

Mock-up

**PRELIMINARY**

## TSA4 Series TCVCXO Oscillator

July 2009

**Lead Free** 

- Pletronics' TSA4 Series is a temperature compensated voltage controlled crystal oscillator with a CMOS output.
- The package is designed for high density surface mount designs.
- Tape and Reel packaging is available.
- 8 to 40 MHz
- Stabilities to 0.5 ppm available
- 5 x 7 mm LCC Ceramic Package
- Optional Voltage Control Function

**Pletronics Inc. certifies this device is in accordance with the RoHS (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: 0.20 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

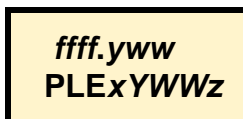
The thermal resistance junction to board is 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

## Part Number:

<b>TSA4</b>	<b>031</b>	<b>035</b>	<b>G</b>	<b>H</b>	<b>015</b>	<b>008</b>	<b>-40.0M</b>	<b>-XX</b>	
									Internal code or blank
									Nominal Frequency in MHZ
									<b>Pullability in ppm (Vcontrol)</b> <b>000</b> = TCXO only <b>008</b> = ± 8 ppm minimum <b>015</b> = ± 15 ppm minimum
									<b>Stability in ppm</b> <b>010</b> = ± 1 ppm <b>005</b> = ± 0.5 ppm <b>015</b> = ± 1.5 ppm <b>025</b> = ± 2.5 ppm
									<b>Highest Specified Operating Temperature</b> <b>A</b> = +40°C <b>E</b> = +60°C <b>J</b> = +80°C <b>B</b> = +45°C <b>F</b> = +65°C <b>K</b> = +85°C <b>C</b> = +50°C <b>G</b> = +70°C <b>D</b> = +55°C <b>H</b> = +75°C
									<b>Lowest Specified Operating Temperature</b> <b>A</b> = +10°C <b>E</b> = -10°C <b>J</b> = -30°C <b>B</b> = +5°C <b>F</b> = -15°C <b>K</b> = -35°C <b>C</b> = +0°C <b>G</b> = -20°C <b>L</b> = -40°C <b>D</b> = -5°C <b>H</b> = -25°C
									<b>Highest Supply Voltage*</b> <b>055</b> = 5.5 volts <b>035</b> = 3.5 volts <b>036</b> = 3.6 volts <b>030</b> = 3.0 volts
									<b>Lowest Supply Voltage *</b> <b>045</b> = 4.5 volts <b>031</b> = 3.1 volts <b>030</b> = 3.0 volts <b>027</b> = 2.7 volts
									<b>Series (Part Type, Logic &amp; Package)</b>

\* Supply Voltage: Select range between 2.7V and 5.5V with ratio of Highest / Lowest ≤ 1.20  
 For Example: the part number for 3.3V nominal could be TSA4030036.....

## Part Marking:



<i>ffff</i>	=	<i>ff.ff</i> frequency in MHZ of the crystal
<i>yww</i>	=	Year and Week of the crystal manufacture
PLE	=	Pletronics
X	=	Model number, normally a "B"
<i>YWW</i>	=	Year and Week of assembly of the TCXO
Z	=	internal factory code

## Electrical Specification for specified V<sub>CC</sub> over the specified temperature range

Item	Min	Typ	Max	Unit	Condition
Frequency Range	8		40	MHZ	
Frequency Accuracy <sup>1</sup>	-2.5 -0.5		+2.5 +0.5	ppm	V <sub>control</sub> 1.50 volts if used
Frequency Stability versus Supply	-0.2		+0.2	ppm	Load: 15 pF & V <sub>CC</sub> ± 5%
Output Waveform	CMOS				
Output Level High	90		-	% of V <sub>CC</sub>	Load: 15 pF
Output Level High	-		10		
Output Rise and Fall Time	-		8	nS	10% to 90% of V <sub>CC</sub> Load: 15 pF
Output Duty Cycle	40		60	%	50% of V <sub>CC</sub> Load: 15 pF
Phase Noise	-	-87 -114 -135 -145 -145		dBc/Hz	
	10 Hz				
	100 Hz				
	1 KHz				
	10 KHz				
	>10 KHz				
V Supply Range <sup>1</sup> V <sub>CC</sub>	2.7		5.5	Volts	
Supply Current	-		3.2 5.0 8.0	mA	15 pF load, V <sub>CC</sub> =3.3V, 25°C
	I <sub>CC</sub> at 13 MHZ				
	I <sub>CC</sub> at 26 MHZ				
	I <sub>CC</sub> at 40 MHZ				
Start-up time	-		10	mS	to be within ±3 ppm of the final frequency
Aging	-1.0 -0.5		+1.0 +0.5	ppm	Per year at 25°C for the first year For any year thereafter
V <sub>control</sub> Range	0.5		2.70	Volts	1.50 volts nominal
V <sub>control</sub> Input Current	-50		+50	uA	
Frequency Pullability <sup>1</sup>	-8		+8	ppm	
Specified Temperature Range <sup>1</sup>	-30		+85		
Operating Temperature Range	-40		+85	°C	
Storage Temperature Range	-55		+95	°C	

<sup>1</sup> Specified by part number (consult factory if a specified temperature to -40°C is required)

