

# VFH240C Series XO Hi-Rel/COTS

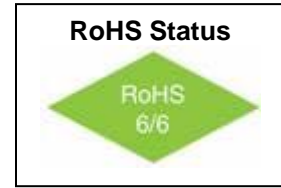
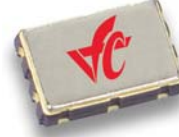
5x7mm SMD, 2.5V, 3.3V LVPECL / LVDS



## Features

### 9.5MHz to 640MHz frequency range

- Low <0.5 ps jitter over 12K-20M,
- LVPECL or LVDS output with tristate
- Small SMD package (5x7 mm)
- Stability options from ± 25ppm to ± 75ppm
- Leadless chip carrier package is hermetically sealed for superior aging and field performance
- Crystal angle controlled to +/-0.5 for excellent temperature stability
- 168 hour Class B burn-in and extensive environmental testing for best performance in rugged field environments
- Serialized test data available
- Calculated MTBF is 3.8X10<sup>6</sup> hours at 125°C



## Applications

- DSL
- Fibre channel
- Extended temperature applications

## Description:

These high reliability oscillators provide LVPECL/LVDS waveforms for applications subjected to the most stringent environmental conditions. They are mechanically robust and weigh less than 0.2 grams. This 5x7 mm SMD package has a hermetic seal, thus ensuring the integrity of each oscillator. Each oscillator is burned-in at 125°C for 168 hours, temperature cycled and centrifuged then fully tested in accordance with Table 1. Reliability tests are performed per Table 2.

**TABLE 1**

### Each unit undergoes the following:

- |  |  |
|--|--|
| 1. Stabilization Bake  | MIL-STD-883 Method 1008, Cond.,B                                   |
| 2. Temperature Cycling   | MIL-STD-883 Method 1010, Cond, B                                   |
| 3. Constant Acceleration   | MIL-STD-883 Method 2001, Cond, A                                   |
| 4. Burn-in   | MIL-STD-883 Method 1015, Cond B<br>(125°C for 168 hours with bias) |
| 5. Fine Leak   | MIL-STD-883 Method 1014, Cond. A1                                  |
| 6. Gross Leak  | MIL-STD-883 Method 1014, Cond C                                    |
| 7. Electrical Test at 25°C and temperature extremes, as follows: |  |

- |               |                       |
|---------------|-----------------------|
| A. Frequency  | F. Duty Cycle         |
| B. Current    | G. Frequency at 3.6V  |
| C. Rise Time  | H. Frequency at 3.0V  |
| D. Fall Time  | I. "Zero" logic level |
| E. Duty Cycle | J. "One" logic level  |
|               | K. Tristate           |

Test Data on each unit is available for additional cost

## MARKING SPECIFICATION

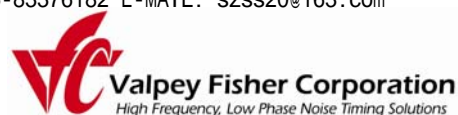
The format for the marking is:

<b>VFH240CXX</b>	XX- Model code
<b>200.000</b>	frequency in MHz
<b>. YWW Manf. Code</b>	YWW year and weeks



