



# VPU7 Series 3.3V PECL VCXO Oscillators

January 2014



- 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.



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## 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> = ± 50 ppm minimum is standard <b>075</b> = ± 75 ppm minimum <b>100</b> = ± 100 ppm minimum
						<b>Stability in ppm (Stability in ppm * 10)</b> <b>000</b> = APR <b>500</b> = ± 50 ppm <b>250</b> = ± 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	9	0	1	2	3	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2009	2010	2011	2012	2013	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

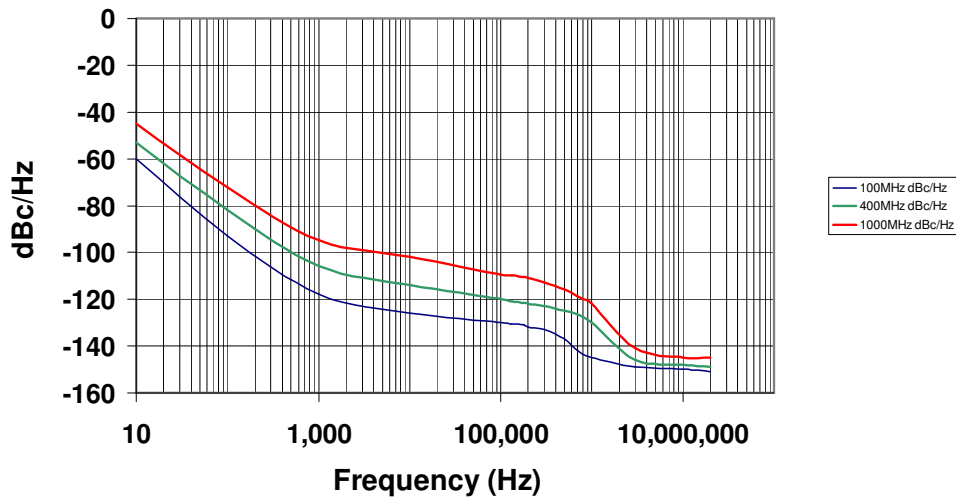
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

## 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

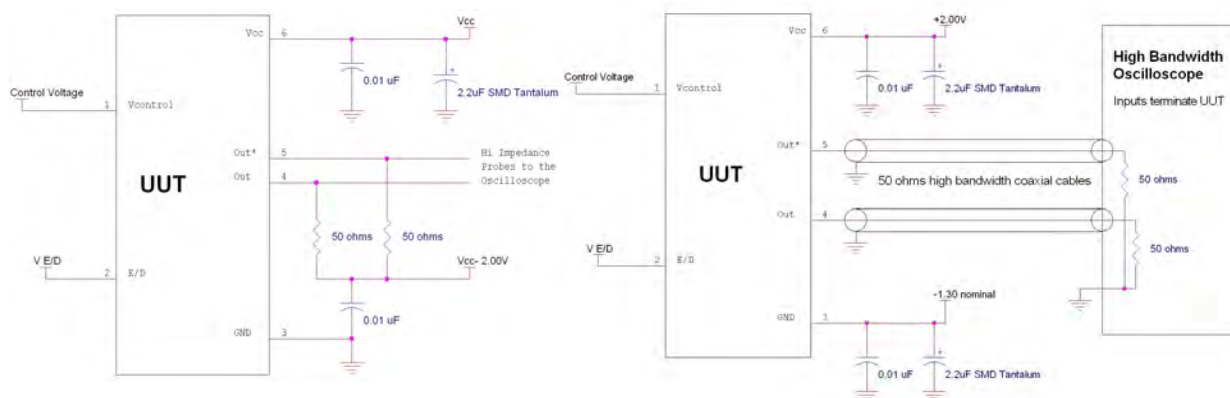
Item	Min	Max	Unit	Condition	
Pullability, Absolute Pull Range	-50 -75 -100	+50 +75 +100	ppm	APR includes the effect of temperature stability, aging, supply voltage and load. Defined by part number.	
Output Waveform	PECL / ECL				
Output High Level	2.12	2.49	volts	Referenced to Ground, $V_{CC} = 3.3 V$	
	0.82	1.19	volts	Referenced to termination voltage, $V_{CC} = 3.3 V$	
	-1.18	-0.81	volts	Referenced to $V_{CC}$ , $V_{CC} = 3.3 V$	
Output Low Level	1.83	1.99	volts	Referenced to Ground, $V_{CC} = 3.3 V$	
	0.53	0.69	volts	Referenced to termination voltage, $V_{CC} = 3.3 V$	
	-1.47	-1.31	volts	Referenced to $V_{CC}$ , $V_{CC} = 3.3 V$	
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	$V_{control} = 1.65V \pm 1.50 V$ , -3dB	
Vcontrol Resistance (Pad 1)	20	-	Kohm		
Voltage vs Frequency Linearity	-10	+10	%	$V_{control} = 1.65V \pm 1.50 V$	
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	$\mu A$	Pad 1 low, device disabled
	$V_{OUT} = 0V$	-50	+50	$\mu A$	
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	$^{\circ}C$	Standard Temperature Range	
	-40	+85	$^{\circ}C$	Extended Temperature Range	
Storage Temperature Range	-55	+125	$^{\circ}C$		

