



THA3  
5.0 x 7.0 x 2.6 mm  
LCC Ceramic Package

## Features

- Pletronics' THA3 Stratum-III Type Series Temperature Compensated Crystal Oscillator
- Optional Voltage Control Function
- Low Power / Fast Warm Up
- CMOS Output
- 2.8V to 3.3V nominal Supply Voltage
- See table for developed Frequencies

## Applications

SONET / SDH / DWDM  
Test & Measurement  
Telecom Transmission & Switching Equipment  
Base Stations / Picocell  
Wireless Communication Equipment

## Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range <sup>2</sup>	8.192	-	40.0	MHz	See table below for developed frequencies
Frequency Stability vs. Temperature <sup>2</sup>	-	±0.28	-	ppm	(f <sub>max</sub> - f <sub>min</sub> ) / 2
Frequency Initial Calibration	-	-	±1.0	ppm	25°C ± 2°C, 24 hours after reflow
Operating Temperature Range <sup>2</sup>	-40	-	+85	°C	Widest range available
Supply Voltage <sup>1,2</sup> V <sub>CC</sub>	2.8	-	3.3	Volts	± 5%
Supply Current I <sub>CC</sub>	-	-	7.0	mA	Load: 15 pF, V <sub>CC</sub> ± 5%
24 Hour Holdover	-	-	±0.37	ppm	
Frequency Stability vs. Supply	-	-	±0.2	ppm	Load: 15 pF, V <sub>CC</sub> ± 5%
Frequency Stability vs. Load	-	-	±0.2	ppm	Load: 15 pF, V <sub>CC</sub> ± 5%
V <sub>control</sub> Range	0.5	-	2.5	Volts	1.50 volts nominal for V <sub>CC</sub>
Frequency Pullability <sup>2</sup>	0	±8.0	±12.0	ppm	Positive Slope
Linearity	-	-	2.0	%	
Output Waveform	CMOS				
Duty Cycle	40	50	60	%	Load: 15 pF V <sub>th</sub> : T <sub>R</sub> and T <sub>F</sub> 10% and 90% of amplitude V <sub>th</sub> : D.C. 50% of amplitude
Output V <sub>HIGH</sub>	90	-	-	%V <sub>dd</sub>	
Output V <sub>LOW</sub>	-	-	10	%V <sub>dd</sub>	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	-	6.5	nS	
Startup Time	-	-	3.0	S	Time to reach specified frequency
Long term stability (Aging)	-	±3.0	-	ppm	After 15 years
Jitter	-	0.6	-	pS	Frequency offset from carrier 12 kHz to 5 MHz, typical performance at 20.0 MHz
Phase Noise 10 Hz 100 Hz 1 kHz 10 kHz	-	-100 -120 -134 -144	-	dBc/Hz	25°C ± 2°C at 26.0 MHz
Storage Temperature Range	-55	-	+95	°C	

Note: <sup>1</sup> Place a 10nF power supply bypass capacitor next to device for correct operation

<sup>2</sup> Specified by part number.

The following is a list of developed frequencies. Consult factory for other options.

8.192M, 9.60M, 9.72M, 10.00M, 12.80M, 13.00M, 16.384M,  
19.20M, 19.44M, 20.00M, 25.60M, 26.00M, 40.00M only

