Precision Sub-Miniature 5.0x3.2mm TCXO / VCTCXO Designed for Telecom Applications

2111 Comprehensive Drive Aurora, Illinois 60505 Phone: 630-851-4722 Fax: 630-851-5040 www.conwin.com

Description:

The Connor-Winfield 5.0x3.2mm Temperature Compensated Crystal Oscillators and Voltage Controlled Temperature Compensated Crystal Oscillators are designed for

use in applications requiring tight frequency stability in a small package. Through the use of Analog Temperature Compensation, this device is capable of holding sub 1-ppm stabilities over wide temperature ranges.

Features:

- 3.3V Operation
- LVCMOS or clipped Sinewave Output Logic
- Sub-Miniature 5.0x3.2mm SMT Package
- Frequency Stabilities Available: ±0.28 ppm with Stratum 3 Holdover ±0.50 ppm or ±1.00 ppm or ±2.00 ppm
- Temperature Ranges Available: 0 to 70°C; 0 to 85°C; -20 to 70°C; -40 to 85°C
- Low Power <6 mA
- Low Jitter <1pS RMS
- Low Phase Noise
- Tape and Reel Packaging
- Recommended for new designs

Applications:

- STRATUM 3 Applications
- GPS Receivers
- Instrumentation
- Femtocells
- FTTH, FTTC

Ordering Information

M	6	0	2	012.8M
Type: Precision TCXO VCTCXO 3.2x5.0mm	$\frac{\text{Temperature}}{\text{Range}}$ 3 = 0 to 85°C 5 = 0 to 70°C 6 = -40 to 85°C 7 = -20 to 70°C	$\frac{Frequency}{Stability}$ $0 = \pm 0.28 \text{ ppm}$ $1 = \pm 0.50 \text{ ppm}$ $2 = \pm 1.00 \text{ ppm}$ $3 = \pm 2.00 \text{ ppm}$	<u>Features</u> 2 = TCXO, LVCMOS, 3.3 Vdc 3 = TCXO, Clipped Sinewave, 3.3 Vdc 4 = VCTCXO, LVCMOS, 3.3 Vdc 5 = VCTCXO, Clipped Sinewave, 3.3 Vdc	Output Frequency Frequency Format -xxx.xM Min* -xxx.xxxxxM Max* * Min 1 and Max 6 digits after the decimal point. M = MHz

* See page 3 for frequency range information on each part number.

Example: M602-012.8M = 3.2x5mm, TCXO, LVCMOS, 3.3Vdc, -40° to 85°C, ±0.28ppm, Output Frequency 12.8MHz To order an M602 with an output frequency of: 6.4MHz = M602-006.4M Consult the factory for available frequencies



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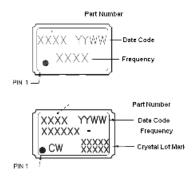


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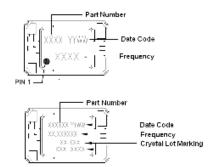
Pad Connections

Pad	Connection
1:	Voltage Control or N/C
2:	Do Not Connect
3:	Do Not Connect
4:	Ground
5:	Output
6:	Do Not Connect
7:	Do Not Connect
8:	Supply, Vcc

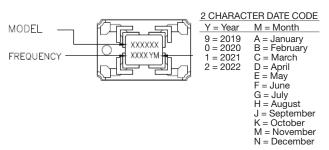
Marking Configurations



Marking Configurations

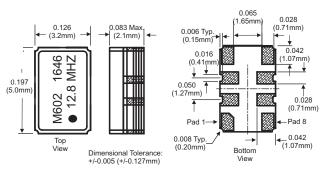


Marking Configurations

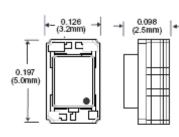


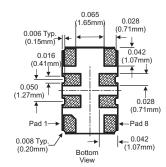
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Package Outline for all frequencies other than those mentioned below

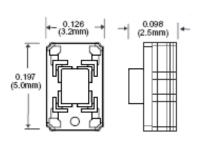


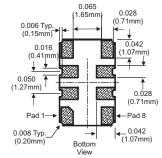
Package Outline for Frequencies (MHz): 19.44, 24.576, 32.0, 33.333333, 38.4, 38.88, 40.0, 48.0, 49.152, and 50





