- KHz Crystal (SMD)
- MHz Crystal (SMD)
- Thermistor Quartz Crystal
- Oscillator SPXO (CMOS/LVPECL/ LVDS/HCSL Output)
- TCXO
- OCXO

TKD Science and Technology Co. Ltd

WTL International Limited

Quartz Crystal
Crystal Oscillator
TCXO
OCXO
Timing Module

Global Leader in Communication Frequency Control Devices

is authorized oversea distributor of TKD

COMPANY PROFILE

泰晶科技股份有限公司
TKD Science and Technology Co., LTD.

TKD Science and Technology Co., Ltd. is specialized in the quartz frequency control components and production equipment research, development, production and sales of national high-tech enterprises. TKD is the leading enterprises in domestic quartz crystal industry area and one of the domestic largest 100 electronic components companies.

Company has a complete product line of quartz crystal resonator, oscillator, thermistor and quartz crystal chip, products containing DIP, SMD encapsulation of high and low frequency crystal resonator, the upstream chip, WAFER, pedestal, shell, etc. And 2016 listed A shares in Shanghai stock exchange (stock code: 603738).

INTRODUCTION >>>

1.Vibration Modes and Orientation Angles

Regarding the vibration mode of the AT cut, the orientation angle at which the primary coefficient of the frequency temperature characteristics near room temperature reaches zero is indicated in Fig.1

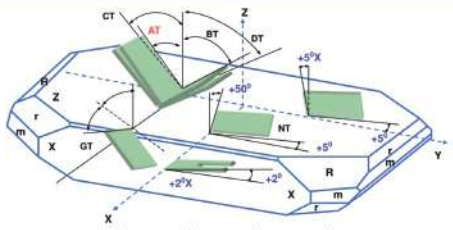


Fig.1 Orientation angle in Z plate artificial crystals

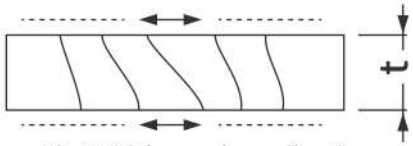


Fig.2 Thickness shear vibration

And the mode of thickness shear vibration is shown virtually in Fig.2.

2.Frequency-temperature characteristics

The frequency-temperature characteristics of a crystal are categorized into two types according to its shape of curve. One is a tertiary curve and the other is a quadratic curve. The typical frequency-temperature characteristics of AT cut are shown in Fig.3 , respectively. AT cut crystal units are most widely used because they produce smaller frequency changes in response to temperature changes in the room temperature range.

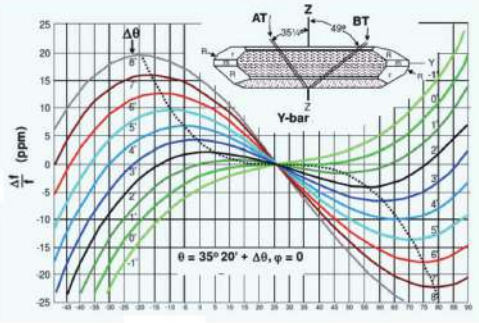


Fig.3 Example of AT cut frequency stability

3. Equivalent circuit and various constants

The equivalent circuit of quartz crystal near the resonance frequency is represented by the arrangements shown in Fig.4.

R_1:Series Resistance
L_1: Motional Inductance
C_1: Motional Capacitance
C_0: Shunt Capacitance

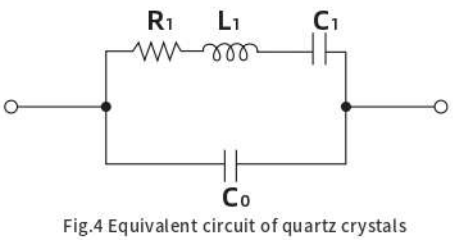


Fig.4 Equivalent circuit of quartz crystals

Series resonance frequency $f_s = \frac{1}{2\pi\sqrt{L_1 C_1}}$

Parallel resonance frequency $f_p = \frac{1}{2\pi\sqrt{L\frac{C_0 * C_1}{C_0 + C_1}}} = \frac{1}{2\pi\sqrt{L_1 C_1}}\sqrt{1+\frac{C_1}{C_0}}$

CONTENTS

● Automotive Solutions ★ Industrial Solutions

KHz Crystal (SMD)

1.1 M8

Metal Can Type Crystals
M8 Series

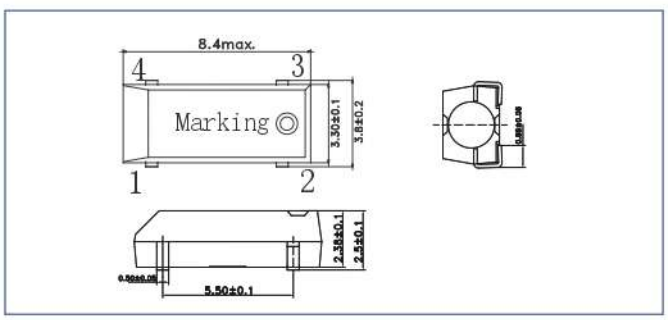
FEATURES

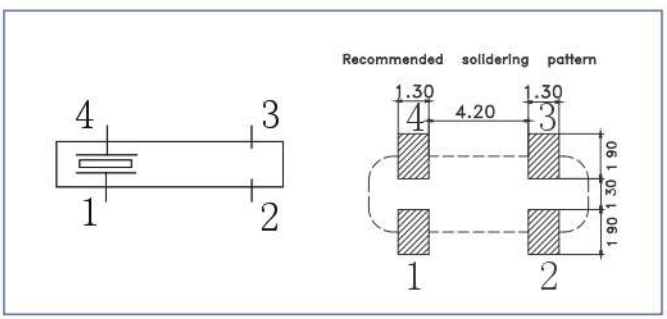
- Ultra-small size: 8.0*3.8*2.5 mm
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M8
Frequency Range	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm, or specify
Operating Temperature Range	-40 ~ +85°C
Shunt Capacitance (C_0)	2.0pF Max.
Drive Level	1.0μW typical
Load Capacitance	Series, 7pF, 9pF, 12.5pF, or specify
Aging (at 25°C)	±5 ppm First year Max.
Storage Temperature Range	-55 ~ +125°C
Turnover Temperature	25±5°C
Temperature Coefficient	(-0.035±0.005) ppm/°C²
Insulation Resistance	500MΩ@DC 100±10V

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32.768KHz	50KΩ Max.

KHz Crystal (SMD)

1.2 M6

Metal Can Type Crystals
M6 Series

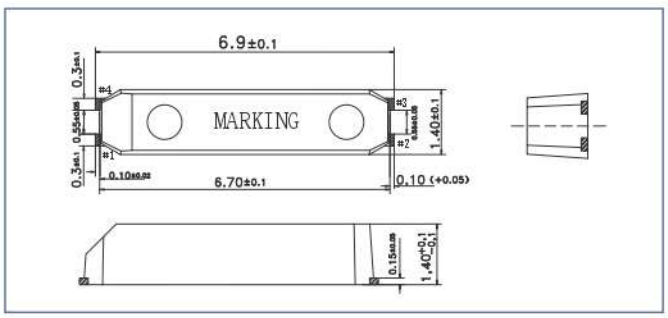
FEATURES

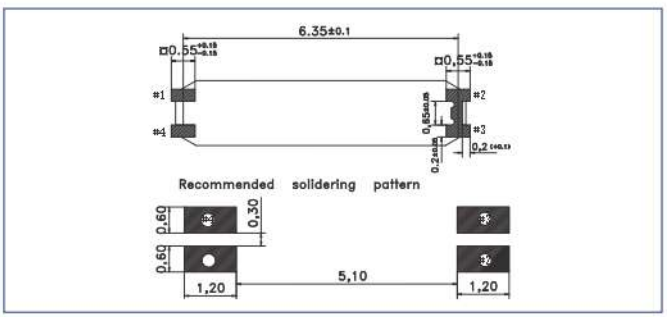
- Ultra-small size: 7.0*1.5*1.5 mm
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M6
Frequency Range	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm, or specify
Operating Temperature Range	-40 ~ +85°C
Shunt Capacitance (C_0)	1.0pF Max.
Drive Level	1.0μW typical
Load Capacitance	Series, 7pF, 9pF, 12.5pF, or specify
Aging (at 25°C)	±5 ppm First year Max.
Storage Temperature Range	-55 ~ +125°C
Turnover Temperature	25±5°C
Temperature Coefficient	(-0.035±0.005) ppm/°C^2
Insulation Resistance	500MΩ@DC 100±10V

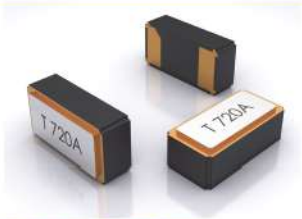
EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32.768KHz	65KΩ Max.

KHz Crystal (SMD)

1.3 K3215

Metal Can Type Crystals
M5 Series



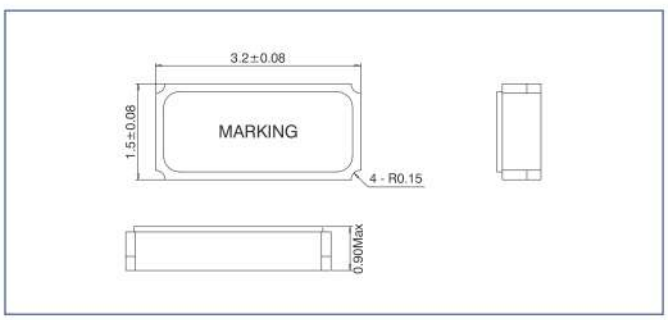
FEATURES

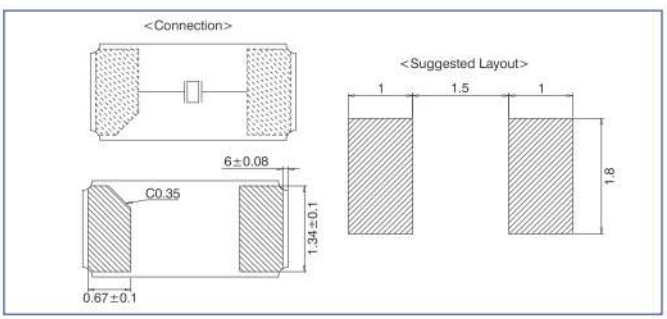
- Ultra-small size: 3.2*1.5*0.9 mm
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M5
Frequency Range	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm, or specify
Operating Temperature Range	-40 ~ +85°C
Shunt Capacitance (C_0)	1.5pF Max.
Drive Level	0.1μW typical, 0.5μW Max.
Load Capacitance	Series, 7pF, 9pF, 12.5pF, or specify
Aging (at 25°C)	±3 ppm First year Max.
Storage Temperature Range	-55 ~ +125°C
Turnover Temperature	25±5°C
Temperature Coefficient	(-0.035±0.005) ppm/°C^2
Insulation Resistance	500MΩ@DC 100±10V

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32.768KHz	70KΩ Max.

KHz Crystal (SMD)

1.4 K2012

Metal Can Type Crystals
M3 Series

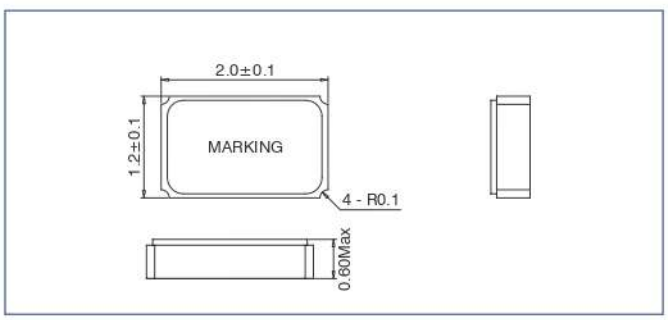
FEATURES

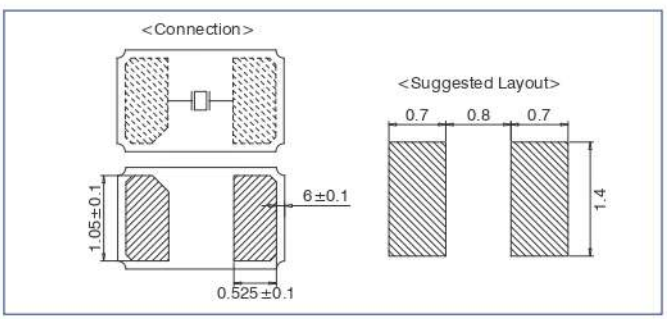
- Ultra-small size: 2.0*1.2*0.6 mm
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M3
Frequency Range	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm, or specify
Operating Temperature Range	-40 ~ +85°C
Shunt Capacitance (C_0)	1.5pF Max.
Drive Level	0.1μW typical, 0.5μW Max.
Load Capacitance	Series, 7pF, 9pF, 12.5pF, or specify
Aging (at 25°C)	±3 ppm First year Max.
Storage Temperature Range	-55 ~ +125°C
Turnover Temperature	25±5°C
Temperature Coefficient	(-0.035±0.005) ppm/°C^2
Insulation Resistance	>500MΩ@DC 100±10V

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32.768KHz	70KΩ Max.

KHz Crystal (SMD)

1.5 K1610

Metal Can Type Crystals
TF 1610

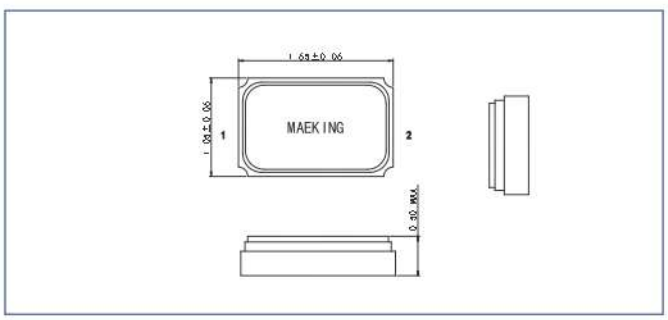
FEATURES

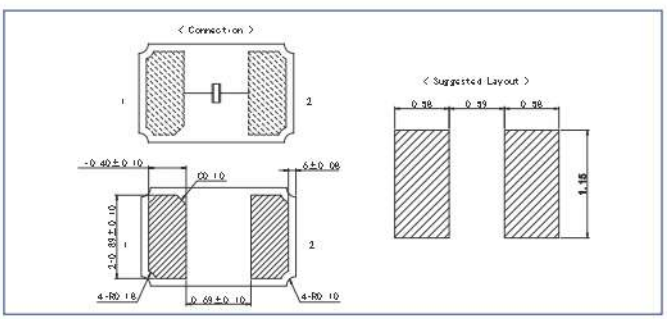
- Ultra-small size: 1.6 x1.0x0.5 mm
- Ceramic seam welding package
- High stability
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	TF1610
Frequency Range	32.768KHz
Frequency Tolerance (at 25°C)	±20ppm
Operating Temperature Range	-40 ~ +85°C
Shunt Capacitance (C_0)	2.0pF Max.
Drive Level	0.1μW(0.5μW Max.)
Load Capacitance	Series, 7pF, 9pF, 12.5pF, or specify
Aging(at 25°C)	±5 ppm First year Max.
Storage Temperature Range	-40 ~ +125°C
Turnover Temperature	25±5°C
Temperature Coefficient	(-0.035±0.005) ppm/°C^2
Insulation Resistance	500MΩ@DC 100±10V

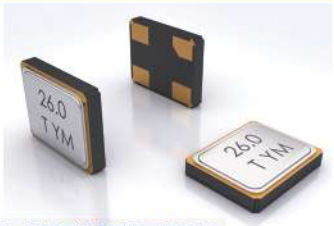
EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32.768KHz	90KΩ Max.

