

# VFH230C Series

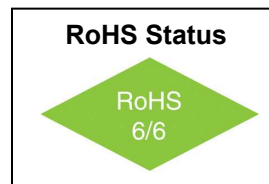
## XO Low Jitter 3.3V

### 5x7mm SMD, LVPECL / LVDS



#### Features

- 750kHz to 800MHz frequency range
- <5.0 ps RMS jitter over 12kHz – 20MHz
- LVPECL or LVDS output with tristate
- SMD package (5x7 mm)
- Stability options from  $\pm 25$ ppm to  $\pm 100$ ppm
- Leadless chip carrier package is hermetically sealed for superior aging and field performance
- Crystal angle controlled to  $\pm 0.5$  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  $3.8 \times 10^6$  hours at 125°C



#### Applications

- Optical Networking, SONET / SDH
- Gigabit Ethernet
- Fibre Channel
- DSL

#### Description

These high reliability oscillators provide LVPECL/LVDS outputs 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 part. 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.

#### Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		0.75		800	MHz	
Frequency Stability	$\Delta F/F$	Vs. Operating Temperature			$\pm 100$ $\pm 50$ $\pm 25$ $\pm 20$	ppm	See "How to Order" chart
		Vs. Supply Voltage		$\pm 1.5$	$\pm 3$	ppm/V	First Year After first year
		Vs. Aging / Year		$\pm 3$ $\pm 1$		ppm/y	
Operating Temperature	T		-55° -55°		+85° +125°	°C	Order Code A Order Code B
Output		LVPECL LVDS					See "How to Order" chart
Supply Voltage	$V_{CC}$		3.15	3.3	3.45	V	

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**Electrical Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Period Jitter RMS		19.44MHz 77.76MHz 155.52MHz 622.08MHz		5 8 9 10		ps	
Integrated Jitter RMS 12kHz to 20MHz		155.52MHz		3	5	ps	
Symmetry		$(V_{DD}-1.3) V_{DC}$ $1.25 V_{DC}$			45/55	%	PECL LVDS
Phase Noise		10Hz		-60		dBc/Hz	@19.44MHz
		100Hz		-90			
		1kHz		-112			
		10kHz		-140			
		100kHz		-140			
		10Hz		-60		dBc/Hz	@106.25MHz
		100Hz		-90			
		1kHz		-112			
		10kHz		-127			
		100kHz		-125			
		10Hz		-60		dBc/Hz	@155.52MHz
		100Hz		-90			
		1kHz		-112			
		10kHz		-125			
		100kHz		-123			
		10Hz		-60		dBc/Hz	@622.08MHz
		100Hz		-90			
		1kHz		-109			
		10kHz		-110			
		100kHz		-109			
Supply Current	$I_{CC}$	0.75 – 24MHz			25	mA	PECL
		24 – 160MHz			65		
		160 – 800MHz			100		
		0.75 – 24MHz			25	mA	LVDS
		24 – 96MHz			45		
		96 – 800MHz			80		
Load	50 Ohms to $V_{DD}-2V$ (PECL) 100 Ohms (LVDS)						
Output High Voltage	$V_{OH}$			$V_{DD}-1.025$ 1.4	1.6	V	PECL LVDS
Output Low Voltage	$V_{OL}$		0.9	1.1	$V_{DD}-1.620$	V	PECL LVDS
Output Differential Voltage	$V_{OD}$		247	355	454	mV	LVDS
Offset Voltage	$V_{OS}$		1.125	1.2	1.375	V	LVDS
Rise / Fall Time	$T_R/T_F$	20% to 80%		0.6 0.7	1.5 1.0	ns	PECL LVDS
Tristate	"1": Output enable – Pin 1 may float or 2.8V min (3.3V $V_{DD}$ ) "0": Tristate – Pin 1 requires 0.4V max (3.3V $V_{DD}$ )						