## Part Number (Possible Options shown)

Series Model	V <sub>CC</sub> Supply Voltage <sup>1</sup>		Operating Temperature		Stability <sup>1,2</sup>	Pullability <sup>1</sup>	Frequency
	Lowest	Highest	Lowest	Highest	(ppm)	(ppm)	(MHz)
THA3	031	035	G	K	280	008	-19.44M
	<b>031</b> = 3.1 for 3.3 volts nominal <b>029</b> = 2.9 for 3.0 volts nominal <b>027</b> = 2.7 for 2.8 volts nominal	<b>035</b> = 3.5 for 3.3 volts nominal <b>031</b> = 3.1 for 3.0 volts nominal <b>029</b> = 2.9 for 2.8 volts nominal	<b>A</b> = +10°C <b>B</b> = +5°C <b>C</b> = +0°C <b>D</b> = -5°C <b>E</b> = -10°C <b>F</b> = -15°C <b>G</b> = -20°C <b>H</b> = -25°C <b>J</b> = -30°C <b>K</b> = -35°C <b>L</b> = -40°C	<b>A</b> = +40°C <b>B</b> = +45°C <b>C</b> = +50°C <b>D</b> = +55°C <b>E</b> = +60°C <b>F</b> = +65°C <b>G</b> = +70°C <b>H</b> = +75°C <b>J</b> = +80°C <b>K</b> = +85°C	<b>280</b> = ± 0.28 <b>500</b> = ± 0.5	<b>000</b> = TCXO <b>005</b> = ± 5 <b>008</b> = ± 8	10 - 40 MHz <b>Developed:</b> 8.192M, 9.60M, 9.72M, 10.00M, 12.80M, 13.00M, 16.384M, 19.20M, 19.44M, 20.00M, 25.60M, 26.00M, 40.00M

<sup>1</sup> Contact Factory for non-standard specifications

<sup>2</sup> Not all stabilities are available with all operating temperature ranges. Contact Factory for exact combinations available.

## Device Marking

PFFFF	OR	FFFF.zzz YMD	OR	FFFF zzz • P zzzzzz YMD	OR	FFFF zzz • PLE zz YWWz	OR	FFFF zzz • PLE z YWWz
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P or PLE

FFFF

YWW

YMD

z

= Pletronics

= Frequency in MHz

= Date Code (year week)

= Date code (year month day) - See table below (may appear in any one of the locations shown)

= Internal factory codes

**Note: Output Frequency may be half the Crystal Frequency marking, depending on requirements.**

Specifications such as part number, frequency stability, supply voltage and operating temperature range, etc. are not identified from marking.

External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YMD (Year Month Day)

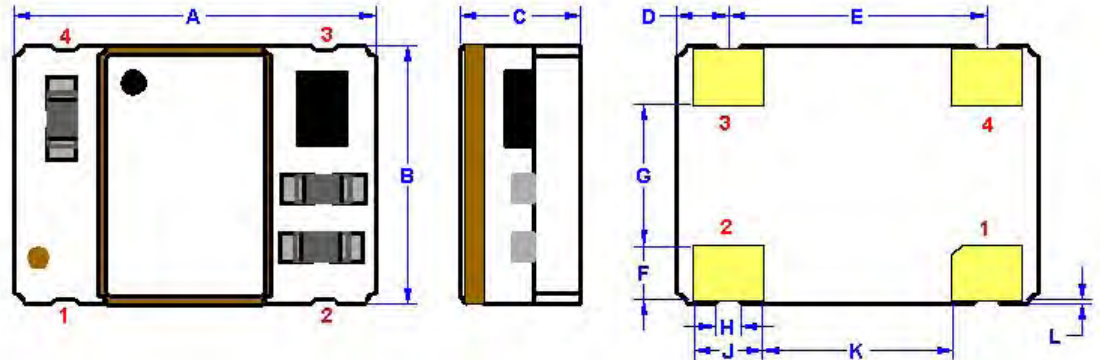
Code	5	6	7	8	9	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2015	2016	2017	2018	2019	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

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

## Mechanical Dimensions

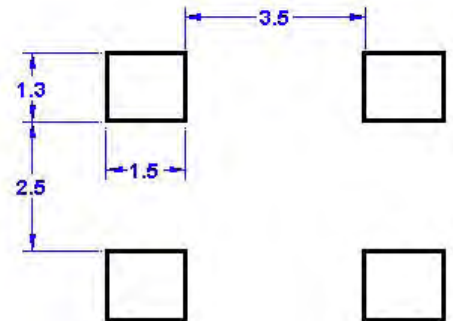
	Inches	mm
A	0.276 ± 0.006	7.00 ± 0.15
B	0.197 ± 0.006	5.00 ± 0.15
C	0.104 max	2.65 max
D <sup>1</sup>	0.038	0.96
E <sup>1</sup>	0.200	5.08
F <sup>1</sup>	0.043	1.10
G <sup>1</sup>	0.102	2.60
H <sup>1</sup>	0.024	0.60
J <sup>1</sup>	0.055	1.40
K <sup>1</sup>	0.145	3.68
L <sup>1</sup>	0.004	0.10

