

PE76D / PE78D Series 2.5 V PECL Clock Oscillators

January 2008

Do Not Use for New Designs - use PE55 or PE77

- Pletronics' PE76D/PE78D Series is a quartz crystal controlled precision square wave generator with a PECL output.
- FR4 base with a mechanical metal cover.
- Solder pad compatible with many 9x14mm plastic J lead packages.
- Has internal bypass capacitor on the Vcc lead
- Tape and Reel or cut tape packaging is available.
- 40 to 250 MHz
- 9.04mm x 8.91mm (S package)
- Enable/Disable PE76D on pad 1
PE78D on pad 2)
- Disable function includes low standby power mode
- 3rd Overtone Crystals used
- Low Jitter
- 5x7 mm LCC ceramic oscillator PE77 series

**Pletronics Inc. certifies this device is in accordance with the
RoHS 5/6 (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: 0.4 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 |
| V _i Input Voltage | -0.5V to V _{CC} + 0.5V |
| V _o 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 60 to 100°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Part Number:

PE7x 45 D E W -125.0M -XX

Part Marking:

PLE PE77
FF.FFF M
• YMDXX

| | |
|--|--|
| | 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} W = 2.5V ± 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 (where x is a 6 or 8) |

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

The marking is the PE77xxDW device
The Tape and Reel and box marking shows the PE7x PN.

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 |

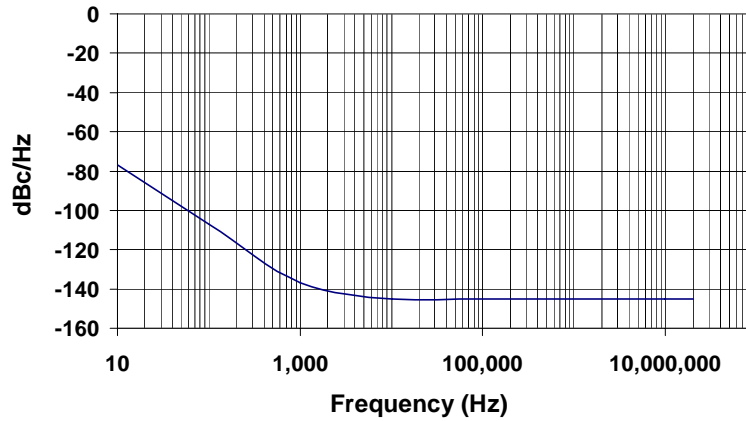
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|------|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Code | D | E | F | G | H | J | K | L | M | N | P | R |
| Day | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23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

Electrical Specification for 2.50V $\pm 5\%$ over the specified temperature range

