

VPU7 Series 3.3V PECL VCXO Oscillators

November 2018



- Pletronics' VPU7 Series is a voltage - quartz crystal controlled precision square wave generator with a PECL output
- See VLU7 for LVDS output
- Tape and Reel or cut tape packaging
- 10.9 MHz to 1,175MHz
- Enable/Disable Function on pad 2
- Output frequency is synthesized
- Low Jitter

Pletronics Inc. certifies this device is in accordance with the RoHS (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: 0.28 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 +4.6V |
| V _i Input Voltage | -0.5V to V _{CC} + 0.5V |
| V _o Output Voltage | -0.5V to V _{CC} + 0.5V |
| I _o Output Current | -50mA |

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:

| | | | | | | |
|------------|----|-----|-----|---------|-----|--|
| VPU7029036 | EG | 000 | 050 | -312.5M | -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 |
| | | | | | | Pullability in ppm (Vcontrol) APR 050 = ± 50 ppm minimum is standard 075 = ± 75 ppm minimum 100 = ± 100 ppm minimum |
| | | | | | | Stability in ppm (Stability in ppm * 10) 000 = APR 500 = ± 50 ppm 250 = ± 25 ppm (typical values shown) |
| | | | | | | Temperature Range EG = -10 to +70°C LK = -40 to +85°C |
| | | | | | | Series Model |

Part Marking:

PLE VPU7
FF.FFF M
• YMDXX

Marking Legend:

PLE = Pletronics
 FF.FFF M = Frequency in MHZ
 YMD = Date of Manufacture (year-month-day)
 All other marking is internal factory codes

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 |

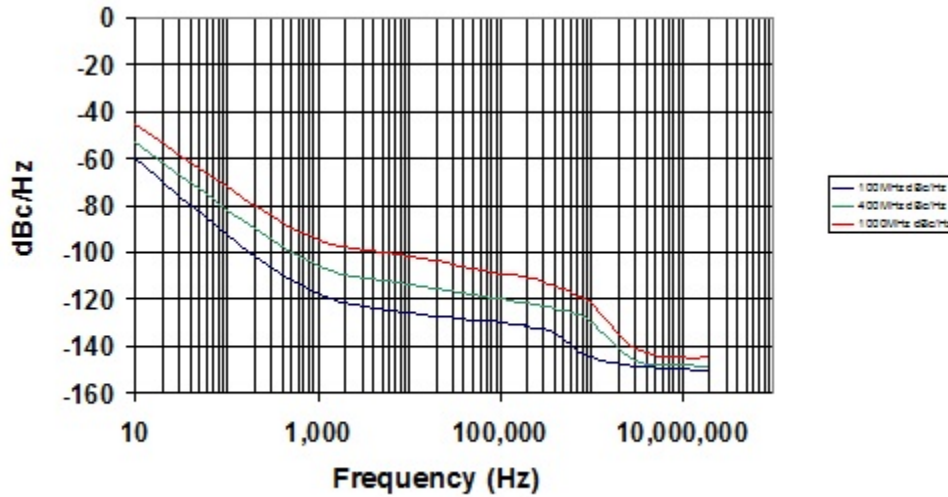
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H | J | K | L | M | N | P | R | T | U | V | W | X | 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 and the frequency range of 10.9 MHz to 766 MHz and 876 MHz to 1,175MHz

