VFH240C Series
XO Hi-Rel/COTS
5x7mm SMD, 2.5V, 3.3V LVPECL / LVDS

Valpey Fisher Corporation
High Frequency, Low Phase Noise Timing Solutions

Features
- High speed – low jitter 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
- Tristate option available
- Serialized test data available
- Calculated MTBF is $3.8X10^6$ hours at 125°C

RoHS Status

RoHS 6/6

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 (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

Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		38		640	MHz	
Frequency Stability	ΔF/F	Vs. Operating Temperature			± 75 ± 50 ± 25	ppm	*Order Code A* *Order Code B* *Order Code C*
		Vs. Supply Voltage Vs. Aging / Year		± 3 ± 3 ±1		ppm/V ppm ppm	First Year After first year
Operating Temperature	T		-55° -40°		+125° +85°	°C	*Order Code D* *Order Code G*
Output		LVPECL LVDS					*Order Code L* *Order Code D*
Supply Voltage	Vcc		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 155.52 MHz 311.08 MHz 622.08 MHz		2.5 3 3 6	4 4 5 8	ps	
Integrated Jitter RMS **12KHz to 20MHz**		155.52MHz 311.04MHz 622.08MHz		0.4 0.4 0.4	0.5 0.5 0.5	ps	
Period Jitter Peak-to-Peak		77.76MHz 155.52MHz 311.08MHz 622.08MHz		18 20 25 42	30 30 30 55	ps	
Symmetry		(V_{DD}-1.3) V_{DC} 1.25V_{DC}	45 45		55 55	%	PECL LVDS
Phase Noise		10Hz 100Hz 1KHz 10KHz 100KHz		-66 -96 -124 -136 -132		dBc/Hz	@77.76MHz
		10Hz 100Hz 1KHz 10KHz 100KHz		-62 -92 -120 -132 -128		dBc/Hz	@155.52MHz
		10Hz 100Hz 1KHz 10KHz 100KHz		-59 -86 -116 -129 -124		dBc/Hz	@311.04MHz
		10Hz 100Hz 1KHz 10KHz 100KHz		-48 -80 -108 -118 -114		dBc/Hz	@622.08MHz

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Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Input Current	Icc	38 – 100MHz 100 – 300MHz 300 – 640MHz			65 80 90	mA	PECL
		38 – 100MHz 100 – 320MHz 320 – 640MHz			45 60 70	mA	LVDS
Load	50 Ohm to V_{DD}-2V (PECL) 100 Ohm (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	Tr/Tf	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_{DD}) or 2.25V min (2.5V V_{DD}) "0": Tristate – Pin 1 requires 0.4V max (3.3V or 2.5V V_{DD})						

Absolute Maximum Ratings

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Lead Temperature		Soldering, 10s max			260	°C	
Storage Temperature	Ts				-55	°C	
Junction Temperature	Tj				+125°	°C	
ESD Protection		Human Body Model			2	KV	
Thermal Resistance	Rθjc	Junction to case		16		°C/Watt	

How to Order

VFH240C — □□□□ — **FREQUENCY, MHz**

Stability

Code	Specification
A	75 ppm
B	50 ppm
C*	25 ppm

*C available only for G temperature range

Temperature Range

Code	Specification
E	-55°C to 125°C
G	-40°C to 85°C

Supply Voltage

Code	Output
E	3.3V
G	2.5V

Output

Code	Output
L	LVPECL
D	LVDS

Environmental and Mechanical Conditions

Parameter	Specification
Shock	MIL-STD 883, Method 2002, Test Condition B (1500 peak g, 0.5 ms duration, ½ sine wave, 5 shocks in 6 planes)
Humidity	Resistant to 85 ºR.H. at 85 ºC
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 reistance-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.

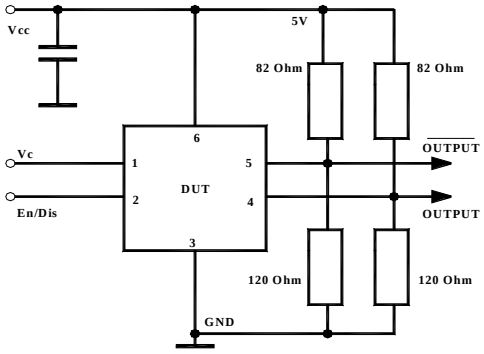
Standard	Condition	Description	End Point Measurement
MIL-STD-883	Method 2002 COND.B	Mechanical Shock 1500 g's, 5ms 5 drops, 6 axis	Frequency Output waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, .06" disp., 20-20, 000-20 Hz	Frequency Output waveform
MIL-STD-883	Method 2003	Solderability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