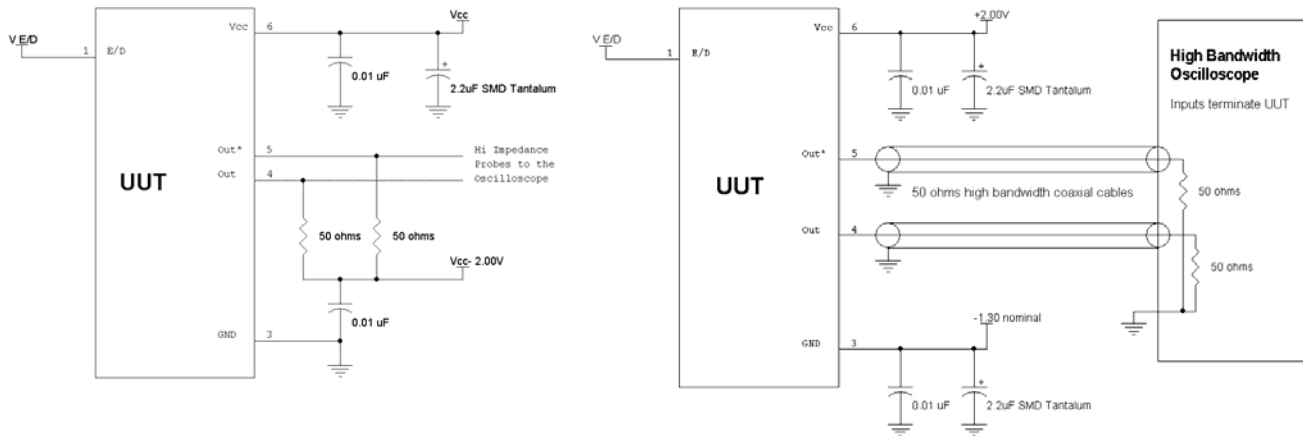
| Item | Min | Max | Unit | Condition |
|--------------------------------------|----------------|--------|--------|--|
| Frequency Range | 40 | 250 | MHz | |
| Frequency Accuracy "45" | -50 | +50 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| "44" | -25 | +25 | | |
| "20" | -20 | +20 | | |
| Output Waveform | PECL /ECL | | | |
| Output High Level (0°C to 85°C) | 1.475 | 1.760 | volts | Referenced to Ground, $V_{CC} = 2.5 V$ |
| | 0.975 | 1.260 | volts | Referenced to termination voltage, $V_{CC} = 2.5 V$ |
| | -1.025 | -0.740 | volts | Referenced to V_{CC} , $V_{CC} = 2.5 V$ |
| Output High Level (-40°C) | 1.415 | 1.620 | volts | Referenced to Ground, $V_{CC} = 2.5 V$ |
| | 0.915 | 1.12 | volts | Referenced to termination voltage, $V_{CC} = 2.5 V$ |
| | -1.085 | -0.88 | volts | Referenced to V_{CC} , $V_{CC} = 2.5 V$ |
| Output Low Level (0°C to 85°C) | 0.690 | 1.095 | volts | Referenced to Ground, $V_{CC} = 2.5 V$ |
| | 0.190 | 0.595 | volts | Referenced to termination voltage, $V_{CC} = 2.5 V$ |
| | -1.810 | -1.405 | volts | Referenced to V_{CC} , $V_{CC} = 2.5 V$ |
| Output Low Level (-40°C) | 0.670 | 1.195 | volts | Referenced to Ground, $V_{CC} = 2.5 V$ |
| | 0.170 | 0.695 | volts | Referenced to termination voltage, $V_{CC} = 2.5 V$ |
| | -1.830 | -1.305 | volts | Referenced to V_{CC} , $V_{CC} = 2.5 V$ |
| Output Symmetry | 45 | 55 | % | at 50% point of V_{CC} (See load circuit) |
| Jitter | - | 0.13 | 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 | V_{th} 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 | 1.7 | - | volts | Referenced to pad 3 |
| Output leakage $V_{OUT} = V_{CC}$ | -10 | +10 | uA | Pad 1 low, device disabled |
| | $V_{OUT} = 0V$ | -10 | +10 | |
| 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

