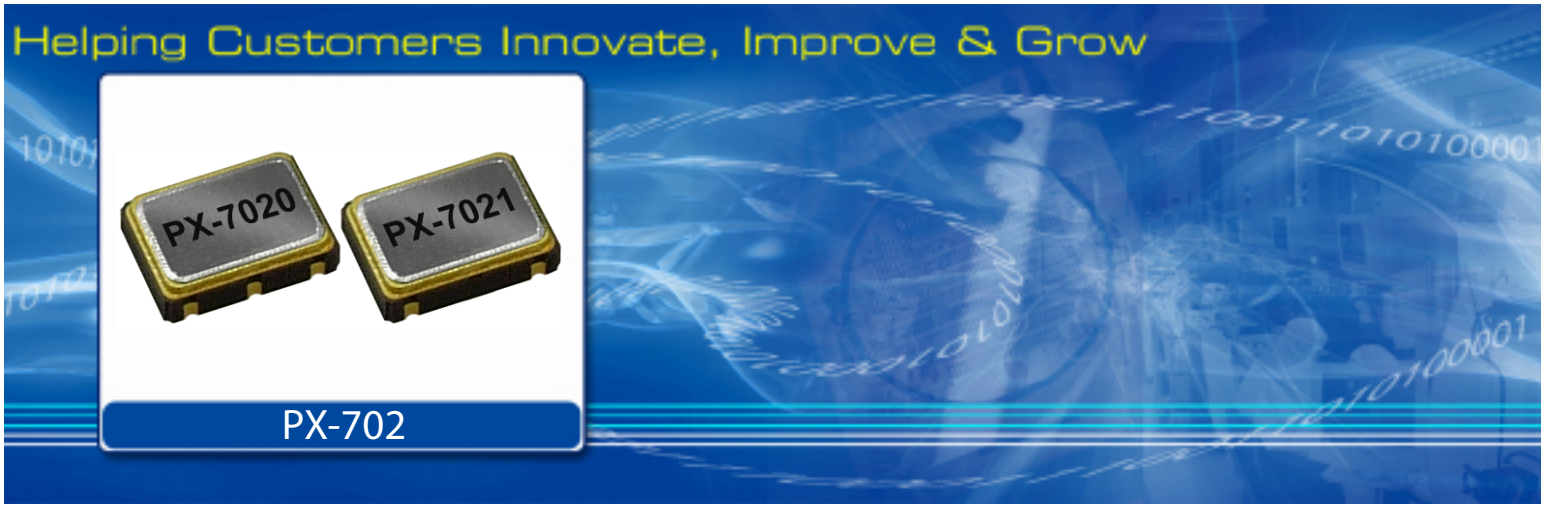
PX-702

High Temperature
Crystal Oscillator



Vectron offers a small footprint High Temperature Ceramic SMD Crystal Oscillator (PX-702) product platform for extreme environment applications. In addition to its wide operating temperature range, PX-702 HTXO is also ideal for high shock & vibration applications. PX-702 HTXO is also designed to exceed 3000g shock and 36g vibration levels of the demanding MIL-STD-883 requirements.

Vectron's vertical integration in the following technical areas ensures the ability to design and manufacture state of the art high temperature frequency control products:

- BAW & SAW Design & Fabrication to produce high quality resonators.
- RF Oscillator Circuit Design.
- Established 250°C High Temperature Electronics Packaging Expertise.
- Established 250°C High Temperature Electronics Assembly & Test Expertise.
- Environmental Screening.

Vectron's manufacturing processes, from quartz resonator fabrication to oscillator electronics assembly and test, are painstakingly controlled via ISO and SPC procedures. Vectron fabricates high temperature quartz resonators using proprietary manufacturing processes designed specifically for high temperature and harsh environment applications. In order to ensure high reliability in the field, critical electrode metallization and testing processes are conducted inside state-of-the-art Class 1K cleanrooms, while oscillator assembly is conducted in Class 10K cleanrooms. All high temperature oscillators are 100% tested before delivery.

