
Input/output impedance (Z1/Zout)	50 Ω
Power Supply Voltage	Vac+5V≤220mA; Vo+130V≤6mA
Central frequency drift	≤80ppm/°C
Operating temperature range	-55°C~+85°C
Storage temperature range	-55°C~+105°C
Outline dimension	54×32×13mm

External Shape Structure

32

2.54*11=27.94

24

13

Ancient Item

14-Ø1.6
Electrical insulator

1

12

13

24 X Ø0.5

Pin Definition

1	Vcc
2	A0
3	A1
4	A2
5	A3
6	A4
7	A5
8	A6
9	A7
10	A8
11	A9
12	RF1
13	RF2
14-23	GND
24	Vbb

Address code calculation formula: $\{[(f_x - f_{low}) / (f_{high} - f_{low})] \times 250\}$, where f_x is the center frequency to be tuned within the segment; f_{low} is the lowest frequency within the segment.

f_{high} is the highest frequency within the segment; 250 is the total number of steps within the segment.

*This package can be customized for other dual-band products operating within the frequency range of 30 MHz to 678 MHz.

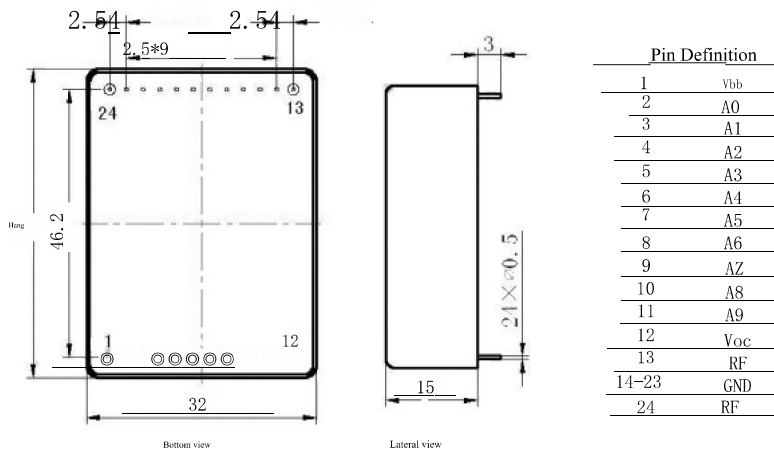
Recommended Product (3) Frequency Hopping Filter DN3 Series

Product Name: Frequency Hopping Filter

Product model: STVFD-30M-512M-16-N3

Technical Indicator Items	Item parameter
Frequency range (fo)	30MHz~512MHz (30~90, 90~225, 225~512) MHz
Insertion loss (IL)	≤5.5dB
3 dB bandwidth (BW3)	≥3%*fo
Selectivity	≥20dBc @fo±10%fo
Distal inhibition	≥40dB@2fo
Standing wave ratio	≤2:1
Tuning time (Tv)	≤30uS
Input signal power (Pn)	≥+30 dBm (P1B compression point)
Address code (address)	Ten parallel binary codes A0–A9, compatible with both CMOS and TTL levels. A0–A7 are intra-band address codes, while A8–A9 are frequency band selection codes.
Input/output impedance (Z./Zou)	50 Ω
Power Supply Voltage	Vac+3.3V≤100mA; Vbo+130V≤3.0mA
Central frequency drift	≤80ppm/°C
Operating temperature range	–40°C~+85°C
Storage temperature range	–55°C~+105°C
Outline dimension	50×32×15mm

External Shape Structure



Band Control	A8	A9	Wave band	Address code calculation formula: $\{[(f-f_{\text{flow}})/(f_{\text{high}}-f_{\text{flow}})] \times 250\}$, where f_x is the center frequency to be tuned within the segment; f_{flow} is the lowest frequency within the segment; f_{high} is the highest frequency within the segment; and 250 represents the total number of steps within the segment.
	0	0	30~90MHz (D1)	
	1	0	90~225MHz (D2)	
	1	1	225~512MHz (D3)	

