

**OR-XBFXXXX-X Series  
HF/UHF SMD TCVCXO  
Ultra Low Phase Noise**

Rev. N

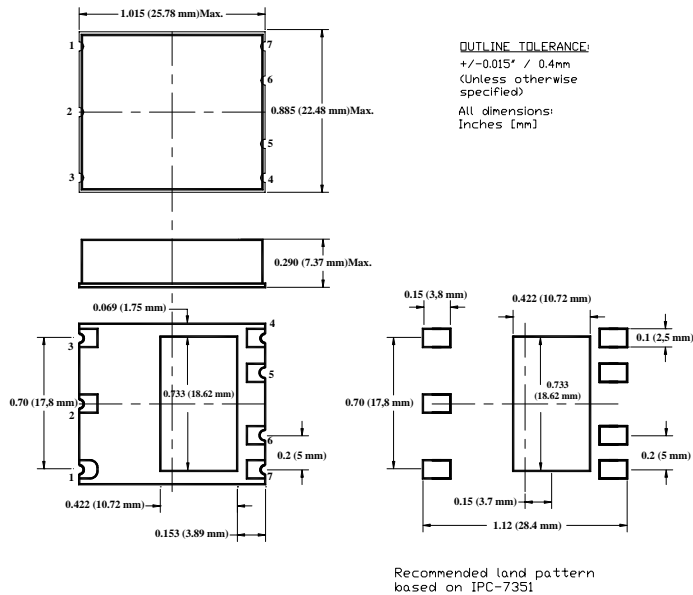
**Description:** The OR-XBFXXXX Series of SMD temperature compensated, voltage controlled crystal oscillators (TCVCXO), provides High and Ultra High Frequency with excellent temperature stability, extremely low phase noise and jitter with a variety of different output types in a small surface mount FR4 based package.

**Features**

- **Small, Low Profile SMD Package**
- **Very Low Phase Jitter and Phase Noise**
- **Excellent Frequency Stability**
- **Ultra High Frequency – up to 2.0 GHz**
- **CMOS, Sine-Wave, Differential PECL or LVDS outputs available**
- **Stratum3 available**
- **COTS/Dual use**

Note: For frequency stability over temperature  $\pm 1$ ppm and tighter, the package height may be 10mm or 12.5mm

NEL recommends connecting the large pad located between the general signal pads to ground for heat transfer and improved RF grounding.



**Creating a Part Number**

**OR - X BF X X X X - X - FREQ**

**Package Code**  
OR 7 Pad 25x22x7mm SMD

**Supply Voltage**

Code	Specification
0	5V $\pm 5\%$
A	3.3V $\pm 5\%$

**TCXO/TCVCXO Option**

Code	Specification
X	No V. Control
V	W/ V. Control

Not all combinations available – consult factory

**Output Type**

Code	Specification
C	CMOS
P	PECL
S	Sine-wave
L	LVDS

**Temp. Frequency Stability**

Code	Specification
1	$\pm 1.0$ ppm
2	$\pm 2.5$ ppm
3	$\pm 0.28$ ppm
9	Customer Specific

**Environmental**

Code	Specification
L	Contains a level of lead that is in excess of RoHS directive and is not designed for reflow
R	RoHS compliant

