



# THD3004-16.384MHz Stratum-III TCVCXO

February 2016



- Pletronics' THD3004-16.384M is a temperature compensated crystal oscillator
- Voltage Control Function
- HCMOS output.
- The package is designed for high density surface mount designs.
- 3.2 x 5 mm LCC Ceramic Package
- Tape and Reel packaging is available.

## Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2011/65/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.

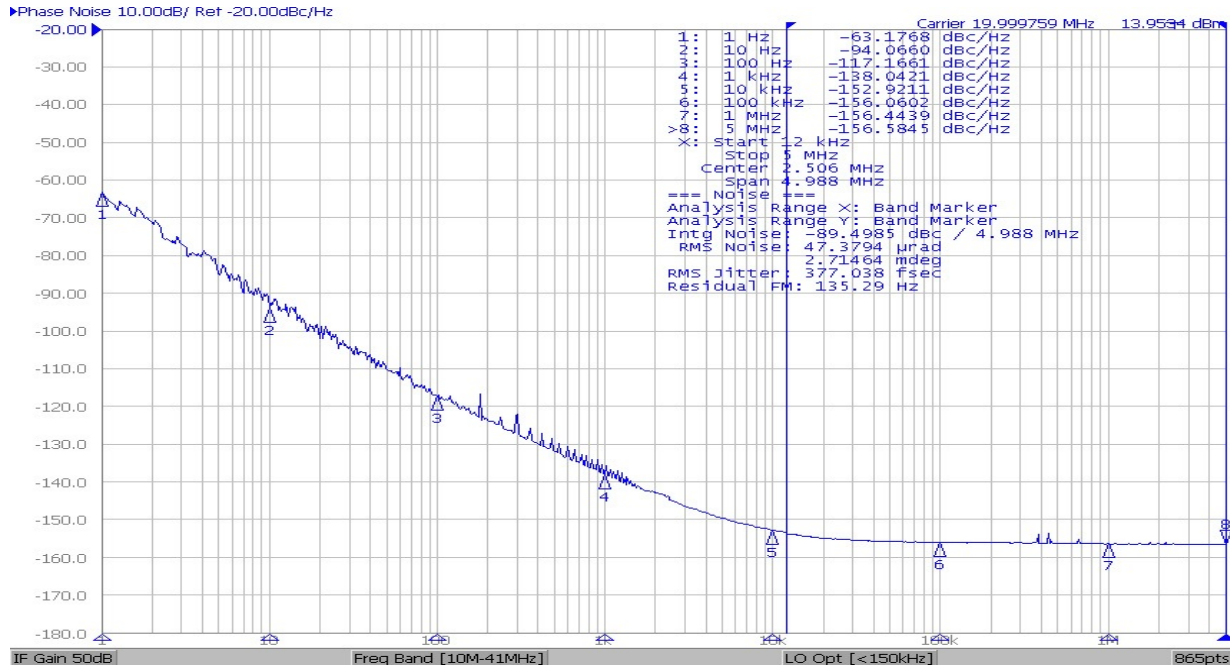
### ESD Rating

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

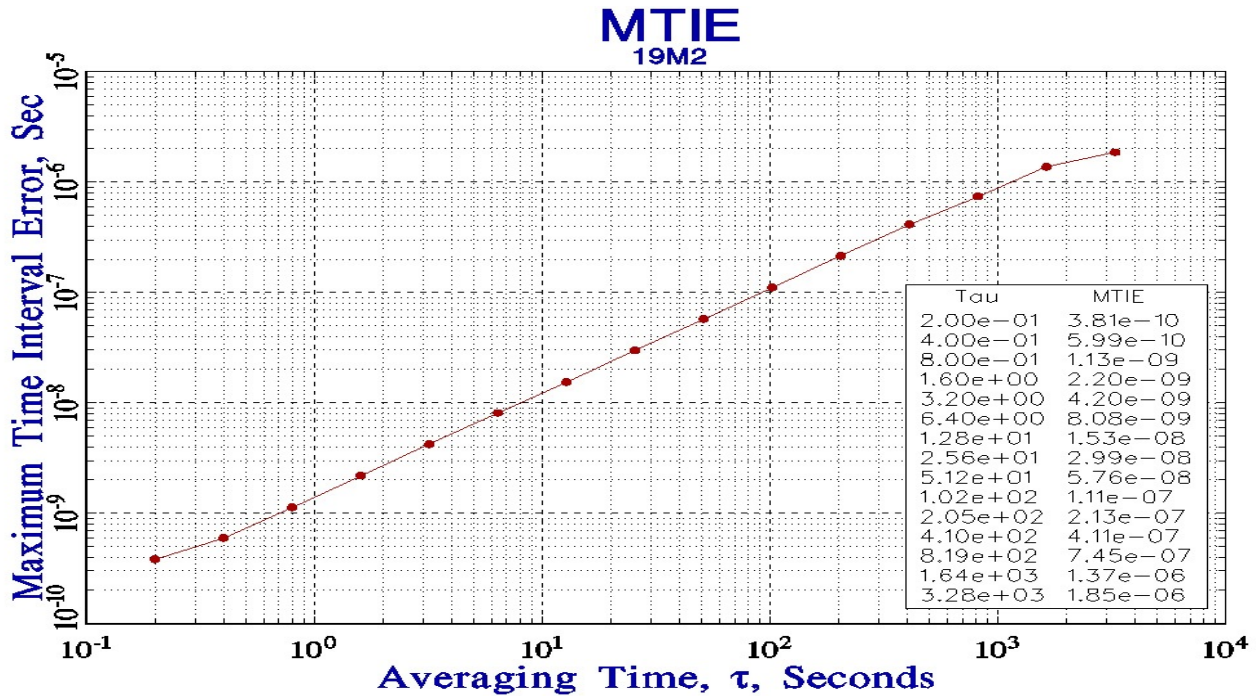
## Electrical Specification for specified Vcc over the specified temperature range

Item	Min	TYP	Max	Unit	Condition	
Frequency Range		16.384		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**

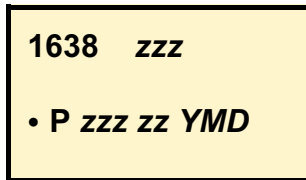
