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 °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°C
2: -40°C to +85°C
6: -20°C to +70°C
8: 0°C to +50°C
F: -30°C to +75°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.

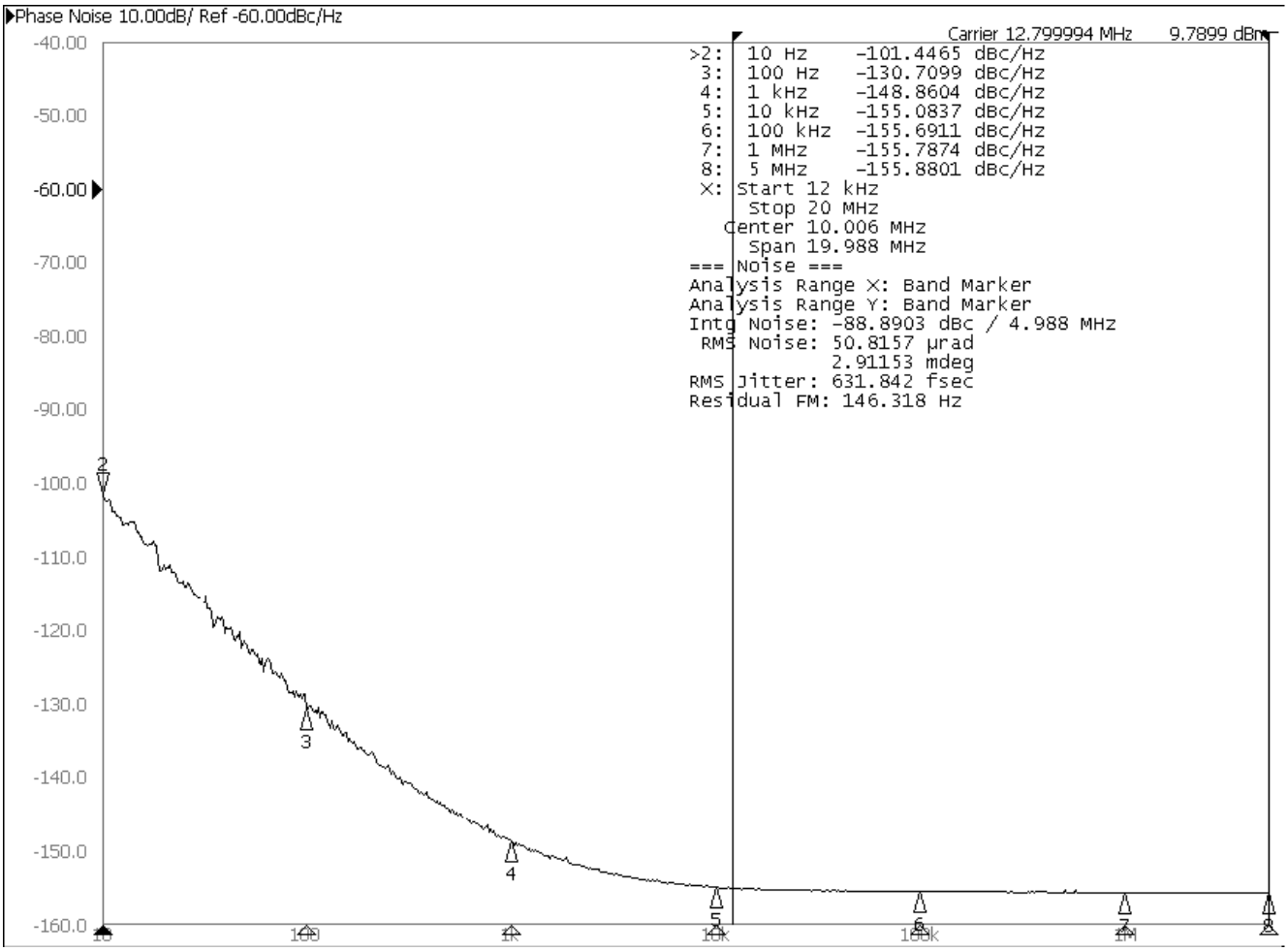
Rev: 01/28/2013

Performance Characteristics

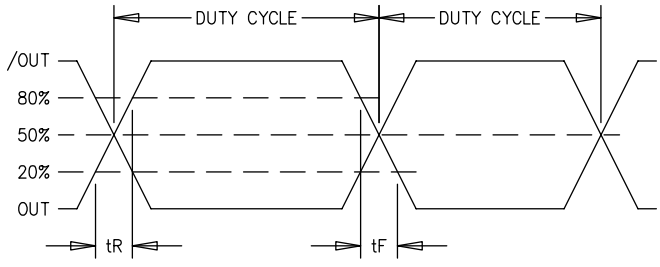
	Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions/Notes
Electrical Specifications	Frequency Range	F_O	8		52	MHz	
	Operating Temperature	T_A	(See Ordering Information)			°C	
	Storage Temperature	T_{STG}	-55		+125	°C	
	Frequency Tolerance @ +25 °C	ΔF/F	-1.0		+1.0	ppm	For TCXO only
	Frequency Stability	$\Delta F_T/F$	(See Ordering Information)			ppm	$(F_{MAX} - F_{MIN})/2$
	Stability vs. Reflow		-1.0		+1.0	ppm	
	Frequency vs. Supply	$\Delta F_{VDD}/F$		±0.02	±0.1	ppm	For ±5% supply voltage variation
	Frequency vs. Load	$\Delta F_{LOAD}/F$		±0.02	±0.1	ppm	For ±5% load variation
	Aging (First Year)		-1.0		+1.0	ppm	$F_0 \leq 20$ MHz
	Aging (First Year)		-2.0		+2.0	ppm	$F_0 > 20$ MHz
	Aging (10 Year)		-3.0		+3.0	ppm	$F_0 \leq 20$ 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	I_{DD}	2.0		3.0	mA	HCMOS output at 13 MHz
	(Reference to V_{DD} = 3.3 V)		3.0		4.0	mA	HCMOS output at 26 MHz
			5.5		6.5	mA	HCMOS output at 52 MHz
