



- Pletronics' THD3002-20.0M is a temperature compensated crystal oscillator
- Optional Voltage Control Function
- HCMOS output.
- The package is designed for high density surface mount designs.
- Tape and Reel packaging is available.
- Select Stratum-III frequencies available
- 3.2 x 5 mm LCC Ceramic Package
- Tape and Reel packaging is available.
- Select Stratum-III frequencies available

**Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:  
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.10 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020D.1  
Second Level Interconnect code: e4

### Absolute Maximum Ratings:

Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +6.5V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V

### Thermal Characteristics

The maximum die or junction temperature is 155°C  
The thermal resistance junction to board is 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

### ESD Rating

Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

## Electrical Specification for specified Vcc over the specified temperature range

Item	Min	TYP	Max	Unit	Condition	
Frequency Range		20.0		MHz		
Frequency Stability vs Temp.	-0.28		+0.28	ppm	Vcontrol = 1.50 volts (Fmax-Fmin)/2	
24 Hour Holdover	-0.37		0.37	ppm	GR-1244-CORE	
Frequency Calibration	-0.5		+0.5	ppm	Frequency offset at 25°C, 60 minutes after reflow	
Frequency Stability / Supply	-0.10		+0.10	ppm	Load: 10K ohm // 10 pF & Vcc ± 5%	
Load Sensitivity	-0.20		+0.20	ppm	±2% variation in magnitude from 10K ohm ±10%    10 pF	
Long Term Stability (Aging)	-3.4		+3.4	ppm	After 15 years.	
Output Waveform	CMOS					
Output V <sub>HIGH</sub> as % of Supply	90			%V <sub>S</sub>	Load: 10K ohm ± 10% // 10 pF	
Output V <sub>LOW</sub> as % of Supply			10	%V <sub>S</sub>		
T <sub>RISE</sub> and T <sub>FALL</sub> (10% to 90%)			6.5	nS		
Duty Cycle at 50% Supply	40	50	60	%		
Phase Noise	10 Hz 100 Hz 1 kHz 10 kHz	- - - -	-90 -115 -135 -145	- - - -	dBc/Hz	Typical values for a 20.0 MHz oscillator at 25°C
Jitter	-	-	1.7	pS	10 Hz to 1 MHz offset from carrier	
V Supply Range V <sub>CC</sub>	2.8	-	5.5	Volts		
Supply Current I <sub>CC</sub>	-	-	7.0	mA		
Vcontrol Range	0.5		2.50	Volts	1.50 volts nominal	
Frequency Pullability	± 9.2	± 10.0	-	ppm		
Linearity	-	0.05	2.0	%	In accordance with MIL-PRF-55310	
Operating Temperature Range	-40		+85	°C	Specified by part number	
Storage Temperature Range	-55		+95	°C		

## Phase Noise:




## MTIE:



**Reliability: Environmental Compliance**

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition B
Vibration	MIL-STD-883 Method 2007, Condition A
Solderability	MIL-STD-883 Method 2003
Thermal Shock	MIL-STD-883 Method 1011, Condition A

**Package Labeling**

<b>P/N:</b>  THD3002-20.0M <b>Customer P/N:</b>  12345678 <b>Qty:</b>  1000 <b>D/C</b>  TC512SA MSL: 1
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<b>RoHS Compliant</b> 2nd Lvl Interconnect Category=e4 Max Safe Temp=260C for 10s 2X Max
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Label is 1" x 2.6" (25.4mm x 66.7mm)  
 Font is Courier New  
 Bar code is 39-Full ASCII

Label is 1" x 2.6" (25.4mm x 66.7mm)  
 Font is Arial

**Part Marking:**

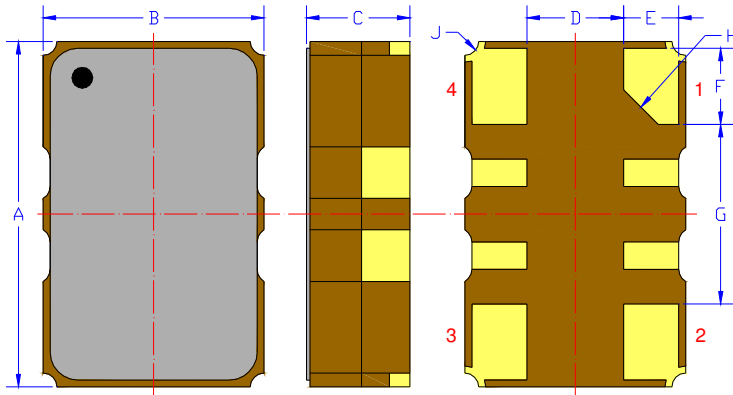
<b>fff.yww</b> • PLExx.xxxx
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or

