



Introduces

M6001/M6002 SERIES TCXO

and

M6003/M6004 SERIES VCTCXO

- Operating stabilities to ± 0.5 ppm
- Stratum III stability of ± 4.6 ppm (non-holdover) over an operating temperature of -40°C to $+85^{\circ}\text{C}$ for ten years
- 3.3 V or 5.0 V operating voltage
- Ideal for Signal Processing, Military/Avionic Communications, Flight Controls, WLAN, Basestations, DWDM, SERDES, SONET/SDH, 10G and 40G Ethernet Applications

MtronPTI

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APPLICATION INFORMATION

M6001, M6002, M6003 & M6004 Series **9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO**

MtronPTI is one of the first companies to introduce a family of low voltage, surface mount TCXO's and VCTCXO's (voltage controlled TCXO) that are designed to provide network and wireless engineers with products that offer tight stability and excellent aging characteristics. The M6001-6004 Series utilizes hermetically sealed crystals, along with a "low-aging" process, to achieve consistent, long-term stability and minimal frequency shift in the customer's application after re-flow. With this process, a first year aging rate of less than 1 ppm is achievable. A stability of ± 0.5 ppm over 0°C to $+70^{\circ}\text{C}$ is available as well as stabilities ranging from ± 1 ppm to ± 4.6 ppm over -40°C to $+85^{\circ}\text{C}$.

A special version (L-stability option) of the M6001-6004 is available for Stratum 3 applications. MtronPTI's unique approach to crystal compensation enables these devices to achieve Stratum 3 stability (± 4.6 ppm) from -40°C to 85°C . The low phase noise (-143 dBc/Hz @ 10 kHz) make the M6001-6004 ideal for those design engineers working on high data-rate, low BER data communication network products.

The M6001/M6002 (3.3 V and 5 V TCXO) and M6003/M6004 (3.3 V and 5 V VCTCXO) are ideally suited for a wide range of applications such as: SONET, SDH, SERDES, and PCS base stations; point to point/multi-point radios; WDM systems; Gig-Ethernet; 10G and 40G systems; test and measurement; frequency synthesis; frequency translation; specialized mobile radio, and WLAN. Standard output for the M6001-6004 series is HCMOS compatible and draws as little as 4 mA with a 3.3 volt supply at 19.440 MHz frequency. This low power consumption provides an advantage over similarly specified ovenized oscillators for power-sensitive applications.

Customers can order product with or without the tristate feature. The M6003-6004 series offers ± 10 ppm minimum pull range with excellent tuning linearity performance for critical PPL applications. These products are available in frequencies from 5 to 30 MHz, and can be offered in a surface mount FR-4 based platform with industry standard 9 x 14 mm footprint. Contact the factory for 14 pin DIP configuration.

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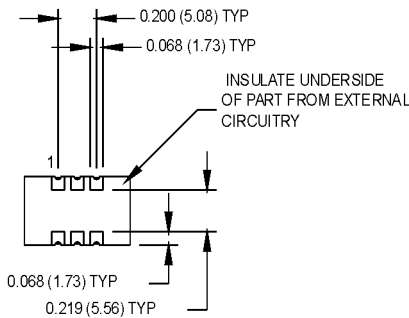
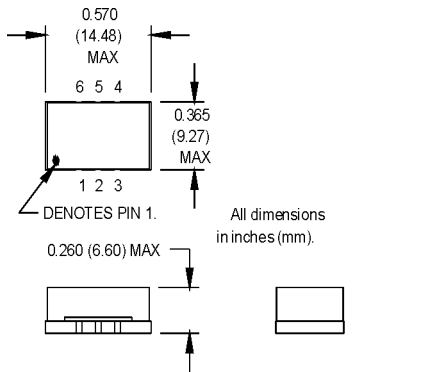


Features:

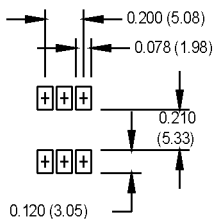
- Operating stabilities to ± 0.5 ppm
- Stratum III stability of ± 4.6 ppm (non holdover)

Applications:

- Ideal for Signal Processing, Military / Avionic Communications, Flight Controls, WLAN, Basestations, DWDM, SERDES, SONET / SDH, 10G and 40G Ethernet applications.