MHz Crystal (SMD)

2.1 M3225

Metal Can Type Crystals
M3225 Series



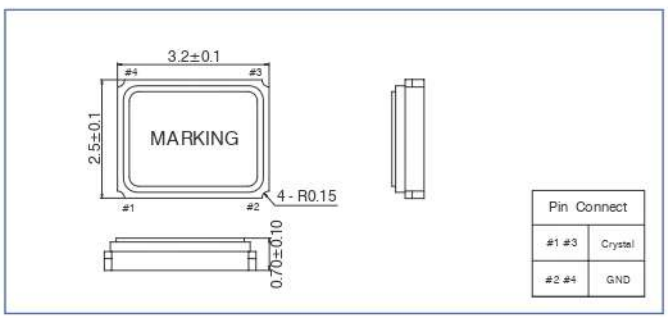
FEATURES

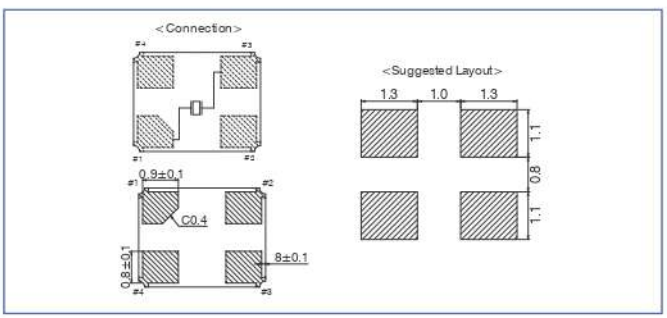
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M3225
Frequency Range	8 ~ 54 MHz
Frequency Tolerance (at 25°C)	±10 ppm, or specify
Frequency Stability Over Operating Temperature Range	±10 ppm, or specify
Operating Temperature Range	-10 ~ +60°C, or specify
Shunt Capacitance (C_0)	3pF Max.
Drive Level	100μW (typical)
Load Capacitance	Series, 6pF, 10pF, 12pF, 16pF, or specify
Aging (at 25°C)	±3 ppm/year Max.
Storage Temperature Range	-40 ~ +125°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
8MHz≤F_O<10MHz	300 Ω Max.
10MHz≤F_O<15MHz	150 Ω Max.
15MHz≤F_O<19.5MHz	80 Ω Max.
19.5MHz≤F_O<27MHz	60 Ω Max.
27MHz≤F_O<54MHz	50 Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp.(°C)	±10	±15
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	×	△

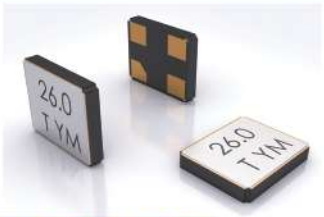
ppm / Temp.(°C)	±20	±30	±50
-40 ~ +105	△	○	○
-40 ~ +125	×	△	○

*○: Available △: Condition X: Not available
Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.2 M2520

Metal Can Type Crystals
M2520 Series



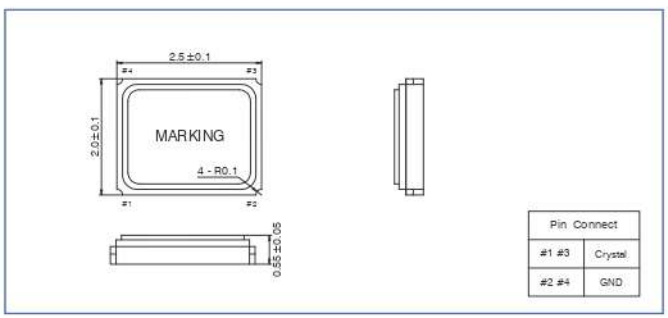
FEATURES

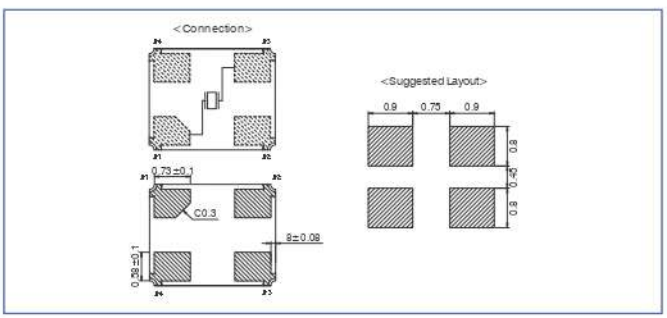
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M2520
Frequency Range	12 ~ 54 MHz
Frequency Tolerance (at 25°C)	±10 ppm, or specify
Frequency Stability Over Operating Temperature Range	±10 ppm, or specify
Operating Temperature Range	-10 ~ +60°C, or specify
Shunt Capacitance (C_0)	3pF Max.
Drive Level	100μW (typical)
Load Capacitance	Series, 6pF, 12pF, 16pF, or specify
Aging (at 25°C)	±3 ppm/year Max.
Storage Temperature Range	-40 ~ +125°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
12MHz≤F_0<20MHz	150 Ω Max.
20MHz≤F_0≤30MHz	80 Ω Max.
30MHz<F_0<54MHz	60Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp.(°C)	±5	±10	±15
-10 ~ +60	△	○	○
-20 ~ +70	×	△	○
-40 ~ +85	×	×	△

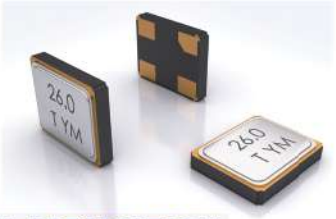
ppm / Temp.(°C)	±15	±20	±30	±50
-40 ~ +105	△	○	○	○
-40 ~ +125	×	×	△	○

*o: Available △: Condition X: Not available
Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.3 M2016

Metal Can Type Crystals
M2016 Series



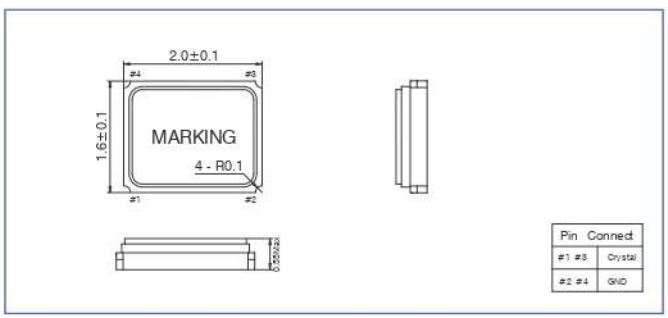
FEATURES

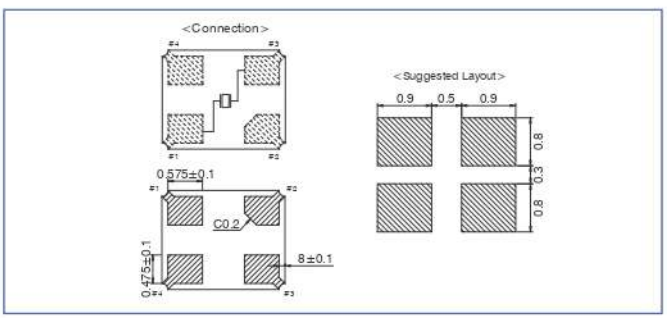
- Reflow resistance type crystal units
- Higher frequency pull ability and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant/Pb Free

TYPICAL APPLICATION

- The best choice of Notebook Computer TV, STB, LCDM and Cable Modem

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M2016
Frequency Range	12 ~ 96 MHz
Frequency Tolerance (at 25°C)	±10 ppm, or specify
Frequency Stability Over Operating Temperature Range	±10 ppm, or specify
Operating Temperature Range	-10 ~ +60°C, or specify
Shunt Capacitance (C_0)	3pF Max.
Drive Level	10μW (100μW Max.)
Load Capacitance	Series, 6pF, 12pF, 16pF, or specify
Aging (at 25°C)	±3 ppm/year Max.
Storage Temperature Range	-40 ~ +125°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
12MHz≤F_0<16MHz	300 Ω Max.
16MHz≤F_0<20MHz	120 Ω Max.
20MHz≤F_0<30MHz	80 Ω Max.
30MHz≤F_0<60MHz	60 Ω Max.
60MHz≤F_0<96MHz	40 Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp.(°C)	±5	±10	±15
-10 ~ +60	△	○	○
-20 ~ +70	×	△	○
-40 ~ +85	×	×	△

ppm / Temp.(°C)	±15	±20	±30	±50
-40 ~ +105	△	○	○	○
-40 ~ +125	×	×	△	○

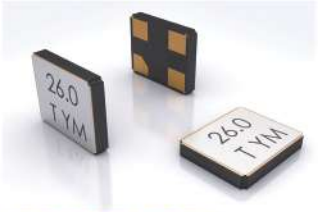
*o: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.4 M1612

SMD AT cut crystal unit
M1612 series



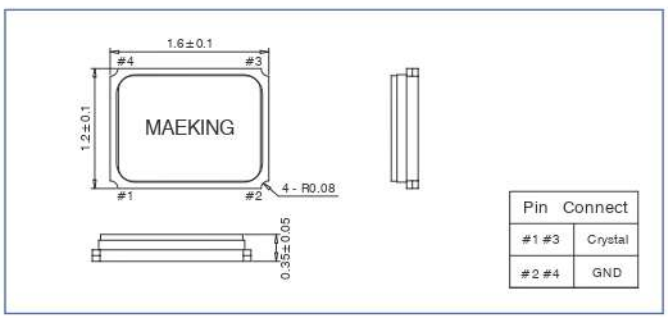
FEATURES

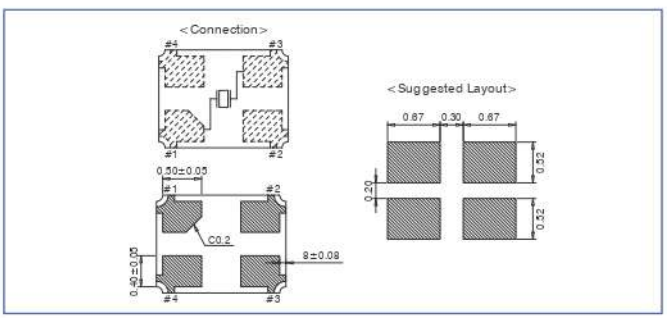
- Ultra-small size: 1.6 × 1.2 × 0.35 mm
- Ceramic seam welding package
- High stability and low aging
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M1612
Frequency Range	24 ~ 96MHz
Frequency Tolerance (at 25°C)	±10 ppm, or specify
Frequency Stability Over Operating Temperature Range	±10ppm, ±15ppm, or specify
Operating Temperature Range	-10 ~ +60°C
Shunt Capacitance (C_0)	3.0pF Max.
Drive Level	100μW (typical)
Load Capacitance	Series, 8pF, 10pF, or specify
Aging (at 25°C)	±3 ppm/year Max.
Storage Temperature Range	-40 ~ +125°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
24MHz≤F_0<32MHz	120 Ω Max.
32MHz≤F_0<52MHz	80Ω Max.
52MHz≤F_0≤96MHz	50 Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp.(°C)	±5	±10	±15
-10 ~ +60	△	○	○
-20 ~ +70	×	△	○
-40 ~ +85	×	×	△

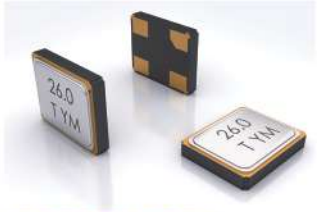
ppm / Temp.(°C)	±15	±20	±30	±50
-40 ~ +105	△	○	○	○
-40 ~ +125	×	×	△	○

*o: Available △: Condition X: Not available
Note: not all combination of options are available. Other specifications may be available upon request.

MHz Crystal (SMD)

2.5 M1210

SMD AT cut crystal unit
M1210 series



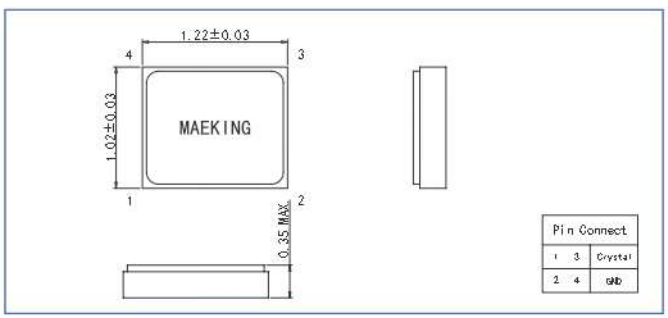
FEATURES

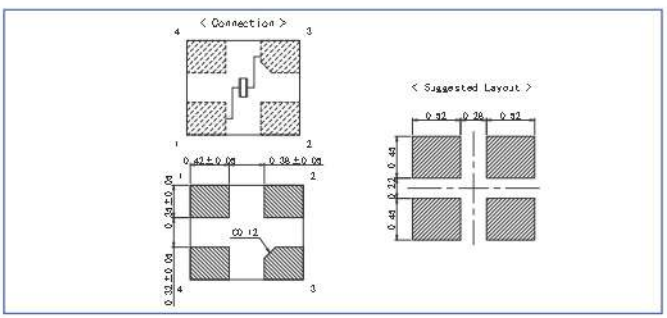
- Ultra-small size: 1.2 × 1.0 × 0.3 mm
- Sealing with gold-tin preform ceramic package
- High stability and low aging
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	M1210
Frequency Range	32 ~ 48MHz
Frequency Tolerance (at 25°C)	±10 ppm, or specify
Frequency Stability Over Operating Temperature Range	±10 ppm, or specify
Operating Temperature Range	-10 ~ +60°C
Shunt Capacitance (C_0)	3.0pF Max.
Drive Level	100μW (typical)
Load Capacitance	Series, 8pF, 10pF, or specify
Aging (at 25°C)	±3 ppm/year Max.
Storage Temperature Range	-40 ~ +125°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
32MHz≤F_O≤48MHz	80Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp.(°C)	±5	±10	±15
-10 ~ +60	△	○	○
-20 ~ +70	×	△	○
-40 ~ +85	×	×	△

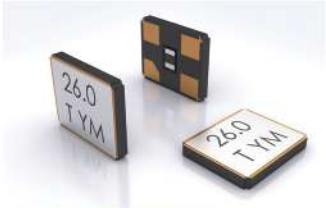
ppm / Temp.(°C)	±15	±20	±30	±50
-40 ~ +105	△	○	○	○
-40 ~ +125	×	×	△	○

*o: Available △: Condition X: Not available
Note: not all combination of options are available. Other specifications may be available upon request.

