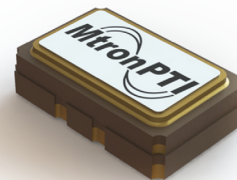


M618x Series

3.2 x 5.0 mm, 3.0, 3.3 & 5.0 V, HCMOS or Clipped Sine Wave
Precision TCXO/TCVCXO

Product Features

- Tight stability performance
(± 0.2 ppm) over Industrial Temperatures (-40°C to $+85^{\circ}\text{C}$)
(± 0.1 ppm) over Commercial Temperatures (0°C to 70°C)
- 3.0 V, 3.3 V and 5.0 V versions
- Low phase noise performance
- Tristate Function standard



Product Description

MtronPTI's M618x Series TCXO's and TCVCXO's provide design engineers with low voltage, surface mount products with extremely tight stability (down to ± 0.10 ppm) over temperature and time. Specially processed crystals enable the M618x to achieve consistent long-term stability and minimal frequency shift after reflow. The low phase noise (-155 dBc/Hz at 100 kHz) makes the M618x ideal for the design engineer working on all types of systems as the reference timing source.

Product Applications

The M618x Series is ideally suited for a wide range of applications such as GPS, military, avionics, test and measurement, WLAN, WiMax base stations, point to point/multi-point radios, medical equipment, frequency synthesis, frequency translation and land mobile radio. Standard output for the M618x series is HCMOS compatible or clipped sine wave. The product is ideally suited for battery and remote applications where it draws as little as 1.5 mA of current with a 3.3 volt supply at 13 MHz. This low power consumption provides an advantage over similarly specified ovenized oscillators for power-sensitive applications. The M618x series offers ± 10 ppm minimum pull range with excellent tuning linearity performance for critical PLL applications. This series is available in selective frequencies from 8 MHz to 52 MHz.

Product Ordering Information

Ordering Information		M618x		1 J T C N		00.0000 MHz	
Product Series		M6180: 5.0 V M6181: 3.3 V M6182: 3.0 V					
Temperature Range		1: 0°C to $+70^{\circ}\text{C}$ 2: -40°C to $+85^{\circ}\text{C}$ 6: -20°C to $+70^{\circ}\text{C}$		8: 0°C to $+50^{\circ}\text{C}$ F: -30°C to $+75^{\circ}\text{C}$			
Stability		M: ± 0.2 ppm N: ± 0.10 ppm Q: ± 0.14 ppm		P: ± 0.3 ppm G: ± 0.5 ppm J: ± 1.0 ppm		K: ± 2.0 ppm H: ± 2.5 ppm L: ± 4.6 ppm	
Output Type		T: Voltage Controlled With Tristate (VCTCXO) F: No Voltage Control With Tristate (TCXO)					
Output Waveform		C: 45/55% HCMOS S: Clipped Sinewave					
Package/Lead Configurations		N: Leadless Ceramic Frequency (customer specified)					

M6180Sxxx, M6181Sxxx, M6182Sxxx - Contact factory for datasheets.