			1.3		1.9	mA	Clipped Sine Wave output at 13 MHz
			1.7		2.3	mA	Clipped Sine Wave output at 26 MHz
			2.8		3.5	mA	Clipped Sine Wave output at 52 MHz
	Output Logic Levels	V_{OL}			20	% V_{DD}	I_{OH}/I_{OL} = ±4 mA, V_{DD} = +3.0 V
	(HCMOS)	V_{OH}	80			% V_{DD}	I_{OH}/I_{OL} = ±4 mA, V_{DD} = +3.0 V
	Output Level	V_{OUT}	1.0			V_{pk-pk}	$F_0 \leq 40$ MHz
	(Clipped Sine Wave)	V_{OUT}	0.8			V_{pk-pk}	$F_0 > 40$ 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				HCMOS Output
			10 kΩ || 10 pF				Clipped Sine Wave Output
	Frequency Adjustment		-10		+10	ppm	Over Control Voltage Range
	Control Voltage Range		0.3	1.50	2.7	V	For V_{DD} = 3.0 V
			0.3	1.65	3.0	V	For V_{DD} = 3.3 V
			0.5	2.50	4.5	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			% V_{DD}	Output enabled. Logic “1” or “Open”
					30	% V_{DD}	Output disabled. Logic “0” or “GND”
	Tristate Leakage Current		-100		+100	µA	
	Phase Noise			-101		dBc/Hz	@ 10 Hz Offset
	(Typical 12.8 MHz HCMOS @ 3.3 V)			-130		dBc/Hz	@ 100 Hz Offset
				-149		dBc/Hz	@ 1 kHz Offset
				-155		dBc/Hz	@ 10 kHz Offset
				-156		dBc/Hz	@ 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					

Phase Noise Plot

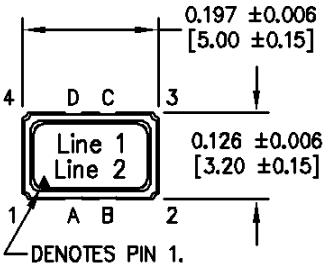
M618x 12.8 MHz Phase Noise

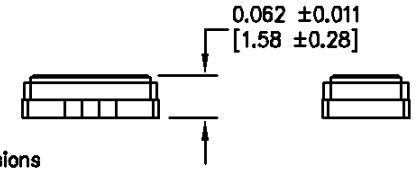


Output Waveform (HCMOS Output)

