WTL®

Quartz Crystal
Always WTL

Edition 7

WTL INTERNATIONAL LIMITED

As an expert for frequency control products, those products may be not so spectacular,but they are closely related to our lives. WTL connects the people and ideas of the world together, returns the world by our dynamic and innovative spirit in the win-win to long rhythm.

Welcome to WTL.

深圳市维拓精电科技有限公司

作为频率控制产品的专家，我们的产品并不那么引人注目，但它与我们的生活却息息相关。维拓将来自世界各地的人和思维融合在一起，秉承着“共赢之源，维拓百年”经营理念，以我们的激进向上，科技创新来回报您与整个世界。

维拓, 真诚欢迎您！

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Quartz Crystal,Always WTL®

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SAW Filter

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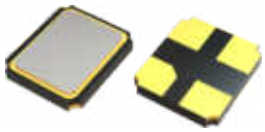
SMD Seam Sealed Crystals
1.2×1.0×0.33 mm

Feature

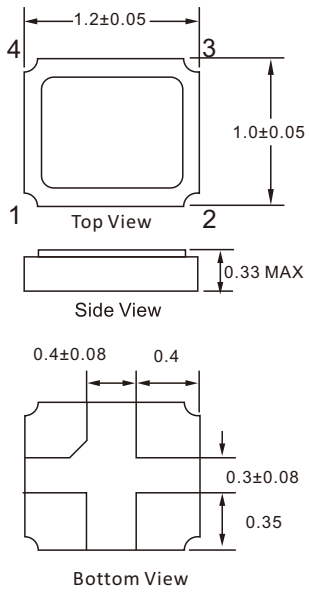


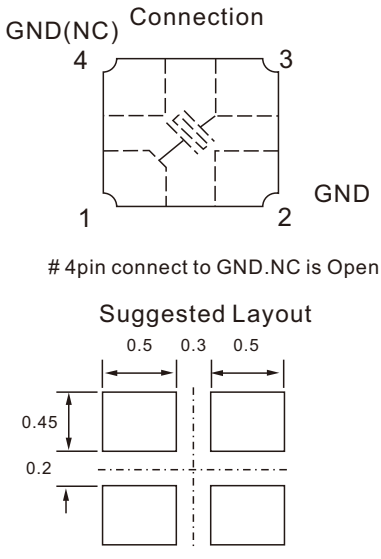
- Size 1.2 × 1.0, ultra miniature and lightweight SMD crystal with a low profile of 0.33mm
- Seam with vacuum Sealed for Ultra-small size
- High precision and high reliability
- Automatic mounting is possible
- Reflow is possible
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications	
Frequency Range(MHz)	32~40	40~96
Mode	AT/Fundamental	
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify	
Frequency Tolerance(at 25°C)	±10ppm~±30ppm or specify	
Operating Temperature Range	-20~+70°C or Specify	
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify	
Equivalent Series Resistance (ESR) max.	150Ω	100Ω
Storage Temperature Range	-55~+125°C	
Shunt Capacitance(C_0)	3pF Max	
Drive Level (Typical)	50μW max	
Aging @25°C 1st Year (Max)	±2 ppm,±5ppm	

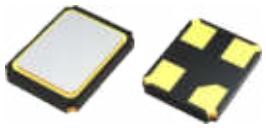
Dimension(mm)





SMD Seam Sealed Crystals
1.6×1.2×0.35 mm

Feature

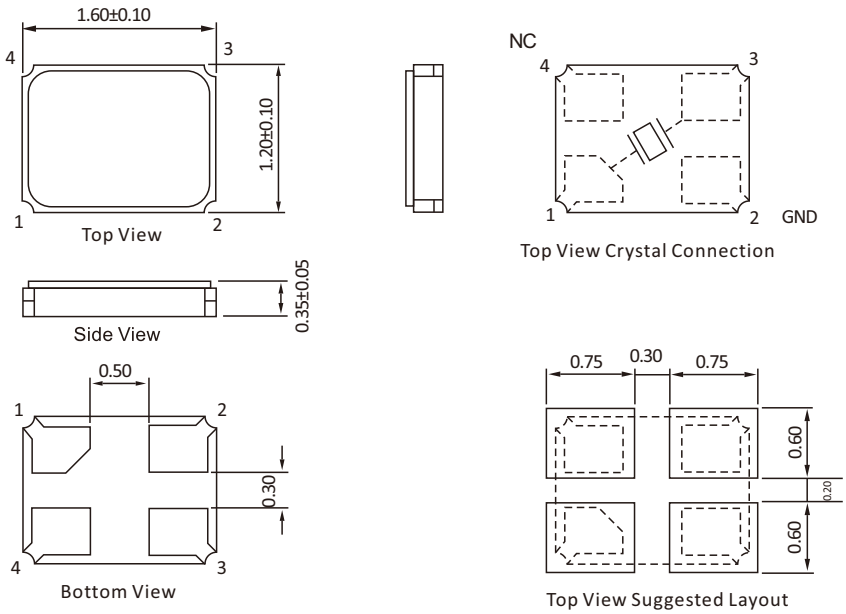


- Size 1.6 × 1.2 , Ultra thin , thickness 0.35mm
- High precision and high frequency stability
- Designed for automatic mounting and reflow soldering
- RoHS Compliant /Pb Free

Electrical Specifications

Item	Specifications		
Frequency Range(MHz)	20~24	24~30	30~66
Mode	AT/Fundamental		
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify		
Frequency Tolerance(at 25°C)	±10ppm~±30ppm or specify		
Operating Temperature Range	-20~+70°C or Specify		
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify		
Equivalent Series Resistance (ESR) max.	150Ω	100Ω	80Ω
Storage Temperature Range	-55~+125°C		
Shunt Capacitance(C_0)	3pF Max		
Drive Level (Typical)	1 ~ 200μW (50μW typical)		
Aging @25 °C 1st Year (Max)	±3 ppm/year		

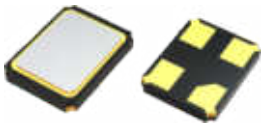
Dimension(mm)



SMD Seam Sealed Crystals
2.0×1.6×0.5 mm

Feature

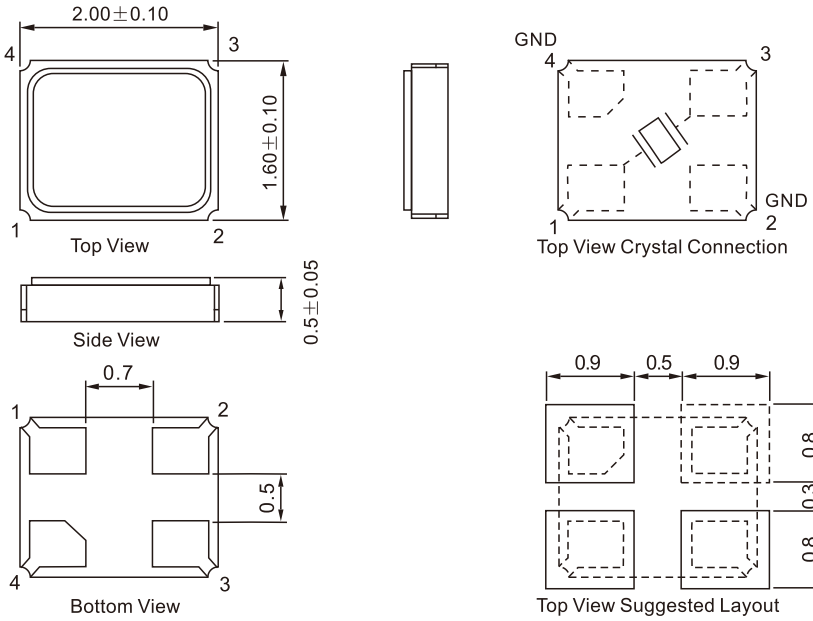
- Size 2.0 × 1.6 , Ultra thin , thickness 0.5mm
- High precision and high frequency stability
- Excellent heat resistance and environmental characteristics
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free



Electrical Specifications

Item	Specifications		
Frequency Range(MHz)	16~19.2	19.2~30	30~96
Mode	AT/Fundamental		
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify		
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify		
Operating Temperature Range	-20~+70°C or Specify		
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify		
Equivalent Series Resistance (ESR) max.	200Ω	100Ω	80Ω
Storage Temperature Range	-55~+125°C		
Shunt Capacitance(C_0)	3pF Max		
Drive Level (Typical)	1 ~ 200μW (50μW typical)		
Aging @25°C 1st Year (Max)	±3 ppm/year		

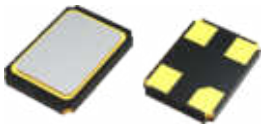
Dimension(mm)



SMD Seam Sealed Crystals
2.5×2.0×0.55 mm

Feature

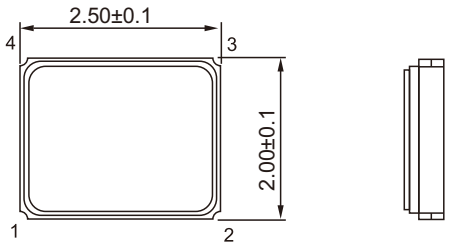
- Size 2.5 × 2.0 , Ultra thin , thickness 0.55mm
- High precision and high frequency stability
- Excellent heat resistance and environmental characteristics
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free



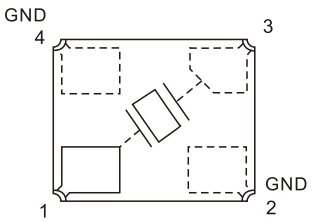
Electrical Specifications

Item	Specifications	
Frequency Range(MHz)	12~24	24~54
Mode	AT/Fundamental	
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify	
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify	
Operating Temperature Range	-20~+70°C or Specify	
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±50ppm or specify	
Equivalent Series Resistance (ESR) max.	80Ω	60Ω
Storage Temperature Range	-55~+125°C	
Shunt Capacitance(C_0)	3pF Max	
Drive Level (Typical)	1 ~100 µW (10µW typical)	
Aging @ 25°C 1st Year (Max)	±3 ppm/year	

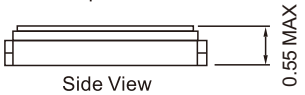
Dimension(mm)



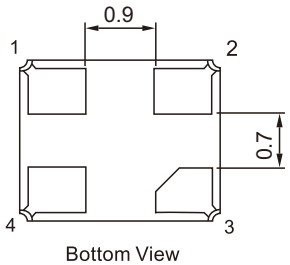
Top View



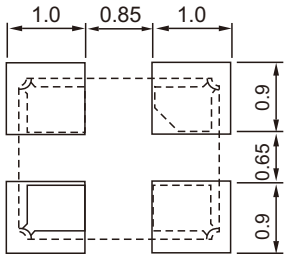
Top View Crystal Connection



Side View



Bottom View

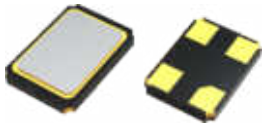


Top View Suggested Layout

SMD Seam Sealed Crystals
3.2×2.5×0.7 mm

Feature

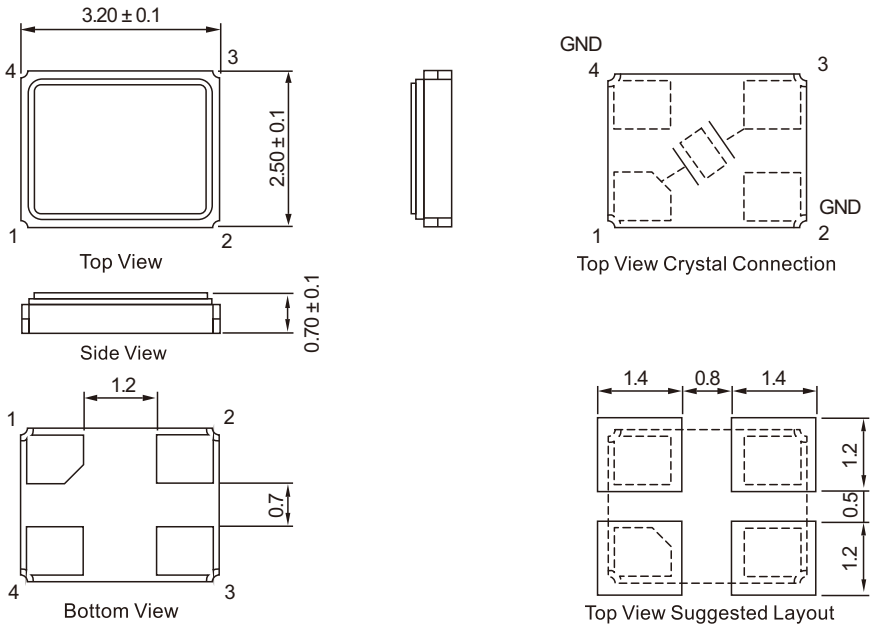
- Size 3.2×2.5, Ultra thin , thickness 0.7mm
- High precision and high frequency stability
- Excellent heat resistance and environmental characteristics
- Designed for automatic mounting and reflow soldering
- RoHS Compliant /Pb Free



Electrical Specifications

Item	Specifications		
Frequency Range(MHz)	8~10	10~24	24~104
Mode	AT/Fundamental		
Load Capacitance (CL)	8pF, 9pF, 10pF, 12pF, 18pF, 20pF, or Specify		
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify		
Operating Temperature Range	-20~+70℃ or Specify		
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify		
Equivalent Series Resistance (ESR) max.	200Ω	80Ω	60Ω
Storage Temperature Range	-55~+125℃		
Shunt Capacitance(C 0)	3pF Max		
Drive Level (Typical)	1~ 100 µW (50µW typical)		
Aging @25°C 1st Year (Max)	±3 ppm/year max		

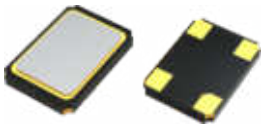
Dimension(mm)



SMD Seam Sealed Crystals
5.0×3.2×0.9 mm

Feature

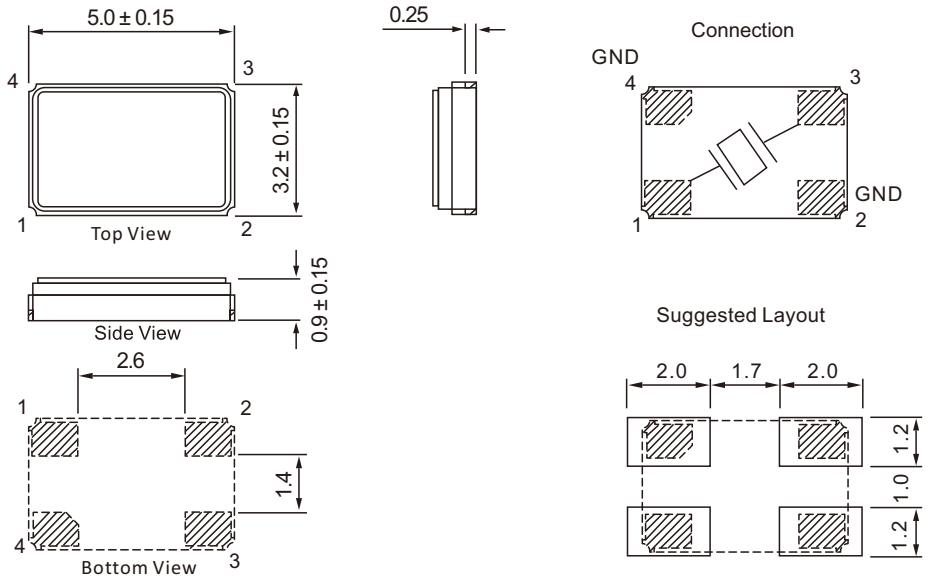
- Size 5.0×3.2, thickness 0.9mm
- High precision and high frequency stability
- Excellent heat resistance and environmental characteristics
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free



Electrical Specifications

Item	Specifications			
Frequency Range(MHz)	8~12	12~48	40~60	60~100
Mode	AT/Fundamental		AT/3RD	
Load Capacitance (CL)	8pF, 16pF, 20pF, 30pF, or Specify			
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify			
Operating Temperature Range	-20~+70℃ or Specify			
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify			
Equivalent Series Resistance (ESR) max.	60Ω	45Ω	120Ω	80Ω
Storage Temperature Range	-55~+125℃			
Shunt Capacitance(C_0)	5pF Max			
Drive Level (Typical)	1 ~ 100 μW (10μW typical)			
Aging @25 °C 1st Year (Max)	±3 ppm/year			

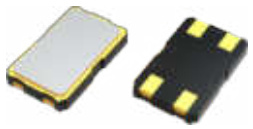
Dimension(mm)



SMD Seam Sealed Crystals
7.0×5.0×1.1 mm

Feature

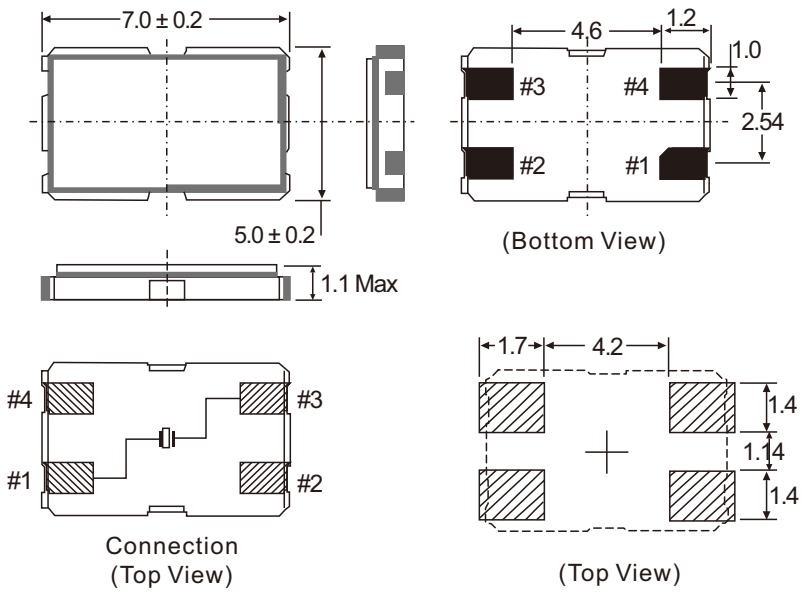
- SMD type crystal units
- High precision and high frequency stability
- Excellent heat resistance and environmental characteristics
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free



Electrical Specifications

Item	Specifications		
Frequency Range(MHz)	6~8	8~48	32~110
Mode	AT/Fundamental		AT/3RD
Load Capacitance (CL)	8pF, 16pF, 20pF, 30pF, or Specify		
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify		
Operating Temperature Range	-20~+70°C or Specify		
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify		
Equivalent Series Resistance (ESR) max.	100Ω	60Ω	80Ω
Storage Temperature Range	-55~+125°C		
Shunt Capacitance(C_0)	5pF Max		
Drive Level (Typical)	1~100 μW		
Aging @ 25°C 1st Year (Max)	±3 ppm/year		

Dimension(mm)



SMD Glass Sealed Ceramic
5.0×3.2×1.2 mm

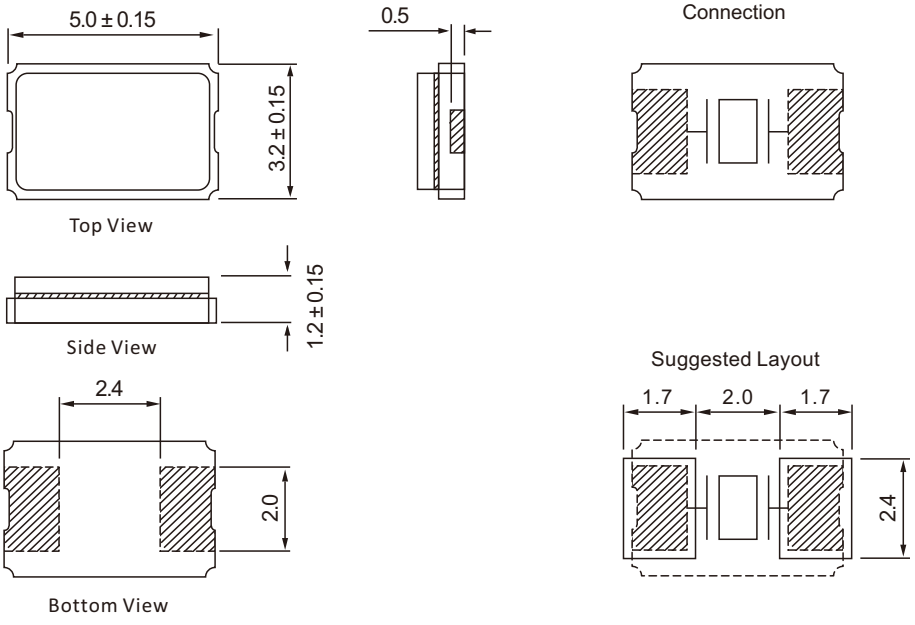
Feature

- 2 pads SMD glass sealed crystal units
- High reliable environmental performance
- Tight tolerance and stability parts are available
- Designed for automatic mounting and reflow soldering
- Contains Pb in sealing glass exempted by RoHS directive

Electrical Specifications

Item	Specifications		
Frequency Range(MHz)	8~12	12~54	40~80
Mode	AT/Fundamental		AT/3RD
Load Capacitance (CL)	10pF, 20pF, 30pF, 32pF or Specify		
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify		
Operating Temperature Range	-20~+70°C or Specify		
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify		
Equivalent Series Resistance (ESR) max.	60Ω	40Ω	100Ω
Storage Temperature Range	-55~+125°C		
Shunt Capacitance(C_0)	5pF Max		
Drive Level (Typical)	1~200μW (100μW typical)		
Aging @25°C 1st Year (Max)	±3 ppm/year		

Dimension(mm)



Resistance Welded HC-49S
11.05×4.7×3.68 mm

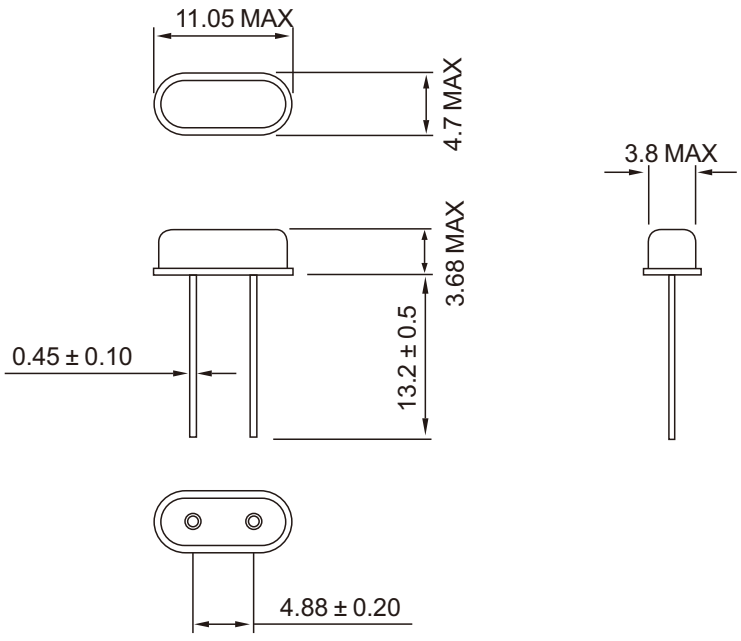
Feature

- Resistance welded type crystal units
- A great number of standard frequencies
- Higher frequency available and lower equivalent series resistance
- Lower cost and highly mass production capability
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications					
Frequency Range(MHz)	3.2~6	6~8	8~16	16~54	30~50	50~100
Mode	AT/Fundamental				AT/3RD	AT/3RD
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify					
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or Specify					
Operating Temperature Range	-20~+70°C or Specify					
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or Specify					
Equivalent Series Resistance (ESR) max.	150Ω	60Ω	50Ω	30Ω	80Ω	60Ω
Storage Temperature Range	-55~+125°C					
Shunt Capacitance(C_0)	7.0 pF Max					
Drive Level (Typical)	1 μW~100 μW (10μW typical)					
Aging @25 °C 1st Year (Max)	±3 ppm/year or ±5 ppm/year					

Dimension(mm)



Resistance Welded HC-49SMD
12.7×4.8×3.8 mm

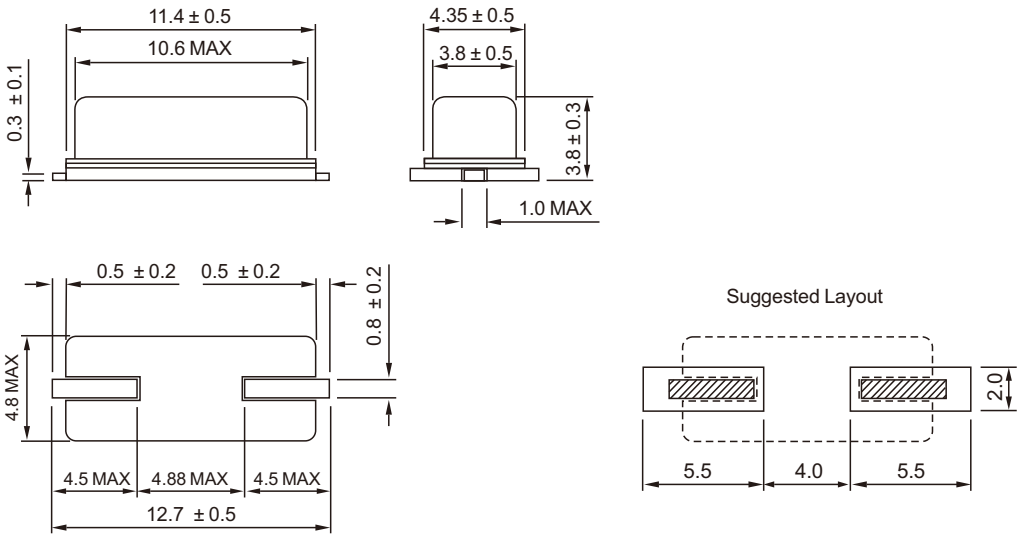
Feature

- Surface mount type crystal units.
- A great number of standard frequencies.
- Higher frequency available and lower equivalent series resistance.
- Lower cost and highly mass production capability.
- RoHS Compliant / Pb Free

Electrical Specifications

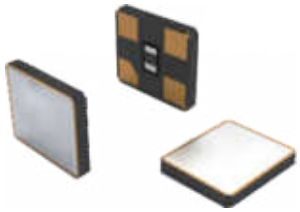
Item	Specifications					
Frequency Range(MHz)	3.2~6	6~8	8~16	16~54	30~50	50~100
Mode	AT/Fundamental				AT/3RD	AT/3RD
Load Capacitance (CL)	8pF, 10pF, 12pF or Specify					
Frequency Tolerance(at 25°C)	±10ppm ~ ±30ppm or specify					
Operating Temperature Range	-20~+70°C or Specify					
Frequency Stability Over Operating Temperature Range	±10ppm ~ ±30ppm or specify					
Equivalent Series Resistance (ESR) max.	150Ω	60Ω	50Ω	30Ω	80Ω	60Ω
Storage Temperature Range	-55~+125°C					
Shunt Capacitance(C_0)	7.0 pF Max					
Drive Level (Typical)	1 µW~500 µW (100µW typical)					
Aging @25 °C 1st Year (Max)	±3 ppm/year or ±5 ppm/year					

Dimension(mm)



Thermistor quartz crystal
1.6 x1.2 x0.65mm series

Feature



- Ultra-small size: 1.6 x 1.2 x 0.65 mm
- Ceramic seam welding package
- High stability and low aging
- Pb Free and RoHS compliant

Electrical Specifications

Item/Type	Specifications
Frequency Range(MHz)	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	10μW (100μW Max.)
Load Capacitance(CL)	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 ≤ 76.8MHz	40Ω Max.

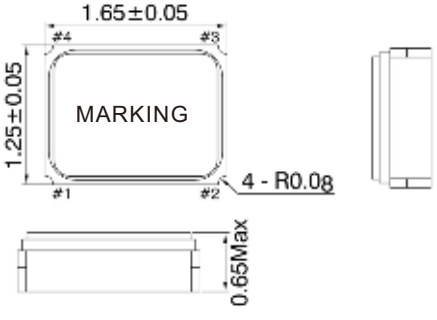
Freq.Stability vs.Temp. Range

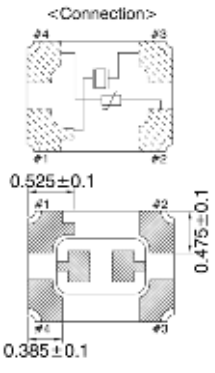
Temp.(°c) \ PPM	±12
-30~+85	○

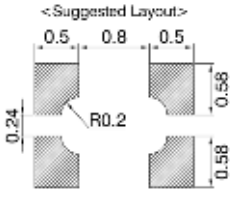
*O:Available △:Condition X: Not available

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

Dimension(mm)



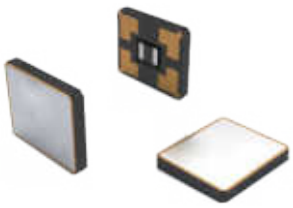




Thermistor quartz crystal
2.0 x 1.6 x 0.65mm series

Feature

- Ultra-small size: 2.0 x 1.6 x 0.65 mm
- Low aging
- Excellent shock and vibration performance
- Thermally coupled temperature sensor



Electrical Specifications

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

Equivalent Series Resistance(ESR)

Frequency	Resistance
19.2MHz,26MHz,38.4MHz	80Ω Max.

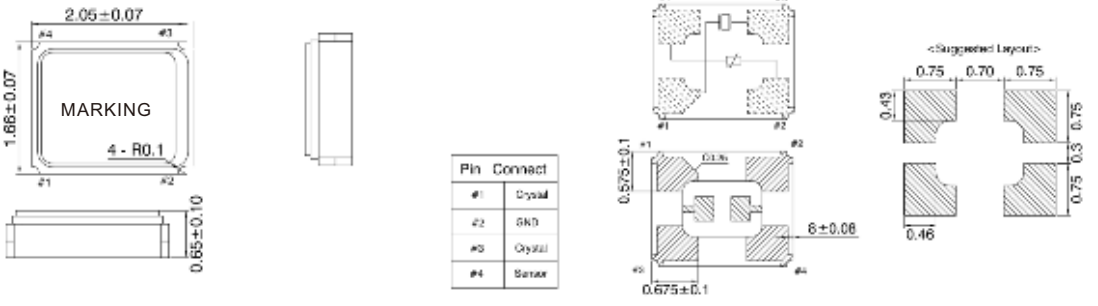
Freq.Stability vs.Temp. Range

Temp.(°c) \ PPM	±12
-30~+85	○

*O:Available △:Condition X: Not available

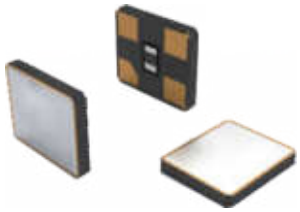
Note: not all combination of options are available.Other specifications may be available upon request.

Dimension(mm)



Thermistor quartz crystal
2.5 x 2.0 x 1.0mm series

Feature



- Ultra-small size: 2.5 x 2.0 x 1.0 mm
- Low aging
- Excellent shock and vibration performance
- Thermally coupled temperature sensor

Electrical Specifications

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

Equivalent Series Resistance(ESR)

Frequency	Resistance
19.2MHz,26MHz	50Ω Max.