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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

<b>P/N:</b>  THD3004-16.384M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  103-M8ZU4
MSL: 1	

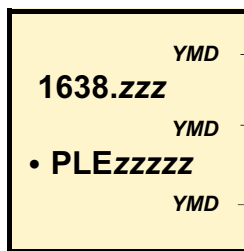
<b>RoHS Compliant</b>
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

## Part Marking:



1638 = 16.384 frequency in MHz  
P = Pletronics  
YMD = Manufacturing date code (see table below)  
z = Internal factory code

## Or:



1638 = 16.384 frequency in MHz  
PLE = Pletronics  
z = Internal factory code

YMD = Manufacturing date code  
(see table below - may appear on any line on part)

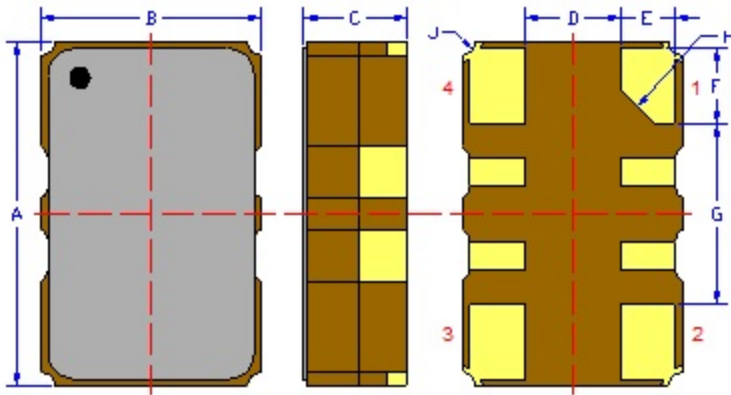
The actual part number is THD3004-16.384M where the model number "004" is the specification number the part is made to. This is not included in the part marking. This is included on the label on the Tape and Reel.