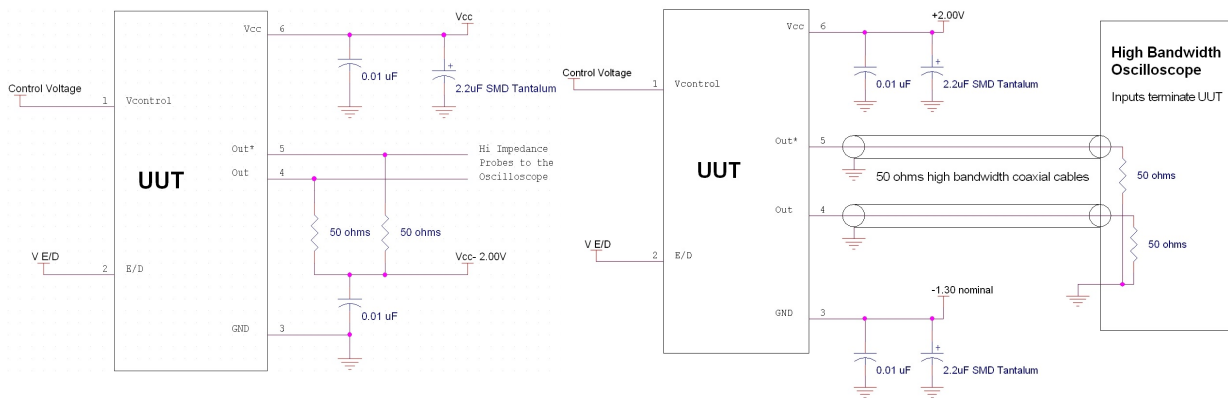
| Item | Min | Max | Unit | Condition | |
|--------------------------------------|-----------------------|--------------------|--------------------|---|----------------------------|
| Pullability, Absolute Pull Range | -50 -75 -100 | +50 +75 +100 | ppm | APR includes the effect of temperature stability, aging, supply voltage and load. Defined by part number. | |
| Output Waveform | PECL / ECL | | | | |
| Output High Level | 2.12 | 2.49 | volts | Referenced to Ground, $V_{CC} = 3.3\text{ V}$ | |
| | 0.82 | 1.19 | volts | Referenced to termination voltage, $V_{CC} = 3.3\text{ V}$ | |
| | -1.18 | -0.81 | volts | Referenced to V_{CC} , $V_{CC} = 3.3\text{ V}$ | |
| Output Low Level | 1.83 | 1.99 | volts | Referenced to Ground, $V_{CC} = 3.3\text{ V}$ | |
| | 0.53 | 0.69 | volts | Referenced to termination voltage, $V_{CC} = 3.3\text{ V}$ | |
| | -1.47 | -1.31 | volts | Referenced to V_{CC} , $V_{CC} = 3.3\text{ V}$ | |
| Output Peak to Peak Level | 0.405 | 1.076 | volts | | |
| Output Symmetry | 47 | 53 | % | at 50% point of V_{CC} (See load circuit) | |
| Modulation Bandwidth | 10 | - | KHz | $V_{control} = 1.65\text{V} \pm 1.50\text{ V}$, -3dB | |
| Vcontrol Resistance (Pad 1) | 20 | - | Kohm | | |
| Voltage vs Frequency Linearity | -10 | +10 | % | $V_{control} = 1.65\text{V} \pm 1.50\text{ V}$ | |
| Jitter | - | 0.8 | pS RMS | 12 KHz to 20 MHz from the output frequency | |
| | - | 3.2 | pS RMS | 10 Hz to 20 MHz from the output frequency | |
| Output T_{RISE} and T_{FALL} | 100 | 300 | pS | V_{th} is 20% and 80% of waveform | |
| V_{CC} Supply Current (I_{CC}) | - | 110 | mA | | |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | to V_{CC} | |
| V disable | - | 0.8 | volts | Referenced to pad 3 | |
| V enable | 2.00 | - | volts | Referenced to pad 3 | |
| Output leakage | $V_{OUT} = V_{CC}$ | -50 | +50 | μA | Pad 1 low, device disabled |
| | $V_{OUT} = 0\text{V}$ | -50 | +50 | μA | |
| 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 | - | 5 | mS | Time for output to reach specified frequency | |
| Operating Temperature Range | -10 | +70 | $^{\circ}\text{C}$ | Standard Temperature Range | |
| | -40 | +85 | $^{\circ}\text{C}$ | Extended Temperature Range | |
| Storage Temperature Range | -55 | +125 | $^{\circ}\text{C}$ | | |

Specifications with Pad 2 E/D open circuit or connected to V_{CC}

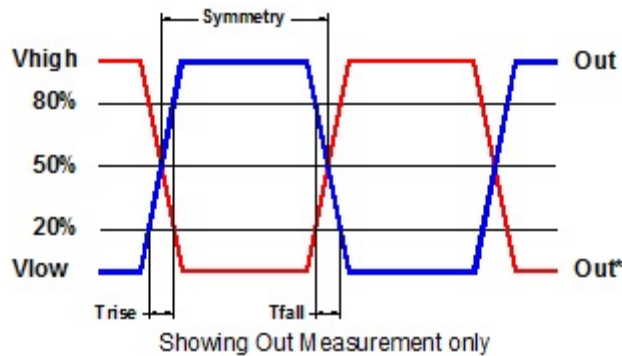
Typical Phase-Noise Response



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 | 2000 | MIL-STD-883 Method 3115 |
| Charged Device Model | 1500 | JESD 22-C101 |

Package Labeling

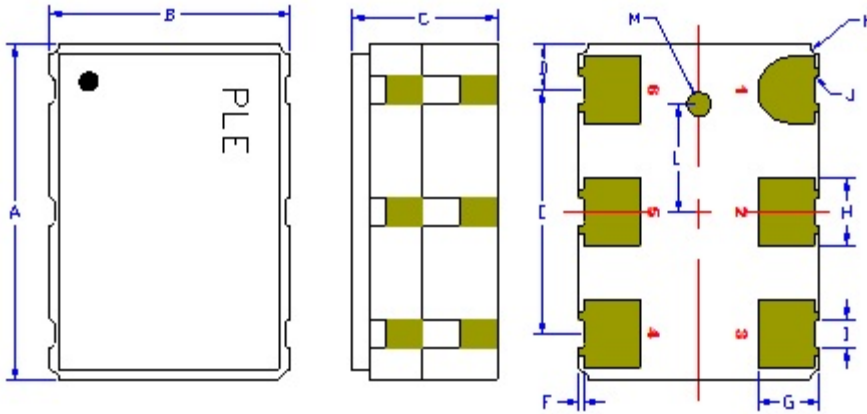
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