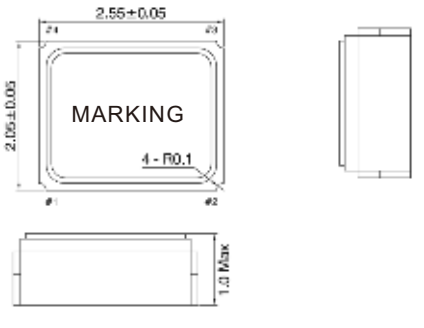
Freq.Stability vs.Temp. Range

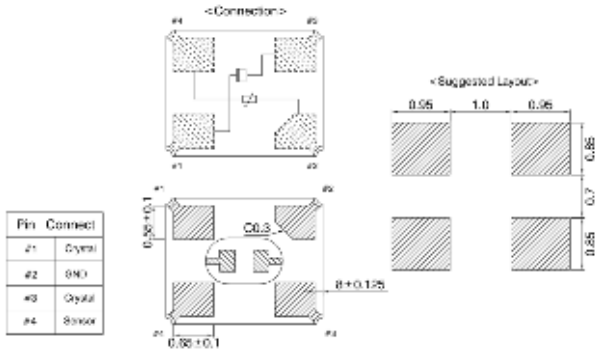
Temp.(°c) \ PPM	±12
-30~+85	○

*O:Available △:Condition X: Not available

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

Dimension(mm)

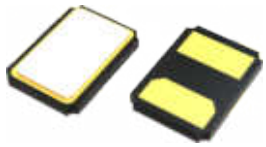




1.2 x 1.0 x 0.5 mm SMD Package

FEATURE

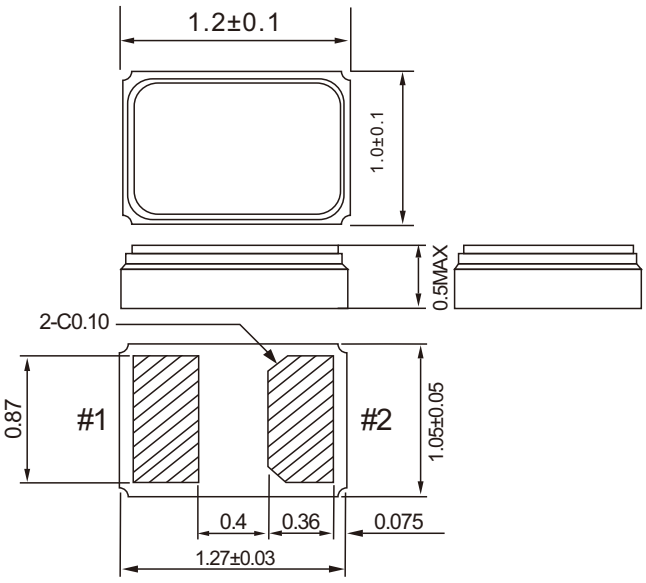
- Ultra small size 1.2x1.0x0.5 mm
- High reliability environmental performance
- High frequency stability and high precision
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

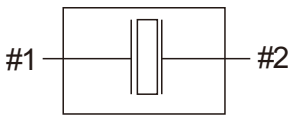


ELECTRICAL SPECIFICATIONS

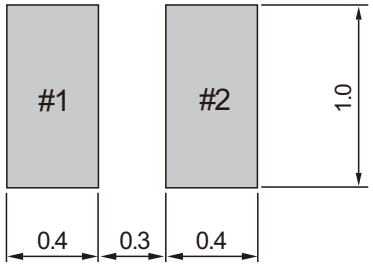
Item	Specifications
Frequency	32.768kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF
Frequency Tolerance(at 25°C)	±20ppm
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	(-0.036±10%) x 10^{-6}/°C ^{2}
Equivalent Series Resistance (ESR) max.	90kΩ
Drive Level (Typical)	0.1μW
Drive Level(Max)	0.3μW
Shunt Capacitance(C_0)	1.4pF Typ.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	-55°C~+125°C
Aging @25°C 1st Year (Max)	±3ppm/year

DIMENSION(mm)





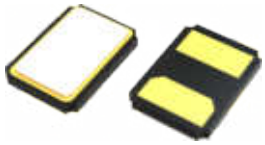
Connection



Suggested Layout

1.6 x 1.0 x 0.5 mm SMD Package

Feature

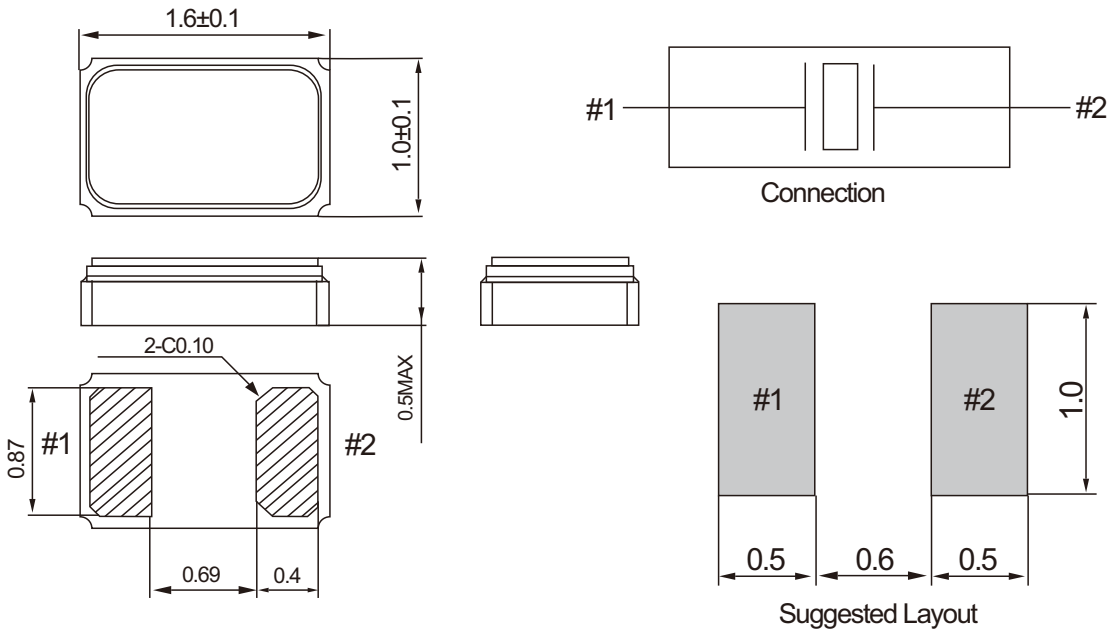


- Ultra small size 1.6x1.0x0.5 mm
- High reliability environmental performance
- High frequency stability and high precision
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

Electrical Specifications

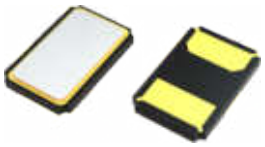
Item	Specifications
Frequency	32.768kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF
Frequency Tolerance(at 25°C)	±20ppm
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	(-0.036±10%) x 10^{-6}/°C^2
Equivalent Series Resistance (ESR) max.	90kΩ
Drive Level (Typical)	0.1μW
Drive Level(Max)	0.5μW
Shunt Capacitance(C_0)	1.2pF Typ.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	-55°C~+125°C
Aging @25 °C 1st Year (Max)	±3ppm/year

Dimension(mm)



2.0 x 1.2 x 0.6 mm SMD Package

Feature

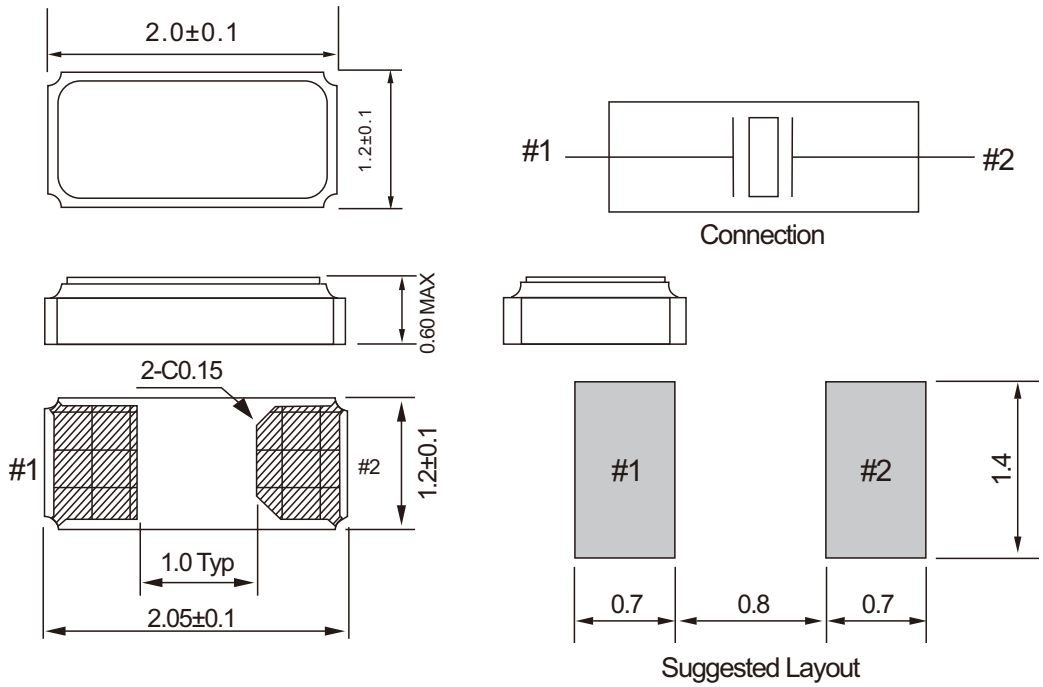


- Ultra small size 2.0*1.2*0.6 mm
- High reliability environmental performance.
- High frequency stability and high precision.
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

Electrical Specifications

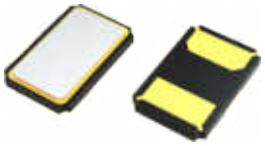
Item	Specifications
Frequency	32.768kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF
Frequency Tolerance(at 25°C)	±20ppm
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	(-0.030±10%) x 10^{-6}/°C^2
Equivalent Series Resistance (ESR) max.	90kΩ
Drive Level (Typical)	0.1μW
Drive Level(Max)	1.0μW
Shunt Capacitance(C_0)	1.3pF Typ.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	-55°C~+125°C
Aging @25°C 1st Year (Max)	±3ppm/year

Dimension(mm)



3.2 x 1.5 x 0.75 mm SMD Package

Feature

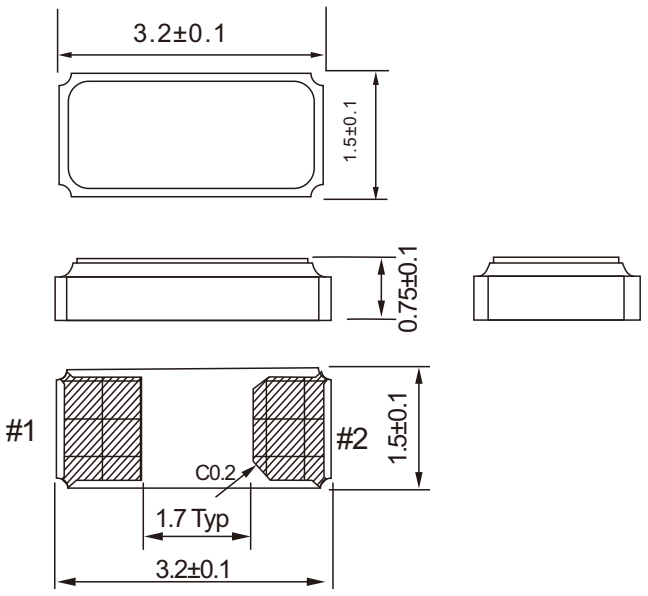


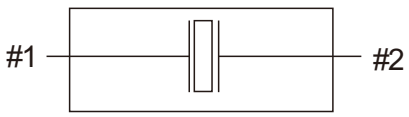
- Ultra small size 3.2*1.5*0.75 mm
- High reliability environmental performance.
- High frequency stability and high precision.
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

Electrical Specifications

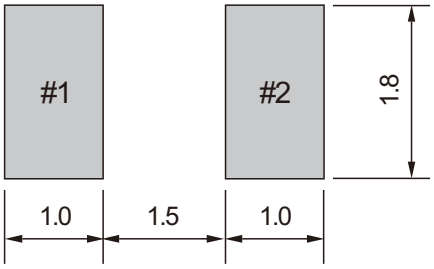
Item	Specifications
Frequency	32.768kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF
Frequency Tolerance(at 25°C)	±20ppm
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	$(-0.033\pm10\%) \times 10^{-6}/°C^2$
Equivalent Series Resistance (ESR) max.	70kΩ
Drive Level (Typical)	0.1μW
Drive Level(Max)	1.0μW
Shunt Capacitance(C_0)	1.0pF Typ.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	-55°C~+125°C
Aging @25°C 1st Year (Max)	±3ppm/year

Dimension(mm)





Connection



Suggested Layout

3.8 x 8.0 x 2.5 mm SMD Package

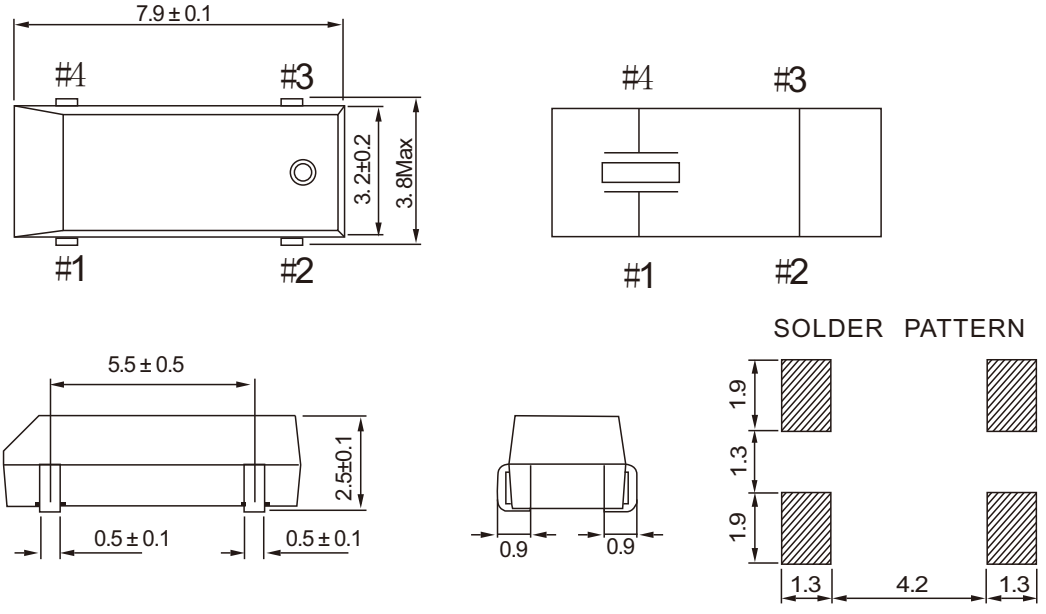
Feature

- Wide frequency range
- Designed for automatic mounting and reflow soldering
- Higher frequency available and lower equivalent series resistance
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications				
Frequency Range (kHz)	30~40	40~60	60~70	70~200	200~350
Load Capacitance (CL)	6~12.5pF,or specify				
Frequency Tolerance(at 25°C)	±5ppm ~ ±100ppm				
Operating Temperature Range	-10~+60°C, -20~+70°C, -40~+85°C or specify				
Turnover Temperature	25 ± 5°C				
Frequency Temperature Curve	(-0.034±10%) x $10^{-6}/±^{2}$				
Equivalent Series Resistance (ESR) Max.	40kΩ	30kΩ	25kΩ	22kΩ	20kΩ
Drive Level (Typical)	0.1μW				
Drive Level(Max)	1μW				
Shunt Capacitance (C_0)	2.0pF Typ.				
Insulation Resistance	More than 500Mohms at DC100V				
Storage Temperature Range	-55°C~+125°C				
Aging @25 °C 1st Year (Max)	±3ppm/year, ±5 ppm/year,				

Dimension(mm)



6.9 x 1.4 x 1.3 mm SMD Package

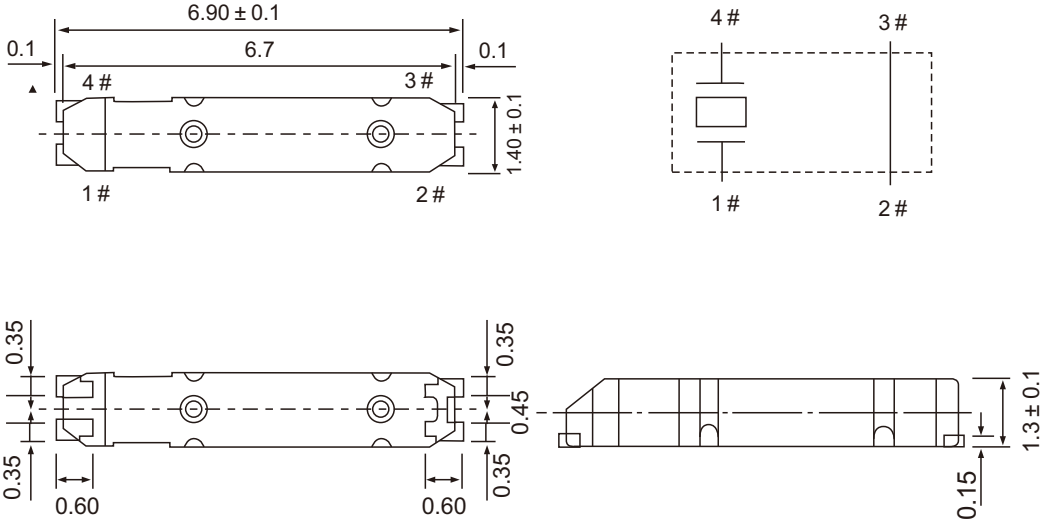
Feature

- Ultra small size 6.9x1.4x1.3 mm
- High reliability environmental performance
- High frequency stability and high precision
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications
Frequency	32.768kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF
Frequency Tolerance(at 25°C)	±5ppm , ±10ppm , ±20ppm
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	(-0.033±10%) x 10^{-6}/°C^2
Equivalent Series Resistance (ESR) max.	65kΩ
Drive Level (Typical)	0.1μW
Drive Level(Max)	1μW
Shunt Capacitance(C_0)	0.9pF Typ.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	-55°C~+125°C
Aging @25 °C 1st Year (Max)	±3ppm/year

Dimension(mm)



Φ2 x 6mm DIP Crystal

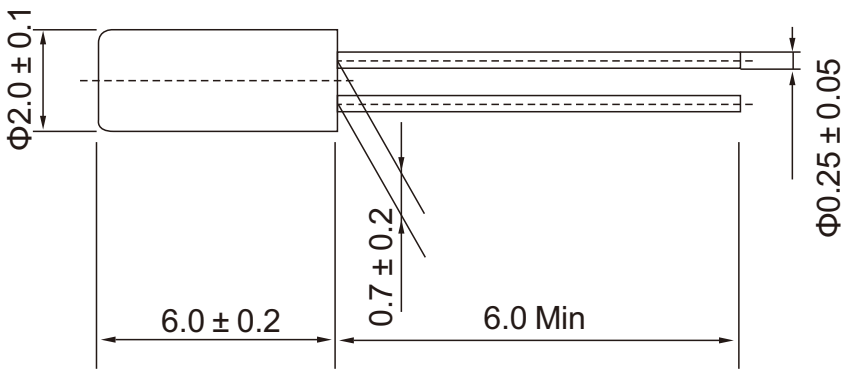
Feature

- Small sizeΦ2 x 6mm
- A great number of standard frequencies
- Higher frequency available and lower equivalent series resistance
- The best choice of Clock
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications				
Frequency Range (kHz)	30~40	40~60	60~70	70~200	200~350
Load Capacitance (CL)	6~12.5pF,or specify				
Frequency Tolerance(at 25°C)	±5ppm ~ ±100ppm				
Operating Temperature Range	-20~+70°C or specify				
Turnover Temperature	25 ± 5°C				
Frequency Temperature Curve	(-0.034±10%) x 10^{-6}/°C^2				
Equivalent Series Resistance (ESR) Max.	40kΩ	30kΩ	25kΩ	22kΩ	20kΩ
Drive Level (Typical)	0.1μW				
Drive Level(Max)	1μW				
Shunt Capacitance (C_0)	1.5 pF Typ.				
Insulation Resistance	More than 500Mohms at DC100V				
Storage Temperature Range	-40°C~+85°C				
Aging @25 °C 1st Year (Max)	±3ppm/year, ±5 ppm/year,				

Dimension(mm)



Φ3 x 8mm DIP Crystal

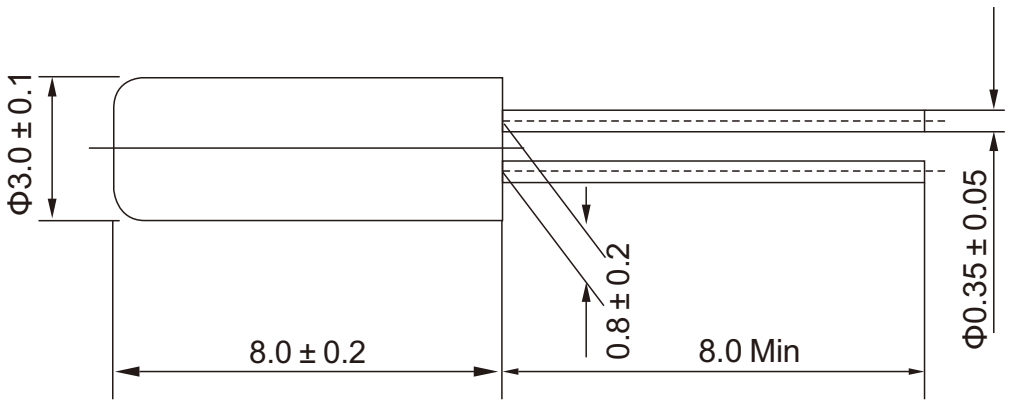
Feature

- Small size Φ3 x 8mm
- A great number of standard frequencies
- Higher frequency available and lower equivalent series resistance
- Lower cost and highly mass production capability
- The best choice of PC and Clock
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications				
Frequency Range (kHz)	30~40	40~60	60~70	70~200	200~350
Load Capacitance (CL)	6~12.5pF,or specify				
Frequency Tolerance(at 25°C)	±5ppm ~ ±100ppm				
Operating Temperature Range	-20~+70°C or specify				
Turnover Temperature	25 ± 5°C				
Frequency Temperature Curve	$(-0.034\pm10\%) \times 10^{-6}/°C^2$				
Equivalent Series Resistance (ESR) Max.	40kΩ	30kΩ	25kΩ	22kΩ	20kΩ
Drive Level (Typical)	0.1μW				
Drive Level (Max)	1μW				
Shunt Capacitance (C_0)	1.8 pF Typ.				
Insulation Resistance	More than 500Mohms at DC100V				
Storage Temperature Range	-40°C~ +85°C				
Aging @25°C 1st Year (Max)	±5 ppm/year,				

Dimension(mm)



Φ2 x 6mm With Jacket Crystal

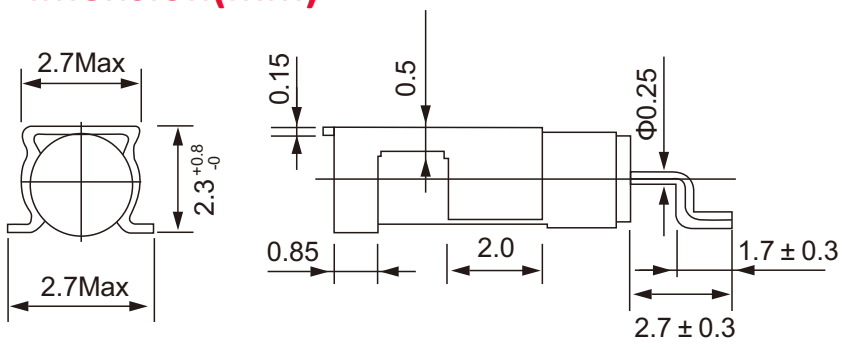
Feature

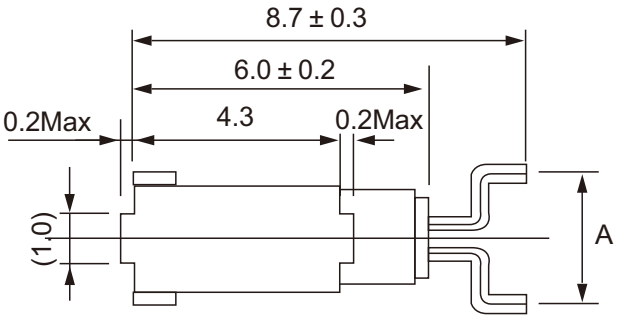
- Small size Φ 2 x 6mm SMD with Jacket
- Excellent frequency stability
- Designed for automatic mounting and reflow soldering
- RoHS Compliant / Pb Free

Electrical Specifications

Item	Specifications
Frequency	30~100kHz
Load Capacitance (CL)	6pF, 7pF, 9pF , 12.5pF or specify
Frequency Tolerance(at 25°C)	±20ppm or Specify
Operating Temperature Range	-40~+85°C
Turnover Temperature	25 ± 5°C
Frequency Temperature Curve	(-0.030±10%) x 10^{-6}/°C^2
Equivalent Series Resistance (ESR) max.	50kΩ
Driver Level (Typical)	0.1μW
Driver Level(Max)	1.0μW
Shunt Capacitance(C_0)	1.5pF Max.
Insulation Resistance	More than 500Mohms at DC100V
Storage Temperature Range	−40°C ~+85°C
Aging @25 °C 1st Year (Max)	±5 ppm/year

Dimension(mm)





Type	H(mm)
A1	2.54±0.3
A2	1.27±0.3

Φ2 x 6mm SMD Crystal

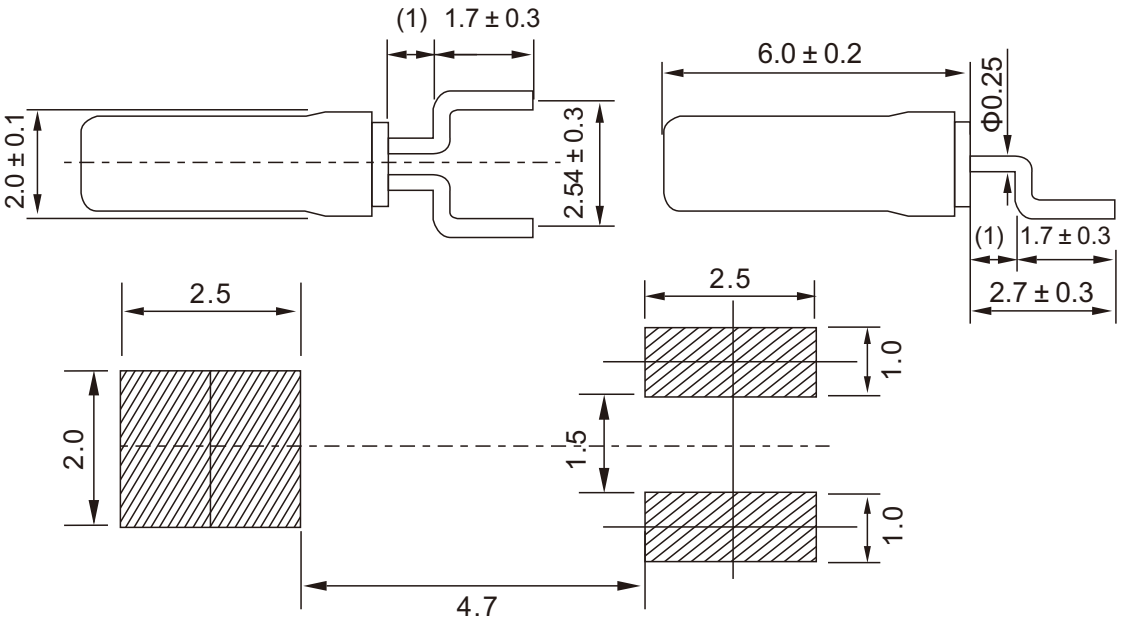
Feature

- Small size Φ2 x 6mm
- Wide frequency range: 30kHz~350kHz
- High reliability and high frequency stability
- Suited for automatic mounting and reflow soldering
- Environmentally friendly products, RoHS certified

Electrical Specifications

Item	Specifications				
Frequency Range (kHz)	30~40	40~60	60~70	70~200	200~350
Load Capacitance (CL)	6~12.5pF,or specify				
Frequency Tolerance(at 25°C)	±5ppm ~ ±100ppm				
Operating Temperature Range	-20~+70°C or specify				
Turnover Temperature	25 ± 5°C				
Frequency Temperature Curve	(-0.035±10%) x 10^{-6}/°C ^{2}				
Equivalent Series Resistance (ESR) Max.	40kΩ	30kΩ	25kΩ	22kΩ	20kΩ
Driver Level (Typical)	0.1μW				
Driver Level(Max)	1μW				
Shunt Capacitance (C_0)	1.45 pF Typ.				
Insulation Resistance	More than 500Mohms at DC100V				
Storage Temperature Range	-40°C~+85°C				
Aging @25 °C 1st Year (Max)	±5 ppm/year				

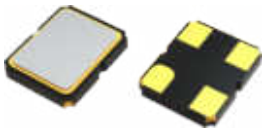
Dimension(mm)



2.5 ×2.0 mm 32.768kHz SMD Crystal Oscillator

Feature

- Typical 2.5 x 2.0 x 0.81 mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- Built-in ASIC enables reduction of current consumption

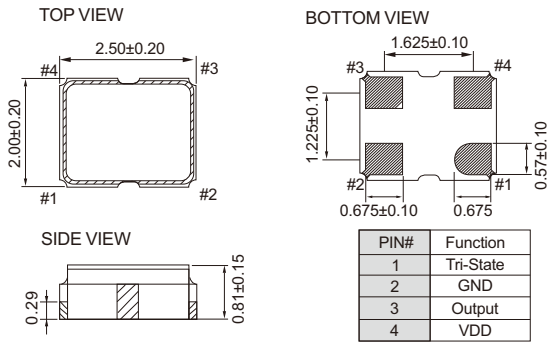


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Supply Current	@ 15pF Load	-	70	-	66	-	63	uA
	@ no load	-	65	-	62	-	60	
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	50	-	50	-	50	nSec
Output Level	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Startup Time		-	2	-	2	-	2	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	
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

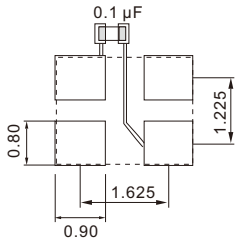
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

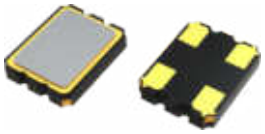
ppm / Temp. (°C)	±20	±25	±40	±50
-10 ~ +60	○	○	○	○
-20 ~ +70	△	○	○	○
-40 ~ +85	X	△	○	○
-40 ~ +125	X	X	△	○

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

3.2 ×2.5 mm 32.768kHz SMD Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.95 mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- Built-in ASIC enables reduction of current consumption

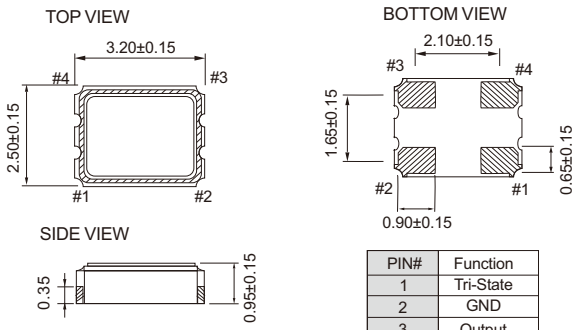


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Supply Current	@ 15pF Load	-	70	-	66	-	63	uA
	@ no load	-	65	-	62	-	60	
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	50	-	50	-	50	nSec
Output Level	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

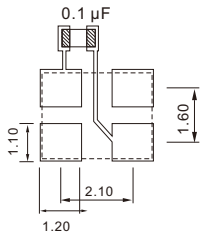
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

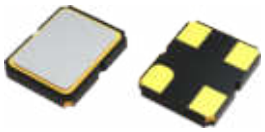
Temp. (°C) \ ppm	±20	±25	±40	±50
-10 ~ +60	o	o	o	o
-20 ~ +70	Δ	o	o	o
-40 ~ +85	x	Δ	o	o
-40 ~ +125	x	x	Δ	o

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

2.5 ×2.0 mm 32.768kHz Low Current Consumption SMD Oscillator

Feature

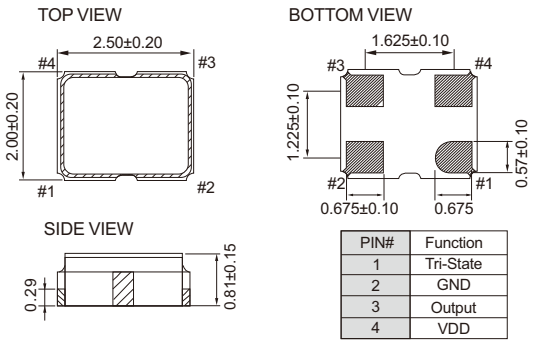
- Typical 2.5 x 2.0 x 0.81 mm SMD package.
- Low Power Supply Voltage: 3.3V, 2.5V, 1.8V
- Singled-end Output: CMOS
- Frequency: 32.768kHz
- Low Current Consumption: 18uA Max
- Temperature Range: -40 to 85 °C Operation
- Pb-free/RoHS Compliant



Electrical Specifications

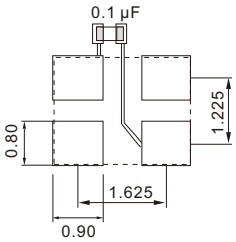
Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Supply Current(no load)		-	18	-	18	-	18	uA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	15	-	15	-	15	nSec
Output Level	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Startup Time		-	20	-	20	-	20	mSec
Standby Current		-	3	-	3	-	3	uA
Output Loading(CMOS)			15	-	15	-	15	pF
Tri-State (Input to Pin 2)	Enable	2.31	-	1.75	-	1.26	-	V
	Disable	-	0.99	-	0.75	-	0.54	
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

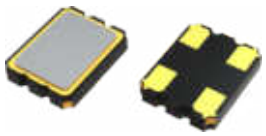
ppm / Temp. (°C)	±20	±25	±50
-10 ~ +60	○	○	○
-20 ~ +70	○	○	○
-40 ~ +85	△	○	○

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

3.2 ×2.5 mm 32.768kHz Low Current Consumption SMD Oscillator

Feature

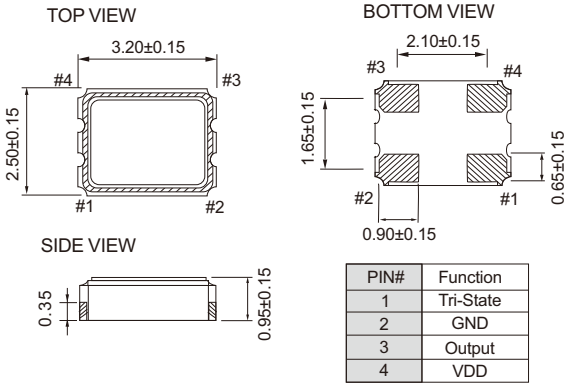
- Typical 3.2 x 2.5 x 0.95 mm SMD package.
- Low Power Supply Voltage: 3.3V, 2.5V, 1.8V
- Singled-end Output: CMOS
- Frequency: 32.768kHz
- Low Current Consumption: 10uA Max
- Temperature Range: -40 to 125 °C Operation
- Pb-free/RoHS Compliant



Electrical Specifications

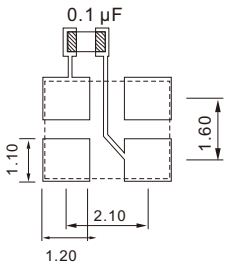
Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-10%	V_{DD}+10%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Supply Current(no load)		-	18	-	18	-	18	uA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	15	-	15	-	15	nSec
Output Level	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Startup Time		-	20	-	20	-	20	mSec
Standby Current		-	3	-	3	-	3	uA
Output Loading(CMOS)			15	-	15	-	15	pF
Tri-State (Input to Pin 2)	Enable	2.31	-	1.75	-	1.26	-	V
	Disable	-	0.99	-	0.75	-	0.54	
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

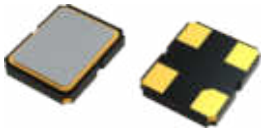
ppm / Temp. (°C)	±20	±25	±30	±50
-10 ~ +60	o	o	o	o
-20 ~ +70	△	o	o	o
-40 ~ +85	X	△	o	o
-40 ~ +105	X	X	△	o
-40 ~ +125	X	X	X	o

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

SMD Crystal Oscillator 1.6 × 1.2 mm

Feature

- Typical 1.65 x 1.25 x 0.8 mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- RoHS compliant/Pb-free

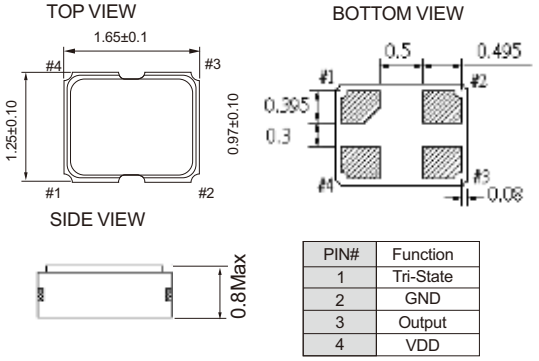


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		2	80	2	80	2	80	MHz
Standard Frequency		24,26,32,40						MHz
Supply Current		-	20	-	20	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Rise/Fall Time		-	10	-	10	-	10	nSec
Output Level (CMOS)	Output High(Logic"1")	2.97		2.25		1.62		V
	Output Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