SUGGESTED SOLDER PAD LAYOUT



Ordering Information

Product Series	M6001 - M6004	1	L	F	C	K	-R
M6001 = 3.3 V TCXO							
M6002 = 5.0 V TCXO							
M6003 = 3.3 V VCTCXO							
M6004 = 5.0 V VCTCXO							
Temperature Range							
1: 0°C to +70°C							
8: 0°C to +50°C							
2: -40°C to +85°C							
Stability							
L: ± 4.6 ppm							
J: ± 1 ppm							
K: ± 2 ppm							
G: ± 0.5 ppm (0° to 50°C only)							
Frequency Control (Pin #1)							
F: Fixed (M6001 and M6002 only)							
V: Voltage Controlled (M6003 and M6004 only)							
Symmetry/Logic Compatibility							
C: 45/55% CMOS							
Package/Lead Configurations							
K: FR-4 6 pad							
D: DIP (contact factory)							
RoHS Compliant							
R: RoHS Compliant							
Blank: Non-RoHS							

Pin Connections

FUNCTION	PAD
N/C or Control Voltage	1
Tristate	2
Ground/Case	3
Output	4
N/C	5
+Vdd	6

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PARAMETER	Symbol	Min.	Typ.	Max.	Units	Condition/Notes	
Frequency Range	F	5		30	MHz		
Operating Temperature	T _A	(See Ordering Information)					
Storage Temperature	T _S	-55		+105	°C		
Frequency Stability		(See Ordering Information)					See Note 1
Aging						See Note 2	
1st Year				1.0	ppm		
10 year aging				3.0	ppm		
Input Voltage	V _{dd}	3.15	3.3	3.45	V	M6001, M6003	
		4.75	5.0	5.25	V	M6002, M6004	
Input Current	I _{dd}			10	mA	M6001, M6003	
				20	mA	M6002, M6004	
Pullability		±10			ppm	M6003/M6004 only (positive slope)	
Control Voltage	V _c	0.5	1.5	2.5	V	M6003/M6004 only	
Modulation Bandwidth	f _m	10			kHz	M6003/M6004 only	
Input Impedance	Z _{in}	50k			Ohms	M6003/M6004 only	
Output Type						CMOS	
Load			15		pF		
Symmetry (Duty Cycle)		(See Ordering Information)					
Logic "1" Level	V _{oh}	90 %			V _{dd}		
Logic "0" Level	V _{ol}			10%	V _{dd}		
Rise/Fall Time	T _r /T _f			3	ns		
Tristate Function		Input Logic "1": output active Input Logic "0": output disables					
Start up Time		10			ms		
Phase Noise (Typical) @19.44 MHz	10 Hz -77	100 Hz -107	1 kHz -128	10 kHz -143	100 kHz -148	Offset from carrier	

Electrical Specifications

1. Stability is inclusive of initial calibration, temperature, reflow, supply, load, shock, vibration, and ten year aging at 55°C.
2. "L" stability version only. All other stability options - initial calibration and deviation vs. temperature.