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

| | |
|--|--|
| P/N:  VPU7029036EG100050-100.0M | |
| Customer P/N:  12345678 | D/C  4AN3LGC2-SF2 |
| Qty:  1000 | MSL: 1 |

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

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 | 0.117 max | 2.97 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 |
| L ¹ | 0.089 | 2.25 |
| M ¹ | 0.010r | 0.25r |

Contacts (pads):

Gold 11.8 to 39.4 μ inches (0.3 to 1.0 μ m)
over

Nickel 50 to 350 μ inches (1.27 to 8.89 μ m)

Center metallized pad on the base is internally connected, may be open or connected to V_{cc} or to Ground.

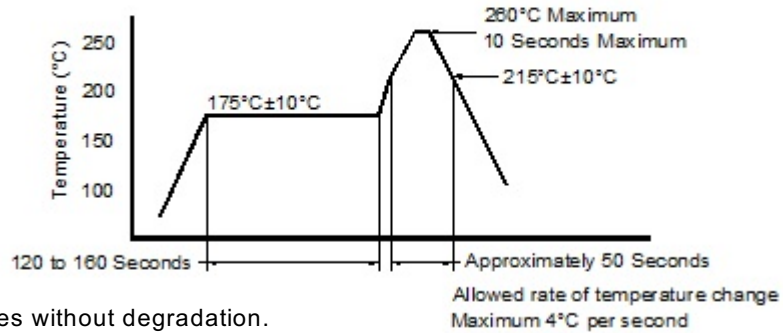
¹ Typical dimensions

Not to Scale

Do not permit solder to bridge the upper gold contacts on the side

| Pad | Function | Note |
|-----|-----------------------------|--|
| 1 | Vcontrol | Modulates the output frequency |
| 2 | Output Enable/Disable | When this pad is not connected the oscillator shall operate. When this pad is <0.80 volts, the output will be inhibited (high impedance state.) Recommend connecting this pad to V_{cc} if the oscillator is to be always on.. |
| 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. The outputs become a High Z when disabled and the voltage level is determined by the termination circuitry. |
| 5 | Output* | |
| 6 | Supply Voltage (V_{cc}) | Recommend connecting appropriate power supply bypass capacitors as close as possible. |

Reflow Cycle (typical for lead free processing)

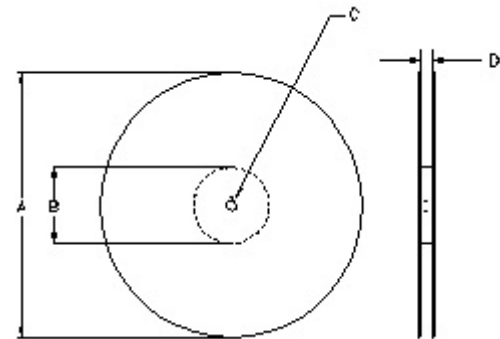


The part may be reflowed 2 times without degradation.

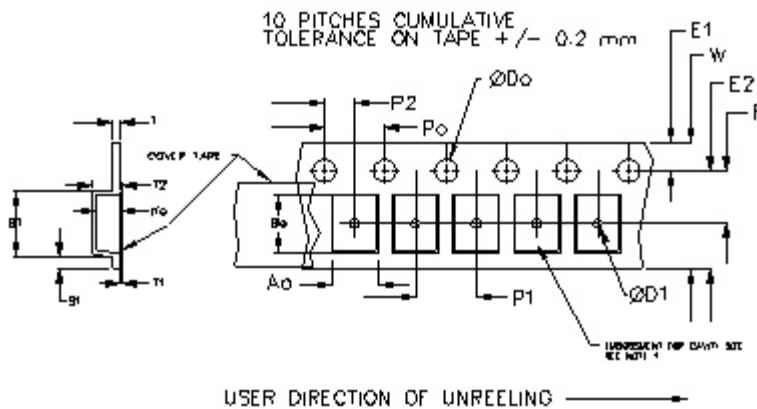
Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

| 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 | ±0.1 | ±0.1 | 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 | | | 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 |
| | mm | --- | --- | 24.4 +2.0 / -0.0 | 24.0 |
| | mm | --- | --- | 32.4 +2.0 / -0.0 | 32.0 |

Reel dimensions may vary from the above

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