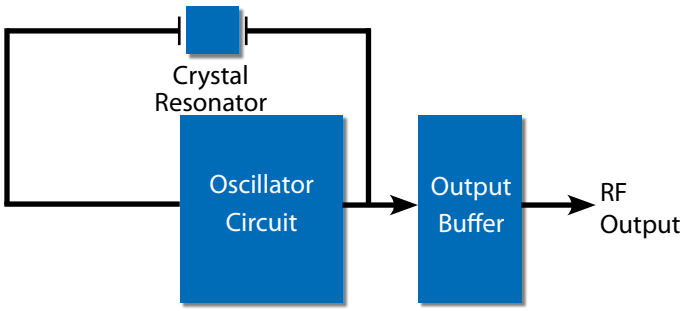
Features

- Continuous operating temperature range -55°C to 230°C
- 1.8, 2.5, 3.3 or 5.0 Vdc operation
- Tight temperature stability
- 4-point crystal mount for Harsh Environment Applications
- High Shock and Vibration Survival
- Output frequency 500 KHz to 40 MHz standard (see HT RTCXO datasheet for 32.768 KHz requirements)
- Standard 5x7x1.8 mm SMD package
- Made in USA

Applications

- Oil / Gas downhole tool
- Geophysical services
- High temperature industrial process control
- Extended temperature Military/Aerospace
- Avionics
- Engine control

Block Diagram



Performance Specifications

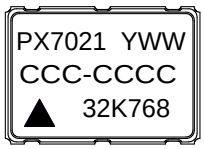
Specification Parameters	Values	
Frequency Range	500KHz to 50MHz Std	(see HT RTCXO datasheet for 32.768KHz requirements) (Hi-Freq Design to 100MHz available, consult factory)
Supply (Vdd)	+1.8Vdc ±5% (J) +2.5Vdc ±5% (H)	+3.3Vdc ±5% (E) +5.0Vdc ±5% (D)
Current	3.5mA typical @ 7.5MHz, 3.3V 1mA typical @ 7.5MHz, 1.8V	(Consult factory for ultra low current requirements)
Level "0" & "1"	<0.4V / >Vdd - 0.5V	
Output	HCMOS Compatible (A)	
Rise & Fall Time	1ns typical / 5ns Max	
Symmetry	40/60%	
Operating Temperature	0°C to +150°C (1) -20°C to +180°C (Z) -55°C to +180°C (Y) 0°C to +200°C (2)	-55°C to +200°C (5) 0°C to +230°C (3) -55°C to 230°C (6) (Consult factory for custom temp requirement up to +250°C)
Jitter (12kHz - 20MHz)	<0.5 ps Typical	
Phase Noise (typical @20MHz, HCMOS, 3.3V)	10Hz -70 dBc/Hz 100Hz -110 dBc/Hz 1kHz -135 dBc/Hz 10kHz -150 dBc/Hz 100kHz -160 dBc/Hz 1MHz -160 dBc/Hz	
Temperature Stability	±40ppm (J) ±100ppm (S) ±150ppm (U)	±200ppm (V) ±250ppm (W) ±350ppm (Y)
Package Size	5.0 x 7.0 x 1.8 mm Ceramic SMD	
Storage Temperature	-55°C to +125°C	

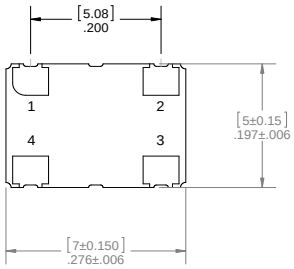
Environmental Compliance		
Mechanical Shock	3000g	MIL-STD-883, Method 2002.5, Condition C
Random Vibration	36.6g	MIL-STD-883, Method 2026, Condition J
Sine Vibration	30g	MIL-STD-202, Method 204, Condition G
Seal Test	Fine	MIL-STD-883 Method 1014 Condition A2
Seal Test	Gross	MIL-STD-202 Method 112 Condition D
Temperature Cycling	1000 Cycles	MIL-STD-883 Method 1010 Condition B
Acceleration	5000g Y1 axis	MIL-STD-883 Method 2001 Condition A

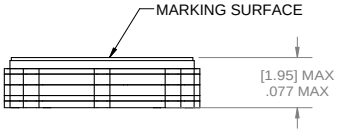
Physical Specifications and Marking

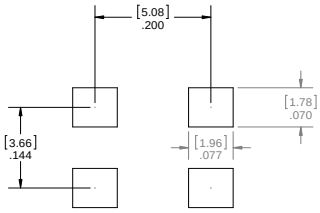
Pin Connections (4-Leads)	
1	Enable/Disable option
2	Case & Electrical Ground
3	RF Output
4	Vcc Power Supply Voltage

