



LV77F / LV77G Series 3.3 V LVDS Clock Oscillators

November 2018



- Pletronics' LV77F and LV77G Series is a quartz crystal controlled precision square wave generator with a fast rise and fall time LVDS output.
- The package is designed for high density surface mount designs.
- 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
- LV77F use Fundamental Mode Crystals
 13MHz to 110MHz
- LV77G use 3rd Overtone Crystals
 35MHz to 220MHz
- Low Jitter

**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 |
| Junction Temperature (T _j) | -55°C to +150°C |

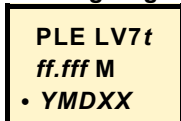
Thermal Characteristics

The maximum die or junction temperature is 150°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 | G | 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 C = Temp. range -20 to +70°C E = Temp. range -40 to +85°C |
| | | | | | | | Series Model F = Fundamental mode crystal G = 3 rd Overtone mode crystal |
| | | | | | | | Frequency Stability 45 = ± 50 ppm 44 = ± 25 ppm 20 = ± 20 ppm |
| | | | | | | | Series Model |

Marking Legend:



- PLE = Pletronics
- t = Mode of operation 'F' or 'G'
- ff.fff M = Frequency in MHz
- 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 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|------|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year | 2016 | 2017 | 2018 | 2019 | 2020 | Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

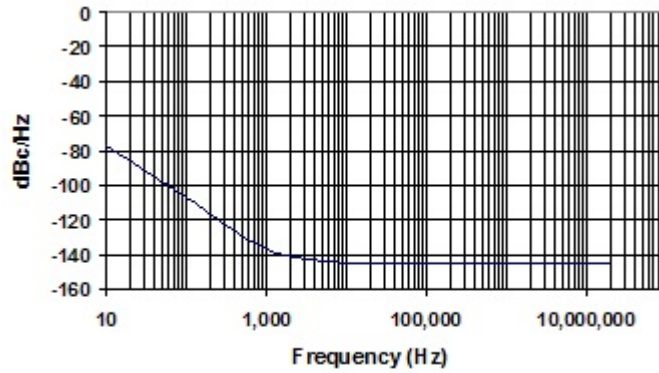
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H | J | K | L | M | N | P | R | T | U | V | W | X |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

Electrical Specification for 3.30V $\pm 10\%$ over the specified temperature range

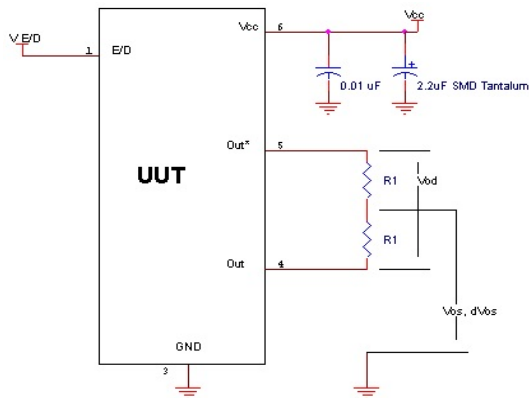
| Item | Min | Typ | Max | Unit | Condition | |
|--------------------------------------|----------------|----------|----------|----------------|--|--------------------|
| Frequency Range | 13 | - | 110 | MHz | For "F" series devices | |
| | 35 | - | 220 | MHz | For "G" series devices | |
| Frequency 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 | | | |
| Supply Voltage Sensitivity | -2 | - | 2 | ppm | For V_{CC} change of $\pm 10\%$ | |
| Output Waveform | LVDS | | | | | |
| Output High Level (V_{OH}) | - | 1.43 | 1.60 | volts | See load circuit | |
| Output Low Level (V_{OL}) | 0.90 | 1.10 | - | volts | See load circuit | |
| Output Offset Voltage | 1.125 | - | 1.375 | volts | | |
| Output Symmetry | 45 | - | 55 | % | output crossing point | ≤ 200 MHz |
| | 40 | - | 60 | % | output crossing point | > 200 MHz |
| Output Swing | 250 | 350 | 450 | mV | 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} | - | 150 | 400 | pS | V_{th} is 20% and 80% of waveform | |
| V_{CC} Supply Current (I_{CC}) | - | 12 16 | 20 27 | mA | < 80 MHz ≥ 80 MHz | "F" series devices |
| | - | 12 | 20 | mA | < 90 MHz | "G" series devices |
| | - | 16 | 27 | | ≥ 90 MHz to > 125 MHz | |
| | - | 20 | 34 | | ≥ 125 MHz to > 160 MHz | |
| - | 24 | 40 | | ≥ 160 MHz | | |
| Disable current | - | -10 | - | μ A | Pad 1 = 0.0 volts | |
| V disable | - | - | 30 | % V_{CC} | Referenced to pad 3 | |
| V enable | 70 | - | - | % V_{CC} | Referenced to pad 3 | |
| 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 | mS | | |
| Disable time | - | - | 200 | nS | Time for output to reach a high Z state | |
| Start up time | - | - | 2 | mS | Time for output to reach specified frequency | |
| Operating Temperature | -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 | -55 | - | +125 | $^{\circ}$ C | | |
| Standby Current I_{CC} | - | - | 10 | μ A | Pad 1 low, device disabled | |