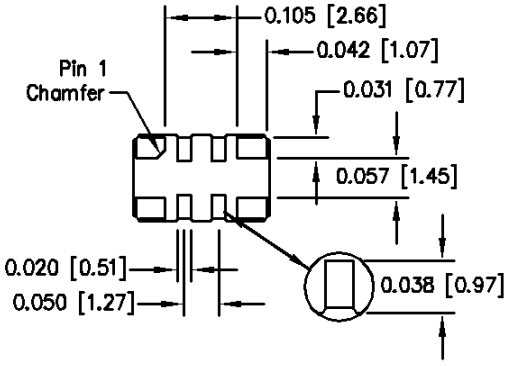


Product Dimension & Pinout Information





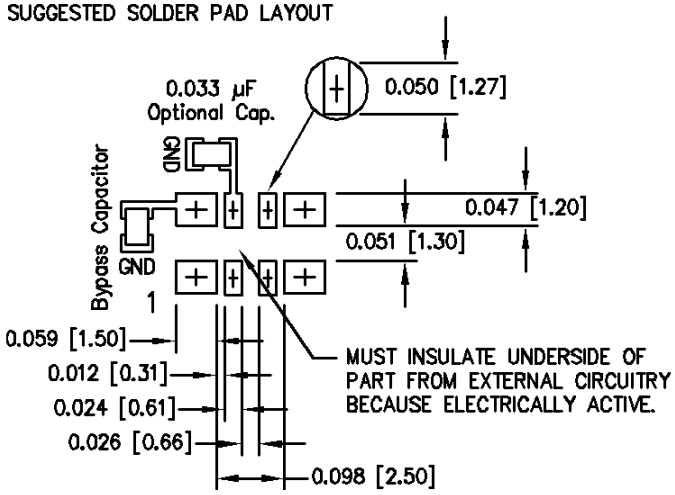
All dimensions
in inches [mm].



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: XXMXXXX

SUGGESTED SOLDER PAD LAYOUT



Handling Information

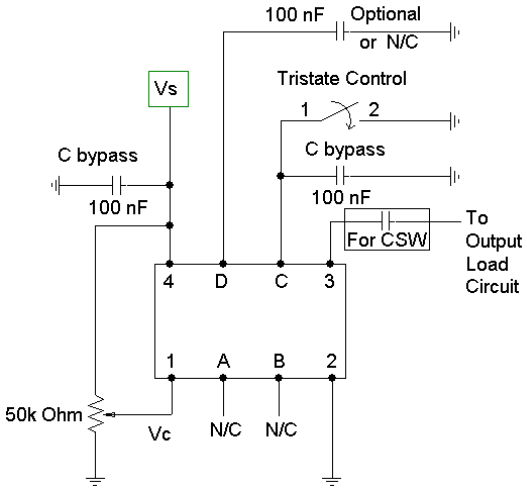
Although protection circuitry has been designed into the M618x oscillator, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and 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 Ω, 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

