

# TCD4027-26.0M 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.
- 26 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

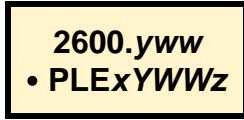
### Thermal Characteristics

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:**



2600 = 26.0 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

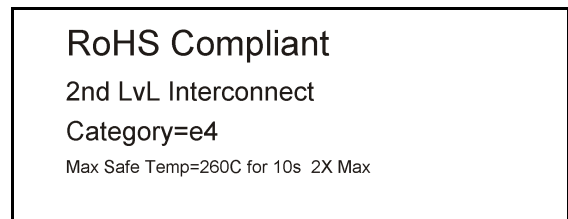
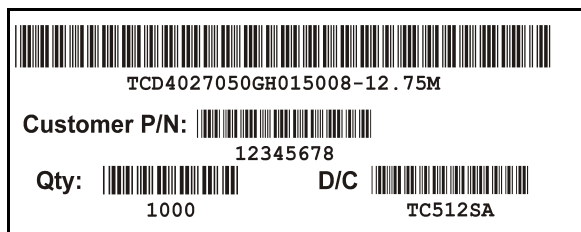
**Reliability: Environmental Compliance**

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 TCD4027-26.0M for the Part Number

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

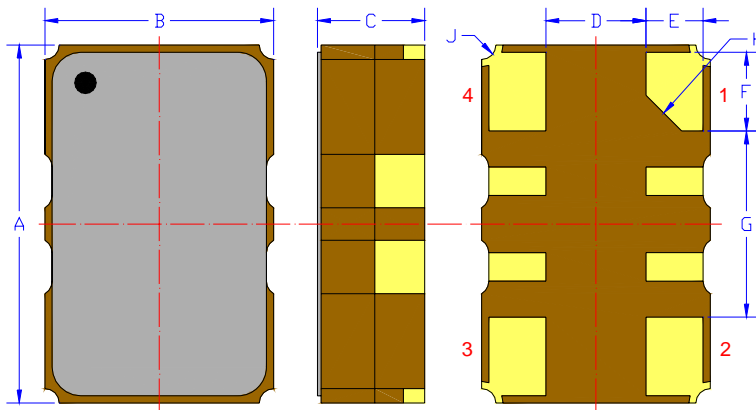


**Electrical Specification for specified Vcc over the specified temperature range**

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 ±3 ±1	-	ppb/day	1 day after reflow 7 days after reflow 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 100Hz	-	-100 -120	-	dBc/Hz Typical values for a 26.0 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)

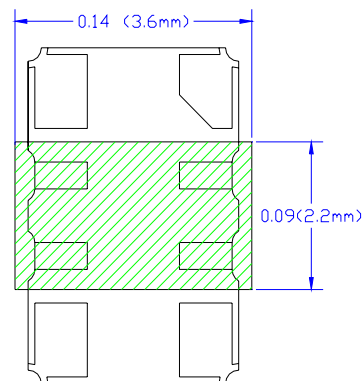
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	The output is DC coupled. Most common used with external coupling capacitor. 0.001 to 0.01uF recommended
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power 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

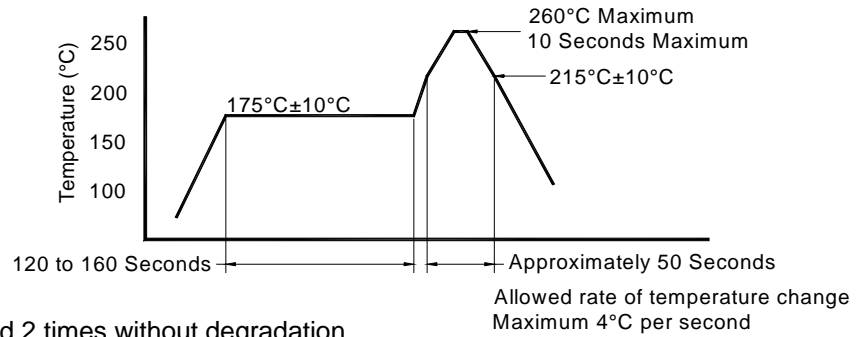
All connection points in the designated region have solder mask cover to avoid any electrical connections

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)