*This package can be customized for products operating in other three frequency bands within the range of 30 MHz to 1000 MHz.

quartz-crystal filter

Quartz crystal oscillator

Silicon Crystal Filter

Electrical frequency-jumping filter

mechanical filter

Clock and Signal Processing Chip

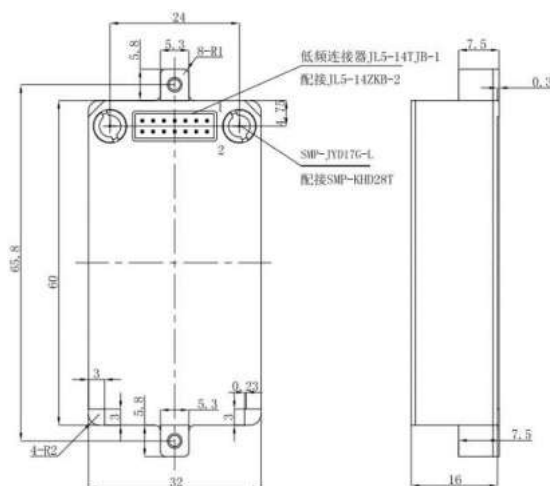
Recommended Product (4)

Frequency Hopping Filter

Product model: STVFD30-678M-17-N4-G

Technical Indicator Items	Item parameter
Frequency range (fo)	30MHz~678MHz (30-90, 90-225, 225-512, 512-678) MHz
Insertion loss (IL)	≤7. 0dB
Standing wave ratio	≤2:1
3 dB bandwidth (BW3dB)	≥2.5% fo (frequency band D1); ≥3.0% fo (frequency band D2); ≥3.5% fo (frequency band D3)
1 d B bandwidth (BW1B)	≥20 MHz (Band D4)
With a 10% FO ± FO inhibition range	≥30 dBc@fo ±10% f. (Frequency band D1)
With a 15% FO ± FO inhibition range	≥48 dBc@ (frequency bands D1-D2); ≥44 dBc@ (frequency band D3); ≥20 dBc@ (frequency band D4)
Distal inhibition	≥Suppression at 35 dB@2 GHz and ≥35 dB@1.6 GHz
Input/output impedance (Zm/Zou)	50 Ω
Tuning time (Tv)	≤30uS
Address Code (Address)	Ten parallel binary codes A0-A9
Input signal power (Pn)	≥+30dBm
Power Supply Voltage	Vcc1: +3. 3V≤100mA; Vcc2: -3. 3V≤1mA; Vbb: +120V≤3mA
Central frequency drift	≤80ppm/℃
Operating temperature range	-40℃~+85℃
Storage temperature range	-55℃~+85℃
Outline dimension	60×32×16 mm (specific dimensions subject to the 3D model); interface specifications follow the protocol.

External Shape Structure



Band Control	A8	A9	Frequency range
	0	0	30~90MHz (D1)
	0	1	90~225MHz (D2)
	1	0	225~512MHz (D3)
	1	1	512~678MHz (D4)

Address code calculation formula: $\{((f_flow)/(fnigh-flow))\} \times 250$

fx is the center frequency to be tuned within the band; **fow** is the lowest frequency within the band; **fhigh** is the highest frequency within the band; and **250** is the total number of steps within the band.

