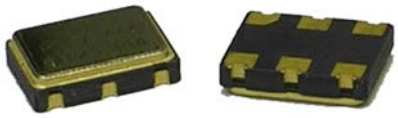
# LV88D Single Frequency
# LVDS Clock Oscillators

April 2010



- Pletronics' LV88D 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.
- 106.25 MHz or 212.50 MHz
- 5 x 7 mm LCC Ceramic Package
- Enable/Disable Function on pad 1
- $V_{CC}$ of 3.3 volts
- 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.

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### Part Number:

| LV88 | 45 | D | E | V | -106.25M | -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**
106.25 MHz or 212.50 MHz

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

Part Marking:

PLE LV88
106.25 M
• ***YMDXX***

**or**

PLE LV88
212.50 M
• ***YMDXX***

**or**

**LV8XYWWXX**
106.25 M
• ***PLE XXX***

**or**

**LV8XYWWXX**
212.50 M
• ***PLE XXX***

**Marking Legend:**
PLE = Pletronics
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 | 0 | 1 | 2 | 3 | 4 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

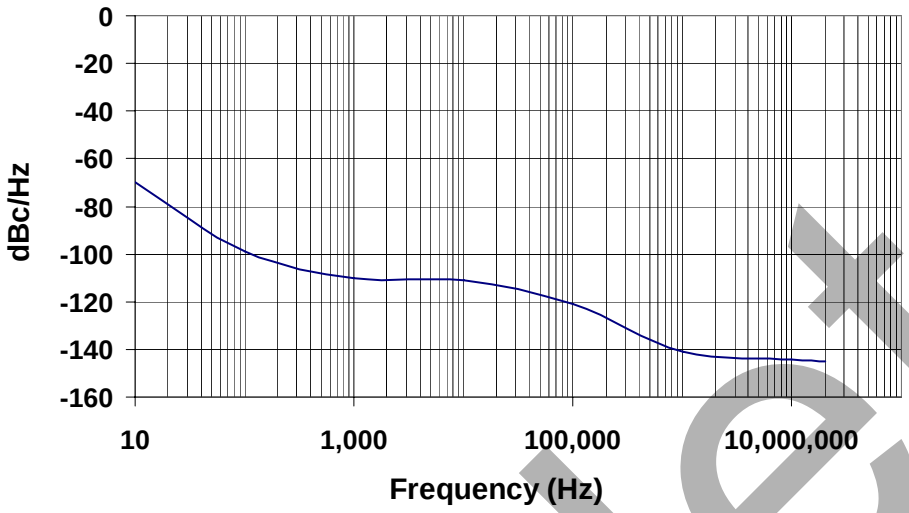
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| **Code** | **H** | **J** | **K** | **L** | **M** | **N** | **P** | **R** | **T**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

### Electrical Specification for 3.30V ±10% over the specified temperature range

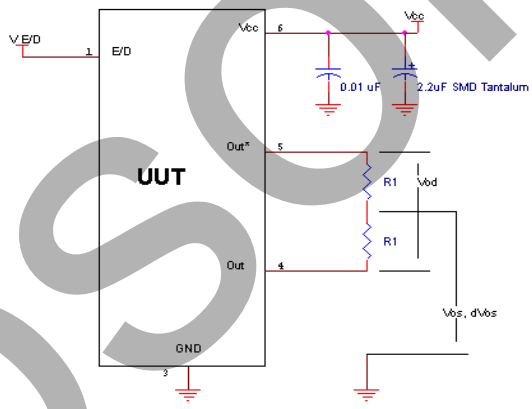
| Item | Min | Max | Unit | Condition |
|---|---|---|---|---|
| Frequency Range | 106.25 | 212.50 | MHz | |
| Frequency Accuracy "**45**" | -50 | +50 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| "**44**" | -25 | +25 | | |
| "**20**" | -20 | +20 | | |
| Output Waveform | LVDS | | | |
| Output High Level | -- | 1.47 | Volts | See load circuit R1 = 50 ohms |
| Output Low Level | 0.93 | -- | Volts | |
| Differential Output ($V_{OD}$) | 200 | 400 | mVolts | |
| Output Offset Voltage ($V_{OS}$) | 1.125 | 1.275 | Volts | |
| Differential Output Error ($dV_{OS}$) | -- | 25 | mVolts | |
| Output Symmetry | 48 | 52 | % | Referenced to 50% of amplitude or crossing point |
| Output $T_{RISE}$ and $T_{FALL}$ | 200 | 600 | pS | Vth is 20% and 80% of waveform |
| Jitter | - | 0.8 | pS RMS | Measured 12KHz to 20MHz from Fnominal |
| | - | 1.5 | | Measured 10Hz to 1MHz from Fnominal |
| Output Current | | 12 | mA | Outputs shorted together |
| Vcc Supply Current | - | 68 | mA | Includes current of properly terminated device |
| V disable | - | 0.8 | Volts | Outputs held in a fixed state |
| V enable | 2.0 | - | Volts | |
| Input High Current | -10 | +10 | uA | Pad 1 at $V_{CC}$ |
| Input Low Current | -50 | +10 | uA | Pad 1 at 0 Volts |
| 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 | Measured from the time Vcc = 3.0V |
| Operating Temperature Range | -10 | +70 | °C | Standard Temperature Range |
| | -20 | +70 | °C | Extended Temperature Range "**C**" Option |
| | -40 | +85 | °C | Extended Temperature Range "**E**" Option |
| Storage Temperature Range | -55 | +125 | °C | |