**Temperature Range**

Code	Specification
E	-10°C to 60°C
B	0°C to 70°C
C	-20°C to 70°C
D	-40°C to 85°C

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<i>Specifications</i> <sup>(1)</sup>							
Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
<i>Electrical</i>							
Frequency Range	F	CMOS LVDS PECL, Sine-wave	30 30 30		200 1,000 2,000	MHz	
Input Voltage	Vcc		3.135 4.75	3.30 5.0	3.465 5.25	V	A 0
Input Current	Icc	CMOS, Sine PECL, Sine, LVDS			30 100 140	mA	@100MHz, 3.3V @622MHz, 3.3V @1000MHz, 3.3V
Frequency Stab.	ΔF/F	Overall, available			±4.6		20 years
Frequency Stability	ΔF/F	vs. Temperature vs. Vcc aging		±0.5 ±0.1 ±1 ±3.5	±1	ppm ppm/V ppm/year ppm	See chart  First Year 10 years
Calibration	ΔF/F	As shipped, 25°C		±0.5	±1	ppm	
Load		CMOS Sine PECL LVDS	15pf/10K Ohm Internally AC-coupled 50 Ohm 50 Ohm to Vcc-2V or Thevenin equivalent 100 Ohm between the outputs receiving end				
Duty cycle		@50%	45	50	55	%	CMOS, PECL, LVDS
Rise/Fall time	Tr/Tf	20 to 80 %		3 0.35		ns	CMOS PECL, LVDS
Logic "1" level	Voh	CMOS	0.9Vcc			V	
Logic "0" level	Vol	CMOS			0.1Vcc	V	
Logic "1" level	Voh	PECL	Vcc-0.96		Vcc-0.81	V	100K available
Logic "0" level	Vol	PECL	Vcc-1.85		Vcc-1.65	V	100K available
Output Levels, LVDS	Vod	Differential Amplitude	247	330	454	mV	
		Amplitude error			50	mV	
	Vof	Offset Voltage	1.125	1.25	1.375	V	
		Offset Voltage Error			50	mV	
Output power <sup>(2)</sup>	P	Sine-wave Into 50 Ohms <math>\leq 400\text{MHz}</math>	0 4	3 7		dBm	3.3V 5.0V
		>400MHz	-5 0	0 5	5		3.3V 5.0V
Start up time	Ts			2	10	ms	
Phase Jitter		1σ		0.4 0.2	1 0.4	ps	100Hz to 20MHz 12KHz to 20MHz
Subharmonics		PECL, LVDS, Sine PECL, Sine CMOS, Sine		-45 -40	-40 -35 None	dBc	F>250MHz F>1,000MHz F<250MHz
Spurious					-60	dBc	
Harmonics		Sine-wave		-30	-25 -15	dBc	F<1,000MHz F≥1,000MHz
SSB Phase Noise		@10Hz @100 Hz @1 KHz @10 KHz @100 KHz		-80 -110 -140 -155 -160		dBc/Hz	@100MHz
SSB Phase Noise		@10Hz @100 Hz @1 KHz @10 KHz @100 KHz		-60/-60 -90/-90 -120/-120 -140/-145 -145/-150		dBc/Hz	@622MHz; PECL, LVDS/Sine
SSB Phase Noise		@10Hz @100 Hz @1 KHz @10 KHz @100 KHz		-60 -90 -120 -130 -135		dBc/Hz	@1,000MHz



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*Electrical* (continued)

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Input Impedance				> 10KOhm			
Control voltage	Vc		0		3.3	V	
Modulation bandwidth	MB		2 Hz				Contact Factory for wider MB
Deviation		Vc=0V to 3.3V,25°C	±5	±7		ppm	

- Note 1) All parameters, unless otherwise specified, are at nominal conditions, ie: T=25°C, Nominal Vcc & Nominal Load  
 2) Higher output power available – consult factory (current consumption may increase)

*Absolute Maximum Ratings*

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Input Break Down Voltage	Vcc		-0.5		5.5	V	
Storage temp.	Ts		-40		105	° C	
Contr. Voltage	Vc		-1		9	V	

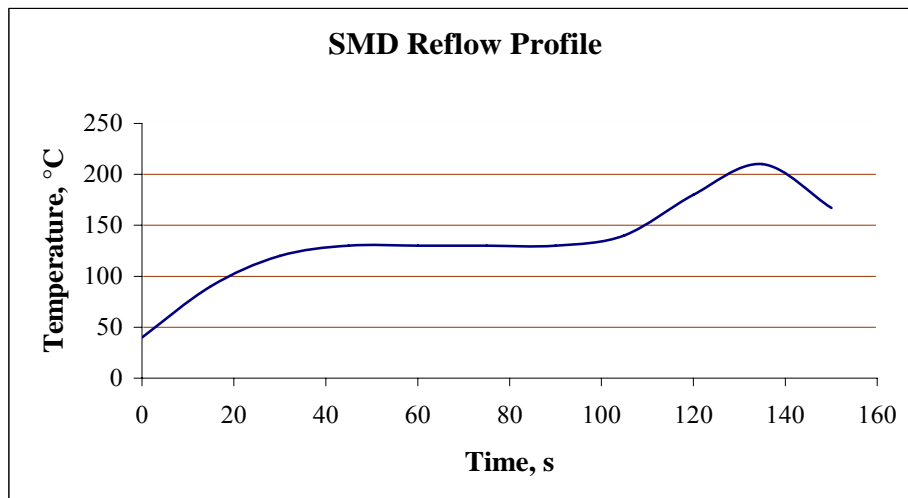
*Environmental and Mechanical*

Operating temp. range	0°C to 70°C , -40°C to 85°C, see chart, page 1
Mechanical Shock	Per MIL-STD-202, Method 213, Cond. E
Thermal Shock	Per MIL-STD-883, Method 1011, Cond. A
Vibration	Per MIL-STD-883, Method 2007, Cond. A
Soldering Conditions	See MAX reflow profile; The device may be reflowed once. Reflowing upside down is not allowed. NO CLEAN assembly is recommended.
Hermetic Seal	Leak rate less than 1x10 <sup>-8</sup> atm.cc/s of helium (crystal only)

*Electrical Connections*

Pin Out	Pin #1- Voltage Control ; Pin #2 – N/C ; Pin #3 – Vcc; Pin#4 – Output, CMOS, or Sine; Pin #5 – PECL/LVDS Output; Pin #6 – PECL/LVDS Complementary Output; Pin #7 - GND
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### Maximum solder reflow profile



The device may be reflowed once. Reflowing upside down is not allowed. NO CLEAN assembly is recommended.