

# VFH230C Series

## Crystal Oscillators LVPECL/LVDS 3.3V



5X7 mm Surface Mount High Reliability 750 KHz to 800 MHz

These high reliability oscillators provide PECL/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.

### Features

- High speed – Low jitter LVPECL or LVDS output with tristate
- Small SMD package (5X7 mm)
- Stability options from +/-25ppm to +/-100ppm
- 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
- Tristate option available
- Serialized test data available
- Calculated MTBF is  $3.8 \times 10^6$  hours at 125°C

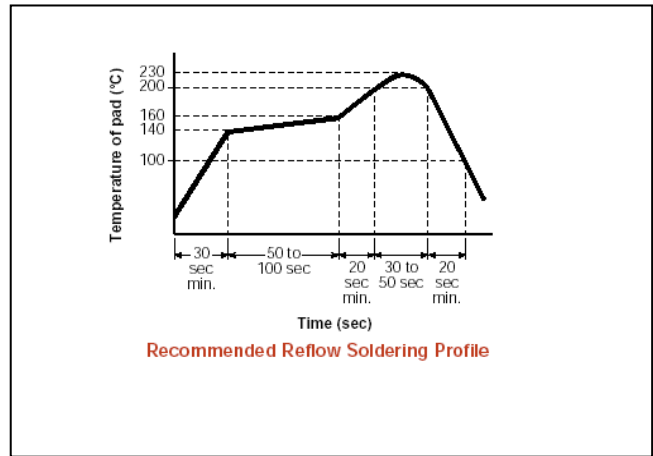
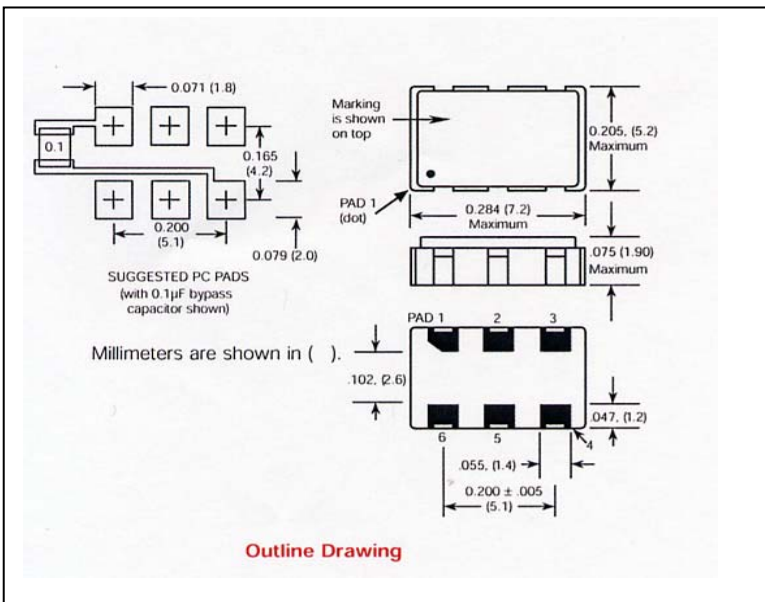
### Applications

Telecom/networking systems that require low jitter clocks

- DSL
- Gigabit Ethernet
- Fibre channel
- Optical networking
- Extended temperature applications

### Connections

PIN 1	Tristate
Pin 2	N/C
PIN 3	Ground
PIN 4	Output 1: Q
PIN 5	Output 2: Q
PIN 6	+V <sub>DD</sub>



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### ELECTRICAL SPECIFICATIONS

**Frequency Range** 750 KHz to 800 MHz

**Frequency Stability**

Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration 100, 50, 25 or 20 ppm

	MIN	TYP	MAX	UNITS
<b>Input Voltage, V<sub>DD</sub></b>	3.15	3.3	3.45	volts
<b>Jitter</b>				
Period jitter RMS				
19.44MHz		5		ps
77.76MHz		8		ps
155.52MHz		9		ps
622.08MHz		10		ps
Integrated jitter RMS				
12 KHz to 20 MHz @ 155.52MHz		3	5	ps
<b>Symmetry at (V<sub>DD</sub>-1.3) V<sub>DC</sub> (PECL)</b>				percent
<b>At (1.25 V<sub>DC</sub>) (LVDS)</b>			45/55	percent

**Aging**

First year 3 ppm  
After first year 1 ppm/yr

**Tristate**

**Input Requirements for Pin 1:**

“1”: On-Pin 1 may float or 2.8V min  
“0”: Tristate-Pin 1 requires 0.4V max

Typical Phase Noise (dBc/Hz)	10Hz	100Hz	1KHz	10KHz	100KHz
Oscillator Frequency					
19.44MHz	-60	-90	-112	-140	-140
106.25MHz	-60	-90	-112	-127	-125
155.52MHz	-60	-90	-112	-125	-123
622.08MHz	-60	-90	-109	-110	-109

**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 (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

### ENVIRONMENTAL SPECIFICATIONS

**Shock**-MIL-STD 883, Method 2002, Test Condition B (1500 peak g, 0.5 ms duration, ½ sine wave, 5 shocks in 6 planes)

**Vibration**-MIL-STD 883, Method 2007, Test Condition A (20-2000Hz of .06:d.a. or 20 Gs, whichever is less)

**Humidity**- Resistant to 85° R.H. at 85° C

### MECHANICAL SPECIFICATION

**Leak**-MIL STD 883, method 1014, condition A1 and C1

**Case**-Hermetically sealed ceramic LCC

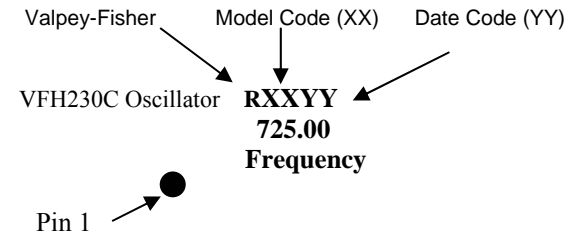
**Pads**-60 microinch of gold over nickel

