

## Product Features

- Extreme operating temperature range to 200°C
- Designed for harsh shock and vibration applications
- Hermetically sealed
- Long term reliability
- Small form factor 5x7 SMT
- 5x7 leaded and DIP package option coming soon  
(contact factory for availability)



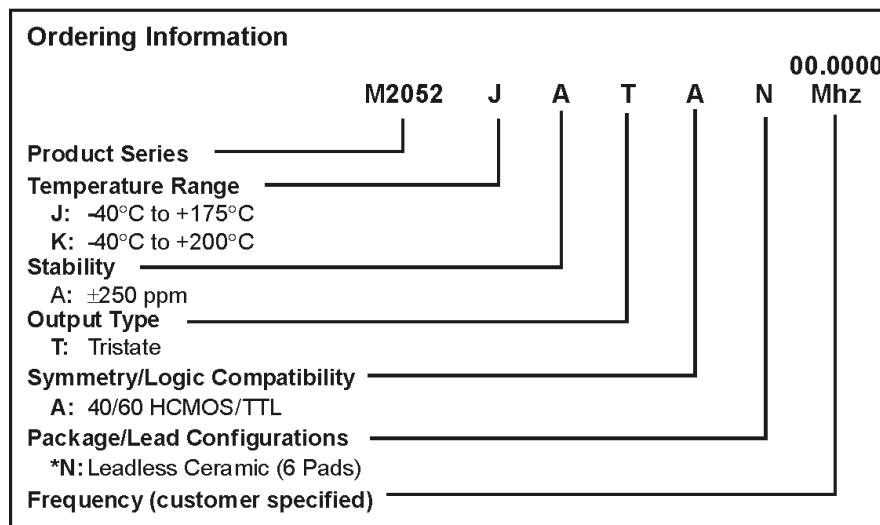
## Product Description

The M2052 Series HCMOS/TTL compatible clock oscillators offer a reliable solution for extreme environmental applications. The small form factor 5x7 SMT packages have excellent heat transfer characteristics and are hermetically sealed. The unique crystal mounting structure used on MtronPTI's high reliability oscillators is capable of surviving mechanical shocks up to 1000 g's and vibration levels to 20 g's. With power consumption being a critical parameter for down-hole drilling applications, these HCMOS/TTL compatible XOs will draw as little as 1.5 mA of input current with a 3.3 V supply.

## Product Applications

- Down Hole Drilling Tools for Oil and Gas Exploration
- Extreme Thermal Applications
- Geo-Thermal Exploration