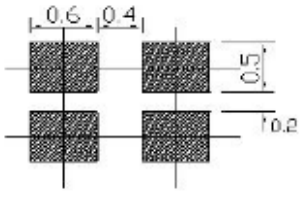
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



FREQ. STABILITY vs. TEMP. RANGE

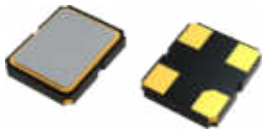
ppm / Temp. (°C)	±20	±25	±50
-10 ~ +60	○	○	○
-20 ~ +70	△	○	○
-40 ~ +85	X	○	○
-40 ~ +125	X	X	○

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

SMD Crystal Oscillator 2.0 ×1.6 mm

Feature

- Typical 2.05 x 1.65 x 0.75 mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- RoHS compliant/Pb-free

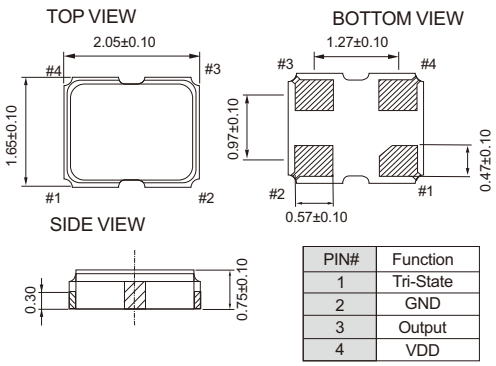


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		1.5	50	1.5	50	1.5	50	MHz
Standard Frequency		24,26,32,40						MHz
Supply Current		-	15	-	10	-	7	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time : Rise/Fall Time	1.5 MHz≦FO<20MHz	-	4	-	4	-	5	nSec
	20 MHz≦FO<50MHz	-	3	-	3	-	4	
Output Level (CMOS)	Output High(Logic"1")	2.97		2.25		1.62		V
	Output Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Standby Current		-	10	-	10	-	10	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

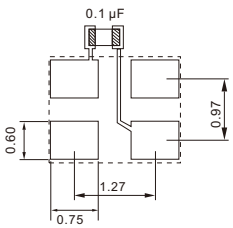
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

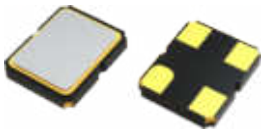
ppm / Temp. (°C)	±20	±25	±50
-10 ~ +60	o	o	o
-20 ~ +70	△	o	o
-40 ~ +85	x	o	o
-40 ~ +125	x	x	o

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

SMD Crystal Oscillator 2.5 ×2.0 mm

Feature

- Typical 2.5 x 2.0 x 0.81 mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: l .8V, 2.5V, 3.3V
- Tri-state enable/disable
- RoHS compliant/Pb-free

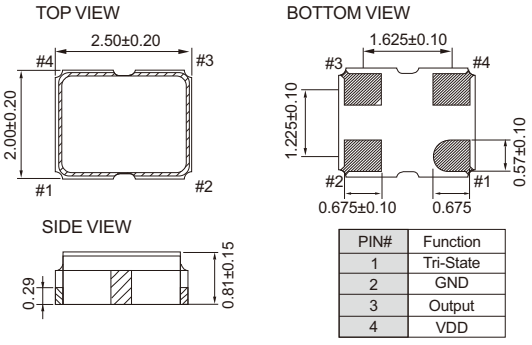


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	1.71	1.89	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
Duty Cycle		45	55	45	55	45	55	%
Transition Time : Rise/Fall Time	1.25 MHz≦FO<10MHz	-	3	-	4	-	5	nSec
	10 MHz≦FO<125MHz	-	3	-	3	-	4	
Output Level	Out High	2.97		2.25		1.62		V
	Out Low		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Standby Current(@-40 to 85°C)		-	10	-	10	-	10	μA
Standby Current(@-40 to 125°C)		-	20	-	20	-	20	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

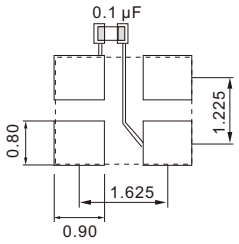
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

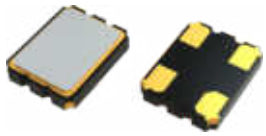
FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±20	±25	±50
-10 ~ +60	o	o	o
-20 ~ +70	△	o	o
-40 ~ +85	x	o	o
-40 ~ +125	x	x	o

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

3.2 ×2.5 mm SMD Crystal Oscillator

Feature



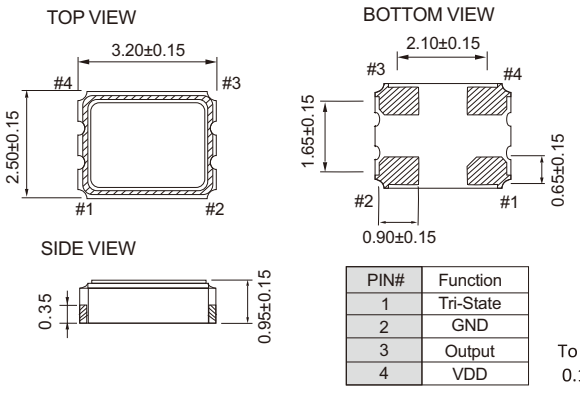
- Typical 3.2 x 2.5 x 0.95mm SMD package.
- Tight symmetry (45 to 55%) available.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- RoHS compliant/Pb-free

Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		1.25	125	1.25	125	1.25	125	MHz
Standard Frequency		4,24,26,32,38,40						MHz
Supply Current(At 15pF Load)		-	15	-	10	-	7	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time : Rise/Fall Time	1.25 MHz≦FO<10MHz	-	3	-	4	-	5	nSec
	10 MHz≦FO<125MHz	-	3	-	3	-	4	
Output Level	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Standby Current(@-40 to 85°C)		-	10	-	10	-	10	μA
Standby Current(@-40 to 125°C)		-	20	-	20	-	20	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

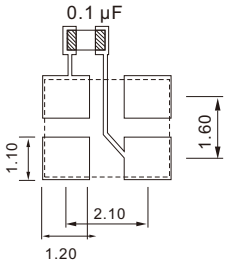
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±20	±25	±50
-10 ~ +60	o	o	o
-20 ~ +70	△	o	o
-40 ~ +85	x	o	o
-40 ~ +125	x	x	o

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

5.0 ×3.2 mm SMD Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.2mm ceramic SMD package
- Tight symmetry (45 to 55%) available
- Operation voltage: 1.8V, 2.5V, 3.3V
- Realize the standby function with Tri-State
- RoHS compliant/Pb-free

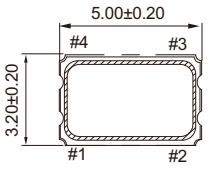
Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		0.0137	160	0.0137	160	0.0137	135	MHz
Standard Frequency		2.048,25,26,27,50,66.667,100,125						MHz
Supply Current	13.7kHz ≦ FO< 93kHz	-	1	-	1	-	1	mA
	0.3125MHz ≦ FO<50MHz	-	10	-	8	-	7	
	40 MHz ≦ FO<75MHz	-	20	-	18	-	15	
	75 MHz ≦ FO<135MHz	-	35	-	30	-	25	
	135 MHz ≦ FO	-	45	-	40	-	-	
Transition Time : Rise/Fall Time	13.7kHz ≦ FO< 93kHz	-	50	-	50	-	50	nSec
	0.3125 MHz ≦ FO<100MHz	-	5	-	5	-	5	
	100 MHz ≦ FO	-	3	-	3	-	3	
Output Level (CMOS)	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Standby Current		-	10	-	10	-	10	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

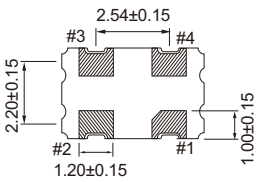
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)

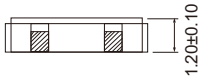
TOP VIEW



BOTTOM VIEW

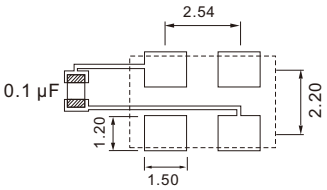


SIDE VIEW



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

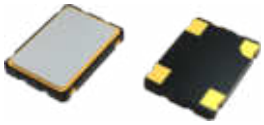
ppm / Temp. (°C)	±20	±25	±50
10 ~ +60	○	○	○
-20 ~ +70	△	○	○
-40 ~ +85	△	○	○
-40 ~ +125	X	X	○

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

7.0 ×5.0 mm SMD Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.3mm SMD package.
- Operation voltage: 1.8V, 2.5V, 3.3V
- Tri-state enable/disable
- Output frequency up to 166MHz
- RoHS compliant/Pb-free



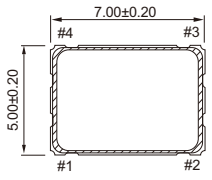
Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		0.0137	166	0.0137	133	0.0137	125	MHz
Standard Frequency		2.048,25,26,27,50,66.667,100,125						MHz
Supply Current	13.7kHz≦FO< 70kHz	-	1	-	1	-	1	mA
	0.312MHz≦FO<35.328MHz	-	10	-	8	-	7	
	40 MHz≦FO<75MHz	-	20	-	18	-	15	
	75 MHz≦FO<135MHz	-	35	-	30	-	25	
	135 MHz≦FO	-	45	-	40	-	-	
Transition Time : Rise/Fall Time	13.7kHz≦FO< 93kHz	-	50	-	50	-	50	nSec
	0.312 MHz≦FO<100MHz	-	5	-	5	-	5	
	100 MHz≦FO	-	3	-	3	-	3	
Output Level (CMOS)	Output High(Logic"1")	2.97		2.25		1.62		V
	Output Low(Logic"0")		0.33		0.25		0.18	
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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (Integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Standby Current		-	10	-	10	-	10	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

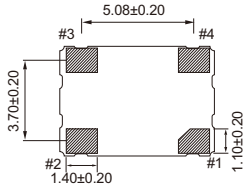
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)

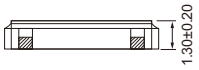
TOP VIEW



BOTTOM VIEW

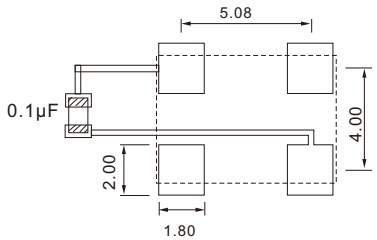


SIDE VIEW



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

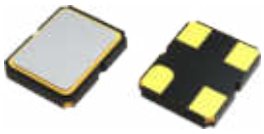
FREQ. STABILITY vs. TEMP. RANGE

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

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

2.5 ×2.0 mm Ultra Low Power SMD Crystal Oscillator

Feature



- Typical 2.5 x 2.0 x 0.81 mm SMD package
- Singled-end Output: CMOS
- Ultra Low Power Supply Voltage: 0.9V, 1.2V, 1.5V
- Low Noise Typical: 0.3ps at 12kHz to 20MHz Frequency Offsets
- Temperature Range: -40 to 85°C Operation
- Pb-free/RoHS Compliant

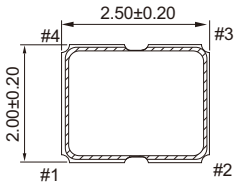
Electrical Specifications

Parameter		0.9V		1.2V		1.5V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	50	1	50	1	50	MHz
Supply Current(At 15pF Load)		-	1.5	-	2	-	3	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time : Rise/Fall Time	1 MHz≦FO<10MHz	-	4	-	3	-	3	nSec
	10 MHz≦FO<20MHz	-	3	-	3	-	3	
	20 MHz≦FO<50MHz	-	2	-	2	-	2	
Output Level	Out High	0.9V_{DD}		0.9V_{DD}		0.9V_{DD}		V
	Out Low		0.1V_{DD}		0.1V_{DD}		0.1V_{DD}	
Startup Time		-	4	-	4	-	4	mSec
Tri-State (Input to Pin 1)	Enable	0.7V_{DD}		0.7V_{DD}		0.7V_{DD}		V
	Disable		0.3V_{DD}		0.3V_{DD}		0.3V_{DD}	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Phase Noise @24MHz @100kHz		-148		-150		-150		dBc/Hz
Standby Current		-	100	-	100	-	100	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

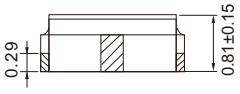
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)

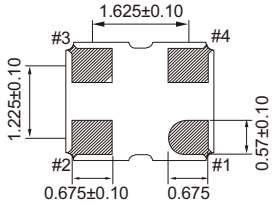
TOP VIEW



SIDE VIEW

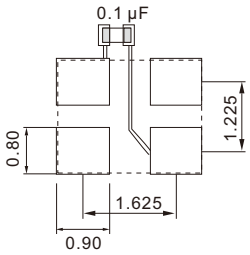


BOTTOM VIEW



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

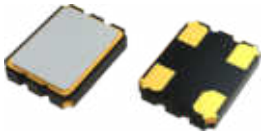
ppm / Temp. (°C)	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○

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

3.2 ×2.5 mm Ultra Low Power SMD Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.95 mm SMD package
- Singled-end Output: CMOS
- Ultra Low Power Supply Voltage: 0.9V, 1.2V, 1.5V
- Low Noise Typical: 0.3ps at 12kHz to 20MHz Frequency Offsets
- Temperature Range: -40 to 85°C Operation
- Pb-free/RoHS Compliant

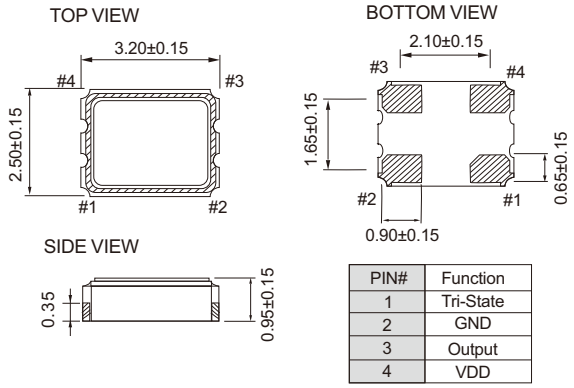


Electrical Specifications

Parameter		0.9V		1.2V		1.5V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	50	1	50	1	50	MHz
Supply Current(At 15pF Load)		-	1.5	-	2	-	3	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time : Rise/Fall Time	1 MHz≦FO<10MHz	-	4	-	3	-	3	nSec
	10 MHz≦FO<20MHz	-	3	-	3	-	3	
	20 MHz≦FO<50MHz	-	2	-	2	-	2	
Output Level	Out High	0.9V_{DD}		0.9V_{DD}		0.9V_{DD}		V
	Out Low		0.1V_{DD}		0.1V_{DD}		0.1V_{DD}	
Startup Time		-	4	-	4	-	4	mSec
Tri-State (Input to Pin 1)	Enable	0.7V_{DD}		0.7V_{DD}		0.7V_{DD}		V
	Disable		0.3V_{DD}		0.3V_{DD}		0.3V_{DD}	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Phase Noise @24MHz @100kHz		-148		-150		-150		dBc/Hz
Standby Current		-	100	-	100	-	100	μA
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

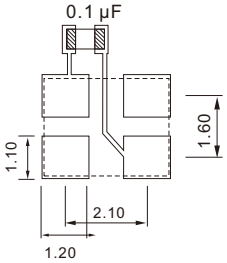
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

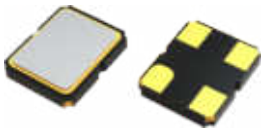
ppm / Temp. (°C)	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○

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

2.5 ×2.0 mm Extended Operating Temperature Range SMD Crystal Oscillator

Feature

- Typical 2.5 x 2.0 x 0.81 mm SMD package.
- Extended Industrial Operating Temperature Range -55~+125°C
- Low jitter and phase noise(25ps Pk-Pk Period jitter,typical)
- Tight symmetry（45 to 55%) available.
- Operation voltage : 1 .8V, 2.5V, 3.3V.
- Tri-state enable/disable.

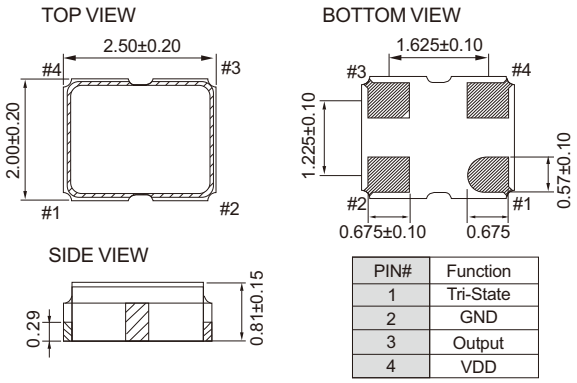


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		1.25	100	1.25	100	1.25	100	MHz
Supply Current	FO<80MHz	-	10	-	8	-	5	mA
	80 MHz≦FO	-	15	-	10	-	8	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	3	-	4	-	5	nSec
Output Level (CMOS)	Output High(Logic"1")	2.97		2.25		1.62		V
	Output Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

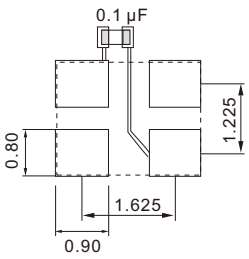
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

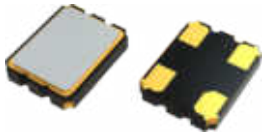
ppm / Temp. (°C)	±30	±40	±50	±100
-40 ~ +85	○	○	○	○
-40 ~ +105	△	○	○	○
-40 ~ +125	X	△	○	○
-55 ~ +125	X	X	△	○

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

3.2 ×2.5 mm Extended Operating Temperature Range SMD Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.95 mm SMD package.
- Extended Industrial Operating Temperature Range -55~+125°C
- Low jitter and phase noise(25ps Pk-Pk Period jitter,typical)
- Tight symmetry（45 to 55%) available.
- Operation voltage : 1 .8V, 2.5V, 3.3V.
- Tri-state enable/disable.

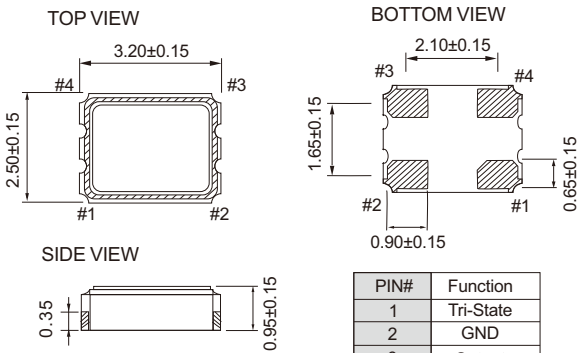


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		1.25	100	1.25	100	1.25	100	MHz
Supply Current	FO<80MHz	-	10	-	8	-	5	mA
	80 MHz≦FO	-	15	-	10	-	8	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	3	-	4	-	5	nSec
Output Level (CMOS)	Output High(Logic"1")	2.97		2.25		1.62		V
	Output Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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	
Period Jitter (Pk-Pk)		-	40	-	40	-	40	pSec
RMS Phase Jitter (integrated 12kHz to 20MHz)		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

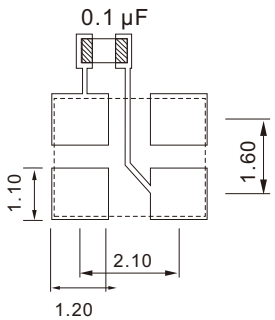
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

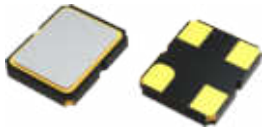
ppm / Temp. (°C)	±30	±40	±50	±100
-40 ~ +85	○	○	○	○
-40 ~ +105	△	○	○	○
-40 ~ +125	X	△	○	○
-55 ~ +125	X	X	△	○

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

2.5 ×2.0 mm Ultra Low Noise SMD Crystal Oscillator

Feature

- Typical 2.5 x 2.0 x 0.81 mm SMD package.
- Ultra Low Phase Noise designed specifically for Hi-Resolution Audio (HiFi , HD Audio)
- F=45.1584MHz(@1.8V,25°C):typical low close-in phase noise of-100dBc/ Hz@10Hz-offset, -127dBc/Hz@100Hz-offset,and a noise floor of-157dBc/Hz
- F=49.152MHz(@1.8V,25°C):typical low close-in phase noise of-100dBc/ Hz@10Hz-offset, -128dBc/Hz@100Hz-offset,and a noise floor of-157dBc/Hz
- Wide operating temperature range:-40°C~+105°C

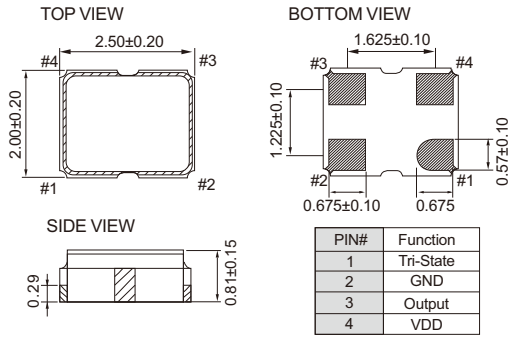


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		20	60	20	60	20	60	MHz
Supply Current		-	8	-	7	-	5	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	6	-	6	-	6	nSec
Output Level (CMOS)	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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 to 20MHz)		-	0.5	-	0.5	-	0.5	pSec
Phase Noise (TYP.)		F=20MHz		F=40MHz		F=60MHz		dBc/Hz
1.8V, 25°C	1kHz offset	-147		-143		-139		dBc/Hz
	100kHz offset	-156		-154		-150		dBc/Hz
2.5 to 3.3V, 25°C	1kHz offset	-151		-148		-142		dBc/Hz
	100kHz offset	-157		-156		-156		dBc/Hz
Aging(@25°C 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

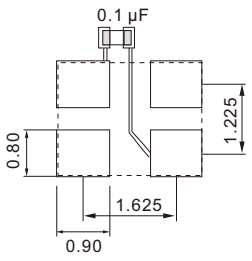
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

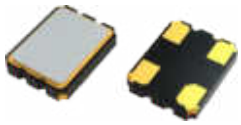
ppm / Temp. (°C)	±20	±25	±30	±50
-10 ~ +60	o	o	o	o
-20 ~ +70	△	o	o	o
-40 ~ +85	X	o	o	o
-40 ~ +105	X	X	△	o

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

3.2 × 2.5 mm Ultra Low Noise SMD Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.95 mm SMD package.
- Ultra Low Phase Noise designed specifically for Hi-Resolution Audio (HiFi , HD Audio)
- F=45.1584MHz(@1.8V,25°C):typical low close-in phase noise of-100dBc/Hz@10Hz-offset, -127dBc/Hz@100Hz-offset,and a noise floor of-157dBc/Hz
- F=49.152MHz(@1.8V,25°C):typical low close-in phase noise of-100dBc/Hz@10Hz-offset, -128dBc/Hz@100Hz-offset,and a noise floor of-157dBc/Hz
- Wide operating temperature range:-40°C~+105°C

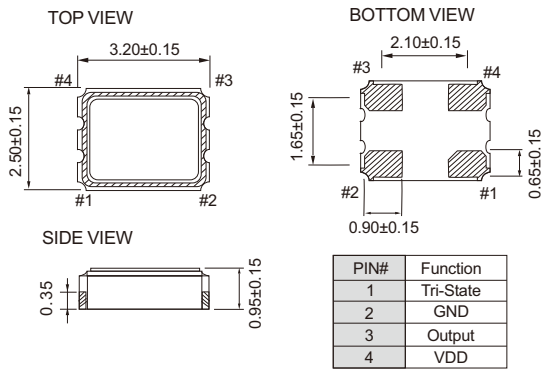


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.25	2.75	1.62	1.98	V
Frequency Range		20	60	20	60	20	60	MHz
Supply Current		-	8	-	7	-	5	mA
Duty Cycle		45	55	45	55	45	55	%
Transition Time :Rise/Fall Time		-	6	-	6	-	6	nSec
Output Level (CMOS)	Out High(Logic"1")	2.97		2.25		1.62		V
	Out Low(Logic"0")		0.33		0.25		0.18	
Start Time		-	2	-	2	-	2	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 to 20MHz)		-	0.5	-	0.5	-	0.5	pSec
Phase Noise (TYP.)		F=20MHz		F=40MHz		F=60MHz		dBc/Hz
1.8V, 25°C	1kHz offset	-147		-143		-139		dBc/Hz
	100kHz offset	-156		-154		-150		dBc/Hz
2.5 to 3.3V, 25°C	1kHz offset	-151		-148		-142		dBc/Hz
	100kHz offset	-157		-156		-156		dBc/Hz
Aging(@25°C 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

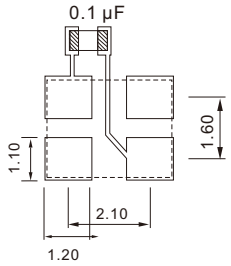
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±20	±25	±30	±50
-10 ~ +60	○	○	○	○
-20 ~ +70	△	○	○	○
-40 ~ +85	X	○	○	○
-40 ~ +105	X	X	△	○

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

20.8 x 12.46 DIP14 FULL Size Crystal Oscillator

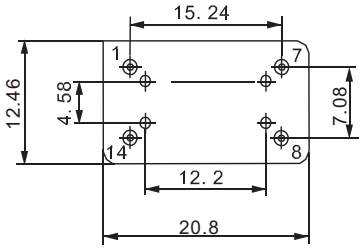
Feature

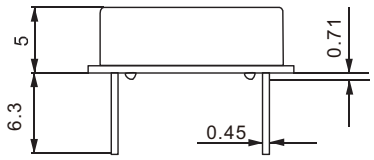
- Typical 20.8 x12.46 x5 mm
- Tight symmetry (45 to 55%) available.
- Operation voltage:5V, 3.3V
- Tri-state enable/disable

Electrical Specifications

Parameter		3.3V		5.0V		Unit
		Min.	Max.	Min.	Max.	
Fan out Type		CMOS		TTL/CMOS		
Supply Voltage Variation		3.0	3.6	4.5	5.5	V
Frequency Range		0.25	180	0.25	180	MHz
Frequency Stability		±25, ±50, ±100 or specify				PPM
Operating Temperature		0~70,-20~70, -40~85 or specify				°C
Supply Current	0.25 MHz≦FO<20MHz	-	10	-	15	mA
	20 MHz≦FO<50MHz	-	30	-	40	mA
	50 MHz≦FO<180MHz	-	40	-	50	mA
Duty Cycle		45	55	45	55	%
Transition Time : Rise/Fall Time	0.25 MHz≦FO<20MHz	-	10	-	8	nSec
	20 MHz≦FO<50MHz	-	6	-	5	
	50 MHz≦FO<180MHz	-	5	-	4	
Input Voltage	Vol (Max)	-	0.33	-	0.4/0.5	V
	2.4V/4.5V	2.4/2.5	-	3.0	-	
Driving Ability	CMOS load max	15		15/50		pF
	TTL load max			10TTL		
Start Time		5 ms max(15pF)/ 10 ms (50pF)				mSec
E/D Function	#1 OPEN	Pin#8 Open		Pin#8 Open		
	#1 >=2.2V	Pin#8 Open		Pin#8 Open		
	#1<=0.8V	Pin#8 High		Pin#8 High		
Aging(@25°C 1st year)		±3	±5	±3	±5	ppm
Storage Temp. Range		-55	125	-55	125	°C

Dimension(mm)





Pin	Function
1	Tri-State/NC
7	GND
8	Output
14	Vdd

12.46 x 12.46 DIP8 Half Size Crystal Oscillator

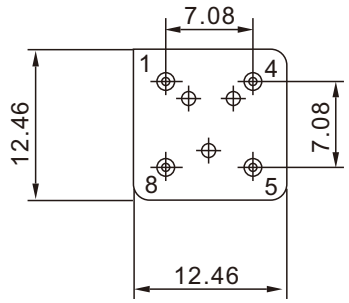
Feature

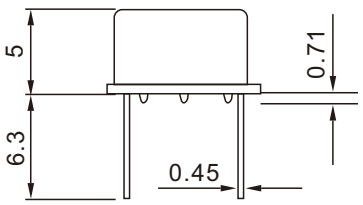
- Typical 12.46 x12.46x5 mm
- Tight symmetry (45 to 55%) available.
- Operation voltage:5V, 3.3V
- Tri-state enable/disable

Electrical Specifications

Parameter		3.3V		5.0V		Unit
		Min.	Max.	Min.	Max.	
Fan out Type		CMOS		TTL/CMOS		
Supply Voltage Variation		3.0	3.6	4.5	5.5	V
Frequency Range		0.25	180	0.25	180	MHz
Frequency Stability		±25, ±50, ±100				PPM
Operating Temperature		0~70,-20~70, -40~85				°C
Supply Current	0.25 MHz≦FO<20MHz	-	10	-	15	mA
	20 MHz≦FO<50MHz	-	30	-	40	mA
	50 MHz≦FO<180MHz	-	40	-	50	mA
Duty Cycle		45	55	45	55	%
Transition Time : Rise/Fall Time	0.25 MHz≦FO<20MHz	-	10	-	8	nSec
	20 MHz≦FO<50MHz	-	6	-	5	
	50 MHz≦FO<180MHz	-	5	-	4	
Input Voltage	Vol (Max)	-	0.33	-	0.4/0.5	V
	2.4V/4.5V	2.4/2.5	-	3.0	-	
Driving Ability	CMOS load max	15		15/50		pF
	TTL load max			10TTL		
Start Time		5 ms max(15pF)/ 10 ms (50pF)				mSec
E/D Function	#1 OPEN	Pin#5 Open		Pin#5 Open		
	#1 >=2.2V	Pin#5 Open		Pin#5 Open		
	#1<=0.8V	Pin#5 High		Pin#5 High		
Aging(@25°C 1st year)		±3	±5	±3	±5	ppm
Storage Temp. Range		-55	125	-55	125	°C

Dimension(mm)

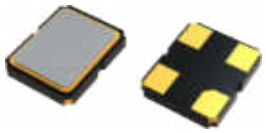




Pin	Function
1	Tri-State/NC
4	GND
5	Output
8	Vdd

FASTXO 2.0 x 1.6 mm SMD Crystal Oscillator

Feature



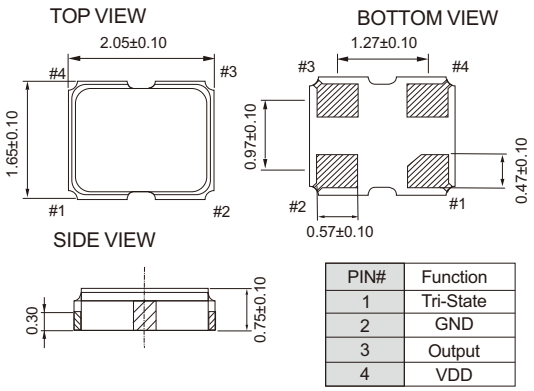
- Typical 2.05 x 1.65 x 0.75 mm ceramic SMD package
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- FASTXO series, Fast delivery at any frequency
- Tri-State Enable/Disable
- Frequency Stability ±25ppm over -40 °C to 85 °C
- RoHS compliant/Pb-free

Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	200	1	200	1	125	MHz
Supply Current		-	30	-	28	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Out High(Logic"1")	2.97	-	2.25	-	1.62	-	V
	Out Low(Logic"0")		0.33	-	0.25		0.18	
Start Time		-	8	-	8	-	8	mSec
Transition Time :Rise/Fall Time		-	2	-	2	-	3	nSec
Tri-State	Output Enable	2.31	-	1.75	-	1.26	-	V
	Output Disable	-	0.99	-	0.75	-	0.54	
Stand by current(@PD mode)		-	400	-	400	-	400	uA
Stand by current(@OE mode)		-	20	-	20	-	20	mA
Output Loading Jitter(12KHz		15		15		15		
RMS Phase Jitter(12kHz to 20MHz)@3.3V		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

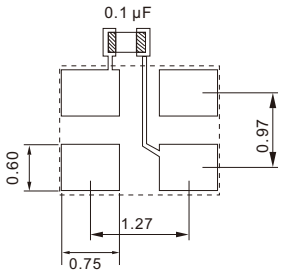
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

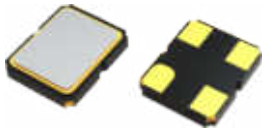
FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C) \ ppm	±15	±20	±25	±50
-20 ~ +70	o	o	o	o
-40 ~ +85	x	△	o	o
-40 ~ +105	x	x	△	o

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

FASTXO 2.5 × 2.0 mm SMD Crystal Oscillator

Feature



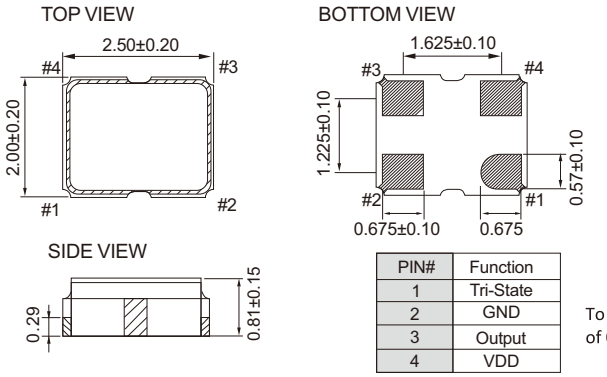
- Typical 2.5 x 2.0 x 0.81 mm ceramic SMD package.
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- FASTXO series, Fast delivery at any frequency
- Tri-State Enable/Disable
- Frequency Stability ±25ppm over -40 °C to 85 °C
- RoHS compliant/Pb-free

Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	200	1	200	1	125	MHz
Supply Current		-	30	-	28	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Out High(Logic"1")	2.97	-	2.25	-	1.62	-	V
	Out Low(Logic"0")		0.33	-	0.25		0.18	
Start Time		-	8	-	8	-	8	mSec
Transition Time :Rise/Fall Time		-	2	-	2	-	3	nSec
Tri-State	Output Enable	2.31	-	1.75	-	1.26	-	V
	Output Disable	-	0.99	-	0.75	-	0.54	
Stand by current(@PD mode)		-	400	-	400	-	400	uA
Stand by current(@OE mode)		-	20	-	20	-	20	mA
Output Loading		15		15		15		
RMS Phase Jitter(12kHz to 20MHz)@3.3V		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

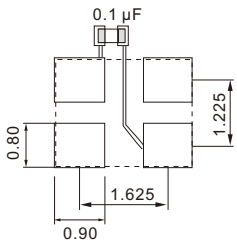
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