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Performance Characteristics

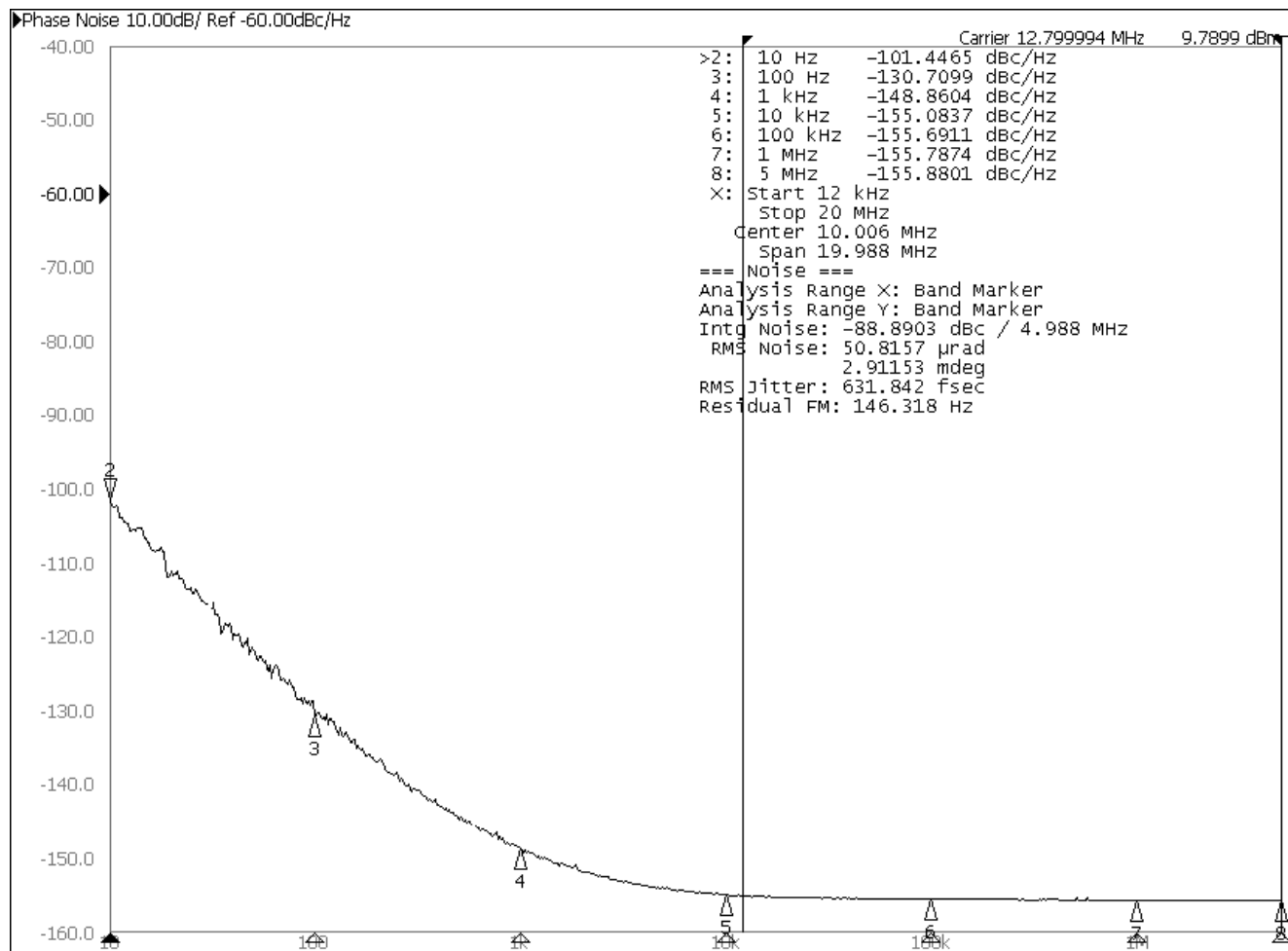
Electrical Specifications	Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions/Notes	
	Frequency Range	F _O	8		52	MHz		
	Operating Temperature	T _A	(See Ordering Information)			°C		
	Storage Temperature	T _{STG}	-55		+125	°C		
	Frequency Tolerance @ +25 °C	ΔF/F	-1.0		+1.0	ppm	For TCXO only	
	Frequency Stability	ΔF _T /F	(See Ordering Information)			ppm	(F _{MAX} - F _{MIN})/2	
	Stability vs. Reflow		-1.0		+1.0	ppm		
	Frequency vs. Supply	ΔF _{VDD} /F		±0.02	±0.1	ppm	For ±5% supply voltage variation	
	Frequency vs. Load	ΔF _{LOAD} /F		±0.02	±0.1	ppm	For ±5% load variation	
	Aging (First Year)		-1.0		+1.0	ppm	F ₀ ≤ 20 MHz	
	Aging (First Year)		-2.0		+2.0	ppm	F ₀ > 20 MHz	
	Aging (10 Year)		-3.0		+3.0	ppm	F ₀ ≤ 20 MHz (includes first year)	
	Aging (10 Year)		-5.0		+5.0	ppm	F ₀ > 20 MHz (includes first year)	
	Supply Voltage	V _{DD}	(See Ordering Information)			V	±5% voltage tolerance	
	Supply Current (Reference to V _{DD} = 3.3 V)	I _{DD}	2.0 3.0 5.5 1.3 1.7 2.8		3.0 4.0 6.5 1.9 2.3 3.5	mA mA mA mA mA mA	HCMOS output at 13 MHz HCMOS output at 26 MHz HCMOS output at 52 MHz Clipped Sine Wave output at 13 MHz Clipped Sine Wave output at 26 MHz Clipped Sine Wave output at 52 MHz	
	Output Logic Levels (HCMOS)	V _{OL} V _{OH}	80		20	% V _{DD} % V _{DD}	I _{OH} /I _{OL} = ±4 mA, V _{DD} = +3.0 V I _{OH} /I _{OL} = ±4 mA, V _{DD} = +3.0 V	
	Output Level (Clipped Sine Wave)	V _{OUT} V _{OUT}	1.0 0.8			V _{pk-pk} V _{pk-pk}	F ₀ ≤ 40 MHz F ₀ > 40 MHz	
	Symmetry (Duty Cycle)	t _{DC}	40	50	60	%	Ref. to ½ V _{DD} HCMOS Only	
	Rise/Fall Time	t _R /t _F			6.5	ns	Ref. 10% to 90% HCMOS only	
	Output Load		15 pF 10 kΩ 10 pF				HCMOS Output Clipped Sine Wave Output	
	Frequency Adjustment		-10		+10	ppm	Over Control Voltage Range	
	Control Voltage Range		0.3 0.3 0.5	1.50 1.65 2.50	2.7 3.0 4.5	V V V	For V _{DD} = 3.0 V For V _{DD} = 3.3 V For V _{DD} = 5.0 V	
	Input Leakage Current		-50		+50	μA		
	Input Resistance		100			kΩ		
	Linearity				5	%		
	Modulation Bandwidth		2 kHz					
	Tristate Function		70		30	% V _{DD} % V _{DD}	Output enabled. Logic “1” or “Open” Output disabled. Logic “0” or “GND”	
	Tristate Leakage Current		-100		+100	μA		
	Phase Noise (Typical 12.8 MHz HCMOS @ 3.3 V)			-101 -130 -149 -155 -156		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	@ 10 Hz Offset @ 100 Hz Offset @ 1 kHz Offset @ 10 kHz Offset @ 100 kHz Offset	
	Environmental	Shock	MIL-STD-202, Method 213, Condition C (100 g)					
		Vibration	MIL-STD-202, Methods 201 & 204 (10 g from 10 Hz to 2000 Hz)					
		Solderability	EIAJ-STD-002					
Package		3.2 mm x 5.0 mm x 1.58 mm, SMT (RoHS Compliant)						
Max Soldering Conditions		See solder profile						