<sup>1</sup> Typical dimensions



### Pad Layout mm shown (Top View)

Disclaimer: Recommended layout shown.  
Adjust pad layout as needed for individual  
process requirements.  
Solder mask required, as shown.



(Not to Scale)

**Contacts (pads):** Gold 11.8 to 39.4 μm (0.3 to 1.0 μm) over Nickel 50 to 350 μm (1.27 to 8.89 μm)

## Layout

Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground. EFC (Electronic Frequency Control).
2	Ground (GND)	
3	Output	CMOS
4	V <sub>CC</sub> Supply Voltage	Connect an appropriate 10nF power supply bypass capacitor as close as possible

For Optimum Jitter Performance, Pletronics recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place 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

## Package Labeling

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 16mm tape, 8mm pitch.

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

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



### RoHS Compliant

2nd Lvl Interconnect

Category=e4

Max Safe Temp=260C for 10s 2X Max

**Pletronics Inc. certifies this device is in accordance with the RoHS 2 (2011/65/EU) and WEEE (2002/96/EC) directives.**

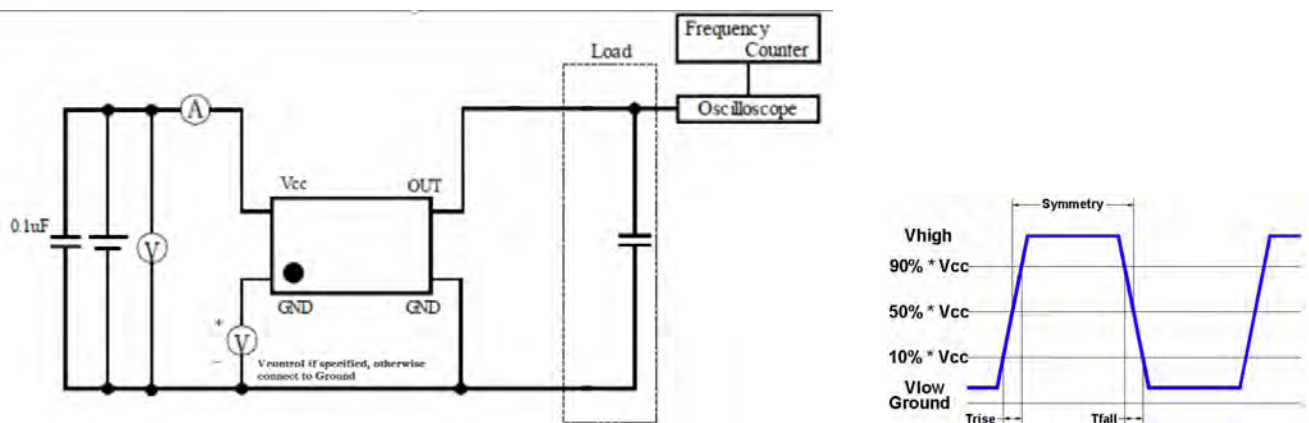
Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 0.20 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020D

Second Level Interconnect code: e4

## Electrical Test /Load Circuit



## Environmental / ESD Ratings

Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	JESD22-B104
Vibration	JESD22-B103
Solderability	IPC J-STD-002
Thermal Shock	MIL-STD-883 Method 1011, Condition A

ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Charged Device Model	500V	JESD 22-C101
Machine Model	200V	JESD22-A115