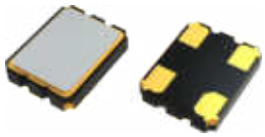
ppm / Temp. (°C)	±15	±20	±25	±50
-20 ~ +70	△	○	○	○
-40 ~ +85	x	△	○	○
-40 ~ +105	x	x	△	○

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

FASTXO 3.2 × 2.5 mm SMD Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.95 mm ceramic SMD package.
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- FASTXO series, Fast delivery at any frequency
- Tri-State Enable/Disable
- Frequency Stability ±25ppm over -40 °C to 85 °C
- RoHS compliant/Pb-free

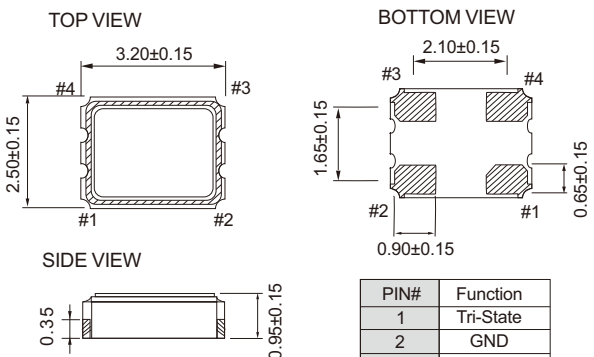


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	200	1	200	1	125	MHz
Supply Current		-	30	-	28	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Out High(Logic"1")	2.97	-	2.25	-	1.62	-	V
	Out Low(Logic"0")		0.33	-	0.25		0.18	
Start Time		-	8	-	8	-	8	mSec
Transition Time :Rise/Fall Time		-	2	-	2	-	3	nSec
Tri-State	Output Enable	2.31	-	1.75	-	1.26	-	V
	Output Disable	-	0.99	-	0.75	-	0.54	
Stand by current(@PD mode)		-	400	-	400	-	400	uA
Stand by current(@OE mode)		-	20	-	20	-	20	mA
Output Loading		15		15		15		
RMS Phase Jitter(12kHz to 20MHz)@3.3V		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

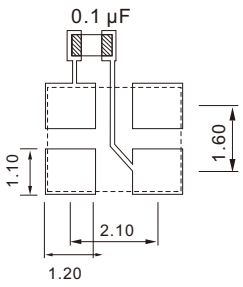
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±15	±20	±25	±50
-20 ~ +70	o	o	o	o
-40 ~ +85	x	△	o	o
-40 ~ +105	x	x	△	o

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

FASTXO 5.0 × 3.2 mm SMD Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x1.2 mm ceramic SMD package.
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- FASTXO series, Fast delivery at any frequency
- Tri-State Enable/Disable
- Frequency Stability ±25ppm over -40 °C to 85 °C
- RoHS compliant/Pb-free

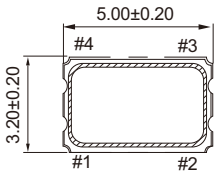
Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	200	1	200	1	125	MHz
Supply Current		-	30	-	28	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Out High(Logic"1")	2.97	-	2.25	-	1.62	-	V
	Out Low(Logic"0")		0.33	-	0.25		0.18	
Start Time		-	8	-	8	-	8	mSec
Transition Time :Rise/Fall Time		-	2	-	2	-	3	nSec
Tri-State	Output Enable	2.31	-	1.75	-	1.26	-	V
	Output Disable	-	0.99	-	0.75	-	0.54	
Stand by current(@PD mode)		-	400	-	400	-	400	uA
Stand by current(@OE mode)		-	20	-	20	-	20	mA
Output Loading		15		15		15		
RMS Phase Jitter(12kHz to 20MHz)@3.3V		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	°C

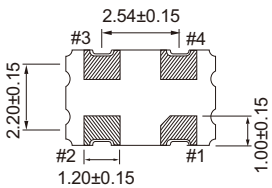
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)

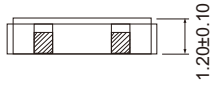
TOP VIEW



BOTTOM VIEW

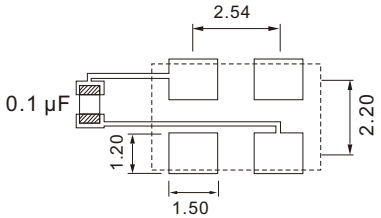


SIDE VIEW



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

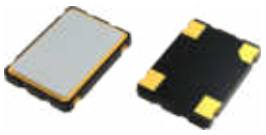
ppm / Temp.(°C)	±15	±20	±25	±50
-20 ~ +70	o	o	o	o
-40 ~ +85	x	△	o	o
-40 ~ +105	x	x	△	o

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

FASTXO 7.0 × 5.0 mm SMD Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x1.3 mm ceramic SMD package
- Operation supply voltage: 1.8V, 2.5V and 3.3V
- FASTXO series, Fast delivery at any frequency
- Tri-State Enable/Disable
- Frequency Stability ±25ppm over -40 °C to 85 °C
- RoHS compliant/Pb-free

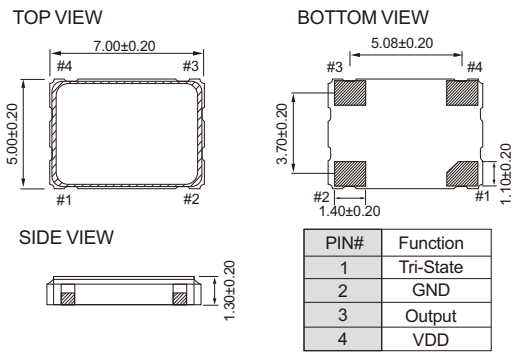


Electrical Specifications

Parameter		3.3V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		1	200	1	200	1	125	MHz
Supply Current		-	30	-	28	-	20	mA
Duty Cycle		45	55	45	55	45	55	%
Output Level (CMOS)	Out High(Logic"1")	2.97	-	2.25	-	1.62	-	V
	Out Low(Logic"0")		0.33	-	0.25		0.18	
Start Time		-	8	-	8	-	8	mSec
Transition Time :Rise/Fall Time		-	2	-	2	-	3	nSec
Tri-State	Output Enable	2.31	-	1.75	-	1.26	-	V
	Output Disable	-	0.99	-	0.75	-	0.54	
Stand by current(@PD mode)		-	400	-	400	-	400	uA
Stand by current(@OE mode)		-	20	-	20	-	20	mA
Output Loading		15		15		15		
RMS Phase Jitter(12kHz to 20MHz)@3.3V		-	1	-	1	-	1	pSec
Aging(@25 1st year)		-	±3	-	±3	-	±3	ppm
Storage Temp.Range		-55	125	-55	125	-55	125	°C

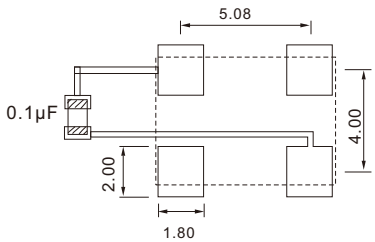
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

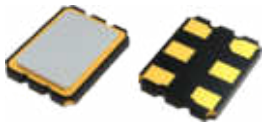
ppm / Temp. (°C)	±15	±20	±25	±50
-20 ~ +70	o	o	o	o
-40 ~ +85	x	Δ	o	o
-40 ~ +105	x	x	Δ	o

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

FASTXO 3.2 × 2.5 mm SMD CMOS Output Crystal Oscillator

Feature

- Low power supply voltage: 3.3, 2.5 supply options
- Singled-end output : CMOS
- Frequency support from 10MHz to 250MHz
- Low noise typical: 0.8 ps at 12kHz to 20MHz frequency offsets
- Temperature range: -40 to 85 °C operation
- Fast delivery

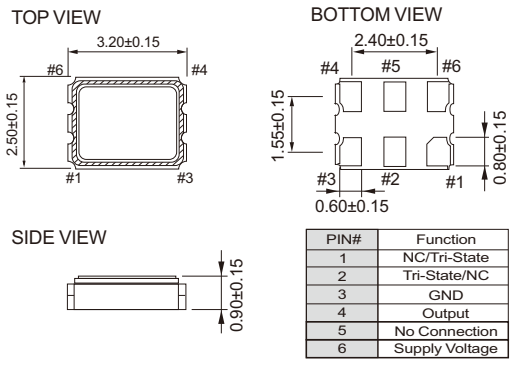


Electrical Specifications

Parameter		3.3V		2.5V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.97	3.63	2.375	2.625	V
Frequency Range		10	250	10	250	MHz
Supply Current		-	50	-	45	mA
Output level	Output High	2.97	-	2.25	-	V
	Output Low	-	0.33	-	0.25	
Transition Time : Rise/Fall Time		-	1.0	-	1.0	nSec
Start Time		-	10	-	10	mSec
Tri-State(Input to Pin 1/2)	Enable	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	
Stand by current		-	18	-	18	mA
Output Loading (10MHz to 200MHz)		-	15	-	15	pF
Output Loading (200MHz to 250MHz)		-	5	-	5	pF
RMS Phase Jitter(integrated 12kHz ~ 20MHz)		0.8	1.5	0.8	1.5	pSec
Phase Noise @125MHz	1kHz	-107		-107		dBc/Hz
	10kHz	-111		-111		
	100kHz	-114		-114		
	1MHz	-125		-125		
	20MHz	-147		-147		
Aging(@25 1st year)		-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C

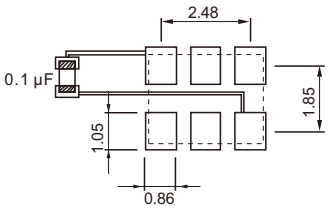
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	No Connection
6	Supply Voltage

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

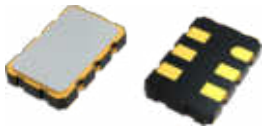
ppm / Temp. (°C)	±25	±50
-10 ~ +60	o	o
-20 ~ +70	o	o
-40 ~ +85	Δ	o

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

FASTXO 5.0 × 3.2 mm SMD CMOS Crystal Oscillator

Feature

- Typical 5.0 x 3.2 ceramic SMD package
- Very low phase jitter : < 1 ps (0.6ps, typ.) RMS
- Any frequency between 10 MHz and 250 MHz
- Tri-state enable/disable
- Fast delivery

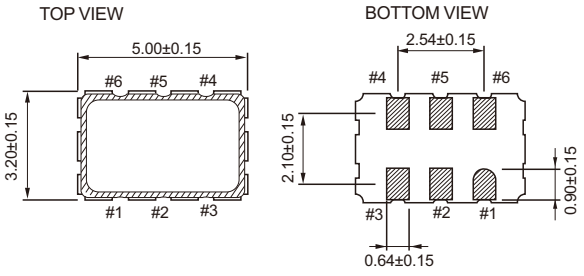


Electrical Specifications

Parameter		CMOS				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	V
Frequency Range		10	250	10	250	MHz
Standard Frequency		106.25,125,133.33,150,155.52,156.25, 212.5				MHz
Supply Current 10 MHz≦FO<250MHz		-	30	-	30	mA
Output level	Output High	2.97	-	2.25	-	V
	Output Low	-	0.33	-	0.25	
Transition Time : Rise/Fall Time		-	1.5	-	1.5	nSec
Start Time		-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	
RMS Phase Jitter(integrated12kHz ~ 20MHz)			1.0	-	1.0	pSec
Phase Noise @125MHz	100Hz	-75		-75		dBc/Hz
	1kHz	-105		-105		
	10kHz	-120		-120		
Aging(@25 1st year)		-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C

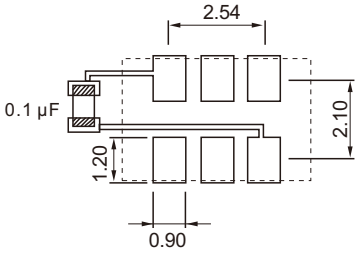
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	Tri-State
2	NC
3	GND
4	Output
5	NC
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

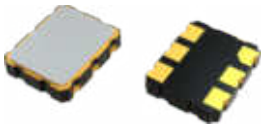
FREQ. STABILITY vs. TEMP. RANGE

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

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

FASTXO 7.0 × 5.0 mm SMD CMOS Crystal Oscillator

Fearture



- Typical 7.0 x 5.0 SMD package
- Very low phase jitter : < 1 ps (0.6ps, typ.) RMS
- Any frequency between 10 MHz and 250 MHz
- Tri-state enable/disable
- Fast delivery

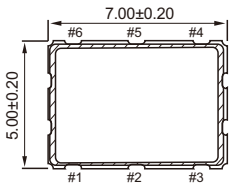
Electrical Specifications

Parameter		CMOS				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	V
Frequency Range		10	250	10	250	MHz
Standard Frequency		106.25,125,133.33,150,155.52,156.25,187.5,212.5				MHz
Supply Current 10 MHz≦FO<250MHz		-	30	-	30	mA
Output level	Output High	2.97	-	2.25	-	V
	Output Low	-	0.33	-	0.25	
Transition Time : Rise/Fall Time		-	1.5	-	1.5	nSec
Start Time		-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	
RMS Phase Jitter(integrated 12kHz~ 20MHz)			1	-	1	pSec
Phase Noise @125MHz	100Hz	-75		-75		dBc/Hz
	1kHz	-105		-105		
	10kHz	-120		-120		
Aging(@25 1st year)		-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C

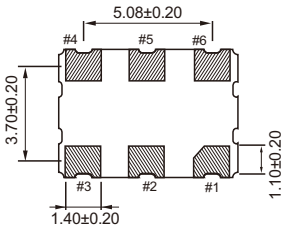
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)

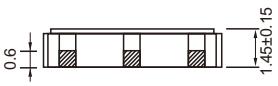
TOP VIEW



BOTTOM VIEW

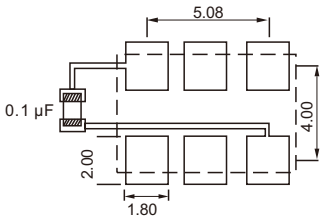


SIDE VIEW



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

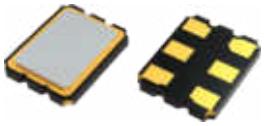
ppm / Temp. (°C)	±25	±50
-10 ~ +60	○	○
-20 ~ +70	○	○
-40 ~ +85	△	○

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

3.2 × 2.5mm SMD Differential Output Oscillator

Feature

- Low power supply voltage: 3.3, 2.5 supply options
- Differential output : LVPECL, LVDS
- Frequency support from 10MHz to 1.5GHz
- Low noise typical: 0.8 ps at 12kHz to 20MHz frequency offsets
- Temperature range: -40 to 85 °C operation
- Fast delivery

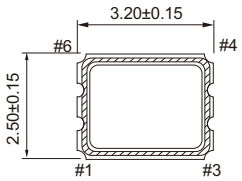


Electrical Specifications

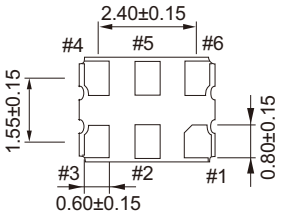
Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	V
Frequency Range		10	1500	10	1500	10	1500	10	1500	MHz
Supply Current		-	50	-	50	-	50	-	50	mA
Output level	Output High	2.275	2.7	1.475	1.9	-	1.6	-	1.6	V
	Output Low	1.45	1.68	0.65	0.88	0.9	-	0.9	-	
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter(integrated12kHz~ 20MHz)			1.5	-	1.5	-	1.5	-	1.5	pSec
Phase Noise @250MHz VDD=3.3v	1kHz	-107		-107		-107		-107		dBc/Hz
	10kHz	-111		-111		-111		-111		
	100kHz	-114		-114		-114		-114		
	1MHz	-125		-125		-125		-125		
	20MHz	-147		-147		-147		-147		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

Dimension(mm)

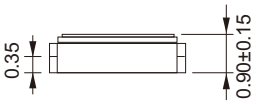
TOP VIEW



BOTTOM VIEW

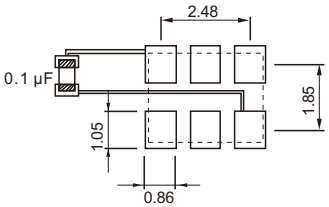


SIDE VIEW



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	No Connection
6	Supply Voltage

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	Δ	O

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

5.0 × 3.2mm SMD LVPECL /LVDS Crystal Oscillator

Feature

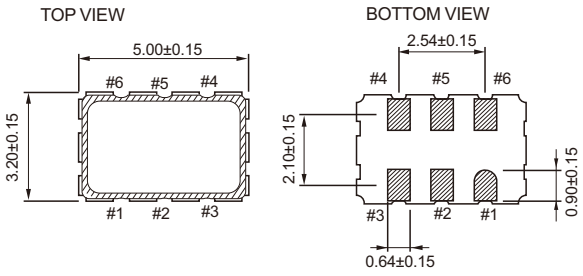
- Industry Standard 5.0 x 3.2 x 1.25 hermetically sealed package
- Very low phase jitter : < 1 ps (0.6ps, typ.) RMS
- Any frequency between 10 MHz and 1500 MHz
- Tri-state enable/disable
- Fast delivery

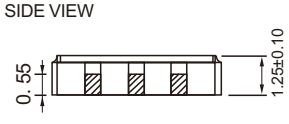
Electrical Specifications

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	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 10 MHz≦FO<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	-	
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter(integrated12kHz~ 20MHz)			1	-	1	-	1	-	1	pSec
Phase Noise @156.25MHz	100Hz	-85		-85		-85		-85		dBc/Hz
	1kHz	-105		-105		-105		-105		
	10kHz	-115		-115		-115		-115		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

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

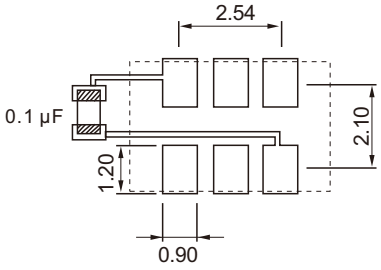
Dimension(mm)





PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

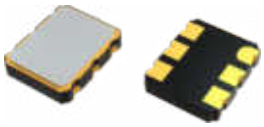
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	Δ	O

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

7.0 × 5.0 mm SMD LVPECL /LVDS Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.75 ceramic SMD package
- Very low phase jitter : < 1 ps (0.6ps, typ.) RMS
- Any frequency between 10 MHz and 1500 MHz
- Tri-state enable/disable
- Fast delivery



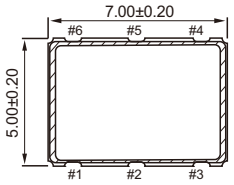
Electrical Specifications

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	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 10 MHz≦FO<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	-	
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter(integrated 12kHz~ 20MHz)			1	-	1	-	1	-	1	pSec
Phase Noise @156.25MHz	100Hz	-94		-94		-94		-94		dBc/Hz
	1kHz	-113		-113		-113		-112		
	10kHz	-122		-122		-122		-122		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

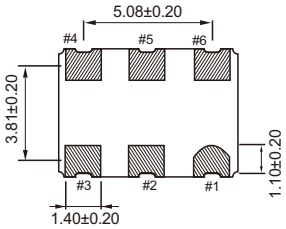
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)

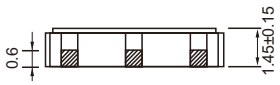
TOP VIEW



BOTTOM VIEW

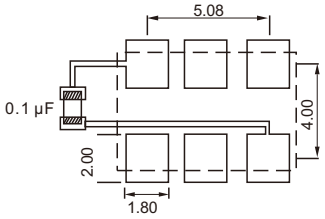


SIDE VIEW



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

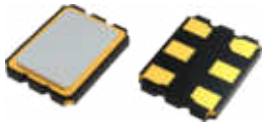
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	o	o
-20 ~ +70	o	o
-40 ~ +85	Δ	o

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

3.2 × 2.5 mm SMD LVPECL /LVDS Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.9mm SMD 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

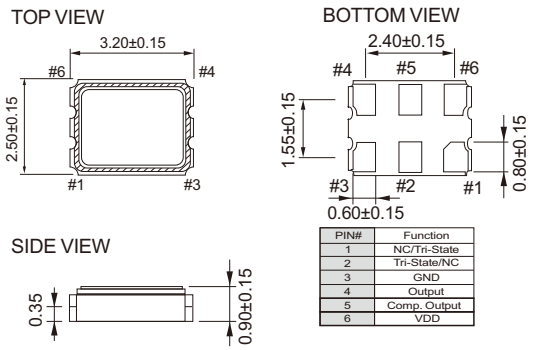


Electrical Specifications

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		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	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	10 MHz≦FO<160MHz	-	75	-	75	-	50	-	50	mA
	160 MHz≦FO<250MHz	-	100	-	100	-	50	-	50	
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		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter (integrated 12kHz ~ 20MHz)	FO<80MHz	-	1	-	1	-	1	-	1	pSec
	80 MHz≦FO<125MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	125 MHz≦FO<170MHz	-	0.3	-	0.3	-	0.3	-	0.3	
	170 MHz≦FO<200MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	200 MHz≦FO	-	0.3	-	0.3	-	0.3	-	0.3	
Phase Noise @156.25MHz	100Hz	-95		-90		-90		-90		dBc/Hz
	1kHz	-125		-125		-120		-120		
	10kHz	-140		-140		-140		-140		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

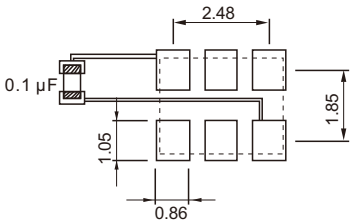
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

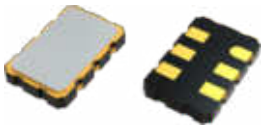
ppm / Temp. (°C)	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	Δ	O
-40 ~ +125	X	O

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

5.0 × 3.2 mm SMD LVPECL /LVDS Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.25mm ceramic SMD package.
- Very low jitter performance: typical 0.3 pS RMS from 12 k - 20 MHz
- Output frequency up to 320 MHz.
- Operating temperature up to 125°C
- Tri-state enable/disable

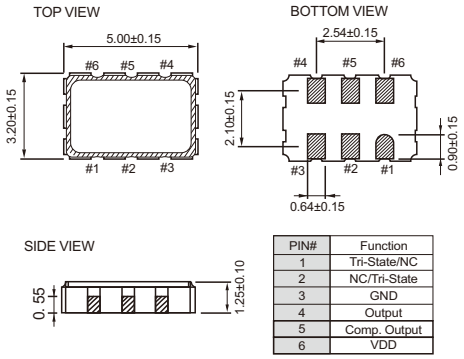


Electrical Specifications

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	V
Frequency Range		10	320	10	320	10	320	10	320	MHz
Standard Frequency		25,106.25,125, 156.25,161.1328,212.5								MHz
Supply Current	10 MHz≦FO<160MHz	-	75	-	75	-	50	-	50	mA
	160 MHz≦FO<250MHz	-	100	-	100	-	50	-	50	
	250 MHz≦FO<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		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter(integrated 12kHz ~ 20MHz)	FO<80MHz	-	1	-	1	-	1	-	1	pSec
	80 MHz≦FO<125MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	125 MHz≦FO<170MHz	-	0.3	-	0.3	-	0.3	-	0.3	
	170 MHz≦FO<200MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	200 MHz≦FO	-	0.3	-	0.3	-	0.3	-	0.3	
Phase Noise @156.25MHz	100Hz	-95		-90		-90		-90		dBc/Hz
	1kHz	-125		-125		-120		-120		
	10kHz	-140		-140		-140		-140		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

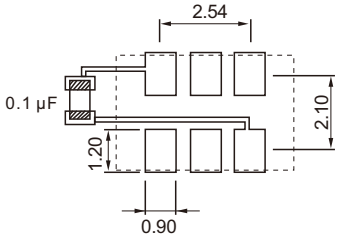
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 10% and 90% of VDD, with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Tri-State/NC
2	NC/Tri-State
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

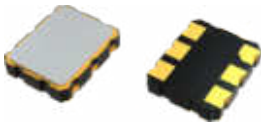
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	o	o
-20 ~ +70	o	o
-40 ~ +85	Δ	o
-40 ~ +125	x	O

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

7.0 × 5.0 mm SMD LVPECL /LVDS Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.45mm ceramic SMD package
- Very low jitter performance: typical 0.3 pS RMS from 12k - 20MHz
- Output frequency up to 320 MHz
- Operating temperature up to 125°C
- Tri-state enable/disable



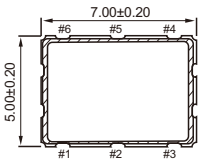
Electrical Specifications

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	3.135	3.465	2.375	2.625	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								MHz
Supply Current	10 MHz≦FO<160MHz	-	75	-	75	-	50	-	50	mA
	160 MHz≦FO<250MHz	-	100	-	100	-	50	-	50	
	250 MHz≦FO<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		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	-	0.99	-	0.75	
RMS Phase Jitter(integrated 12kHz~ 20MHz)	FO<80MHz	-	1	-	1	-	1	-	1	pSec
	80 MHz≦FO<125MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	125 MHz≦FO<170MHz	-	0.3	-	0.3	-	0.3	-	0.3	
	170 MHz≦FO<200MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	200 MHz≦FO	-	0.3	-	0.3	-	0.3	-	0.3	
Phase Noise @156.25MHz	100Hz	-100		-100		-100		-100		dBc/Hz
	1kHz	-130		-130		-130		-130		
	10kHz	-145		-145		-145		-145		
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

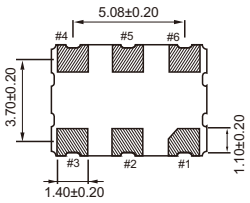
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)

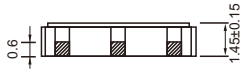
TOP VIEW



BOTTOM VIEW

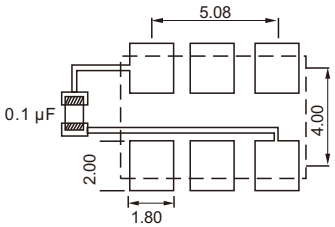


SIDE VIEW



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp_Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

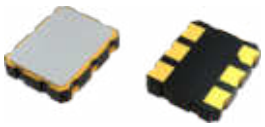
ppm / Temp. (°C)	±25	±50
-10 ~ +60	o	o
-20 ~ +70	o	o
-40 ~ +85	Δ	o
-40 ~ +125	x	O

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

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

Feature

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



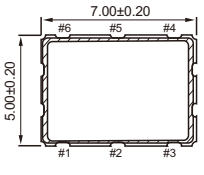
Electrical Specifications

Parameter		LVPECL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	V
Frequency Range		70	170	100	160	MHz
Standard Frequency		100,125,155.52,156.25				MHz
Supply Current		-	75	-	75	mA
Transition Time :Rise/Fall Time		-	1	-	1	nSec
Output Level	Output High	2.275		1.475		V
	Output Low		1.68		1.095	
Start Time		-	10	-	10	mSec
Tri-State (Input to Pin 1 or Pin 2)	Enable	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	
RMS Phase Jitter (Integrated12kHzto 20MHz)		-	0.1	-	0.1	pSec
Phase Noise @156.25MHz	100Hz offset	-100		-100		dBc/Hz
	1kHz offset	-130		-130		dBc/Hz
	10kHzoffset	-150		-150		dBc/Hz
Aging(@25°C 1st year)		-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C

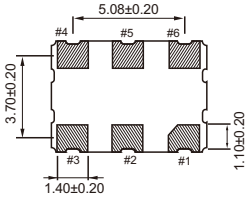
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 20% and 80% of VDD,

Dimension(mm)

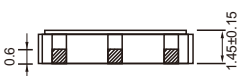
TOP VIEW



BOTTOM VIEW

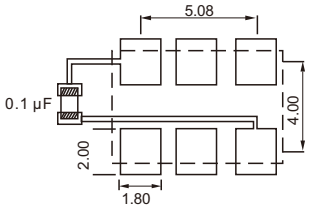


SIDE VIEW



PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

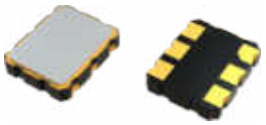
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	Δ	○
-20 ~ +70	Δ	○
-40 ~ +85	x	○

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

7.0 × 5.0 mm SMD HCSL Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.45 mm hermetically sealed ceramic package
- Very low jitter performance: Max. 0.5 pS RMS from 12kHz-20MHz
- Tight symmetry (45 to 55%) available
- Tri-state enable/disable
- High-speed current steering logic (HCSL) output



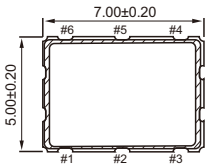
Electrical Specifications

Parameter		HCSL				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		3.135	3.465	2.375	2.625	V
Frequency Range		25	175	25	175	MHz
Standard Frequency		100				MHz
Supply Current		-	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
Start Time		-	10	-	10	mSec
Tri-State (Input to Pin 1/2)	Enable	2.31	-	1.75	-	V
	Disable	-	0.99	-	0.75	
RMS Phase Jitter(integrated 12kHz~ 20MHz)		-	0.5	-	0.5	pSec
Aging(@25 1st year)		-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	°C

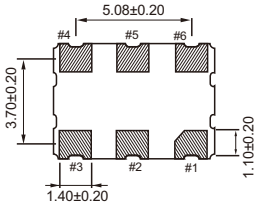
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)

TOP VIEW



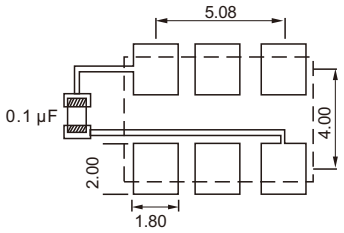
BOTTOM VIEW



SIDE VIEW

PIN#	Function
1	NC/Tri-State
2	Tri-State/NC
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

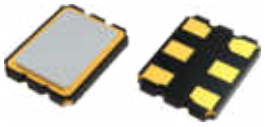
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	o	o
-20 ~ +70	o	o
-40 ~ +85	Δ	o
-40 ~ +125	x	o

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

3.2 x 2.5 mm SMD CMOS Output Voltage Controlled Crystal Oscillator

Feature

- Low power supply voltage:3.3, 2.5 supply options.
- Frequency support from 10MHz to 250MHz.
- Low phase jitter typical: 0.8ps RMS from 12kHz TO 20MHz.
- Wide frequency control range. Tri-state enable/disable function
- Temperature range: -40 to 85°C operation
- Pb-free/ RoHS compliant

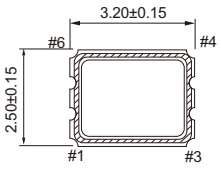


Electrical Specifications

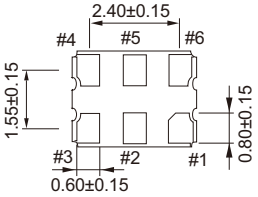
Parameter		CMOS				Unit
		3.3V		2.5V		
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)		VDD-10%	VDD+10%	VDD-5%	VDD+5%	V
Frequency Range		10	250	10	250	MHz
Supply Current		-	50	-	45	mA
Output Level	Output High	2.97	-	2.25	-	V
	Output Low	-	0.33	-	0.25	
Transition Time (10% ~ 90%) Rise/Fall Time +		-	1.0	-	1.0	nSec
Duty Cycle		45	55	45	55	%
Start Time		-	10	-	10	mSec
Tri-State (input to Pin 2)						
Enable		70%VDD	-	70%VDD	-	V
Disable		-	30%VDD	-	30%VDD	
Stand by Current		-	18	-	18	mA
Output Loading (10MHz to 200MHz)		-	15	-	15	pf
Output Loading (200MHz to 250MHz)		-	5	-	5	pf
Phase Noise		Typ.	Max.	Typ.	Max.	
At VDD=3.3V,fout=250MHz	1kHz offset	-107	-	-107	-	dBc/Hz
	10kHz offset	-111	-	-111	-	
	100kHz offset	-114	-	-114	-	
	1MHz offset	-125	-	-125	-	
	20MHz offset	-147	-	-147	-	
RMS Phase Jitter (12 kHz~20 MHz)		0.8	1.5	0.8	1.5	pSec
Control Voltage Center		1.65		1.25		V
Control Voltage Range		0.3	3	0.25	2.25	V
Frequency Pulling Range		±50	±150	±50	±150	ppm

Dimension(mm)

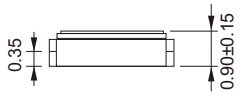
TOP VIEW



BOTTOM VIEW

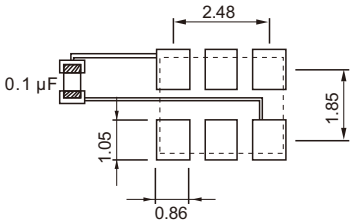


SIDE VIEW



PIN#	Function
1	VC
2	Tri-State
3	GND
4	Output
5	No Connection
6	Supply Voltage

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

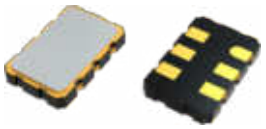
○: Available△:Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

5.0 x 3.2 mm SMD Voltage Controlled Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.25 mm 6 pads ceramic SMD package
- Tight symmetry (45 to 55%) available
- Output frequency up to 250 MHz
- Tri-state enable/disable
- Pb-free/ RoHS compliant

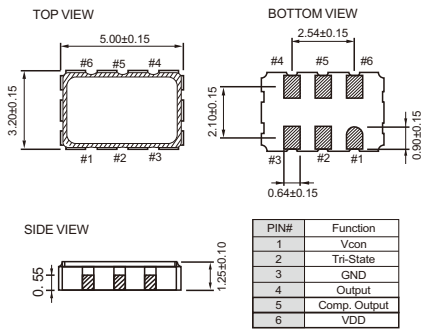


Electrical Specifications

Parameter		2.5V / 3.3V		Unit
		Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	V
Frequency Range		10	250	MHz
Absolute Pulling Range (APR)		±50	-	ppm
Control Voltage Range		0.3	3.0	V
Supply Current	10 MHz≦ Fo ＜160 MHz	-	40	mA
	160 MHz≦ Fo ≦250 MHz	-	50	
Output Level (CMOS)	Output High (Logic"1")	2.97		V
	Output Low (Logic"0")		0.33	
Transition Time (10% ~ 90%) Rise/Fall Time +		-	2	nSec
Duty Cycle		45	55	%
Start Time		-	2	mSec
Tri-State (input to Pin 2)	Enable	2.31	-	V
	Disable	-	0.99	
Period Jitter (Pk-Pk)		-	150	pSec
RMS Phase Jitter	(Integrated 12kHz~20MHz)	-	1	pSec
Linearity		-	10	%
Modulation Bandwidth (BW)		10	-	kHz
Input Impedance		1000	-	kΩ
Phase Noise@155.52MHz	100 Hz	-75		dBc/Hz
	1 kHz	-105		
	10kHz	-125		
Aging (@ 25℃ 1st year)		-	±3	ppm
Storage Temp. Range		-55	125	℃

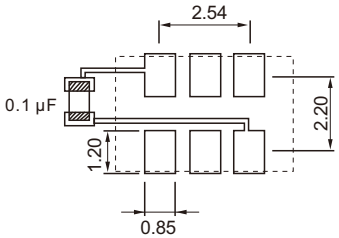
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of V DD , with an output load of 15pF.