Package Outline for Frequencies (MHz): 40.0, 50.0







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	Absolute Maxi	mum Ratings			
Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	85	°C	
Supply Voltage (Vcc)	-0.5	-	6.0	Vdc	
Input Voltage (Vc)	-0.5	-	Vcc + 0.5	Vdc	
	Operating Sp	ecifications			
Parameter	Minimum	Nominal	Maximum	Units	Notes
TCXO Frequency Calibration @ 25°C	-1.0	-	1.0	ppm	1
Supply Voltage Variation. (Vcc±5%)	-0.2	-	0.2	ppm	
Load Coefficient, ±5%	-0.2	-	0.2	ppm	
Static Temperature Hysteresis	-0.4	-	0.4	ppm	2
Aging First Year	-1.0	-	1.0	ppm	
Total Frequency Tolerance (20 Years)	-4.6	-	4.6	ppm	3
Supply Voltage (Vcc)	3.135	3.3	3.465	Vdc	4
Supply Current (Icc) LVCMOS	-	2.1	6.0	mA	
Clipped Sinewave	-	1.3	2.9	mA	
Period Jitter	-	3	5	ps rms	
ntegrated Phase Jitter (BW=12kHz to 20MHz)	-	0.3	1.0	ps rms	
SSB Phase Noise (Fo=20 MHz)					
at 10Hz offset	-	-90	-70	dBc/Hz	
at 100Hz offset	-	-115	-100	dBc/Hz	
at 1KHz offset	-	-135	-130	dBc/Hz	
at >10KHz offset	-	-152	-145	dBc/Hz	
at >100KHz offset	-	-154	-150	dBc/Hz	
Start Up Time	-	-	10	ms	
Input	Characteristics for	Voltage Contro	l (Pad 1)		
Parameter	Minimum	Nominal	Maximum	Units	Notes
Control Voltage Range (Vcc = 3.3V) (Vc)	0.3	1.65	3.0	Vdc	
Frequency Tuning measured @ 25°C	±10	-	-	ppm	5
Linearity	±5	-	-	%	
Slope	Positive				

Siope	Positive				
Input Impedance	100K	-	-	Ohms	
Modulation Bandwidth (3dB)	10	-	-	KHz	
LVCMOS Output Characteristics					

	Eronioo output	onaraotonotio	·		
Parameter	Minimum	Nominal	Maximum	Units	Notes
LOAD	-	15	-	pF	6
Voltage (High) (Voh)	90% Vcc	-	-	Vdc	
(Low) (Vol)	-	-	10% Vcc	Vdc	
Current (High) (loh)	-	-	-4	mA	
(Low) (IoI)	4	-	-	mA	
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time 10% to 90%	-	-	8	ns	
				-	

Clipped Sinewave Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
LOAD	-	-	-		7
Output Load Resistance	-	10K	-	Ohms	6
Output Load Capacitance	-	10	-	pF	6
Output Voltage (< 40 MHz)	1.0	1.2	-	V	pk-pk
Output Voltage (=>40 MHz)	0.8	1.0	-	V	pk-pk
Output Impedance	-	200	-	Ohms	

Notes:

1) TCXO: Initial calibration @ 25°C. Specifications at time of shipment after 48 hours of operation.

2) Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C.

3) Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage (±5%), load change (±5%), reflow soldering process and 20 years aging.

4) For best in application performance, careful selection of an external power source is critical. Select an external regulator that meets or exceeds to the following specifications regarding voltage regulation tolerance, initial accuracy, temperature coefficient, voltage noise, and low voltage noise density. Factory Test Conditions: initial Accuracy ±2mv, Noise (0.1Hz to 10KHz) 15uV p-y, Voltage Noise Density = 50nV/ (Square root Hz), Temperature Coefficient <5ppm°C. 5) Additional pull ranges are available; please contact the factory for additional information.

6) Attention: To achieve optimal frequency stability, and in some cases to meet the specification stated on this datasheet, it is required that the circuit connected to this TCXO output must have the equivalent input capacitance that is specified by the nominal load capacitance. Deviations from the nominal load capacitance will have a graduated effect on the stability of approximately 20ppb per pF load difference.

7) Output is DC coupled.

