

VFH5070

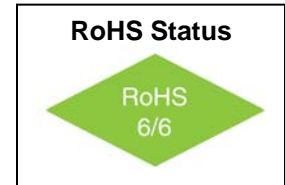
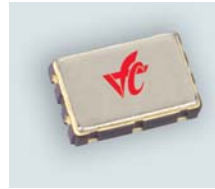
VCXO High Reliability

5x7mm SMD, CMOS



Features

- 1MHz to 80MHz frequency range
- -55°C to +125°C operating temperature range
- <0.2ps RMS Jitter over 12kHz to 20MHz
- APR min ± 100 ppm
- 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 3.8×10^6 hours



Applications

- Industrial
- Military
- High Temperature Commercial

Description:

These high reliability oscillators provide CMOS 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.

Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Frequency Range	F		1		80	MHz	
Frequency Stability	$\Delta F/F$	Includes operating temperature, change of input voltage, change of load, shock and vibration		± 50		ppm	-55°C to +125°C
Aging		First Year After First Year		3 1		ppm ppm	
Pull Range	APR	Vc 1.65 \pm 1.65V	± 100	± 110		ppm	3.3V
		Vc 2.5 \pm 2.5V	± 100	± 110			5.0V
Operating Temperature	T		-55 -55		+125 +85	°C	See "How to Order"



VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V _{CC}		3.0 4.5	3.3 5.0	3.6 5.5	V	
Supply Current	I _{CC}		3.0		5.0	mA	CL=15 pF V _{DD} = 3.6V
			4.0		7.0		CL=15 pF V _{DD} = 5.5V
Current Consumption	I _{DDD}	CL=15pF, V _{DD} =3.6V, 5.5V OE=0V, F0=27MHz		1	2	mA	@ output disable
Output Off Leak	I _O	OE=0V			10	μA	@ output disable
“H” Input Current	I _{IH}	V _{IN} =V _{DD}			1	μA	
“L” Input Current	I _{IL}	V _{IN} =V _{SS}		1.3	10	μA	
“H” Output Voltage	V _{OH}	I _{OH} =-5mA	V _{DD} - 0.4			V	I _{OH} =-3mA
“L” Output Voltage	V _{OL}	I _{OL} =-5mA			0.4	V	I _{OH} =3mA
Rise & Fall Times		CMOS, 15pF	3.0		6.0	ns	+125°C
RMS Jitter 12KHz to 20MHz	1σ			<0.2		ps	
Phase Noise		10Hz 100Hz 1kHz 10kHz 100kHz 1MHz		-65 -94 -120 -142 -155 -159		dBc/Hz	@ 50MHz
Input Impedance	V _C Impedance	Pad 1, V _C	5* 100			MOhm KOhm	Order Code H * Order Code B
Start-up Time	T _s				5	ms	
Duty Cycle		CMOS @50% V _{DD}		48/52	45/55	%	
Control Voltage	V _C		0		3.3	V	3.3V
			0		5.0		5.0V
Modulation Bandwidth	F _C		15	20		kHz	3.3V
			15	20			5.0V
Pulling Linearity	F _{LIN}			10	15	%	
Tristate	Input HIGH (>2.5V) or floating: Input LOW (<0.5V):		ACTIVE HIGH IMPEDANCE				

*Available for 3.3V only.