Product Name: Frequency Hopping Filter

Product model: STVFD30M-13-N4-G

Technical Indicator Items	Item parameter
Frequency range (fo)	30MHz~678MHz (30-90, 90-225, 225-512, 512-678) MHz
Insertion loss (IL)	≤3. 0dB
Standing wave ratio	≤2:1
3 dB bandwidth (BW3aB)	≥3.0% fo (frequency bands D1-D2); ≥3.5% fo (frequency band D3)
1 dB bandwidth (BW1dB)	≥20 MHz (Band D4)
With a 10% FO ± FO inhibition range	≥18 dBc@fo ±10%fo (frequency band D1)
With a 15% FO ± FO inhibition range	≥30 dBc@fo ±15%fo (frequency bands D1-D3); ≥20 dBc@fo ±15%fo (frequency band D4)
Distal inhibition	≥Inhibition at 25 dB@2 frequency band; ≥30 dB@1.6 GHz
Input/output impedance (Zm/Zaut)	50 Ω
Tuning time (Tv)	≤30uS
Address Code (Address)	Ten parallel binary codes A0-A9
Input signal power (Pn)	≥+30dBm
Power Supply Voltage	Vcc1: +3. 3V≤100mA; Vcc2: -3. 3V≤1mA; Vbb: +120V≤3mA
Central frequency drift	≤80ppm/℃
Operating temperature range	-40℃~+85℃
Storage temperature range	-55℃~+85℃
Outline dimension	60×32×16 mm (specific dimensions subject to the 3D model); interface specifications follow the protocol.

External Shape Structure

Low-frequency connector JL5-14TJL-1 ____对接
JL5-14ZKB-2

SMP-TYD17G-L.
Connect to SMP-KHD28T

0.3

5.8 8-RT

____0.3 Friend

4-R2

37.8

43.6

Band Control	A8	A9	Frequency range
	0	0	30~90MHz (D1)
	0	1	90~225MHz (D2)
	1	0	225~512MHz (D3)
	1	1	512~678MHz (D4)

Address code calculation formula: $\{((f-fow)/(fnigh-fow))\} \times 250$
fx is the center frequency to be tuned within the band; fow is the lowest frequency within the band;fnigh is the highest frequency within the band; and 250 is the total number of steps within the band.

Mechanical Filter

Mechanical filters are specialized filtering devices that utilize the natural resonant frequency of rigid bodies during mechanical vibration for frequency selection, manufactured from high-Q-value dedicated constant-modulus alloys. These products feature high selectivity, compact size, lightweight design, excellent frequency stability, and high reliability, with a frequency range of 0.6 kHz to 600 kHz. The company has independently developed an integrated plate-type vibration system mechanical filter, achieving significant miniaturization of the product.

The mechanical filters developed by the company meet enterprise and military quality standards, primarily designed for domestic space and satellite applications.

List of Typical Products Mechanical Filter Series

Typical Product	Centrality Frequency kHz	Passband Width kHz	Passband Undulate dB	Insert Loss dB	Square ratio	Stop band Dissipation dB	Product specification
STMF-02-B-16-021-40	16	0.21 ± 0.01	≤ 1.5	≤ 2.5	$K4_3 \leq 3.0$	≥ 40	"Procurement Specification for LJT-16kHz Mechanical Filters for Space Vehicles" CASTPS14/693A-2014
STMF-02-B-17-045-40	17	0.45 ± 0.02	≤ 1.5	≤ 2.5	$ka_3 \leq 3.0$	≥ 40	"Procurement Specifications for LJT-F2 Series Mechanical Filters for Space Vehicles" CASTPS14/852A-2014
STMF-04-C-21-0.45-40	21	0.45 ± 0.02	≤ 1.5	≤ 3.0	$ka \leq 3.0$	≥ 40	
STMF-01-D-188-4.5-50	188	4.50 ± 0.4	≤ 1.5	≤ 3.0	$ka_3 \leq 2.5$	≥ 50	Detailed Specifications for Small, Highly Reliable Mechanical Filter Sets Q/TD20023A-2008
STMF-01-D-208-4.5-50	208	4.50 ± 0.4	≤ 1.5	≤ 3.0	$k403 \leq 2.5$	≥ 50	
STMF-01-D-228-4.5-50	228	4.50 ± 0.4	≤ 1.5	≤ 3.0	$k43 \leq 2.5$	≥ 50	
STMF-01-D-230-42-50	230	4.20 ± 0.3	≤ 1.5	≤ 3.0	$ka_3 \leq 2.5$	≥ 50	"Procurement Specification for LJT-230k-B Mechanical Filters for Space Vehicles" CASTPS14/688A-2014



Mechanical Filter STMF Series

Product Features and Applications/Features

- ◎ Highly reliable and stable;
- ◎ Compact size and lightweight;
- ◎ High quality grade (CASTC, standard-compliant);
- ◎ It is widely used in fields such as satellites, missile remote control, telemetry, and communication electronics.