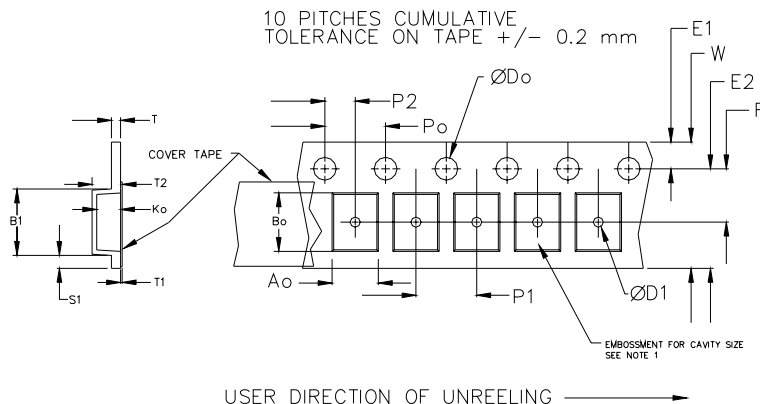
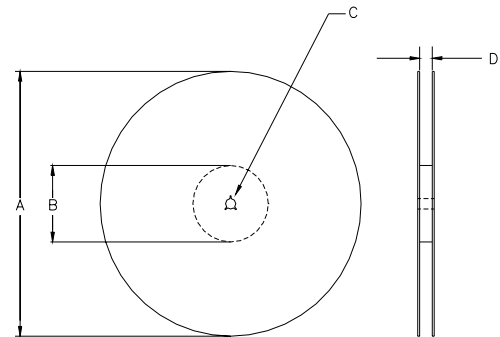
The part may be reflowed 2 times without degradation.

### 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.

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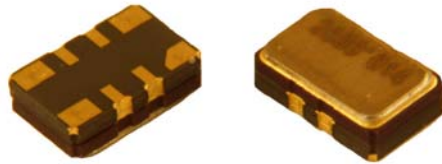
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### **Contacting Pletronics Inc.**

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)

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# TCD4029-26.0M 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.
- 26 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

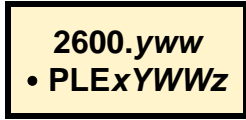
### Thermal Characteristics

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:**



2600	=	26.00 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

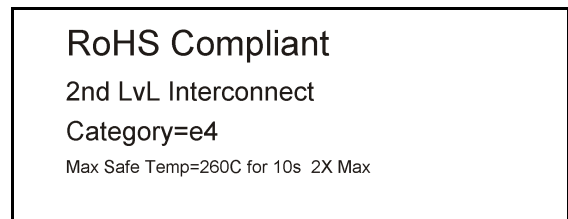
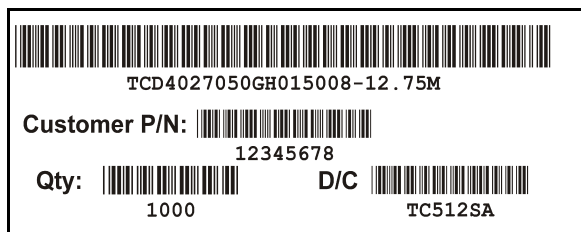
**Reliability: Environmental Compliance**

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 TCD4029-26.0M for the Part Number

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



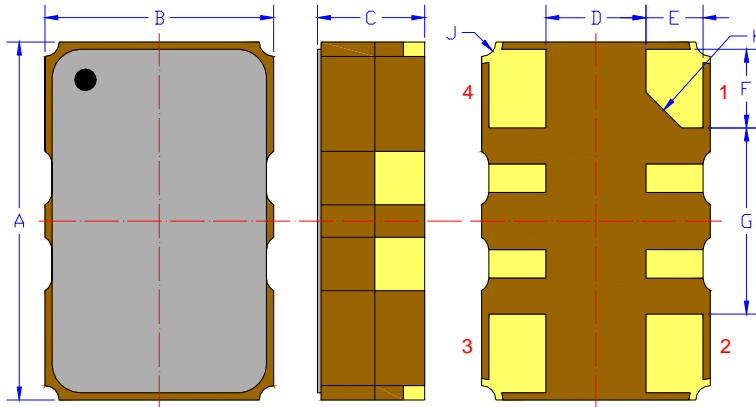


**Electrical Specification for specified Vcc over the specified temperature range**

Item	Min	TYP	Max	Unit	Condition
Frequency Stability over temperature	-100	-	+100	ppb	Over 0°C-80°C at fixed supply voltage + load (reference to midpoint min/max frequency)
Holdover	-100	0	100	ppb	Over 0°C-80°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	-	ppb/day	1 day after reflow
	-	±3	-		7 days after reflow
	-	±1	-		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	-	-100	dBc/Hz	Typical values for a 26.0 MHz oscillator at 25°C
	100Hz	-	-120		
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	-	+80	°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)

