

LV77D Series 3.3 V LVDS Clock Oscillators

April 2007

Lead Free 

- Pletronics' LV77D Series is a quartz crystal controlled precision square wave generator with an LVDS 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
- 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 +5.0V |
| 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 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Part Number:

| | | | | | | |
|------|----|---|---|---|---------|-----|
| LV77 | 45 | D | E | V | -125.0M | -XX |
|------|----|---|---|---|---------|-----|

Part Marking:

| | |
|--|--|
| | 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 |

PLE LV77
FF.FFF M
• YMDXX

or

LV7XYWWXX
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 |

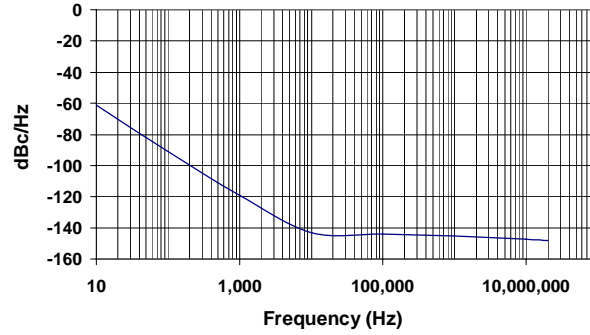
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|------|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Code | D | E | F | G | H | J | K | L | M | N | P | R |
| Day | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23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

Electrical Specification for 3.30V $\pm 10\%$ over the specified temperature range and the frequency range of 1 to 250 MHz

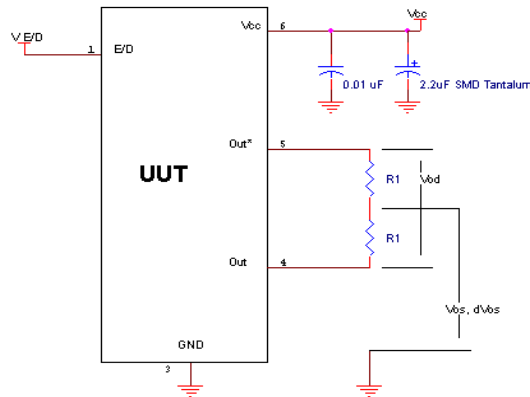
| Item | Min | Max | Unit | Condition | |
|---|----------------|-------|--------------|---|---------------|
| Frequency Accuracy | "45" | -50 | +50 | ppm For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures | |
| | "44" | -25 | +25 | | |
| | "20" | -20 | +20 | | |
| Output Waveform | LVDS | | | | |
| Output High Level | -- | 1.60 | Volts | See load circuit R1 = 50 ohms | |
| Output Low Level | 0.90 | -- | Volts | | |
| Differential Output (V_{OD}) | 250 | 450 | mVolts | | |
| Output Offset Voltage (V_{OS}) | 1.125 | 1.375 | Volts | | ≥ 80 MHz |
| | 1.125 | 1.500 | Volts | | < 80 MHz |
| Differential Output Error (dV_{OS}) | -- | 50 | mVolts | | - |
| Output Symmetry | 45 | 55 | % | Referenced to 50% of amplitude or crossing point | |
| Output T_{RISE} and T_{FALL} | 300 | 700 | pS | ≥ 80 MHz | |
| | 400 | 900 | pS | < 80 MHz | |
| Jitter | - | 0.6 | pS RMS | Measured from 12KHz to 20MHz from Fnominal | |
| | - | 2.8 | | Measured from 10Hz to 1MHz from Fnominal | |
| Vcc Supply Current | - | 66 | mA | ≥ 80 MHz | |
| | - | 45 | mA | < 80 MHz | |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | To Vcc (equivalent resistance) | |
| V disable | - | 0.8 | Volts | Referenced to Ground | |
| V enable | 2.0 | - | Volts | Referenced to Ground | |
| Output leakage $V_{OUT} = V_{CC}$ | -10 | +10 | μ A | Pad 1 low, device disabled | |
| | $V_{OUT} = 0V$ | -10 | +10 | | μ A |
| Enable | - | 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 | - | 5 | mS | ≥ 80 MHz | |
| | - | 3 | mS | < 80 MHz | |
| Operating Temperature Range | -10 | +70 | $^{\circ}$ C | Standard Temperature Range | |
| | -40 | +85 | $^{\circ}$ C | Extended Temperature Range "E" Option | |
| Storage Temperature Range | -55 | +125 | $^{\circ}$ C | | |
| Standby Current I_{CC} | - | 3 | μ A | ≥ 80 MHz | |
| | - | 1.5 | mA | < 80 MHz | |