Dimensions in [mm] inches



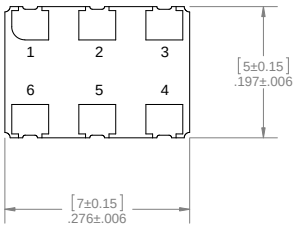




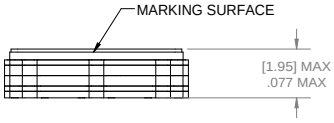


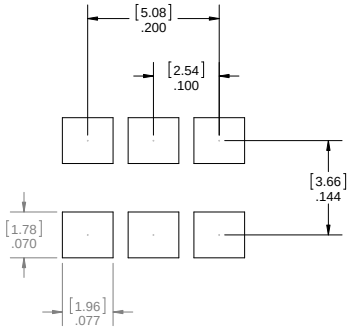
Note: Overall package thickness tolerance will be increases from +/- .007 to +/- .015 when I/O pads are solder coated.

Dimensions in [mm] inches



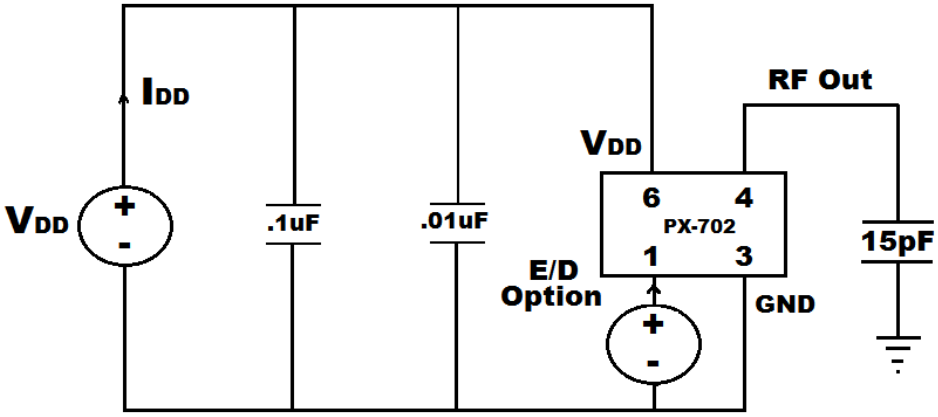
Pin Connections (6-Leads)	
1	Enable/Disable option
2	No Connection
3	Case & Electrical Ground
4	RF Output
5	No Connection
6	Vcc Power Supply Voltage



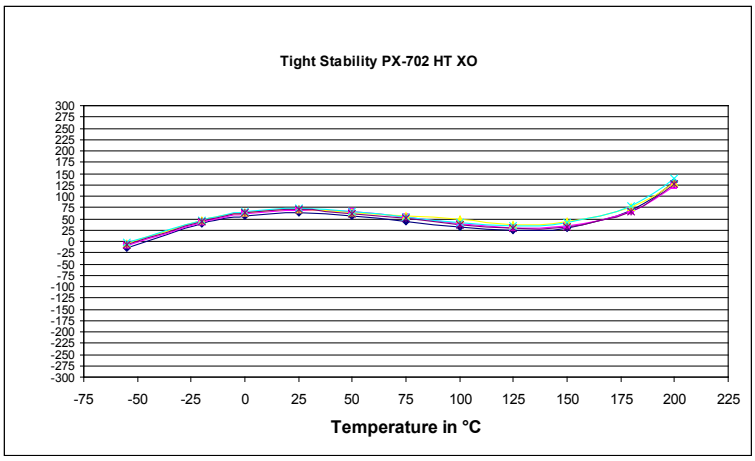


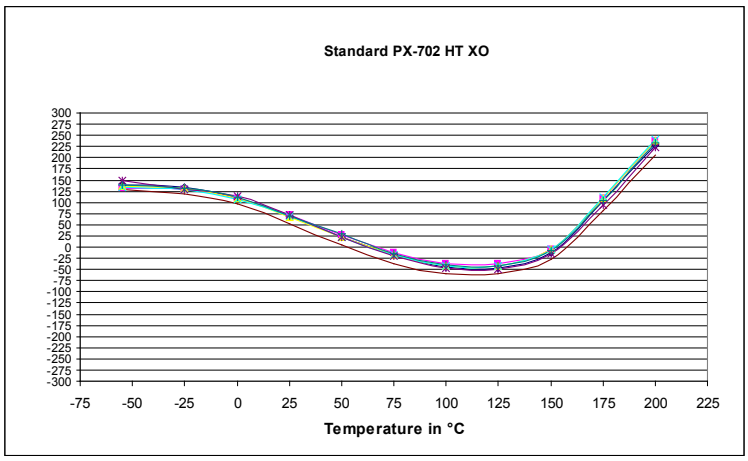
Note: Overall package thickness tolerance will be increases from +/- .007 to +/- .015 when I/O pads are solder coated.