Thermistor Quartz Crystal

3.1 T2520

Thermistor Quartz Crystals
T2520 Series



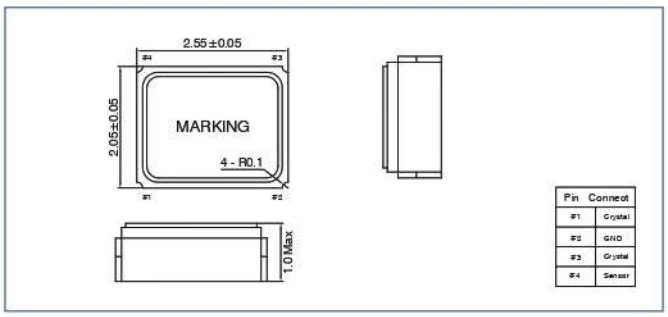
FEATURES

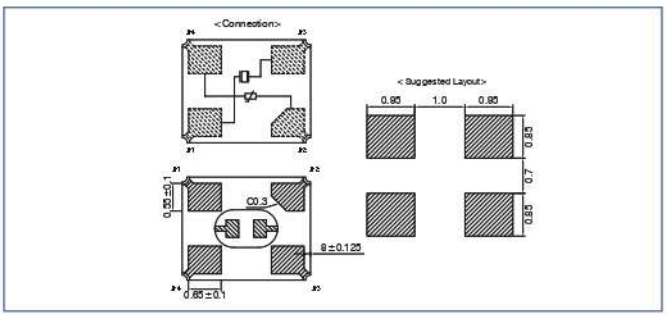
- Low aging
- Excellent shock and vibration performance
- Thermally coupled temperature sensor

TYPICAL APPLICATION

- The best choice of Automotive, Communtications GPS, Wifi and Mobile phones

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	T2520
Frequency Range	19.2MHz, 26MHz
Frequency Tolerance (at 25°C)	±10ppm, or specify
Frequency Stability Over 0perating Temperature Range	±12ppm, or specify
Operating Temperature Range	-30 ~ +85°C, or specify
Shunt Capacitance (C_0)	3pF Max.
Load Capacitance	7pF, or specify
Drive Level	100μW (typical)
Aging(at 25°C)	±1 ppm/year Max.
Storage Temperature Range	-40 ~ +85°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
19MHz ≤ f_nom < 20MHz	70Ω Max.
20MHz ≤ f_nom ≤26MHz	50Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±12
-30 ~ +85	○

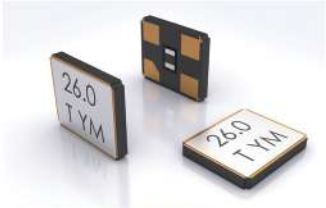
*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

Thermistor Quartz Crystal

3.2 T2016

Thermistor Quartz Crystals
T2016 Series



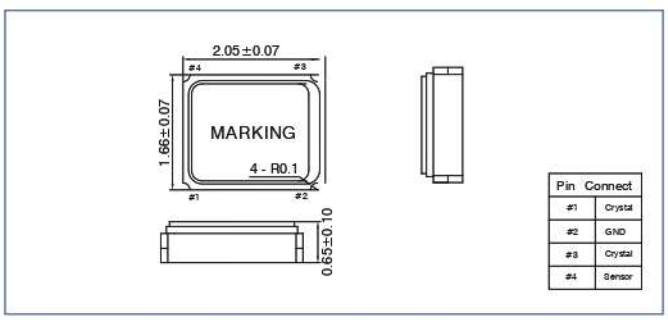
FEATURES

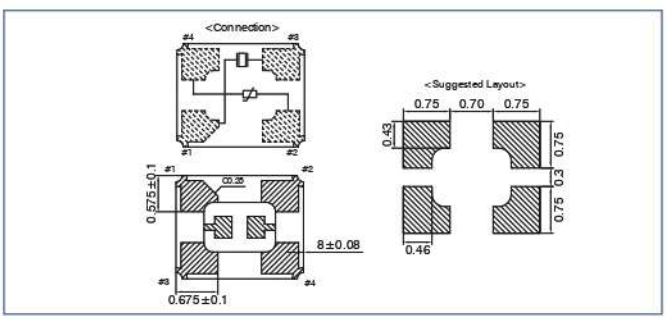
- Low aging
- Excellent shock and vibration performance
- Thermally coupled temperature sensor

TYPICAL APPLICATION

- The best choice of Automotive, Communtications GPS, Wifi and Mobile phones

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	T2016
Frequency Range	19.2MHz, 26MHz, 38.4MHz
Frequency Tolerance (at 25°C)	±10ppm, or specify
Frequency Stability Over 0perating Temperature Range	±12ppm, or specify
Operating Temperature Range	-30 ~ +85°C, or specify
Shunt Capacitance (C_0)	3pF Max.
Load Capacitance	7pF, or specify
Drive Level	100μW (typical)
Aging(at 25°C)	±1 ppm/year Max.
Storage Temperature Range	-40 ~ +85°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
19.2MHz ≤ f_nom < 30.0MHz	80Ω Max.
30.0MHz ≤ f_nom < 54.0MHz	60Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(℃) \ ppm	±12
-30 ~ +85	○

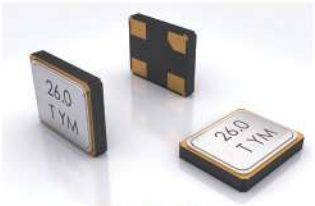
*○: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

Thermistor Quartz Crystal

3.3 T1612

Thermistor quartz crystal
T1612 series



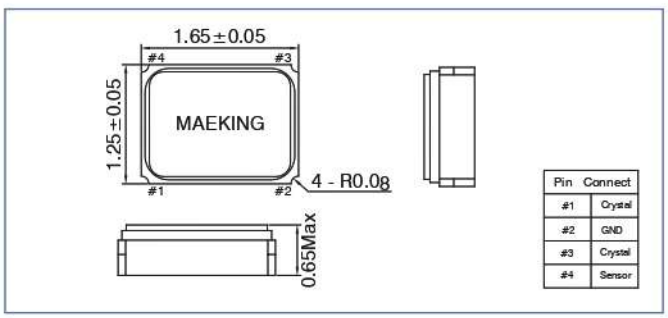
FEATURES

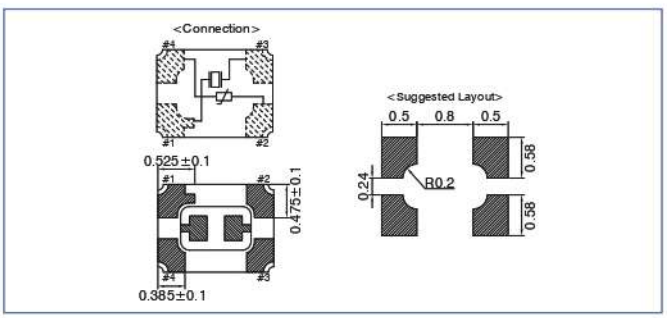
- Ultra-small size: 1.6 × 1.2 × 0.35 mm
- Ceramic seam welding package
- High stability and low aging
- Pb Free and RoHS compliant

TYPICAL APPLICATION

- Small wireless device, Wireless module, IoT, Wearable device, TWS
- Health care equipment, Small consumer equipment etc

DIMENSIONS





ELECTRICAL SPECIFICATION

Item/Type	T1612
Frequency Range	26 ~ 76.8MHz
Frequency Tolerance (at 25°C)	±10ppm, or specify
Frequency stability over Operating Temperature	±12ppm, or specify
Operating Temperature Range	-30 ~ +85°C
Shunt Capacitance (C_0)	3pF Max.
Drive Level	100μW (typical)
Load Capacitance	7pF, or specify
Aging(at 25°C)	±1 ppm/year Max.
Storage Temperature Range	-40 ~ +85°C

EQUIVALENT SERIES RESISTANCE(ESR)

Frequency	Resistance
26MHz ≤ f_nom < 40MHz	80Ω Max.
40MHz ≤ f_nom≤ 52MHz	60Ω Max.
52MHz< f_nom ≤ 96MHz	40Ω Max.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±12
-30 ~ +85	○

*○: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.1 XO3225

3.2 x 2.5 mm SMD Crystal Oscillator

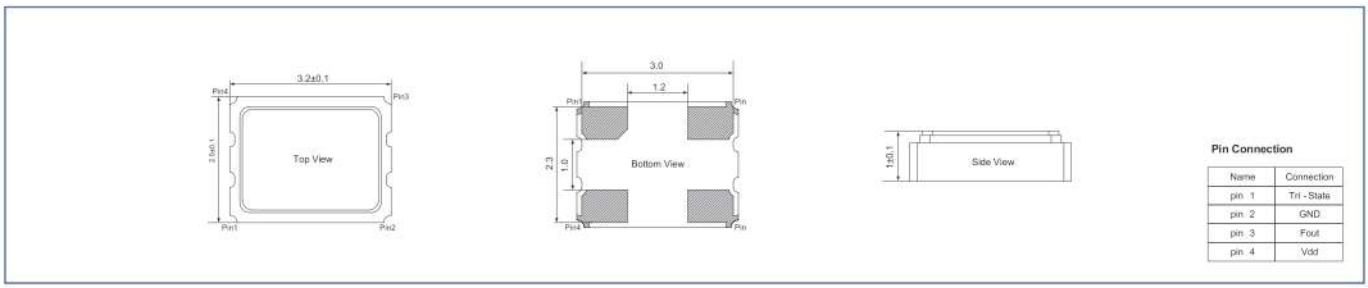
FEATURES

- Typical 3.2 x 2.5 x 0.95mm Ceramic SMD Package
- Tight Symmetry (45 to 55%) Available
- Operation Voltage: 1.8V, 2.5V, 3.3V
- Tri-State Enable/Disable Operation

TYPICAL APPLICATION

- WLAN/WiMAX
- Mobile Phone
- DSC, Set-Top Box, HDTV

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		1.25	125	1.25	125	1.25	125	MHz
Standard Frequency		24, 26, 30, 40						MHz
Supply Current	At 15pF Load	—	15	—	10	—	7	mA
	No Load Condition, 1.25MHz≤F_O<10MHz	—	1.5	—	1.5	—	1.2	mA
	No Load Condition, 10MHz≤F_O<20MHz	—	2	—	2	—	1.5	mA
	No Load Condition, 20MHz≤F_O<80MHz	—	3	—	2.5	—	1.5	mA
	No Load Condition, 80MHz≤F_O<125MHz	—	8	—	7	—	5	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level	Output High	2.97	—	2.25	—	1.62	—	V
	Output Low	—	0.33	—	0.25	—	0.18	
Transition Time: Rise/Fall Time+	1.25MHz≤F_O<10MHz	—	3	—	4	—	5	nSec
	10MHz≤F_O<20MHz	—	3	—	3	—	4	nSec
	20MHz≤F_O<80MHz	—	3	—	3	—	4	nSec
	80MHz≤F_O<125MHz		3		3		4	nSec
Startup Time		—	2	—	2	—	2	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	1.26	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.54	
	Output Loading	15		15		15		pF
Stand by Current	(@-40 ~ 85°C)	—	10	—	10	—	10	uA
	(@-40 ~ 125°C)	—	20	—	20	—	20	uA
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C
Period Jitter(Pk-Pk)		—	40	—	40	—	40	pSec
RMS Phase Jitter(Intergrated 12 KHz ~ 20MHz)		—	1	—	1	—	1	pSec

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

FREQ. STABILITY vs. TEMP. RANGE

Temp.(℃) \ ppm	±20	±25	±50
-10 ~ +60	○	○	○
-20 ~ +70	△	○	○
-40 ~ +85	×	○	○

*o: Available △: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.2 XO2520

2.5 x 2.0mm SMD CMOS Output Crystal Oscillator

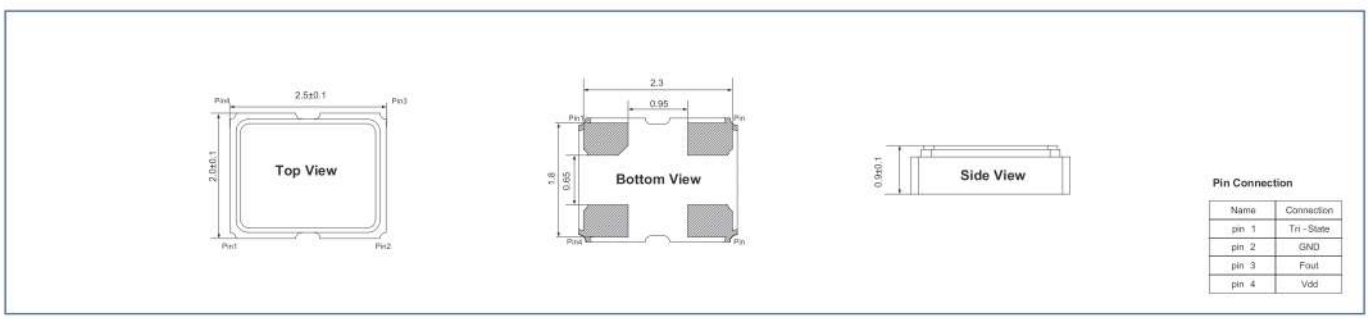
FEATURES

- Ultra Low Power Supply Voltage: 0.9V, 1.2V, 1.5V
- Low Noise Typical: 0.3ps at 12kHz to 20MHz
  Supply Options Frequency Offsets
- Singled-end Output: CMOS
- Temperature Range: -40 ~ 85°C Operation
- Frequency Support from 1MHz to 50MHz
- Pb-free/RoHS Compliant

TYPICAL APPLICATION

- IoT
- Game Console
- Smartphone
- Wearable Device
- Digital Camera
- Digital Consumer Electronics

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		0.9V		1.2V		1.5V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		1	50	1	50	1	50	MHz
Supply Current	At 15pF Load	—	1.5	—	2	—	3	mA
	No Load Condition, 1.25MHz≤F_O<10MHz	—	0.9	—	1	—	1.2	mA
	No Load Condition, 10MHz≤F_O<20MHz	—	1	—	1.2	—	1.2	mA
	No Load Condition, 20MHz≤F_O<80MHz	—	1.2	—	1.5	—	1.5	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level	Output High	2.97	—	2.25	—	1.62	—	V
	Output Low	—	0.33	—	0.25	—	0.18	
Transition Time: Rise/Fall Time+	1.25MHz≤F_O<10MHz	—	4	—	3	—	3	nSec
	10MHz≤F_O<20MHz	—	3	—	3	—	3	nSec
	20MHz≤F_O<80MHz	—	2	—	2	—	2	nSec
Startup Time		—	4	—	4	—	4	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	0.7VDD	—	0.7VDD	—	0.7VDD	—	V
	Disable (Low Voltage or GND)	—	0.3VDD	—	0.3VDD	—	0.3VDD	

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

ELECTRICAL SPECIFICATION

Parameter		0.9V		1.2V		1.5V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Output Loading		15		15		15		pF
Stand by Current		—	100	—	100	—	100	uA
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C
Phase Noise(Typ.)		Typ.	Max.	Typ.	Max.	Typ.	Max.	
At VDD=1.2V, Fout=24MHz	1 kHz offset	-130	—	-133	—	-135	—	dBc/Hz
	10 kHz offset	-140	—	-143	—	-143	—	
	100 kHz offset	-148	—	-150	—	-150	—	
	1 MHz offset	-152	—	-155	—	-155	—	
Period Jitter(Pk-Pk)		—	40	—	40	—	40	pSec
RMS Phase Jitter(Intergrated 12 KHz ~ 20MHz)		—	1	—	1	—	1	pSec

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 20% and 80% of VDD.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±20	±25
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○