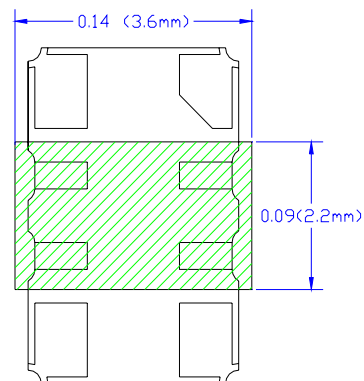
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	The output is DC coupled. Most common used with external coupling capacitor. 0.001 to 0.01uF recommended
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power 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

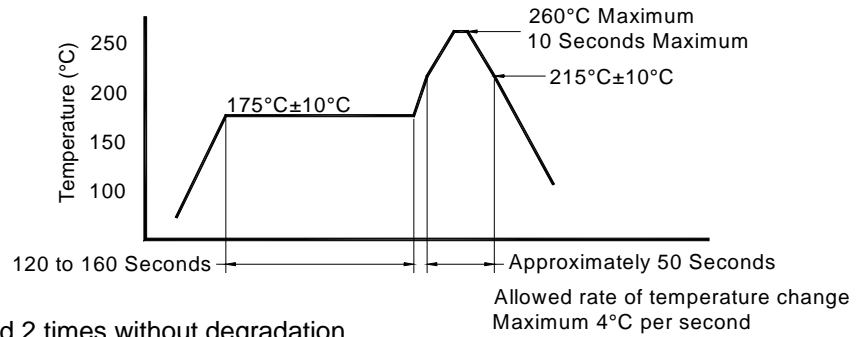
All connection points in the designated region have solder mask cover to avoid any electrical connections

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)



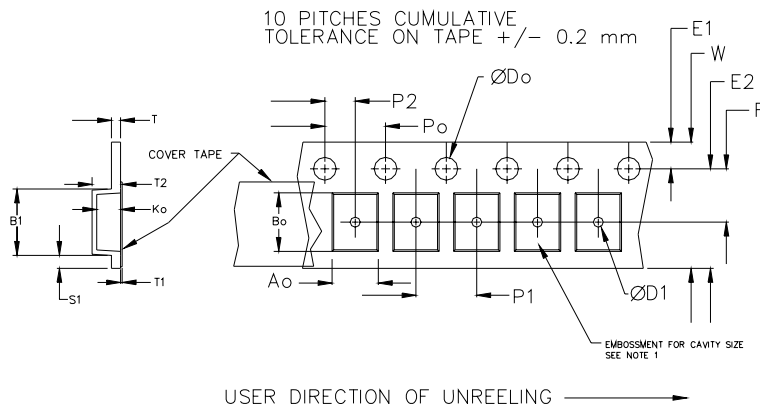
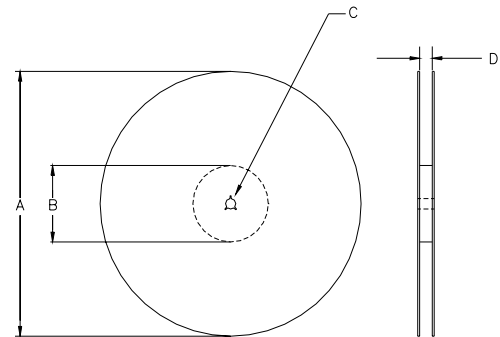
The part may be reflowed 2 times without degradation.

### 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

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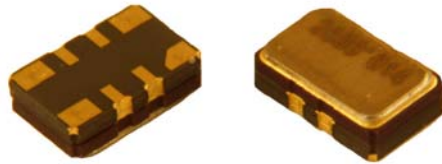
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Pletronics Inc.  
19013 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

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)

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# TCD4032-19.2M 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



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Pletronics Inc. guarantees the device does not contain the following:  
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 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

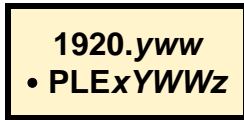
### Thermal Characteristics

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)