Test Circuit Diagram

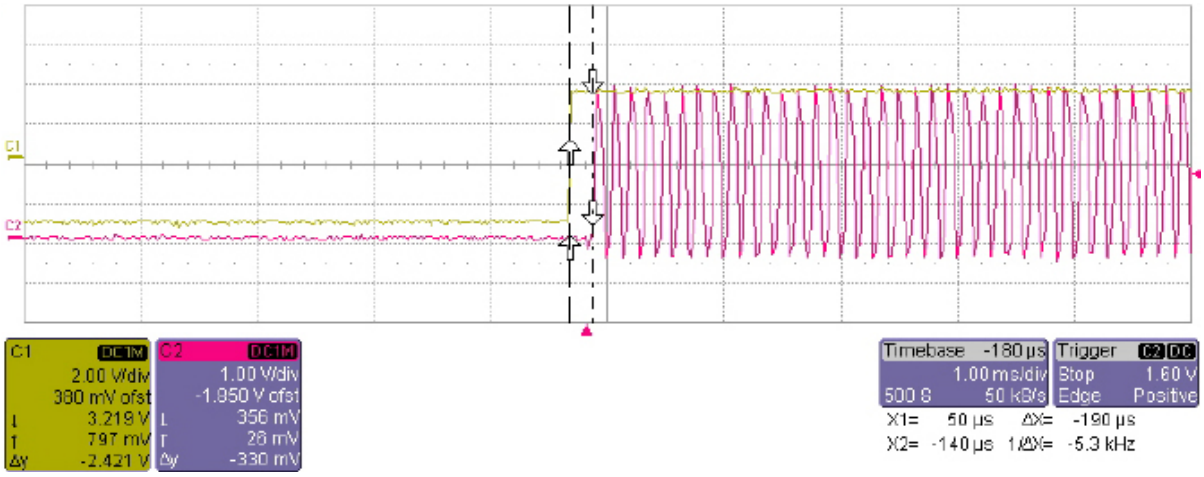


Frequency - Temperature Performance

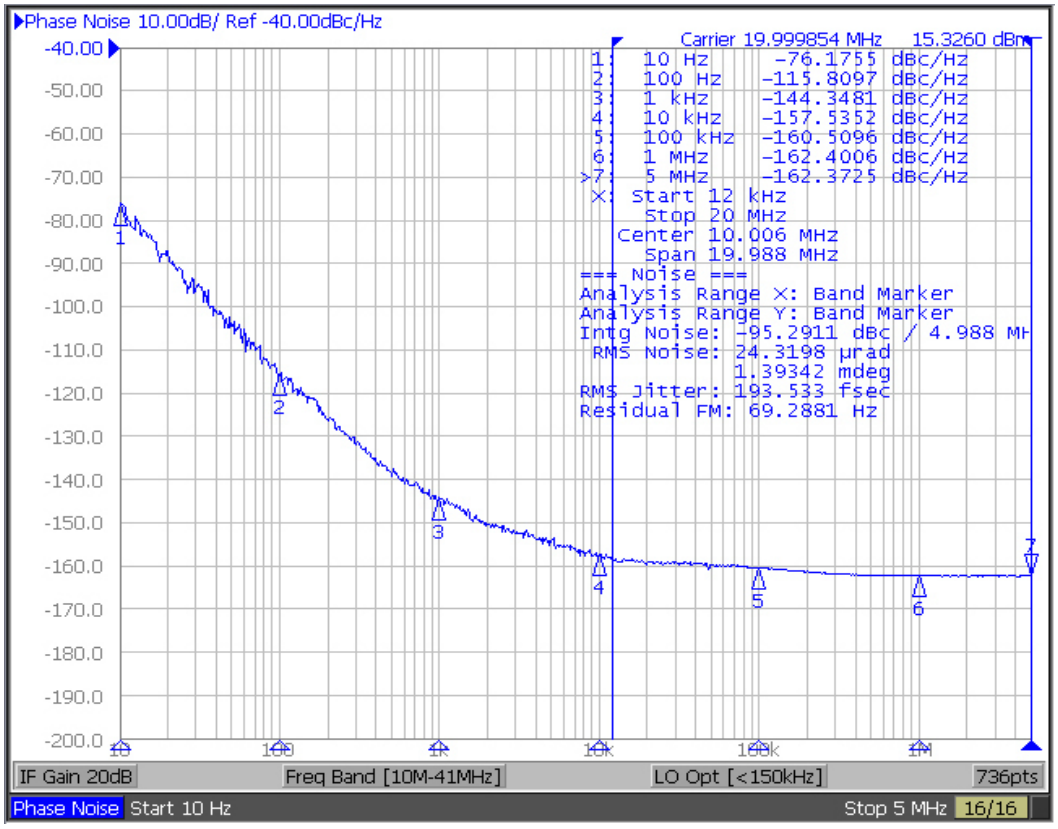




Start-Up Performance



Phase Noise Performance



Standard Frequency List							
32.768kHz *	512.000kHz	1.000MHz	1.024MHz	2.000MHz	2.048MHz	3.686MHz	4.000MHz
4.096MHz	5.000MHz	6.000MHz	7.3728MHz	8.000MHz	8.192MHz	9.600MHz	10.000MHz
12.000MHz	16.000MHz	16.384MHz	20.000MHz	24.000MHz	25.000MHz	30.000MHz	32.000MHz
32.768MHz	40.000MHz	48.000MHz	50.000MHz	51.200MHz			

* See HT RTCXO datasheet for 32.768KHz requirements

Ordering Information

PX - 702 0 - E A Y - W X X X - 20M0000000

Product Family
Crystal Oscillator

Package Type
702: 5x7 mm HTCC

Factory Use
0: 6 Pads
1: 4 Pads
2: 6 Pads (with Sn/Pb solder coated pads)
3: 4 Pads (with Sn/Pb solder coated pads)
4: 6 Pads (with SAC305 solder coated pads)
5: 4 Pads (with SAC305 solder coated pads)

Supply Voltage
J: 1.8V ±5%
H: 2.5V ±5%
E: 3.3V ±5%
D: 5.0V ±5%

Output
A: HCMOS/ACMOS

Frequency

Factory Use

Factory Use

Enable
A: Enable Hi, Tristate
X: No Enable

Temp Stability (PX)
J: ± 40ppm
S: ± 100ppm