*o: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.3 LV3225

3.2 x 2.5 mm SMD LVPECL/LVDS/ HCSL Crystal Oscillator

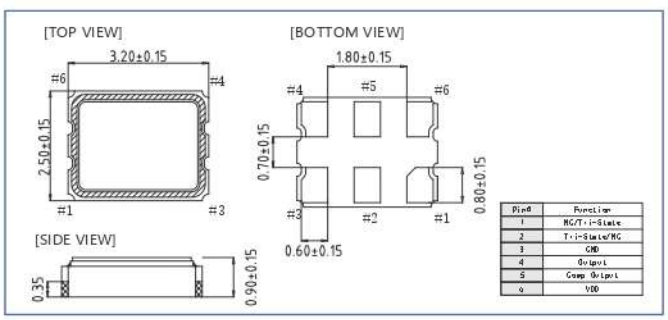
FEATURES

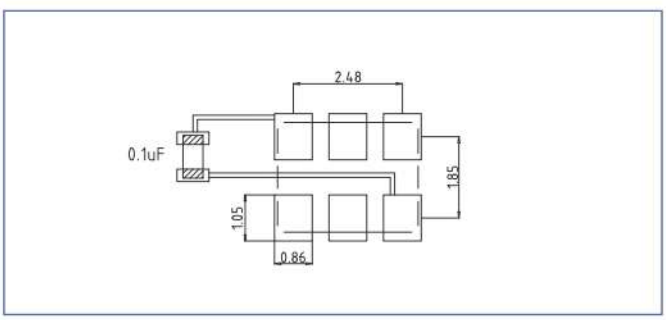
- Industry Standard 3.2 x 2.5 x 0.9 hermetically sealed ceramic package
- Very low jitter performance: typical 0.1 pS RMS from 12 kHz ~ 20 MHz
- Fundamental/3rd overtone crystal design
- Output frequency up to 250 MHz
- Tri-state enable/disable
- Up to 125°C operating temperature range

TYPICAL APPLICATION

- 10Gbit Ethernet, Fiber Channel, Storage Area Network, SONET
- Enterprise Servers, Reference clocks for ADC and DAC
- Telecom

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	250	10	250	10	250	10	250	MHz
Standard Frequency		25, 106.25, 125, 156.25, 161.1328, 212.5								MHz
Supply Current	10MHz≤F_O<160MHz	—	75	—	75	—	50	—	50	mA
	160MHz≤F_O<250MHz	—	100	—	100	—	50	—	50	mA
Output Level	Output High	2.275	—	1.475	—	—	1.6	—	1.6	V
	Output Low	—	1.68	—	0.88	0.9	—	0.9	—	V
Transition Time: Rise/Fall Time+		—	1	—	1	—	1	—	1	nSec
Startup Time		—	10	—	10	—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.99	—	0.75	V
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-95		-90		-90		-90		dBc/Hz
	1 kHz	-125		-125		-120		-120		dBc/Hz
	10 kHz	-140		-140		-140		-140		dBc/Hz
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	F_O<80MHz	—	1	—	1	—	1	—	1	pSec
	80MHz≤F_O<125MHz	—	0.5	—	0.5	—	0.5	—	0.5	pSec
	125MHz≤F_O<170MHz	—	0.3	—	0.3	—	0.3	—	0.3	pSec
	170MHz≤F_O<200MHz	—	0.5	—	0.5	—	0.5	—	0.5	pSec
	200MHz≤F_O	—	0.3	—	0.3	—	0.3	—	0.3	pSec

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

Parameter		HCSL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		25	175	25	175	MHz
Standard Frequency		100				
Supply Current	25MHz≤F_o≤175MHz	—	50	—	50	mA
Output Level	Output High	0.6	—	0.58	—	V
	Output Low	—	0.15	—	0.15	
Transition Time: Rise/Fall Time+		—	0.5	—	0.5	nSec
Startup Time		—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	0.7VDD	—	0.7VDD	—	V
	Disable (Low Voltage or GND)	—	0.3VDD	—	0.3VDD	
Aging (@25°C, 1st Year)		—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	25MHz≤F_o≤175MHz	—	0.5	—	0.5	pSec

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 20% and 80% of VDD.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○
-40 ~ +125	×	○

*o: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.4 LV5032

5.0 x 3.2 mm SMD LVPECL/LVDS/ HCSL Crystal Oscillator

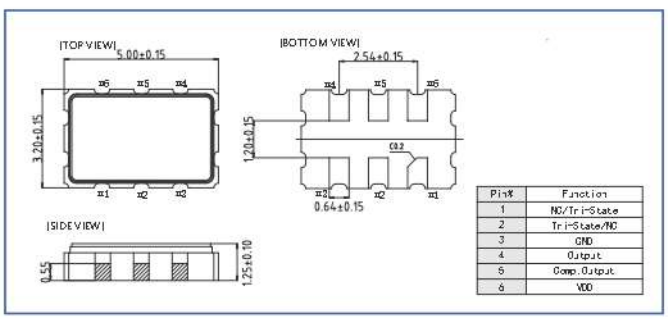
FEATURES

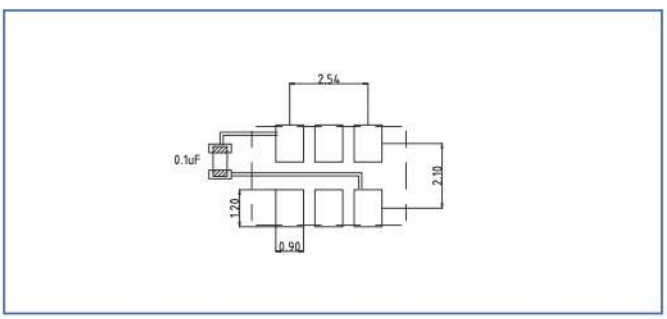
- Typical 5.0 x 3.2 x 1.25 mm hermetically sealed ceramic package
- Very low jitter performance: typical 0.3 pS RMS from 12 k ~ 20 MHz
- Fundamental/3rd overtone crystal design
- Output frequency up to 320 MHz
- Operating temperature up to 125°C
- Tri-state enable/disable

TYPICAL APPLICATION

- 10Gbit Ethernet, Fiber Channel, Storage Area Network, SONET
- Enterprise Servers, Reference clocks for ADC and DAC
- Telecom

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	320	10	320	10	320	10	320	MHz
Standard Frequency		25, 106.25, 125, 156.25, 161.1328, 212.5								
Supply Current	10MHz≤F_O<160MHz	—	75	—	75	—	50	—	50	mA
	160MHz≤F_O<250MHz	—	100	—	100	—	50	—	50	
	250MHz≤F_O<320MHz	—	100	—	100	—	65	—	65	
Output Level	Output High	2.275	—	1.475	—	—	1.6	—	1.6	V
	Output Low	—	1.68	—	0.88	0.9	—	0.9	—	
Transition Time: Rise/Fall Time+		—	1	—	1	—	1	—	1	nSec
Startup Time		—	10	—	10	—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.99	—	0.75	
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-95		-90		-90		-90		dBc/Hz
	1 kHz	-125		-125		-120		-120		
	10 kHz	-140		-140		-140		-140		
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	F_O<80MHz	—	1	—	1	—	1	—	1	pSec
	80MHz≤F_O<125MHz	—	0.5	—	0.5	—	0.5	—	0.5	
	125MHz≤F_O<170MHz	—	0.3	—	0.3	—	0.3	—	0.3	
	170MHz≤F_O<200MHz	—	0.5	—	0.5	—	0.5	—	0.5	
	200MHz≤F_O	—	0.3	—	0.3	—	0.3	—	0.3	

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

Parameter		HCSL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		25	175	25	175	MHz
Standard Frequency		100				
Supply Current	25MHz≤F_O≤175MHz	—	50	—	50	mA
Output Level	Output High	0.6	—	0.58	—	V
	Output Low	—	0.15	—	0.15	
Transition Time: Rise/Fall Time+		—	0.5	—	0.5	nSec
Startup Time		—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	0.7VDD	—	0.7VDD	—	V
	Disable (Low Voltage or GND)	—	0.3VDD	—	0.3VDD	
Aging (@25°C, 1st Year)		—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	25MHz≤F_O≤175MHz	—	0.5	—	0.5	pSec

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 20% and 80% of VDD.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○
-40 ~ +125	×	○

*o: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.5 TLV5032

5.0 x 3.2 mm SMD LVPECL/LVDS Crystal Oscillator

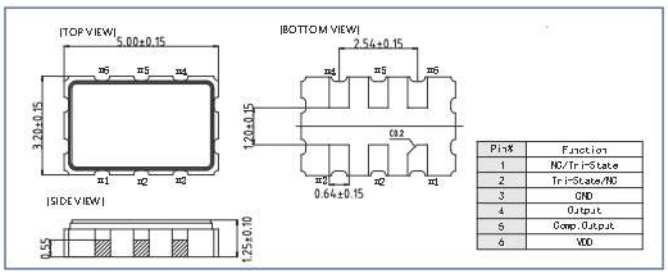
FEATURES

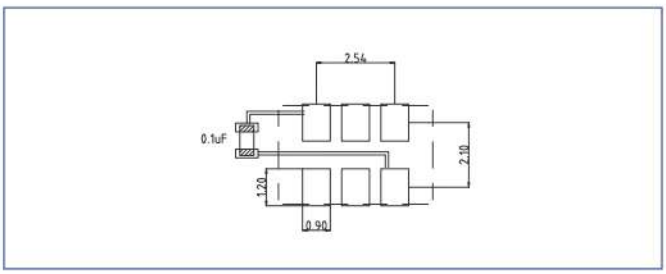
- Industry Standard 5.0 x 3.2 x 1.25 mm hermetically sealed ceramic package
- Very low phase jitter: < 1 pS (0.6 pS, typ.) RMS
- Tri-state enable/disable
- Fast delivery

TYPICAL APPLICATION

- High-Speed Gigabit Ethernet, Fiber Channel, Storage Area Network, SONET
- Enterprise Server, SAS/SATA
- Microprocessors/DSP/FPGA
- Broadband Access
- Smart Grid

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL 3.3V Min.	LVPECL 3.3V Max.	LVPECL 2.5V Min.	LVPECL 2.5V Max.	LVDS 3.3V Min.	LVDS 3.3V Max.	LVDS 2.5V Min.	LVDS 2.5V Max.	Unit
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	1500	10	1500	10	1500	10	1500	MHz
Standard Frequency		106.25, 125, 133.33, 150, 155.52, 156.25, 187.5, 212.5, 312.5, 622.08								MHz
Supply Current	10MHz≤F_O<1500MHz	—	50	—	50	—	50	—	50	mA
Output Level	Output High	2.275	—	1.475	—	—	1.6	—	1.6	V
	Output Low	—	1.68	—	0.88	0.9	—	0.9	—	V
Transition Time: Rise/Fall Time+		—	1	—	1	—	1	—	1	nSec
Startup Time		—	10	—	10	—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.99	—	0.75	V
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-85		-85		-85		-85		dBc/Hz
	1 kHz	-105		-105		-105		-105		dBc/Hz
	10 kHz	-115		-115		-115		-115		dBc/Hz
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)		—	1.2	—	1.2	—	1.2	—	1.2	pSec

+ Transition times are measured between 20% and 80% of VDD.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	×	○

*○: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.6 LV7050

7.0 x 5.0 mm SMD LVPECL/LVDS/HCSL Crystal Oscillator

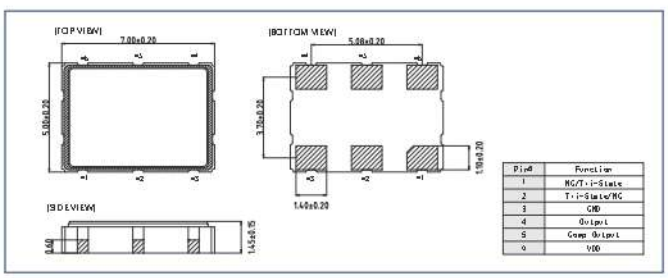
FEATURES

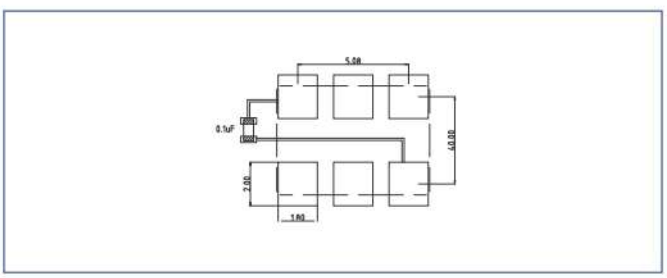
- Typical 7.0 x 5.0 x 1.45 mm hermetically sealed ceramic package
- Very low jitter performance: typical 0.3 pS RMS from 12 k ~ 20 MHz
- Fundamental/3rd overtone crystal design
- Output frequency up to 320 MHz
- Operating temperature up to 125°C
- Tri-state enable/disable

TYPICAL APPLICATION

- 10Gbit Ethernet, Fiber Channel, Storage Area Network, SONET
- Enterprise Servers, Reference clocks for ADC and DAC
- Telecom

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	320	10	320	10	320	10	320	MHz
Standard Frequency		77.76, 106.25, 125, 155.52, 156.25, 187.5, 212.5, 312.5								
Supply Current	10MHz≤F_O<160MHz	—	75	—	75	—	50	—	50	mA
	160MHz≤F_O<250MHz	—	100	—	100	—	50	—	50	
	250MHz≤F_O<320MHz	—	100	—	100	—	65	—	65	
Output Level	Output High	2.275	—	1.475	—	—	1.6	—	1.6	V
	Output Low	—	1.68	—	0.88	0.9	—	0.9	—	
Transition Time: Rise/Fall Time+		—	1	—	1	—	1	—	1	nSec
Startup Time		—	10	—	10	—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.99	—	0.75	
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-100		-100		-100		-100		dBc/Hz
	1 kHz	-130		-130		-130		-130		
	10 kHz	-145		-145		-145		-145		
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	F_O<80MHz	—	1	—	1	—	1	—	1	pSec
	80MHz≤F_O<125MHz	—	0.5	—	0.5	—	0.5	—	0.5	
	125MHz≤F_O<170MHz	—	0.3	—	0.3	—	0.3	—	0.3	
	170MHz≤F_O<200MHz	—	0.5	—	0.5	—	0.5	—	0.5	
	200MHz≤F_O	—	0.3	—	0.3	—	0.3	—	0.3	

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

Parameter		HCSL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		25	175	25	175	MHz
Standard Frequency		100				
Supply Current	25MHz≤F_O≤175MHz	—	50	—	50	mA
Output Level	Output High	0.6	—	0.58	—	V
	Output Low	—	0.15	—	0.15	
Transition Time: Rise/Fall Time+		—	0.5	—	0.5	nSec
Startup Time		—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	0.7VDD	—	0.7VDD	—	V
	Disable (Low Voltage or GND)	—	0.3VDD	—	0.3VDD	
Aging (@25°C, 1st Year)		—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	25MHz≤F_O≤175MHz	—	0.5	—	0.5	pSec

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 20% and 80% of VDD.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○
-40 ~ +125	×	○

