



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

Corporate Headquarters
100 Douglas Avenue
PO Box 630
Yankton, SD 57078-0630
1-800-762-8800
www.mtronpti.com

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.

M6001, M6002, M6003 & M6004 Series

9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO

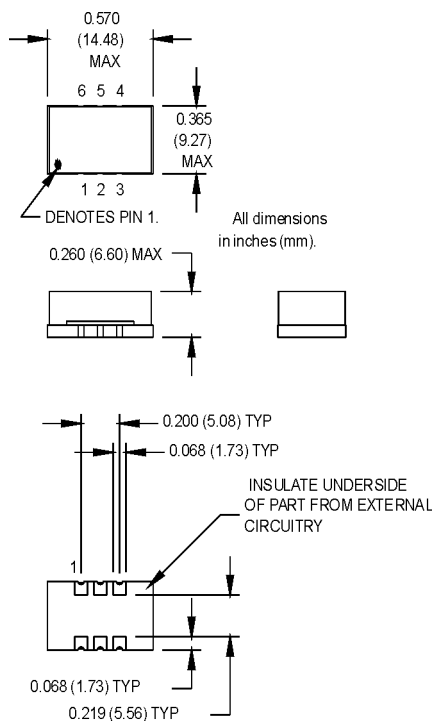


Features:

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

Applications:

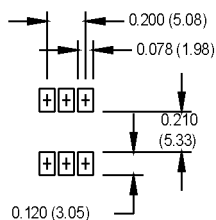
- Ideal for Signal Processing, Military / Avionic Communications, Flight Controls, WLAN, Basestations, DWDM, SERDES, SONET / SDH, 10G and 40G Ethernet applications.



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							
2: -40°C to +85°C							
8: 0°C to +50°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							

SUGGESTED SOLDER PAD LAYOUT



Pin Connections

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

M6001, M6002, M6003 & M6004 Series

9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO



Electrical Specifications	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

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.

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

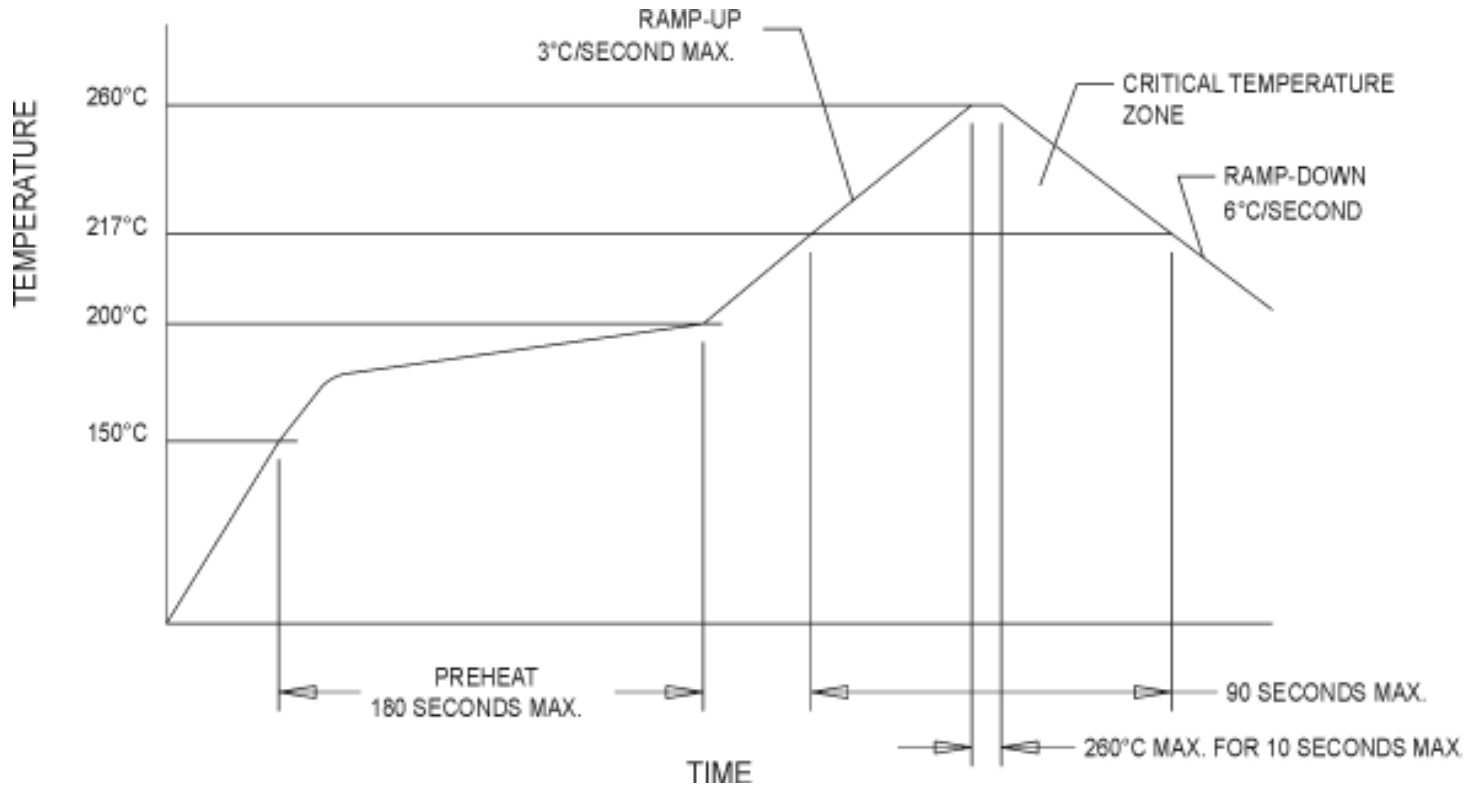
Please see www.mtronpti.com for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.