Quality Specification/Quality Assurance

General Specification: GJB264A-2011 "General Specification for Mechanical Filters"

Enterprise Specifications: Q/TD20118-2008 "Mechanical Filter Product Specification (For Aircraft)" and Q/TD20119-2008 "Mechanical Filter Product Specification (For Missiles)"

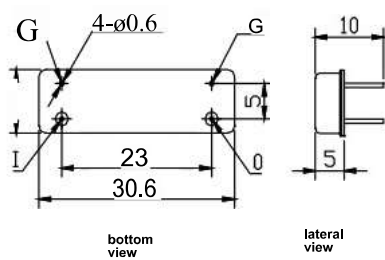
Quality Grade: Enterprise Military Standard



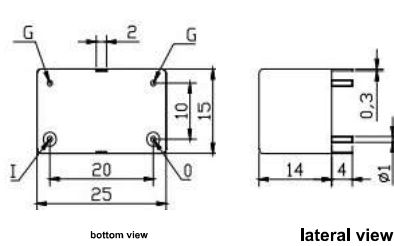
Technical Specifications

Model	Structural dimension mm ³	Frequency range kHz	3 dB relative bandwidth	Square ratio Kaos	Bandgap attenuation (dB)
STMF01	30.6×10×5	180~500	0.3~3%	2~6	≥60
STMF02	25×15×14	3~30	0.5~1%	2~5	≥60
STMF03	40×36×16	9~27	0.5~10%	2~5	≥60
STMF04	30×25×15.5	20~40	0.5~10%	3~6	≥50
STMF05	30×20×15	1~2	0.5~1%	3~6	≥50
STMF06	50×25×15	1~3	1~10%	3~6	≥50

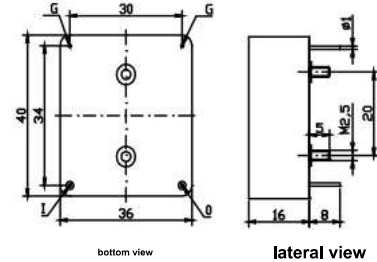
External dimensions and structural code



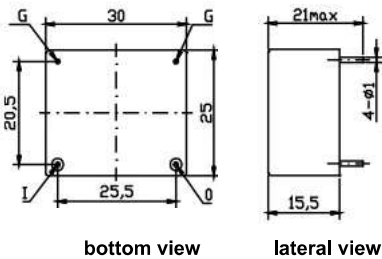
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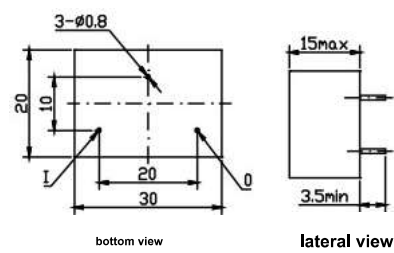
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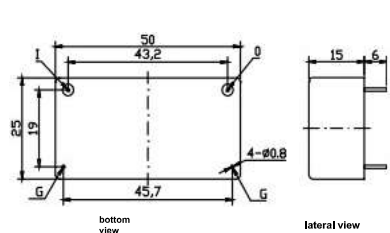
Structure Code: 03