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

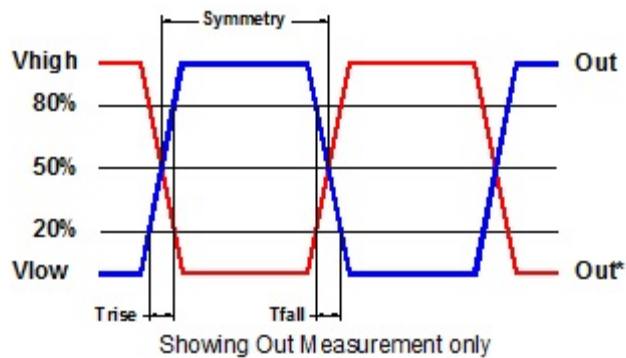
Typical Phase-Noise Response



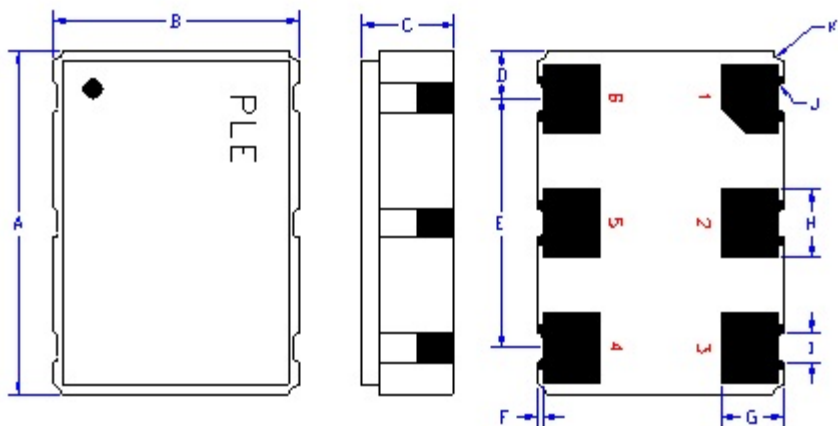
Load Circuit



Test Waveform



Mechanical:



| | 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 |

¹ Typical dimensions

Not to Scale

Contacts (pads) :

Gold 11.8 to 39.4 μ mches (0.3 to 1.0 μ m) over Nickel 50 to 350 μ mches (1.27 to 8.89 μ m)

| Pad | Function | Note |
|-----|-----------------------------|---|
| 1 | Output Enable/Disable | When this pad is not connected the oscillator shall operate. When this pad is <30% of V_{CC} , 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. |



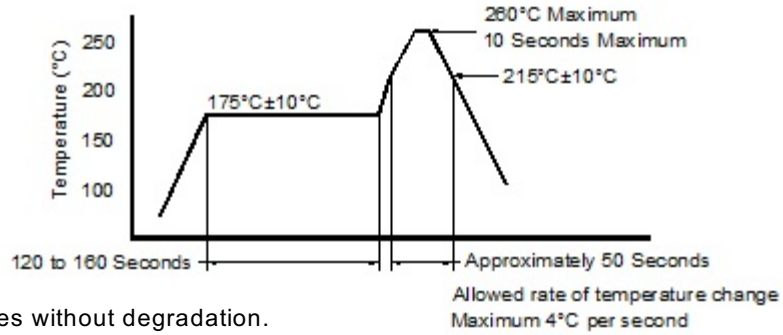
Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable 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)



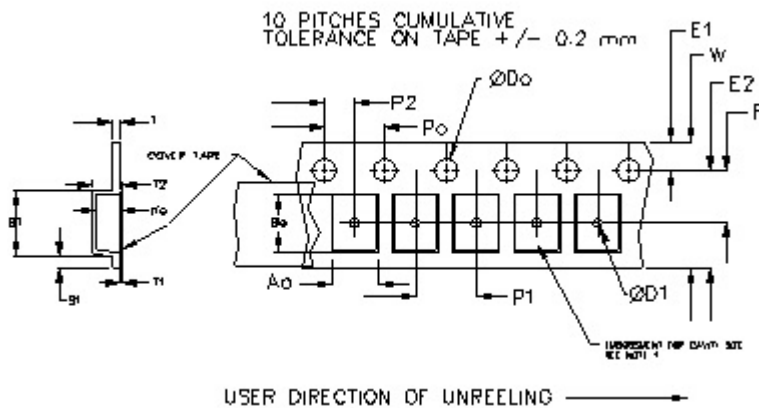
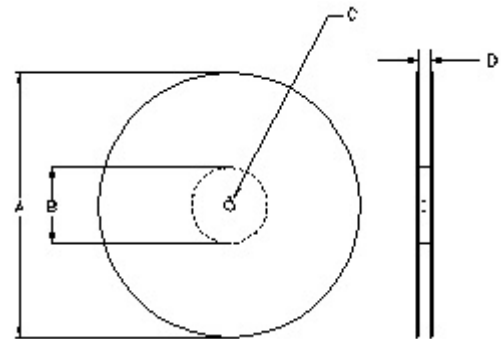
The part may be reflowed 3 times without degradation.

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 | | | 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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