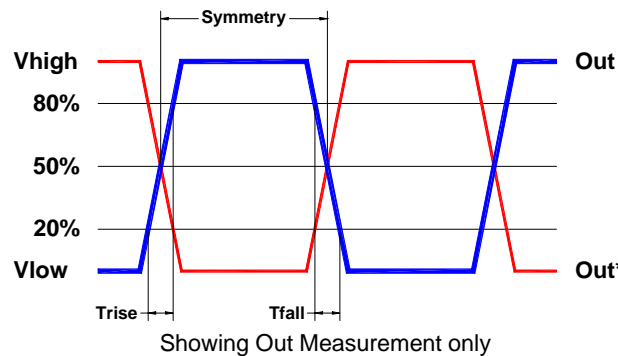
Typical Phase-Noise Response



Load Circuit



Test Waveform



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

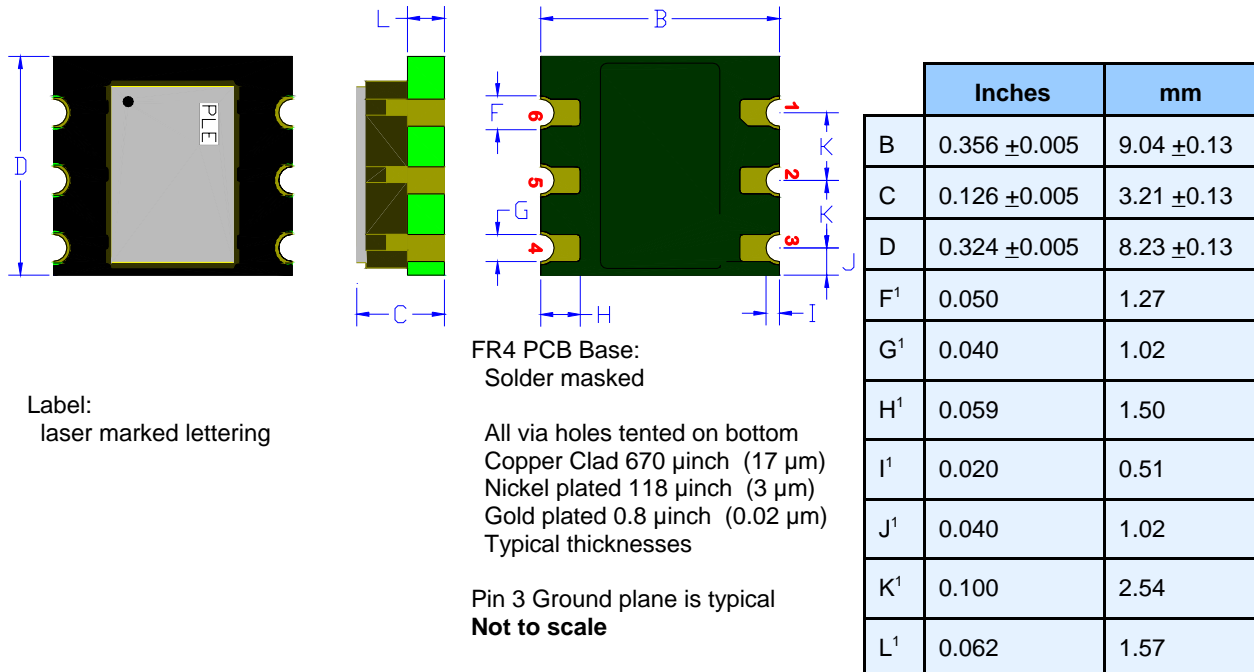
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII
(PE76 example shown)

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

| | | |
|---------------|---|---|
| P/N: |  |  |
| | PE7645DW-100.0M | |
| Customer P/N: |  | |
| | 12345678 | |
| Qty: |  | D/C |
| | 1000 |  |
| | | 75409 |

| |
|-----------------------------------|
| RoHS Compliant |
| 2nd Lvl Interconnect |
| Category=e4 |
| Max Safe Temp=245C for 10s 2X Max |

Mechanical:



| Pad | | Function | Note |
|-----|----|-----------------------------|---|
| 76 | 78 | | |
| 1 | 2 | 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 | 1 | 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. |

Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept both Enable/Disable input pad versions to be used

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.

Mechanical (obsolete version):

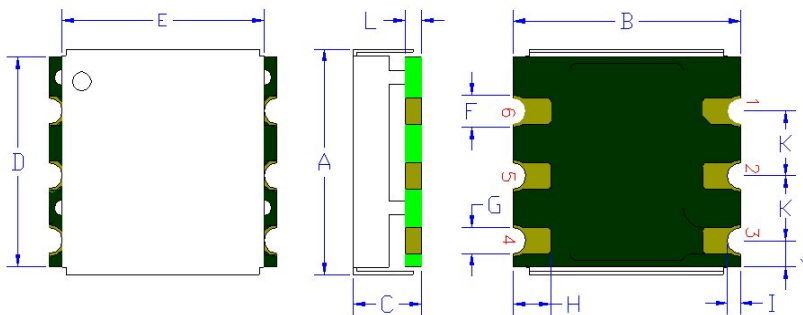
The cover is no longer being supplied over this part. This part is made with a hermetically sealed PE77xxDW series oscillator. This part is now exposed.

The cover has been deleted, the cover was causing problems with the newer high temperature RoHS lead free processes. The cover purpose was only cosmetic.

All parts with 2008 date codes will be made in the new fashion.

There is no change in electrical properties.

Pletronics does recommend that all designs should transition to the PE77xxDW ceramic part.



| | Inches | mm |
|----------------|---------------|------------|
| A | 0.351 ±0.003 | 8.91 ±0.07 |
| B | 0.356 ±0.005 | 9.04 ±0.13 |
| C | 0.103 ±0.005 | 2.62 ±0.13 |
| D ¹ | 0.324 | 8.23 |
| E ¹ | 0.316 | 8.03 |
| F ¹ | 0.050 | 1.27 |
| G ¹ | 0.040 | 1.02 |
| H ¹ | 0.059 | 1.50 |
| I ¹ | 0.020 | 0.51 |
| J ¹ | 0.040 | 1.02 |
| K ¹ | 0.100 | 2.54 |
| L ¹ | 0.026 typical | 0.66 |