Structure Code: 04



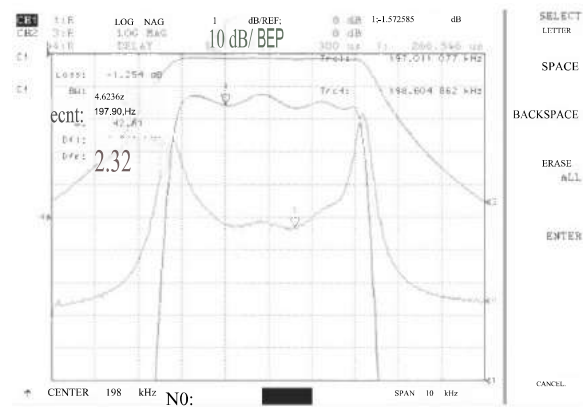
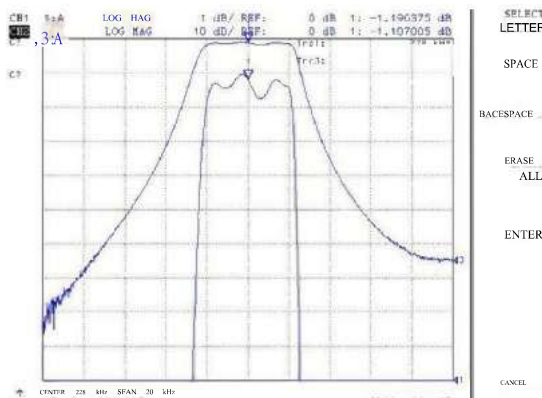
Structure Code: 05



Structure Code: 06

I. Input 0. Output G. Location

Measured passband and stopband characteristics of typical mechanical filter products



Clock and Signal Processing Chip

Product name	Foreign manufacturer	Foreign product model	Tianao Company's alternative product model
Clock Buffer	TI	SN65LVDS104PW	SCB--65104
Clock Buffer		SN65LVDS108DBT	SCB--65108
Clock Buffer	ADI	ADCLK946	SCB-946
Clock Buffer	ADI	ADCLK950	SCB-950
Clock Buffer	Silicon lab	Si53156	SCB-53156
Clock generator	Renesas	DT6P41505	SCK-41505
Clock driver	IDT	ICS551MILF	SCB-01-551
Clock driver		IDT74FCT38074	SCB-01-38074
Clock driver		ICS9FG104DGILF	SCB-01-FG104D
Real-time clock	MAXIM	DS1340C-33	RTC-02-1340L-33
Real-time clock		DS1340Z-33	RTC-02-1340Z-33
Real-time clock	MAXIM	DS1339	RTC-1339-M
Analog-digital converter	ADI	AD7606	SAD-7606
Analog-digital converter	TI	ADS8588S	
Analog-digital converter	ADI	AD7685	SAD-7685
Analog-digital converter	ADI	AD9253	SAD-9253
Analog-digital converter	ADI	AD9653	SAD-9653
Analog-digital converter	E2V	EV10AQ190A	SAD-10AQ190
Operational amplifier	ADI	AD8032	SOP-8032
Operational amplifier	ADI	AD8032ARM (MSOP8 package)	SOP-8032M
Operational amplifier	ADI	AD8042	SOP-8042
Operational amplifier	ADI	AD8139	SOP-8139
Operational amplifier	TI	OP27	SOP-27
Operational amplifier	ADI	OP27	
PHY Chip	Marvell	88Q2112	SPY-2112
Note: For specific product specifications, refer to the "Clock and Signal Processing Chip Product Manual".			

Domestic Substitution Summary Table of Domestic Substitution of Crystal Device Products by Tianao Electronics Company (1)

