PLETRONICS TCD4 Series
TCXO / TCVCXO

TCD4
3.2 x 5 x 1.5 mm
LCC Ceramic Package

Features

- Pletronics' TCD4 Series Temperature Compensated Crystal Oscillator
- Optional Voltage Control Function
- Clipped Sine Wave Output
- 1.8V to 3.3V nominal Supply Voltage
- 10 - 40 MHz Frequency

Applications

GPS
WiMAX, Wi-Fi, Wi-LAN
Handsets
Broadband Access
Point to point radios
Seismic Exploration
Wireless Communications
Base Stations
Test Equipment

Electrical Characteristics

Parameter	**Min**	**Typ**	**Max**	**Unit**	**Condition** (Consult factory for other options)
Frequency Range [2]	10	-	40	MHz	Specified by part number
Frequency Stability vs. Temperature [2]	±0.5	-	±2.5	ppm	Specified by part number (f_{max} - f_{min}) / 2
Frequency Initial Calibration	-	-	±2.0	ppm	Vcontrol 1.50 volts at 25°C ± 2°C when $V_{CC} \geq$ 2.5 volts Vcontrol 0.9 volts at 25°C ± 2°C when $V_{CC} \leq$ 2.4 volts If Vcontrol used
Operating Temperature Range [2]	-40	-	+85	°C	Specified by part number, Consult factory for wider range
Supply Voltage [1, 2] V_{CC}	1.8	-	3.3	Volts	± 5%, Specified by part number
Supply Current I_{CC}	-	2.0	3.0	mA	Load: 10 Kohm || 10 pF, V_{CC} ± 5%
Frequency Stability vs. Supply	-	-	±0.2	ppm	Load: 10 Kohm || 10 pF, V_{CC} ± 5%
Frequency Stability vs. Load	-	-	±0.2	ppm	Load: 10 Kohm || 10 pF ± 5%
Vcontrol Range	0.50 0.30	1.50 0.90	2.50 1.50	Volts	1.50 volts nominal for V_{CC} nominal $\geq$ 2.5 volts 0.9 volts nominal for V_{CC} nominal $\leq$ 2.4 volts
Frequency Pullability [2]	0	±8.0	±12.0	ppm	Specified by part number, Positive Slope
Output Waveform		Clipped Sine Wave			DC Coupled
Output Level	0.8	-	-	V p-p	Load: 10 Kohm || 10 pF ± 10%
Startup Time	-	-	10.0	mS	Within ± 2.0 ppm of final frequency
Long Term Stability (Aging)	-	-	±1.0	ppm	Per year at 25°C ± 2°C
Phase Noise 100 Hz 1 kHz 10 kHz 100 kHz	-	-110 -130 -145 -145	-	dBc/Hz	25°C ± 2°C at 26.0 MHz
Storage Temperature Range	-55	-	+95	°C	

Notes:
[1] Place an appropriate power supply bypass capacitor next to device for correct operation
[2] Specified by part number

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Part Number

Series Model	V_{CC} Supply Voltage [1]		Operating Temperature		Stability [1, 2]	Pullability [1]	Frequency
	Lowest	Highest	Lowest	Highest	(ppm)	(ppm)	(MHz)
TCD4	031	035	G	H	015	008	-19.44M
	031 = 3.1 for 3.3 volts nominal 029 = 2.9 for 3.0 volts nominal 027 = 2.7 for 2.8 volts nominal 024 = 2.4 for 2.5 volts nominal 017 = 1.7 for 1.8 volts nominal	035 = 3.5 for 3.3 volts nominal 031 = 3.1 for 3.0 volts nominal 029 = 2.9 for 2.8 volts nominal 026 = 2.6 for 2.5 volts nominal 019 = 1.9 for 1.8 volts nominal	A = +10°C B = +5°C C = +0°C D = -5°C E = -10°C F = -15°C G = -20°C H = -25°C J = -30°C K = -35°C L = -40°C	A = +40°C B = +45°C C = +50°C D = +55°C E = +60°C F = +65°C G = +70°C H = +75°C J = +80°C K = +85°C	005 = ± 0.5 010 = ± 1.0 015 = ± 1.5 020 = ± 2.0 025 = ± 2.5	000 = TCXO 005 = ± 5 008 = ± 8	10 - 40 MHz

[1] Contact Factory for non-standard specifications
[2] Not all stabilities are available with all operating temperature ranges. Contact Factory for exact combinations available.

Device Marking

FFFF . xxx
• PLE *xx .YWWx*

FFFF . xxx
• PLE
x .YWWx

PLE = Pletronics
FFFF = Frequency in MHz
YWW = Date Code (year week)
All other marking is internal codes

Note: Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Package Labeling

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 16mm tape, 8mm pitch.

