PLETRONICS
www.pletronics.com 425-776-1880





# PE77D Series 3.3 V
## PECL Clock Oscillators

April 2007

Lead Free

- Pletronics' PE77D Series is a quartz crystal controlled precision square wave generator with a PECL output.
- The package is designed for high density surface mount designs.
- Low cost mass produced oscillator.
- Tape and Reel or cut tape packaging is available.
- 5 x 7 mm LCC Ceramic Package
- Enable/Disable Function on pad 1
- Disable function includes low standby power mode
- 3rd Overtone Crystals used
- Improved circuit to minimize oscillator issues such as multi-mode output signal.
- Low Jitter

**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: 0.16 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020C
Second Level Interconnect code: e4

## Absolute Maximum Ratings:

| Parameter | Unit |
|---|---|
| $V_{CC}$ Supply Voltage | -0.5V to +7.0V |
| Vi Input Voltage | -0.5V to $V_{CC}$ + 0.5V |
| Vo Output Voltage | -0.5V to $V_{CC}$ + 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.

Product information is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. Production processsing does not necessarily include testing of all parameters.

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# PE77D Series 3.3 V
## PECL Clock Oscillators
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### Part Number:

| PE77 | 45 | D | E | V | -125.0M | -XX |
|---|---|---|---|---|---|---|

**Packaging code or blank**
T250 = 250 per Tape and Reel
T500 = 500 per Tape and Reel
T1K = 1000 per Tape and Reel

**Frequency in MHz**

**Supply Voltage $V_{cc}$**
**V** = 3.3V ± 10%

**Optional Enhanced OTR**
**Blank** = Temp. range -10 to +70°C
**E** = Temp. range -40 to +85°C

**Series Model**

**Frequency Stability**
**45** = ± 50 ppm
**44** = ± 25 ppm
**20** = ± 20 ppm

**Series Model**

**Part Marking:**

**PLE PE77**
***FF.FFF*** **M**
• ***YMDXX***

**or**

**PE7XYWWXX**
***FF.FFF*** **M**
• ***PLE XXX***

**Marking Legend:**
PLE = Pletronics
*FF.FFF* M = Frequency in MHz
YYWW or YWW or *YMD* = Date of Manufacture (year and week, or year-month-day)
All other marking is internal factory codes

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

**Codes for Date Code YMD**

| Code | 6 | 7 | 8 | 9 | 0 | 1 | 2 |
|---|---|---|---|---|---|---|---|
| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |

| Code | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

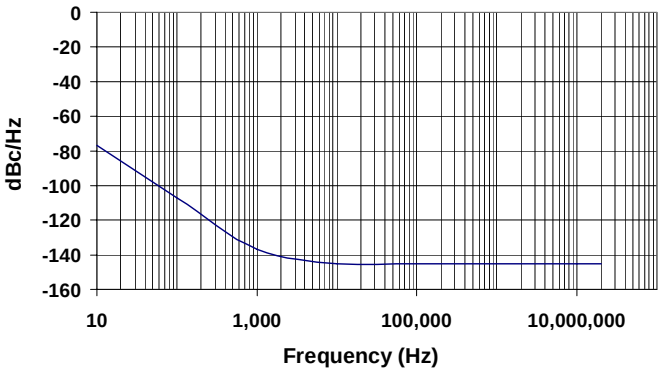
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Code | D | E | F | G | H | J | K | L | M | N | P | R |
| Day | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Code | T | U | V | W | X | Y | Z | | | | | |
| Day | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | | | | |

## Electrical Specification for 3.30V ±10% over the specified temperature range and the frequency range of 40 to 325 MHz

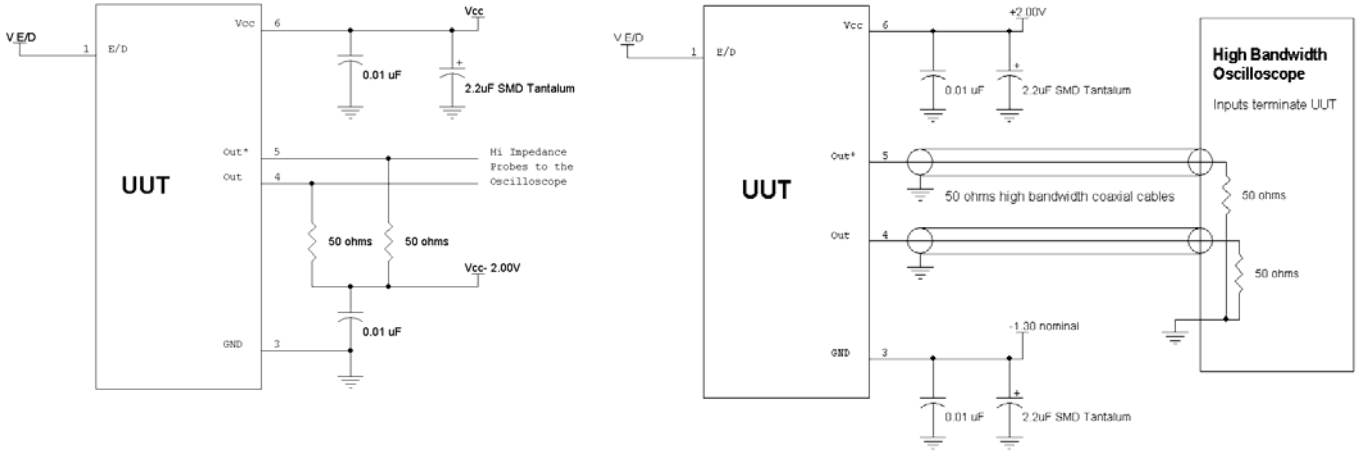
| Item | Min | Max | Unit | Condition |
|---|---|---|---|---|
| Frequency Accuracy "45" | -50 | +50 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| "44" | -25 | +25 | | |
| "20" | -20 | +20 | | |
| Output Waveform | PECL /ECL | | | |
| Output High Level (0°C to 85°C) | 2.275 | 2.420 | volts | Referenced to Ground, $V_{CC}$ = 3.3 V |
| | 0.975 | 1.120 | volts | Referenced to termination voltage, $V_{CC}$ = 3.3 V |
| | -1.025 | -0.880 | volts | Referenced to Vcc, $V_{CC}$ = 3.3 V |
| Output High Level (-40°C) | 2.216 | 2.420 | volts | Referenced to Ground, $V_{CC}$ = 3.3 V |
| | 0.916 | 1.120 | volts | Referenced to termination voltage, $V_{CC}$ = 3.3 V |
| | -1.084 | -0.88 | volts | Referenced to Vcc, $V_{CC}$ = 3.3 V |
| Output Low Level (0°C to 85°C) | 1.490 | 1.680 | volts | Referenced to Ground, $V_{CC}$ = 3.3 V |
| | 0.190 | 0.380 | volts | Referenced to termination voltage, $V_{CC}$ = 3.3 V |
| | -1.810 | -1.620 | volts | Referenced to Vcc, $V_{CC}$ = 3.3 V |
| Output Low Level (-40°C) | 1.470 | 1.745 | volts | Referenced to Ground, $V_{CC}$ = 3.3 V |
| | 0.170 | 0.445 | volts | Referenced to termination voltage, $V_{CC}$ = 3.3 V |
| | -1.830 | -1.555 | volts | Referenced to Vcc, $V_{CC}$ = 3.3 V |
| Output Symmetry | 45 | 55 | % | at 50% point of $V_{CC}$ (See load circuit) |
| Jitter | - | 0.6 | pS RMS | 12 KHz to 20 MHz from the output frequency |
| | - | 2.8 | pS RMS | 10 Hz to 1 MHz from the output frequency |
| Output $T_{RISE}$ and $T_{FALL}$ | - | 0.7 | nS | Vth is 20% and 80% of waveform |
| $V_{CC}$ Supply Current ($I_{CC}$) | - | 90 | mA | |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | to $V_{CC}$ |
| V disable | - | 0.6 | volts | Referenced to pad 3 |
| V enable | 2.40 | - | volts | Referenced to pad 3 |
| Output leakage $V_{OUT} = V_{CC}$ | -10 | +10 | uA | Pad 1 low, device disabled |
| $V_{OUT}$ = 0V | -10 | +10 | uA | |
| Enable time | - | 10 | nS | Time for output to reach a logic state |
| Disable time | - | 10 | nS | Time for output to reach a high Z state |
| Start up time | - | 10 | mS | Time for output to reach specified frequency |
| Operating Temperature Range | -10 | +70 | °C | Standard Temperature Range |
| | - 40 | +85 | °C | Extended Temperature Range "E" Option |
| Storage Temperature Range | -55 | +125 | °C | |
| Standby Current $I_{CC}$ | - | 3 | uA | Pad 1 low, device disabled |