## Product Ordering Information

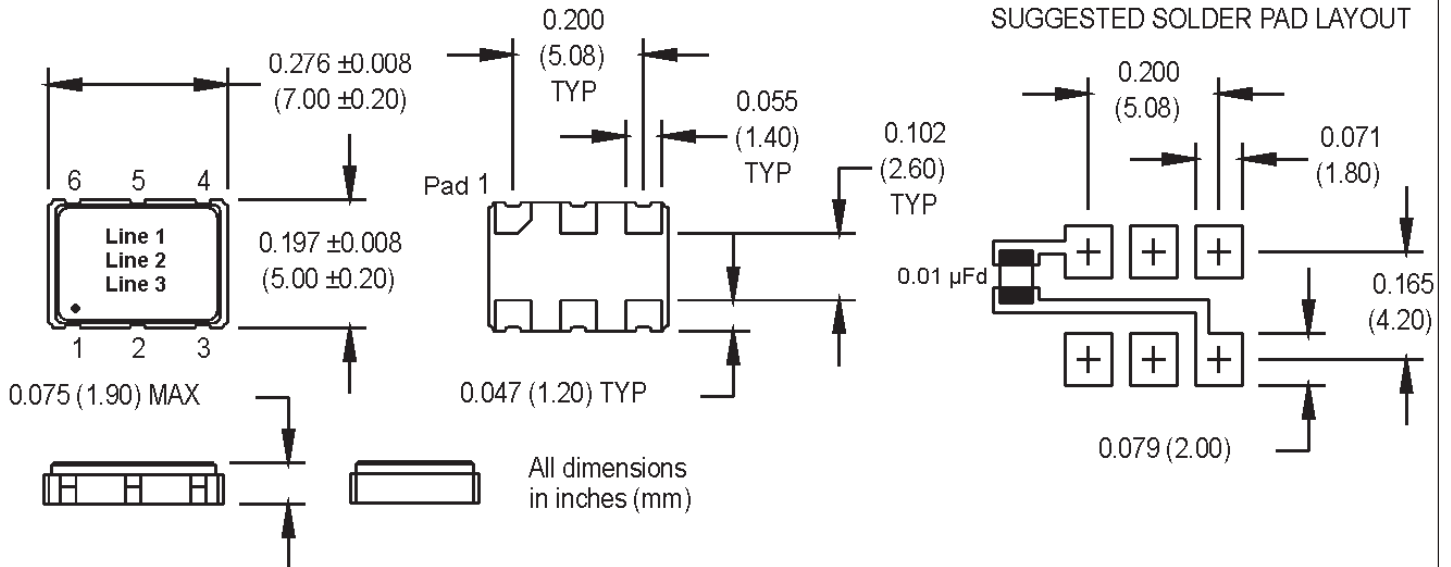


\*Contact factory for other package options

**Performance Characteristics**

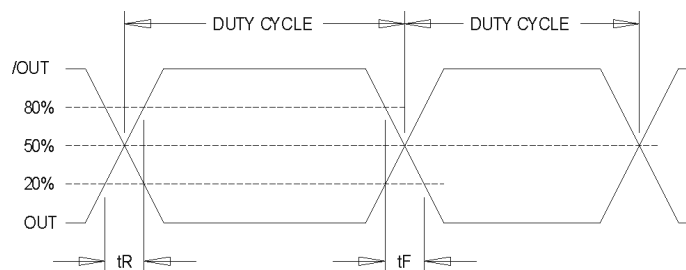
	Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
<b>Electrical Specifications</b>	Frequency Range	$F_O$	2.000000		35.000000	MHz	
	Frequency Stability	$\Delta F/F$	-250		+250	ppm	Includes initial calibration tolerance and deviation over operating temperature.
	Operating Temperature	$T_A$	-40		+200	°C	
	Storage Temperature	$T_S$	-55		+200	°C	
	Operating Voltage	$V_{DD}$	3.0	3.3	3.6	V	
	Operating Current	$I_{DD}$		1.5		mA	@ 10 MHz
				3.0		mA	@ 25 MHz
				4.0		mA	@ 35 MHz
	Output Type		HCMOS/TTL Compatible				
	Output Load				15/2	pF/TTL	
	Symmetry (duty cycle)	$T_{DC}$	40		60	%	Ref to $\frac{1}{2} V_{DD}$
	Logic "1" Level	$V_{OH}$	90% $V_{DD}$			V	HCMOS load
	Logic "0" Level	$V_{OL}$			10% $V_{DD}$	V	HCMOS load
	Rise/Fall Time	$T_R/T_F$			4	ns	From 10% to 90% $V_{DD}$ . Frequency dependent.
	Random Jitter			5	12	ps	RMS (1-Sigma)
Tri-State Function		Logic "1", or floating, Enables Output Logic "0" Disables Output to a High-Z				Pad 1	
<b>Environmental</b>	Mechanical Shock	Per MIL-STD-202, Method 213, Condition E (1000 g's, 0.5 ms duration, $\frac{1}{2}$ sinewave)					
	Vibration	Per MIL-STD-202, Method 204, Condition D (10-2000 Hz at 20 g's)					
	Hermeticity	Per MIL-STD-202, Method 112 ( $1 \times 10^{-8}$ atm cc/s of Helium)					
	Solderability	Per EIAJ-STD-002					
	Max. Soldering Conditions	See solder profile					
Package Type	5 X 7 X 1.9 mm leadless ceramic. RoHS compliant.						