P/N Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

RoHs 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

Pletronics Inc. certifies this device is in accordance with the RoHS 2 (2011/65/EU) 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
Second Level Interconnect code: e4

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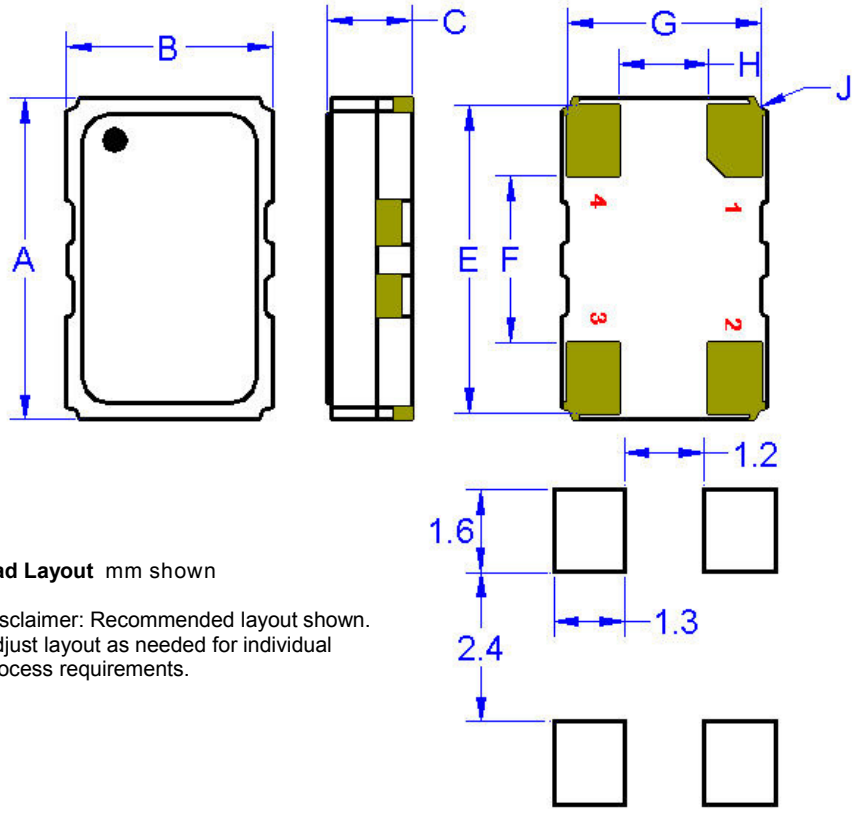
Mechanical Dimensions

	Inches	mm
A	0.197 ± 0.006	5.00 ± 0.15
B	0.126 ± 0.006	3.20 ± 0.15
C	0.059 max	1.50 max
E[1]	0.189	4.80
F[1]	0.102	2.60
G[1]	0.118	3.00
H[1]	0.055	1.40
J[1]	0.008R	0.20R

[1] Typical dimensions



Pad Layout mm shown

Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

(Not to Scale)

Contacts (pads): 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)

Layout

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 commonly used with external coupling capacitor. 0.001 to 0.01µF recommended.
4	V_{CC} Supply Voltage	Connect an appropriate power supply bypass capacitor as close as possible

For Optimum Jitter Performance, Pletronics recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

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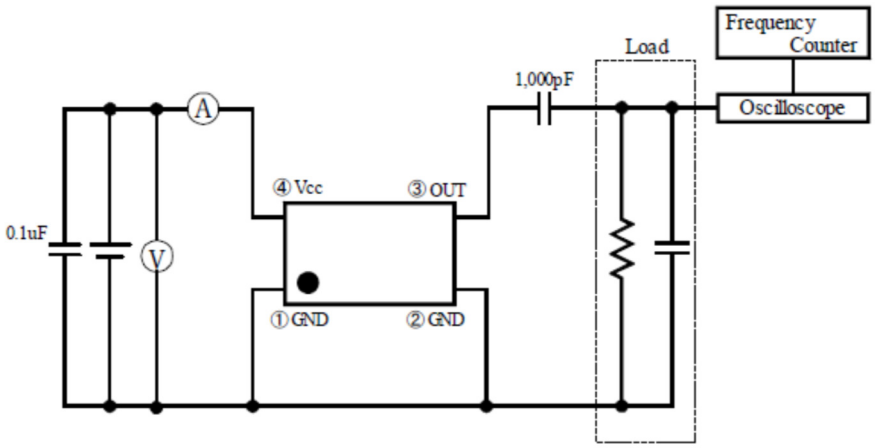
Electrical Test / Load Circuit



Environmental / ESD Ratings

Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	JESD22-B104
Vibration	JESD22-B103
Solderability	IPC J-STD-002
Thermal Shock	MIL-STD-883 Method 1011, Condition A

ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Charged Device Model	500V	JESD 22-C101
Machine Model	200V	JESD22-A115

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.