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**Electrical Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		9.5		640	MHz	
Frequency Stability	$\Delta F/F$	Vs. Operating Temperature			$\pm 75$ $\pm 50$ $\pm 25$	ppm	Order Code A Order Code B Order Code C
		Vs. Supply Voltage Vs. Aging / Year		$\pm 3$ $\pm 3$ $\pm 1$		ppm/V ppm ppm	First Year After first year
Operating Temperature	T		-55° -40° -55		+125° +85° +85	°C	Order Code E Order Code G Order code H
Output		LVPECL LVDS					Order Code L Order Code D
Supply Voltage	V <sub>CC</sub>		3.15 2.25	3.3 2.5	3.45 2.75	V	Order Code E Order Code G
Period Jitter RMS		77.76 MHz		2.5	4	ps	
		155.52 MHz		3	4		
		311.08 MHz		3	5		
		622.08 MHz		6	8		
Integrated Jitter RMS 12KHz to 20MHz		155.52MHz		0.4	0.5	ps	
		311.04MHz		0.4	0.5		
		622.08MHz		0.4	0.5		
Period Jitter Peak-to-Peak		77.76MHz		18	30	ps	
		155.52MHz		20	30		
		311.08MHz		25	30		
		622.08MHz		42	55		
Symmetry		(V <sub>DD</sub> -1.3) V <sub>DC</sub>	45		55	%	PECL LVDS
		1.25V <sub>DC</sub>	45		55		
Phase Noise		10Hz		-66		dBc/Hz	@77.76MHz
		100Hz		-96			
		1KHz		-124			
		10KHz		-136			
		100KHz		-132			
		10Hz		-62		dBc/Hz	@155.52MHz
		100Hz		-92			
		1KHz		-120			
		10KHz		-132			
		100KHz		-128			
		10Hz		-59		dBc/Hz	@311.04MHz
		100Hz		-86			
		1KHz		-116			
		10KHz		-129			
		100KHz		-124			
		10Hz		-48		dBc/Hz	@622.08MHz
		100Hz		-80			
		1KHz		-108			
		10KHz		-118			
		100KHz		-114			



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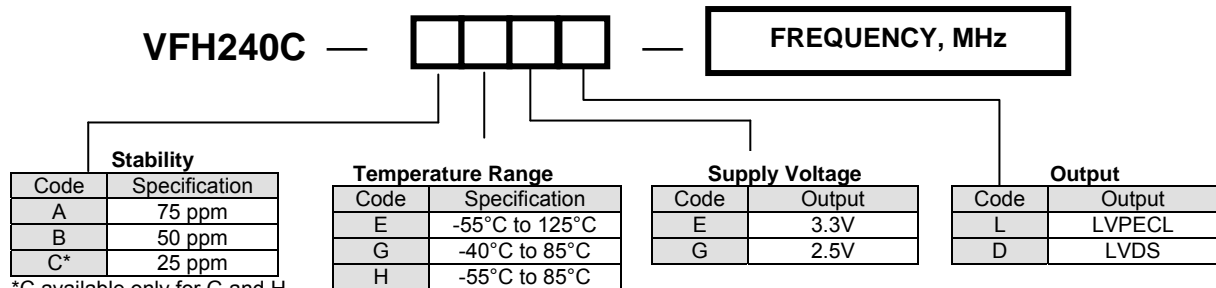
## Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note	
Input Current	I <sub>cc</sub>	38 – 100MHz			65	mA	PECL	
		100 – 300MHz			80			
		300 – 640MHz			90			
		38 – 100MHz			45	mA	LVDS	
		100 – 320MHz			60			
		320 – 640MHz			70			
Load		50 Ohm to V <sub>DD</sub> -2V (PECL) 100 Ohm (LVDS)						
Output High Voltage	V <sub>OH</sub>			V <sub>DD</sub> - 1.025 1.4	1.6	V	PECL LVDS	
Output Low Voltage	V <sub>OL</sub>		0.9	1.1	V <sub>DD</sub> - 1.620	V	PECL LVDS	
Output Differential Voltage	V <sub>OD</sub>		247	355	454	mV	LVDS	
Offset Voltage	V <sub>OS</sub>		1.125	1.2	1.375	V	LVDS	
Rise / Fall Time	T <sub>r</sub> /T <sub>f</sub>	20% to 80%		0.6 0.7	1.5 1.0	ns	PECL LVDS	
Tristate		"1": Output Enable – Pin 1 may float 2.8V min (3.3V V <sub>DD</sub> ) or 2.25V min (2.5V V <sub>DD</sub> ) "0": Tristate – Pin 1 requires 0.4V max (3.3V or 2.5V V <sub>DD</sub> )						