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Model Specifications

	Мо	del Specifica	alions		
Model Number	M502	M503	M504	M505	Notes
Output Type	LVCMOS			Clipped Sinewa	ave
	TCXO	TCX0	VCTCXO	VCTCXO	
Frequency Range Frequency Stability		<u>6.4 to 50.</u> ±0.28p			1
Supply Voltage		<u>±0.20</u> 3.3V0			<u> </u>
Temperature Range		0 to 70			
Holdover Stability		±0.32p			2
Model Number	M302	M303		M305	Nieteo
Output Type		Clipped Sinewave			Notes
		TCX0			
Frequency Range		0.4 +- 50		1010/0	
Frequency Stability					1
		3.3Vd			
Temperature Range		0 to 85	0°C		
Holdover Stability		±0.32p	pm		2
Model Number	M512	M513	M514	M515	Notes
Output Type		Clipped Sinewave			
ICXO/VCTCXO	TCXO	TCXO	VCTCXO		
Frequency Range					
requency Stability					1
		3.3V0			
Temperature Range					
Model Number	M312	M313		M315	Notes
Output Type		Clipped Sinewave			ave
	TCXO		VCTCXO	VCTCXO	
Frequency Range		6.4 to 50.			-
Frequency Stability Supply Voltage		±0.50p 3.3Vd			I
Temperature Range		0 to 85			
	14500			14505	N
Model Number	M522 LVCMOS		M524	M525	Notes
Output Type TCXO/VCTCXO	TCXO	TCX0	VCTCXO	Clipped Sinewa VCTCXO	ive
Frequency Range	10/0	6.4 to 52		VCTCAU	
Frequency Stability		±1.00p			1
Supply Voltage		3.3V0			
Temperature Range		0 to 70)°C		
Model Number	M322		M324	M325	Notes
	M322	M323	M324	M325 Clipped Sinewa	
Output Type	M322 LVCMOS TCX0	M323			
Output Type TCXO/VCTCXO Frequency Range	LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52	LVCMOS VCTCXO MHz	Clipped Sinewa	
Output Type TCXO/VCTCXO Frequency Range Frequency Stability	LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p	LVCMOS VCTCXO MHz pm	Clipped Sinewa	
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc	LVCMOS VCTCXO MHz pm Ic	Clipped Sinewa	
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85	LVCMOS VCTCXO MHz pm lc °C	Clipped Sinewa	
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range	LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85	LVCMOS VCTCXO MHz pm lc °C	Clipped Sinewa	ive 1
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type	LVCMOS TCXO M532 LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave	LVCMOS VCTCXO MHz pm lc °C M534 LVCMOS	Clipped Sinewa VCTCX0 M535 Clipped Sinewa	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO	LVCMOS TCX0 M532	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCX0	LVCMOS VCTCXO MHz pm Ic °C M534 LVCMOS VCTCXO	Clipped Sinewa VCTCX0 M535	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range	LVCMOS TCXO M532 LVCMOS	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52	LVCMOS VCTCXO MHz pm Ic °C M534 LVCMOS VCTCXO MHz	Clipped Sinewa VCTCX0 M535 Clipped Sinewa	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability	LVCMOS TCXO M532 LVCMOS	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52 ±2.00p	LVCMOS VCTCXO MHz pm Ic °C M534 LVCMOS VCTCXO MHz ppm	Clipped Sinewa VCTCX0 M535 Clipped Sinewa	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	LVCMOS TCXO M532 LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vc	LVCMOS VCTCXO MHz pm lc °C M534 LVCMOS VCTCXO MHz ppm dc	Clipped Sinewa VCTCX0 M535 Clipped Sinewa	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	LVCMOS TCXO M532 LVCMOS	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52 ±2.00p	LVCMOS VCTCXO MHz pm lc °C M534 LVCMOS VCTCXO MHz ppm dc	Clipped Sinewa VCTCX0 M535 Clipped Sinewa	1 Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number	LVCMOS TCX0 M532 LVCMOS TCX0 M332	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vc 0 to 70 M333	LVCMOS VCTCXO MHz pm lc %°C M534 LVCMOS VCTCXO MHz ppm dc 0°C M334	Clipped Sinewa VCTCX0 M535 Clipped Sinewa VCTCX0 M335	1 Notes Notes Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type	LVCMOS TCX0 M532 LVCMOS TCX0 M332 LVCMOS	M323 Clipped Sinewave TCX0 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vc 0 to 70 M333 Clipped Sinewave	LVCMOS VCTCXO MHz pm lc %°C M534 LVCMOS VCTCXO MHz ppm lc p°C M334 LVCMOS	Clipped Sinewa VCTCX0 M535 Clipped Sinewa VCTCX0 M335 Clipped Sinewa	1 Notes Notes Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO	LVCMOS TCX0 M532 LVCMOS TCX0 M332	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52 ±2.00p 3.3Vc 0 to 7(M333 Clipped Sinewave TCXO	LVCMOS VCTCXO MHz pm lc °C M534 LVCMOS VCTCXO MHz ppm lc pm lc M334 LVCMOS VCTCXO	Clipped Sinewa VCTCX0 M535 Clipped Sinewa VCTCX0 M335	1 Notes Notes Notes
Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range	LVCMOS TCX0 M532 LVCMOS TCX0 M332 LVCMOS	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52 ±2.00p 3.3Vc 0 to 70 M333 Clipped Sinewave TCXO 6.4 to 52 ±2.00p 3.3Vc 0 to 70 M333 Clipped Sinewave TCXO 6.4 to 52	LVCMOS VCTCXO MHz pm c °C M534 LVCMOS VCTCXO MHz ppm dc p°C M334 LVCMOS VCTCXO MHz	Clipped Sinewa VCTCX0 M535 Clipped Sinewa VCTCX0 M335 Clipped Sinewa	1 Notes Notes Notes
Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Range Frequency Range Frequency Range Frequency Range Frequency Range Frequency Range	LVCMOS TCX0 M532 LVCMOS TCX0 M332 LVCMOS	M323 Clipped Sinewave TCXO 6.4 to 52 ±1.00p 3.3Vc 0 to 85 M533 Clipped Sinewave TCXO 6.4 to 52 ±2.00p 3.3Vc 0 to 7(M333 Clipped Sinewave TCXO	LVCMOS VCTCXO MHz pm lc °C M534 LVCMOS VCTCXO MHz opm dc 0°C M334 LVCMOS VCTCXO MHz pm	Clipped Sinewa VCTCX0 M535 Clipped Sinewa VCTCX0 M335 Clipped Sinewa	1 Notes Notes