Dimension(mm)



PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	Comp. Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

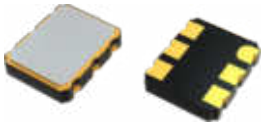
ppm / Temp. (℃)	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	Δ	O

O: Available Δ:Conditional X: Not available
Inclusive of calibration @ 25 ℃, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

7.0 x 5.0 mm SMD Voltage Controlled Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.75 mm 6 pads ceramic SMD package.
- Tight symmetry (45 to 55%) available.
- Output frequency up to 250 MHz.
- Tri-state enable/disable
- Pb-free/ RoHS compliant



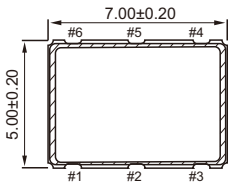
Electrical Specificaations

Parameter		2.5V / 3.3V		Unit
		Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	V
Frequency Range		10	250	MHz
Absolute Pulling Range (APR)		±50	-	ppm
Control Voltage Range		0.3	3.0	V
Supply Current	10 MHz≦ Fo ＜160 MHz	-	40	mA
	160 MHz≦ Fo ≦250 MHz	-	50	
Output Level (CMOS)	Output High (Logic"1")	2.97		V
	Output Low (Logic"0")		0.33	
Transition Time (10% ~ 90%) Rise/Fall Time +		-	2	nSec
Start Time		-	2	mSec
Tri-State (input to Pin 2)	Enable	2.31	-	V
	Disable	-	0.99	
Period Jitter (Pk-Pk)		-	150	pSec
RMS Phase Jitter	(Integrated 12kHz~20MHz) (At Integer Mode)	-	1	pSec
Linearity		-	10	%
Modulation Bandwidth (BW)		10	-	kHz
Input Impedance		1000	-	kΩ
Phase Noise@155.52MHz	100 Hz	-75		dBc/Hz
	1 kHz	-105		
	10kHz	-125		
Aging (@ 25℃ 1st year)		-	±3	ppm
Storage Temp. Range		-55	125	℃

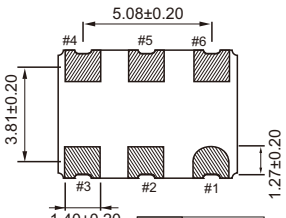
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.
+ Transition times are measured between 10% and 90% of V DD , with an output load of 15pF.

Dimension(mm)

【TOP VIEW】

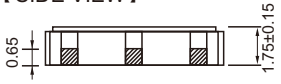


【BOTTOM VIEW】

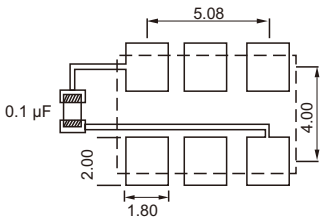


PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	NC
6	VDD

【SIDE VIEW】



Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

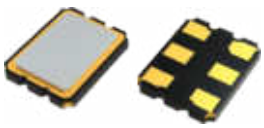
o: Available △:Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

High Frequency up to 1.5GHz 3.2 x 2.5 mm SMD DifferenntialOutputoltage Controlled Crystal Oscillator

Feature

- Low power supply voltage: 3.3V, 2.5V supply options
- Differenntial output :LVPECL, LVDS
- Frequency support from 10MHz to 1.5GHz
- Low phase jiter typical: 0.8 ps RMS from 12kHz to 20MHz
- Wide frequency control range
- Pb-free/RoHS compliant

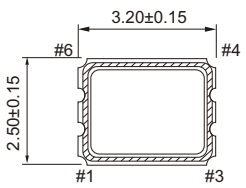


Electrical Specificaations

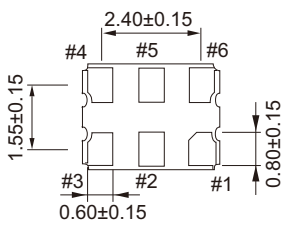
Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		VDD-10%	VDD+10%	VDD-5%	VDD+5%	VDD-10%	VDD+10%	VDD-5%	VDD+5%	V
Frequency Range		10	1500	10	1500	10	1500	10	1500	MHz
Supply Current		-	50	-	45	-	45	-	35	mA
Duty Cycle		45	55	45	55	45	55	45	55	%
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Output Level	Out High(Logic"1")	2.27	2.7	1.47	1.9		1.6		1.6	V
	Out Low(Logic"0")	1.45	1.7	0.65	0.9	0.9		0.9		
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 2)	Enable(High Voltage or floating)	0.7V_{DD}	-	0.7V_{DD}	-	0.7V_{DD}	-	0.7V_{DD}	-	V
	Disable(Low Voltage or GND)	-	0.3 V_{DD}	-	0.3 V_{DD}	-	0.3 V_{DD}	-	0.3 V_{DD}	
Standby by Current		-	18	-	18	-	18	-	18	mA
Output Loading		50Ω into VDD-2V				100Ω				
RMS Phase Jitter (integrated12kHz to 20MHz)		0.8	1.5	0.8	1.5	0.8	1.5	0.8	1.5	pSec
Control Voltage Function on Pin1										
Control Voltage Center		1.65		1.25		1.65		1.25		V
Control Voltage Range		0.3	3	0.3	3	0.3	3	0.3	3	V
Absolute Pulling Range (APR)		±50	±150	±50	±150	±50	±150	±50	±150	ppm
Linearity		5	10	5	10	5	10	5	10	%
Modulation Bandwidth		10	-	10	-	10	-	10	-	kHz
VC Input Impedance		1	-	1	-	1	-	1	-	MΩ

Dimension(mm)

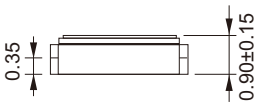
【TOP VIEW】



【BOTTOM VIEW】

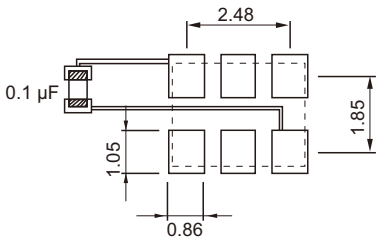


【SIDE VIEW】



PIN#	Function
1	VC
2	Tri-State
3	GND
4	Output
5	Comp. Output
6	Supply Voltage

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

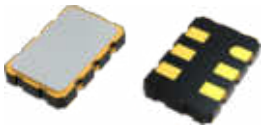
○: Available △:Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

5.0 x 3.2 mm SMD Differenntial Output Voltage Controlled Crystal Oscillator

Feature

- Differenntial output:VPECL, LVDS
- Frequency support from 10MHz to 1.5GHz
- Low phase jiter typical:<1ps RMS from 12kHz to 20MHz
- Wide frequency control range
- Pb-free/RoHS compliant

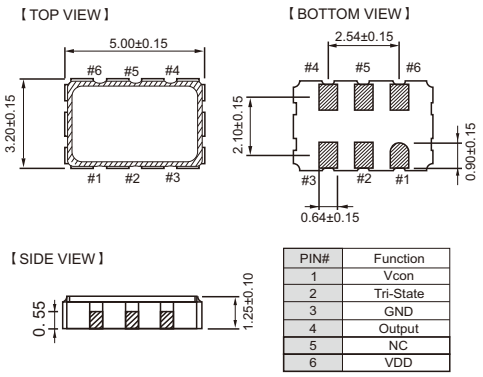


Electrical Specificaations

Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		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
Supply Current	10MHz≦F0<160MHz	-	75	-	75	-	50	-	50	mA
	160MHz≦FO<1500MHz	-	100		100		75		75	
Duty Cycle		45	55	45	55	45	55	45	55	%
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Output Level	Out High(Logic"1")	2.27		2.27			1.6		1.6	V
	Out Low(Logic"0")		1.7		1.7	0.9		0.9		
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 2)	Enable(High Voltage or floating)	$0.7V_{DD}$	-	$0.7V_{DD}$	-	$0.7V_{DD}$	-	$0.7V_{DD}$	-	V
	Disable(Low Voltage or GND)	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	
RMS Phase Jitter (integrated12kHz to 20MHz)			1		1		1		1	pSec
Control Voltage Function on Pin1										
Control Voltage Center		1.65		1.25		1.65		1.25		V
Control Voltage Range		0.3	3	0.3	3	0.3	3	0.3	3	V
Absolute Pulling Range (APR)		±50		±50		±50		±50		ppm
Linearity			10		10		10		10	%
Modulation Bandwidth		10	-	10	-	10	-	10	-	kHz
VC Input Impedance		1	-	1	-	1	-	1	-	MΩ
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

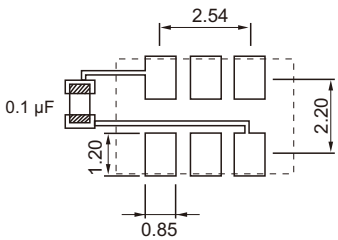
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	NC
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

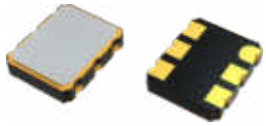
ppm / Temp. (°C)	±25	±50
-10 ~ +60	O	O
-20 ~ +70	△	O
-40 ~ +85	△	O

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

7.0 x 5.0 mm SMD Differenntial Output Voltage Controlled Crystal Oscillator

Feature

- Differenntial output :VPECL, LVDS
- Frequency support from 10MHz to 1.5GHz
- Low phase jiter typical:<1ps RMS from 12kHz to 20MHz
- Wide frequency control range
- Pb-free/RoHS compliant

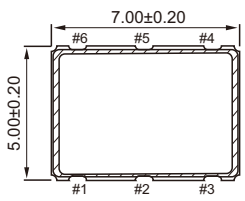


Electrical Specificaations

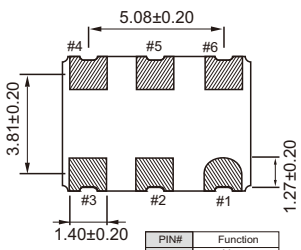
Parameter		LVPECL				LVDS				Unit
		3.3V		2.5V		3.3V		2.5V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		VDD-10%	VDD+10%	VDD-5%	VDD+5%	VDD-10%	VDD+10%	VDD-5%	VDD+5%	V
Frequency Range		10	1500	10	1500	10	1500	10	1500	MHz
Supply Current	10MHz≦F0<160MHz	-	75	-	75	-	50	-	50	mA
	160MHz≦FO<1500MHz	-	100		100		75		75	
Duty Cycle		45	55	45	55	45	55	45	55	%
Transition Time : Rise/Fall Time		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Output Level	Out High(Logic"1")	2.27		2.27			1.6		1.6	V
	Out Low(Logic"0")		1.7		1.7	0.9		0.9		
Start Time		-	10	-	10	-	10	-	10	mSec
Tri-State (Input to Pin 2)	Enable(High Voltage or floating)	$0.7V_{DD}$	-	$0.7V_{DD}$	-	$0.7V_{DD}$	-	$0.7V_{DD}$	-	V
	Disable(Low Voltage or GND)	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	-	$0.3\ V_{DD}$	
RMS Phase Jitter (integrated12kHz to 20MHz)			1		1		1		1	pSec
Control Voltage Function on Pin1										
Control Voltage Center		1.65		1.25		1.65		1.25		V
Control Voltage Range		0.3	3	0.3	3	0.3	3	0.3	3	V
Absolute Pulling Range (APR)		±50		±50		±50		±50		ppm
Linearity			10		10		10		10	%
Modulation Bandwidth		10	-	10	-	10	-	10	-	kHz
VC Input Impedance		1	-	1	-	1	-	1	-	MΩ
Aging(@25 1st year)		-	±3	-	±3	-	±3	-	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	°C

Dimension(mm)

【TOP VIEW】

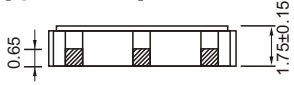


【BOTTOM VIEW】

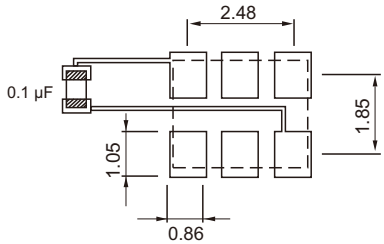


PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	Comp.Output
6	VDD

【SIDE VIEW】



Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

o: Available △:Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

5.0 x 3.2mm SMD LVPECL/LVDS Voltage Controlled Crystal Oscillator

Feature

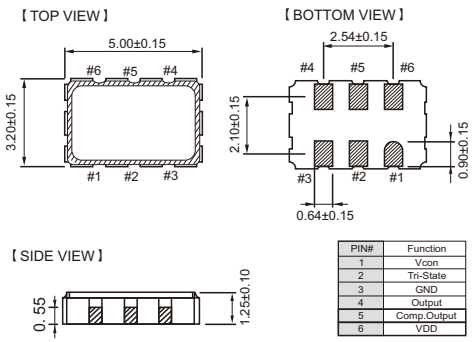
- Typical 5.0 x 3.2 x 1.25 mm 6 pads ceramic SMD package.
- Tight symmetry (45 to 55%) available.
- Tri-state enable/disable

Electrical Specificaations

Parameter		LVPECL 3.3V		LVDS 3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		30	250	30	250	MHz
Standard Frequency		122.88,153.6,155.52,156.25				MHz
Absolute Pulling Range (APR)		±50		±50	-	ppm
Control Voltage Range		0.3	3.0	0.3	3.0	V
Supply Current 30MHz Fo 250 MHz			100		75	mA
Output Level	Output High（logic"1"）	2.275	-		1.6	V
	Output Low (logic "0")		1.68	0.9		
Transition Time: Rise/Fall Time +			1.0		1.0	nSec
Start Time			3		3	mSec
Tri-State (input to Pin 2)	Enable (High voltage or floating)	2.31		2.31		V
	Disable (Low voltage or GND)		0.99		0.99	
Linearity			10		10	%
Modulation Bandwidth (BW)		20		20		kHz
Input Impedance		1		1		MΩ
RMS Phase Jitter	F0 ＜ 100 MHz		1.0		1.0	pSec
	100 MHz ≦ F0 ＜ 125 MHz		0.7		0.7	
	125 MHz≦ F0 ＜ 150 MHz		0.5		0.5	
	150 MHz≦ F0 ＜ 250 MHz		0.3		0.3	
Phase Noise @122.88MHz	100 Hz	-105		-105		dBc/HZ
	1kHz	-128		-128		
	10kHz	-145		-145		
Aging (@ 25°C 1st year)			±3		±3	ppm
Storage Temp. Range		-55	125	-55	125	℃

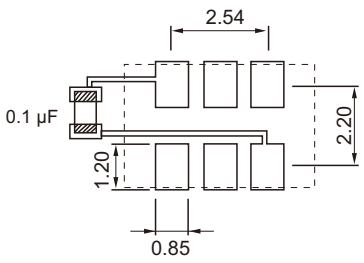
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	Comp.Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	X	O

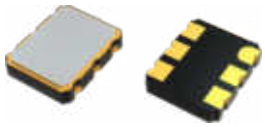
O: Available △:Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

7.0 x 5.0 mm SMD LVPECL/LVDS Voltage Controlled Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.75 mm 6 pads ceramic SMD package.
- Very low jiter performance: typical 0.3 pS RMS from 12kHz-20MHz.
- Wide frequency control range.
- Complementary Output.
- Tri-state enable/disable.

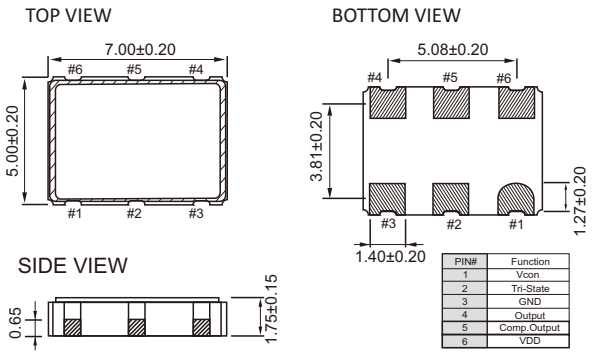


Electrical Specificaations

Parameter		LVPECL				LVDS				Unit
		3.3 V		2.5 V		3.3 V		2.5 V		
		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		1.5	200	65	200	1.5	200	65	200	MHz
Standard Frequency		77.76,106.25,122.88,125,155.52,156.25,200								MHz
Absolute Pulling Range (APR)		±50	–	±50	–	±50	–	±50	–	ppm
Control Voltage Range		0.3	3.0	0	2.5	0.3	3.0	0	2.5	V
Supply Current	1.5 MHz ≦ F0 < 65 MHz	–	75	–	75	–	45	–	45	mA
	65 MHz ≦ F0 < 200 MHz	–	100	–	100	–	80	–	80	
Output Level	Output High	2.275	–	1.475	–	–	1.6	–	1.6	V
	Output Low	–	1.68	–	1.095	0.9	–	0.9	–	
Transition Time: Rise/Fall Time +		–	1.0	–	1.0	–	1.0	–	1.0	nSec
Start Time			3		3		3		3	mSec
Tri-State (input to PIN 2)	Enable (High voltage or floaating)	2.31	–	1.75	–	2.31	–	1.75	–	V
	Disable (Low voltage or GND)	–	0.99	–	0.75	–	0.99	–	0.75	
Linearity		–	10	–	10	–	10	–	10	%
Modulation Bandwidth (BW)		15	–	15	–	15	–	15	–	kHz
Input Impedance		1	–	1	–	1	–	1	–	Mhz
RMS Phase Jiter (Integrated 12kHz~20MHz)	F0 < 100 MHz	–	1.0	–	1.0	–	1.0	–	1.0	pSec
	100 MHz ≦ F0 < 125 MHz	–	0.7	–	0.7	–	0.7	–	0.7	
	125 MHz ≦ F0 < 150 MHz	–	0.5	–	0.5	–	0.5	–	0.5	
	150 MHz ≦ F0	–	0.3	–	0.3	–	0.3	–	0.3	
Phase Noise @153.6 MHz	100 Hz	-85		-85		-85		-85		dBc/Hz
	1kHz	-115		-115		-115		-115		
	10kHz	-130		-130		-130		-130		
Aging (@ 25 C 1st year)		–	±3	–	±3	–	±3	–	±3	ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	℃

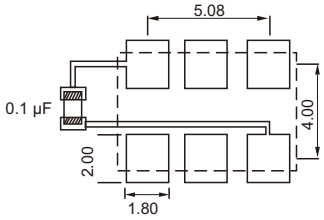
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	Comp.Output
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

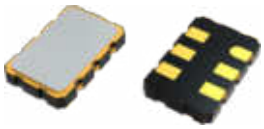
ppm / Temp. (℃)	±25	±50
-10 ~ +60	△	O
-20 ~ +70	△	O
-40 ~ +85	X	O

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

5.0 x 3.2mm SMD Voltage Controlled Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.25 mm 6 pads ceramic SMD package.
- Tight symmetry (45 to 55%) available.
- Operating emperature up to 105°C.
- Tri-state enable/disable.

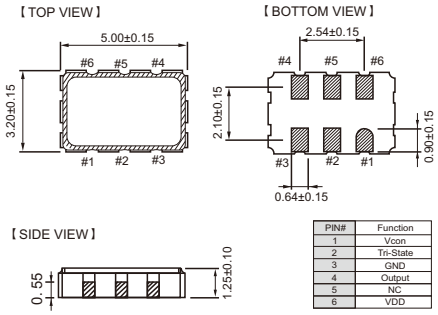


Electrical Specificaations

Parameter		3.3V		Unit
		Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	V
Frequency Range		1.5	170	MHz
Standard Frequency		19.44, 38.4		MHz
Absolute Pulling Range (APR)		±50		ppm
Control Voltage Range		0.3	3.0	V
Supply Current	1.5MHz≦ F0 ＜20 MHz		10	mA
	20MHz≦ F0 ＜50 MH		20	
	50MHz≦ F0 ≦170 MHz		30	
Output Level	Output High	2.97	-	V
	Output Low		0.33	
Transition Time: Rise/Fall Time +	1.5 MHz ≦F0＜ 20 MHz	-	5	nSec
	20 MHz≦ F0 ＜ 50 MHz	-	4	
	50 MHz≦ F0≦170 MHz	-	3	
Start Time		-	2	mSec
Tri-State (input to Pin 2)	Enable (High voltage or floating)	2.31	-	V
	Disable (Low voltage or GND)	-	0.99	
Linearity			10	%
Modulation Bandwidth (BW)		15	-	kHz
Input Impedance		10	-	MΩ
Period Jitter (Pk-Pk)		-	40	pSec
RMS Phase Jitter (Integrated 12 kHz ~ 20 MHz)		-	1	pSec
Phase Noise @38.4MHz	100 Hz	-100		dBc/HZ
	1kHz	-133		
	10kHz	-140		
Aging (@ 25°C 1st year)			±3	Ppm
Storage Temp. Range		-55	125	℃

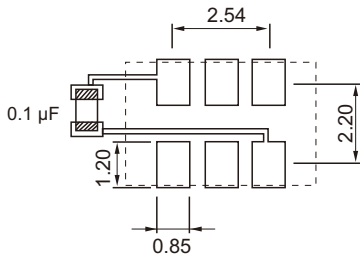
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)



PIN#	Function
1	Vcon
2	Tri-State
3	GND
4	Output
5	NC
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C) \ ppm	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	X	O
-40 ~ +105	X	O

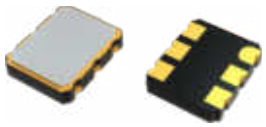
o: Available △ :Conditional X: Not available

Inclusive of calibration @ 25 °C, operating temperature range, input voltage variation, load variation, aging (1 st year), shock, and vibration

7.0 x 5.0 mm SMD Voltage Controlled Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.75 mm 6 pads ceramic SMD package.
- Tight symmetry (45 to 55%) available.
- Operating emperature up to 105°C.
- Tri-state enable/disable



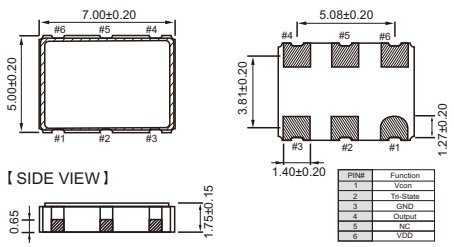
Electrical Specificaations

Parameter		3.3V		Unit
		Min.	Max.	
Supply Voltage Variation(VDD)		VDD-5%	VDD+5%	V
Frequency Range		1.5	170	MHz
Standard Frequency		10,20,25,27,32.768,35.328,38.88,61.44,122.88, 153.6		MHz
Absolute Pulling Range (APR)		±50		ppm
Control Voltage Range		0.3	3.0	V
Supply Current	1.5MHz≦ F0 ＜20 MHz		10	mA
	20MHz≦ F0 ＜50 MH		20	
	50MHz≦ F0 ≦80 MHz		30	
	80MHz≦ F0 ≦160 MHz		40	
	160MHz≦ F0 ≦170 MHz		50	
Output Level	Output High	2.97	-	V
	Output Low		0.33	
Transition Time: Rise/Fall Time +	1.5 MHz ≦F0＜ 20 MHz	-	5	nSec
	20 MHz≦ F0 ＜ 50 MHz	-	4	
	50 MHz≦ F0≦80 MHz		3	
	80 MHz≦ F0≦170 MHz	-	2	
Start Time		-	5	mSec
Tri-State (input to Pin 2)	Enable (High voltage or floating)	2.31	-	V
	Disable (Low voltage or GND)	-	0.99	
Linearity			10	%
Modulation Bandwidth (BW)		15	-	kHz
Input Impedance		10	-	MΩ
Period Jitter (Pk-Pk)		-	40	pSec
RMS Phase Jitter (Integrated 12kHz ~ 20 MHz)		-	1	pSec
Phase Noise @38.4MHz	100 Hz	-115		dBc/HZ
	1kHz	-135		
	10kHz	-150		
Aging (@ 25°C 1st year)			±3	Ppm
Storage Temp. Range		-55	125	℃

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.

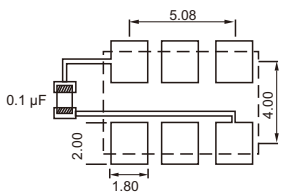
Dimension(mm)

【TOP VIEW】 【BOTTOM VIEW】



【SIDE VIEW】

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

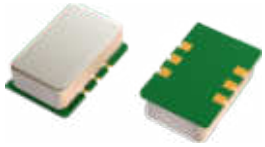
Temp. (°C) \ ppm	±25	±50
-10 ~ +60	O	O
-20 ~ +70	O	O
-40 ~ +85	X	O
-40 ~ +105	X	O

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

14.2 x9.3 mm SMD LVPECL/LVDS Voltage Controlled Crystal Oscillator

Feature

- Typical 14.2 x 9.3 x 5.4 mm 6 pads ceramic SMD package
- Tight symmetry (45 to 55%) avilable
- Wide frequency control range
- Complementary Output
- Low phase jiter (Max:0.5 pSec)



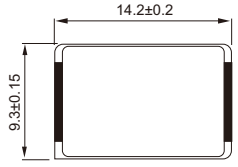
Electrical Specificaations

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		30	250	30	250	30	250	30	250	MHz
Standard Frequency		77.76,106.25,122.88,125,155.52,156.25,200								MHz
Absolute Pulling Range (APR)		±50	-	±50	-	±50	-	±50	-	ppm
Control Voltage Range		0.3	3.0	0	2.5	0.3	3.0	0	2.5	V
Supply Current	1.5 MHz ≦ F0 ＜ 65 MHz	-	75	-	75	-	45	-	45	mA
	65 MHz≦ F0＜250 MHz	-	100	-	100	-	80	-	80	
Output Level	Output High	2.275	-	1.475	-	-	1.6	-	1.6	V
	Output Low	-	1.68	-	1.095	0.9	-	0.9	-	
Transition Time: Rise/Fall Time +		-	1.0	-	1.0	-	1.0	-	1.0	nSec
Start Time			3		3		3		3	mSec
Tri-State (input to Pin 2)	Enable (High voltage or floating)	-	0.99	-	0.75	-	0.99	-	0.75	V
	Disable (Low voltage or GND)	2.31	-	1.75	-	2.31	-	1.75	-	
Linearity		-	10	-	10	-	10	-	10	%
Modulation Bandwidth (BW)		15	-	15	-	15	-	15	-	kHz
Input Impedance		10	-	10	-	10	-	10	-	MΩ
RMS Phase Jitter (Integrated 12kHz~20MHz)	F0 ＜ 100 MHz	-	1.0	-	1.0	-	1.0	-	1.0	pSec
	100 MHz ≦ F0 ＜ 125 MHz	-	0.7	-	0.7	-	0.7	-	0.7	
	125 MHz≦ F0 ＜ 150 MHz	-	0.5	-	0.5	-	0.5	-	0.5	
	150 MHz≦ F0	-	0.3	-	0.3	-	0.3	-	0.3	
Phase Noise @155.52MHz	100 Hz	-85		-85		-85		-85		dBc/Hz
	1kHz	-115		-115		-115		-115		
	10kHz	-130		-130		-130		-130		
Aging (@ 25°C 1st year)		-	±3	-	±3	-	±3	-	±3	Ppm
Storage Temp. Range		-55	125	-55	125	-55	125	-55	125	℃

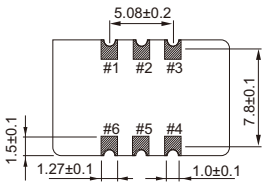
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
+ Transition times are measured between 20% and 80% of VDD.

Dimension(mm)

【TOP VIEW】



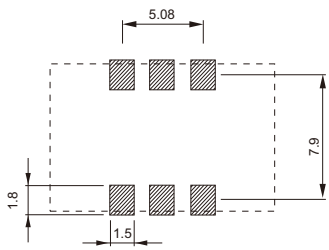
【BOTTOM VIEW】



【SIDE VIEW】

PIN#	Function
1	Vcon
2	Tri-State/NC
3	GND
4	Output
5	Comp. Outout
6	Supply Voltage

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (℃)	±25	±50
-10 ~ +60	△	O
-20 ~ +70	△	O
-40 ~ +85	X	O

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

Voltage Controlled Crystal Oscillator Full/Half Size(VCXO)

Feature

- Size 20.3x12.6mm and 12.6x12.6mm
- Hybrid IC Circuit Construction
- CMOS compatible output
- All metal, hermeti ally sealed welded package

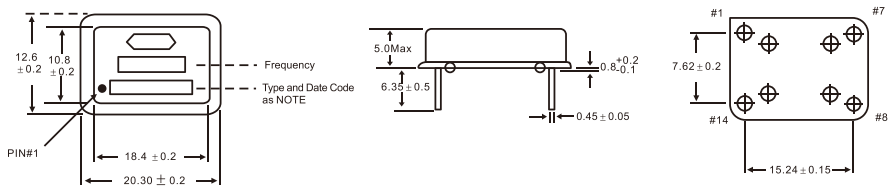
Electrical Specificaations

Item		Specificaations	
Frequency Range		1MHz~80MHz	
Frequency Stability		±25, ±50, ±100ppm	
Operating emperature		0-70°C, -20-70°C, -40-85°C	
Fan Out Type		HCMOS Square wave	
Load		15pF	15pF
Voltage Voh		4.5V Minimum	3.0V Minimum
Voltage Vol		0.4V Maximum	0.3V Maximum
Duty Cycle		40/60 Maximum	40/60 Maximum
Rise/Fall Time		5ns	5ns
Frequency Control		Positi e Transfer Characterisstic	
	Pullability	±50ppm, ±100ppm,±150ppm, ±200ppm Minimum	
	Control Voltage	0.5Vdc to 4.5Vdc	0.3Vdc to 3.0Vdc
	Center Frequency	2.5 Vdc	1.65 Vdc
	Monotonic Linearity	< ± 15%	< ± 15%
	Input impedance	50 Kohms Normal	50 Kohms Normal
Supply Voltage		+5Vdc +/-5% or 3.3V +/-5%	+3.3V
Supply Current		60mA Max	40mA Max
Package		All metal, hermeti ally sealed welt package	

*Please consult our sales representati e for other specificacations.

