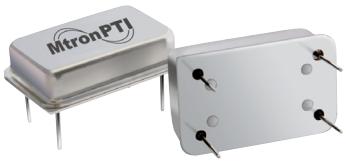
M6049/M6050 Series

14 Pin Dip, 3.3 & 5.0 Volt, HCMOS, Clipped Sinewave Precision TCXO/TCVCXO

Product Features

- Tight stability (0.5 ppm)
- 3.3 V and 5.0 V versions
- Wide frequency range 8-52 MHz
- Low phase noise



Product Description

MtronPTI's M6049/M6050 series of TCXO and TCVCXO's provide design engineers with a high stability in a reliable standard 14-DIP through-hole device. Tight stability of ± 0.5 ppm is achievable utilizing MtronPTI's unique crystal compensation technology. Excellent phase noise (-152 dBc/Hz at 10kHz) is also exhibited by the M6049/M6050 series. HCMOS and clipped sinewave output types are available in frequencies from 8 MHz to 52 MHz.

Product Applications

The M6049/M6050 series is ideally suited for a wide range of applications such as SERDES, SONET, WiMAX, GSM, GPS, 3G & 4G, CDMA, Gig-E, and other wireless communications systems. The low power (< 10 mA) make the M6049/M6050 a good choice for use in battery back-up operated systems and other "green" related, power sensitive applications. The low phase noise allows the M6049/M6050 to be used as a reference oscillator for PLL circuits in RF synthesizers and digital transmission systems.

Product Ordering Information

Ordering Information

M6049	1	G	A	C	D	00.0000 MHz

Product Series
M6049 = 3.3 V
M6050 = 5.0 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
G: ±0.5 ppm
J: ±1.0 ppm
K: ±2.0 ppm
H: ±2.5 ppm
L: ±4.6 ppm
E: ±10 ppm

Tuning Range (min)
A: ±5 ppm
B: ±10 ppm
C: ±20 ppm
X: No Voltage Control

Output Waveform
C: 45/55% HCMOS
S: Clipped Sinewave

Package/Lead Configurations
D: 14 Pin Dip

Frequency (customer specified)