<b>fff.yww</b> • PLExx.xxxx
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fff.yww = frequency in MHz . Year week  
 PLE = Pletronics  
 xx.xxxx = internal code

## Mechanical:



	Inches	mm
A	0.197 ±0.008	5.00 ±0.20
B	0.126 ±0.008	3.20 ±0.20
C	0.059 max	1.50 max
D <sup>1</sup>	0.055	1.40
E <sup>1</sup>	0.031	0.80
F <sup>1</sup>	0.043	1.10
G <sup>1</sup>	0.102	2.60
H <sup>1</sup>	0.013C	0.50C
J <sup>1</sup>	0.008	0.20R

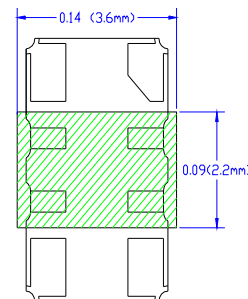
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power supply bypass capacitors as close as possible.
-	N. C.	All other pads on the bottom shall not be connected. These are internally connected and were for the TCXO compensation process

## Layout and application information

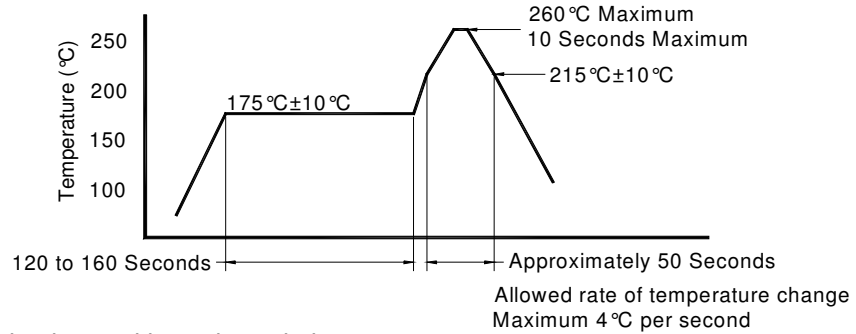
All connection points in the designated region have solder mask cover to avoid any electrical connections

For Optimum Stability and Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.
- minimize air flow across the device



## Reflow Cycle (typical for lead free processing)



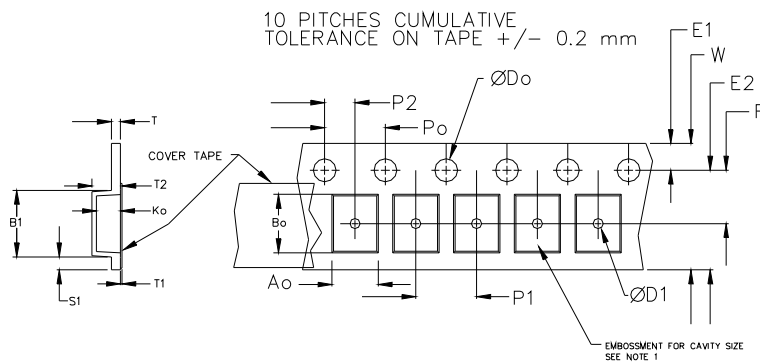
The part may be reflowed 2 times without degradation.

## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5	1.0	1.75	4.0	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5			2.0 ±0.1			
16mm		+0.1 -0.0			±0.1			
24mm		1.5			±0.1			

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
16 mm	12.1	14.25	7.5 ± 0.1	8.0 ± 0.1	8.0	16.3	Note 1

Note 1: Embossed cavity to conform to EIA-481-B      Dimensions in mm      Not to scale



REEL DIMENSIONS					
A	inches	7.0	10.0	13.0	Tape Width
	mm	177.8	254.0	330.2	
B	inches	2.50	4.00	3.75	Tape Width
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			Tape Width
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	

Reel dimensions may vary from the above

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