



VHA6010-33.333M VCXO CMOS Oscillator

May 2009

**This product is designed to meet the needs of the
Aquantia Corporation AQ1002 10GBASE-T Ethernet PHY Transceiver**

- Pletronics' VHA6 Series is a voltage controlled crystal oscillator with a CMOS output.
- This model uses fundamental mode crystals with no multiplication circuits.
- Tape and Reel or tube packaging is available.
- 5x7 mm Ceramic LCC Package
- Voltage Control Function on pad 1
- Enable/ Disable Function on pad 2



**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: 0.2 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 +5.5V
V _i Input Voltage	-0.5V to V _{CC} + 0.5V
V _o 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 60 to 100°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Part Marking:

PLE V6010
 33.333M
 • YMDxG8

Legend:

PLE = Pletronics
 33.333M = Frequency in MHZ
 YMD = Date of Manufacture (year, month and day)
 x = production code
 All other marking is internal factory code

Codes for Date Code YMD

Code	9	0	1	2	3	4	5
Year	2009	2010	2011	2012	2013	2014	2015





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

Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)
 Font is Courier New
 Bar code is 39-Full ASCII
 (The P/N will be shown as VHA6010-33.333M)

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

P/N:	
	VHA6029036EG500100-16.384M
Customer P/N:	
	12345678
Qty:	
	1000
D/C	
	0510M012

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

ESD Rating

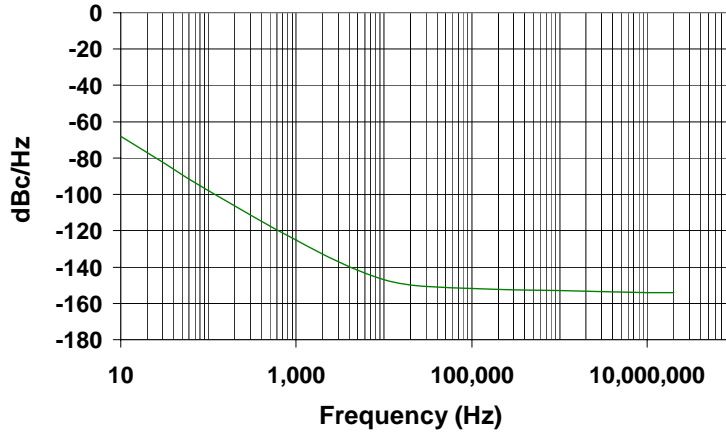
Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

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

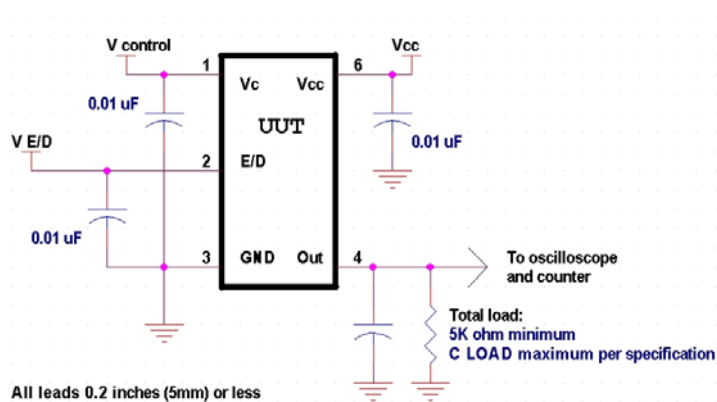
Item	Min	Typ	Max	Unit	Condition
Frequency	33.3330 MHZ				
Frequency Accuracy	-50	0	+50	ppm	Vcontrol = 1.60V and over temperature, load and supply variations
Pullability (APR)	-65	-	+65	ppm	Absolute Pull Range, about Vcontrol = 1.60V $\pm 0.80V$ includes the effect of temperature stability
Output Waveform	CMOS				
Output High Level	90	-	-	%	of V _{CC} for I _{OH} = +4 mA
Output Low Level	-	-	10	%	of V _{CC} for I _{OL} = -4 mA
Output Short Circuit Current	-50	-	+50	mA	
Output T _{RISE} and T _{FALL}	-	4.0	6.0	nS	10% to 90% of V _{CC} , C _{LOAD} = 15 pF
Output Symmetry	45	50	55	%	at 50% point of V _{CC} (See load circuit)
Vcontrol Resistance Pin 1	2	-	-	Mohm	
Modulation Bandwidth	15	20	-	KHz	Vcontrol = 1.60V $\pm 1.0V$, -3dB
Modulation Linearity	-10	-	+10	%	Vcontrol = 1.60V $\pm 1.0V$, -3dB
E/D Internal Pull-up	50	-	-	Kohm	to V _{CC}
V disable	-	-	15	%	of V _{CC} applied to pin 1
V enable	85	-	-	%	of V _{CC} applied to pin 1
Output leakage	-10	-	+10	uA	Pin 1 low, device disabled
	-10	-	+10	uA	
Enable time	-	-	250	nS	Time for output to reach a logic state
Disable time	-	-	250	nS	Time for output to reach a high Z state
Start up time	-	1.5	10	mS	Time for output to reach specified frequency
Supply Current	-	4.0	7.0	mA	C _{LOAD} = 15 pF
Operating Temperature	-10		+70	°C	Defined by part number
Storage Temperature Range	-55		+125	°C	

Specifications with Pad 2 E/D open circuit

Typical phase noise plot for 5 oscillators at different output frequencies.



