

# TCD4025-19.2M Microcell, Femtocell TCVCXO Oscillator

June 2010

- Pletronics' TCD4 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.
- 19.2 MHz
- 3.2 x 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: 0.10 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 |

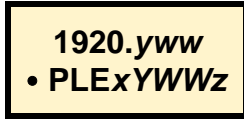
### Thermal Characteristics

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            |

### Part Marking:



|      |   |  |
|------|---|--|
| 1920 | = | 19.20 frequency in MHz                   |
| yww  | = | Year and Week of the crystal manufacture |
| PLE  | = | Pletronics                               |
| X    | = | Model number, normally a "B"             |
| YWW  | = | Year and Week of assembly of the TCXO    |
| Z    | = | internal factory code                    |

### 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)

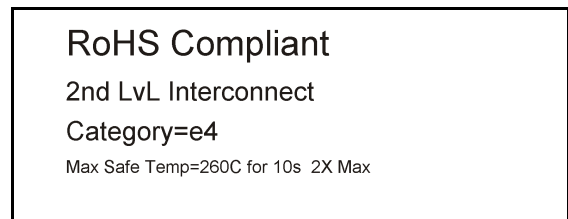
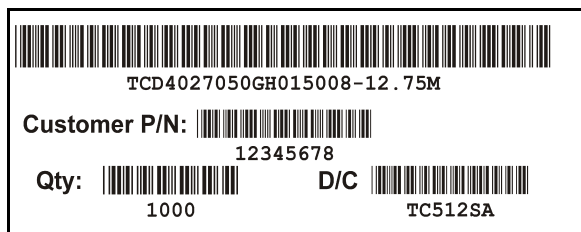
Font is Courier New

Bar code is 39-Full ASCII

The bar code will show TCD4025-19.2M for the Part Number

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

Font is Arial

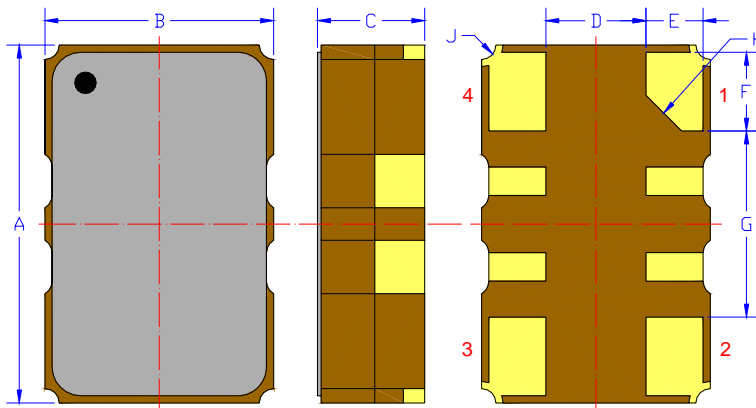


### Electrical Specification for specified Vcc over the specified temperature range

| Item  | Min              | TYP             | Max          | Unit    | Condition  |
|---|------------------|-----------------|--------------|---------|--|
| Frequency Stability over temperature        | -100             | -               | +100         | ppb     | Over 0°C-70°C at fixed supply voltage + load (reference to midpoint min/max frequency) |
| Holdover                                    | -100             | 0               | 100          | ppb     | Over 0°C-70°C for 24 hours   |
| Frequency Calibration                       | -2.0             | -               | +2.0         | ppm     | Frequency offset at 25°C, 60 minutes after reflow.                                     |
| Supply voltage stability                    | -                | -               | 10           | ppb     | ± 2% variation in supply voltage at 25°C   |
| Load sensitivity                            | -5               | -               | 5            | ppb     | 2% variation in magnitude from 10K ohm ±10%    10 pF                                   |
| Aging rate following reflow                 | -                | ±10<br>±3<br>±1 | -            | ppb/day | 1 day after reflow<br>7 days after reflow<br>30 days after reflow                      |
| Long term stability (Aging)                 | -1000            | -               | 1000         | ppb     | Long term stability after 1 year   |
| Long term stability (Aging)                 | -1000            | -               | 1500         | ppb     | Long term stability after 5 years  |
| Output Waveform                             | Clipped Sinewave |                 |              |         | DC Coupled   |
| Output Level                                | 0.8              | -               | -            | V p-p   | Load: 10K ohm ± 10%    10 pF ±10%, DC Coupled  |
| Phase Noise                                 | 10 Hz<br>100Hz   | -               | -100<br>-120 | -       | dBc/Hz<br>Typical values for a 19.2 MHz oscillator at 25°C                             |
| 1 KHz                                       | -                | -134            | -            |         |  |
| 10KHz                                       | -                | -144            | -            |         |  |
| Jitter                                      | -                | -               | 1.7          | pS      | Frequency offset from carrier 10Hz to 1MHz   |
| V Supply Range <sup>1</sup> V <sub>CC</sub> | 2.7              | 3.3             | 3.5          | Volts   |  |
| Supply Current I <sub>CC</sub>              | -                | -               | 3.0          | mA      |  |
| Long term stability                         | -1500            | -               | 1500         | ppb     | Long term stability after 5 years  |
| Vcontrol Range                              | 0.5              | -               | 2.50         | Volts   | 1.50 volts nominal   |
| Frequency Pullability                       | 4.5              | -               | 10           | ±ppm    | Slope positive   |
| Linearity                                   | -                | 0.05            | 2.0          | %       | In accordance with MIL-PRF-55310   |
| Operating Temperature Range                 | 0                | -               | +70          | °C      |  |
| Storage Temperature Range                   | -55              | -               | +95          | °C      |  |

Note:<sup>1</sup> For correct operation a 10nF supply de-coupling capacitor should be placed next to the device.