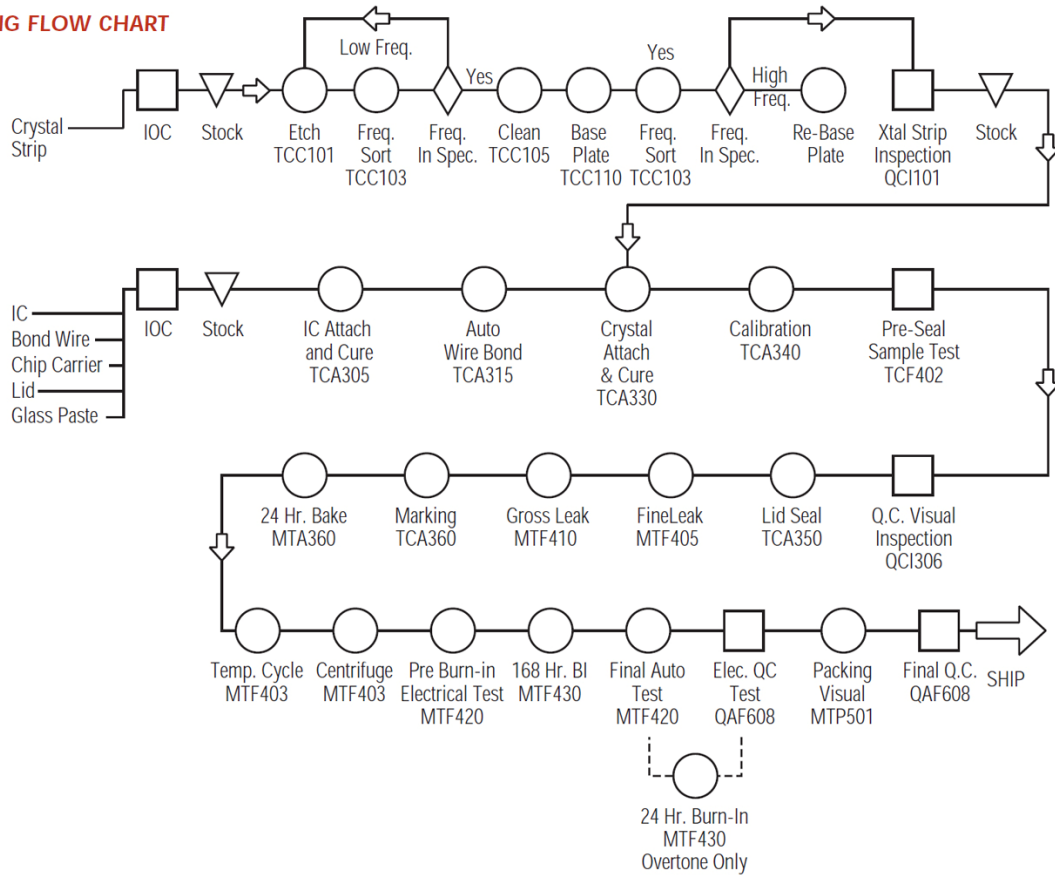
VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



PROCESSING FLOW CHART



VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



Absolute Maximum Rating

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V _{DD}		V _{SS} -0.5		7	V	
Input Voltage	V _{IN}	All Input Pin	V _{SS} -0.5		V _{DD} +0.5	V	
Output Voltage	V _{OUT}		V _{SS} -0.5		V _{DD} +0.5	V	
Power Dissipation	I _{OUT}				30	mA	
ESD		MM		±200			
		HBM		±2000			

Environmental and Mechanical Conditions

Parameter	Specification
Shock	1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane
Vibration	10-2000 Hz of 0.06" d.a. or 20Gs, whichever is less
Humidity	Resistant to 85° R.H. at 85°C
Leak	Per MIL-STD-883, Method 1014, Cond. A1 and Cond. C
Case	Hermetically sealed ceramic LCC
Pads	39 microinch of gold over nickel
Resistance to Solvents	Per MIL-STD-202, Method 215
Marking	Epoxy ink or laser engraved



VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



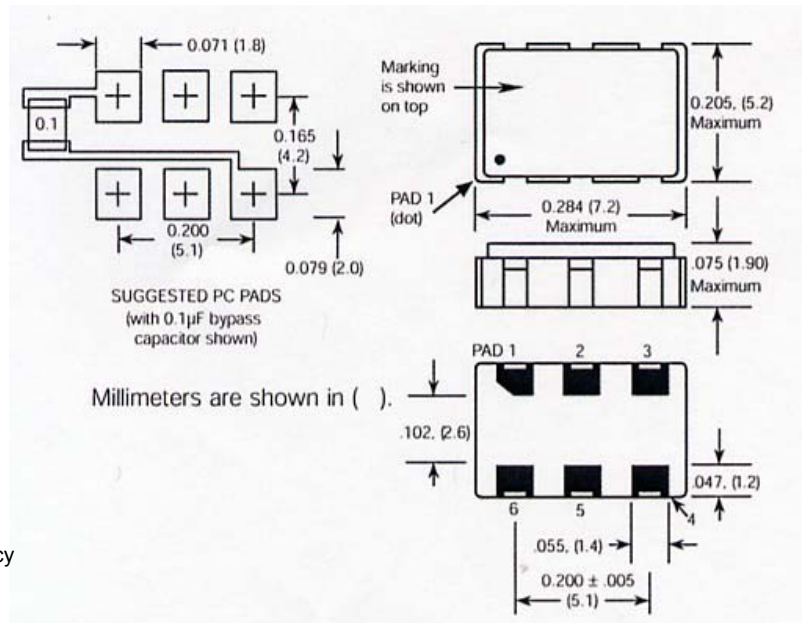
How to Order:

VFH5070 - [E] [L] [] - FREQUENCY

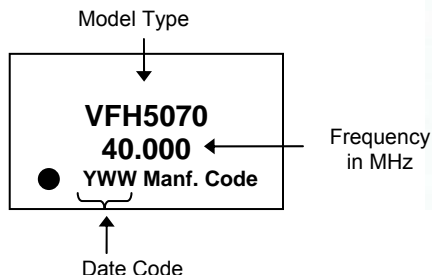
Voltage		Temperature Range		Input Impedance	
Code	Specification	Code	Specification	Code	Specification
D	5.0V	L	-55°C to +125°C	H	5MΩ*
E	3.3V	H	-55°C to +85°C	B	100KΩ

*3.3V only

Pin #	Connections
1	Vc
2	Tristate
3	Ground, Case
4	Output
5	N/C
6	Vcc



Marking Specification



VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



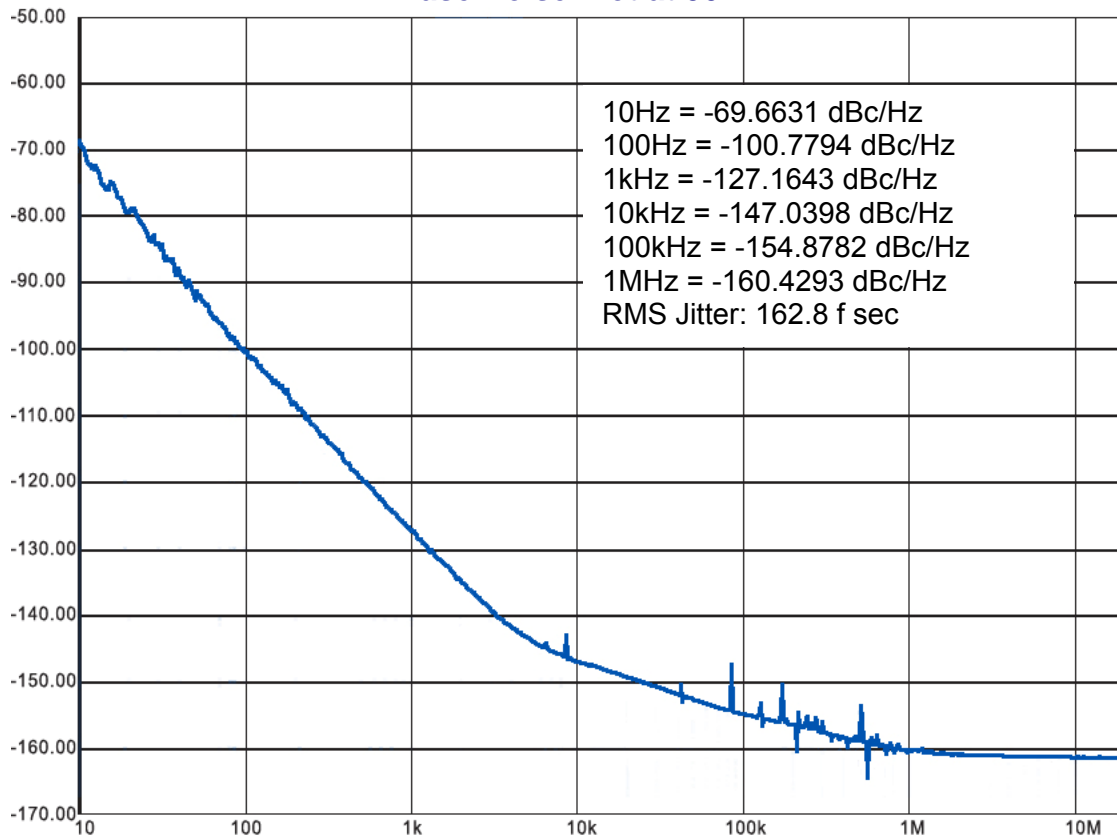
Table 1

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 max V_{DD} |
| C. Rise Time | H. Frequency at min V_{DD} |
| D. Fall Time | I. "Zero" logic level |
| E. Duty Cycle | J. Tristate |

Test Data on each unit is available for additional cost

Phase Noise Plot at 50MHz



VFH5070

VCXO High Reliability

5x7mm SMD, CMOS



TABLE 2
Valpey Fisher Qualification Test Procedures and Conditions for Quartz Crystal Oscillators

1. Group A

- Electrical Characteristics at -55°, +25° and +125 ° C
 - Frequency @ + 3.3 and +5.0 volts
 - 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 1-12pcs.

<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, 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: 6 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.	Frequency Output waveform 15 cycles
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 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	Frequency Output waveform Immersion @350°C 3.5 sec

C. Subgroups 3: 6 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 .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

