



## TCF4 Series TCVCXO Oscillator

January 2009

**Lead Free**

- Pletronics' TCF4 Series is a temperature compensated voltage controlled crystal oscillator with a clipped sinewave output.
- The package is designed for high density surface mount designs.
- Tape and Reel packaging is available.
- 10 to 40 MHz
- 2.0 x 2.5 mm LCC Ceramic Package
- Optional Voltage Control Function

**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: 0.13 grams

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

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

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### 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

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## Part Number:

TCF4	031	035	G	H	015	008	-12.75M	-XX	
									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>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>M</b> = -45°C
									<b>Highest Supply Voltage *</b> <b>035</b> = 3.5 volts for 3.3 volts nominal <b>031</b> = 3.1 volts for 3.0 volts nominal <b>026</b> = 2.6 volts for 2.5 volts nominal
									<b>Lowest Supply Voltage *</b> <b>031</b> = 3.1 volts for 3.3 volts nominal <b>029</b> = 2.9 volts for 3.0 volts nominal <b>024</b> = 2.4 volts for 2.5 volts nominal
									<b>Series (Part Type, Logic &amp; Package)</b>

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\* Supply Voltage: Select range between 2.7V and 5.0V with Highest / Lowest ≤ 1.10  
 For Example: the part number for 3.3V nominal would be TCE4032034.....

## Part Marking:

XXXXXX  
Pwwyzz

Where:

XXXXXX = process code for crystal  
 wwwyzz = Date code

## Electrical Specification for specified Vcc range of 2.3V through 3.7V with a variation of $\pm 5\%$ over the specified temperature range

Item	Min	Typ	Max	Unit	Condition	
Frequency Range	10	-	40	MHZ		
Frequency Accuracy Range <sup>1</sup>	-2.5 -0.5	-	+2.5 +0.5	ppm	Vcontrol 1.50 volts if used <sup>2</sup>	
Frequency setting	-2	0	+2	ppm	Vcontrol 1.50 volts at 25°C	
Frequency Stability vs. Supply	-0.2	0	+0.2	ppm	Load: 10K ohm // 10 pF & Vcc $\pm 5\%$	
Frequency Stability vs. Load	-0.2	0	+0.2	ppm	Load: 10K ohm // 10 pF $\pm 5\%$	
Output Waveform	Clipped Sinewave					
Output Level	0.8	-	1.1	V p-p	Load: 10K ohm $\pm 10\%$ // 10 pF $\pm 10\%$	
Phase Noise	100 Hz 1 KHz 10 KHz 100 KHz	- - - -	-110 -130 -145 -145	- - - -	dBc/Hz	
V Supply Range <sup>1</sup>	V <sub>CC</sub>	2.3	-	3.7	Volts	
Supply Current	I <sub>CC</sub>	-	-	2.0	mA	
Aging		-1.0	-	+1.0	ppm	Per year at 25°C
Vcontrol Range		0.5	-	2.50	Volts	1.50 volts nominal
Frequency Pullability <sup>1</sup>		-5	$\pm 3$	+5	ppm	
Operating Temperature Range <sup>1</sup>		-30		+85	°C	
Storage Temperature Range		-55		+95	°C	

<sup>1</sup> Specified by part number

<sup>2</sup> For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures

## 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

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## Package Labeling

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

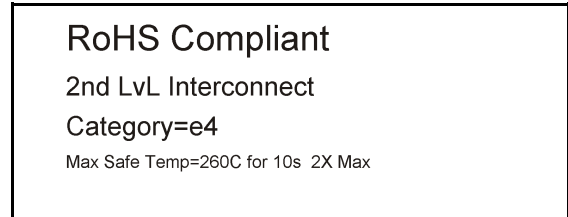
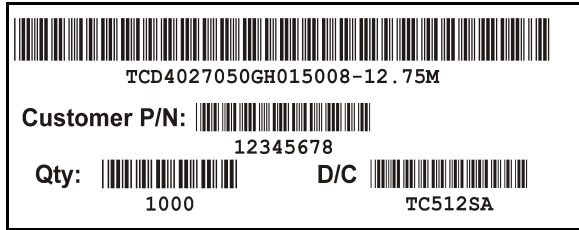
Font is Courier New