Specifications with Pad 1 E/D open circuit

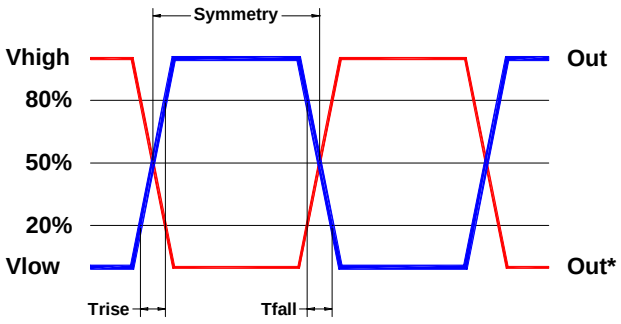
## Typical Phase-Noise Response




## Load Circuit




## Test Waveform




Showing Out Measurement only

## 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

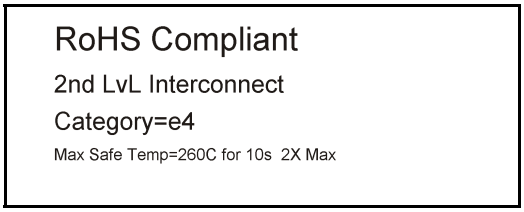
| Model | Minimum Voltage | Conditions |
|---|---|---|
| Human Body Model | 1500 | MIL-STD-883 Method 3115 |
| Charged Device Model | 1000 | JESD 22-C101 |

## Package Labeling

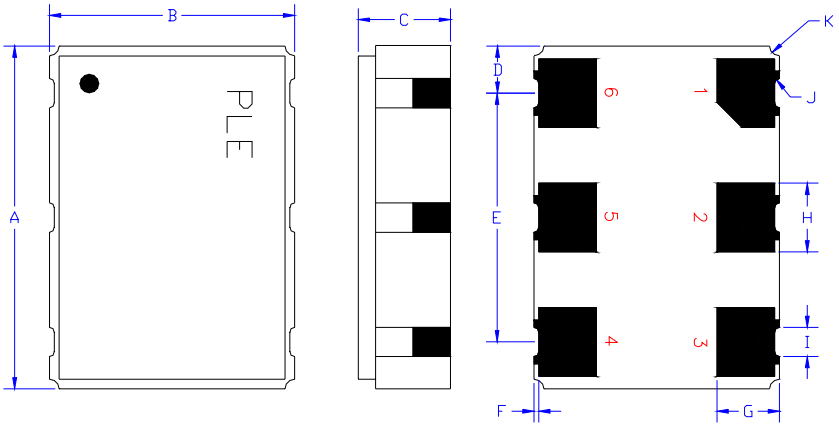
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII




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



## Mechanical:




| | Inches | mm |
|---|---|---|
| A | 0.276 ±0.006 | 7.00 ±0.15 |
| B | 0.197 ±0.006 | 5.00 ±0.15 |
| C | 0.067 max | 1.70 max |
| D[1] | 0.038 | 0.96 |
| E[1] | 0.200 | 5.08 |
| F[1] | 0.004 | 0.10 |
| G[1] | 0.050 | 1.27 |
| H[1] | 0.055 | 1.40 |
| I[1] | 0.024 | 0.60 |
| J[1] | 0.004R | 0.10R |
| K[1] | 0.008R | 0.20R |