**Product Dimension & Pinout Information**



Pad	Function
1	Tri-state
2	No Internal Connection
3	Ground
4	Output
5	No Internal Connection
6	+V <sub>DD</sub>

**Output Waveform**



**Handling Information**

Although protection circuitry has been designed into the M2052 Series 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-883D, Method 3015, Class 1



**ATTENTION**  
Static Sensitive  
Devices  
Handle only at  
Static Safe Work  
Stations

**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 $1 \times 10^{-8}$
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

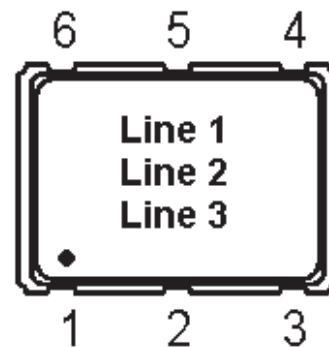
**Part Marking Guide**

**PART MARKING:**

Line 1: M2052  
Line 2: XXMXXX  
Line 3: Myywwvv

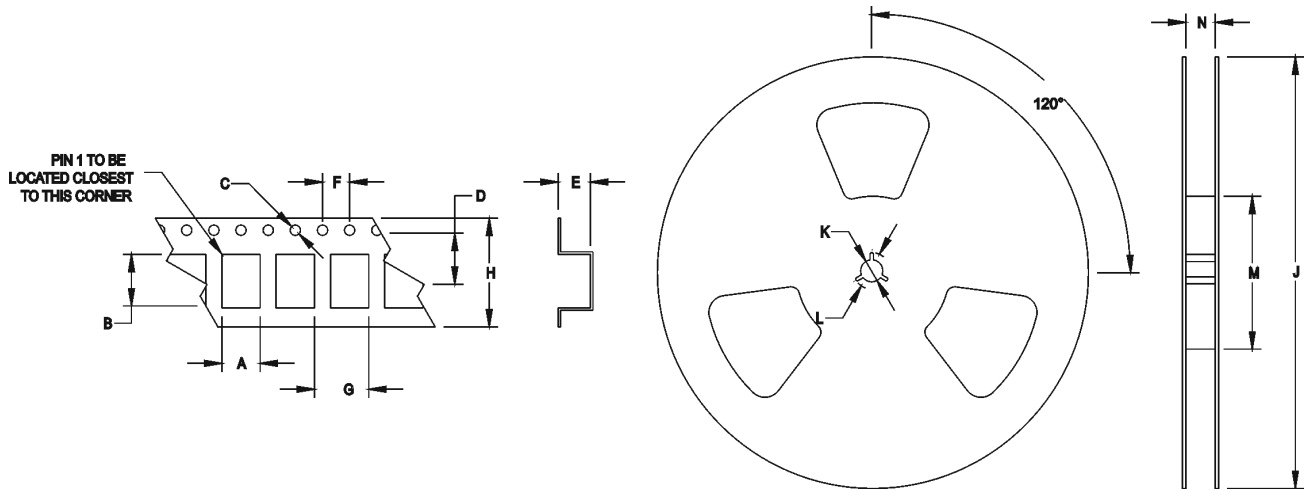
**LEGEND:**

XXMXXX: Frequency (MHz)  
yy: Year  
ww: Work Week  
vv: Factory Code