ATTENTION
Static Sensitive Devices
Handle only at Static
Safe Work Stations

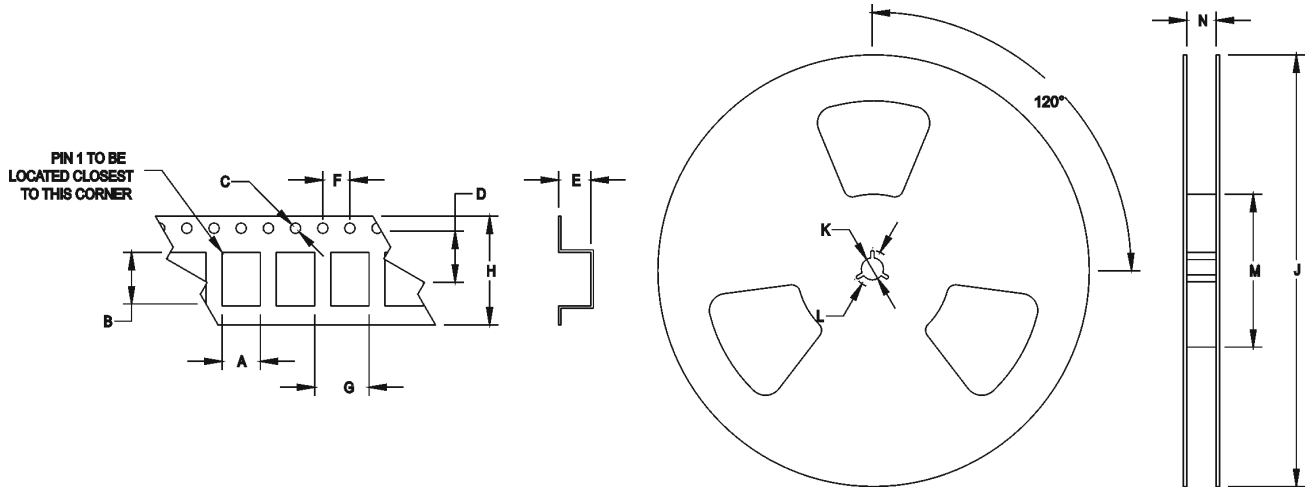
Typical Test Circuits



Test Circuit - N Package
With Tristate

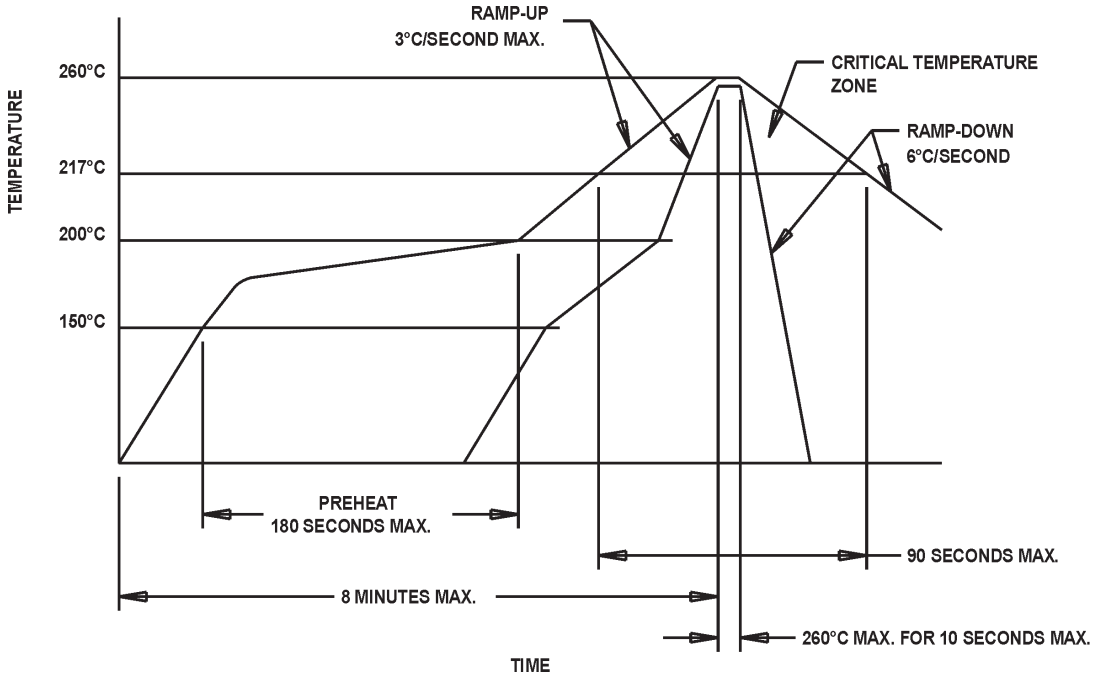
Tape & Reel Specifications

(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



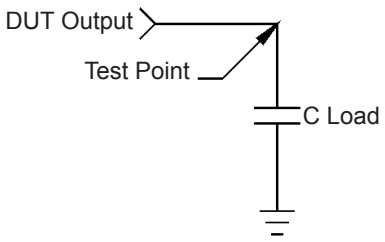
Note: Exceeding these limits may damage the device.

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 1x10-8
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

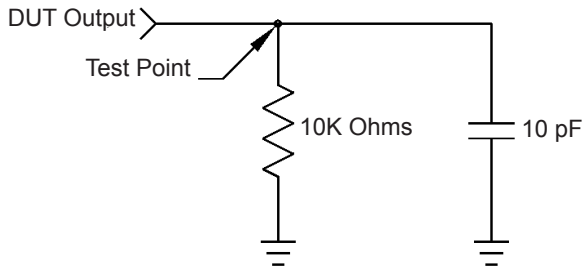
Load Circuit

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