Absolute Maximum Ratings

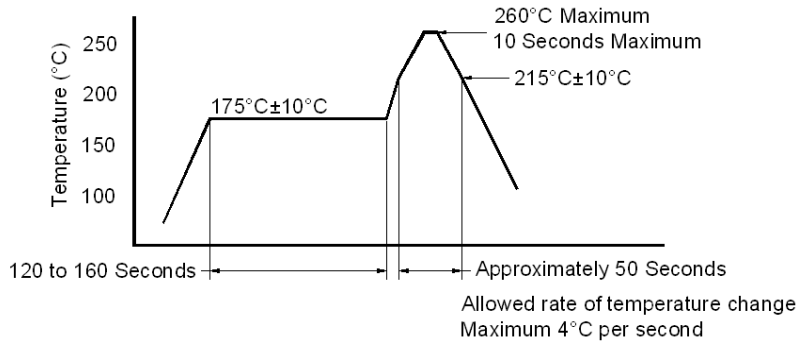
Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.6V to +6V
V <sub>i</sub> Input Voltage	-0.6V to V <sub>CC</sub> + 0.6V
I <sub>o</sub> Output Current	-10mA to +10mA

### 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.

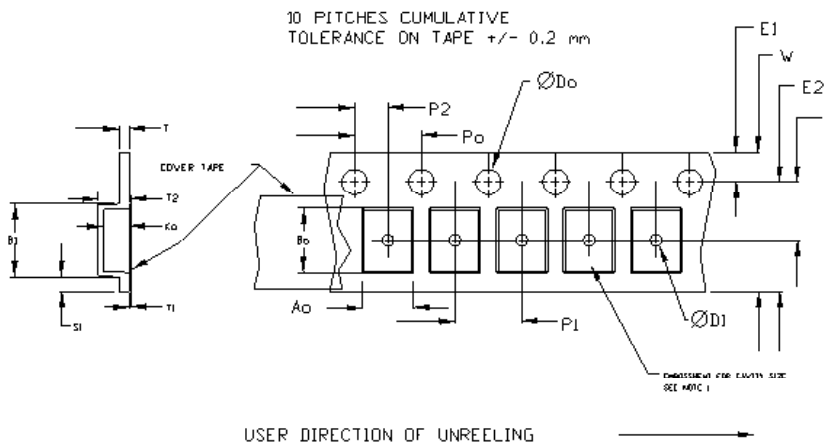
## Reflow Cycle



The part may be reflowed 2 times without degradation (typical for lead free processing).

Parts assembled with No Clean (NC) solder paste.

## Tape and Reel



Tape Constant Dimensions Table 1

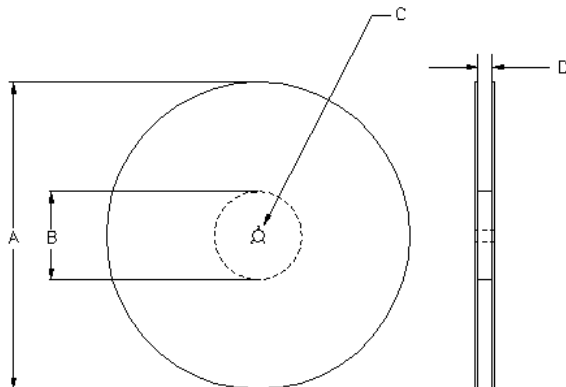
Tape Size	Do	D1 min	E1	Po	P2	S1 min	T max	T1 max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0	0.6	0.6	0.1
12mm		1.5			±0.05			
16mm		1.5			2.0			
24mm		1.5			±0.1			

Tape Variable Dimensions Table 2

Tape Size	B1 max	E2 min	F	P1	T2 max	W max	Ao, Bo & Ko
16mm	12.1	14.25	7.5 ±0.1	8.0 ±0.1	8.0	16.3	Note 1

Dimensions in mm Drawing Not to scale

Note 1: Embossed cavity to conform to EIA-481-B



Reel Dimensions (may vary) Table 3

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
7	7.0	177.8	2.50	63.5	13.0	Tape size +0.4
10	10.0	254.0	4.00	101.6	+0.5 -0.2	+2.0 -0.0
13	13.0	330.2	3.75	95.3		