M618x Series

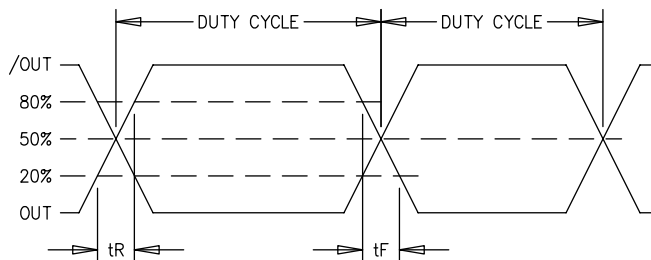
3.2 x 5.0 mm, 3.0, 3.3 & 5.0 V, HCMOS or Clipped Sine Wave
Precision TCXO/TCVCXO

Phase Noise Plot

M618x 12.8 MHz Phase Noise



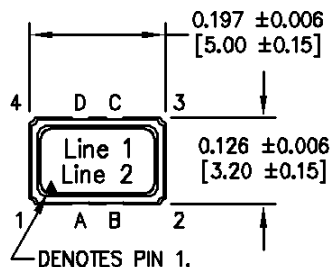
Output Waveform (HCMOS Output)



M618x Series

3.2 x 5.0 mm, 3.0, 3.3 & 5.0 V, HCMOS or Clipped Sine Wave
Precision TCXO/TCVCXO

Product Dimension & Pinout Information

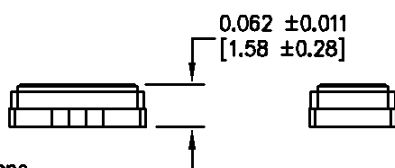


Pad Connections:

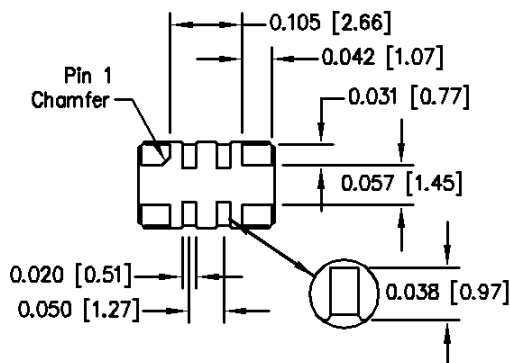
- 1= EFC or n/c
- A= n/c
- B= n/c
- 2= Ground
- 3= Output
- C= Enable/Disable or n/c
- D= Low Phase Noise capacitor or n/c
- 4= Supply Voltage