*o: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.7 TLV7050

7.0 x 5.0 mm SMD LVPECL/LVDS Crystal Oscillator

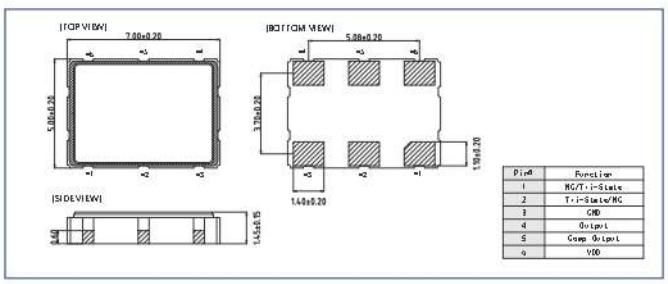
FEATURES

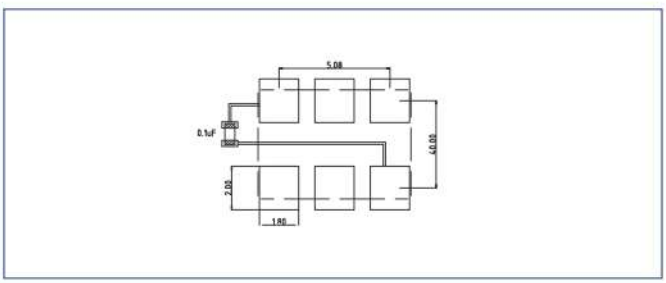
- Typical 7.0 x 5.0 x 1.45 mm hermetically sealed ceramic package
- Very low phase jitter : < 1 ps(0.6 ps, typ.) RMS
- Any frequency between 10 MHz and 1500 MHz
- Fast deliver
- Tri-state enable/disable

TYPICAL APPLICATION

- High-Speed Gigabit Ethernet, Fiber Channel, Storage Area Network, SONET
- Enterprise Server, SAS/SATA
- Microprocessors/DSP/FPGA
- Broadband Access
- Smart Grid

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	1500	10	1500	10	1500	10	1500	MHz
Standard Frequency		106.25, 125, 133.33, 150, 155.52, 156.25, 187.5, 212.5, 312.5, 622.08								MHz
Supply Current	10MHz≤F_O<1500MHz	—	50	—	50	—	50	—	50	mA
Output Level	Output High	2.275	—	1.475	—	—	1.6	—	1.6	V
	Output Low	—	1.68	—	0.88	0.9	—	0.9	—	V
Transition Time: Rise/Fall Time+		—	1	—	1	—	1	—	1	nSec
Startup Time		—	10	—	10	—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	—	0.99	—	0.75	V
Aging (@25°C, 1st Year)		—	±3	—	±3	—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-85		-85		-85		-85		dBc/Hz
	1 kHz	-105		-105		-105		-105		dBc/Hz
	10 kHz	-115		-115		-115		-115		dBc/Hz
RMS Phase Jitter(Intergrated 12 KHz ~ 20MHz)		—	1	—	1	—	1	—	1	pSec

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	×	○

*○: Available Δ: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

Oscillator (CMOS/LVPECL/LVDS/HCSL Output)

4.8 ULV7050

7.0 x 5.0 mm SMD Ultra Low Phase Jitter LVPECL Crystal Oscillator

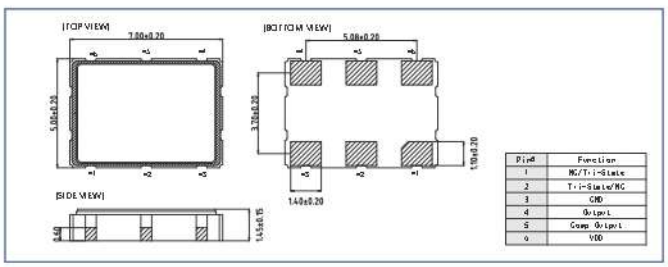
FEATURES

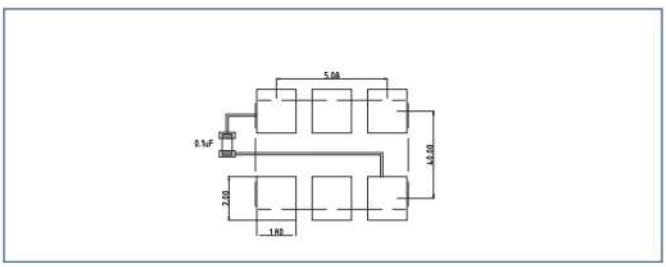
- Typical 7.0 x 5.0 x 1.45 mm 6 pads ceramic SMD package.
- Ultra low jitter performance: < 100 fs RMS from 12k ~ 20MHz
- Tight symmetry (45 to 55%) available
- Complementary output

TYPICAL APPLICATION

- 40 Gbit/100 Gbit Ethernet, MAN, SONET
- WLAN/WiMAX, xDSL
- Fiber Channel
- Test Instrumentation

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		LVPECL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		70	170	100	160	MHz
Standard Frequency		100, 125, 155.52, 156.25				
Supply Current	25MHz≤F_O<175MHz	—	75	—	75	mA
Output Level	Output High	2.275	—	1.475	—	V
	Output Low	—	1.68	—	1.095	
Transition Time: Rise/Fall Time+		—	1	—	1	nSec
Startup Time		—	10	—	10	mSec
Tri-State (Input to Pin2 or Pin1)	Enable (High Voltage or Floating)	2.31	—	1.75	—	V
	Disable (Low Voltage or GND)	—	0.99	—	0.75	
Aging (@25°C, 1st Year)		—	±3	—	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C
Phase Noise @ 156.25 MHz	100 Hz	-100		-100		dBc/Hz
	1 kHz	-130		-130		
	10 kHz	-150		-150		
RMS Phase Jitter (Intergrated 12 KHz ~ 20MHz)	70MHz≤F_O≤170MHz	—	0.1	—	0.1	pSec

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±25	±50
-10 ~ +60	△	○
-20 ~ +70	△	○
-40 ~ +85	×	○

*○: Available △: Condition X: Not available
*Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1st year), shock, and vibration.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.1 TC2016

2.0 x 1.6 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

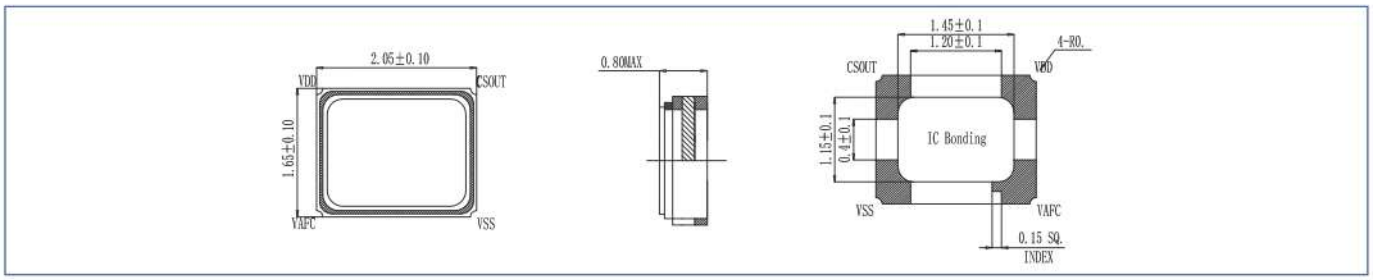
FEATURES

- Typical 2.0 x 1.6 x 0.7 mm ceramic SMD package
- For automatic assembly
- Compactness and lightweight
- VCTCXO available
- Miniature size and low profile

TYPICAL APPLICATION

- GPS
- WiMAX, WLAN
- Mobile Phone
- IoT, wearable Electronics

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		19.2, 26.0, 32.0, 38.4						MHz
Frequency Tolerance*		—	±1.5	—	±1.5	—	±1.5	ppm
Frequency stability	Vs Supply Voltage (±5%) change	±0.1	±0.2	±0.1	±0.2	±0.1	±0.2	ppm
	Vs Load (±10%) change	±0.1	±0.2	±0.1	±0.2	±0.1	±0.2	ppm
	Vs Aging (@1st year)	—	±1.0	—	±1.0	—	±1.0	ppm
Supply Current	10 MHz ≤ F_O ≤ 26 MHz	—	1.5	—	1.5	—	1.5	mA
	26 MHz < F_O ≤ 52 MHz	—	2.0	—	2.0	—	2.0	mA
Output Level (Clipped sine wave)		0.8	—	0.8	—	0.8	—	Vp-p
Load		10KΩ // 10pF		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range (VCTCXO)		0.5	2.5	0.4	2.4	0.3	1.5	V
Pulling Range (VCTCXO)		±5.0	±17.0	±5.0	±17.0	±5.0	±17.0	ppm
Vc Input Impedance (VCTCXO)		500	—	500	—	500	—	KΩ
Phase Noise @ 19.2 MHz	100 Hz	-115		-115		-115		dBc/Hz
	1 KHz	-135		-135		-135		dBc/Hz
	10 KHz	-148		-148		-148		dBc/Hz
Start time		—	2	—	2	—	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	○	○	○	○	○
-30 ~ +85	○	○	○	○	○
-40 ~ +85	○	○	○	○	○

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25°C, 1 hour after reflow.

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.2 TC2520

2.5 x 2.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

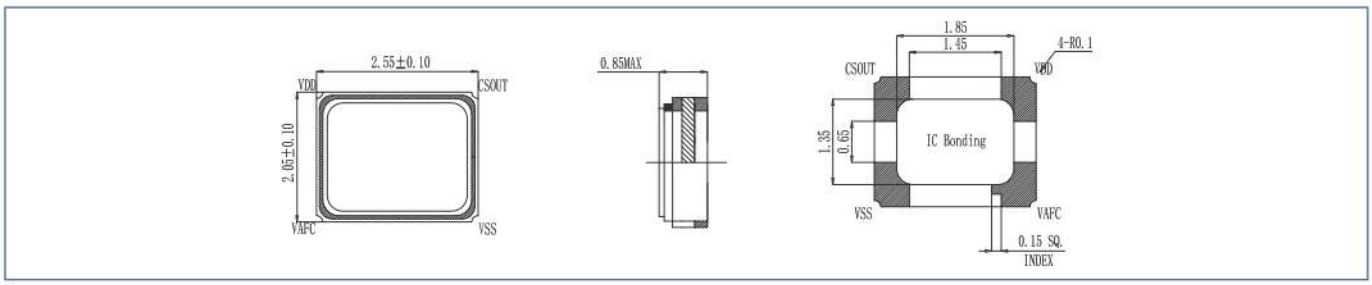
FEATURES

- Typical 2.5 x 2.0 x 0.7 mm ceramic SMD package
- For automatic assembly
- Compactness and lightweight
- VCTCXO available
- Low thickness

TYPICAL APPLICATION

- GPS
- WiMAX, WLAN
- Mobile Phone

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		19.2, 26.0, 32.0, 38.4						MHz
Frequency Tolerance*		—	±1.5	—	±1.5	—	±1.5	ppm
Frequency stability	Vs Supply Voltage (±5%) change	±0.1	±0.2	±0.1	±0.2	±0.1	±0.2	ppm
	Vs Load (±10%) change	±0.1	±0.2	±0.1	±0.2	±0.1	±0.2	ppm
	Vs Aging (@1st year)	—	±1.0	—	±1.0	—	±1.0	ppm
Supply Current	10 MHz ≤ F_O ≤ 26 MHz	—	1.5	—	1.5	—	1.5	mA
	26 MHz < F_O ≤ 52 MHz	—	2.0	—	2.0	—	2.0	mA
Output Level (Clipped sine wave)		0.8	—	0.8	—	0.8	—	Vp-p
Load		10KΩ // 10pF		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range (VCTCXO)		0.5	2.5	0.4	2.4	0.3	1.5	V
Pulling Range (VCTCXO)		±5.0	±17.0	±5.0	±17.0	±5.0	±17.0	ppm
Vc Input Impedance (VCTCXO)		500	—	500	—	500	—	KΩ
Phase Noise @ 19.2 MHz	100 Hz	-115		-115		-115		dBc/Hz
	1 KHz	-135		-135		-135		dBc/Hz
	10 KHz	-148		-148		-148		dBc/Hz
Start time		—	2	—	2	—	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	○	○	○	○	○
-30 ~ +85	○	○	○	○	○
-40 ~ +85	○	○	○	○	○

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25°C, 1 hour after reflow.

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.3 TC2520C

2.5 x 2.0 mm CMOS Temperature Compensated Crystal Oscillator

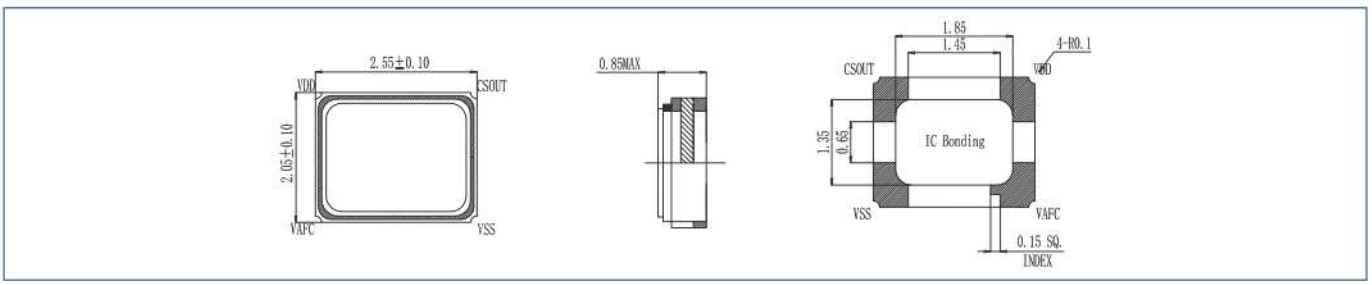
FEATURES

- Tolerance: ±2 ppm accuracy @25°C, ±2.5ppm over -40° ~ +85°C
- LVCMOS Output Logic
- Tight symmetry (45 to 55%) available
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- Femto second phase jitter and -145dBc/Hz at 10kHz offset

TYPICAL APPLICATION

- Wireless Connectivity
- Smart grid

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)±5%		3.135	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		9.5	60	9.5	60	9.5	60	MHz
Supply Current	9.5 MHz ≤ F_o ≤ 60 MHz	—	10	—	7	—	5	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Output Hight (Logic"1")	2.97	—	2.25	—	1.62	—	V
	Output Low (Logic"0")	—	0.33	—	0.25	—	0.18	
Transition Time : Rise/Fall Time+		—	8	—	8	—	8	nSec
Start time		—	5	—	5	—	5	mSec
Tri-State(Input to Pin 1)	Enable(High voltage or floating)	2.31	—	1.75	—	1.26	—	V
	Disable(Low voltage or GND)	—	0.99	—	0.75	—	0.54	
RMS Phase Jitter	(integrated 12kHz ~ 20MHz)	—	1	—	1	—	1	pSec
Phase Noise @ 26 MHz	10 Hz	—	-80	—	-80	—	-80	dBc/Hz
	100 Hz	—	-110	—	-110	—	-110	
	1 KHz	—	-130	—	-130	—	-130	
	10 KHz	—	-145	—	-145	—	-145	
Aging (@25°C 1st year)		—	±1	—	±1	—	±1	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±2.5	±5	±10
-40 ~ +85	○	○	○
-40 ~ +90	△	○	○
-40 ~ +105	×	△	○

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.4 TC3225

3.2 x 2.5 mm SMD Voltage Controlled Temperature VCTCXO Compensated Crystal Oscillator