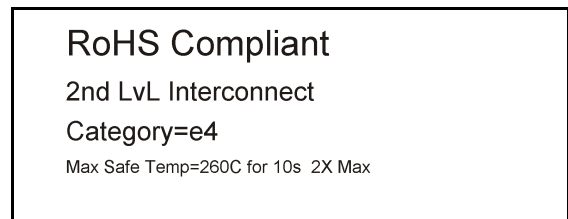
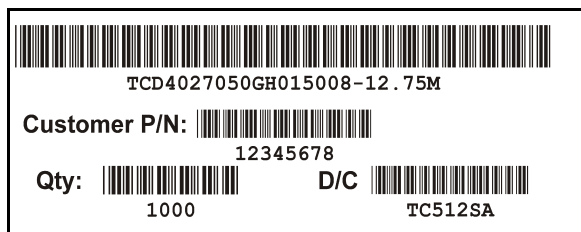
Font is Courier New

Bar code is 39-Full ASCII

The bar code will show TCD4032-19.2M for the Part Number

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

Font is Arial

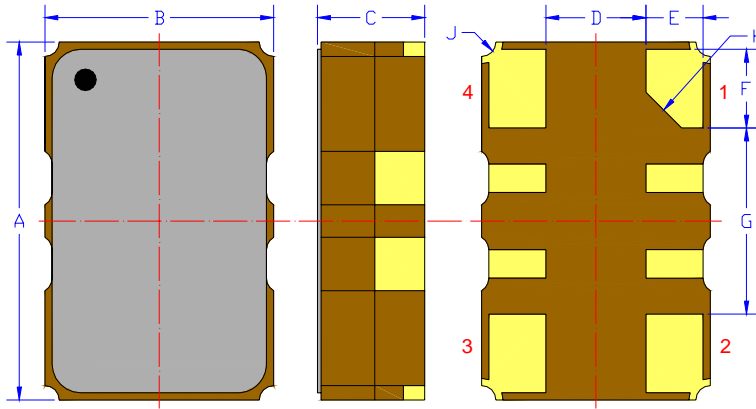


**Electrical Specification for specified Vcc over the specified temperature range**

Item	Min	TYP	Max	Unit	Condition
Frequency Stability over temperature	-100	-	+100	ppb	Over 0°C-80°C at fixed supply voltage + load (reference to midpoint min/max frequency)
Holdover	-100	0	100	ppb	Over 0°C-80°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	-	ppb/day	1 day after reflow
	-	±3	-		7 days after reflow
	-	±1	-		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	-	-100	dBc/Hz	Typical values for a 19.2 MHz oscillator at 25°C
	100Hz	-	-120		
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	-	+80	°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)

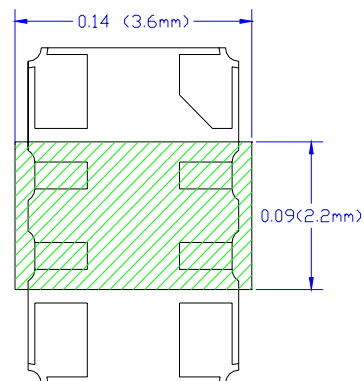
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	The output is DC coupled. Most common used with external coupling capacitor. 0.001 to 0.01uF recommended
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power 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

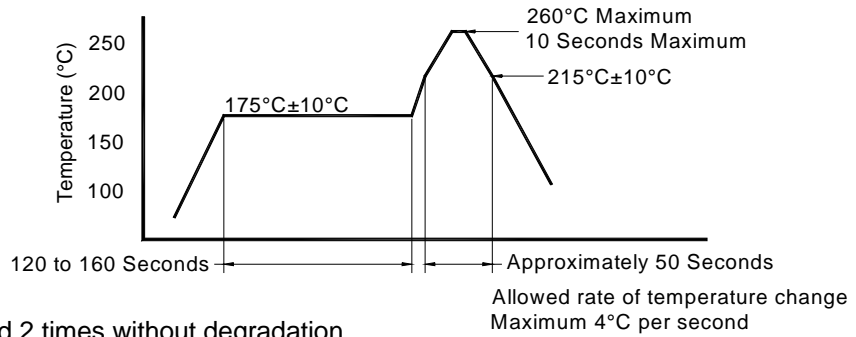
For Optimum Stability and Jitter Performance, Pletronics recommends:

- 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)