## Absolute Maximum Ratings

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Lead Temperature		Soldering, 10s max			260	°C	
Storage Temperature	T <sub>s</sub>				-55	°C	
Junction Temperature	T <sub>j</sub>				+125°	°C	
ESD Protection		Human Body Model			2	KV	
Thermal Resistance	R <sub>θjc</sub>	Junction to case		16		°C/Watt	

## How to Order



\*C available only for G and H temperature range



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## Environmental and Mechanical Conditions

Parameter	Specification
Shock	MIL-STD 883, Method 2002, Test Condition B (1500 peak g, 0.5 ms duration, 1/2 sine wave, 5 shocks in 6 planes)
Humidity	Resistant to 85 °R.H. at 85 °C
Vibration	MIL-STD 883, Method 2007, Test Condition A (20-2000Hz of .06:d.a. or 20 Gs, whichever is less)
Leak	MIL STD 883, Method 1014, Condition A1 and C1
Case	Ceramic with hermetic resistance-welded metal lid
Pads	Solderable gold over nickel
Marking	Epoxy ink or laser engraved
Resistance to Solvents	MIL STD 202, Method 215

**TABLE 2**  
**Reliability Test Procedures and Conditions for Quartz Crystal Oscillators**

**1. Group A**

Electrical Characteristics at -55°, (0° for '5515), 25° and 125° (70° for M5515 and 85° for M5622)  
 Frequency @ 4.5, 5.0 and 5.5 volts (for 5 volts units)  
 Symmetry (Duty Cycle)  
 Input current  
 Zero/One levels  
 Rise/Fall times  
 Physical Dimensions  
 Length/width  
 Height  
 Package finish (Corrosion, discoloration, etc.)  
 Marking placement/legibility

**2. Group B- Life Test**

1000 hrs at 125°C with bias and load

**3. Group C- All units have passed Group A testing**

**A. Subgroup 1-8 pcs.**

Standard	Condition	Description	End Point Measurement
MIL-STD-883	Method 2002 COND.B	Mechanical Shock 1500 g's, 5ms 5 drops, 6 axis	Frequency Output waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, .06" disp., 20- 20, 000-20 Hz	Frequency Output waveform
MIL-STD-883	Method 2003	Solderability	Visual 95% Coverage

**B. Subgroup 2-4 pcs (One-half of Subgroup 1)**

Standard	Condition	Description	End point Measurement
MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq.	Frequency Output waveform 15cycles
MIL-STD-202	Method 105 COND. B	Altitude, 3.44 inch Hg. 12 hrs	Frequency Output waveform
MIL-STD-883	Method 1004	Moisture resist. with 5V applied 25-65°C, 90 to 100% RH, 10 cycles	Frequency Output waveform
MIL-STD-202	Method 210 COND.A	Resistance to Solder Heat	Frequency Output waveform Immersion @350°C 3.5 sec

**C. Subgroups 3-4 pcs. (One half of Subgroup 1)**

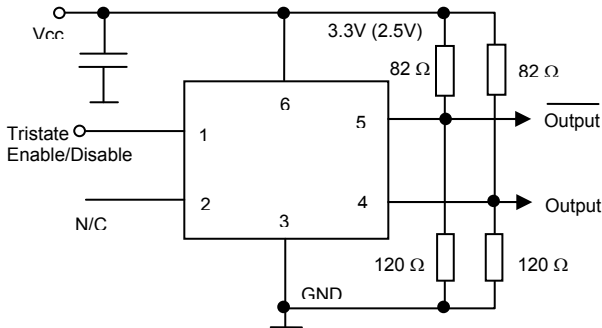
Standard	Condition	Description	End point Measurement
MIL-STD-883	Method 1009 COND. A	Salt Atmosphere 24 hrs. @ 35°C .5-3.0% Solution	Frequency Output waveform Visual
MIL-STD-883	Method 1014 COND. B	Fine Leak	Qs <5 X10 <sup>-8</sup>
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid



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Pin #	Connection
1	Tristate
2	N/C
3	Case, GND
4	Output
5	Output
6	Supply Voltage