U: ± 150ppm
V: ± 200ppm
W: ± 250ppm
Y: ± 350ppm

Temperature Range
1: 0°C to 150°C
Z: -20°C to 180°C
Y: -55°C to 180°C
2: 0°C to 200°C
5: -55°C to 200°C
3: 0°C to 230°C
6: -55°C to 230°C

Temperature Range and Stability Table		
Temp Range	**Temp Stability**	**PX-702**
1: 0°C to 150°C	J: ± 40ppm	Tight Stability
	S: ± 100ppm	Standard
	U: ± 150ppm	Standard
	W: ± 250ppm	Standard
Z: -20°C to 180°C	J: ± 40ppm	Tight Stability
	S: ± 100ppm	Tight Stability
	U: ± 150ppm	Standard
	W: ± 250ppm	Standard
Y: -55°C to 180°C	S: ± 100ppm	Tight Stability
	U: ± 150ppm	Standard
	W: ± 250ppm	Standard
2: 0°C to 200°C	S: ± 100ppm	Tight Stability
	U: ± 150ppm	Tight Stability
	V: ± 200ppm	Standard
	W: ± 250ppm	Standard
5: -55°C to 200°C	S: ± 100ppm	Tight Stability
	U: ± 150ppm	Tight Stability
	V: ± 200ppm	Standard
	W: ± 250ppm	Standard
3: 0°C to 230°C	V: ± 200ppm	Tight Stability
	W: ± 250ppm	Tight Stability
	Y: ± 350ppm	Standard
6: -55°C to 230°C	V: ± 200ppm	Tight Stability
	W: ± 250ppm	Tight Stability
	Y: ± 350ppm	Standard

*Contact factory for custom requirements

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