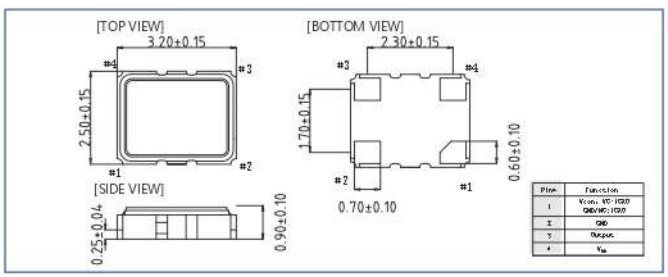
FEATURES

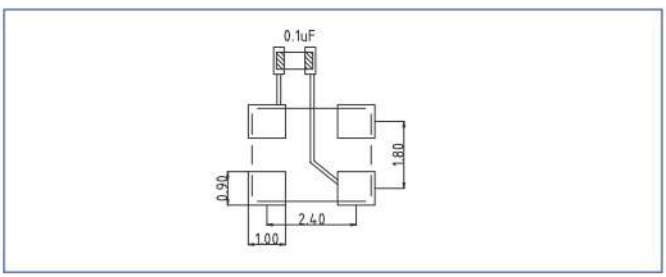
- Typical 3.2 x 2.5 x 0.9 mm SMD
- Compactness and lightweight
- VCTCXO available
- For automatic assembly
- Low power consumption
- Low thickness

TYPICAL APPLICATION

- GPS
- WiMAX, WLAN
- Mobile Phone

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		10, 12.8, 13, 16.367667, 16.368, 16.369, 19.2 19.44, 20, 25, 26, 27, 30, 30.72, 32, 38.4						
Frequency Tolerance*		—	±2.0	—	±2.0	—	±2.0	ppm
Frequency stability	Vs Supply Voltage (±5%) change	—	±0.2	—	±0.2	—	±0.2	ppm
	Vs Load (±10%) change	—	±0.2	—	±0.2	—	±0.2	
	Vs Aging (@1st year)	—	±1.0	—	±1.0	—	±1.0	ppm
Supply Current	10 MHz ≤ F_O ≤ 26 MHz	—	1.5	—	1.5	—	1.5	mA
	26 MHz < F_O ≤ 52 MHz	—	2.0	—	2.0	—	2.0	
Output Level (Clipped sine wave)		0.8	—	0.8	—	0.8	—	Vp-p
Load		10KΩ // 10pF		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range (VCTCXO)		0.5	2.5	0.4	2.4	0.3	1.5	V
Pulling Range (VCTCXO)		±5.0	—	±5.0	—	±5.0	—	ppm
Vc Input Impedance (VCTCXO)		500	—	500	—	500	—	KΩ
Phase Noise @ 19.2 MHz	100 Hz	-115		-115		-115		dBc/Hz
	1 KHz	-135		-135		-135		
	10 KHz	-148		-148		-148		
Start time		—	2	—	2	—	2	mSec
Storage Temp. Range		-40	85	-40	85	-40	85	°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	○	○	○	○	○
-30 ~ +85	○	○	○	○	○
-40 ~ +85	○	○	○	○	○

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25°C, 1 hour after reflow.

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.5 TC3225C

3.2 x 2.5 mm CMOS Temperature Compensated Crystal Oscillator TCXO

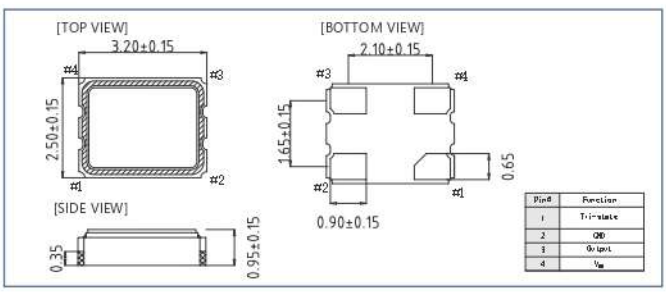
FEATURES

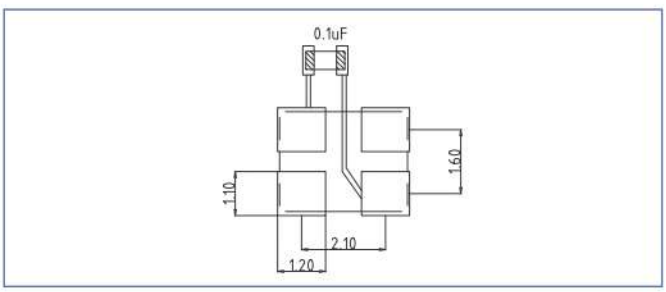
- Tolerance: ±2 ppm accuracy @25°C, ±2.5ppm over - 40 ~ +85°C
- LVCMOS Output Logic
- Tight symmetry (45 to 55%) available
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- Femto second phase jitter and -145dBc/Hz at 10kHz offset

TYPICAL APPLICATION

- Wireless Connectivity
- Smart grid

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)±5%		3.135	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		9.5	60	9.5	60	9.5	60	MHz
Supply Current	9.5 MHz ≤ F_o ≤ 60 MHz	—	10	—	7	—	5	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Output Hight (Logic "1")	2.97	—	2.25	—	1.62	—	V
	Output Low (Logic "0")	—	0.33	—	0.25	—	0.18	
Transition Time : Rise/Fall Time+		—	8	—	8	—	8	nSec
Start time		—	5	—	5	—	5	mSec
Tri-State(Input to Pin 1)	Enable(High voltage or floating)	2.31	—	1.75	—	1.26	—	V
	Disable(Low voltage or GND)	—	0.99	—	0.75	—	0.54	
RMS Phase Jitter	(integrated 12 kHz ~ 20 MHz)	—	1	—	1	—	1	pSec
Phase Noise @ 26 MHz	10 Hz	—	-80	—	-80	—	-80	dBc/Hz
	100 Hz	—	-110	—	-110	—	-110	
	1 KHz	—	-130	—	-130	—	-130	
	10 KHz	—	-145	—	-145	—	-145	
Aging (@25°C 1st year)		—	±1	—	±1	—	±1	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±2.5	±5	±10
-40 ~ +85	○	○	○
-40 ~ +90	△	○	○
-40 ~ +105	×	△	○

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.6 TC5032

5.0 x 3.2 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator VCTCXO

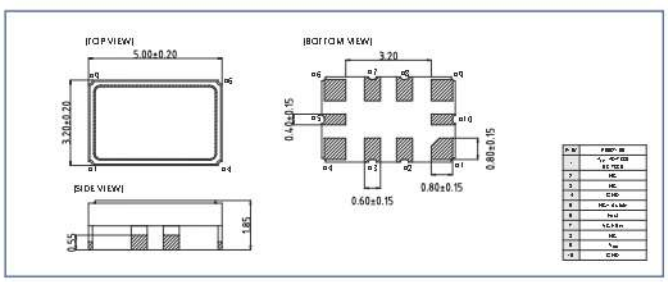
FEATURES

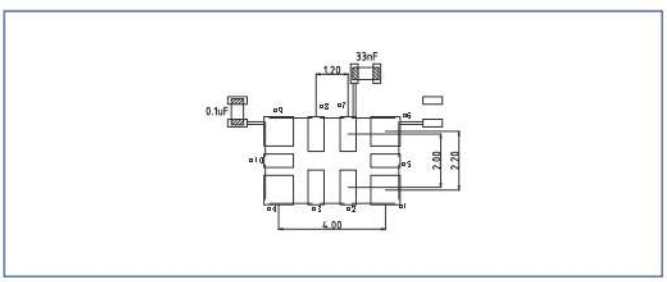
- Typical 5.0 x 3.2 x 1.85 mm ceramic SMD package
- High Stability for Stratum III
- High Precision for ±0.1ppm @ -40 ~ +85°C, ±0.2ppm @ -40 ~ +105°C
- Frequency support from 10MHz to 52MHz
- Wide temperature range
- Tri-state Enable/Disable function
- Pb-free/RoHS compliant

TYPICAL APPLICATION

- Time Synchronization
- Microwave Communication
- Test & Measurement
- Telecom Systems
- Satellite Communation

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		3.3V		2.5V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		Vdd-5%	Vdd+5%	Vdd-5%	Vdd+5%	V
Frequency Range		10	52	10	52	MHz
Frequency Tolerance(@25°C)		—	±1.0	—	±1.0	ppm
Frequency stability	Vs Supply Voltage (±5%) change	—	±0.1	—	±0.1	ppm
	Vs Load (±10%) change	—	±0.05	—	±0.05	
	Vs Aging (@1st year)	—	±1.0	—	±1.0	
Output Waveform		CMOS				
Supply Current	10 MHz ≤ F_o ≤38 MHz	—	6.5	—	6.5	mA
	38 MHz < F_o ≤52 MHz	—	7.5	—	7.5	
Supply Current(Clipped Sine) 10 MHz ≤ F_o ≤ 52 MHz		—	3.5	—	3.5	mA
Output Level	Output High	90%Vdd	—	90%Vdd	—	V
	Output Low	—	10%Vdd	—	10%Vdd	
Transition Time (10% ~ 90%)	Rise Time	—	6.5	—	6.5	nSec
	Fall Time	—	6.5	—	6.5	
Duty Cycle		45	55	45	55	%
Load		—	15	—	15	pF
Output Waveform		Clipped sine wave				
Supply Current	10 MHz ≤ F_o ≤ 38 MHz	—	4.5	—	4.5	mA
	38 MHz < F_o ≤ 52 MHz	—	5.0	—	5.0	
Output Level		0.8	—	0.8	—	Vp-p
Load		10KΩ // 10pF		10KΩ // 10pF		

TCXO

Parameter		3.3V		2.5V		Unit
		Min.	Max.	Min.	Max.	
Tri-State Control	Enable	80%Vdd	—	80%Vdd	—	V
	Disable	—	20%Vdd	—	20%Vdd	
Startup time		—	5	—	5	mS ec
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range(VCTCXO)		±5.0	—	±5.0	—	ppm
Vc Input Impedance		100	—	100	—	KΩ
Phase Noise @TCXO VDD=3.3 V, Fout=20 MHz	100 Hz offset	-122		-122		dBc/Hz
	1 kHz offset	-142		-142		
	10 kHz offset	-154		-154		
	100 kHz offset	-157		-157		
	1 MHz offset	-159		-159		

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25°C, 1 hour after reflow.

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.05	±0.1	±0.2	±0.28	±0.5
-10 ~ +60	○	○	○	○	○
-20 ~ +70	○	○	○	○	○
-40 ~ +85	△	○	○	○	○
-40 ~ +95	△	△	○	○	○
-40 ~ +105	×	△	○	○	○

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

5.7 TC7050

7.0 x 5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

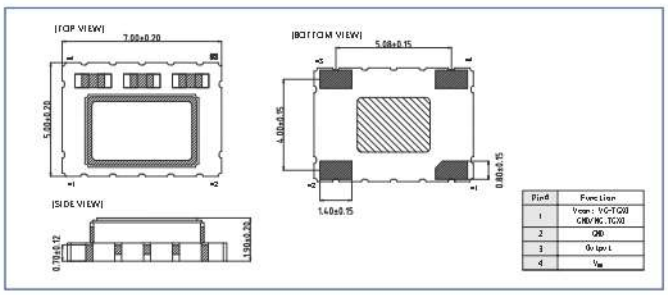
FEATURES

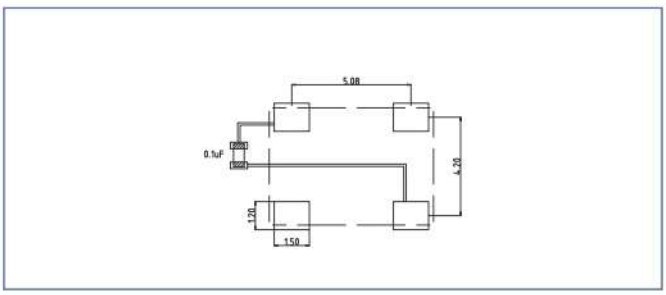
- Typical 7.0 x 5.0 x 1.9 mm ceramic SMD package
- High Precision for -40 ~ +85°C, ±0.28ppm, -40 ~ +105°C, ±2ppm
- CMOS and Clipped Sine wave (without DC-cut capacitor) output optional

TYPICAL APPLICATION

- Femtocell, Base Stations
- WLAN/WiMAX/WIFI, Wireless Communications

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		Vdd-5%	Vdd+5%	Vdd-5%	Vdd+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency(for COMS)		10, 12.8, 16.384, 19.2, 19.44, 20, 25, 26				
Frequency Tolerance*		—	±2.0	—	±2.0	ppm
Frequency stability	Vs Supply Voltage (±5%) change	—	±0.1	—	±0.05	ppm
	Vs Load (±10%) change	—	±0.05	—	±0.05	
	Vs Aging (@1st year)	—	±1.0	—	±1.0	ppm
Supply Current(CMOS output)		—	6	—	6	mA
Output Level (Clipped sine wave)		—	3.5	—	3.5	
Output Level(CMOS)	Output High	90%Vdd	—	90%Vdd	—	V
	Output Low	—	10%Vdd	—	10%Vdd	
CMOS	Duty	45	55	45	55	%
Output Level(Clipped sine)		0.8	—	0.8	—	Vp-p
Load(CMOS)		15pF		15pF		pF
Load(Clipped sine)		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range(VCTCXO)		±5.0	—	±5.0	—	ppm
Vc Input Impedance		100	—	100	—	KΩ
Phase Noise @ 19.2 MHz	100 Hz	-130		-130		dBc/Hz
	1 KHz	-145		-145		
	10 KHz	-154		-154		
Start time		—	2	—	2	mSec
Storage Temp. Range		-55	125	-55	125	°C

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25°C, 1 hour after reflow.