Marking

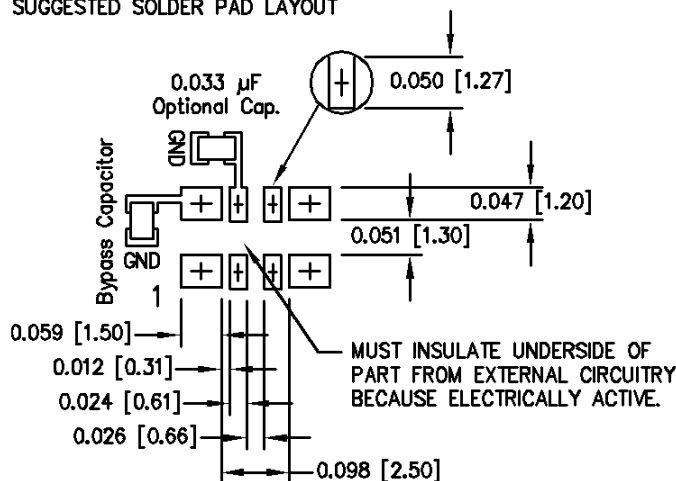
Line 1: M61 YM
Line 2: XXMXXX



All dimensions
in inches [mm].



SUGGESTED SOLDER PAD LAYOUT

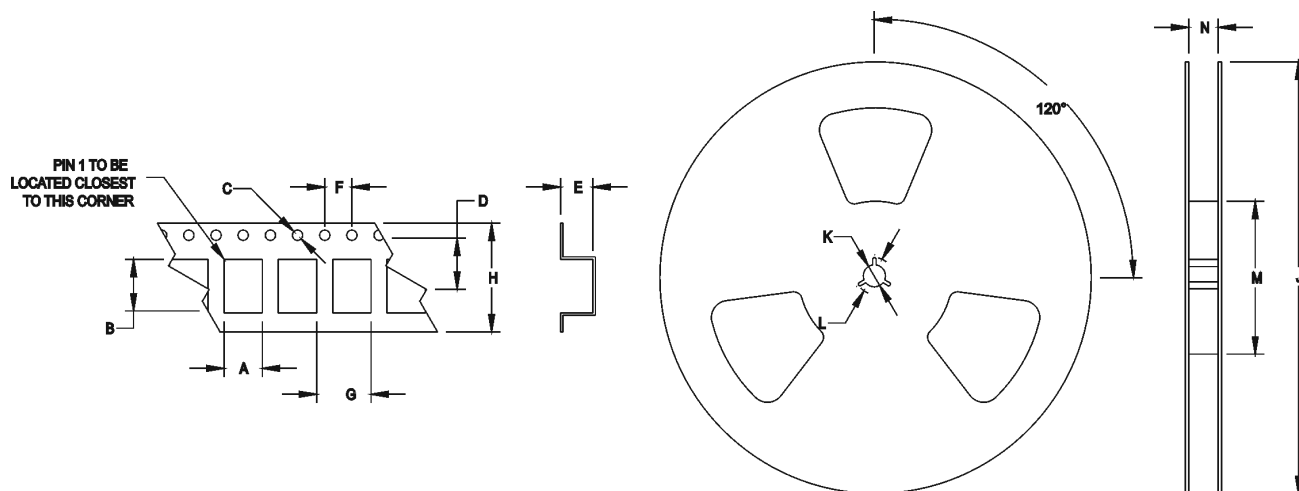


M618x Series

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Precision TCXO/TCVCXO

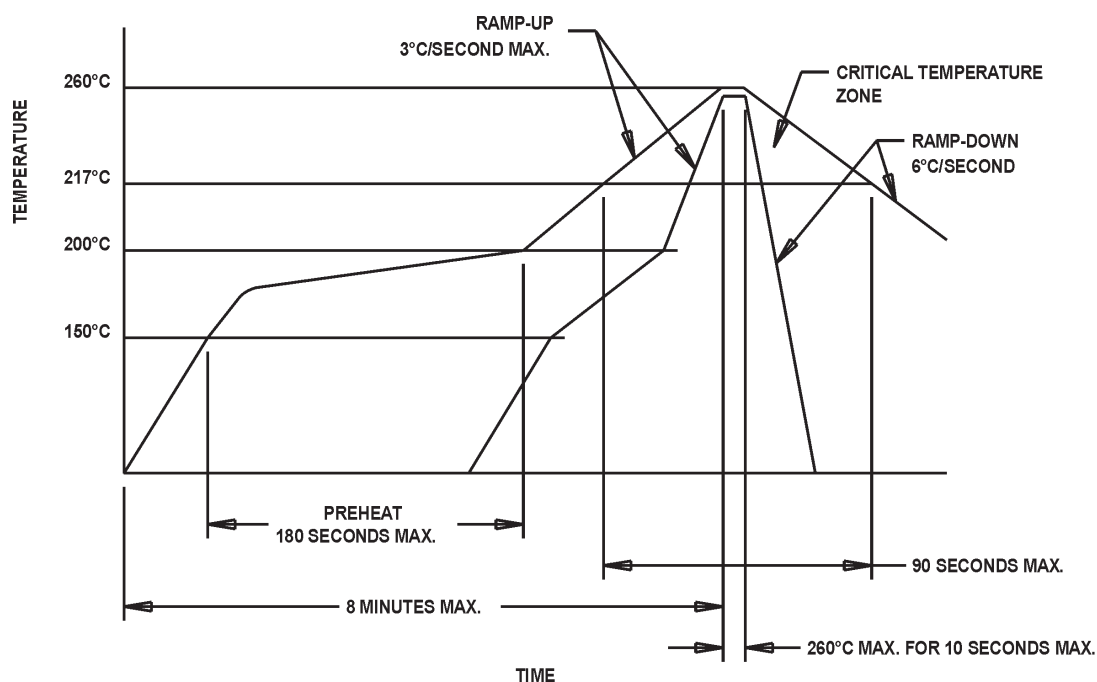
Tape & Reel Specifications

(all measurements are in mm)	A	B	C	D	E	F	G	H	J	K	L	M	N
M618x	3.6	5.4	1.5	5.5	1.9	4	8	12	180	13	20.2	60	12



Standard Tape and Reel: 1000 parts per reel

Maximum Soldering Conditions



Note: Exceeding these limits may damage the device.

M618x Series

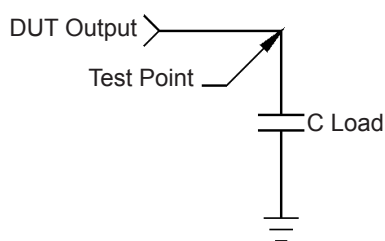
3.2 x 5.0 mm, 3.0, 3.3 & 5.0 V, HCMOS or Clipped Sine Wave
Precision TCXO/TCVCXO

Quality Parameters

Environmental Specifications/Qualification Testing Performed		
Test	Test Method	Test Condition
Electrical Characteristics	Internal Specification	Per Specification
Frequency vs. Temperature	Internal Specification	Per Specification
Mechanical Shock	MIL-STD-202, Method 213, C	100 g's
