



## 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 <sub>CC</sub> Supply Voltage	-0.5V to +4.6V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V
I <sub>o</sub> 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	
						<b>Packaging code or blank</b> <b>T250</b> = 250 per Tape and Reel <b>T500</b> = 500 per Tape and Reel <b>T1K</b> = 1000 per Tape and Reel
						<b>Frequency in MHZ</b>
						<b>Pullability in ppm (Vcontrol) APR</b> <b>050</b> = $\pm 50$ ppm minimum is standard <b>075</b> = $\pm 75$ ppm minimum <b>100</b> = $\pm 100$ ppm minimum
						<b>Stability in ppm (Stability in ppm * 10)</b> <b>000</b> = APR <b>500</b> = $\pm 50$ ppm <b>250</b> = $\pm 25$ ppm      (typical values shown)
						<b>Temperature Range</b> <b>EG</b> = -10 to +70°C <b>LK</b> = -40 to +85°C
						<b>Series Model</b>

### 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	$\mu\text{A}$	Pad 1 low, device disabled
	$V_{OUT} = 0\text{V}$	-50	+50	$\mu\text{A}$	
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  $V_{CC}$

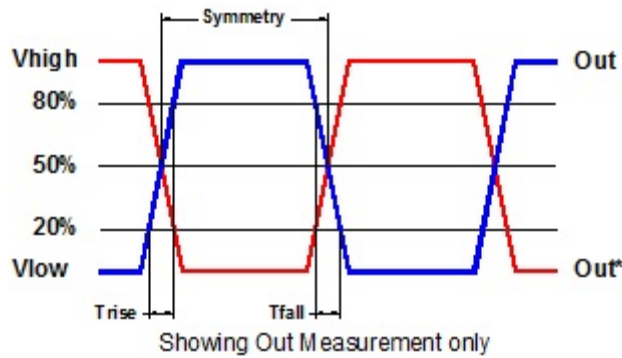
**Typical Phase-Noise Response**



**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

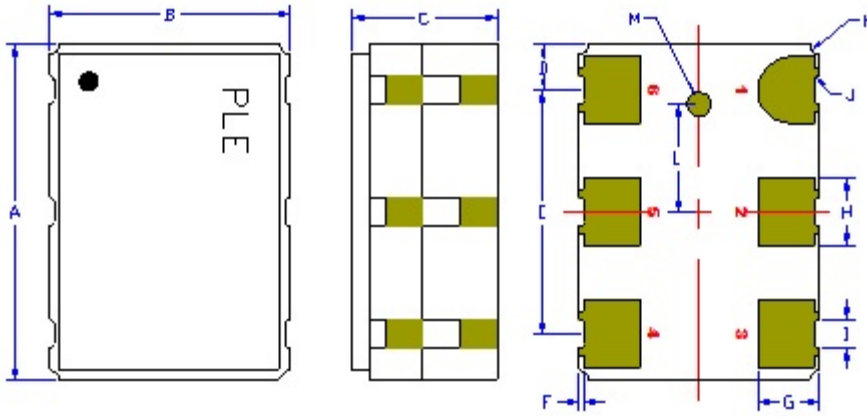
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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

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

<b>RoHS Compliant</b> 2nd Lvl Interconnect Category=e4 Max Safe Temp=260C for 10s 2X Max
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## Mechanical:



### Contacts (pads):

Gold 11.8 to 39.4  $\mu$ inches (0.3 to 1.0  $\mu$ m)  
over  
Nickel 50 to 350  $\mu$ inches (1.27 to 8.89  $\mu$ m)

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

<sup>1</sup> Typical dimensions

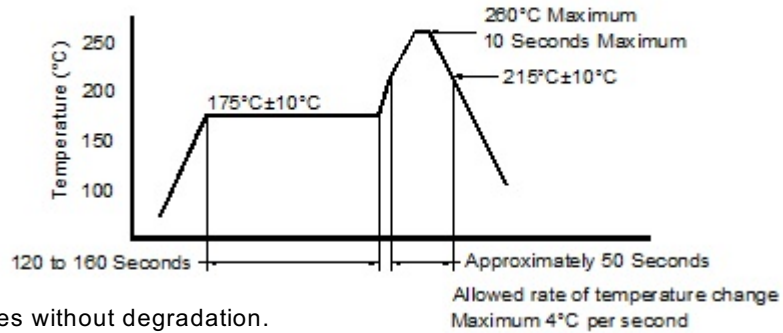
Not to Scale

	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	0.117 max	2.97 max
D <sup>1</sup>	0.038	0.96
E <sup>1</sup>	0.200	5.08
F <sup>1</sup>	0.004	0.10
G <sup>1</sup>	0.050	1.27
H <sup>1</sup>	0.055	1.40
I <sup>1</sup>	0.024	0.60
J <sup>1</sup>	0.004r	0.10r
K <sup>1</sup>	0.008r	0.20r
L <sup>1</sup>	0.089	2.25
M <sup>1</sup>	0.010r	0.25r

**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)

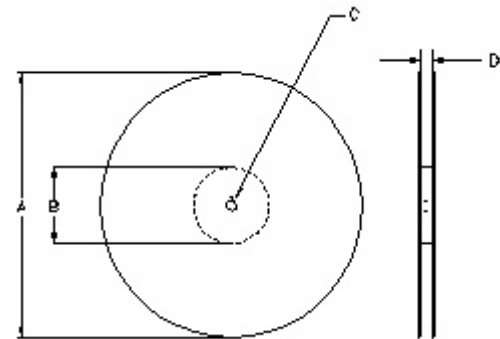


The part may be reflowed 2 times without degradation.

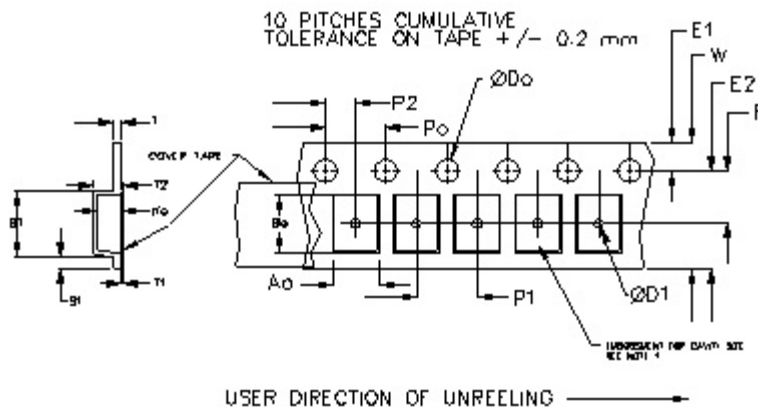
## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

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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