### Mechanical:



|                | Inches       | mm         |
|----------------|--------------|------------|
| A              | 0.197 ±0.008 | 5.00 ±0.20 |
| B              | 0.126 ±0.008 | 3.20 ±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      |

Not to Scale

<sup>1</sup> Typical dimensions

#### Contacts:

Gold 11.8 to 39.4 μinches (0.3 to 1.0 μm)  
over  
Nickel 50 to 350 μinches (1.27 to 8.89 μm)

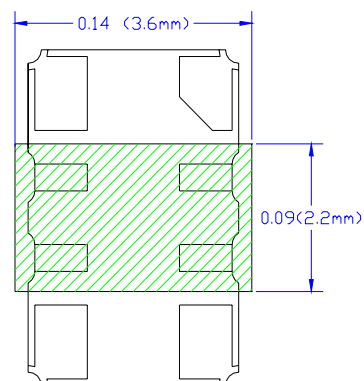
| Pad | Function                          | Note   |
|-----|-----------------------------------|--|
| 1   | Vcontrol Input                    | If this function is not specified, recommend connecting this pad to ground.  |
| 2   | Ground (GND)                      |  |
| 3   | Output                            | The output is DC coupled. Most common used with external coupling capacitor. 0.001 to 0.01uF recommended                       |
| 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

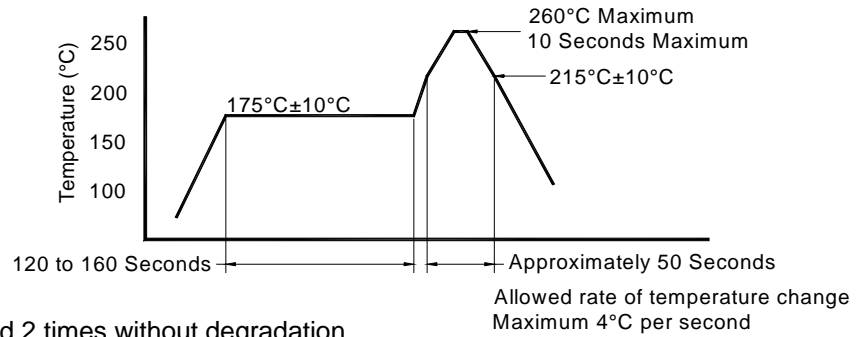
All connection points in the designated region have solder mask cover to avoid any electrical connections

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)



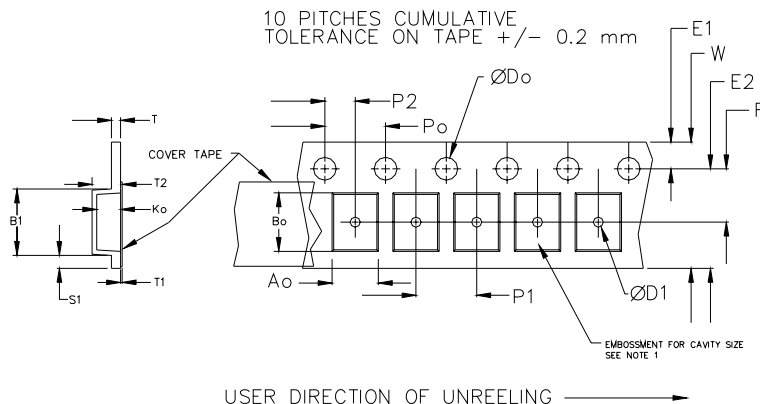
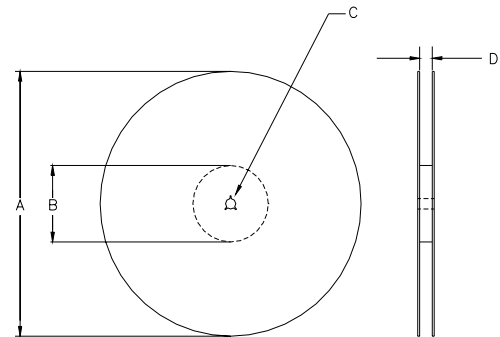
The part may be reflowed 2 times without degradation.

### 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 |      |     | ± 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           | 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 from the above

### **IMPORTANT NOTICE**

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's limited warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE products are not designed, intended, authorized or warranted to be suitable for use in life support applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of PLE products in such applications is understood to be fully at the risk of the customer. Use of PLE products in such applications requires the written approval of an appropriate PLE officer. Questions concerning potential risk applications should be directed to PLE.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

### **Contacting Pletronics Inc.**

Pletronics Inc.  
19013 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

Copyright © 2010, Pletronics Inc.