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

[1] Typical dimensions

Not to Scale

| Pad | Function | Note |
|---|---|---|
| 1 | Output Enable/Disable | When this pad is not connected the oscillator shall operate. When this pad is <0.30 volts, the output will be inhibited (high impedance state.) Recommend connecting this pad to $V_{CC}$ if the oscillator is to be always on. |
| 2 | No connect | There is no internal connection to this pad |
| 3 | Ground (GND) | |
| 4 | Output | Both outputs must be terminated and biased for proper operation. The ideal termination is 50 ohms connected to 2.0V below the Supply Voltage. |
| 5 | Output* | |
| 6 | Supply Voltage ($V_{CC}$) | Recommend connecting appropriate power supply bypass capacitors as close as possible. |

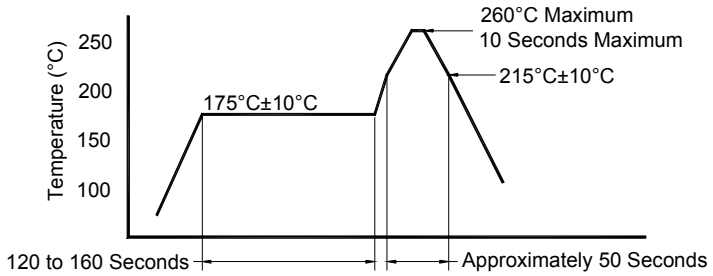
Lead Free

## Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable input on either pad

For Optimum 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.

## Reflow Cycle (typical for lead free processing)




Allowed rate of temperature change
Maximum 4°C per second

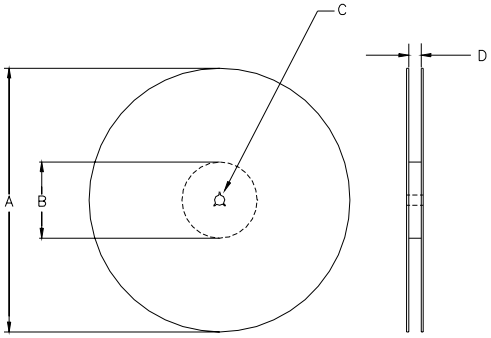
The part may be reflowed 2 times without degradation.

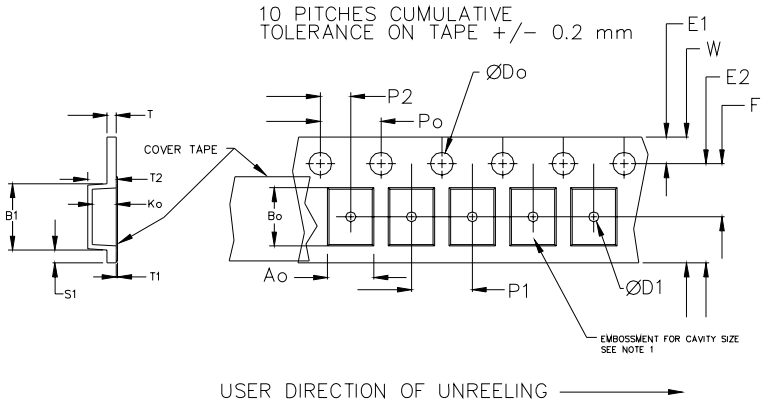
## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

| Constant Dimensions Table 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tape Size | D0 | D1 Min | E1 | P0 | P2 | S1 Min | T Max | T1 Max |
| 8mm | 1.5 +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 | | | | | | |

| 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 | |
| | mm | 177.8 | 254.0 | 330.2 | |
| B | inches | 2.50 | 4.00 | 3.75 | |
| | mm | 63.5 | 101.6 | 95.3 | Tape Width |
| 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

**IMPORTANT NOTICE**

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