Specifications with Pad 1 E/D open circuit unless otherwise stated

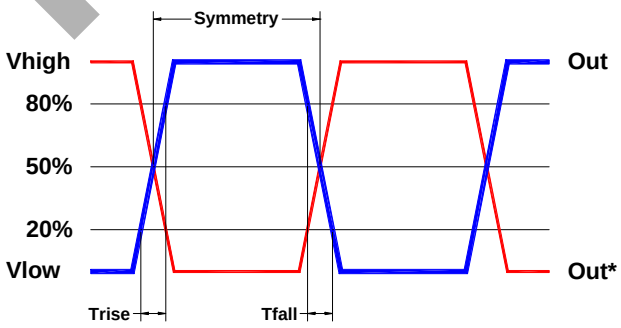
### Typical Phase-Noise Response




### 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 |

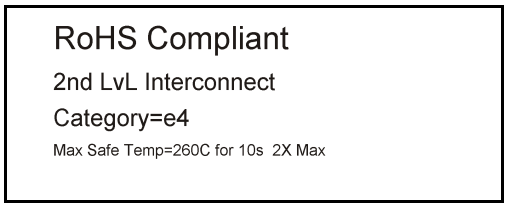
## ESD Rating

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

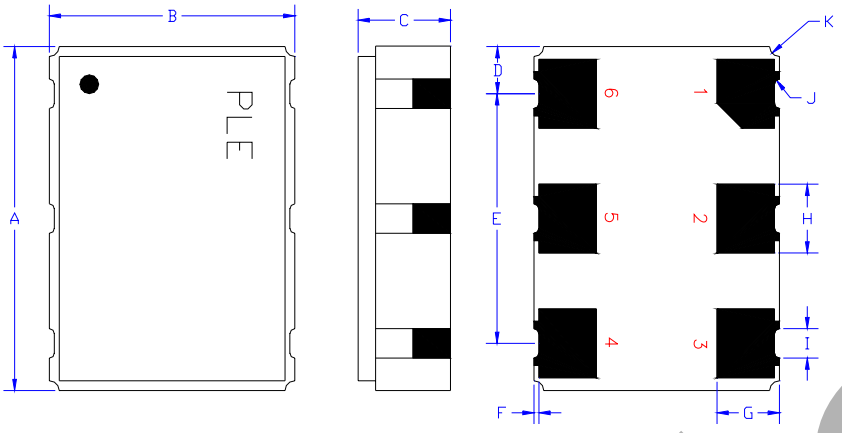
## Package Labeling

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 to 39.4 µinches (0.3 to 1.0 µm)
over
Nickel 50 to 350 µinches (1.27 to 8.89 µm)

[1] Typical dimensions

Not to Scale

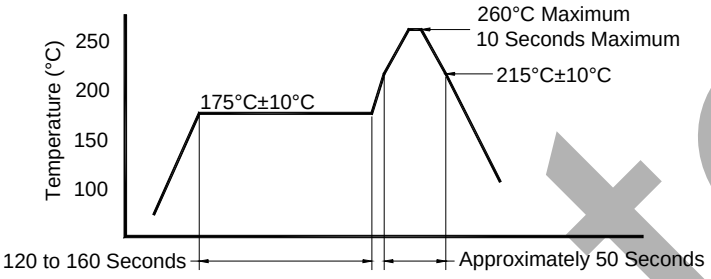
| Pad | Function | Note |
|---|---|---|
| 1 | Output Enable/Disable | When this pad is not connected the oscillator shall operate. When this pad is <0.30 volts, the output will be set Output high and Output* low, the outputs are not in a high impedance condition. Recommend connecting this pad to $V_{CC}$ if the oscillator is to be always on. |
| 2 | No connect | No internal connection |
| 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. |

Lead Free

## Layout and application information

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

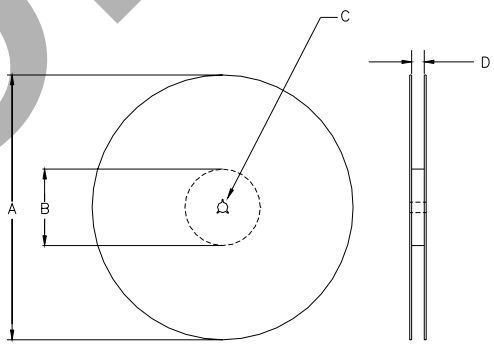
The part may be reflowed 3 times without degradation.

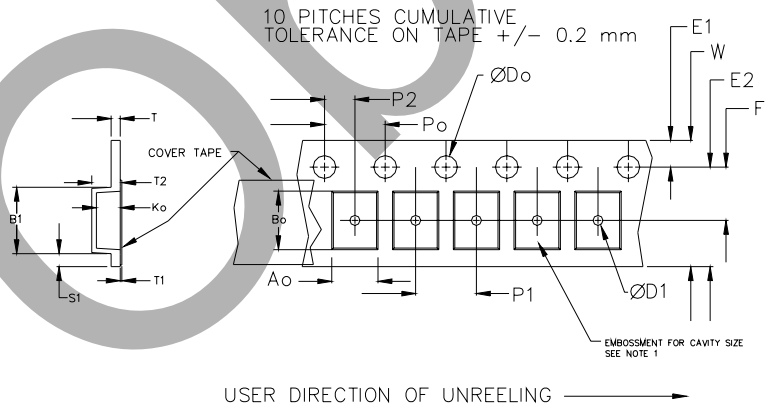
### Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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

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