Dimension(mm)

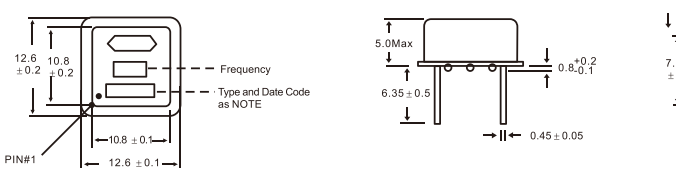
Full Size VCXO



FULL SIZE	
PIN	Connection
#1	Control Voltage
#7	GND
#8	Out put
#4	(+)5VDC

All units are in mm

Haif Size VCXO

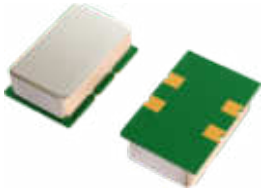


HALF SIZE	
PIN	Connection
#1	Control Voltage
#4	GND
#5	Out put
#8	(+)5VDC

All units are in mm

14 X9 mm High Frequency Very Low Noise/Low g-Sensitivity CXO

Feature



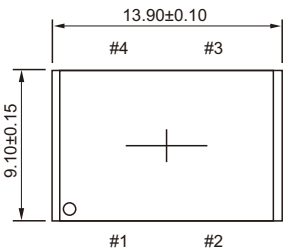
- Typical 14 x 9 x 3.6mm SMD package
- High frequency high performance VCXO
- High frequency and very low phase noise/Low g-Sensitivity
- Low Power Consumption

Electrical Specificaations

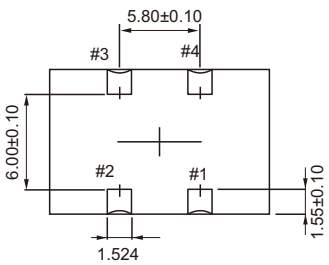
Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation(V_{DD})		4.75	5.25	3.135	3.465	V
Frequency Range		50	125	50	125	MHz
Frequency Stability (Overall)		-25	+25	-25	+25	ppm
Standard Frequency		100,122.88,125				MHz
Absolute Pulling Range (APR)		±30		±25	-	ppm
Control Voltage Range		0	5.0	0	3.3	V
Waveform		Sine Wave		CMOS		
Level (CMOS)	V_{OL}	For CMOS			0.5	V
	V_{OH}			4.5		
Duty Cycle				45	55	%
Transition Time: Rise/Fall Time +					3	nSec
Load				15		pF
Level(Sine Wave)		10		For Sine Wave		dbm
Load		50				ohms
Harmonics			-30			dBc
Current			30		30	mA
Phase Noise @122.88MHz	100 Hz	-117		-115		dBc/HZ
	1kHz	-144		-140		
	10kHz	-165		-160		
	100kHz	-172		-168		
	1MHz	-175		-170		
Operating Temperature Range		-20℃ ~ + 70℃ or -40℃ ~ + 85℃				℃
Storage Temp. Range		-45	90	-45	90	℃

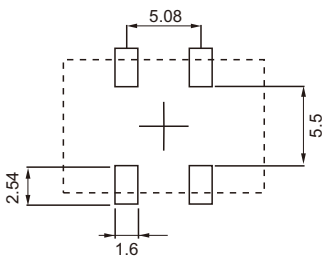
Dimension(mm)

【TOP VIEW】



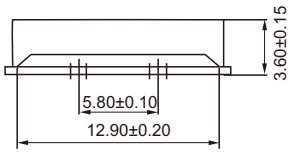
【BOTTOM VIEW】





Recommended Soldering Pattern

【SIDE VIEW】

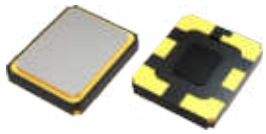


Pin	Function
#1	Vcon
#2	GND
#3	Output
#4	V_{DD}

2.0 x 1.6 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

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



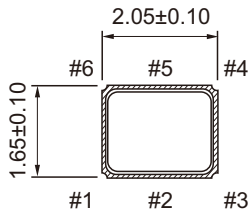
Electrical Specificaations

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		16.369,19.2,26,38.4						MHz
Frequency Tolerance*		-	±2.0	-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±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	
Supply Current	10MHz≦FO<26MHz	-	1.5	-	1.5	-	1.5	mA
	26 MHz≦FO<52MHz	-	2.0	-	2.0	-	2.0	
Output Level (Clipped sine wave)		0.8	-	0.8	-	0.8	-	V_{p-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	-	±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		500	-	500	-	500	-	kΩ
Phase Noise @19.2MHz	100Hz	-115		-115		-115		dBc/Hz
	1kHz	-135		-135		-135		
	10kHz	-148		-148		-148		
Start Time		-	2	-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

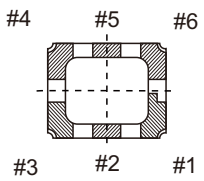
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

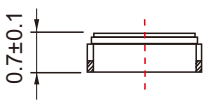
【TOP VIEW】



【BOTTOM VIEW】

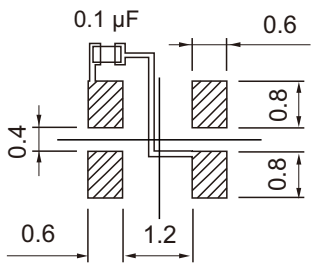


【SIDE VIEW】



PIN#	Function
1	Vcon:VC-TCXO GND:TCXO
2	No Comnnection
3	GND
4	Output
5	No Comnnection
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

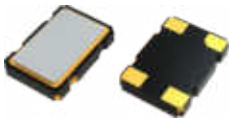
ppm / Temp. (°C)	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	o	o	o	o	o
-30 ~ +85	o	o	o	o	o
-40 ~ +85	o	o	o	o	o

o: Available △:Conditional X: Not available

2.5 x2.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 2.5 x 2.0 x 0.7 mm SMD package.
- Compactness and lightweight
- VCTCXO available
- Low thickness



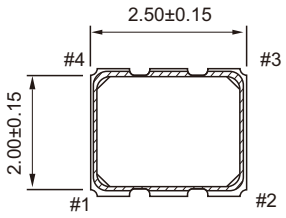
Electrical Specificaations

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		16.369,19.2,26,38.4						MHz
Frequency Tolerance*		-	±2.0	-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±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	
Supply Current	10MHz≦FO<26MHz	-	1.5	-	1.5	-	1.5	mA
	26 MHz≦FO<52MHz	-	2.0	-	2.0	-	2.0	
Output Level (Clipped sine wave)		0.8	-	0.8	-	0.8	-	V_{p-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	-	±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		500	-	500	-	500	-	kΩ
Phase Noise @19.2MHz	100Hz	-115		-115		-115		dBc/Hz
	1kHz	-135		-135		-135		
	10kHz	-148		-148		-148		
Start Time		-	2	-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

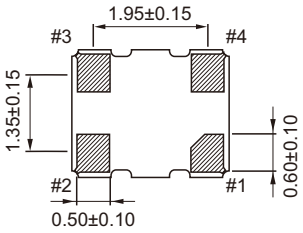
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

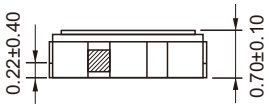
【TOP VIEW】



【BOTTOM VIEW】

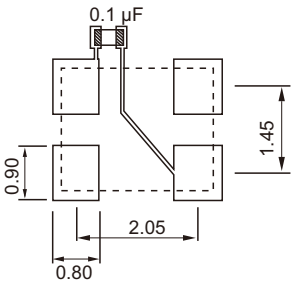


【SIDE VIEW】



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

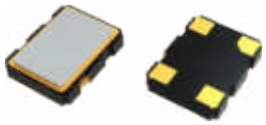
Temp. (°C) \ ppm	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	O	O	O	O	O
-30 ~ +85	O	O	O	O	O
-40 ~ +85	O	O	O	O	O

O: Available △:Conditional X: Not available

3.2 x2.5 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 3.2 x 2.5 x 0.9 mm SMD package
- Compactness and lightweight
- VCTCXO available
- Low thickness



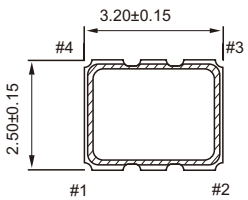
Electrical Specificaations

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		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, 20,25,26,27,30,30.72,32,38.4						MHz
Frequency Tolerance*		-	±2.0	-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±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	
Supply Current	10MHz≦FO<26MHz	-	1.5	-	1.5	-	1.5	mA
	26 MHz≦FO<52MHz	-	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	-	±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		500	-	500	-	500	-	kΩ
Phase Noise @19.2MHz	100Hz	-115		-115		-115		dBc/Hz
	1kHz	-135		-135		-135		
	10kHz	-148		-148		-148		
Start Time		-	2	-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

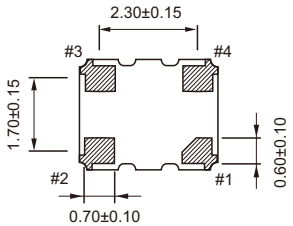
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

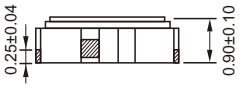
【TOP VIEW】



【BOTTOM VIEW】

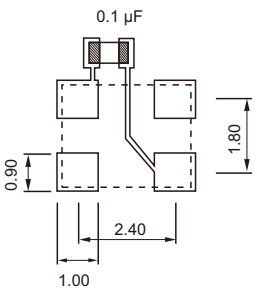


【SIDE VIEW】



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

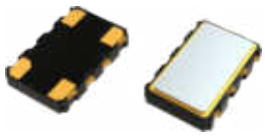
ppm / Temp. (°C)	±0.5	±1.0	±1.5	±2.0	±2.5
-20 ~ +70	o	o	o	o	o
-30 ~ +85	o	o	o	o	o
-40 ~ +85	o	o	o	o	o

o: Available △ :Conditional X: Not available

5.0 x3.2 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.1 mm SMD package
- CMOS and Clipped Sine Wave output optional
- Compactness and lightweight
- Voltage control TCXO available



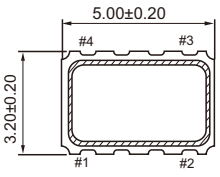
Electrical Specificaations

Parameter		3.3/3.0/2.8V		2.5V		1.8V		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation		2.66	3.465	2.375	2.625	1.71	1.89	V
Frequency Range		10	52	10	52	10	52	MHz
Standard Frequency		10,12.8,13,16.368,16.369,19.2,19.44,20,25,26,27,30,30.72,32,38.4						MHz
Frequency Tolerance*		-	±2.0	-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±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	
Supply Current (Clipped Sine)	10MHz≦FO<26MHz	-	1.5	-	1.5	-	1.5	mA
	26 MHz≦FO<52MHz	-	2.0	-	2.0	-	2.0	
Supply Current(CMOS) 10MHz≦FO<52MHz		-	10	-	5	-	7	mA
Clipped sine wave	Output Level	0.8	-	0.8	-	0.8	-	V_{p-p}
	Load	10KΩ//10pF		10KΩ//10pF		10KΩ//10pF		
CMOS	Output High	$0.9V_{DD}$	-	$0.9V_{DD}$	-	$0.9V_{DD}$	-	V
	Output Low	-	$0.1V_{DD}$	-	$0.1V_{DD}$	-	$0.1V_{DD}$	V
	Load	-	15	-	15	-	15	pF
Control Voltage Range(VCTCXO)		0.5	2.5	0.4	2.4	0.3	1.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		500	-	500	-	500	-	kΩ
Phase Noise @19.2MHz Clipped Sine	100Hz	-115		-115		-115		dBc/Hz
	1kHz	-135		-135		-135		
	10kHz	-148		-148		-148		
Start Time		-	2	-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	-55	125	°C

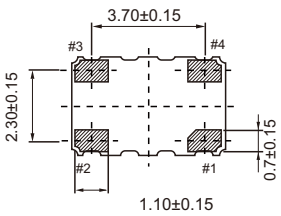
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

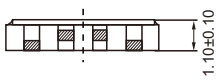
【TOP VIEW】



【BOTTOM VIEW】

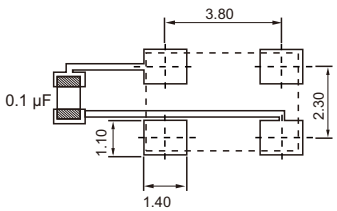


【SIDE VIEW】



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

o: Available △ :Conditional X: Not available

7.0 x5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

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

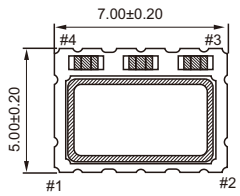
Electrical Specificaations

Parameter		3.3/3.0		2.5V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency		5,6.4,8,8.192,10,12.5,12.8,16,16.384,19.44,25,26				MHz
Frequency Tolerance*		-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±5%) change	-	±0.1	-	±0.1	ppm
	VS Load(±10%) change	-	±0.2	-	±0.2	
	VS Aging(@1st year)	-	±1.0	-	±1.0	
Supply Current(Clipped Sine)		-	3.5	-	3.5	mA
Supply Current(CMOS)		-	6	-	6	mA
Clipped sine wave	Output Level	0.8	-	0.8	-	V_{p-p}
	Load	10KΩ//10pF		10KΩ//10pF		
CMOS	Output High	0.9V_{DD}	-	0.9V_{DD}	-	V
	Output Low	-	0.1V_{DD}	-	0.1V_{DD}	V
	Load	15		15		pF
	Duty	45	55	45	55	%
Control Voltage Range(VCTCXO)		0.5	2.5	0.4	2.4	V
Pulling Range (VCTCXO)		±5	±12	±5	±12	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @19.2MHz Clipped Sine	100Hz	-115		-115		dBc/Hz
	1kHz	-135		-135		
	10kHz	-148		-148		
Start Time		-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	°C

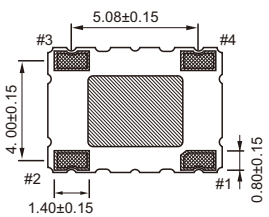
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

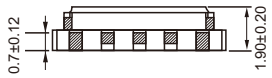
【TOP VIEW】



【BOTTOM VIEW】

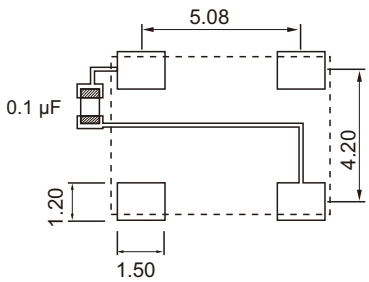


【SIDE VIEW】



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 µF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

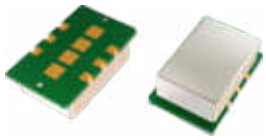
ppm / Temp. (°C)	±0.5	±1.0
-20 ~ +70	O	O
-30 ~ +85	O	O
-40 ~ +85	O	O

O: Available △ :Conditional X: Not available

14.3 x8.7mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 14.3 x 8.7 x 4.9 mm
- Metal cover, FR-4 PCB based.
- Output: TTL/CMOS or Clipped Sine Wave
- Low current option (2mA or Clipped Sine Wave o/p)
- VCTCXO available



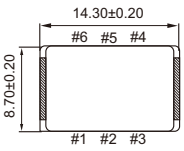
Electrical Specificaations

Parameter		3.3/3.0		5.0V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		5	40	5	40	MHz
Standard Frequency (for CMOS)		5, 6.4 ,8 , 8.192, 10, 12.5, 12.8, 16, 16.384, 19.44, 20, 25				MHz
Standard Frequency (for Clipped Sine)		8.192, 10, 12.5, 12.8, 16, 16.384, 19.44, 20, 25				MHz
Frequency Tolerance*		-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±5%) change	-	±0.2	-	±0.2	ppm
	VS Load(±10%) change	-	±0.2	-	±0.2	
	VS Aging(@1st year)	-	±1.0	-	±1.0	
Supply Current(Clipped Sine)		-	3.5	-	3.5	mA
Supply Current(CMOS)		-	6	-	6	mA
Clipped sine wave	Output Level	0.8	-	0.8	-	V_{p-p}
	Load	10KΩ//10pF		10KΩ//10pF		
CMOS	Output High	0.9V_{DD}	-	0.9V_{DD}	-	V
	Output Low	-	0.1V_{DD}	-	0.1V_{DD}	V
	Load	15		15		pF
	Duty	45	55	45	55	%
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @12.8MHz	100Hz	-120		-120		dBc/Hz
	1kHz	-140		-140		
	10kHz	-148		-148		
Start Time		-	2	-	2	mSec
Tri-State(option)	Disable	-	0.99	-	1.5	V
	Enable	2.31	-	3.5	-	V
Storage Temp. Range		-55	125	-55	125	°C

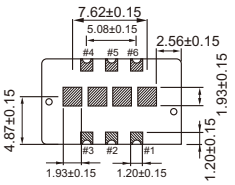
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

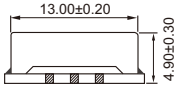
【TOP VIEW】



【BOTTOM VIEW】

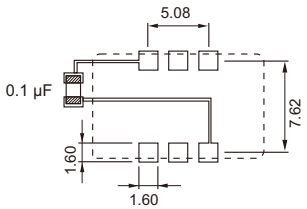


【SIDE VIEW】



PIN#	Function
1	Vcon:VC-TCXO GND/NC:TCXO
2	Tri-State / NC
3	GND & Case
4	Output
5	NC
6	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	±0.05	±0.1	±0.14	±0.2	±0.28	±0.37	±0.5
-10 ~ +60	o	o	o	o	o	o	o
-20 ~ +70	o	o	o	o	o	o	o
-40 ~ +85	X	X	X	△	o	o	o

o: Available △:Conditional X: Not available

3.2x2.5mm High Frequency Temperature Compensated Crystal Oscillator

Feature

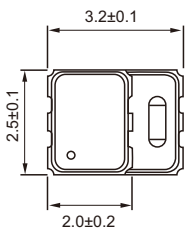
- Low power supply voltage:3.3V and 2.5V options
- Clock output:CMOS, LVPECL,LVDS options
- CMOS output frequency support from 10MHz TO 250MHz
- Differenntial output equency supports from10MHz to 1.5GHz
- Low Phase Jiter typical 0.8 pS RMS at 12kHz to 20MHz frequency offsets
- Low current consumption, Pbfree/RoHS compliant
- Frequency Stability ±2.0ppm over -40°C to 85°C

Electrical Specificaations

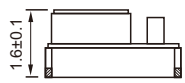
Parameter		LVPECL		LVDS		CMOS		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage		3.3V or 2.5V						V
Supply Voltage Variation		VDD-5%	VDD+5%	VDD-5%	VDD+5%	VDD-5%	VDD+5%	
Frequency Range		10	1500	10	1500	10	250	MHz
Supply Current		-	54	-	45	-	40	mA
Output Level	Output High	VDD-1.03	VDD-0.6		1.6	90%VDD		V
	Output Low	VDD-1.85	VDD-1.6	0.9	-		10%VDD	
Transition Time(Rise/ Fall Time)		-	0.5(20-80%)	-	1.0(20-80%)	-	3.0(20-80%)	nSec
Duty Cycle		45	55	45	55	45	55	%
Start time		-	5	-	5	-	5	mSec
Tri-State mode (input to pin 2)	Enable	70%VDD	-	70%VDD	-	70%VDD	-	
	Disable		30%VDD		30%VDD		30%VDD	
Stand by Curent		-	20	-	20	-	20	mA
Output Loading		50Ω into VDD-2V		100Ω		15pF		
Phase Noise		Typ.	Max.	Typ.	Max.	Typ.	Max.	
At VDD=3.3V, F out=250MHz	1kHz offset	-107	-	-107	-	-107	-	dBc/Hz
	10kHz offset	-111	-	-111	-	-111	-	
	100kHz offset	-114	-	-114	-	-114	-	
	1MHz offset	-125	-	-125	-	-125	-	
	20MHz offset	-147	-	-147	-	-147	-	
RMS Phase Jiter(12kHz to 20MHz)		0.8	1.5	0.8	1.5	0.8	1.5	pSec

Dimension(mm)

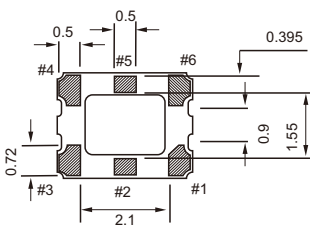
【TOP VIEW】



【SIDE VIEW】



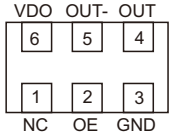
【BOTTOM VIEW】



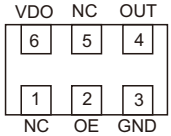
Type	CMOS	Differential
Pad	Function	Function
1	No Connection	No Connection
2	Tri-State	Tri-State
3	GND	
4	Output	Output
5	No Connection	Comp. Output
6	Supply Voltage(VDD)	

PIN Assignments

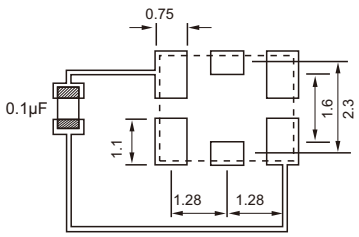
(LVPECL LVDS)



(CMOS)



Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C) \ ppm	±1.0	±2.0	±2.5
-30 ~ +85	○	○	○
-40 ~ +85	△	○	○

Inclusive of calibration @ 25°C, operating temperature load variation, aging (1st year), shock, and vibration

5.0 x 3.2 mm SMD High Precision VCTC Crystal Oscillator

Feature

- Typical 5.0 x 3.2 x 1.55 mm ceramic SMD package.
- ±0.28ppm, -40°C~+85°C ; ±0.05ppm, -10°C~+70°C
- CMOS and Clipped Sine wave (without DC-cut capacitor) output optional

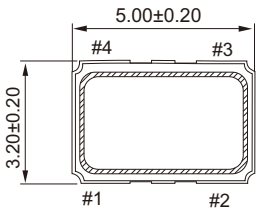
Electrical Specificaations

Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		10	52	10	52	MHz
Standard Frequency		10,12.8,13,19.2,20,25,26,30.72				MHz
Frequency Tolerance*		-	±2.0	-	±2.0	ppm
Frequency stability	Vs Supply Voltage(±5%) change	-	±0.3	-	±0.3	ppm
	Vs Load(±10%) change	-	±0.2	-	±0.2	
	Vs Aging (@1st year)	-	±0.1	-	±0.1	
Supply Current	CMOS 10MHz≧F0≧40MHz	-	6	-	6	mA
	CMOS 40MHz＞F0≧52MHz	-	8	-	8	
	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 Wave)		0.8	-	0.8	-	Vp-p
Load	CMOS	15pF		15pF		
	Clipped Sine Wave	10KΩ//10pF		10KΩ//10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @10.0MHz	100Hz	-125				dBc/Hz
	1kHz	-145				
	10kHz	-150				
Start Time		-	2	-	2	mSec
Storage Temp.Range		-55	125	-55	125	°C

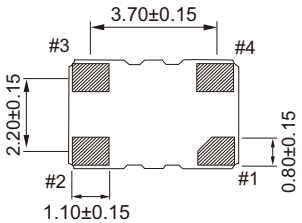
Standard frequencies are frequencies which the crystal has been desaigned and does not imply a stock position.
*Frequency at 25℃,1 hour after reflow.

Dimension(mm)

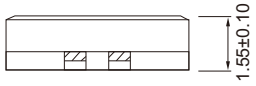
【TOP VIEW】



【BOTTOM VIEW】

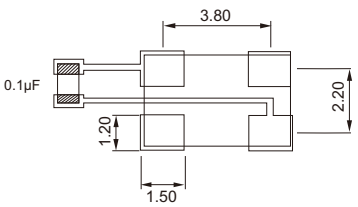


【SIDE VIEW】



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C) \ ppm	±0.05	±0.1	±0.2	±0.28	±0.5
-10 ~ +70	o	o	o	o	o
20 ~ +70	X	o	o	o	o
-40 ~ +85	X	X	△	o	o

o: Available △:Conditional X: Not available

7.0x5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 7.0 x5.0 x1.9 mm ceramic SMD package
- High Precision for -40°C~+85°C,±0.28ppm,-40°C~+105°C,±2ppm
- CMOS and Clipped Sine wave(without DC-cut capacitor)output optional

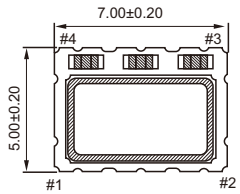
Electrical Specificaations

Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency		10,12.8,16.384,19.2,19.44,20,25,26				MHz
Frequency Tolerance*		-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±5%) change	-	±0.1	-	±0.05	ppm
	VS Load(±10%) change	-	±0.05	-	±0.05	
	VS Aging(@1st year)	-	±1.0	-	±1.0	
Supply Current	CMOS output	-	6	-	6	mA
	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 Wave)		0.8	-	0.8	-	Vp-p
Load	CMOS	15pF		15pF		
	Clipped Sine Wave	10KΩ//10pF		10KΩ//10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @10.0MHz	100Hz	-130		-130		dBc/Hz
	1kHz	-145		-145		
	10kHz	-154		-154		
Start Time		-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	°C

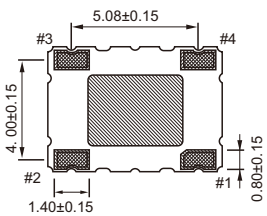
Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position
.* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)

【TOP VIEW】



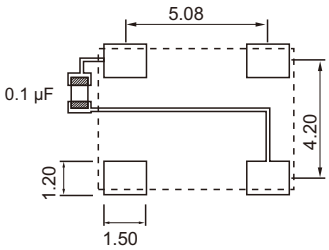
【BOTTOM VIEW】



【SIDE VIEW】

PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

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

o: Available △:Conditional X: Not available

7.0x5.0mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.9 mm SMD package
- Stratum 3 (Overall ±4.6ppm including 20 years aging)
- CMOS and Clipped Sine wave (without DC-cut capacitor) output optional

Electrical Specifications

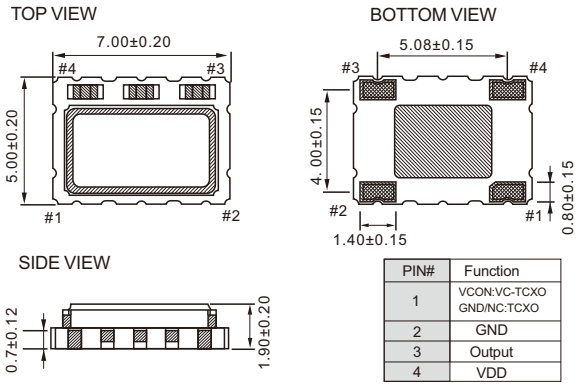
Parameter		5.0V		3.3V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		VDD-5%	VDD+5%	VDD-5%	VDD+5%	V
Frequency Range		5	52	5	52	MHz
Standard Frequency		10,12.8,16.384,19.2,19.44,20,25,26				MHz
Operating Temp. Range		-20~+70 / -40~ +85				℃
Frequency stability (Overall, 20 Years)*		-	±4.6	-	±4.6	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
	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 Wave)		0.8	-	0.8	-	Vp-p
Load	CMOS	15pF		15pF		
	Clipped Sine Wave	10KΩ//10pF		10KΩ//10pF		
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @10.0MHz	100Hz	-130				dBc/Hz
	1kHz	-145				
	10kHz	-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.

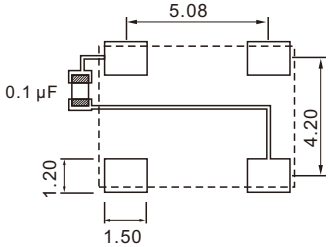
+ Including 24hours aging , supply voltage VDD ±5% and frequency stability over temperature.

Dimension(mm)



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

7.0 x5.0 mm SMD Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

- Typical 7.0 x 5.0 x 1.9 mm SMD package
- High Precision and High Temperature for -40 ~ +95°C ±0.1ppm,-40 ~ +105°C , ±0.2ppm
- CMOS and Clipped Sine wave (without DC-cut capacitor) output optional

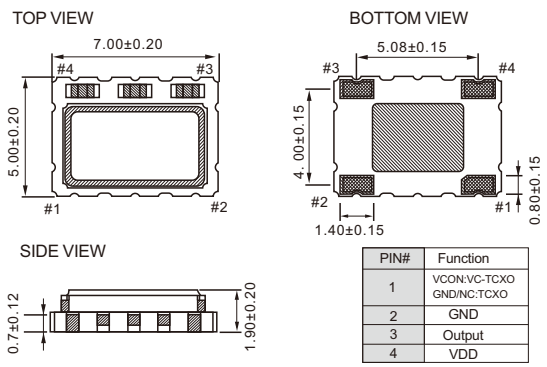
Electrical Specifications

Parameter		3.3V		2.5V		Unit
		Min.	Max.	Min.	Max.	
Supply Voltage Variation		V_{DD}-5%	V_{DD}+5%	V_{DD}-5%	V_{DD}+5%	V
Frequency Range		10	52	10	52	MHz
Standard Frequency		10,19.2,20				MHz
Frequency Tolerance*		-	±1.5	-	±1.5	ppm
Frequency stability	VS Supply V(±5%) change	-	±0.1	-	±0.05	ppm
	VS Load(±10%) change	-	±0.05	-	±0.05	
	VS Aging(@1st year)	-	±1.0	-	±1.0	ppm/year
Supply Current (Clipped Sine Wave)		-	5.0	-	4.5	mA
Supply Current (CMOS output)		-	7.5	-	7	mA
Load	CMOS	15pF				
	(Clipped Sine Wave)	10KΩ//10pF		10KΩ//10pF		
Output Level CMOS	Output High	0.9V_{DD}	-	0.9V_{DD}	-	V
	Output Low	-	0.1V_{DD}	-	0.1V_{DD}	V
	Duty	45	55	45	55	%
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5	-	±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	kΩ
Phase Noise @20MHz Clipped Sine	100Hz	-130				dBc/Hz
	1kHz	-148				
	10kHz	-156				
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

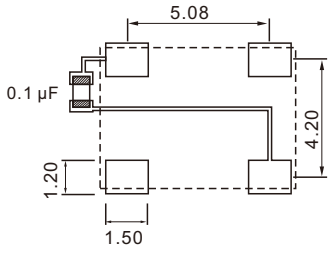
* Frequency at 25°C, 1 hour after reflow.

Dimension(mm)



PIN#	Function
1	VCON:VC-TCXO GND/NC:TCXO
2	GND
3	Output
4	VDD

Solder Pad Layout(mm)



To ensure optimal oscillator performance, place a by-pass capacitor of 0.1 μF as close to the part as possible between Vdd and GND pads.

FREQ. STABILITY vs. TEMP. RANGE

Temp. (°C) \ ppm	±0.05	±0.1	±0.2	±0.28	±0.5	±2
-40 ~ +85	△	o	o	o	o	o
-40 ~ +95	△	△	o	o	o	o
-40 ~ +105	X	△	o	o	o	o

o: Available △:Conditional X: Not available

20.4 x12.8mm DIP Voltage Controlled Temperature Compensated Crystal Oscillator

Feature

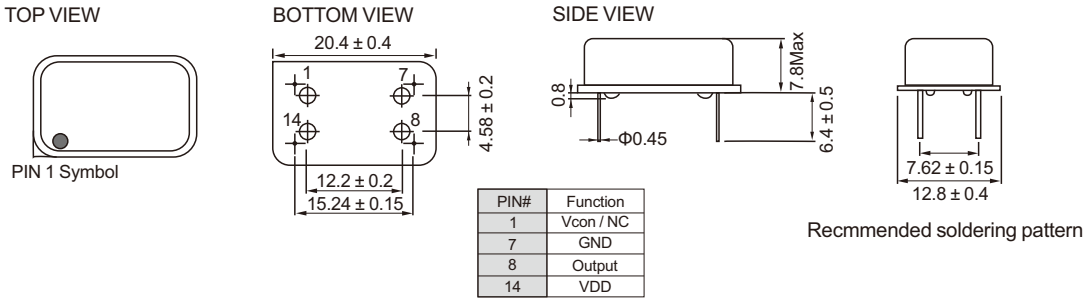
- Typical 20.4 x12.8 x 7.8 mm
- Hermetically Sealed 14 PIN DIP Package
- Double sealed metal case and high reliability
- VCTCXO available

Electrical Specifications

Parameter		Clipped Sine Wave				CMOS				Unit
		3.3V		2.8V		3.3V		2.8V		
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Supply Voltage Variation(V_{DD}) ±5%		3.135	3.465	2.66	2.94	3.135	3.465	2.66	2.94	V
Frequency Range		10	52	10	52	1.25	52	1.25	52	MHz
Frequency Tolerance*		-	±2.0	-	±2.0	-	±2.0	-	±2.0	ppm
Frequency stability	VS Supply V(±5%) change	-	±0.2	-	±0.2	-	±0.2	-	±0.2	ppm
	VS Load(±10%) change	-	±0.2	-	±0.2	-	±0.2	-	±0.2	
	VS Aging(@1st year)	-	±1.0	-	±1.0	-	±1.0	-	±1.0	
Supply Current	10MHz≦FO<15MHz	-	2.0	-	2.0	Only for clipped sine wave				mA
	15 MHz≦FO<26MHz	-	3.0	-	3.0					
	26 MHz≦FO<52MHz	-	4.0	-	4.0					
Output Level		0.8	-	0.8	-					V_{p-p}
Supply Current	1.25MHz≦FO<10MHz	Only for CMOS				-	10	-	7	mA
	10MHz≦FO<15MHz					-	15	-	10	
	15 MHz≦FO<26MHz					-	20	-	15	
	26 MHz≦FO<52MHz					-	25	-	20	
CMOS	Output High					0.9Vdd	-	0.9Vdd	-	V
	Output Low					-	0.1Vdd	-	0.1Vdd	
	Duty					40	60	40	60	%
Control Voltage Range(VCTCXO)		0.5	2.5	0.5	2.5	0.5	2.5	0.5	2.5	V
Pulling Range (VCTCXO)		±5		±5		±5		±5	-	ppm
Vc Input Impedance(VCTCXO)		100	-	100	-	100	-	100	-	kΩ
Phase Noise @13MHz	100Hz	-115		-115		-115		-120		dBc/Hz
	1kHz	-135		-135		-135		-140		
	10kHz	-148		-148		-148		-148		
Start Time		-	2	-	2	-	2	-	2	mSec
Storage Temp. Range		-55	125	-55	125	-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.

Dimension(mm)



PIN#	Function
1	Vcon / NC
7	GND
8	Output
14	VDD

FREQ. STABILITY vs. TEMP. RANGE

ppm / Temp. (°C)	Clipped sine wave		CMOS	
	±0.5	±1.0	±0.5	±1.0
-20 ~ +70	o	o	o	o
-40 ~ +85	△	o	△	o

o: Available △: Conditional X: Not available
" Pulling Range < 10 ppm available

18.5x12 mm to 91x56 mm DIP Temperature Compensated Crystal Oscillator

Feature

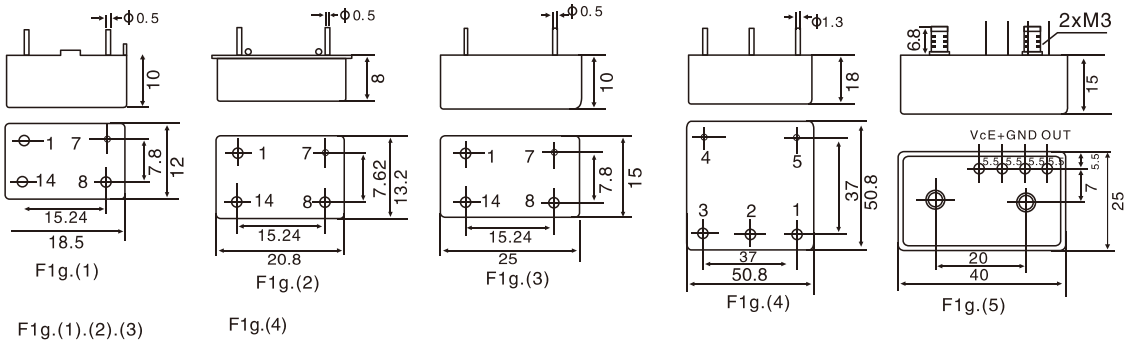
- Mobile communication, Avionics, Test Equipment, Electronic instruments

Electrical Specifications

Items		TFT210	TFT230	TFT250	TFT270	TFT300
Frequency Range(MHz)		1~32	30~95	90~155	150~210	200~1500
F-T stability(ppm)		±0.5~±5			±1~±10	
Operating Temperature(°C)		-10~60 0~70 -20~+70 -40~+70 -50~+85				
Storage Temperature(°C)		-55~+120				
Power	Voltage(Vdc)	+3.3 +5.0 +12				
	Current(mA)	2~20				
Output	Waveform	Sine/Pulse		Sine		
	Impedance	50Ω /100Ω		50Ω		
	Level	(Pulse):TTL/HCMOS (Sine):≥1.5vP-P/50Ω				
	Type	(pins):SMA		SMA		
Aging/Year(ppm)		±1 ~ ±3				
Frequency trim(ppm)		±1 ~ ±5/(mechanical or electrical)				
F-V Stability		(3~5)x10 - 7(3.3V ± 5%, 5V ± 10%, 12V ± 10%)				
Dimension(mm)		18.5x12x(8~10) 20.8x13.2x(8~10) 25x15x10 30x20x10 40x25x15 44x27x19 50.8x50.8x18 91x56x20				

*Please consult our sales representative for other specifications.