### Codes for Date Code YMD

Code	4	5	6	7	8	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2014	2015	2016	2017	2018	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

## Mechanical:



	Inches	mm
A	0.197 $\pm$ 0.008	5.00 $\pm$ 0.20
B	0.126 $\pm$ 0.008	3.20 $\pm$ 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

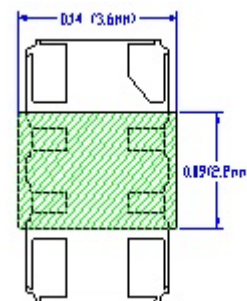
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power supply bypass capacitors as close as possible.
-	N. C.	All other pads on the bottom shall not be connected.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

## Layout and application information

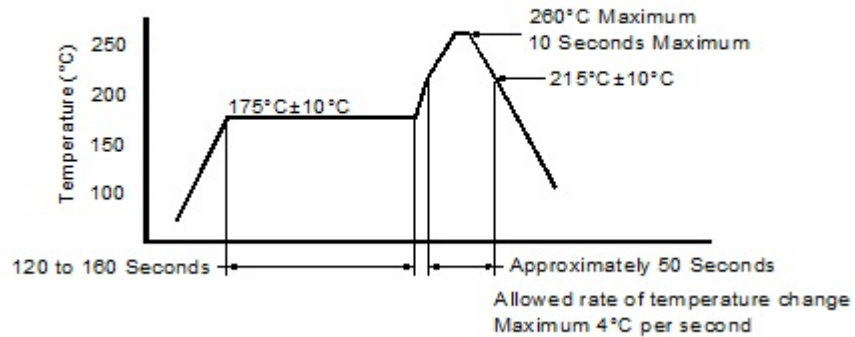
All connection points in the designated region have solder mask cover to avoid any electrical connections

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)



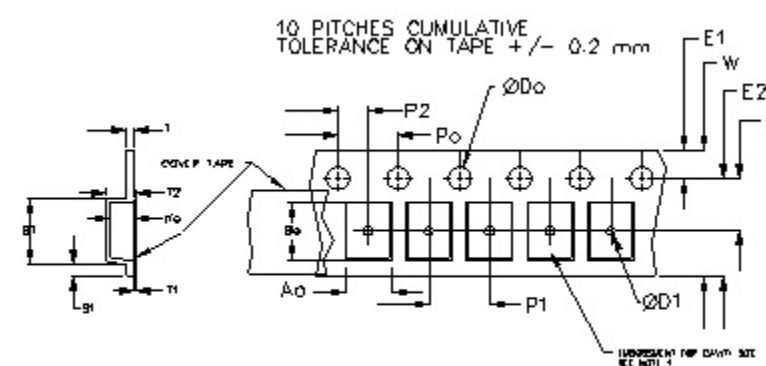
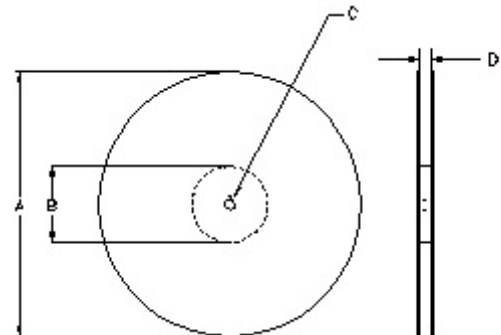
The part may be reflowed 2 times without degradation.

## 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			1.5			
24mm		1.5			2.0 ±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



from the above

USER DIRECTION OF UNREELING →

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



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