



LV77D Series 2.5 V LVDS Clock Oscillators

February 2016



- 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
- 80 MHz ~ 325 MHz

Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2011/65/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-020D.1
 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.



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Part Number:

| | | | | | | |
|------|----|---|---|---|---------|-----|
| LV77 | 45 | D | E | W | -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 | PLE LV77 FF.FFF M • YMDXX |
| | Frequency in MHz | or LV7XYWWXX FF.FFF M • PLE XXX |
| | Supply Voltage V_{CC} W = 2.5V ± 10% | |
| | Optional Enhanced OTR Blank = Temp. range -10 to +70°C C = Temp. range -20 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 | |

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 | 4 | 5 | 6 | 7 | 8 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|------|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 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 | D | E | F | G |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H | J | K | L | M | N | P | R | T | U | V | W | X | Y | Z | |
| Day | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |



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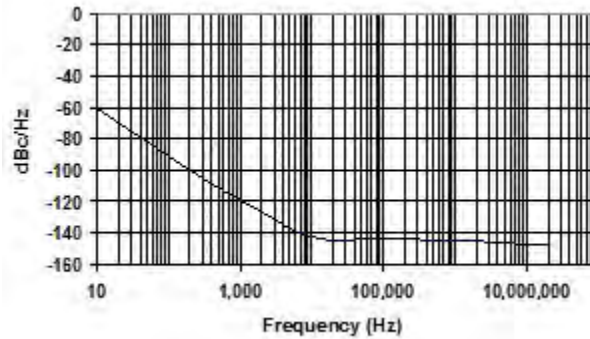
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Electrical Specification for 2.50V $\pm 10\%$ over the specified temperature range and the frequency range of 80 to 325 MHz

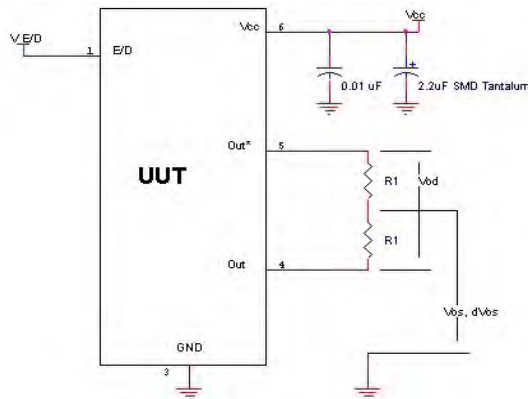
| Item | Min | Max | Unit | Condition | |
|---|--------------------|-------|-------------|--|--|
| Frequency Accuracy | "45" | -50 | +50 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| | "44" | -25 | +25 | | |
| | "20" | -20 | +20 | | |
| Output Waveform | 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 | | |
| Differential Output Error (dV_{OS}) | -- | 50 | mVolts | | |
| Output Offset Voltage (V_{OS}) | 1.125 | 1.375 | Volts | ≥ 80 MHz | See load circuit R1 = 50 ohms |
| | 1.125 | 1.500 | Volts | < 80 MHz | |
| Output Symmetry | 45 | 55 | % | Referenced to 50% of amplitude or crossing point | |
| Output T_{RISE} and T_{FALL} | 300 | 700 | pS | Vth is 20% and 80% of waveform ≥ 80 MHz | |
| | 400 | 900 | pS | Vth is 20% and 80% of waveform < 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 | - | 63 | mA | ≥ 80 MHz | Includes current of properly terminated device |
| | - | 40 | mA | < 80 MHz | |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | To Vcc (equivalent resistance) | |
| V disable | - | 0.4 | Volts | Referenced to Ground | |
| V enable | 2.0 | - | Volts | | |
| Output leakage | $V_{OUT} = V_{CC}$ | -10 | +10 | μ A | Pad 1 low, device disabled |
| | $V_{OUT} = 0V$ | -10 | +10 | μ A | |
| Enable time | - | 2 | m | Time for output to reach a logic state | |
| Disable time | - | 200 | nS | Time for output to reach a high Z state | |
| Start up time | - | 5 | mS | ≥ 80 MHz | Measured from the time $V_{CC} = 2.2V$ |
| | - | 3 | mS | < 80 MHz | |
| Operating Temperature Range | -10 | +70 | $^{\circ}C$ | Standard Temperature Range | |
| | -20 | +70 | $^{\circ}C$ | Extended Temperature Range "C" Option | |
| | -40 | +85 | $^{\circ}C$ | Extended Temperature Range "E" Option | |
| Storage Temperature Range | -55 | +125 | $^{\circ}C$ | | |
| Standby Current I_{CC} | - | 3 | μ A | Pad 1 low, device disabled ≥ 80 MHz | |
| | - | 1.5 | mA | Pad 1 low, device disabled < 80 MHz | |