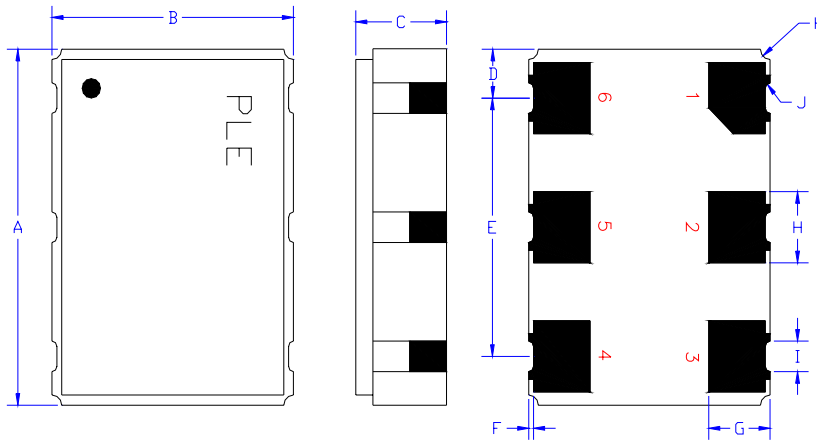
Load Circuit and Test Waveform



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

Mechanical:



Gold 11.8 μinches 0.3 μm minimum over
 Nickel 50 to 350 μinches 1.27 to 8.89 μm

¹ Typical dimensions
 Not to Scale

	Inches	mm
A	0.276 ±0.006	7.00 ±0.15
B	0.197 ±0.006	5.00 ±0.15
C	0.073 ±0.012	1.87 ±0.30
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

Pad	Function	Note
1	Vcontrol Input	
2	Output Enable/ Disable	When this pad is not connected, the oscillator shall operate When this pad is logic low, 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	
5	N.C.	No Internal connection, pad may be connected to ground or V _{cc}
6	Supply Voltage (V _{cc})	Recommend connecting appropriate power supply bypass capacitors as close as possible.

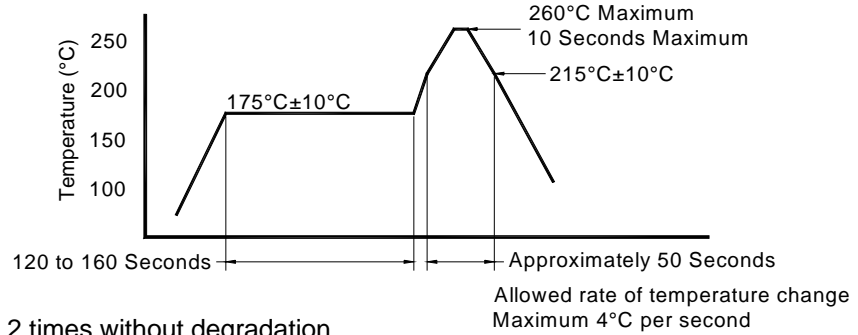


Layout and application information

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)

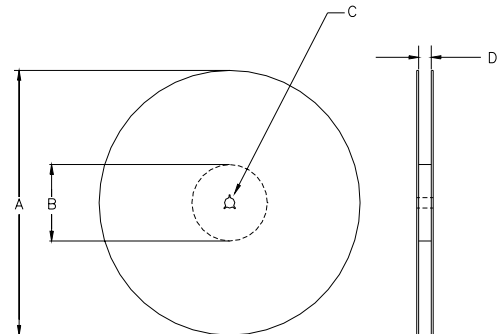


The part may be reflowed 2 times without degradation.

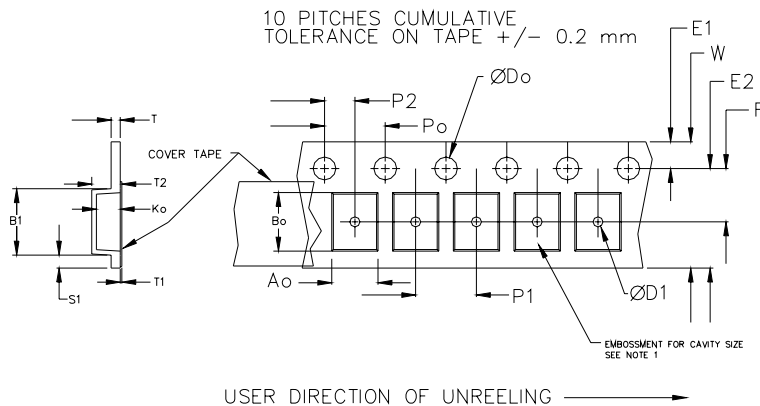
Tape and Reel: available for quantities of 250 to 1000 per reel

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			2.0 ±0.1			
16mm		1.5			2.0 ±0.1			
24mm		1.5			2.0 ±0.1			

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

IMPORTANT NOTICE

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