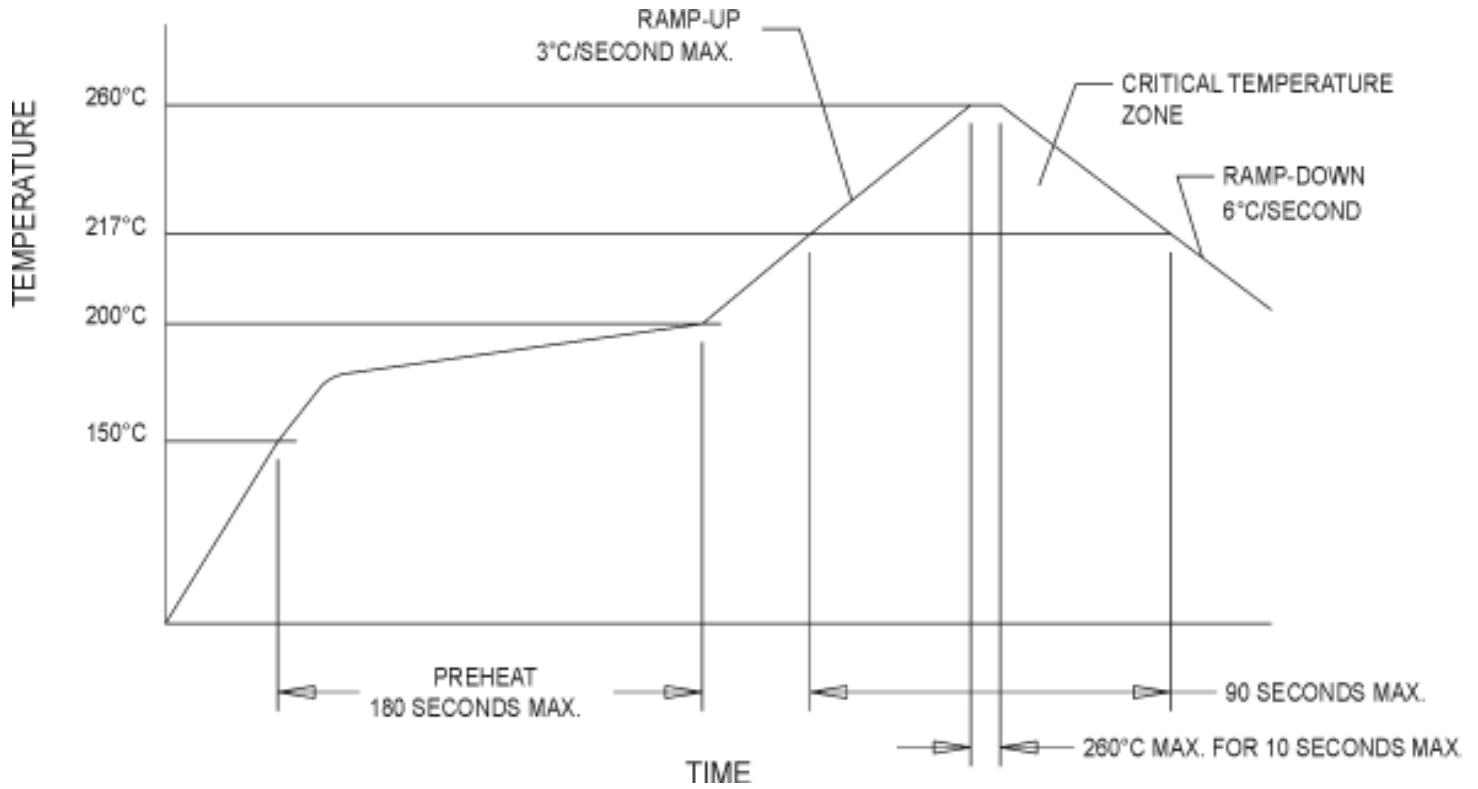
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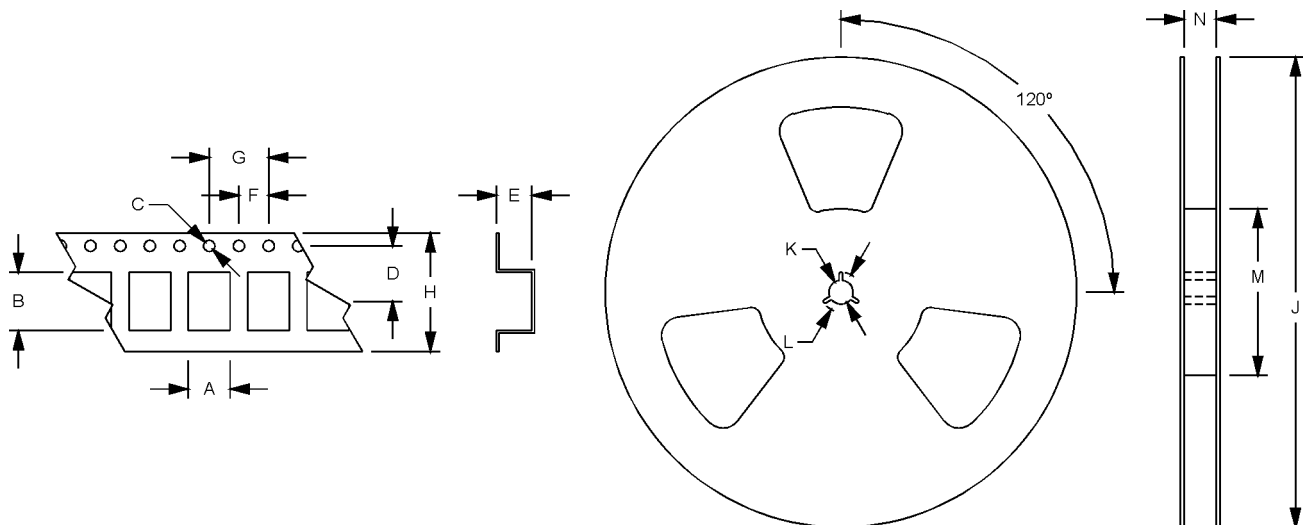
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Solder Profile:



Tape and Reel Specifications:



Product	A	B	C	D	E	F	G	H	I	J	K	L
M6001 – M6004	6.51	9.29	1.5	7.5	2.8	4	8/12	16	180-330	13	21	60-100

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Quality Parameters:

Environmental Specifications/Qualification Testing Performed on the M6001 - M6004 Series		
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
Terminal Pull	MIL-STD-883, Method 2004, A	2 Pounds
Lead Bend	MIL-STD-883, Method 2004, B1	1 Bending Cycle
Physical Dimensions	MIL-STD-883, Method 2016	Per Specification
Internal Visual	Internal Specification	Per Internal Specification

Handling Information:

Although protection circuitry has been designed into the M6001 - M6004 Series, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode. Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500, capacitance = 100 pF) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters.

Model	ESD Threshold, Minimum	Unit
Human Body	1500*	V
Charged Device	1500*	V

* MIL-STD-833D, Method 3015, Class 1



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