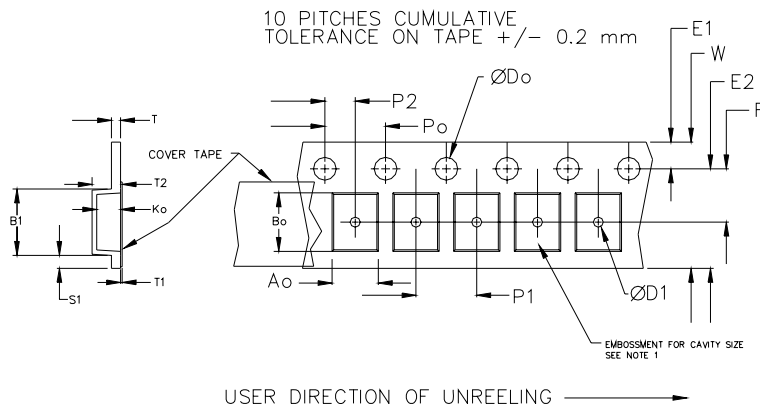
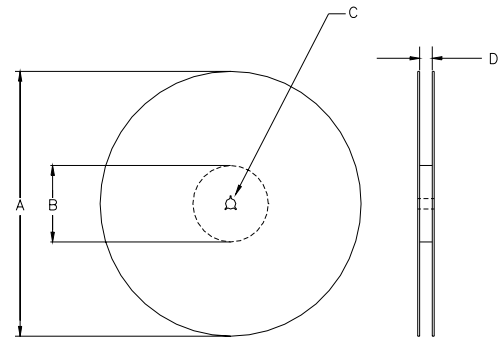
The part may be reflowed 2 times without degradation.

### 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**

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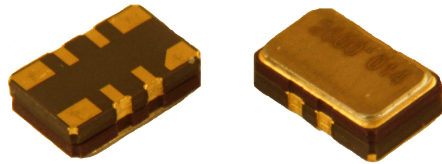
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### **Contacting Pletronics Inc.**

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)

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# TCD4050-20.0M Microcell, Femtocell TCVCXO Oscillator

December 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.
- 20 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

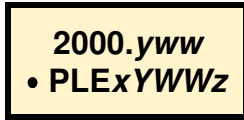
### Thermal Characteristics

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:



2000	=	20.00 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 TCD4029-26.0M for the Part Number

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

<b>P/N:</b>	
	TCD4050-20.0M
<b>Customer P/N:</b>	
	12345678
<b>Qty:</b>	
	1000
<b>D/C</b>	
	TC512SA
MSL: 1	

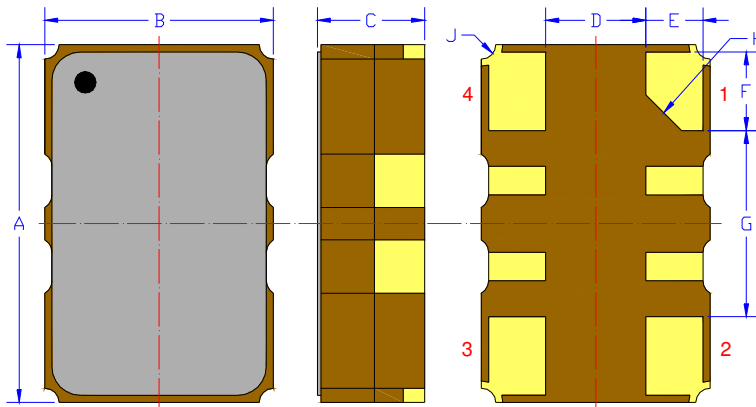
<b>RoHS Compliant</b>
2nd Lvl Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

### 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-80°C at fixed supply voltage + load (reference to midpoint min/max frequency)
Holdover	-100	0	100	ppb	Over 0°C-80°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 ±3 ±1	-	ppb/day	1 day after reflow 7 days after reflow 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 100Hz	-	-100 -120	-	dBc/Hz Typical values for a 26.0 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	-	+80	°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

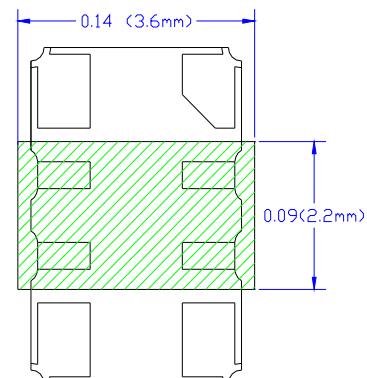
### Contacts:

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

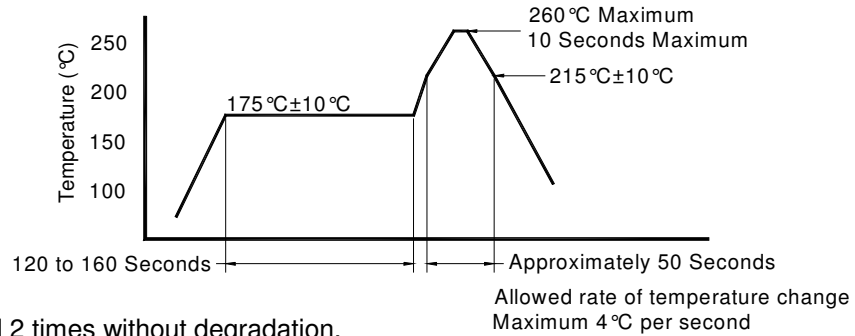
All connection points in the designated region have solder mask cover to avoid any electrical connections



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)



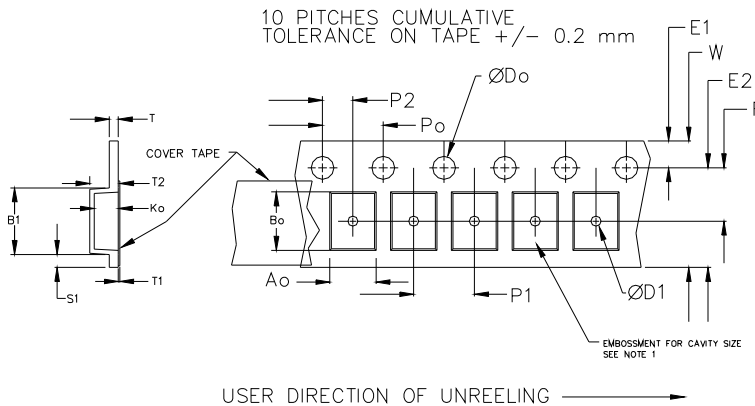
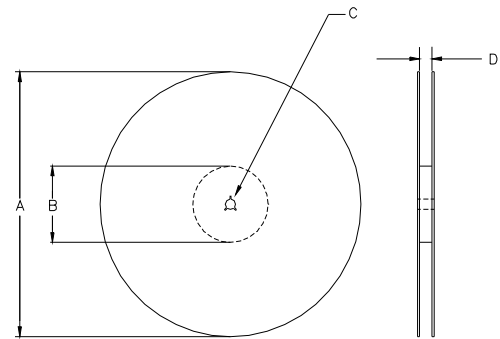
The part may be reflowed 2 times without degradation.

### 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						
16mm		1.5						
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 +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**

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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.

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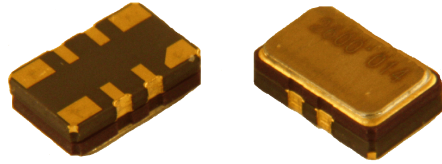
#### **Contacting Pletronics Inc.**

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)

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# TCD4051-10.0M Microcell, Femtocell TCVCXO Oscillator

December 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.
- 10 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

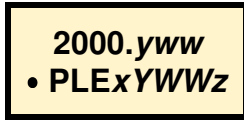
## Thermal Characteristics

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:



2000	=	20.00 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

\* Device marking will show 20.0 MHz. Actual output frequency will be 10 Mhz

## 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 TCD4029-26.0M for the Part Number

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

Font is Arial

<b>P/N:</b>	
	TCD4051-10.0M
<b>Customer P/N:</b>	
	12345678
<b>Qty:</b>	
	1000
<b>D/C</b>	
	TC512SA
MSL: 1	

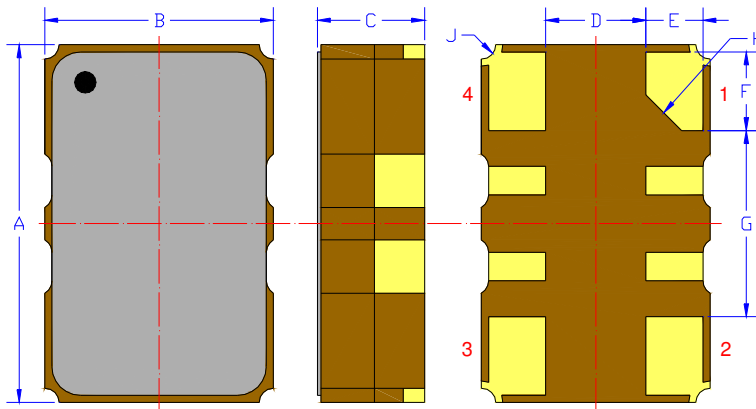
<b>RoHS Compliant</b>
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