Vibration	MIL-STD-202, Method 201-204	10 g's from 10-2000 Hz
Thermal Cycle	MIL-STD-883, Method 1010, B	-55 Deg. C to +125 Deg. C, 15 minute Dwell, 10 cycles
Aging	Internal Specification	168 Hours at 105 Degrees C
Gross Leak	MIL-STD-202, Method 112	30 Second Immersion
Fine Leak	MIL-STD-202, Method 112	Must meet 1×10^{-8}
Solderability	MIL-STD-883, Method 2003	8 Hour Steam Age – Must Exhibit 95% coverage
Resistance to Solvents	MIL-STD-883, Method 2015	Three 1 minute soaks
Physical Dimensions	MIL-STD-883, Method 2016	Per Specification
Internal Visual	Internal Specification	Per Internal Specification

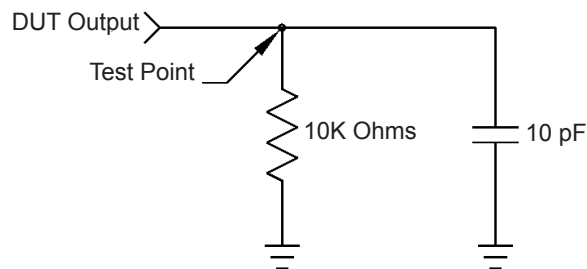
Load Circuit

Load Circuit #2 - HCMOS Output



Note: C Load includes probe and fixturing.

Load Circuit #7 - Clipped Sine Wave Output



For custom products or additional specifications contact our sales team at
800.762.8800 (toll free) or 605.665.9321

For more information on this product visit the MtronPTI website at
www.mtronpti.com