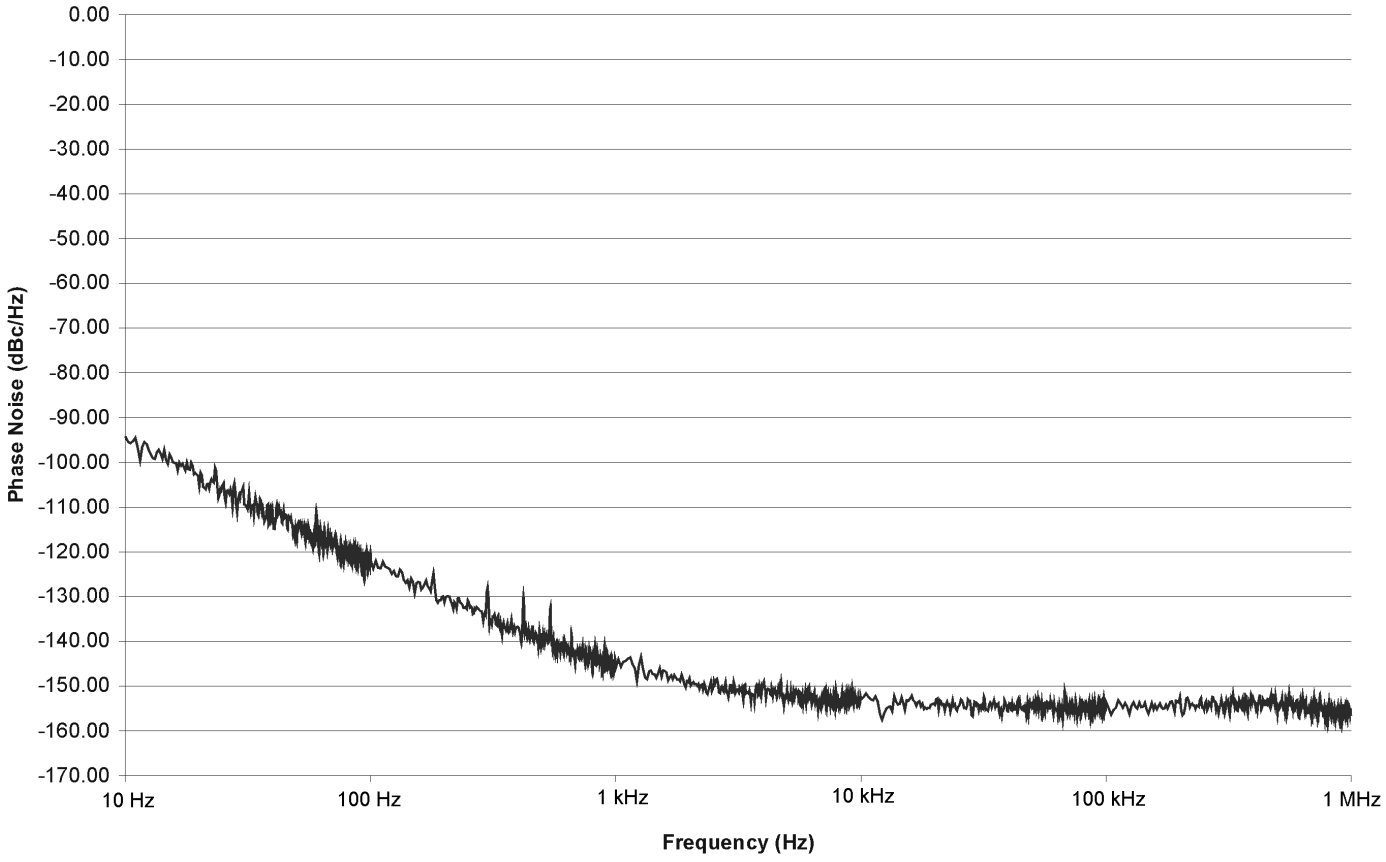
Revision: 7-27-09

Performance Characteristics

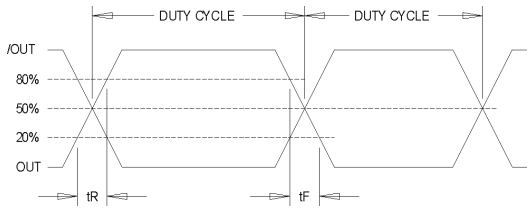
	Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions/Notes
Electrical Specifications	Frequency Range	F_O	8		52	MHz	
	Operating Temperature	T_A	-40		+85	°C	See Ordering Information
	Storage Temperature	T_{STG}	-55		+125	°C	
	Frequency Tolerance @ +25°C		-1.0		+1.0	ppm	For TCXO only
	Frequency Stability						See Ordering Information
	Stability Vs. Reflow		-1.0		+1.0	ppm	
	Frequency Vs. Supply			±0.2		ppm	For 10% supply voltage variation
	Frequency Vs. Load			±0.2		ppm	For 10% load variation
	Aging (First Year)		-1.0		+1.0	ppm	$F_0 \leq 20$ MHz
	Aging (First Year)		-2.0		+2.0	ppm	$F_0 \geq 20$ 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	$F_0 \geq 20$ MHz (Includes first year)
	Supply Voltage (V_S)		-5.0		+5.0	%	See Ordering Information
	Supply Current (I_D)			2.2	3.3	mA	HCMOS output at 13 MHz
				3.5	5.0	mA	HCMOS output at 26 MHz
				6.0	9.2	mA	HCMOS output at 52 MHz
	Output Logic Levels	V_{OL}			20	$\%V_S$	I_{OH}/I_{OL} = ± 4 mA, Vs = +3.0 V
	(HCMOS)	V_{OH}	80			$\%V_S$	I_{OH}/I_{OL} = ± 4 mA, Vs = +3.0 V
	Output Logic Levels	V_{OL}	1.0			V_{pk-pk}	$F_o \leq 40$ MHz
	(Clipped Sinewave)	V_{OH}	0.8			V_{pk-pk}	$F_o > 40$ MHz
	Waveform Symmetry		45		55	%	Ref. to ½ V_S. HCMOS only
	Rise/Fall Time				8	ns	Ref. 10% to 90%. HCMOS only
	Output Load			15		pF	HCMOS output
	Frequency Adjustment		See Ordering Information				Over Control Voltage Range
	Control Voltage Range		0.3		3.0	Volts	For V_S = 3.3 V
			0.5		4.5	Volts	For V_S = 5.0 V
	Input Leakage Current		-50		+50	µA	Pin 1
	Input Resistance		100			Kohm	Pin 1
	Linearity				10	%	
	Modulation Bandwidth		10			KHz	Pin 1, 20 MHz, min pull of ±10 ppm
	Phase Noise			-95		dBc/Hz	10 Hz Offset
	(Typical 10 MHz CMOS)			-125		dBc/Hz	100 Hz Offset
				-145		dBc/Hz	1 KHz Offset
				-152		dBc/Hz	10 KHz Offset
				-155		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 to 2000 Hz
	Solderability	EIAJ-STD-002					
	Package	14 Pin Dip					RoHS Compliant