SMD Single-Ended Crystal Oscillator

Foreign manufacturer	Foreign product model	Company's alternative product model	Quality grade	Enterprise Military Standard Product Specifications	Packaging size
MMDC	WU50AM	SCX011BG□MDHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	WU33AM	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	WU18AM	SCX011BG□MDHLT-G	Military level	QITD50000-2022	SMD7.0×5.0×1.3
	WG3N	SCX020AG□MDHIT-G	Military level	Q/TD 50002-2022	SMD5.0×3.2×1.2
	WG5N	SCX020AG□MDHHT-G	Military level	Q/TD50002-2022	SMD5.0×3.2×1.2
XSIS	XC5R-7B	SCX011BG□MDHLT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	XC5L-7B	SCX011BG□MDHIT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	XC5A-7B	SCX011BG□MDHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	XC5N-7B	SCX011BG□MDHKT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
GXL	GSVI-33V-M	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	GSVI-50V-M	SCX011BG□MDHHT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	GSVI-18V-M	SCX011BG□MDHLT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	GSVI-25V-M	SCX011BG□MDHKT-G	Military level	QITD50000-2022	SMD7.0×5.0×1.3
Q-TECH	M55310/16	SCX010DG□MDHIN-G	Military level	Q/TD20132-2008	20.5×12.7×5 (DIP14)
	M55310/26	SCX010AGDMDHIN-G	Military level	Q/TD20132-2008	20.5×12.7×5 (DIP14)
FRE-TECH	FTX053305055 ANM	SCX011BG□MCHIT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	FTX053105055 ANM	SCX011BG□MCHLT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	FTX053505055 ANM	SCX011BHOMCHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	FT310055A	SCX011BG□MDHIT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
VFC	T5323	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	T5623	SCX010AG□MCHHN-G	Military level	Q/TD20132-2008	20.5×12.7×5 (DIP14)
EPSON	SG8002DB□ MPC	SCX010AG□MCHIN-G	Military level	Q/TD20132-2008	20.5×12.7×5 (DIP14)
	SG8002DB□ MPH	SCX010AG□MCHHN-G	Military level	Q/TD20132-2008	20.5×12.7×5 (DIP14)
	SG8002DC□ MPC	SCX010CG□MCHIN-G	Military level	Q/TD20263-2013	12.7×12.7×5 (DIP8)
	SG8002DCD MPH	SCX010CG□MCHHN-G	Military level	Q/TD20263-2013	12.7×12.7×5 (DIP8)
	SG8002CA□ MPC	SCX011BG□MCHIT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	SG8002JF□ MPC	SCX011BG□MCHIT-G	Military level	Q/TD 50000-2022	SMD7.0×5.0×1.3
	SG8002CA□ MPH	SCX011BG□MCHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3

Foreign manufacturer	Foreign product model	Company's alternative product model	Quality grade	Enterprise Military Standard Product Specifications	Packaging size
	SG8002JF□ MPH	SCX011BG□MCHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
VECTRO N	VCC1-103	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	VCC1-105	SCX011BG□MDHHT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	FT310055A	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
TAITIEN	OCETHHJANF	SCX011BG□MDHIT-G	Military level	Q/TD50000-2022	SMD7.0×5.0×1.3
	OVETHHJANF	SCX020AG□MDHIT-G	Military level	Q/TD50002-2022	SMD5.0×3.2×1.2

SMD differential crystal oscillator

Foreign manufacturer	Foreign product model	Company's alternative product model	Quality grade	Enterprise Military Standard Product Specifications	Packaging size
PLE	LV9945DEV	SCX023G□MCVIT1-G	Military level	QTD 50001-2022	SMD7.0×5.0×1.45
	LV7745DEV	SCX023G□MCVIT1-G	Military level	QTD50001-2022	SMD7.0×5.0×1.45
	LV7745DEW	SCX023G□ MCVKT1-G	Military level	Q/TD50001-2022	SMD7.0×5.0×1.45
	LV7745DEX	SCX023G□ MCVLT1-G	Military level	Q/TD 50001-2022	SMD7.0×5.0×1.45
ON SEMI	NBXDBA012	SCX023G□MCEIT1-G	Military level	QTD 50001-2022	SMD7.0×5.0×1.45
	NBXDBA015	SCX023G□MCEIT1-G	Military level	Q/TD 50001-2022	SMD7.0×5.0×1.45
	NBXDBB017	SCX023G□MCEIT1-G	Military level	Q/TD 50001-2022	SMD7.0×5.0×1.45
MMDC	LVDSAM	SCX023G□MCVIT1-G	Military level	Q/TD 50001-2022	SMD7.0×5.0×1.45
	PECLAM	SCX023G□MCEIT1-G	Military level	Q/TD50001-2022	SMD7.0×5.0×1.45
TAITIEN	OTERHHVTNF	SCX023G□MCVIT1-G	Military level	Q/TD50001-2022	SMD7.0×5.0×1.45
	OTERHHLTNF	SCX023G□MCEIT1-G	Military level	Q/TD 50001-2022	SMD7.0×5.0×1.45
	OWERHHVTNF	SCX024G□MCVIT1-G	Military level	QTD 50003-2022	SMD5.0×3.2×1.25
	OWERHHLTNF	SCX024G□MCEIT1-G	Military level	Q/TD50003-2022	SMD5.0×3.2×1.25