Specifications with Pad 1 E/D open circuit

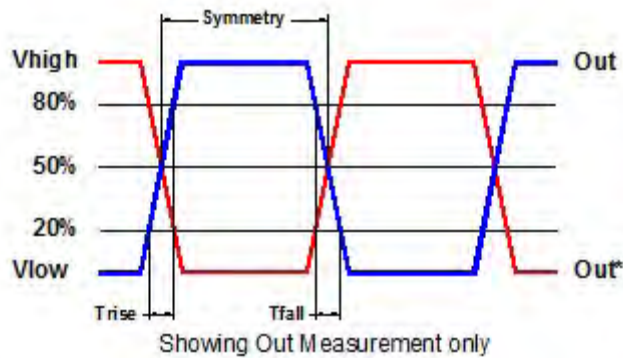
Typical Phase-Noise Response



Load Circuit



Test Waveform





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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: | | |
| Customer P/N: | | |
| Qty: | D/C | |

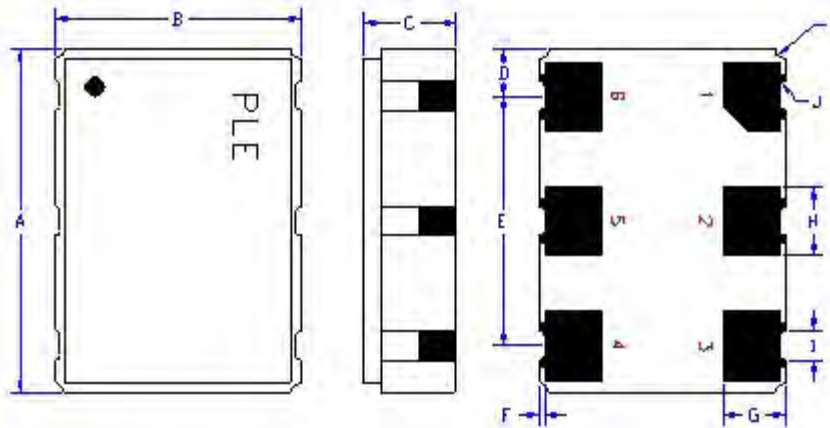
RoHS Compliant

2nd LvL Interconnect

Category=e4

Max Safe Temp=260C for 10s 2X Max

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 (pads):

Gold 11.8 to 39.4µinches (0.3 to 1.0µm)
over

Nickel 50 to 350µinches (1.27 to 8.89µm)

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 | 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. |



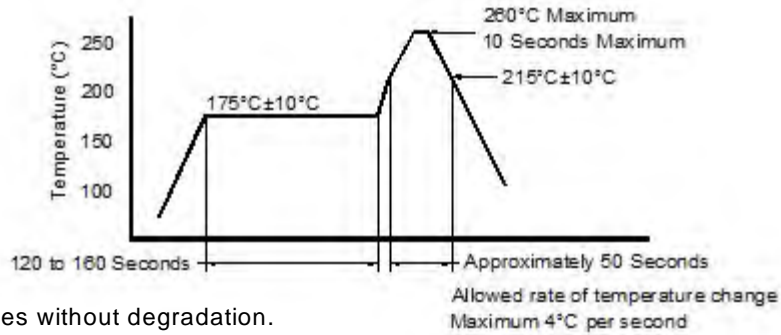
Layout and application information

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)



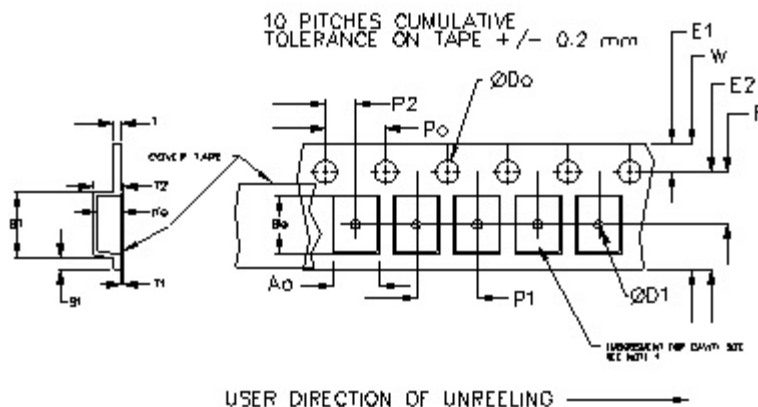
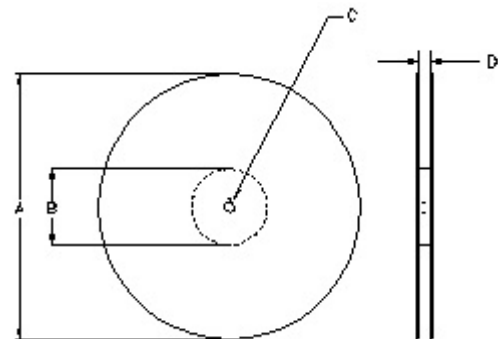
The part may be reflowed 3 times without degradation.

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 | | | 2.0 ± 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 | | | 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