## 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


## ESD Rating

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

## Package Labeling

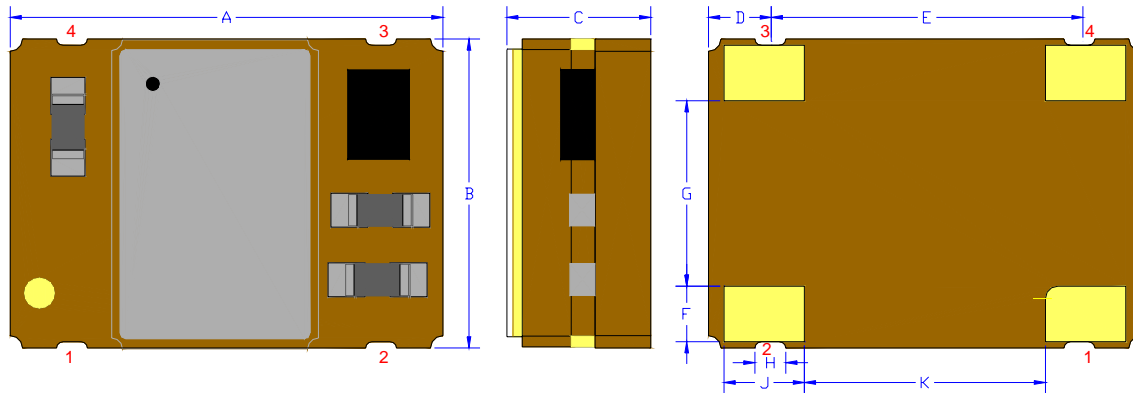
Label is 1" x 2.6" (25.4mm x 66.7mm)  
 Font is Courier New  
 Bar code is 39-Full ASCII  
 (Note: Label will show the actual PN)

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

<b>P/N:</b>  THA4029036JH025000-12.80M	
<b>Customer P/N:</b>  12345678	
<b>Qty:</b>  1000	<b>D/C</b>  9HP3

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



Not to Scale

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> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

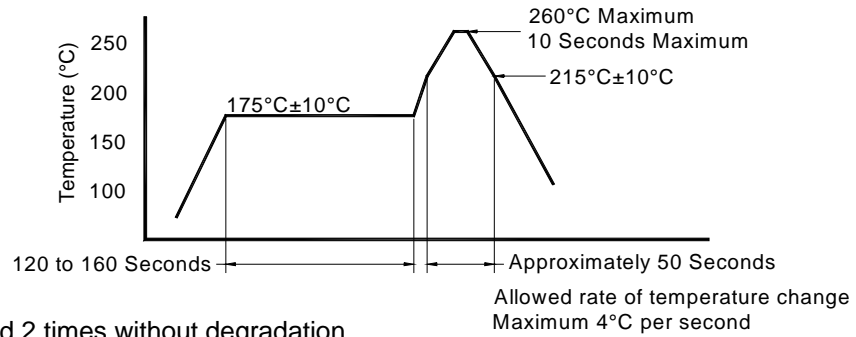
	Inches	mm
A	0.276 ±0.006	7.00 ±0.15
B	0.197 ±0.006	5.00 ±0.15
C	0.099 max	2.50 max
D <sup>1</sup>	0.039	1.00
E <sup>1</sup>	0.197	5.00
F <sup>1</sup>	0.025	0.90
G <sup>1</sup>	0.118	3.00
H <sup>1</sup>	0.020	0.50
J <sup>1</sup>	0.051	1.30
K <sup>1</sup>	0.154	3.90

<sup>1</sup> Typic dimensions

Contacts :

Gold 11.8 μinches 0.3 μm minimum over Nickel 50 to 350 μinches 1.27 to 8.89 μm

## Reflow Cycle (typical for lead free processing)

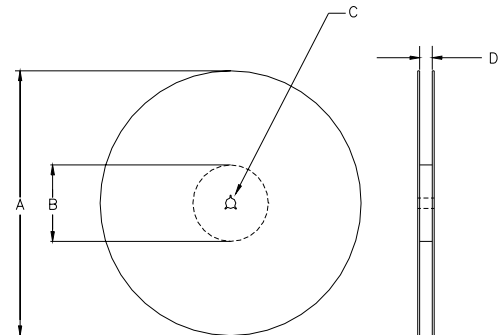


The part may be reflowed 2 times without degradation.

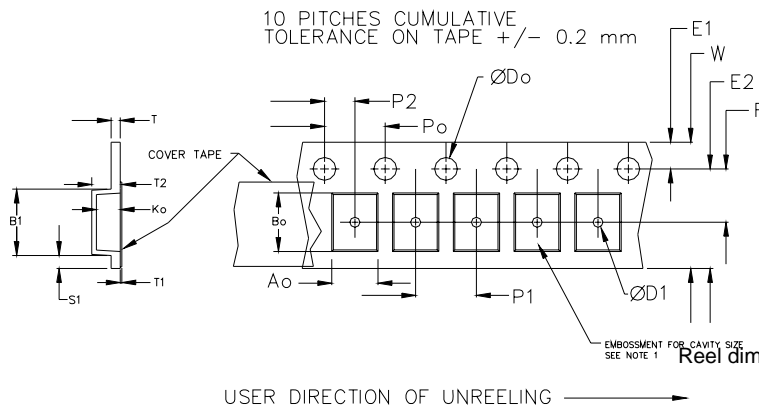
## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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			Tape Width
A	inches	7.0	10.0	13.0	
	mm	177.8	254.0	330.2	
B	inches	2.50	4.00	3.75	
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.0

Reel dimensions may vary from the above

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