**Warming and Tonifying
Crystal Oscillator**

Foreign manufacturer	Foreign product model	Company's alternative product model	Quality grade	Enterprise Military Standard Product Specifications	Packaging size
MMDC	MGTV	STX025BD□MAHI	Military level	Q/TD20304-2015	SMD7.0*5.0*2.0
MtronPTI	M610×1611x	STX025BD□M□□ □	Military level	Q/TD20304-2015	SMD7.0*5.0*2.0
	K160X	STX015□□□M□□ □	Military level	Q/TD20126A-2016	20.8*13.2*8 (DIP14)
	X03080	STX012□□□M□□ □	Military level	Q/TD20126A-2016	27.5*18*6 (DIP14)
RAKON	RFP060/65	STX013D□MCSH	Military level	Q/TD20288-2015	SMD20*12.5*5.2
	CFPT9000	STX025CD□ MAHIV	Military level	Q/TD20304-2015	SMD7*5*2
	RFP060/65	STX013D□MCSH	Military level	Q/TD20288-2015	20.0*12.5*5.2
TAITIEN	TTEAADLJANF	STX025DD□ MAHIV	Military level	Q/TD 50008-2023	SMD7*5*2
	TWEAADLJANF	STX027AD□MAHIV	Military level	Q/TD20304-2015	SMD5*3.2*1.4
NEL	AN-XA7XSXX	STX013D□MCSH	Military level	Q/TD20288-2015	20.0*12.5*5.2
WINTRON	WTC-14AB/C	STX013D□MCSH	Military level	Q/TD20288-2015	20.0*12.5*5.2

Domestic Substitution Summary Table of Domestic Substitution of Crystal Device Products by Tianao Electronics Company (3)