Cover:

Centered on the base
304 Stainless Steel
0.010 inch (0.25mm)
Electroless Nickel Plated
1 μinch (25 μm) typical

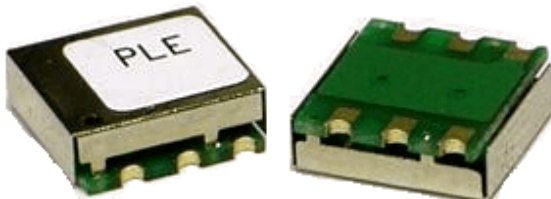
Label:

White Kapton with Black Letters
—or—
Blue Epoxy heat cure ink covering
top with laser marked lettering

FR4 PCB Base:

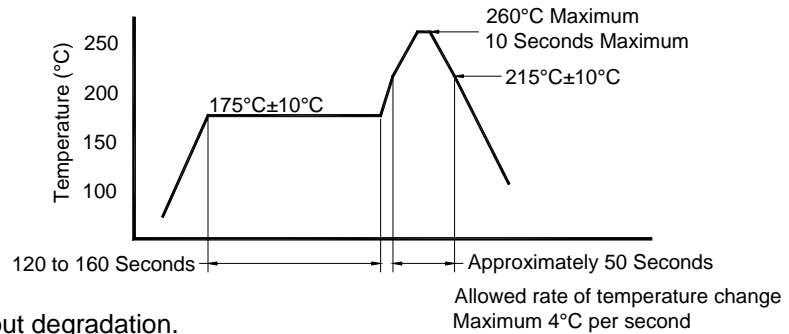
Solder masked
Solder masked
All via holes tented on bottom
Copper Clad 670 μinch (17 μm)
Nickel plated 118 μinch (3 μm)
Gold plated 0.8 μinch (0.02 μm)
Typical thicknesses

Pin 3 Ground plane is typical
Not to scale



- The package is not hermetically sealed.
- The sides are intentionally left open to permit cleaning material to freely flow in the package, thus minimizing the accumulation of contaminants during cleaning processes.
- The internal part of the package must be thoroughly dry before operating.

Reflow Cycle (typical for lead free processing)



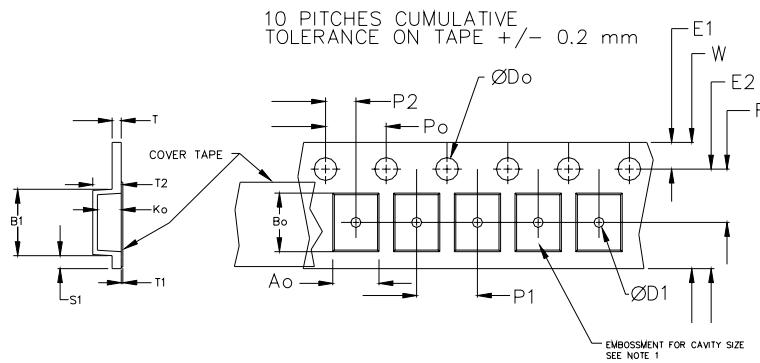
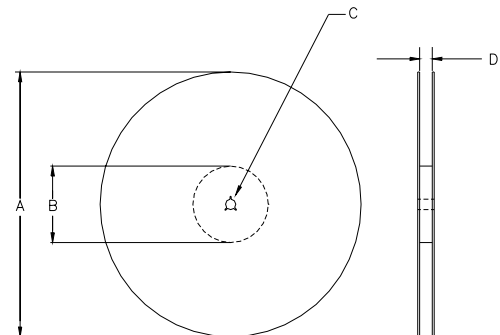
The part may be reflowed 2 times without degradation.

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 +0.1 -0.0 | 1.0 | 1.75 | 4.0 | 2.0 ±0.05 | 0.6 | 0.6 | 0.1 |
| 12mm | | 1.5 | | | 2.0 ±0.1 | | | |
| 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 |
| 24 mm | 9.88 | 22.25 | 11.5 ± 0.1 | 16.0 ± 0.1 | 3.22 | 24.3 | Note 1 |

Note 1: Embossed cavity to conform to EIA-481-B Dimensions in mm Not to scale



USER DIRECTION OF UNREELING →

| | | 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 | --- | --- | 24.4 +2.0 -0.0 | |

Reel dimensions may vary from the above



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January 2008

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