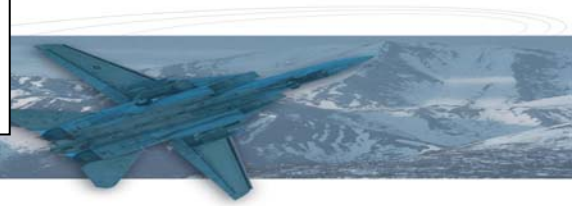


**VFH2121 thru VFH2124; VFH2221 thru VFH2224
VFH2521 thru VFH2524; VFH2621 thru VFH2624
HCMOS/TTL 5V, 3.3V
Low Jitter Surface Mount Oscillators**



High Reliability Product Specification

XO

Features

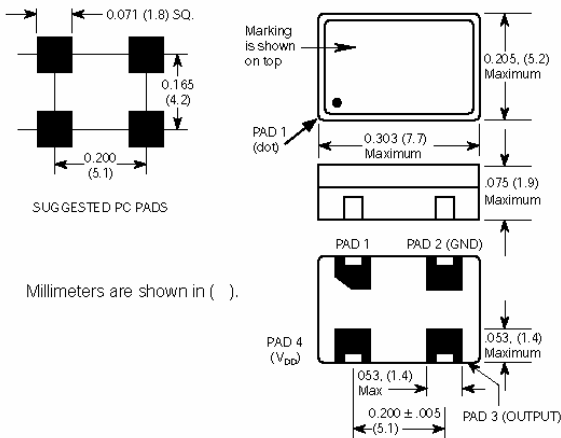
- Leadless chip carrier package is hermetically sealed for superior aging and field performance
- Crystal angle controlled by +/-0.5 minutes for excellent temperature stability
- 168 hour Class B burn-in and extensive environmental testing for best performance in rugged field environments
- Guaranteed start-up with a ramping DC supply
- Start-up time less than 5 ms, typical
- Low jitter of 6ps RMS max ensures stable data transmission
- Tristate option available
- Calculated MTBF is 3.8×10^6 hours at 125°C

Description

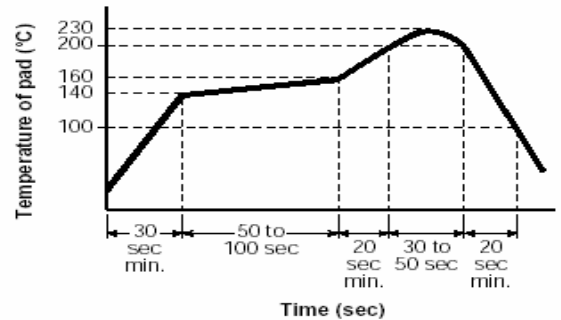
These high reliability oscillators provide HCMOS clock waveforms for applications subjected to the most stringent environmental conditions. They are mechanically robust and weigh less than 0.2 grams. This 5X7mm SMD package has a hermetic seal, thus ensuring the integrity of each oscillator. Each oscillator 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. The calculated MTBF is 3.8×10^6 hours at 125°C.

Connections

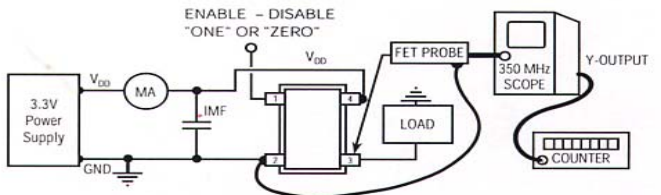
	Non-Tristate Models VFH2121, 2122, 2123, 2124 VFH2521, 2522, 2523, 2524	Tristate Models VFH2221, 2222, 2223, 2224 VFH2621, 2622, 2623, 2624
1.	Not Used	Floating or "1": Oscillator runs Ground or "0": Disable or Tristate
2.	Ground and Case	
3.	Output	
4.	V _{DD}	



Outline Drawing



Recommended Reflow Soldering Profile



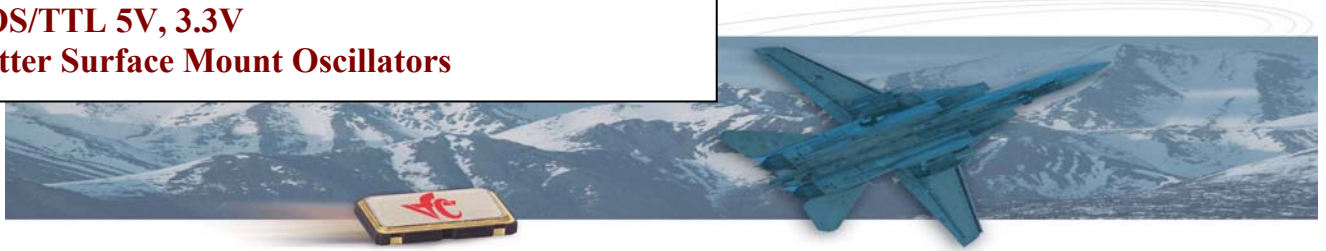
To adapt Fet probe to receptacle use Tektronix Part #103-0164-00