Dimension(mm)



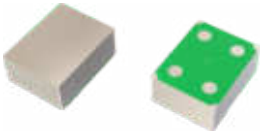
F1g.(1) F1g.(2) F1g.(3) F1g.(4) F1g.(5)

F1g.(1).(2).(3)
1 --- Vc
7 --- GND
8 --- OUT
14 --- $+V_{DD}$

F1g.(4)
1 --- Vc
2 --- E1(OS.)
3 --- OUT
4 --- GND
5 --- E2(OVEN)

9.7 x7.5mm Oven Controlled Crystal Oscillator

Feature

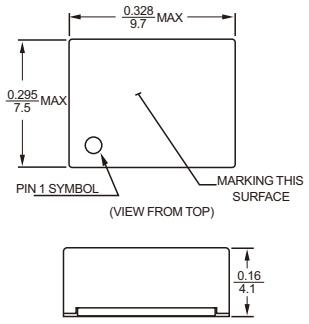


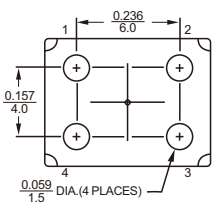
- Dimension 9.7 x 7.5 x 4.1mm, miniaturized 4-Pad SMD package
- ±20 ppb stability over -40 to+85°C
- Stratum 3 (Overall ±4.6 ppm including 20 years aging)
- Low power consumption and high reliability

Electrical Specifications

Parameter		Min.	Type	Max.	Unit
OUTPUT (PIN = "R.F. OUTPUT")					
Frequency		10		40	MHz
Output Level:	Output High	2.4			V
	Output Low			0.4	V
Waveform:		Rectangular/ Clipped Sine			
Load(Rectangular/ Clipped sine)		15pF / 10K ohm//10pF			pF
Duty(Rectangular)		45	50	55	%
Frequency stability					
Frequency stability	Ambient (-20~+70°C /-40~+85°C)	±5, ±10,±20, ±30, ±50			ppb
	Daily	-3.0		+3.0	ppb
	Yearly	-0.6		+0.6	ppm
	10 Years	-3.0		+3.0	ppm
	Voltage(±5% change)	-5.0		+5.0	ppb
	Load(±5% change)	-5.0		+5.0	ppb
	Warm-up	-100		+100	ppb
Phase Noise	10Hz		-98	-92	dBc/Hz
	100Hz		-126	-120	
	1kHz		-145	-140	
	10kHz		-152	-150	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")					
Tuning Range	VCO @ 0 V			-5.0	ppm
	VCO @ 3.3V	+5.0			ppm
Control Voltage		0	1.65	3.3	V
INPUT POWER (PIN = "+VDC")					
Voltage		3.135	3.3	3.465	V
Current				350	mA
Steady State			0.3	0.4	W
Storage Temperature		-55		+125	°C

Dimension(mm)

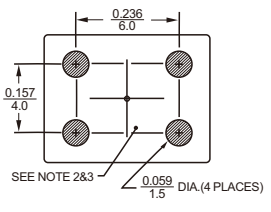




Numbers for reference only. (Not stamped on unit)

(VIEW FROM BOTTOM)

Solder Pad Layout(mm)



RECOMMENDED SOLDER PAD LAYOUT

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.

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

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

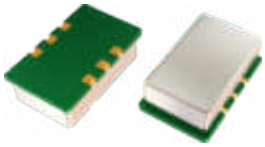
Note 4. Aqueous cleanlng Is FORBIDDEN

Note 5. Test condition : A 0.1uF and 10uF X7R decoupling capacitor is required close to the unit.

14.3 x9.3 mm Oven Controlled Crystal Oscillator

Feature

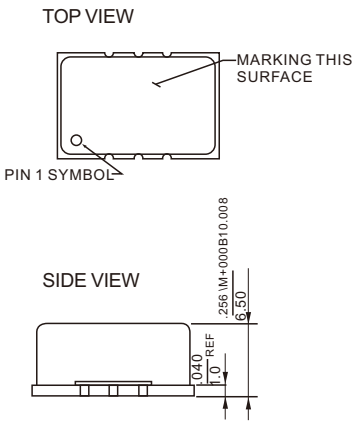
- Dimension 14.3 x 9.3 x 6.5 mm typical
- 6-PIN SMD package
- Frequency Range , 10 MHz to 40MHz
- ±30 ppb stability over -40 to +85 °C
- Stratum 3 (Overall ±4.6 ppm including 20 years aging.)

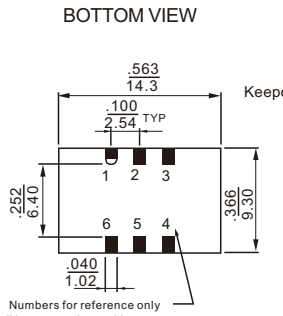


Electrical Specifications

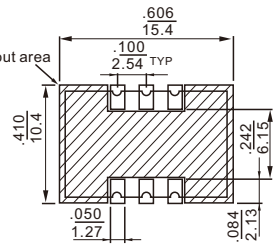
Parameter		Min.	Type	Max.	Unit
OUTPUT (PIN = "R.F. OUTPUT")					
Frequency		10		40	MHz
Output Level:	Output High	2.4			V
HCMOS	Output Low			0.4	V
Waveform:			Rectangular		
Load			15		pF
Duty(Rectangular)		45	50	55	%
Frequency stability					
Frequency stability	Ambient (-20~+70°C /-40~+85°C)		±10,±20, ±30, ±50		ppb
	Daily	-2.0		+2.0	ppb
	Yearly	-0.4		+0.4	ppm
	10 Years	-2.0		+2.0	ppm
	Voltage(±5% change)	-5.0		+5.0	ppb
	Load(±5% change)	-10.0		+10.0	ppb
	Warm-up	-0.1		+0.1	ppm
Phase Noise	10Hz		-98	-92	dBc/Hz
	100Hz		-126	-120	
	1kHz		-145	-140	
	10kHz		-152	-150	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")					
Tuning Range	VCO @ 0 V			-5.0	ppm
	VCO @ 3.3V	+5.0			ppm
Control Voltage		0	1.65	3.3	V
INPUT POWER (PIN = "+VDC")					
Voltage		3.135	3.3	3.465	V
Current			500	600	mA
Steady State			0.5	0.6	W
Storage Temperature		-55		+125	°C

Dimension(mm)





Solder Pad Layout(mm)



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

Notes:
1.If the specification does not specify parameters for PIN 1, PIN 2 then that respective PIN is not internally CONNECTED.

INCH / mm (REFERENCE ONLY)

20.3 x12.7 mm Oven Controlled Crystal Oscillator

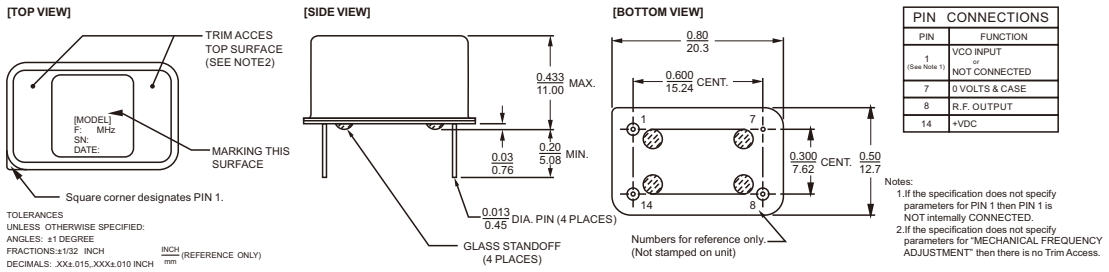
Feature

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

Electrical Specifications

Parameter		Min.	Type	Max.	Unit
OUTPUT (PIN = "R.F. OUTPUT")					
Frequency		5	10	40	MHz
Output Level:	Output High	2.4			V
	Output Low			0.5	V
Waveform:			Rectangular		
Load			15		pF
Duty(Rectangular)		45	50	55	%
Frequency stability					
Frequency stability	Ambient (0~+70°C/-30~+70°C /-40~+85°C)		±50,±100, ±200		ppb
	Daily	-5.0		+5.0	ppb
	Yearly	-0.5		+0.5	ppm
	10 Years	-3.0		+3.0	ppm
	Voltage(±5% change)	-50		+50	ppb
	Load(±5% change)	-50		+50	ppb
	Warm-up	-0.1		+0.1	ppm
	Aging	-5.0		+5.0	ppb
Phase Noise	10Hz			-105	dBc/Hz
	100Hz			-130	
	1kHz			-140	
	10kHz			-150	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")					
Tuning Range	VCO @ 0 V			-5.0	ppm
	VCO @ 5.0V	+5.0			ppm
Control Voltage		0	2.5	5.0	V
INPUT POWER (PIN = "+VDC")					
Voltage		4.75	5.0	5.25	V
Current				400	mA
Steady State				0.8	W
Storage Temperature		-55		+125	°C

Dimension(mm)



20.6 x20.6mm Oven Controlled Crystal Oscillator

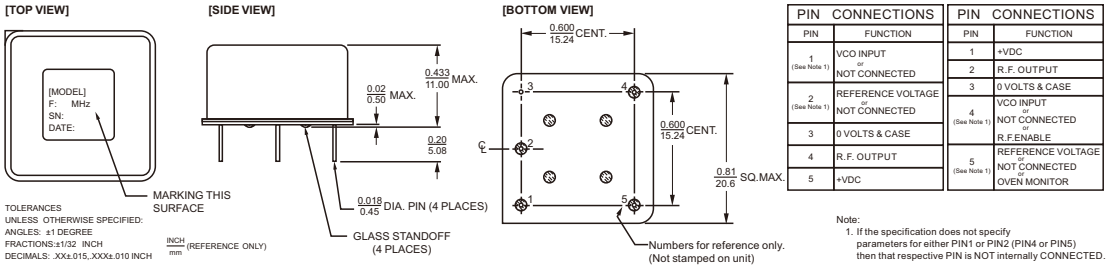
Feature

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

Electrical Specifications

Parameter		Min.	Type	Max.	Unit
OUTPUT (PIN = "R.F. OUTPUT")					
Frequency		5	10	40	MHz
Output Level:	Output High	3.5			V
HCMOS	Output Low			0.5	V
Waveform:			Rectangular		
Load			15		pF
Duty(Rectangular)		45	50	55	%
Frequency stability					
Frequency stability	Ambient (0~70°C/ -30~+70°C /-40~+85°C)		±5,±10, ±20		ppb
	Daily	-0.5		+0.5	ppb
	Yearly	-50		+50	ppb
	10 Years	-0.3		+0.3	ppm
	Voltage(±5% change)	-0.5		+0.5	ppb
	Load(±5% change)	-0.5		+0.5	ppb
	Warm-up	-50		50	ppb
	Aging	-0.5		+0.5	ppb
Phase Noise	10Hz			-115	dBc/Hz
	100Hz			-135	
	1kHz			-145	
	10kHz			-150	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")					
Tuning Range	VCO @ 0 V			-0.5	ppm
	VCO @ 4.0V	+0.5			ppm
Control Voltage		0	2	4.0	V
INPUT POWER (PIN = "+VDC")					
Voltage		4.75	5.0	5.25	V
Current				500	mA
Steady State				1.0	W
Reference Voltage					
Voltage		3.8	4.0	4.2	V
Storage Temperature		-55		+125	°C

Dimension(mm)



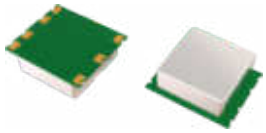
PIN	CONNECTIONS
PIN	FUNCTION
1 (See Note 1)	VCO INPUT or NOT CONNECTED
2 (See Note 1)	REFERENCE VOLTAGE or NOT CONNECTED
3	0 VOLTS & CASE
4	R.F. OUTPUT
5	+VDC

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

Note:
1. If the specification does not specify parameters for either PIN1 or PIN2 (PIN4 or PIN5) then that respective PIN is NOT internally CONNECTED.

25.4 x22.1 mm Oven Controlled Crystal Oscillator

Feature

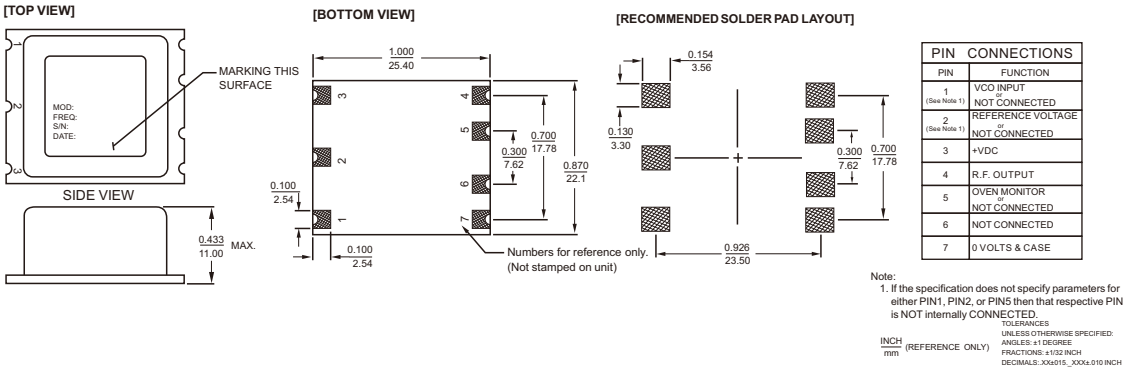


- Dimension 25.4 x 22.1 x 11.0 mm typical
- SC Cut crystal

Electrical Specifications

Parameter		Min.	Type	Max.	Unit
OUTPUT (PIN = "R.F. OUTPUT")					
Frequency		5	10	40	MHz
Output Level:	Output High	2.4			V
	Output Low			0.4	V
Waveform:			Rectangular		
Load			15		pF
Duty(Rectangular)		45	50	55	%
Frequency stability					
Frequency stability	Ambient (0~70°C/ -30~+70°C /-40~+85°C)		±5,±10, ±20		ppb
	Aging	-0.5		+0.5	ppb
	Daily	-0.5		+0.5	ppb
	Yearly	-50		+50	ppb
	10 Years	-0.4		+0.4	ppm
	Voltage(±5% change)	-0.5		+0.5	ppb
	Load(±5% change)	-0.5		+0.5	ppb
	Warm-up	-10		10	ppb
Phase Noise	10Hz			-115	dBc/Hz
	100Hz			-130	
	1kHz			-140	
	10kHz			-150	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")					
Tuning Range	VCO @ 0 V			-0.5	ppm
	VCO @ 2.8V	+0.5			ppm
Control Voltage		0	1.4	2.8	V
INPUT POWER (PIN = "+VDC")					
Voltage		3.135	3.3	3.465	V
Current				1000	mA
Steady State				1.2	W
Reference Voltage					
Voltage		2.7	2.8	2.9	V
Storage Temperature		-55		+125	°C

Dimension(mm)



25.4 x25.4mm Oven Controlled Crystal Oscillator

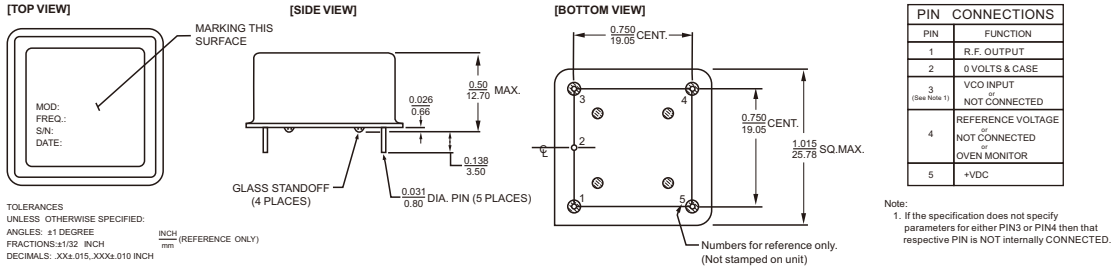
Feature

- Typical 25.4 x25.4 x 12.7 mm
- Hermetically Sealed DIP Package
- Low power consumption and high reliability
- SC Cut Crystal

Electrical Specifications

Parameter		3.3V			5.0V			Unit
		Min.	Type	Max.	Min.	Type	Max.	
OUTPUT (PIN = "R.F. OUTPUT")								
Frequency		5		40	5		40	MHz
Output Level: LVTTL	Output High	2.4			2.4			V
	Output Low			0.4			0.4	V
Waveform:			Rectangular			Rectangular		
Load			15			15		pF
Duty		45	50	55	45	50	55	%
Frequency stability								
Frequency stability	Ambient (0~+70°C/-30~+70°C /-40~+85°C)	±0.5, ±1,±3, ±5, ±10			±0.5, ±1,±3, ±5, ±10			ppb
	Daily	-0.5		+0.5	-0.5		+0.5	ppb
	Yearly	-50		+50	-50		+50	ppb
	10 Years	-0.3		+0.3	-0.3		+0.3	ppm
	Voltage(±5% change)	-0.5		+0.5	-0.5		+0.5	ppb
	Short term			0.05			0.05	ppb/s
	Load(±5% change)	-0.5		+0.5	-0.5		+0.5	ppb
	Warm-up	-10		+10	-10		+10	ppb
Phase Noise	1Hz		-95	-90		-95	-90	dBc/Hz
	10Hz		-125	-120		-125	-120	
	100Hz		-140	-135		-140	-135	
	1kHz		-148	-145		-148	-145	
	10kHz		-156	-155		-156	-155	
	100kHz		-158	-155		-158	-155	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")								
Tuning Range	VCO @ Min. Voltage			-0.5			-0.5	ppm
	VCO @ Max. Voltage	+0.5			+0.5			ppm
Control Voltage	Ordering Information	0	+1.65	+3.3	0	+2.5	+5.0	V
		0	+1.4	+2.8	0	+2.0	+4.0	V
INPUT POWER (PIN = "+VDC")								
Voltage		+3.135	+3.3	+3.465	+4.75	+5.0	+5.25	V
Current				1000			800	mA
Steady State				1.3			1.3	W
REFERENCE VOLTAGE (PIN = "REFERENCE VOLTAGE")								
Voltage		+2.7	+2.8	+2.9	+3.8	+4.0	+4.2	V
Storage Temperature		-55		+125	-55		+125	°C

DIMENSION(mm)



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

25.4x25.4 mm Oven Controlled Crystal Oscillator

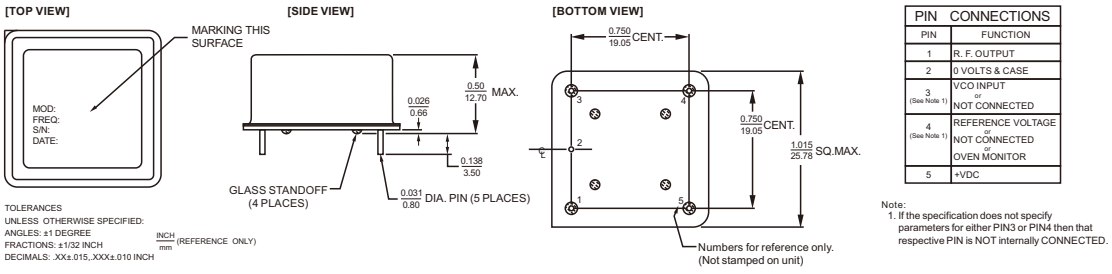
Feature

- Typical 25.4 x25.4 mm.
- Low Phase Noise, Low G-Sensitivity
- Tight Frequency Stability
- Low Power Consumption, Fast Warm-up Time
- Electrical Frequency Tuning Input
- Reference Voltage Output

Electrical Specifications

Parameter		12V			5.0V			Unit
		Min.	Type	Max.	Min.	Type	Max.	
OUTPUT (PIN = "R.F. OUTPUT")								
Frequency			10			100		MHz
Initial Accuracy		-0.1		+0.1	-0.3		+0.3	ppm
Waveform:			Sine Wave			Rectangular		
Frequency stability								
Frequency stability	Ambient(-20~+70°C /-40~+85°C)	±5, ±10, ±20, ±30, ±50, ±100			±20, ±50, ±100			ppb
	Daily	-0.5		+0.5	-5		+5	ppb
	Yearly	-50		+50	-500		+500	ppb
	10 Years	-0.3		+0.3	-2		+2	ppm
	Voltage(±5% change)	-1.0		+1.0	-5		+5	ppb
	Short term			0.002			0.05	ppb/s
	Load(±5% change)	-1.0		+1.0	-5		+5	ppb
	Warm-up	-50		+50	-50		+50	ppb
G-Sensitivity(each axis)				-			1	Ppb/g
Phase Noise	10Hz		-140	-142		-97	-100	dBc/Hz
	100Hz		-155	-155		-130	-135	
	1kHz		-165	-165		-160	-162	
	10kHz		-170	-170		-173	-170	
	100kHz		-170	-170		-175	-172	
	1MHz		-170	-170		-178	-175	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")								
Tuning Range	VCO @ Min. Voltage	±0.4			±3			ppm
Control Voltage	Ordering Information	0.5	5.0	+9.5	0	5.0	+10.0	V
INPUT POWER (PIN = "+VDC")								
Voltage		+11.4	+12	+12.6	+11.4	+12	+12.6	V
Current				500			380	mA
Steady State				2.0			2.0	W
REFERENCE VOLTAGE (PIN = "REFERENCE VOLTAGE")								
Voltage		+9.25	+9.5	+9.75	+9.5	+10	+10.5	V
Storage Temperature		-55		+125	-55		+125	°C

Dimension(mm)



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.

36.3x27.2mm Oven Controlled Crystal Oscillator

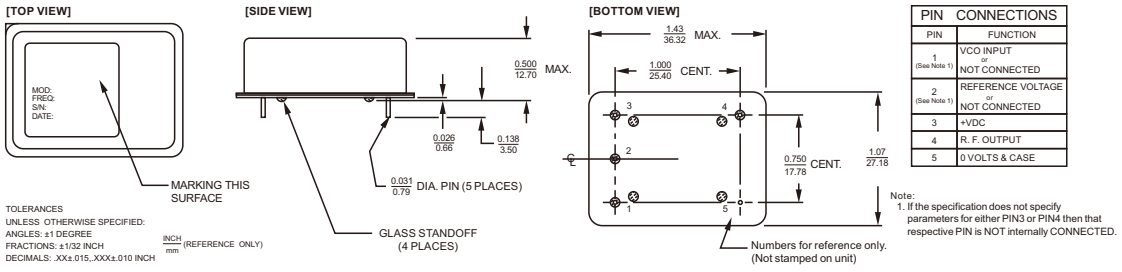
FEATURE

- Typical 36.3 x27.2 x 12.7 mm.
- SC Cut crystal

Electrical Specifications

Parameter		12V			5.0V			Unit
		Min.	Type	Max.	Min.	Type	Max.	
OUTPUT (PIN = "R.F. OUTPUT")								
Frequency		5	10	40	5	10	40	MHz
Output Level:	Output High	2.6			2.4			V
LVTTL	Output Low			0.4			0.4	V
Waveform:		Rectangular			Rectangular			
Load			15			15		pF
Duty		45	50	55	45	50	55	%
Frequency stability								
Frequency stability	Ambient (0~70°C/ -30~+70°C /-40~+85°C)	±3, ±5, ±10			±3, ±5, ±10			ppb
	Aging	-0.5		+0.5	-0.5		+0.5	ppb
	Daily	-0.5		+0.5	-0.5		+0.5	ppb
	Yearly	-50		+50	-50		+50	ppb
	10 Years	-0.3		+0.3	-0.3		+0.3	ppm
	Voltage(±5% change)	-0.5		+0.5	-0.5		+0.5	ppb
	Load(±5% change)	-0.5		+0.5	-0.5		+0.5	ppb
	Warm-up	-10		+10	-10		+10	ppb
Phase Noise	10Hz		-125	-120		-125	-120	dBc/Hz
	100Hz		-140	-135		-140	-135	
	1kHz		-148	-145		-148	-145	
	10kHz		-156	-155		-156	-155	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")								
Tuning Range	VCO @ Min. Voltage			-0.5			-0.5	ppm
	VCO @ Max. Voltage	+0.5			+0.5			ppm
Control Voltage	Ordering Information	0	+2.5	+5.0	0	+2.5	+5.0	V
		0	+2.0	+4.0	0	+2.0	+4.0	V
INPUT POWER (PIN = "+VDC")								
Voltage		+11.4	+12	+12.6	+4.75	+5.0	+5.25	V
Current				1000			850	mA
Steady State				1.3			1.3	W
REFERENCE VOLTAGE (PIN = "REFERENCE VOLTAGE")								
Voltage		+4.75	+5.0	+5.25	+3.8	+4.0	+4.2	V
Storage Temperature		-55		+125	-55		+125	°C

Dimension(mm)



36.3 x27.2mm Double Oven Controlled Crystal Oscillator

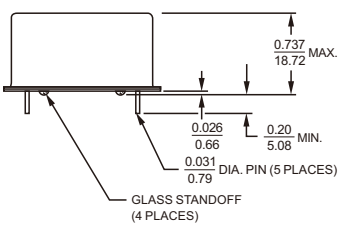
Feature

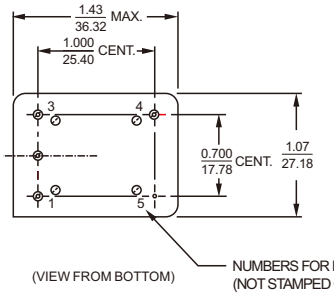
- Typical 36.3 x27.2 x 18.7mm.
- Hermetically Sealed Package
- Low power consumption and high reliability

Electrical Specifications

Parameter		3.3V			5.0V			Unit
		Min.	Type	Max.	Min.	Type	Max.	
OUTPUT (PIN = "R.F. OUTPUT")								
Frequency			10			10		MHz
Initial Accuracy		-0.1		+0.1	-0.1		+0.1	ppm
Output Level:	Output High	2.4			4.4			V
	Output Low			0.3			0.3	V
Waveform:		Rectangular			Rectangular			
Frequency stability								
Frequency stability	Ambient (0~+70°C /-30~+70°C)	±0.2, ±0.5			±0.2, ±0.5			ppb
	Daily	±0.1, ±0.3			±0.1, ±0.3			ppb
	Yearly	±20, ±50			±20, ±50			ppb
	10 Years	±0.1, ±0.2			±0.1, ±0.2			ppm
	Voltage(±5% change)	-0.2		+0.2	-0.2		+0.2	ppb
	Short term			0.007			0.007	ppb/s
	Load(±5% change)	-0.2		+0.2	-0.2		+0.2	ppb
	Warm-up	-20		+20	-20		+20	ppb
Phase Noise	10Hz			-120			-120	dBc/Hz
	100Hz			-138			-138	
	1kHz			-148			-148	
	10kHz			-155			-155	
	100kHz			-158			-158	
ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")								
Tuning Range	VCO @ Min. Voltage	-0.8		-0.35	-0.8		-0.35	ppm
	VCO @ Max. Voltage	+0.35		+0.8	+0.35		+0.8	ppm
Control Voltage	Ordering Information	0	+1.4	+2.8	0	+1.4	+2.8	V
INPUT POWER (PIN = "+VDC")								
Voltage		+3.135	+3.3	+3.465	+4.75	+5.0	+5.25	V
Current				2.5			1.75	A
Steady State				2.5			2.5	W
REFERENCE VOLTAGE (PIN = "REFERENCE VOLTAGE")								
Voltage		+2.66	+2.8	+2.94	+3.8	+4.0	+4.2	V
Storage Temperature		-40		+85	-40		+85	°C

Dimension(mm)





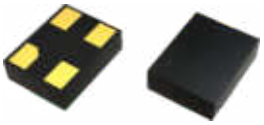
PIN CONNECTIONS	
PIN	FUNCTION
1 (See Note 1)	VCO INPUT or NOT CONNECTED
2 (See Note 1)	REFERENCE VOLTAGE or OVEN MONITOR or NOT CONNECTED
3	+VDC
4	R. F. OUTPUT
5	0 VOLTS & CASE

Note 1. If the specification does not specify parameters for either PIN1 or PIN2 then that respective PIN is NOT internally CONNECTED.

2.0x1.6 mm SMD SAW Resonator

Feature

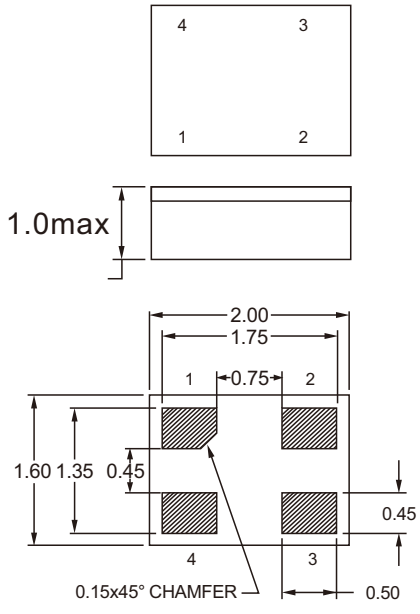
- Small size 2.0x1.6x1.0mm
- The optional frequency can be customized
- High transmit and receive sensitivity
- High temperature resistance and impact resistance
- Good power and reliability
- RoHS compliant



Electrical Specifications

Item			Minimum	Typical	Maximum	Unit
Frequency Range		f_c	154~1000MHz			MHz
Standard Frequency		f_c	303,315,390,433.92,435,72			MHz
Frequency Tolerance(at 25°C)		$\triangle f_c$	±50, ±75, ±150 or specify			kHz
Insertion Loss (in 50ohm system, min)		IL	1.0,1.3,1.4, 1.5 or specify			dB
Temperature Stability	Turnover Temperature	T_0	25	40	55	°C
	Turnover Frequency	f_0		fc		
	Frequency Temperature Coefficient	FTC		0.037		ppm/°C
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$		≤10		ppm/yr
DC Insulation Resistance between Any Two Pins			1.0			MΩ
Operating Temperature Range			-40~+85			°C
Storage Temperature Range			-40~+85			°C

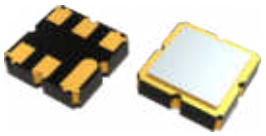
Dimension(mm)



Pin No.	Description
1	Input/ Output
3	Output/ Input
2,4	Ground

3.0x3.0 mm SMD SAW Resonator

Feature

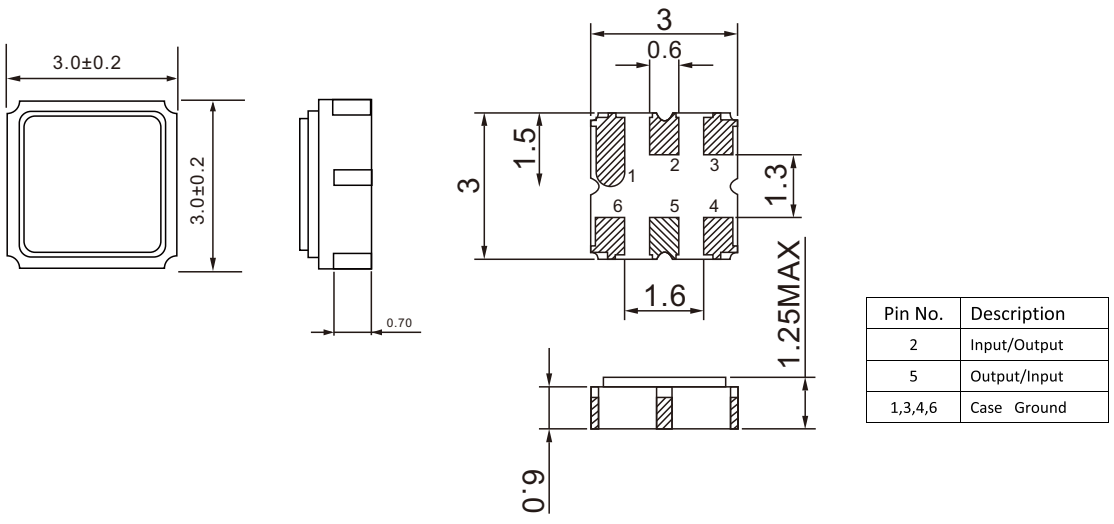


- Small size 3.0x3.0x1.3mm
- The optional frequency can be customized
- High transmit and receive sensitivity
- High temperature resistance and impact resistance
- Good power and reliability
- RoHS compliant

Electrical Specifications

Item			Minimum	Typical	Maximum	Unit
Frequency Range		f_c	154~1000MHz			MHz
Standard Frequency			315,330, 370,433.92,868,915			MHz
Frequency Tolerance(at 25°C)		$\triangle f_c$	±50, ±75, ±150 or specify			kHz
Insertion Loss (in 50ohm system, min)		IL	1.0,1.3,1.4, 1.5 or specify			dB
Temperature Stability	Turnover Temperature	T_0	25	40	55	°C
	Turnover Frequency	f_0		fc		
	Frequency Temperature Coefficient	FTC		0.032		ppm/°C
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$		≤10		ppm/yr
DC Insulation Resistance between Any Two Pins			1.0			MΩ
Operating Temperature Range			-40~+85			°C
Storage Temperature Range			-55~+125			°C

Dimension(mm)

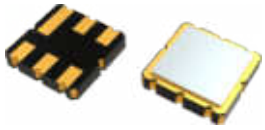


Pin No.	Description
2	Input/Output
5	Output/Input
1,3,4,6	Case Ground

3.8x3.8 mm SMD SAW Resonator

Feature

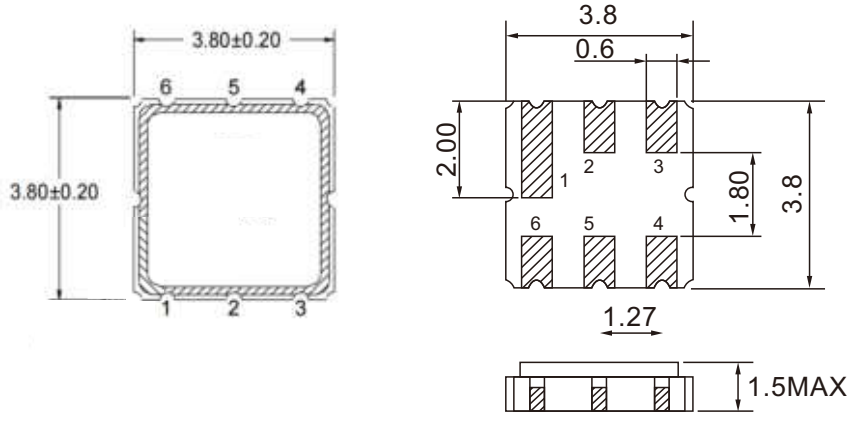
- Small size 3.8x3.8x1.5 mm
- The optional frequency can be customized
- High transmit and receive sensitivity
- High temperature resistance and impact resistance
- Good power and reliability
- RoHS compliant



Electrical Specifications

Item			Minimum	Typical	Maximum	Unit
Frequency Range		f_c	154~1000MHz			MHz
Standard Frequency			315,330, 370,433.92,868,915			MHz
Frequency Tolerance(at 25°C)		$\triangle f_c$	±50, ±75, ±150 or specify			kHz
Insertion Loss (in 50ohm system, min)		IL	1.0,1.3,1.4, 1.5 or specify			dB
Temperature Stability	Turnover Temperature	T_0	25	40	55	°C
	Turnover Frequency	f_0		fc		
	Frequency Temperature Coefficient	FTC		0.032		ppm/°C
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$		≤10		ppm/yr
DC Insulation Resistance between Any Two Pins			1.0			MΩ
Operating Temperature Range			-40~+85			°C
Storage Temperature Range			-55~+125			°C

Dimension(mm)

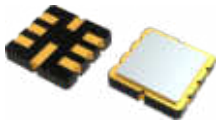


Pin No.	Description
2	Input/Output
5	Output/Input
1,3,4,6	Case Ground

5.0×5.0 mm SMD SAW Resonator

Feature

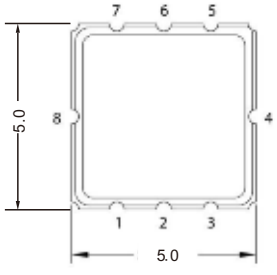
- Size 5.0x5.0x1.5 mm
- The optional frequency can be customized
- High transmit and receive sensitivity
- High temperature resistance and impact resistance
- Good power and reliability
- RoHS compliant