M6001, M6002, M6003 & M6004 Series

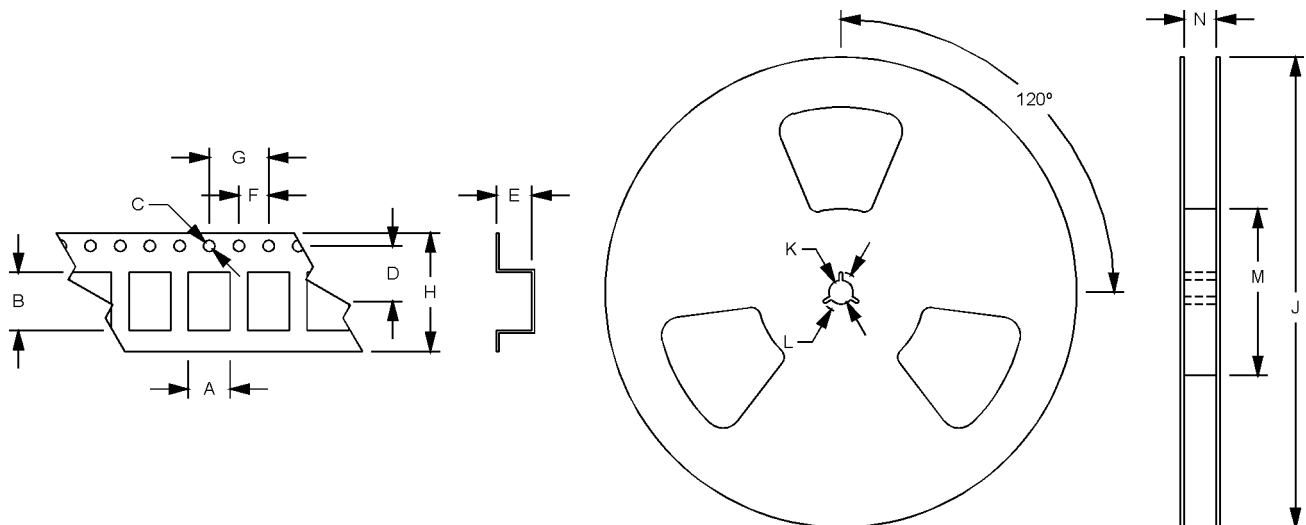
9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO



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

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

Please see www.mtronpti.com for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.

M6001, M6002, M6003 & M6004 Series

9x14 mm FR-4, 5.0 or 3.3 Volt, HCMOS/TTL, TCXO and VCTCXO



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-883D, Method 3015, Class 1



Yankton

PO Box 630
Yankton, SD 57078-0630 USA
Phone: 605-665-9321
Toll Free: 800-762-8800
Fax: 605-665-1709
Email: SalesYKT@mtronpti.com

Orlando

2525 Shader Rd
Orlando, FL 32804 USA
Phone: 407-298-2000
Fax: 407-293-2979
Email: SalesORL@mtronpti.com

San Jose

985 University Ave
Suite 38
Phone: 408-395-0700
Fax: 408-395-8074
Los Gatos, CA 95032 USA
Email: SalesCA@mtronpti.com

Europe

The Netherlands
Phone: 31-40-368-6818
Fax: 011-31-40-368-3501
Email: SalesEU@mtronpti.com

Asia Pacific

1104 Shanghai Industrial
Investment Building
48-62 Hennessy Road
Wanchai, Hong Kong, China
Phone: 852-2866-8023
Fax: 852-2529-1822
Email: SalesHK@mtronpti.com

MtronPTI reserves the right to make changes to the product(s) and service(s) described herein without notice. No liability is assumed as a result of their use or application.

Please see www.mtronpti.com for our complete offering and detailed datasheets. Contact us for your application specific requirements: MtronPTI 1-800-762-8800.