To connect output to scope use Tektronix Part #131-0258-00 (receptacle)

TEST CIRCUIT



**VFH2121 thru VFH2124; VFH2221 thru VFH2224
VFH2521 thru VFH2524; VFH2621 thru VFH2624
HCMOS/TTL 5V, 3.3V
Low Jitter Surface Mount Oscillators**



ELECTRICAL SPECIFICATIONS

5.0 Volt Supply Models

Frequency 1 MHz to 105 MHz
Frequency Stability Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

	MIN	TYP	MAX	UNITS
Input Voltage, V_{DD}	4.5	5.0	5.5	volts
Input Current			45	mA
Output Levels				
“0” Level, sinking 16 mA			0.4	volts
“1” Level, sourcing 8 mA V _{DD} -4				volts
Rise and Fall Time				
CMOS, 15pf, from 0.4 to (V _{DD} -0.4) V, T _R /T _F			4	ns
Jitter				
From positive edge to positive edge			5	psRMS
Symmetry				
CMOS @50% V _{DD}			45/55	percent
Aging				
First year		3		ppm
After first year		1		ppm/yr
Input Requirements for Pin 1:				
“1”: On-Pin 1 may float or 2.4V min., sourcing 400 microAmp				
“0”: Disable or Tristate-Pin 1 requires 0.4V, sinking 400 microAmp				

ENVIRONMENTAL SPECIFICATIONS (All Models)

Shock-1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane
Vibration-10-2000 Hz of .06” d.a. or 20Gs, whichever is less
Humidity-Resistant to 85° R.H. at 85°C
Storage Temperature-55° to +150°C

THERMAL CHARACTERISTICS

Thermal Resistance
 From Junction to Case, R_{θjc} 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

ELECTRICAL SPECIFICATIONS

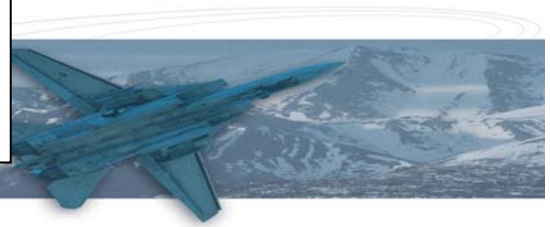
3.3 Volt Supply Models

Frequency 500 KHz to 125MHz
Frequency Stability Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

	MIN	TYP	MAX	UNITS
Input Voltage, V_{DD}	3.0	3.3	3.6	volts
Input Current				
3 M to 10 MHz			4.5	ma
10.1 to 20 MHz			6.0	ma
20.1 to 30 MHz			15.5	ma
30.1 to 50 MHz			20.0	ma
50.1 to 67 MHz			30.0	ma
67.1 tp 125 MHz			40.0	ma
Output Levels				
“0” Level, sinking 16ma			0.4	volts
“1” Level CMOS, sourcing 8 ma V _{DD} -4				volts
Rise and Fall Time				
CMOS, 15 pf, 20 to 80% (<60 MHz)	3.0		4	ns
CMOS, 30 pf, 20 to 80% (<60 MHz)	4.0		5	ns
CMOS, 50 pf, 20 to 80% (<60 MHz)	6.0		8	ns
CMOS, 15 pf, 20 to 80% (>60 MHz)	2.0	2.5		ns
CMOS, 30 pf, 20 to 80% (>60 MHz)	3.0	4.5		ns
Jitter				
			6	ps RMS
Symmetry				
CMOS @50% V _{DD}	48/52	45/55		percent
Aging				
First year		3		ppm
After first year		1		ppm/yr
Input Requirements for Pin 1:				
“1”: On-Pin 1 may float or 2.4V min., sourcing 400 microAmp				
“0”: Disable or Tristate-Pin 1 requires 0.4V, sinking 400 microAmp				



**VFH2121 thru VFH2124; VFH2221 thru VFH2224
VFH2521 thru VFH2524; VFH2621 thru VFH2624
HCMOS/TTL 5V, 3.3V
Low Jitter Surface Mount Oscillators**



Model 5V	Model 3.3V	Frequency Stability	Temperature	Option
VFH2521	VFH2121	+/-0.0025% (+/-25ppm)	-55 to +85°C	Non-Tristate
VFH2522	VFH2122	+/-0.005% (+/-50ppm)	-55 to +85°C	Non-Tristate
VFH2523	VFH2123	+/-0.0075% (+/-75ppm)	-55 to +125°C	Non-Tristate
VFH2524	VFH2124	+/-0.005% (+/-50ppm)	-55 to +125°C	Non-Tristate
VFH2621	VFH2221	+/-0.0025% (+/-25ppm)	-55 to +85°C	Tristate
VFH2622	VFH2222	+/-0.005% (+/-50ppm)	-55 to +85°C	Tristate
VFH2623	VFH2223	+/-0.0075% (+/-75ppm)	-55 to +125°C	Tristate
VFH2624	VFH2224	+/-0.005% (+/-50ppm)	-55 to +125°C	Tristate