**Marking**-Epoxy ink or laser engraved

**Resistance to Solvents**-MIL STD 202, Method 215

### MARKING SPECIFICATION

The format for the marking is:



# VFH230C Series

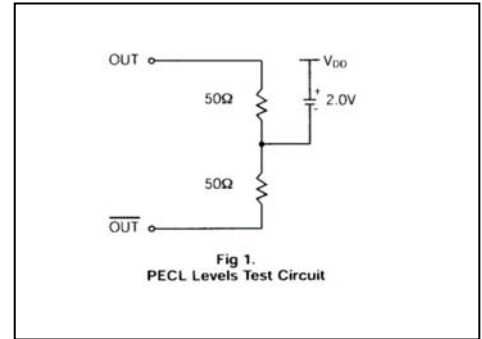
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### PECL Output Models

#### Electrical Specifications

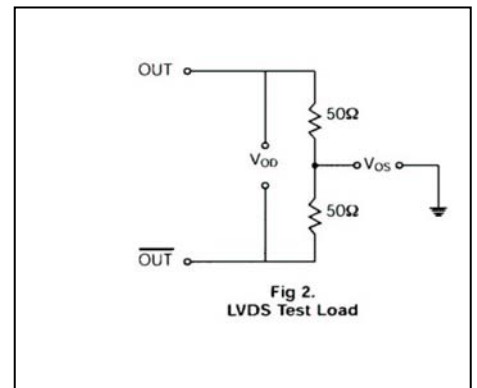
	MIN	TYP	MAX	UNITS
RL = 50 Ω to (V <sub>DD</sub> - 2V) (see figure)				
Output High Voltage, V <sub>OH</sub>		VDD-1.025		V
Output Low Voltage, V <sub>OL</sub>			VDD-1.620	V
<b>Input Current, PECL</b>				
0.75 – 24 MHz			25	mA
24 – 160 MHz			65	mA
160 – 800 MHz			100	mA
<b>Switching Characteristics</b>				
Clock Rise Time, tr @20/80%		0.3	0.35	ns
Clock Fall Time, tf @80/20%		0.3	0.35	ns



### LVDS Output Models

#### Electrical Specifications

	MIN	TYP	MAX	UNITS
RL = 100 Ω (see figure)				
Output Differential Voltage, V <sub>OD</sub>	247	355	454	mV
Output High Voltage, V <sub>OH</sub>		1.4	1.6	V
Output Low Voltage, V <sub>OL</sub>	0.9	1.1		V
Offset Voltage, V <sub>OS</sub>	1.125	1.2	1.375	V
<b>Input Current, LVDS</b>				
0.75 – 24 MHz			25	mA
24 – 96 MHz			45	mA
96 – 800 MHz			80	mA
<b>Switching Characteristics</b>				
Differential Clock Rise Time, tr		0.3	0.4	ns
Differential Clock Fall Time, tf		0.3	0.4	ns



### Create a Part Number

VFH230



Frequency Stability

Temperature Range

Tristate

Output Logic

Code	Specification
A	+/-100 ppm
B	+/-50 ppm
C	+/-25 ppm

Code	Specification
A	-55 to +85°C
B	-55 to +125°C*

\* Temperature range only available in with stability options of 50 or 100 ppm

T	Tristate
N	Non Tristate

Code	Specification
A	45/55% LVDS
B	40/60% LVDS
C	45/55% PECL
D	40/60% PECL



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**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.**

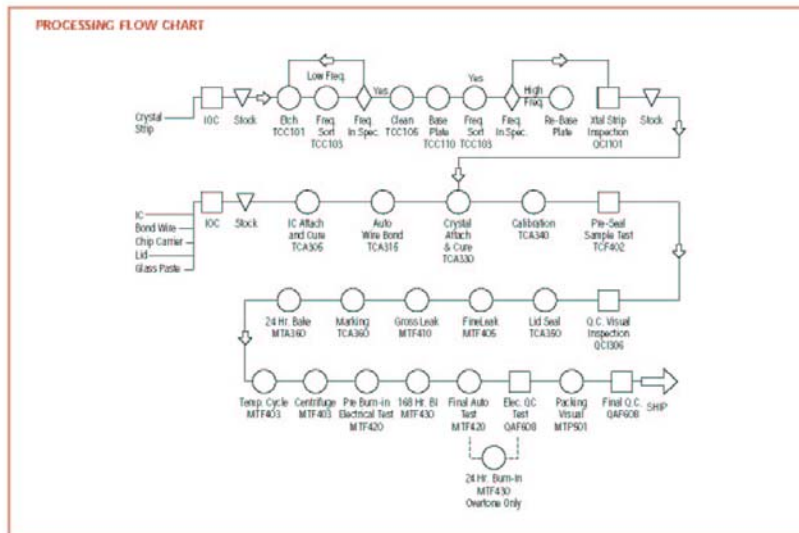
Standard	Condition	Description	End Point Measurement
MIL-STD-883	Method 2002 COND.B	Mechanical Shock	Frequency Output waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, .06" disp., 20-20, 000-20 Hz	Frequency Output waveform
MIL-STD-883	Method 2003	Solderability	Visual 95% Coverage

**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. 15cycles	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 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 Immersion @350°C 3.5 sec	Frequency Output waveform

**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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