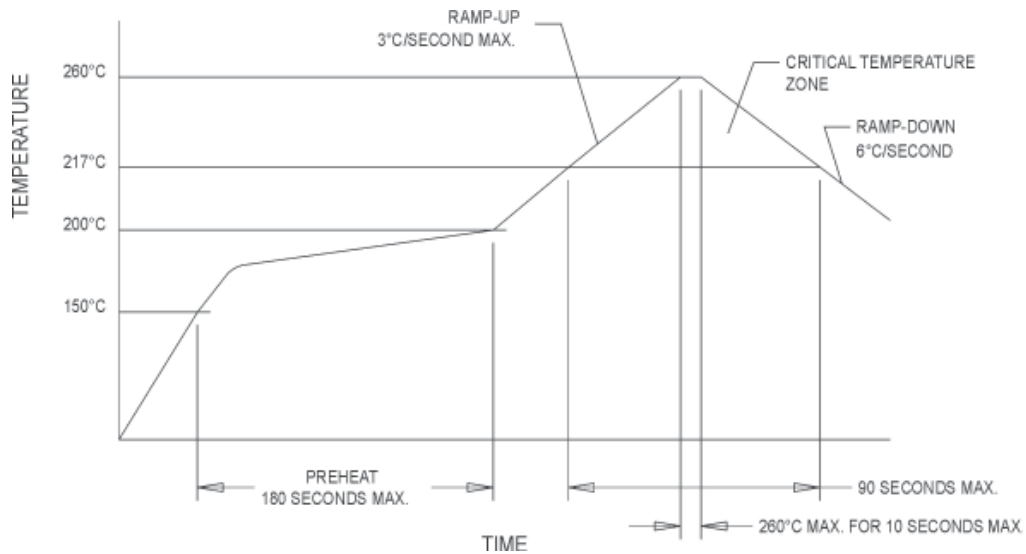
**Tape & Reel Specifications**

(all measurements are in mm)	A	B	C	D	E	F	G	H	I	J	K	L
M2052	6.51	9.29	1.5	7.5	2.8	4	8/12	16	180-330	13	21	60-100



**Standard Tape and Reel: 1,000 parts per reel**

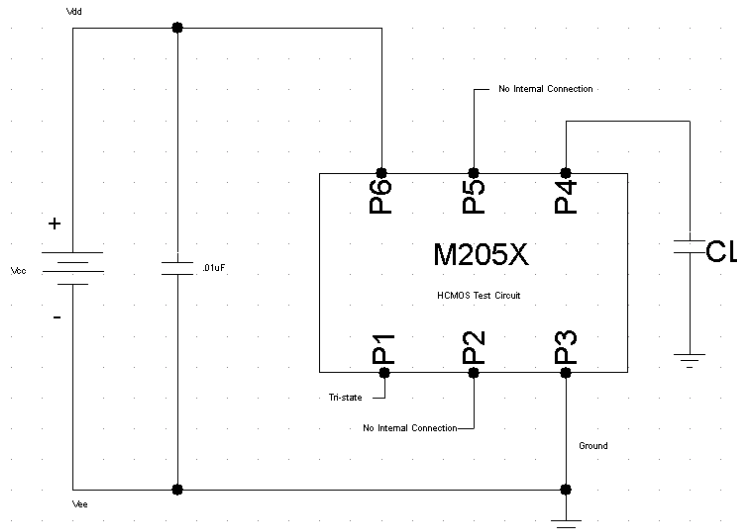
**Maximum Soldering Conditions**



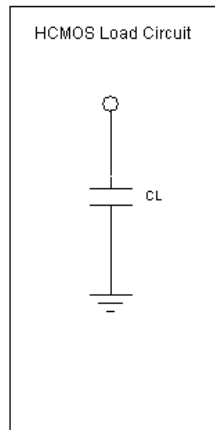
**Solder Conditions**

Note: Exceeding these limits may damage the device.

**Typical Test Circuit**



**Load Circuit**



**Product Revision Table**

Date	Revision	Author	Details of Revision
9/10/09	0	WNJ	Original release
10/1/09	A	WNJ	Updated Shock & Vibration specs
12/1/09	B	WNJ	Updated Operating Current spec
8/26/10	C	MM	Updated Operating Frequency Range & Packaging Type
6/26/12	D	LEO	Expanded Operating Frequency Range.

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](http://www.mtronpti.com)**