MECHANICAL SPECIFICATIONS

Leak- MIL STD 883, Method 1014, condition A1

Case- Hermetically sealed ceramic LCC

Pads- 15 Microinch of gold over nickel

Marking- Epoxy ink or laser engraved

Resistance to Solvents- MIL STD 202, Method 215

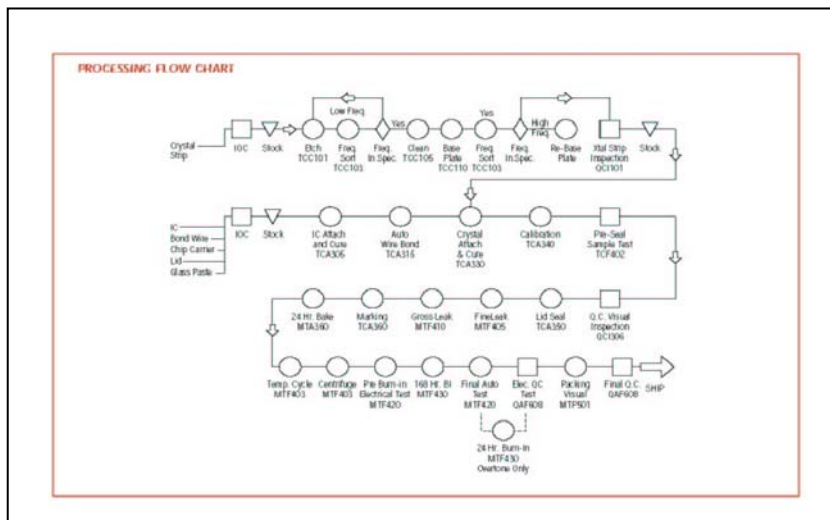
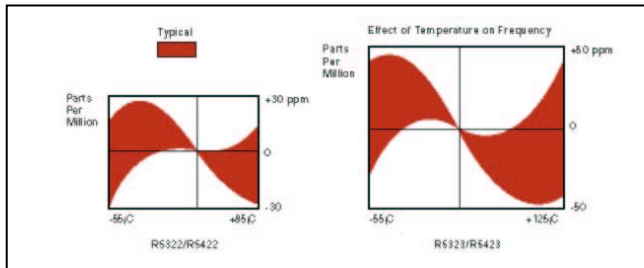
Table 1

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. Frequency at max V _{DD} |
| B. Current | G. Frequency at min V _{DD} |
| C. Rise Time | H. "Zero" logic level |
| D. Fall Time | I. "One" logic level |
| E. Duty Cycle | J. Tristate |

Test Data on each unit is available for additional cost



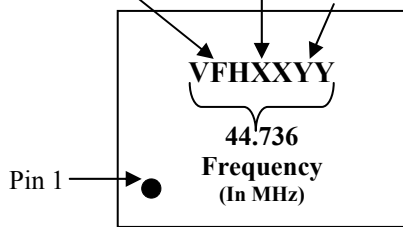
VFH2121 thru VFH2124; VFH2221 thru VFH2224
VFH2521 thru VFH2524; VFH2621 thru VFH2624
HCMOS/TTL 5V, 3.3V
Low Jitter Surface Mount Oscillators



MARKING SPECIFICATION

The format for the marking is:

Valpey-Fisher Model Number (XX)
Hi-Rel Oscillator Date Code (YY)



HOW TO ORDER

For Part Number, put model type before model number, and add frequency in MHz, for example:

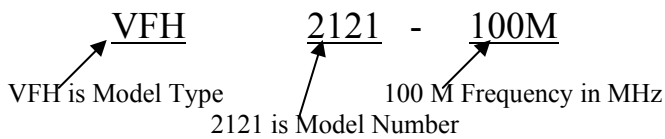


TABLE 2- RELIABILITY TEST PROCEDURE AND CONDITIONS FOR QUARTZ CRYSTAL OSCILLATORS

I. Group A

Electrical Characteristics at -55°, 25° and 125 (85° for R5422)

Frequency @ 3.0, 3.3 and 3.6 volts or 4.5, 5.0 and 5.5 volts

Symmetry (Duty Cycle)

Input current

Zero/One levels

Rise/Fall times

Physical Dimensions

Length/width

Height

Seal (Visual)

Package finish (Corrosion, discoloration, etc.)

Marking placement/legibility

II. Group B- Life Test

1000 hrs aging at or above 125°C. 5V or 3.3V V_{DD}, with proper load

III. 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)

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 5 OR 3.3V 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
	Storage Temp.	24 hrs. @ -55°C	Frequency
	No. Oper	24 hrs. @ 125°C	Output waveform
MIL-STD-883	Method 1009 COND. A	Salt Atmosphere 24 hrs. @ 35°C .5-3.0% Solution	Frequency Output waveform
MIL-STD-883	Method 1014 COND. B	Fine Leak	Visual Qs <5 X10 ⁻⁸
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid

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