

## TCE4 Series TCXO / TCVCXO

May 2012

**Lead Free** 

- Pletronics' TCE4 Series is a temperature compensated crystal oscillator with an optional voltage control function and a clipped sinewave output.
- The package is designed for high density surface mount designs.
- Tape and Reel packaging is available.
- 10 to 52 MHz
- 1.7V to 3.7V
- 2.5 x 3.2 mm LCC Ceramic Package
- Optional Voltage Control Function (TCVCXO)

**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 25 to 40°C/Watt depending on the solder pads, ground plane and construction of the PCB.

## Part Number:

|  |     |     |   |   |     |     |         |     |  |
|--|-----|-----|---|---|-----|-----|---------|-----|--|
| TCE4   | 031 | 035 | G | H | 015 | 008 | -12.75M | -XX |  |
| Internal code or blank   |     |     |   |   |     |     |         |     |  |
| Nominal Frequency in MHz   |     |     |   |   |     |     |         |     |  |
| Pullability in ppm (Vcontrol) (xxx in ppm)<br>000 = TCXO only<br>008 = ± 8 ppm minimum Example   |     |     |   |   |     |     |         |     |  |
| Stability in ppm (ppm = xxx / 10) Examples are:<br>010 = ± 1 ppm<br>015 = ± 1.5 ppm<br>025 = ± 2.5 ppm   |     |     |   |   |     |     |         |     |  |
| Highest Specified Operating Temperature<br>A = +40°C E = +60°C J = +80°C<br>B = +45°C F = +65°C K = +85°C<br>C = +50°C G = +70°C<br>D = +55°C H = +75°C        |     |     |   |   |     |     |         |     |  |
| Lowest Specified Operating Temperature<br>A = +10°C E = -10°C J = -30°C<br>B = +5°C F = -15°C **L = -40°C<br>C = +0°C G = -20°C<br>D = -5°C H = -25°C          |     |     |   |   |     |     |         |     |  |
| Highest Supply Voltage * (xxx / 10)<br>035 = 3.5 volts for 3.3 volts nominal<br>031 = 3.1 volts for 3.0 volts nominal<br>026 = 2.6 volts for 2.5 volts nominal |     |     |   |   |     |     |         |     |  |
| Lowest Supply Voltage * (xxx / 10)<br>031 = 3.1 volts for 3.3 volts nominal<br>029 = 2.9 volts for 3.0 volts nominal<br>024 = 2.4 volts for 2.5 volts nominal  |     |     |   |   |     |     |         |     |  |
| Series (Part Type, Logic & Package)  |     |     |   |   |     |     |         |     |  |

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

\*\* Contact factory for extended temperature operation and stabilities. Not all stabilities are available @-40°C

## Part Marking:

**ffff.xxx**  
•PLExx.ywww

or

**ffff.xxx**  
•PLE x.ywww

ffff.xxx = frequency in MHz .  
PLE = Pletronics  
x = Internal code  
yww = Year week

**Electrical Specification for specified Vsupply with a variation of  $\pm 5\%$  over the specified temperature range**

| Item                                  | Min              | Typ  | Max          | Unit  | Condition                                    |                    |
|---------------------------------------|------------------|------|--------------|-------|--|--------------------|
| Frequency Range                       | 10               | -    | 52           | MHz   |  |                    |
| Frequency Accuracy Range <sup>1</sup> | -2.5<br>-0.5     | -    | +2.5<br>+0.5 | ppm   | Vcontrol 1.50 volts if used                  |                    |
| 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           | -    | -115         | -     | dBc/Hz                                       |                    |
|                                       | 1 KHz            | -    | -136         | -     |  |                    |
|                                       | 10 KHz           | -    | -145         | -     |  |                    |
|                                       | 100 KHz          | -    | -145         | -     |  |                    |
| V Supply Range                        | V <sub>CC</sub>  | 1.7  | -            | 3.7   | Volts  |                    |
| Supply Current                        | I <sub>CC</sub>  | -    | 2.0          | 3.0   | 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           |                  | -30  |              | +85   | °C   |                    |
| Storage Temperature Range             |                  | -55  |              | +95   | °C   |                    |

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

**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)

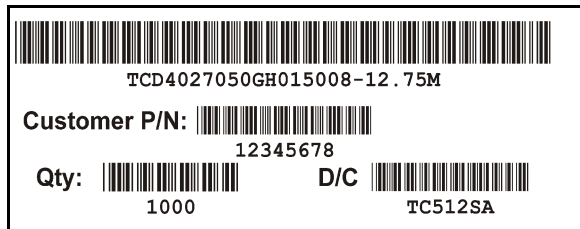
Font is Courier New

Bar code is 39-Full ASCII

(the label will show the TCE4 actual part number)