**Environmental and Mechanical Conditions**

Parameter	Specification
<b>Shock</b>	MIL-STD 883, Method 2002, Cond. B (1500 peak g, 0.5 ms duration, ½ sine wave, 5 shocks in 6 planes)
<b>Humidity</b>	Resistant to 85° R.H. at 85°C
<b>Vibration</b>	MIL-STD 883, Method 2007, Cond. A (20-2000 Hz of 0.06" d.a. or 20 Gs, whichever is less)
<b>Leak</b>	MIL-STD 883, Method 1014, Cond. A and C
<b>Case</b>	Hermetically sealed ceramic LCC
<b>Pads</b>	Solderable gold over nickel
<b>Marking</b>	Epoxy ink or laser engraved
<b>Resistance to Solvents</b>	MIL STD 202, Method 215

**Table 1**

**Each unit undergoes screening for product level B class 2 oscillators by MIL-PRF-55310**

Internal Visual	
Stabilization Bake	MIL-STD-883 Method 1008, COND. B
Temperature Cycling	MIL-STD-883 Method 1010, COND. B
Constant Acceleration	MIL-STD-883 Method 2001, COND. A
Fine Leak	MIL-STD-883 Method 1014, COND. A
Gross Leak	MIL-STD-883 Method 1014, COND. C
Burn-in	MIL-STD-883 Method 1015, COND. B (125°C for 160 hours with bias)
Electrical test at 25°C	
Current	Frequency at max V <sub>DD</sub>
Rise Time	Frequency at min V <sub>DD</sub>
Fall Time	"Zero" logic level
Duty Cycle	"One" logic level
Tristate	
Frequency at 25°C and frequency verification at temperature extremes	

Serialized test data on each unit available upon request for additional cost.

**Thermal Characteristics**

**Thermal Resistance**

From Junction to Case, R<sub>θjc</sub> 16 °C/Watt

**Surface Mount Application**

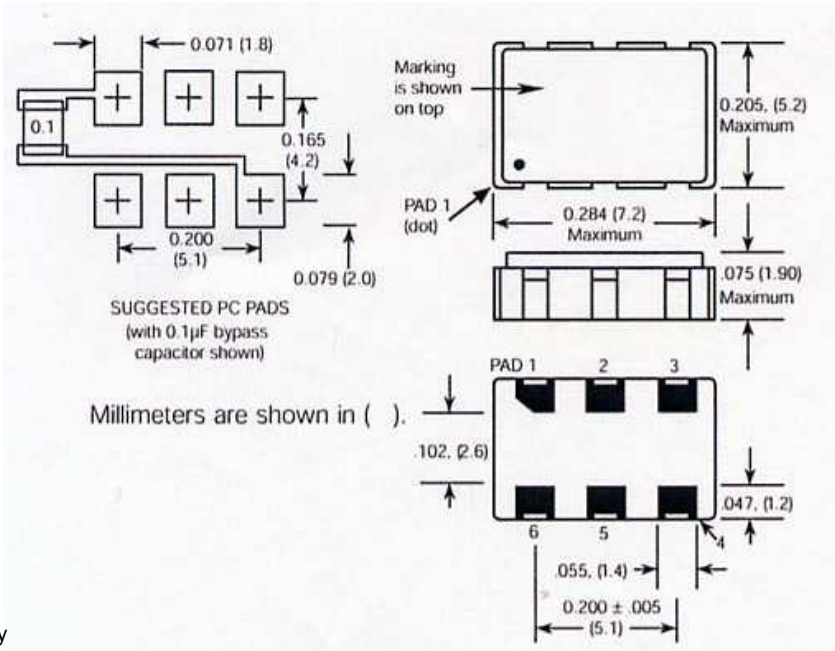
These packages are designed for reflow soldering in accordance with recommended profiles. For hand-soldering, the temperature of the iron should not exceed 400°C for three seconds.

