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

Lead Free

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
Vi Input Voltage	-0.5V to V_{CC} + 0.5V
Vo 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
• ***YMD*xG8**

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

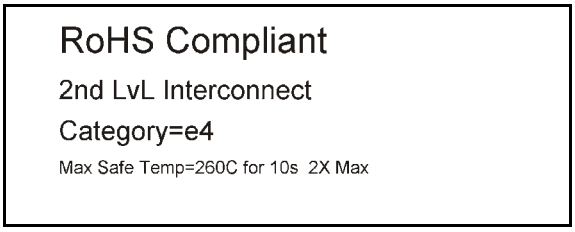
Code	A	B	C	D	E	F	G	H	J	K	L	M
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

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



ESD Rating

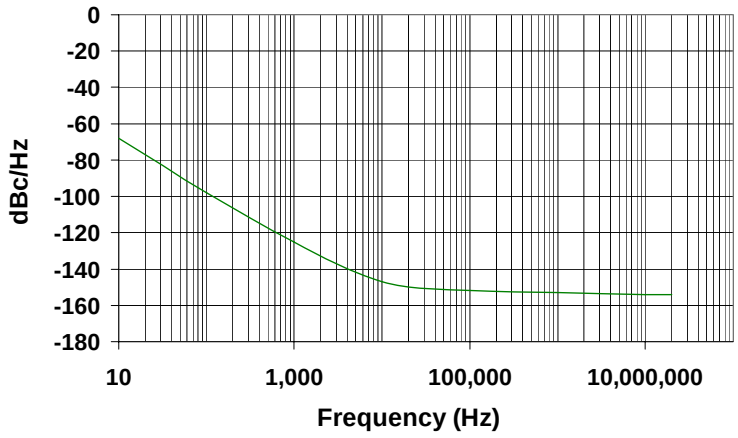
Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

Electrical Specification for 3.30V ±10% over the specified temperature range

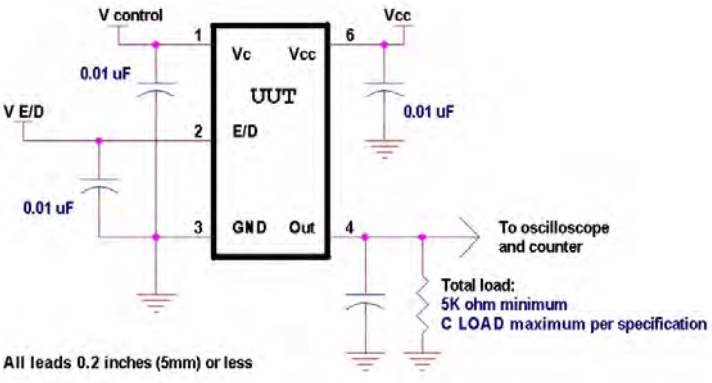
Item	Min	Typ	Max	Unit	Condition
Frequency		33.3330 MHZ			
Frequency Accuracy	-50	0	+50	ppm	Vcontrol = 1.60V and over temperature, load and supply variations
Pullability (APR)	-65	-	+65	ppm	Absolute Pull Range, about Vcontrol = 1.60V ±0.80V includes the effect of temperature stability
Output Waveform		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 ±1.0V, -3dB
Modulation Linearity	-10	-	+10	%	Vcontrol = 1.60V ±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 $V_{OUT} = V_{CC}$	-10	-	+10	uA	Pin 1 low, device disabled
V_{OUT} = 0V	-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	

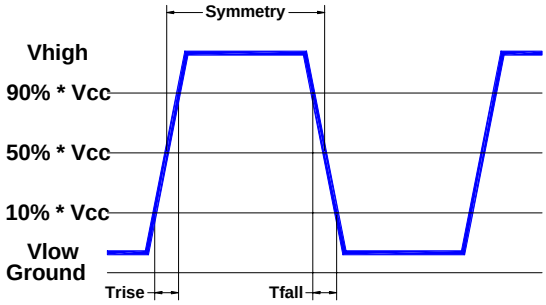
Specifications with Pad 2 E/D open circuit