TCXO

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.05	±0.1	±0.14	±0.2	±0.28	±0.5	±2
-10 ~ +70	○	○	○	○	○	○	○
-20 ~ +85	×	○	○	○	○	○	○
-40 ~ +85	×	×	×	△	○	○	○
-40 ~ +95	×	×	×	×	×	△	○
-40 ~ +105	×	×	×	×	×	×	○

*o: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.8 TC7050S

7.0 x 5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

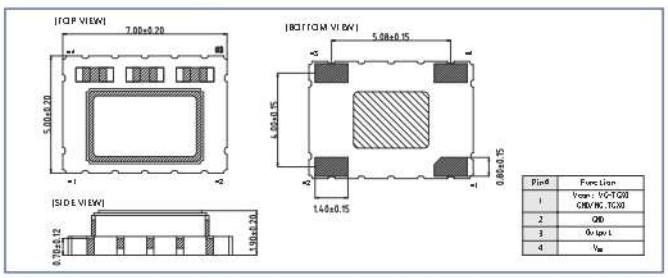
FEATURES

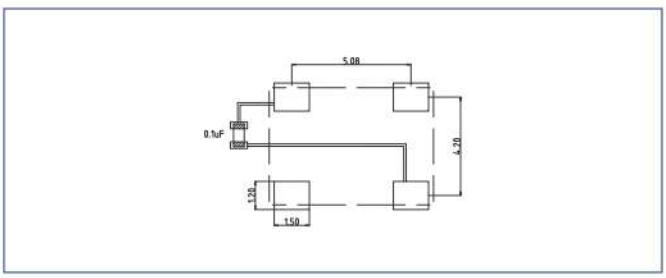
- Typical 7.0 x 5.0 x 1.9 mm ceramic SMD package
- High Precision for -40 ~ +85°C, ±0.28ppm, -40 ~ +105°C, ±2ppm
- CMOS and Clipped Sine wave (without DC-cut capacitor) output optional

TYPICAL APPLICATION

- Stratum 3
- Femtocell, Base Stations

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		Vdd-5%	Vdd+5%	Vdd-5%	Vdd+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency(for COMS)		10, 12.8, 16.384, 19.2, 19.44, 20, 25, 26				
Operating Temp. Range		-20 ~ 70				°C
		-40 ~ 85				
Frequency Stability (Overall, 20 Years)*		—	±4.6	—	±4.6	ppm
Frequency Stability Vs Temp. Range (Ref. to (FMAX+Fmin)/2)		—	±0.14 (-20 ~ +70°C)	—	±0.14 (-20 ~ +70°C)	ppm
			±0.28 (-40 ~ +85°C)		±0.28 (-40 ~ +85°C)	
Holdover Stability +		—	±0.32	—	±0.32	ppm
Supply Current(CMOS output)		—	6	—	6	mA
Output Level (Clipped sine wave)		—	3.5	—	3.5	
Output Level(CMOS)	Output High	90%Vdd	—	90%Vdd	—	V
	Output Low	—	10%Vdd	—	10%Vdd	
	Duty	45	55	45	55	%
Output Level(Clipped sine)		0.8	—	0.8	—	Vp-p
Load(CMOS)		15pF		15pF		pF
Load(Clipped sine)		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range(VCTCXO)		±5.0	—	±5.0	—	ppm
Vc Input Impedance		100	—	100	—	KΩ
Phase Noise @ 10 MHz	100 Hz	-130		-130		dBc/Hz
	1 KHz	-145		-145		
	10 KHz	-154		-154		
Start time		—	2	—	2	mSec
Storage Temp. Range		-55	125	-55	125	°C

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
* Including calibration @ 25°C, supply voltage VDD±5%, load ±10%, reflow soldering, 20 years aging and frequency stability over temperature.
+ Including 24hours aging, supply voltage VDD±5% and frequency stability over temperature.

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

TCXO

5.9 TC7050L

7.0 x 5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

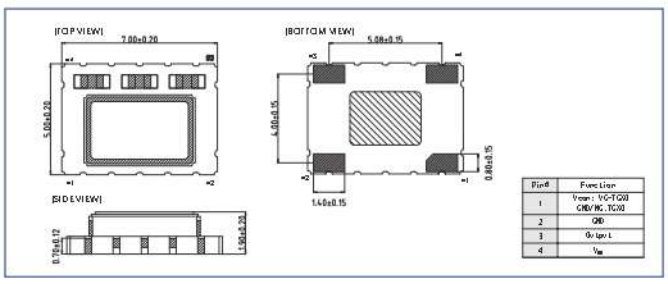
FEATURES

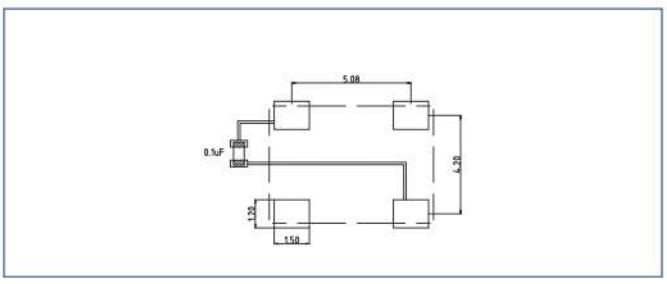
- Typical 7.0 x 5.0 x 1.9 mm ceramic SMD package
- For automatic assembly
- Compactness and light weight
- Low power consumption
- VCTCXO available

TYPICAL APPLICATION

- Femtocell, Base Stations
- WLAN/WiMAX/WIFI, Wireless Communications
- Mobile Phone

DIMENSIONS





ELECTRICAL SPECIFICATION

Parameter		3.3/3.0V		2.5V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation (VDD)		Vdd-5%	Vdd+5%	Vdd-5%	Vdd+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency(for COMS)		5, 6.4, 8, 8.192, 10, 12.5, 12.8, 16, 16.384, 19.44, 25, 26				
Standard Frequency(for Clipped Sine)		8, 8.192, 10, 12.5, 12.8, 16, 16.384, 19.44, 25, 26				
Frequency Tolerance*		—	±2.0	—	±2.0	ppm
Frequency stability	Vs Supply Voltage (±5%) change	—	±0.1	—	±0.1	ppm
	Vs Load (±10%) change	—	±0.2	—	±0.2	
	Vs Aging (@1st year)	—	±1.0	—	±1.0	ppm
Supply Current(CMOS output)		—	6	—	6	mA
Output Level (Clipped sine wave)		—	3.5	—	3.5	
Output Level(CMOS)	Output High	90%Vdd	—	90%Vdd	—	V
	Output Low	—	10%Vdd	—	10%Vdd	
	Duty	45	55	45	55	%
Output Level(Clipped sine)		0.8	—	0.8	—	Vp-p
Load(CMOS)		15pF		15pF		pF
Load(Clipped sine)		10KΩ // 10pF		10KΩ // 10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.4	2.4	V
Pulling Range(VCTCXO)		±5.0	±12.0	±5.0	±12.0	ppm
Vc Input Impedance(VCTCXO)		100	—	100	—	KΩ
Phase Noise @ 19.2 MHz	100 Hz	-115		-115		dBc/Hz
	1 KHz	-135		-135		
	10 KHz	-148		-148		
Start time		—	2	—	2	mSec
Storage Temp. Range		-55	125	-55	125	℃

Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
*Frequency at 25℃, 1 hour after reflow.

TCXO

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppm	±0.5	±1.0
-20 ~ +70	○	○
-30 ~ +85	○	○
-40 ~ +85	△	○

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.1 TOC1409

14.5 x 9.6 mm Oven Controlled Crystal Oscillator Features

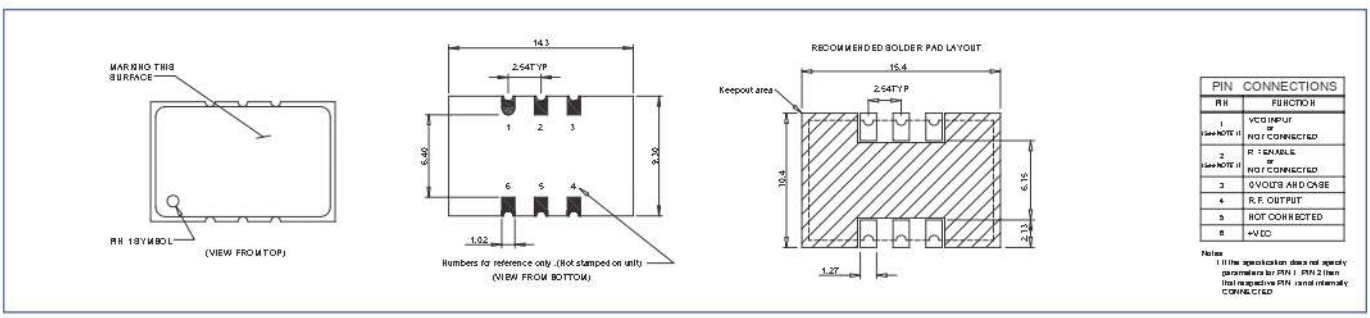
FEATURES

- Dimension 14.5 * 9.6 * 6.5mm typical
- 6-pin SMD Package
- Frequency Range, 10 MHz to 40 MHz
- ±30ppb stability over -40 ~ +85°C
- Stratum 3 (Overall ±4.6ppm including 20 years aging)

TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit
- Packet Timing Protocol (e.g. 1588)

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output	Frequency	—	20	—	MHz	Available frequency range is from 5MHz to 40MHz. Standard frequencies are 10, 12.8, 19.2, 20, 26 and 38.88MHz.
	Waveform	—	Rectangular	—	—	Please contact us for detail information.
	Level	—	HCMOS	—	—	
	"1" Level	2.4	—	—	V	
	"0" Level	—	—	0.4		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+1.65V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-30	—	+30	ppb	-40 ~ +85°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	—	—	—		Per day, at time of shipment.
	Daily	-2.0	—	+2.0	ppb	after 30 days
	Yearly	-0.4	—	+0.4	ppm	
	10 years	-2.0	—	+2.0		
	Voltage	-5	—	+5	ppb	±5% Change
	Load	-10	—	+10	ppb	±10% Change
	Warm-up	-0.1	—	+0.1	ppm	In 5 minutes @ +25°C, referenced to 1 hour.
Phase Noise @20 MHz		—	-98	-92	dBc/Hz	@10 Hz
		—	-126	-120		@100 Hz
		—	-145	-140		@1 kHz
		—	-152	-150		@10 kHz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-5.0	ppm	VCO@ 0V
		5.0	—	—		VCO@ 3.3V
	Control	0	1.65	3.3	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	3.135	3.3	3.465	V	5.0V input voltage is available. Consult factory for control voltage and output level.
	Current	—	500	600	mA	@ turn on
	Steady state	—	0.5	0.6	W	@ +25°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±10	±20	±30	±50
-20 ~ +70	△	○	○	○
-40 ~ +85	×	△	○	○

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.2 TOC0907

9.7 x 7.5 x 4.1mm Oven Controlled Crystal Oscillator Features

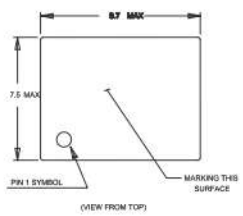
FEATURES

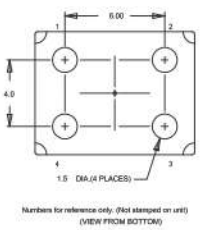
- Dimension 9.7*7.5mm, miniaturized 4-Pad SMD package
- Low Power Consumption
- ±20ppb stability over -40 ~ +85°C
- Stratum 3 (Overall ±4.6ppm including 20 years aging)

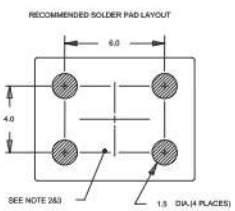
TYPICAL APPLICATION

- Small Cell, Portable Telecommunication Device
- Test and Instrumentation
- Synthesizer, Digital switch, Reference Timing Circuit
- Packet Timing Protocol (eg. IEEE 1588)

DIMENSIONS







PIN CONNECTIONS	
PIN	FUNCTION
1 (See Note 1)	VCO INPUT or NOT CONNECTED
2	0 VOLTS & CASE
3	R. F. OUTPUT
4	+VDC

Note 1. If the specification does not specify parameters for PIN 1 then PIN1 must remain unconnected.

Note 2. Copper in this area should be kept to a minimum to reduce heat heat loss from OCXO.

Note 3. Bottom side reflow is forbidden unless specified in the oscillator specification.

ELECTRICAL SPECIFICATION

Parameter			Min.	Typ.	Max.	Unit.	Test Condition
Output	Frequency		10	—	40	MHz	Available frequency range is from 10MHz to 40MHz. Standard frequencies are 10, 12.8, 19.2, 20, 25 and 30.72MHz.
	Waveform		—	Rectangular Clipped Sine	—	—	Please contact us for detail information.
	Level		—	—	—	—	
	"1" Level	Rectangular	2.4	—	—	V	
	"0" Level		—	—	0.4		
	Duty Cycle		45	50	55	%	@+1.65V
	Clipped Sine		0.8	—	—	Vp-p	
	Load (Rectangular/ Clipped Sine)		15pF / 10Kohm / 10pF				
	Spurious		—	—	-60	dBc	
Frequency Stability	Ambient		-20	—	+20	ppb	-40 ~ +85°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging		—	—	—		Per day, at time of shipment.
	Daily		-3.0	—	+3.0	ppb	after 30 days
	Yearly		-0.6	—	+0.6	ppm	
	10 years		-3.0	—	+3.0		
	Voltage		-5	—	+5	ppb	±5% Change
	Warm-up		-0.1	—	+0.1	ppm	In 5 minutes @ +25°C, referenced to 1 hour.

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Phase Noise @20 MHz		—	-98	-92	dBc/Hz	@10 Hz
		—	-126	-120		@100 Hz
		—	-145	-140		@1 kHz
		—	-152	-150		@10 kHz
Electrical Frequency Adjustment	Range	—	—	-5.0	ppm	VCO@ 0V
		5.0	—	—		VCO@ 3.3V
	Control	0	1.65	3.3	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	3.135	3.3	3.465	V	5.0V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	350	mA	@ turn on
	Steady state	—	0.3	0.4	W	@ +25°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±5	±10	±20	±30	±50
-20 ~ +70	△	○	○	○	○
-40 ~ +85	×	△	○	○	○

*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.3 TOC2012

20.3 x 12.7 mm Oven Controlled Crystal Oscillator

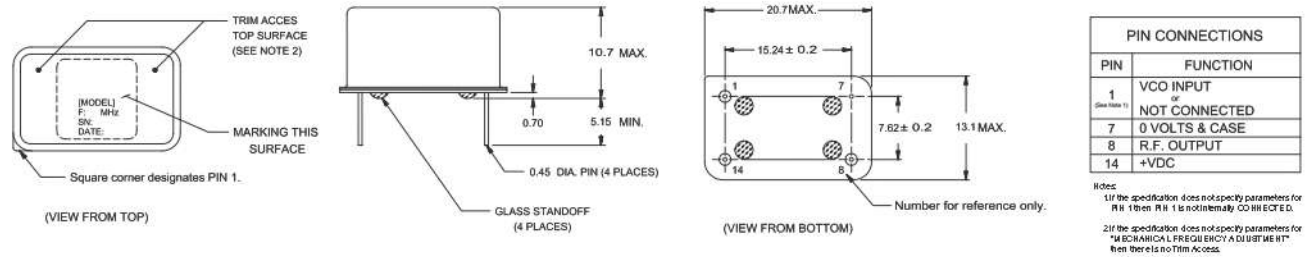
FEATURES

- Dimension 20.3 x 12.7 x 11.0 mm typical
- Stratum 3 (Overall ± 4.6 ppm including 10 years aging)

TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit

DIMENSIONS



PIN CONNECTIONS	
PIN	FUNCTION
1	VCO INPUT or NOT CONNECTED
7	0 VOLTS & CASE
8	R.F. OUTPUT
14	+VDC

Notes:
1.If the specification does not specify parameters for PIN 1 then PIN 1 is not internally CONNECTED.
2.If the specification does not specify parameters for "MECHANICAL FREQUENCY ADJUSTMENT" then there is no Trim Access.

ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output Frequency		—	10	—	MHz	Available frequency range is from 5MHz to 40MHz. Standard frequencies are 10, 12.8, 15.36, 19.2, 20, 26 and 38.88MHz.
Waveform		—	Rectangular	—	—	Please contact us for detail information.
Level	"1" Level	2.4	—	—	V	
	"0" Level	—	—	0.4		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+2.0V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-0.1	—	+0.1	ppm	-30 ~ +70°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	-5.0	—	+5.0	ppb	Per day, at time of shipment.
	Daily	-5.0	—	+5.0	ppb	after 30 days
	Yearly	-0.5	—	+0.5	ppm	
	10 years	-3.0	—	+3.0		
	Voltage	-50	—	+50	ppb	±5% Change
	Warm-up	-0.1	—	+0.1	ppm	In 2 minutes @ +25°C, referenced to 1 hour.
Phase Noise @20 MHz		—	—	-105	dBc/Hz	@10 Hz
		—	—	-130		@100 Hz
		—	—	-140		@1 kHz
		—	—	-150		@10 kHz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-5.0	ppm	VCO@ 0V
		5.0	—	—		VCO@ 5.0V
	Control	0	2.5	5.0	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	4.75	5.0	5.25	V	3.3V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	400	mA	@ turn on
	Steady state	—	—	0.8	W	@ +25°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±50	±100	±200
0 ~ +70	○	○	○
-30 ~ +70	△	○	○
-40 ~ +85	△	○	○

*○: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.4 TOC2020

20.6 x 20.6 mm Oven Controlled Crystal Oscillator

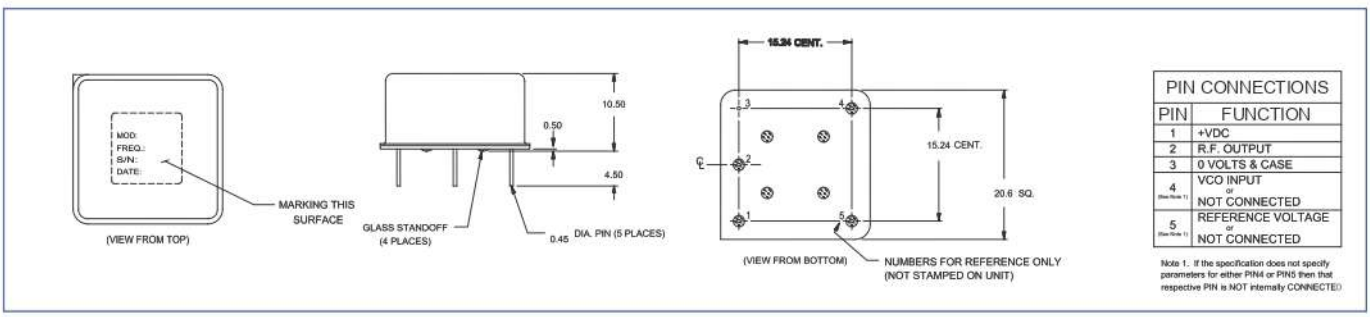
FEATURES

- Dimension 20.6 x 20.6 x 11.0 mm typical
- SC Cut Crystal

TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit

DIMENSIONS



PIN CONNECTIONS	
PIN	FUNCTION
1	+VDC
2	R.F. OUTPUT
3	0 VOLTS & CASE
4 (See Note 1)	VCO INPUT or NOT CONNECTED
5 (See Note 1)	REFERENCE VOLTAGE or NOT CONNECTED

Note 1. If the specification does not specify parameters for either PIN4 or PIN5 then that respective PIN is NOT internally CONNECTED

ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output Frequency		—	10	—	MHz	Available frequency range is from 5MHz to 40MHz. Standard frequencies are 10, 12.8, 13, 15.36, 16.384, 19.2, 20 and 25MHz.
Waveform		—	Rectangular	—	—	Sine wave output is not available. Consult factory for more information.
Level (HCMOS)	"1" Level	3.5	—	—	V	
	"0" Level	—	—	0.5		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+2.0V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-10	—	+10	ppb	-30 ~ +70°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	-0.5	—	+0.5	ppb	Per day, at time of shipment.
	Daily	-0.5	—	+0.5	ppb	after 30 days
	Yearly	-50	—	+50	ppb	
	10 years	-0.3	—	+0.3	ppm	
	Voltage	-0.5	—	+0.5	ppb	±5% Change
	Warm-up	-50	—	+50	ppb	In 3 minutes @ +25°C, referenced to 1 hour.
Phase Noise		—	—	-115	dBc/Hz	@10 Hz
		—	—	-135		@100 Hz
		—	—	-145		@1 kHz
		—	—	-150		@10 kHz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-0.5	ppm	VCO@ 0V
		0.5	—	—		VCO@4.0V
	Control	0	2	4	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	4.75	5.0	5.25	V	3.3V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	500	mA	@ turn on
	Steady state	—	—	1.0	W	@ +25°C
Reference Voltage	Voltage	3.8	4.0	4.2	V	
	Load	9	—	—	kΩ	

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±5	±10	±20
0 ~ +70	○	○	○
-30 ~ +70	△	○	○
-40 ~ +85	△	○	○

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.5 TOC2522

25.4 x 22.1 mm Oven Controlled Crystal Oscillator

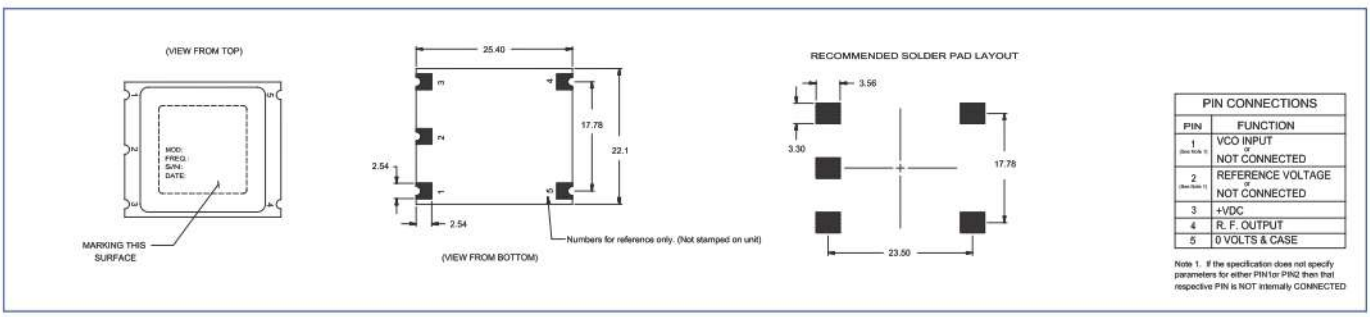
FEATURES

- Dimension 25.4 x 22.1 x 11.0 mm typical
- SC Cut Crystal

TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit

DIMENSIONS



ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output Frequency		—	10	—	MHZ	Available frequency range is from 5MHz to 40MHz. Standard frequencies are 10, 12.8, 15.36, 16.384, 19.2, 20 and 25MHz.
Waveform		—	Rectangular	—	—	Sine wave output is not available. Consult factory for more information.
Level (HCMOS)	"1"Level	2.4	3.3	—	V	
	"0"Level	—	—	0.4		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+1.4V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-10	—	+10	ppb	0 ~ +70°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	-0.5	—	+0.5	ppb	Per day, at time of shipment.
	Daily	-0.5	—	+0.5	ppb	after 30 days
	Yearly	-50	—	+50	ppb	
	10 years	-0.4	—	+0.4	ppm	
	Voltage	-0.5	—	+0.5	ppb	±5% Change
	Warm-up	-10	—	+10	ppb	In 2 minutes @ +25°C, referenced to 1 hour.
Phase Noise @ 20MHz		—	—	-115	dBc/Hz	@10 Hz
		—	—	-130		@100 Hz
		—	—	-140		@1k Hz
		—	—	-150		@10k Hz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-0.5	ppm	VCO@ 0V
		0.5	—	—		VCO@2.8V
	Control	0	1.4	2.8	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	3.135	3.3	3.465	V	5.0V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	1000	mA	@ turn on
	Steady state	—	—	1.2	W	@ +25°C
Reference Voltage	Voltage	2.7	2.8	2.9	V	
	Load	9	—	—	kΩ	

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±5	±10	±20
0 ~ +70	○	○	○
-30 ~ +70	△	○	○
-40 ~ +85	△	○	○

*o: Available Δ: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.6 TOC2525

25.4 x 25.4 mm Oven Controlled Crystal Oscillator

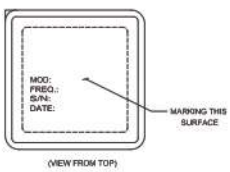
FEATURES

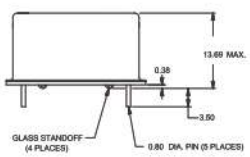
- Dimension 25.4 x 25.4 x 12.7 mm typical
- SC Cut Crystal

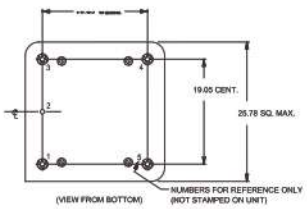
TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit

DIMENSIONS







PIN CONNECTIONS	
PIN	FUNCTION
1	R. F. OUTPUT
2	0 VOLTS & CASE
3 (See Note 1)	VCO INPUT or NOT CONNECTED
4 (See Note 1)	REFERENCE VOLTAGE or NOT CONNECTED or OVEN MONITOR
5	+VDC

Note 1. If the specification does not specify parameters for either PIN3 or PIN4 then that respective PIN is NOT internally CONNECTED.

ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output Frequency		—	10	—	MHz	Available frequency range is from 5Hz to 40MHz. Standard frequencies are 10, 12.8, 13, 15.36, 19.2, 20, 25, 38.88MHz.
Waveform		—	Rectangular	—	—	Sine wave output is not available. Consult factory for more information.
	Level	—	LVTTL	—		
	"1"Level	2.4	—	—	V	
	"0"Level	—	—	0.4		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+1.4V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-10	—	+10	ppb	-30 ~ +70°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	—	—	—		
	Daily	-0.5	—	+0.5	ppb	after 30 days
	Yearly	-50	—	+50	ppb	
	10 years	-0.3	—	+0.3	ppm	
	Voltage	-5.0	—	+5.0	ppb	±5% Change
	Warm-up	-10	—	+10	ppb	In 10 minutes @ +25°C, referenced to 1 hour.
Phase Noise @ 20MHz		—	—	-120	dBc/Hz	@10 Hz
		—	—	-135		@100 Hz
		—	—	-145		@1 kHz
		—	—	-150		@10 kHz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-0.5	ppm	VCO@ 0V
		+0.5	—	—		VCO@3.3V
	Control	0	1.65	3..3	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	3.135	3.3	3.465	V	5.0V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	1000	mA	@ turn on
	Steady state	—	—	1.3	W	@ +25°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±3	±5	±10
0 ~ +70	○	○	○
-30 ~ +70	△	○	○
-40 ~ +85	△	○	○

*o: Available △: Condition X: Not available

Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

OCXO

6.7 TOC3627

36.3 x 27.2 mm Oven Controlled Crystal Oscillator

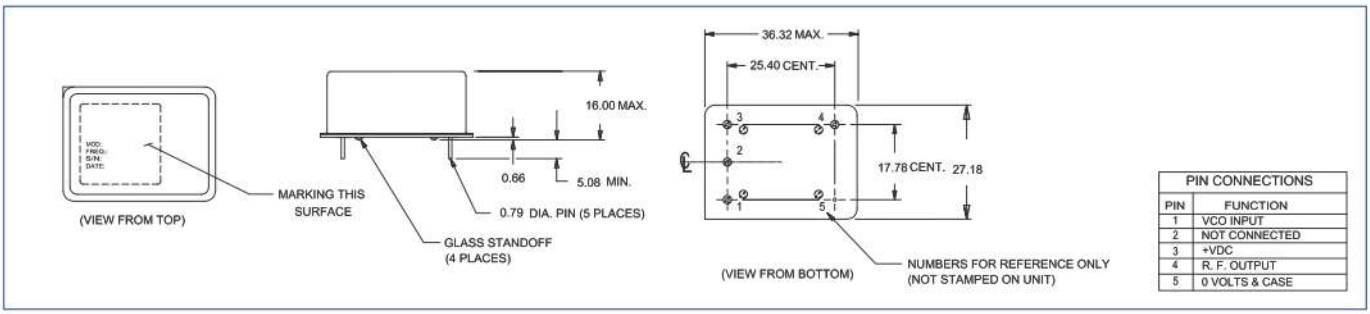
FEATURES

- Dimension 36.3 x 27.2 x 12.7 mm typical
- SC Cut Crystal

TYPICAL APPLICATION

- SDH/SONET, Telecommunication base station
- Test and measurement equipment
- Synthesizer, Digital switch, Reference Timing Circuit

DIMENSIONS



PIN CONNECTIONS	
PIN	FUNCTION
1	VCO INPUT
2	NOT CONNECTED
3	+VDC
4	R. F. OUTPUT
5	0 VOLTS & CASE

ELECTRICAL SPECIFICATION

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Output Frequency		—	10	—	MHz	Available frequency range is from 5MHz to 40MHz. Standard frequencies are 10, 12.8, 13, 15.36, 19.2, 20, 25 and 38.88MHz.
Waveform		—	Rectangular	—	—	Since wave output is available. Consult factory for more information.
Level (LVTTL)	"1"Level	2.4	—	—	V	
	"0"Level	—	—	0.4		
	Load	—	15	—	pF	
	Duty Cycle	45	50	55	%	@+1.4V
	Spurious	—	—	-60	dBc	
Frequency Stability	Ambient	-5.0	—	+5.0	ppb	-40 ~ +85°C, referenced to +25°C Refer to Freq. Stability Vs Temp. Range table.
	Aging	-0.5	—	+0.5	ppb	
	Daily	-0.5	—	+0.5	ppb	after 30 days
	Yearly	-50	—	+50	ppb	
	10 years	-0.3	—	+0.3	ppm	
	Voltage	-0.5	—	+0.5	ppb	±5% Change
	Warm-up	-10	—	+10	ppb	In 10 minutes @ +25°C, referenced to 1 hour.
Phase Noise		—	—	-120	dBc/Hz	@10 Hz
		—	—	-135		@100 Hz
		—	—	-145		@1 kHz
		—	—	-150		@10 kHz

OCXO

Parameter		Min.	Typ.	Max.	Unit.	Test Condition
Electrical Frequency Adjustment	Range	—	—	-0.5	ppm	VCO@ 0V
		0.5	—	—		VCO@5.0V
	Control	0	2.5	5.0	V	
	Slope	—	Positive	—		
	Input impedance	100	—	—	kΩ	
Input Power	Voltage	4.75	5.0	5.25	V	3.3V input voltage is available. Consult factory for control voltage and output level.
	Current	—	—	850	mA	@ turn on
	Steady state	—	—	1.3	W	@ +25°C

FREQ. STABILITY vs. TEMP. RANGE

Temp.(°C) \ ppb	±3	±5	±10
0 ~ +70	○	○	○
-30 ~ +70	△	○	○
-40 ~ +85	△	○	○

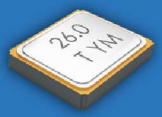
*o: Available Δ: Condition X: Not available

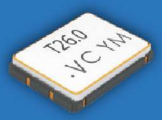
Note: not all combination of options are available. Other specifications may be available upon request.
Specifications subject to change without notice.

泰晶科技股份有限公司
TKD Science and Technology Co., LTD.

深圳市维拓精电科技有限公司
WTL International Limited

- KHz Crystal (SMD)
- MHz Crystal (SMD)
- Thermistor Quartz Crystal
- Oscillator SPXO (CMOS/LVPECL/ LVDS/HCSL Output)
- TCXO
- OCXO





Quartz Crystal
Crystal Oscillator
TCXO
OCXO
Timing Module

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