Absolute Maximum Ratings

Parameter	Unit
V_{CC} Supply Voltage	-0.6V to +6V
Vi Input Voltage	-0.6V to V_{CC} + 0.6V
Io Output Current	-10mA to +10mA

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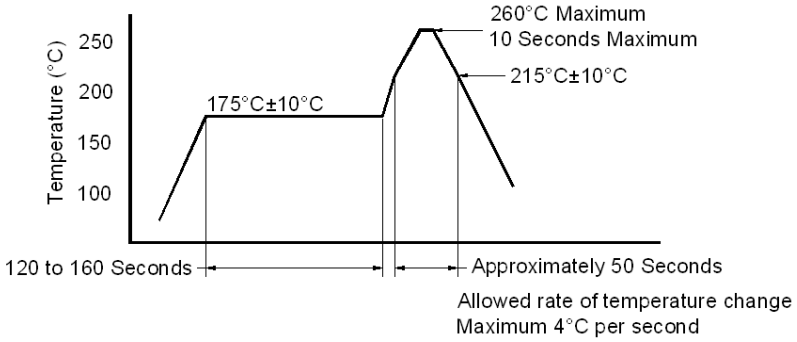
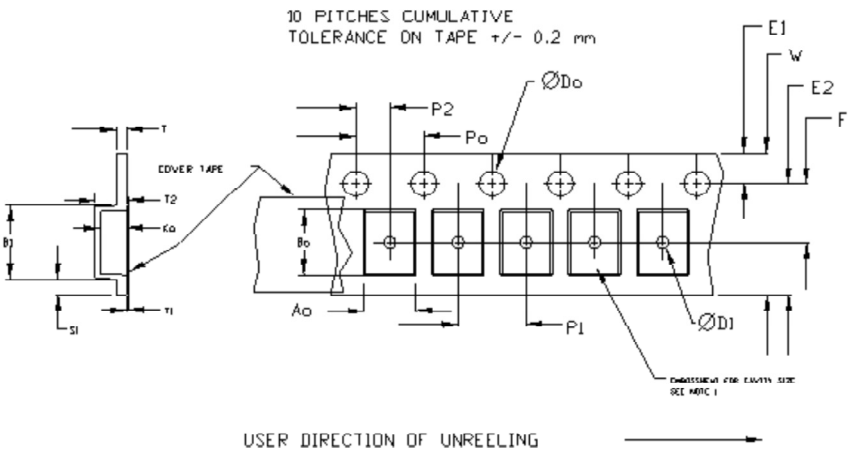
Reflow Cycle



The part may be reflowed 2 times without degradation (typical for lead free processing).

Tape and Reel

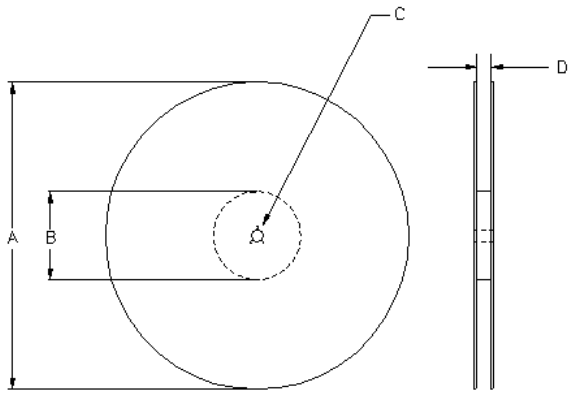


Tape Constant Dimensions Table 1								
Tape Size	Do	D1 min	E1	Po	P2	S1 min	T max	T1 max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5						
16mm		1.5			2.0 ±0.1			
24mm		1.5						

Tape Variable Dimensions Table 2							
Tape Size	B1 max	E2 min	F	P1	T2 max	W max	Ao, Bo & Ko
16mm	12.1	14.25	7.5 ±0.1	8.0 ±0.1	8.0	16.3	Note 1

Dimensions in mm Drawing Not to scale

Note 1: Embossed cavity to conform to EIA– 481-B



Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	177.8	2.50	63.5	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0
10	10.0	254.0	4.00	101.6		
13	13.0	330.2	3.75	95.3		

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