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

Font is Arial



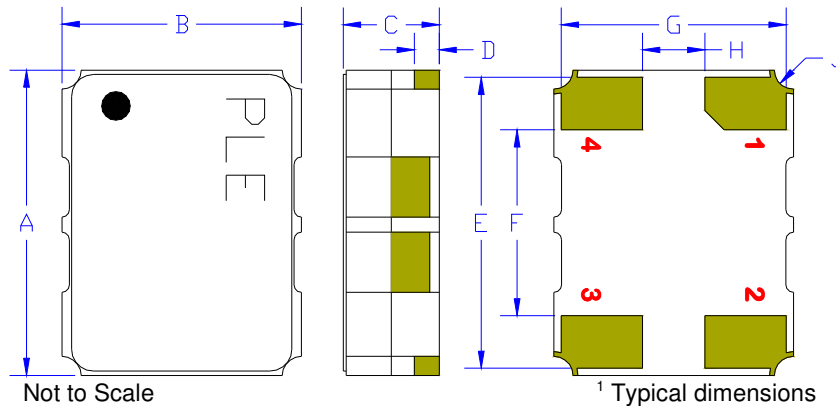
### RoHS Compliant

2nd Lvl Interconnect

Category=e4

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

### Mechanical:

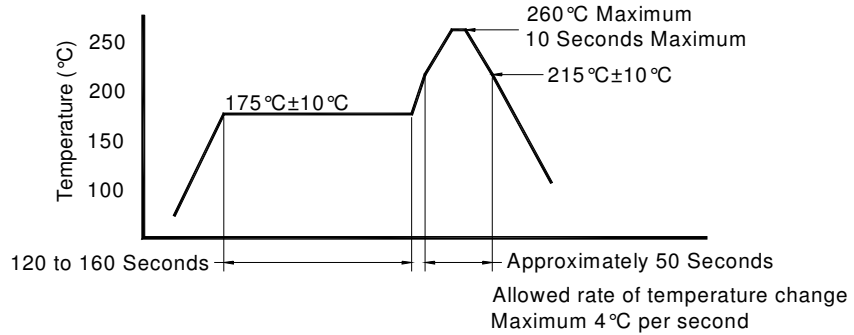


|                | Inches       | mm         |
|----------------|--------------|------------|
| A              | 0.126 ±0.008 | 3.20 ±0.20 |
| B              | 0.098 ±0.008 | 2.50 ±0.20 |
| C              | 0.040 max    | 1.0 max    |
| D <sup>1</sup> | 0.102        | 0.26       |
| E <sup>1</sup> | 0.120        | 3.05       |
| F <sup>1</sup> | 0.077        | 1.95       |
| G <sup>1</sup> | 0.093        | 2.35       |
| H <sup>1</sup> | 0.026        | 0.65       |
| J <sup>1</sup> | 0.008        | 0.20R      |

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

| 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. |

## Reflow Cycle (typical for lead free processing)



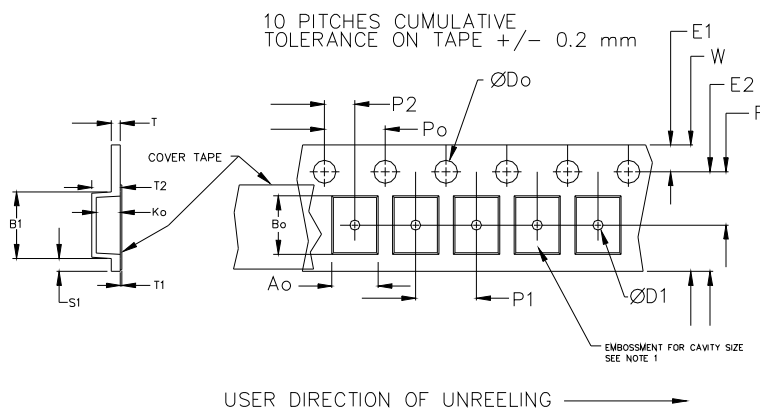
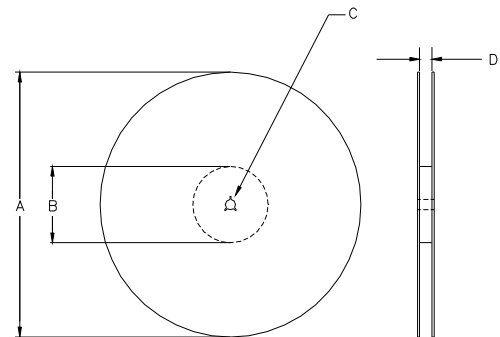
The part may be reflowed 2 times without degradation.

## 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<br>-0.0 | 1.5    | ± 0.1 | ± 0.1 | 2.0 ± 0.1  |        |       |        |
| 24mm                        |              | 1.5    |       |       |            |        |       |        |

| 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<br>+2.0<br>-0.0 | 16.4<br>+2.0<br>-0.0 | 16.4<br>+2.0<br>-0.0 |            |

Reel dimensions may vary from the above

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