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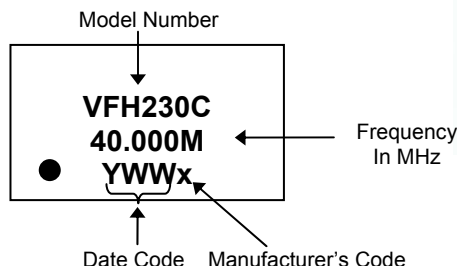


## Pin Assignments

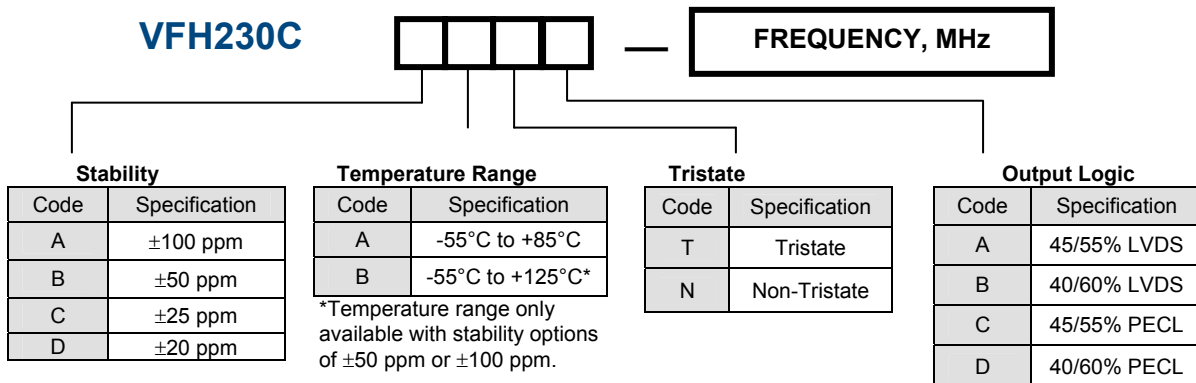
Pin #	Connection
1	Tristate
2	N/C
3	Case, GND
4	Output
5	Output
6	Supply Voltage



## Marking Specification



## How to Order



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

**1. Group A**

Electrical Characteristics at 25°C

- Frequency at nominal supply voltage and endpoints
- Input current
- Symmetry (Duty Cycle)
- Zero/One levels
- Rise/Fall times
- Frequency (verify frequency at the temperature extremes)

Physical Dimensions

- Length/width
- Height
- Package finish (Corrosion, discoloration, etc.)
- Marking placement/legibility

**2. Group B**

1000 hrs at or above 125°C, nominal voltage, proper load (sample size by MIL -PRF-55310 table 6, max. aging within 15 years requirement without catastrophic failures)

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

**A. Subgroup 1: 8 pcs.**

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End Point Measurement</u>
MIL-STD-883	Method 2002 COND.B	Mechanical Shock 1500 g's, 0.5ms 5 drops, 6 axis	Frequency Output waveform
MIL-STD-883	Method 2007 COND. A	Vibration, var. freq. 20 g's, 0.06" 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)**

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End point Measurement</u>
MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq. 15 cycles	Frequency Output waveform
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 supply voltage applied 25°C to 65°C, 90 to 100% RH, 10 cycles	Frequency Output waveform
MIL-STD-202	Method 210 COND. A	Resistance to Solder Heat Immersion @350°C 3.5 sec	Frequency Output waveform

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

<u>Standard</u>	<u>Condition</u>	<u>Description</u>	<u>End point Measurement</u>
	Storage Temp. No. Oper	24 hrs. @ -55°C 24 hrs. @ 125°C	Frequency Output waveform
MIL-STD-883	Method 1009 COND. A	Salt Atmosphere 24 hrs. @ 35°C 0.5-3.0% Solution	Frequency Output waveform Visual
MIL-STD-883	Method 1014 COND. A	Fine Leak	Qs <5 X10 <sup>-8</sup>
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid

Test data is available for additional cost.

**Recommended Reflow Soldering Profile**