Specifications with Pad 1 E/D open circuit

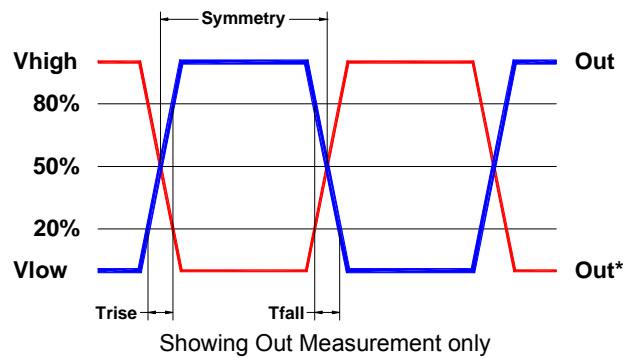
Typical Phase-Noise Response



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

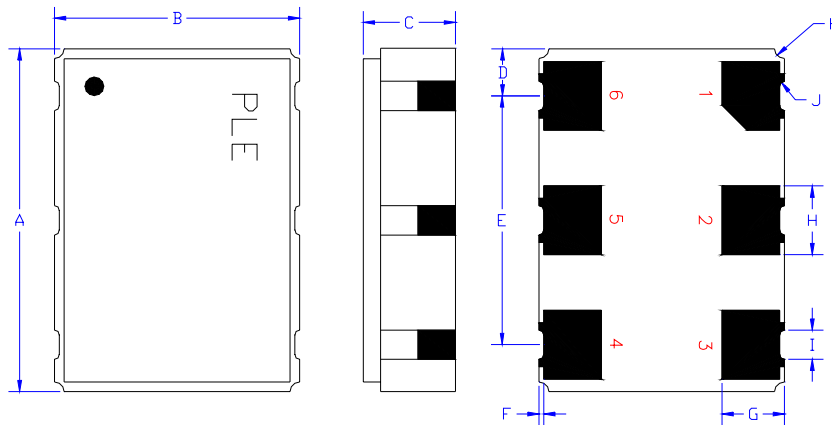
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

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

| | | |
|---------------|---|---|
| P/N: |  |  |
| | LV7745DV-100.0M | |
| Customer P/N: |  | |
| | 12345678 | |
| Qty: |  | D/C  |
| | 1000 | 75501 |

| |
|-----------------------------------|
| RoHS Compliant |
| 2nd LvL Interconnect |
| Category=e4 |
| Max Safe Temp=260C for 10s 2X Max |

Mechanical:



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

¹ Typical dimensions
Not to Scale

| | Inches | mm |
|----------------|-------------------|-----------------|
| A | 0.276 \pm 0.006 | 7.00 \pm 0.15 |
| B | 0.197 \pm 0.006 | 5.00 \pm 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 |

| 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 | The outputs must be terminated, 100 ohms between the outputs is the ideal termination. |
| 5 | Output* | |
| 6 | Supply Voltage (V_{CC}) | Recommend connecting appropriate power supply bypass capacitors as close as possible. |



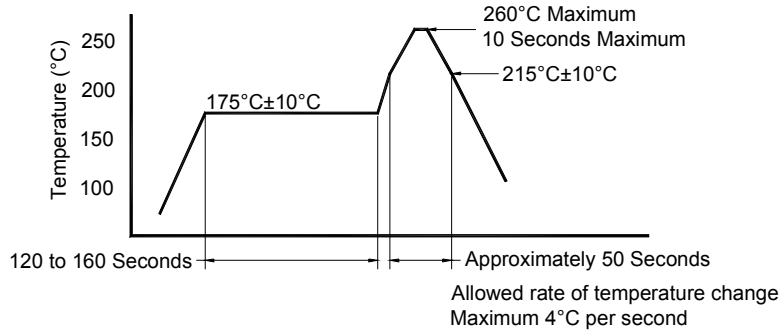
Layout and application information

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

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)



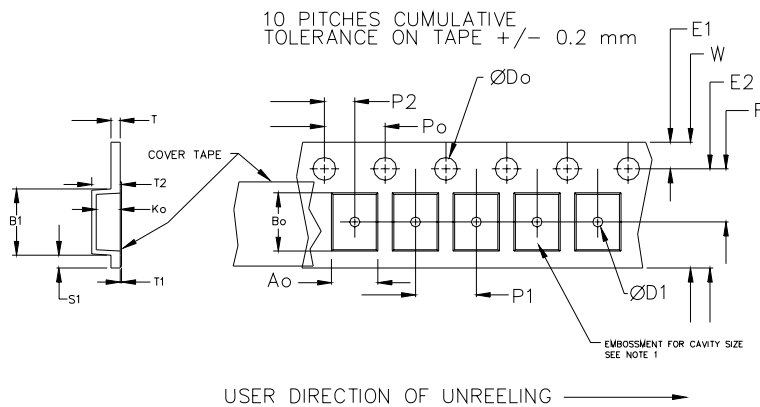
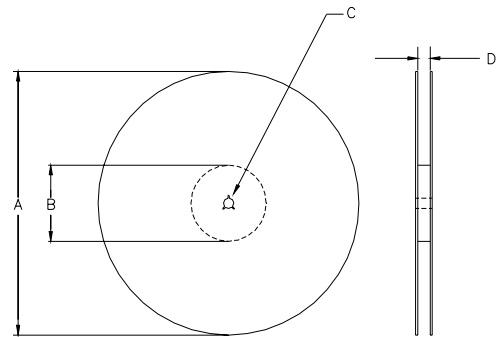
The part may be reflowed 2 times without degradation.

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 | | | 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 | | | | | |
|-----------------|--------|----------------------|----------------------|----------------------|------------|
| 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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Contacting Pletronics Inc.

Pletronics Inc.
19013 36th Ave. West
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880
Fax: 425-776-2760
E-mail: ple-sales@pletronics.com
URL: www.pletronics.com

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