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

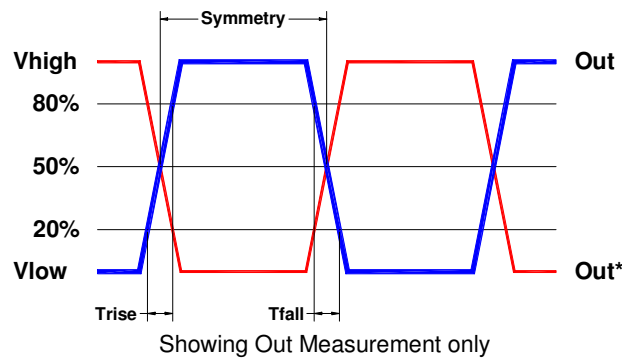
## Typical Phase-Noise Response



## 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

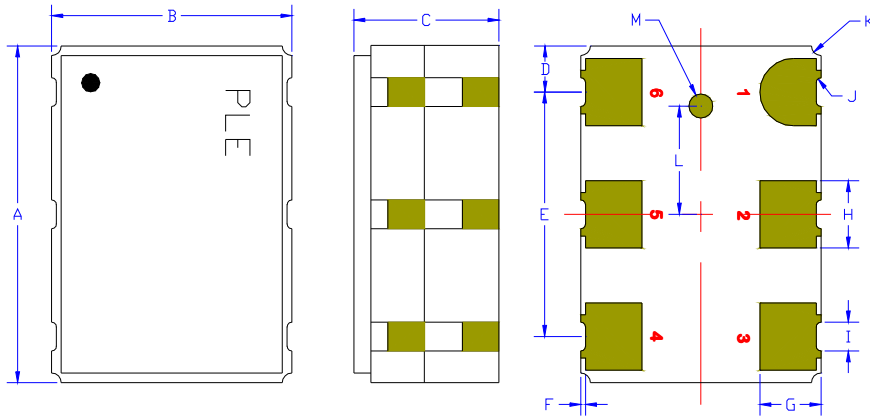
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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:



	Inches	mm
A	0.276 ±0.006	7.00 ±0.15
B	0.197 ±0.006	5.00 ±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

### Contacts (pads):

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)

Center metallized pad on the base is internally connected, may be open or connected to V<sub>cc</sub> or to Ground.

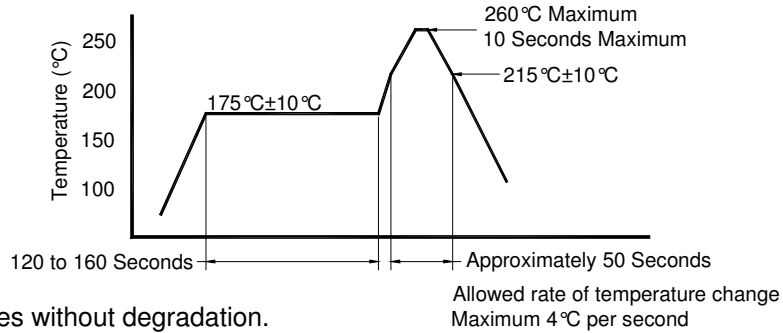
<sup>1</sup> Typical dimensions

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 <sub>cc</sub> 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 <sub>cc</sub> )	Recommend connecting appropriate power supply bypass capacitors as close as possible.

## Reflow Cycle (typical for lead free processing)



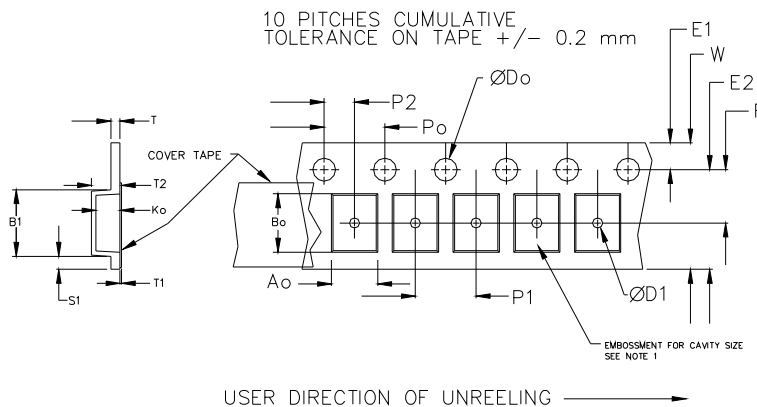
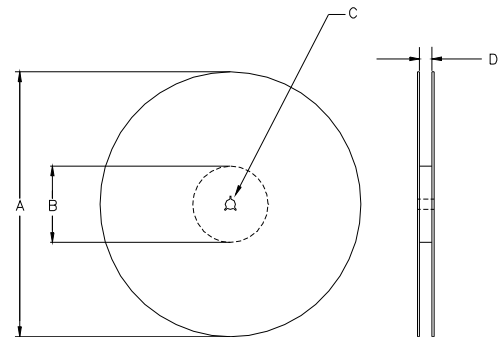
The part may be reflowed 2 times without degradation.

## 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