Bar code is 39-Full ASCII

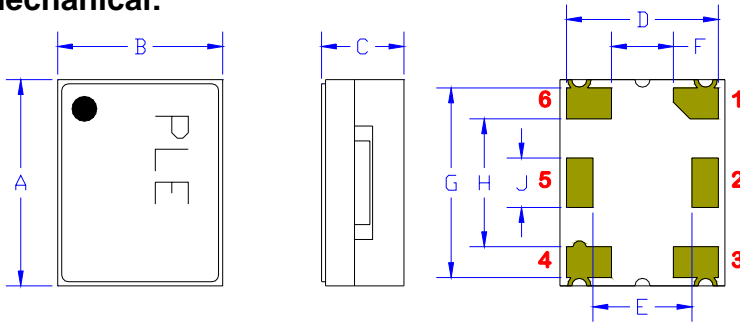
(the label will show the TCF4 actual part number)

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

Font is Arial



## Mechanical:



Not to Scale

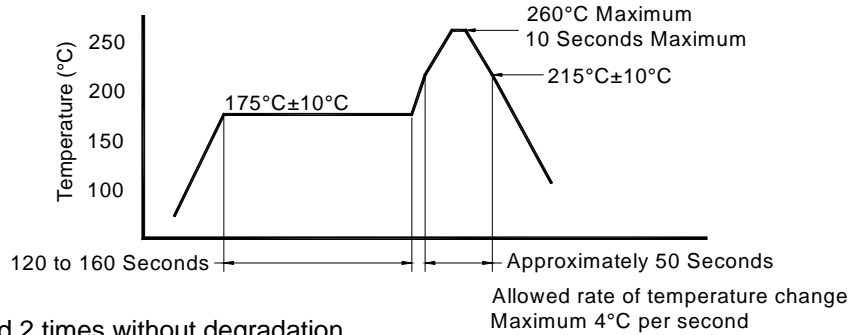
<sup>1</sup> Typical dimensions

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

	Inches	mm
A	0.098 ±0.008	2.50 ±0.20
B	0.079 ±0.008	2.00 ±0.20
C	0.040 max	1.0 max
D <sup>1</sup>	0.072	1.84
E <sup>1</sup>	0.047	1.20
F <sup>1</sup>	0.030	0.75
G <sup>1</sup>	0.091	2.30
H <sup>1</sup>	0.061	1.55
J <sup>1</sup>	0.028	0.70

Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	none	No connection or Ground. Ground is recommended)
3	Ground (GND)	
4	Output	
5	none	No connection or Ground. Ground is recommended)
6	Supply Voltage (V <sub>CC</sub> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

## 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

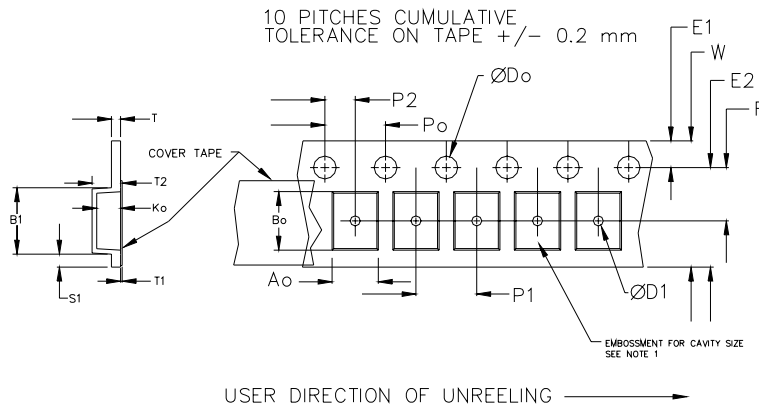
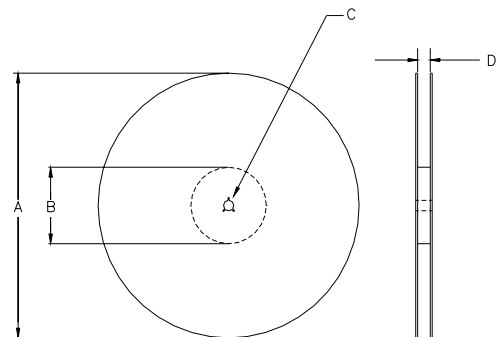
Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5	1.0	1.75	4.0	2.0 ± 0.05	0.6	0.6	0.1
12mm		1.5			2.0 ± 0.1			
16mm		± 0.1			± 0.1			
24mm		1.5			± 0.1			

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	
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			
D	mm	16.4	16.4	16.4	
		+2.0 -0.0	+2.0 -0.0	+2.0 -0.0	

Reel dimensions may vary from the above

### IMPORTANT NOTICE

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