## 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-80°C at fixed supply voltage + load (reference to midpoint min/max frequency)
Holdover	-100	0	100	ppb	Over 0°C-80°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 ±3 ±1	-	ppb/day	1 day after reflow 7 days after reflow 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 100Hz	-	-100 -120	-	dBc/Hz Typical values for a 26.0 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	-	+80	°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)

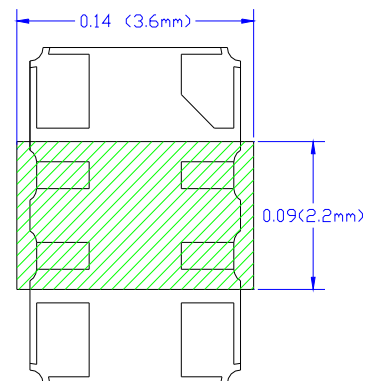
Pad	Function	Note
1	Vcontrol Input	If this function is not specified, recommend connecting this pad to ground.
2	Ground (GND)	
3	Output	The output is DC coupled. Most common used with external coupling capacitor. 0.001 to 0.01uF recommended
4	Supply Voltage (V <sub>CC</sub> )	Connect an appropriate power 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

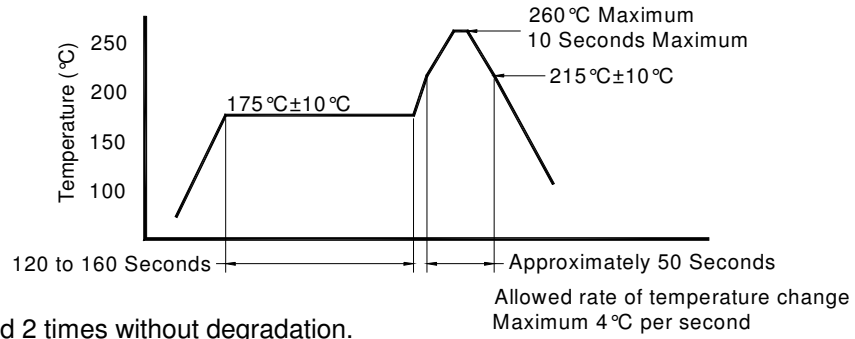
All connection points in the designated region have solder mask cover to avoid any electrical connections

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)

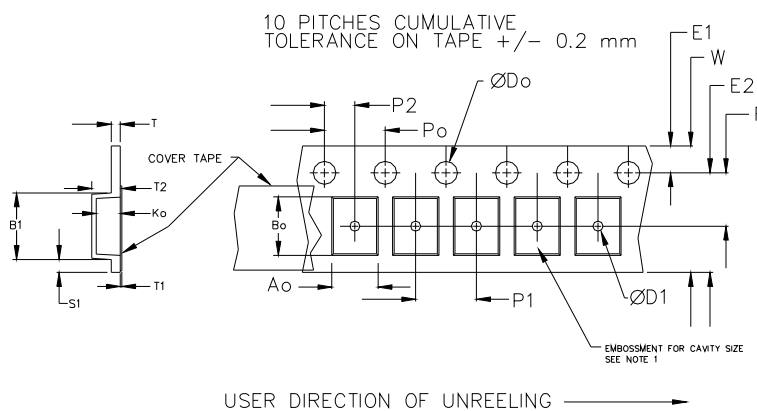
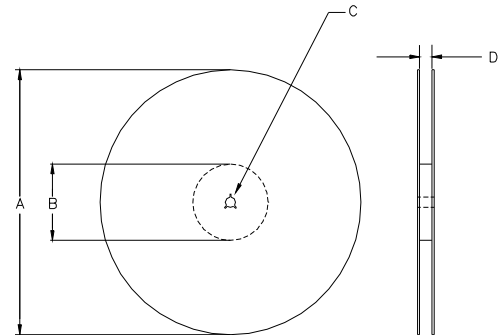


### Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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			1.5			
24mm		1.5			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			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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### **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)

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