Thermoelectric Crystal Oscillator

Foreign manufacturer	Foreign product model	Company's alternative product model	Quality grade	Enterprise Military Standard Product Specifications	Packaging size
VECTRON	OX-400	SOX018B□MBSH	Military level	Q/TD20125A-2016	20.8*13.2*10 (DIP14)
	OX-204/205	SOX017AF□MCSGU	Military level	Q/TD20125A-2016	20*20*11
	OX-990	SOX014V□□M□□□	Military level	QTD20125A-2016	38*38*20
MtronPTI	X05180	SOX019□□M□□□	Military level	Q/TD20125A-2016	25.4*22*13
	X05080	SOX016B□□M□□□	Military level	Q/TD20125A-2016	25.4*25.4*12.7
	X05120	SOX015□□M□□□	Military level	QTD20125A-2016	36*27*13
RAKON	LNO 100	SOX016BF□MCSGU	Military level	Q/TD20125A-2016	25.4*25.4*12.7
	OCXOULNHFA	SOX014AF□MCSGU	Military level	QTD20125A-2016	38*38*13
	OCXOULNHFC	SOX014V□□M□□□	Military level	QTD20125A-2016	38*38*20
	ROX2525	SOX016B□□M□□□	Military level	Q/TD20125A-2016	25.4*25.4*12.7
	ROX3627	SOX015□□M□□□	Military level	Q/TD20125A-2016	36*27*13
NEL	O-CEH-XX	SOX015□□M□S□U	Military level	Q/TD20125A-2016	36*27*13
	O-C1-X	SOX016BF□MCSGU	Military level	QTD20125A-2016	25.4*25.4*12.7
	O-C25-X	SOX017AF□MCSGU	Military level	Q/TD20125A-2016	20*20*11
MORION	MV118/199	SOX017A□□M□□□	Military level	Q/TD20125A-2016	20*20*11
	MV85	SOX016B□□M□□□	Military level	Q/TD20125A-2016	25.4*25.4*12.7
	MV178/197/205	SOX015□□M□□□	Military level	Q/TD20125A-2016	36*27*13
	MV207/209	SOX020B□□M□□□	Military level	Q/TD20125A-2016	36*27*15
AXTAL	AXIOM260/5050	SOX014V□□M□□□	Military level	Q/TD20125A-2016	38*38*20
	AXIOM5151	SOX013BF□MDSGU	Military level	Q/TD20125A-2016	50*50*19
WINTRON	WOC-14A/C	SOX018B□MBSH	Military level	QTD20125A-2016	20.8*13.2*10 (DIP14)
	WOC-14D	SOX018DD□MBSH	Military level	Q/TD20125A-2016	25.4*16*11
	WOC-LB/C	SOX016B□□M□□□	Military level	Q/TD20125A-2016	25.4*25.4*12.7
	WOC-36	SOX015□□M□□□	Military level	QTD20125A-2016	36*27*13
PFC	AVX0 Series	SOX014V□□M□□□	Military level	QTD20125A-2016	38*38*20
	PFOC2/3	SOX013□□□M□□□	Military level	Q/TD20125A-2016	50*50*19
	PFOC4/5	SOX014A□□M□□□	Military level	Q/TD20125A-2016	38*38*13
	PFOC7	SOX016B□□M□□□	Military level	QTD20125A-2016	25.4*25.4*12.7
	PFOC8	SOX017A□□M□□□	Military level	QTD20125A-2016	20*20*11
	PFOC10	SOX018□□M□□□	Military level	Q/TD20125A-2016	20.8*13.2*10 (DIP14)
	PFOC12	SOX019□M□□□	Military level	Q/TD20125A-2016	25.4*22*13
	PFOC17	SOX015□□M□□□	Military level	QTD20125A-2016	36*27*13

Domestic Substitution Summary Table of Typical Operating Frequencies for Tianao Electronics Company's Domestic Substitution Products

Frequency range (MHz)	Typical frequency (MHz)	Quality grade	Company Name
1~10	1、1.024、1.8432、2、2.048、3.6864、3.5795、4、4.096、5、7.3728、8、8.192、9.83、10	Military level	SCX011B、SCX010A/C、STX025A/B/C/D、STX026A、STX012/13/15、SOX013/14/15/16/17/18/19/20/21
10~50	10、23、11、0592、12、12.5、12.288、13、14.318、14.7456、16、16.384、18.432、18.75、19.66、20、20.48、21.6、22.1184、23.04、24、24.576、25、25.165、27、28.8、30、30.72、32、32.512、32.768、33、33.33、35.2512、40、40.96、48、49.152、50	Military level	SCX011B、SCX010A/C、STX025A/B/C/D、STX026A、STX012/13/15、SOX013/14/15/16/17/18/19/20/21
50~100	51.2、53.84、54、58.9824、60、60.208、64、65、65.536、66、66.666、72、75、80、81.84、93.3、95、95.328、97.536、98、100	Military level	SCX011B、SCX010A/C、STX026A、SCX023、STX012/13/15、SOX013/14/15/16/17/18/19/21/23
100~305	102.3、102.4、106.25、107.6、109.1、120、121.5、122.88、125、132、133.25、141.42、156.25、159.375、160、186.6、200、204.8、212.5、250、270、305.25	Military level	SCX011B、SCX010A/C、STX026A、SCX023、STX012/13/15、SOX013/14/15/16/17/18/19/21/23



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