HCMOS Load – see load circuit diagram #2. Clipped Sinewave Load – see load circuit diagram #7.

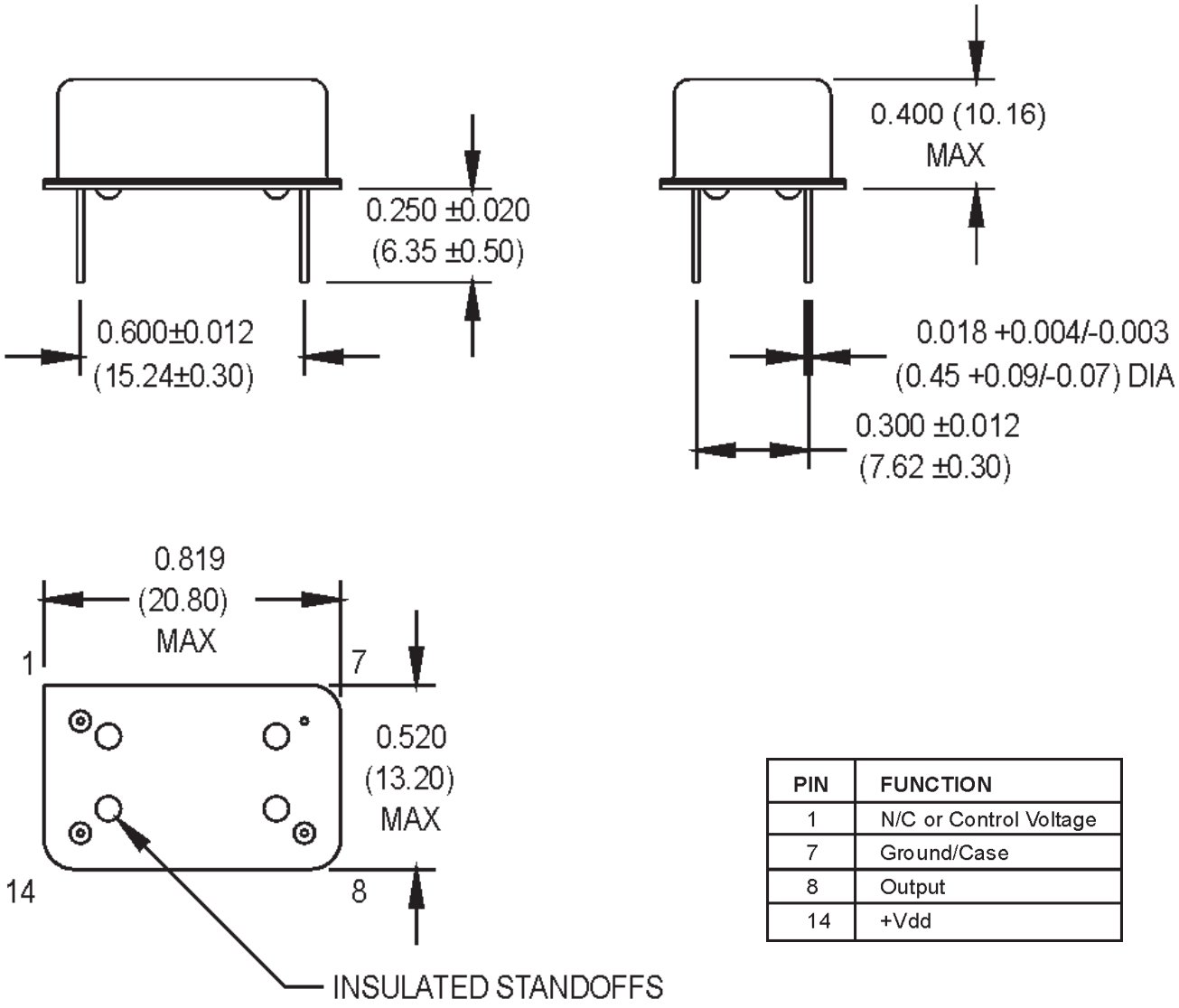
Phase Noise Plot



Output Waveform



Product Dimension & Pinout Information



PIN	FUNCTION
1	N/C or Control Voltage
7	Ground/Case
8	Output
14	+Vdd

All dimensions
in inches (mm).

Handling Information

Although protection circuitry has been designed into the M6049/M6050 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

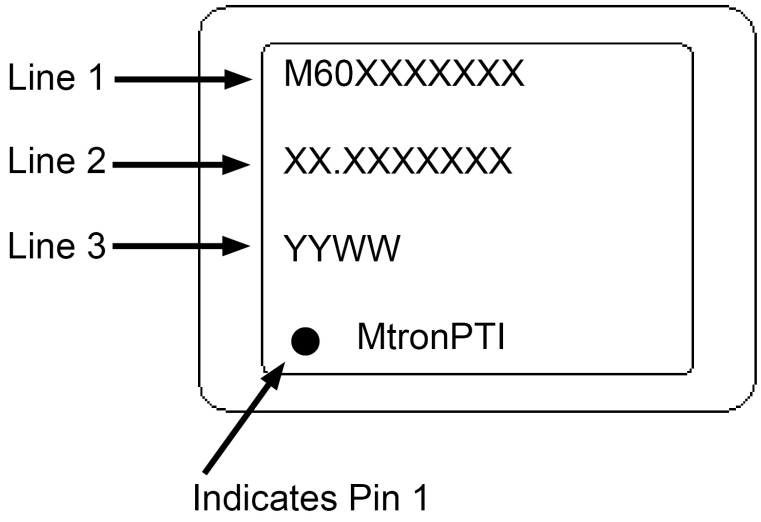