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

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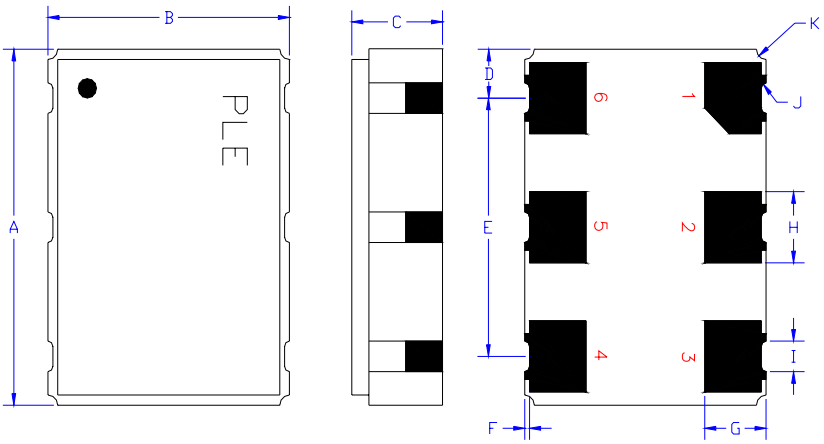
Mechanical:



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.

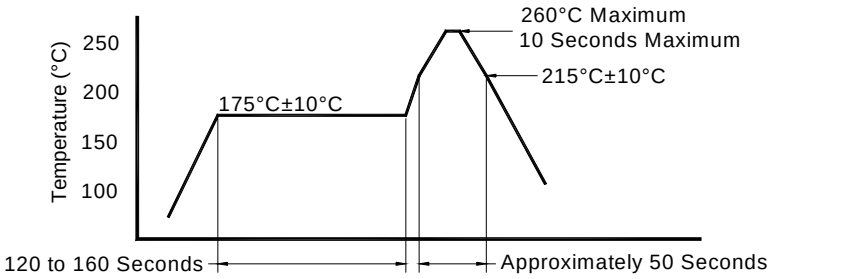
Lead Free

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

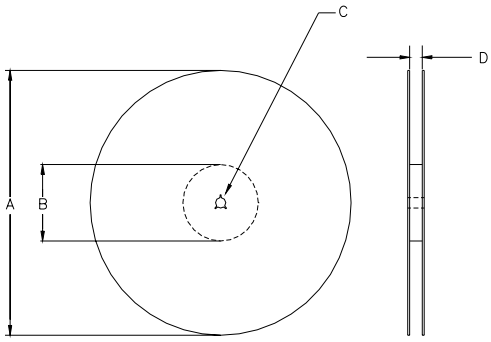
Constant Dimensions Table 1

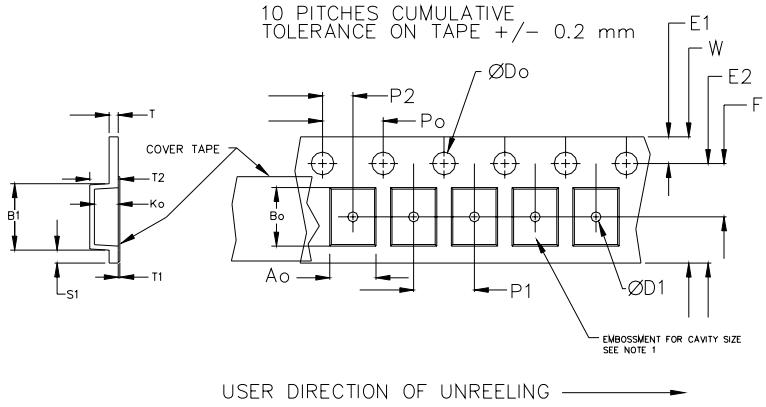
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5						
16mm		1.5			2.0 ±0.1			
24mm		1.5						

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			
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	Tape Width
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

Reel dimensions may vary from the above