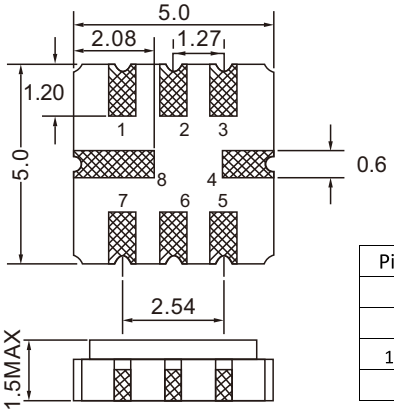


Electrical Specifications

Item			Minimum	Typical	Maximum	Unit
Frequency Range		f_c	154~1000MHz			MHz
Standard Frequency			315,330, 370,433.92,868,915			MHz
Frequency Tolerance(at 25°C)		$\triangle f_c$	±50, ±75, ±150 or specify			kHz
Insertion Loss (min)		IL	1.0,1.3,1.4, 1.5 or specify			dB
Temperature Stability	Turnover Temperature	T_0	25	40	55	°C
	Turnover Frequency	f_0		fc		
	Frequency Temperature Coefficient	FTC		0.032		ppm/°C
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$		≤10		ppm/yr
DC Insulation Resistance between Any Two Pins			1.0			MΩ
Operating Temperature Range			-40~+85			°C
Storage Temperature Range			-55~+125			°C

Dimension(mm)



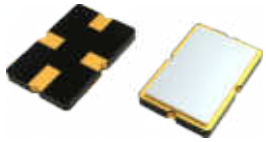


Pin No.	Description
2	Input/Output
6	Output/Input
1,3,5,7	To be grounded
4,8	Case Ground

5.0x3.5 mm SMD SAW Resonator

Feature

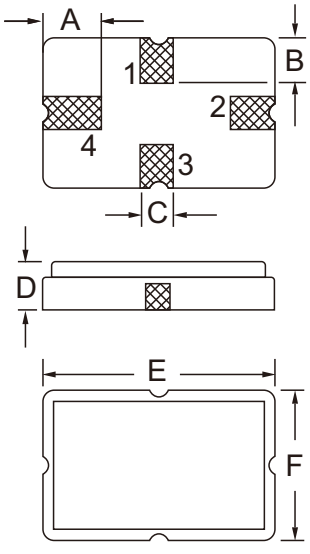
- Size 5.0x3.5x1.5 mm
- The optional frequency can be customized
- High transmit and receive sensitivity
- High temperature resistance and impact resistance
- Good power and reliability
- RoHS compliant



Electrical Specifications

Item			Minimum	Typical	Maximum	Unit
Frequency Range		f_c	154~1000MHz			MHz
Standard Frequency			315,330, 370,433.92,868,915			MHz
Frequency Tolerance(at 25°C)		$\triangle f_c$	±50, ±75, ±150 or specify			kHz
Insertion Loss (min)		IL	1.0,1.3,1.4, 1.5 or specify			dB
Temperature Stability	Turnover Temperature	T_0	25	40	55	°C
	Turnover Frequency	f_0		fc		
	Frequency Temperature Coefficient	FTC		0.032		ppm/°C
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$		≤10		ppm/yr
DC Insulation Resistance between Any Two Pins			1.0			MΩ
Operating Temperature Range			-40~+85			°C
Storage Temperature Range			-55~+125			°C

Dimension(mm)

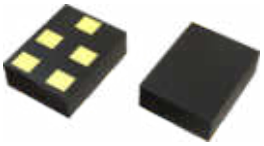


Sign	Data (unit: mm)	Sign	Data (unit: mm)
A	1.2±0.1	D	1.4±0.1
B	0.8±0.1	E	5.0±0.1
C	0.5	F	3.5±0.1

Pin No.	Description
1	Input/Output
3	Output/Input
2,4	Case Ground

1.1x0.9 mm SMD SAW Filter

Feature

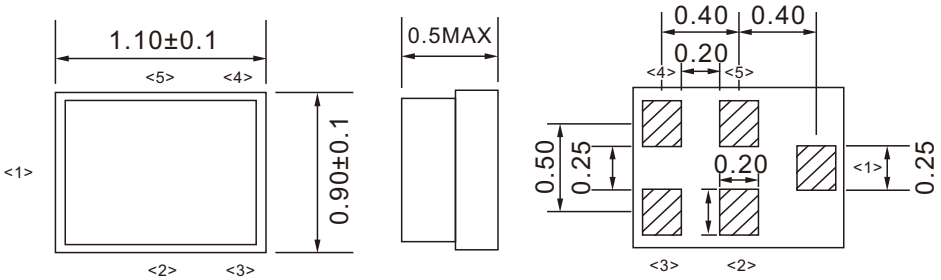


- Small size 1.1x 0.9, Ultra thin , thickness 0.5mm
- CSP process with chip scale package
- Standardization of small size
- Good stability and high reliability
- Mainly used in GPS navigation
- TDD/FDD communication and artificial intelligence chips
- RoHS compliant

Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	800~2605MHz	MHz
Standard Frequency		1575.42, 1582.4,1568	MHz
Useful Band Width		3,18,48 or specify	MHz
Insertion Loss (min)	IL	0.9,1.3,1.8, 2.2 or specify	dB
VSWR(max)		2.0	dB
Operating Temperature Range		−40~+85	℃
Storage Temperature Range		−40~+85	℃

Dimension(mm)

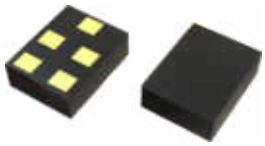


Pin No.	Description
1	Input
4	Output
2,3,5	To be grounded

1.4x1.1 mm SMD SAW Filter

Feature

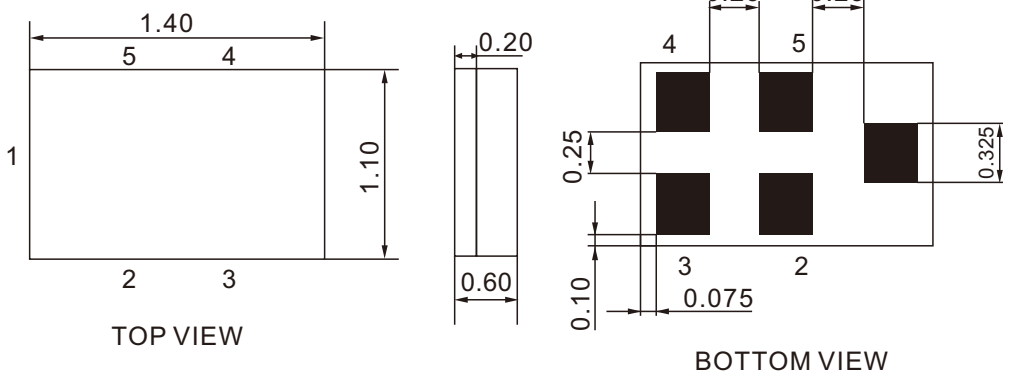
- Small size 1.4x 1.1
- CSP process with chip scale package
- Standardization of small size
- Good stability and high reliability
- Mainly used in GPS navigation
- TDD/FDD communication and artificial intelligence chips
- RoHS compliant



Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	800~2605MHz	MHz
Standard Frequency		868.5,1575.42, 1582.4,1568	MHz
Useful Band Width		3,18,48 or specify	MHz
Insertion Loss (min)	IL	0.9,1.3,1.8, 2.2 or specify	dB
VSWR(max)		2.0	dB
Operating Temperature Range		−40~+85	℃
Storage Temperature Range		−40~+85	℃

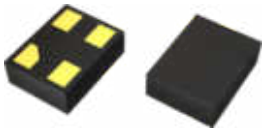
Dimension(mm)



Pin No.	Description
1	Input
4	Output
2,3,5	To be grounded

2.0 x 1.5 mm SMD SAW Filter

Feature

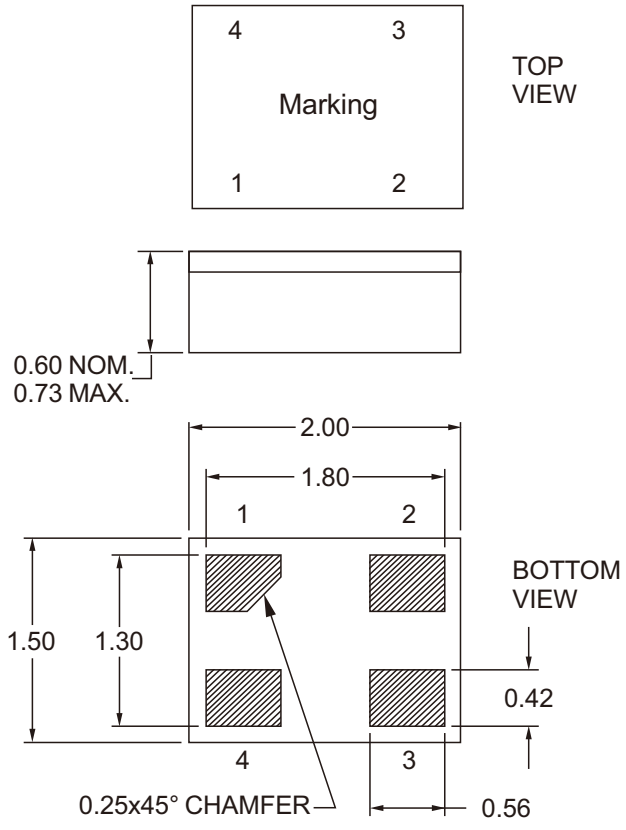


- Small size 2.0x1.5x0.6mm
- CSP process with chip scale package
- Standardization of small size
- Good stability and high reliability
- Mainly used in GPS navigation
- TDD/FDD communication and artificial intelligence chips
- RoHS compliant

Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	800~2605MHz	MHz
Standard Frequency		861,915, 921.5,2345	MHz
Useful Band Width		5,25,40,50 or specify	MHz
Insertion Loss (min)	IL	1.5,2.5,3.2 or specify	dB
Operating Temperature Range		-40~+85	℃
Storage Temperature Range		-40~+85	℃

Dimension(mm)

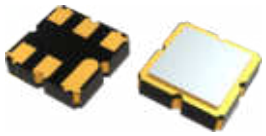


Pin No.	Description
1	Input
3	Output
2,4	Case Ground

3.0 x 3.0 mm SMD SAW Filter

Feature

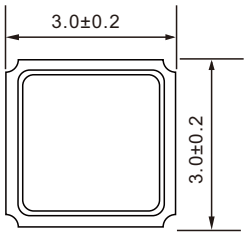
- Small size 3.0x3.0x1.25mm
- Welding can be done with automatic mounting
- Low-loss SAW component
- Low amplitude ripple
- Sharp rejections at both out-bands
- RoHS Compliant

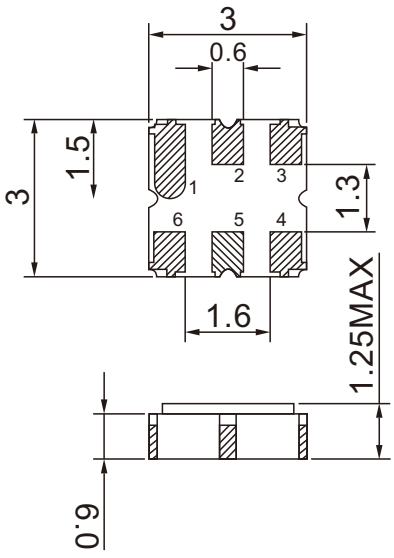


Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	300~2605MHz	MHz
Standard Frequency	f_c	433.92,861,915,1575.42,1582.4,2492 Band1,2,3,5,6,8,12,13,16,17,20,27,28,34,38,39,40,41	MHz
Band Width		6, 10, 15,50 or specify	MHz
Insertion Loss (min)	IL	1.0,1.5,3.0, 6.5 or specify	dB
Operating Temperature Range		-40~+85	℃
Storage Temperature Range		-55~+125	℃

Dimension(mm)



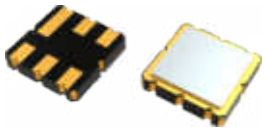


Pin No.	Description
2	Input
5	Output
1,3,4,6	Ground

3.8×3.8 mm SMD SAW Filter

Feature

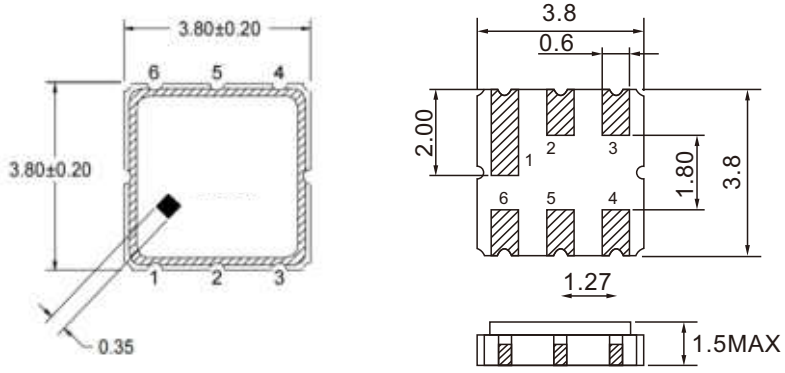
- Small size 3.8x3.8x1.5mm
- Welding can be done with automatic mounting
- Low-loss SAW component
- Low amplitude ripple
- Sharp rejections at both out-bands
- RoHS Compliant



Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	100~1000MHz	MHz
Standard Frequency	f_c	315,433.92,480,500,866.5	MHz
Band Width		2, 3,5,10,20,40, or specify	MHz
Insertion Loss (min)		1.5,1.8,2.0,3.0, 6.5 or specify	dB
Operating Temperature Range	IL	−40~+85	℃
Storage Temperature Range		−55~+125	℃

Dimension(mm)

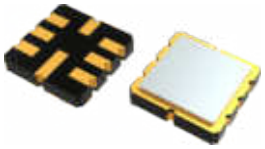


Pin No.	Description
2	Input/Output
5	Output/Input
1,3,4,6	Case Ground

5.0×5.0 mm SMD SAW Filter

Feature

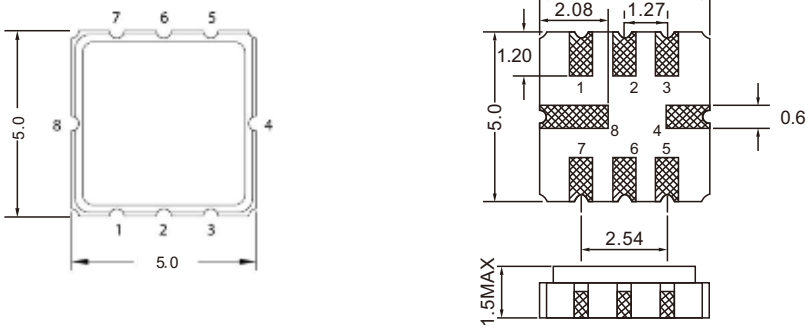
- Small size 5.0x5.0x1.5mm
- Welding can be done with automatic mounting
- Low-loss SAW component
- Low amplitude ripple
- Sharp rejections at both out-bands
- RoHS Compliant



Electrical Specifications

Item		Specifications	Unit
Frequency Range	f_c	100~1000MHz	MHz
Standard Frequency	f_c	110,315,433.92	MHz
Band Width		2, 3,5, 10, 20 or specify	MHz
Insertion Loss (min)		1.8,2.2,3.0, 6.5 or specify	dB
Operating Temperature Range	IL	−40~+85	℃
Storage Temperature Range		−55~+125	℃

Dimension(mm)



2	Input/Output
6	Output/Input
1,3,5,7	To be grounded
4,8	Case Ground

DIP Dielectric Antenna

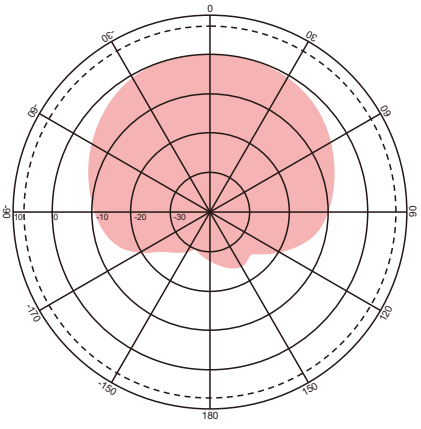
Feature

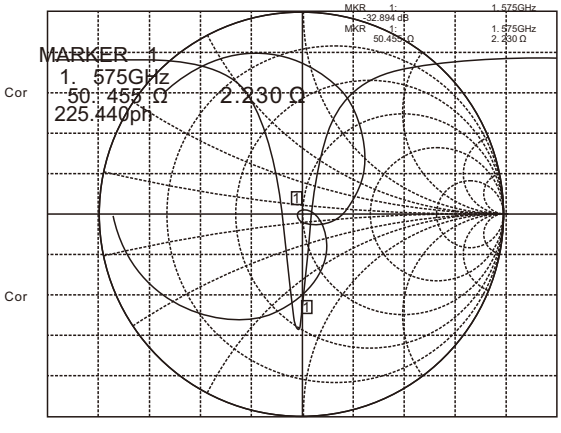
- Various Applications: GPS,BD+GPS, GPS+COMPASS and Multimode
- Various sizes: 10x10mm to 45x 45mm
- High quality dielectric ceramics
- Excellent Radiation Pattern

Electrical Specifications

Model	Frequency	Gain	Output VSWR	Size	Polarization
SPATB1L1G1364 BL5456_JHS04	GPS L1/L5 BDS B1/B2a GLONASS G1 GALILEO E1/E5a	3.5@B1L1E1G1 3.0@L5E5aB2a	≤2.0	45*45*6mm+36*36*4mm	RHCP
SPATL1364BL54 08_G003	GPS L1/L5 BDS B1 GLONASS G1 GALILEO E1/E5a	3.5@B1L1E1G1 2.5@L5E5a	≤2.0	40*40*8mm+36*36*4mm	RHCP
SPATL1364BL53 66_G002	GPS L1/L5 BDS B1 GLONASS G1 GALILEO E1/E5a	3.0@B1L1E1G1 1.5@L5E5a	≤2.0	36*36*6mm+36*36*4mm	RHCP
GGL5-36H325H 4-JHY06	GPS L1/L5 GLONASS G1 GALILEO E1/E5a	3.0	≤1.5	36*36*3mm+25*25*4mm	RHCP
SPATL1254BL5 334_G001	GPS L1/L5 BDS B1 GLONASS G1 GALILEO E1/E5a	1.0@B1L1E1G1 1.0@L5E5a	≤2.0	33*33*4mm+25*25*4mm	RHCP
SPATL1182BL5 254_J7002	GPS L1/L5 GALILEO E1/E5a	2.5	≤2.0	25*25*4mm+18*18*2mm	RHCP
DAS1582R36D 36-3F	GPS L1 BDS B1 GALILEO E1 GLONASS G1	4	≤1.5	36*36*6mm	RHCP
DAS1595R25Y 14_70	GPS L1 GLONASS G1	2.5	≤1.5	25*25*4mm	RHCP
DAS1575R25C 12_70	GPS L1	3.0	≤1.5	25*25*2mm	RHCP
DAS1575R20C 14_50	GPS L1	3.0	≤1.5	20*20*4mm	RHCP
DAS1575R18C 14_Y5003	GPS L1	2.5	≤1.5	18*18*4mm	RHCP
DAS1575R15C 14_30	GPS L1	0.5	≤1.5	15*15*4mm	RHCP
DAS1575R12C 14_Y2001	GPS L1	-2.0	≤1.5	12*12*4mm	RHCP
DAS1575R10C 14_20	GPS L1	-4.0	≤1.5	10*10*4mm	RHCP

Radiation Pattern & Directional Diagram Example

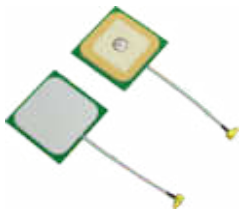




SMD Dielectric Antenna

Feature

- Various Applications: GPS+GLONASS, GPS+COMPASS and Multimode;
- Various sizes: 8x8mm to 25x 25mm;
- High quality dielectric ceramics
- Excellent Radiation Pattern

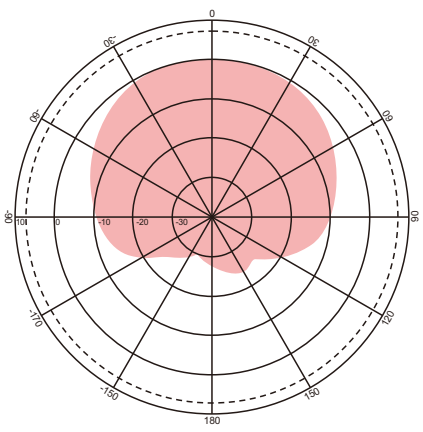


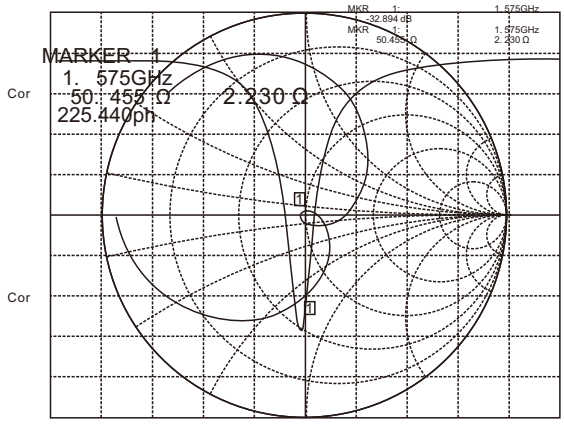
Electrical Specifications

Part Number	Size(mm)	Frequency (MHz)	-10dB Bandwidth (MHz) min.	VSWR (in BW) max.	Ground Plane Size(mm)	Applications
DAS1568R25	25X25	1561-1575	20.0	2.0	50X50	BD+GPS
DAS1568R20	20X20	1561-1575	15.0	2.0	50X50	
DAS1568R18	18X18	1561-1575	--	--	50X50	
DAS1568R15	15X15	1561-1575	--	--	50X50	
DAS1568R12	12X12	1561-1575	--	--	50X50	
DAS1568R10	10X10	1561-1575	--	--	50X50	
DAS1568R09	9X9	1561-1575	--	--	50X50	
DAS1568R08	8X8	1561-1575	--	--	50X50	
DAS1575R25	25X25	1575.42	15.0	2.0	50X50	GPS
DAS1575R20	20X20	1575.42	10.0	2.0	50X50	
DAS1575R18	18X18	1575.42	8.0	2.0	50X50	
DAS1575R15	15X15	1575.42	8.0	2.0	50X50	
DAS1575R12	12X12	1575.42	7.0	2.0	50X50	
DAS1575R10	10X10	1575.42	6.0	2.0	50X50	
DAS1575R09	9X9	1575.42	6.0	2.0	50X50	
DAS1575R08	8X8	1575.42	5.0	2.0	50X50	
DAS1590R25	25X25	1575-1610	--	--	50X50	GPS+GLONASS
DAS1590R20	20X20	1575-1610	--	--	50X50	
DAS1590R18	18X18	1575-1610	--	--	50X50	
DAS1590R15	15X15	1575-1610	--	--	50X50	
DAS1590R12	12X12	1575-1610	--	--	50X50	
DAS1590R10	10X10	1575-1610	--	--	50X50	
DAS1590R09	9X9	1575-1610	--	--	50X50	
DAS1590R08	8X8	1575-1610	--	--	50X50	

Note: 1.Antenna thickness can be customized according to actual requirements;
2.Beidu l, Beidou ll, GLONASS and GNSS can be customized;
3.Antenna pads can be customized according to requirements.

Radiation Pattern & Directional Diagram Example





GPS,GLONASS,
Built-in navigation antenna

Feature

- Various Frequency: GPS-L1, BDS-B1
- Various sizes: 12x12mm to 25x25mm
- High quality dielectric ceramics
- Excellent Radiation Pattern
- Application: Positioning, navigation, timing

Electrical Specifications

Part Number	Size (mm)	Frequency (MHz)	Antenna Gain (dB)	Axial Ratio (dB)	VSWR	Noise Figure (dB)	LNA Gain (dB)	Output Impedance (Ω)	Working Voltage (V)	Working Current (mA)
WGPI2540P062	25X25X4	GPS-L1	2.5	3	2.0:1	2.2	26	50	3±0.5	11.5±1
WGPI2520P062	25X25X2	GPS-L1	1.5	3	2.0:1	2.2	26	50	3±0.5	11.5±1
WGPI2540P251	25X25X4	GPS-L1	2.5	3	2.0:1	1.1	19	50	3±0.5	4.5±1
WGPI2540P272	25X25X4	GPS-L1	2.5	3	2.0:1	1.2	30	50	3±0.5	8.5±1
WGPI2540P271	25X25X4	GPS-L1	2.5	3	2.0:1	1.2	32	50	3±0.5	8.5±1
WGPI2520P271	25X25X2	GPS-L1	1.5	3	2.0:1	1.2	32	50	3±0.5	8.5±1
WGPI2040P053	20X20X4	GPS-L1	2.0	3	2.0:1	1.5	26	50	3±0.3	10.0±1
WGPI2020P053	20X20X2	GPS-L1	1.0	3	2.0:1	1.5	26	50	3±0.3	10.0±1
WGPI1840P185	18X18X4	GPS-L1	2.0	3	2.0:1	1.2	32	50	3±0.5	8.5±1
WGPI1820P185	18X18X2	GPS-L1	1.0	3	2.0:1	1.2	32	50	3±0.5	8.5±1
WGPI1840P186	18X18X4	GPS-L1	2.0	3	2.0:1	1.2	19	50	3±0.5	4.2±1
WGPI1540P045	15X15X4	GPS-L1	1.5	3	2.0:1	1.5	16	50	3±0.5	4.5±1
WGPI1540P151	15X15X4	GPS-L1	1.5	3	2.0:1	1.5	42	50	3±0.5	8.5±1
WGPI1540P152	15X15X4	GPS-L1	1.5	3	2.0:1	1.2	22	50	3±0.5	4.2±1
WGBI2040P053	20X20X4	GPS-L1/ BDS-B1	2.0	6	2.0:1	1.5	26	50	3±0.3	10.0±1
WGBI2020P053	20X20X2	GPS-L1/ BDS-B1	1.0	6	2.0:1	1.5	26	50	3±0.3	10.0±1
WGBI1840P185	18X18X4	GPS-L1/ BDS-B1	2.0	6	2.0:1	1.2	32	50	3±0.5	8.5±1
WGBI1820P185	18X18X2	GPS-L1/ BD-B1	1.0	6	2.0:1	1.2	32	50	3±0.5	8.5±1
WGBI1840P186	18X18X4	GPS-L1/ BDS-B1	2.0	6	2.0:1	1.2	19	50	3±0.5	4.2±1
WGBI1540P045	15X15X4	GPS-L1/ BDS-B1	1.5	6	2.0:1	1.5	16	50	3±0.5	4.5±1
WGBI1540P151	15X15X4	GPS-L1/ BDS-B1	1.5	6	2.0:1	1.5	42	50	3±0.5	8.5±1
WBDI1540P152	15X15X4	BDS-B1	1.5	3	2.0:1	1.2	22	50	3±0.5	4.2±1
WBDI1540P155	15X15X4	BDS-B1	1.5	3	2.0:1	1.5	25	50	3±0.5	8.5±1
WBDI1520P152	15X15X2	BDS-B1	0.5	3	2.0:1	1.2	22	50	3±0.5	4.2±1
WBDI1520P154	15X15X2	GPS-L1/ BDS-B1	0.5	3	2.0:1	1.2	19	50	3±0.5	4.2±1
WBDI1340P033	13X13X4	BDS-B1	0.5	3	2.0:1	1.5	16	50	3±0.5	4.5±1
WBDI1220P121	12X12X2	BDS-B1	0.5	3	2.0:1	1.5	19	50	3±0.5	4.2±1

GPS,GLONASS,
Built-in navigation antenna

FEATURE

- Various Dimension:43X37x13.6/61x61x18mm
- Various Frequency:GPS-L1,BDS-B1
- High quality dielectric ceramics
- Excellent Radiation Pattern
- Application: Positioning, navigation, timing

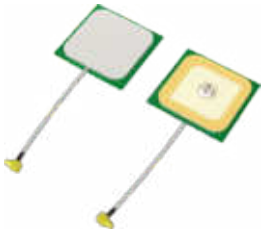
ELECTRICAL SPECIFICATIONS

Part Number	Frequency (MHz)	Axial Ratio Max	Antenna Gain dBi	Noise Figure max	VSWR	Current @3V	LNA Gain dB	In-band Flatness dB	Size(mm)	
DA001	GPS-L1	3dB	2.5dBi	2.2dB	2.0	11.2mA	26dB	±2dB	43X37X13.6	RG-174+SMA
DA002	GPS-L1/ BDS-B1	6dB	2.5dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA003	GPS-L1	8dB	2.0dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA004	GL-L1	10dB	1.5dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA005	GPS-L1	3dB	2.5dBi	1.2dB	2.0	8.4mA	32dB	±2dB	43X37X13.6	RG-174+SMA
DA006	GPS-L1/ BDS-N1	6dB	2.5dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA007	GPS-L1	8dB	2.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA008	GL-L1	10dB	1.5dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA009	GPS-L1	3dB	5.0dBi	2.2dB	2.0	11.2mA	26dB	±2dB	61X61X18	RG-174+SMA
DA010	GPS-L1/BDS-B1	3dB	5.0dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA011	GPS-L1	6dB	5.0dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA012	GL-L1	8dB	5.0dBi	2.2dB	2.0	11.2mA	26dB	±2dB		
DA001	GPS-L1	3dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB	61X61X18	RG-174+SMA
DA002	GPS-L1/BDS-N1	3dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA001	GPS-L1	8dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA002	GL-L1	10dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA001	BDS-B1	3dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB	61X61X18	RG-174+SMA
DA002	GLONASS-L1	3dB	5.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA001	BDS-B1/GPS-L1	3dB	3.0dBi	1.2dB	2.0	8.4mA	32dB	±2dB		
DA002	GLONASS-L1	3dB	2.5dBi	1.2dB	2.0	8.4mA	32dB	±2dB		

RFID, ETC, DSRC Dielectric Antenna

Feature

- Various Dimension
- Stabilized Temperature Factor
- High quality dielectric ceramics
- Excellent Radiation Pattern



Electrical Specifications

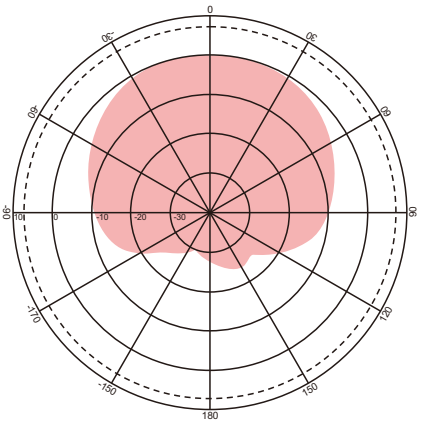
RFID

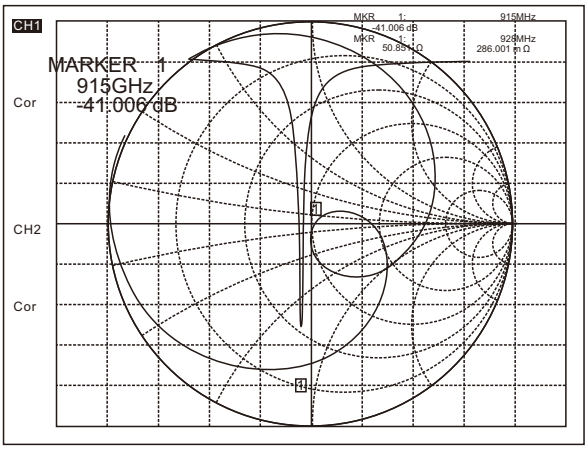
Part Number	Size(mm)	Frequency(MHz)	Ground Plane Size	Applications
DAR915X3030	30X30	902-928	150X150	RFID
DAR915X2509	25X9	902-928	150X150	
DAR915X1309	13X9	902-928	150X150	
DAR915X1307	13X7	902-928	150X150	
DAR915X1207	12X7	902-928	150X150	
DAR915X1103	11X3	902-928	150X150	
DAR915X0605	ϕ6X5	902-928	150X150	
Note: The application frequency band of 868MHz is a so applicable				

RF Antenna

Part Number	Size(mm)	Frequency(MHz)	-10dB Bandwidth (MHz) min.	VSWR (in BW) max.	Ground Plane Size	Applications
DAE915R7880A	78.5X78.5	902-928	26.0	2.0	95X95	RFID/ETC/DSRC
DAE915R6150A	61.5X61.5	902-928	8.0	2.0	95X95	
DAE915R4060A	40X40	902-928	5.0	2.0	70X70	
DAE915R3540C	35.5X35.5	902-928	3.0	2.0	40X40	
DAE915R2540J	25X25	902-928	2.0	2.0	40X40	
DAE915R1840G	18X18	902-928	2.0	2.0	40X40	
DAE5810R1330C	13X13	5725-5850	400.0	2.0	40X40	
Note: The application frequency band of 868MHz is a so applicable						

Radiation Pattern & Directional Diagram Example





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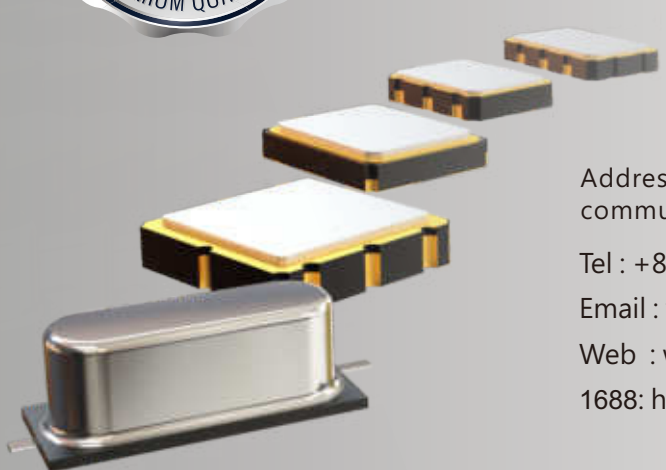

WTL International Limited

Address: 106, Building 3, jinyulingfeng, No.155, Bulong RoadShuijing community, jihua Street,Longgang District,ShenzhenCity, 518112,China

Tel : +86-755-82677582

Email : wtl@wtlcrystals.com

Web : www.wtlcrystals.com

1688: https//wtlcrystals.en.alibaba.com