* MIL-STD-833D, Method 3015, Class 1

Quality Parameters

Environmental Specifications/Qualification Testing Performed on the M6049/M6050 TCXO/TCVCXO		
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, 6 ms
Vibration	MIL-STD-202, Method 201-204	10 g 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
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

Part Marking Guide

Line 1: Model Number
Line 2: Frequency
Line 3: Date Code



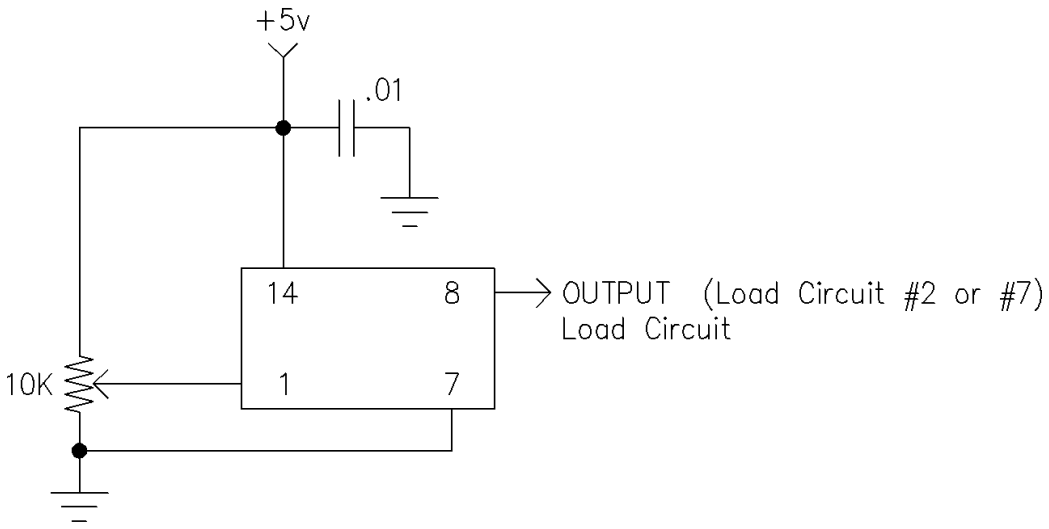
Maximum Wave Soldering Conditions:

Typical solder conditions for through hole crystals and oscillators:
Per MIL-STD-202, Method 210 “Resistance to Soldering Heat”, Condition C

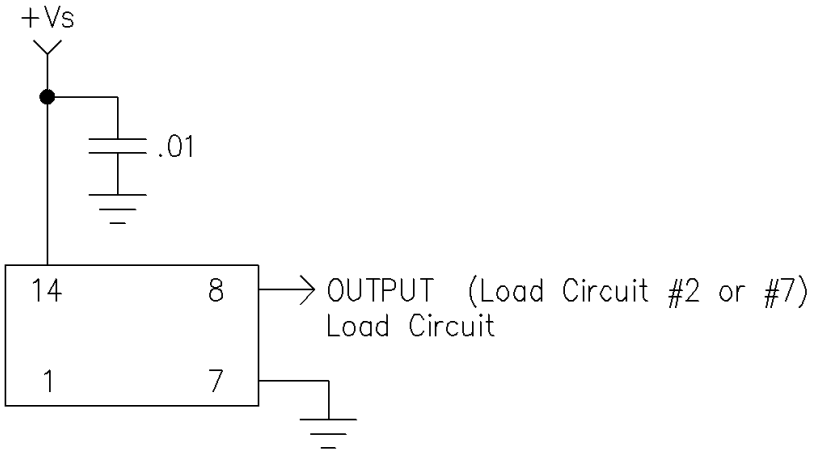
Wave solder with a solder bath temperature of 260°C ±5°C and an exposure time of 10 ±1 second. Preheat 1-4°C/s to within 100°C of solder temperature (25 ±6 mm/s).

Note: Exceeding these limits may damage the device.

Typical Test Circuit



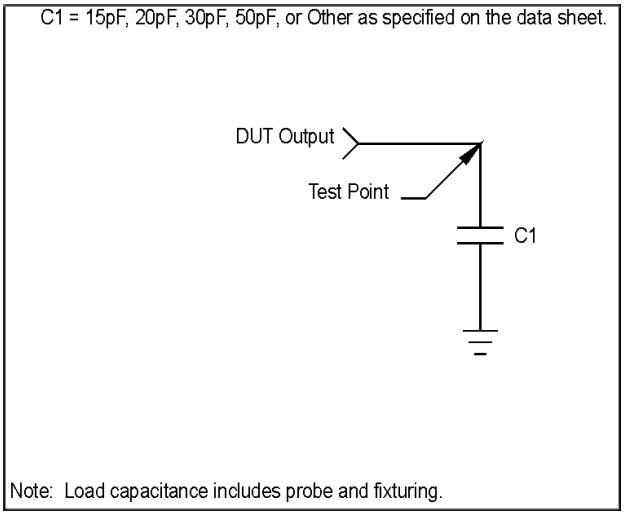
Voltage Tune Option (TCVCXO)



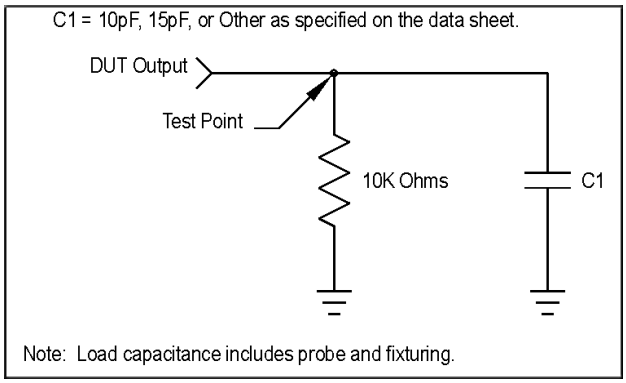
Non-Voltage Tune Option (TCXO)

Load Circuit

Load Circuit #2 - HCMOS



Load Circuit #7 - Clipped Sinewave TCXO/TCVCXO



Product Revision Table

Date	Revision	PCN Number	Details of Revision

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