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

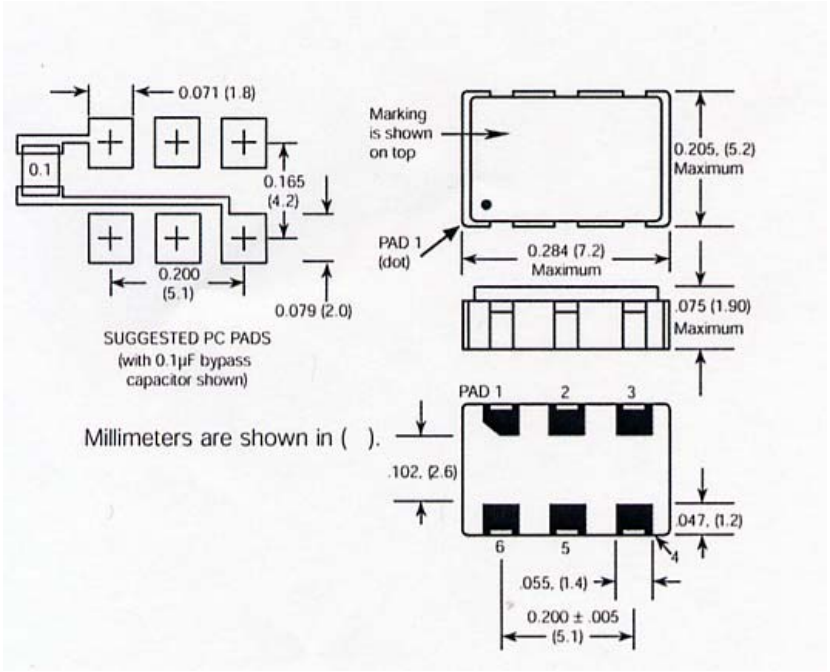
Standard	Condition	Description	End point Measurement
MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq.	Frequency Output waveform 15cycles
MIL-STD-202	Method 105 COND. B	Altitude, 3.44 inch Hg. 12 hrs	Frequency Output waveform
MIL-STD-883	Method 1004	Moisture resist. with 5V applied 25-65°C,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

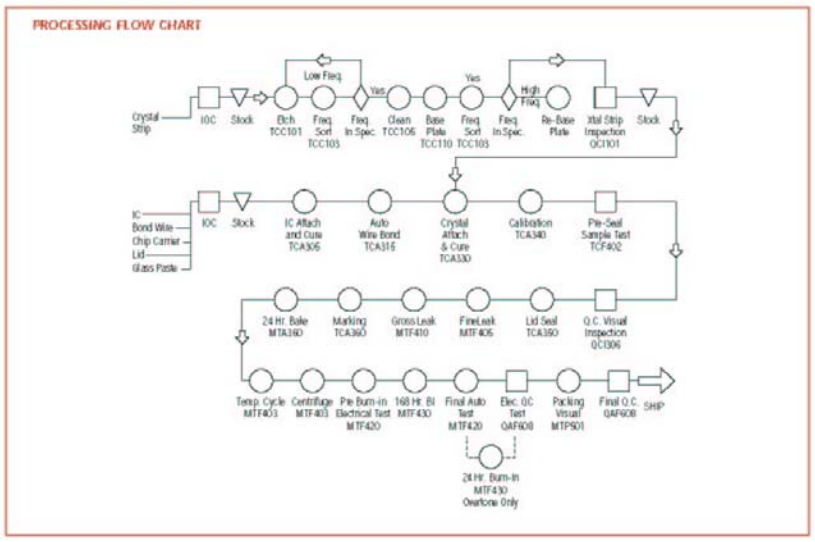
C. Subgroups 3-4 pcs. (One half of Subgroup 1)

Standard	Condition	Description	End point Measurement
	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 .5-3.0% Solution	Frequency Output waveform Visual
MIL-STD-883	Method 1014 COND. B	Fine Leak	Qs <5 X10^{-8}
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid



Pin #	Connection
1	Tristate
2	N/C
3	Case, GND
4	Output
5	$\overline{\text{Output}}$
6	Supply Voltage





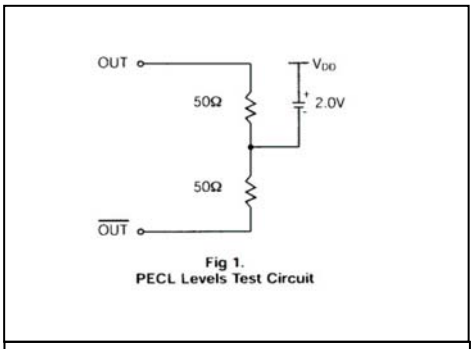


Fig 1.
PECL Levels Test Circuit

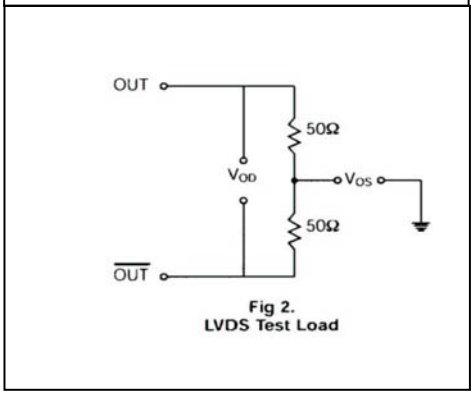


Fig 2.
LVDS Test Load