Model Specifications

	Mo	del Specifica	ations		
Model Number	M702	M703	M704	M705	Notes
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewa	ive
TCXO/VCTCXO	TCX0	TCXO	VCTCXO	VCTCXO	
Frequency Range		6.4 to 50.	0 MHz		
Frequency Stability		±0.28p			1
Supply Voltage		3.3Vd			
Temperature Range		-20 to 7			
Holdover Stability		±0.32p	pm		2
Model Number	M602	M603	M604	M605	Notes
Output Type	LVCMOS			Clipped Sinewa	
TCX0/VCTCX0	TCXO	TCX0	VCTCXO	VCTCX0	100
Frequency Range	10/10	6.4 to 50		1010/10	
Frequency Stability		±0.28			1
Supply Voltage		3.3\			
Temperature Range		-40 to			
Holdover Stability		±0.32	2ppm		2
Marial Maria	14740	14740			N1
Model Number	M712	M713	M714	M715	Notes
Output Type	LVCMOS			Clipped Sinewa	ive
	TCXO	TCX0	VCTCXO	VCTCXO	
Frequency Range Frequency Stability		<u>6.4 to 50.</u> ±0.50p			1
Supply Voltage		<u>±0.50p</u> 3.3Vd			<u> </u>
Temperature Range		-20 to 7			
		-20 10 7	0 0		
Model Number	M612	M613	M614	M615	Notes
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewa	ave
TCX0/VCTCX0	TCX0		VCTCXO	VCTCXO	
Frequency Range		6.4 to 50			
Frequency Stability		±0.50			1
Supply Voltage		3.3\			
Temperature Range		-40 to	85°C		
Model Number	M722	M723	M724	M725	Notes
Output Type	LVCMOS			Clipped Sinewa	
TCX0/VCTCX0	TCXO		VCTCXO	VCTCXO	
Frequency Range		6.4 to 52	MHz		
Frequency Stability		±1.00p	pm		1
Supply Voltage		3.3Vd			
Temperature Range		-20 to 7	0°C		
Madal Number	M622	M623	M624	M625	Notes
Model Number Output Type	LVCMOS			Clipped Sinewa	
TCXO/VCTCXO	TCXO	TCX0	VCTCXO	VCTCX0	100
Frequency Range					
	10/0			1010/0	
	1070	6.4 to 52	MHz	1010/0	1
Frequency Stability	10,0	6.4 to 52 ±1.00	MHz)ppm	VCTOXO	1
Frequency Stability Supply Voltage	10,0	6.4 to 52	MHz)ppm /dc		1
Frequency Stability Supply Voltage Temperature Range		6.4 to 52 ±1.00 3.31 -40 to	MHz)ppm /dc 85°C		
Frequency Stability Supply Voltage Temperature Range Model Number	M732	6.4 to 52 ±1.00 3.3\ -40 to M733	MHz)ppm /dc 85°C M734	M735	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type	M732 LVCMOS	6.4 to 52 ±1.00 3.3\ -40 to M733 Clipped Sinewave	MHz)ppm /dc 85°C M734 LVCMOS	M735 Clipped Sinewa	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO	M732	6.4 to 52 ±1.00 -40 to M733 Clipped Sinewave TCX0	MHz Dppm /dc 85°C M734 LVCMOS VCTCXO	M735	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range	M732 LVCMOS	6.4 to 52 ±1.00 -40 to M733 Clipped Sinewave TCX0 6.4 to 52	MHz)ppm /dc 85°C M734 LVCMOS VCTCXO MHz	M735 Clipped Sinewa	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability	M732 LVCMOS	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p	MHz Dppm /dc 85°C M734 LVCMOS VCTCXO MHz pm	M735 Clipped Sinewa	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	M732 LVCMOS	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vd	MHz Dppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c	M735 Clipped Sinewa	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCX0/VCTCX0 Frequency Range Frequency Stability	M732 LVCMOS	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p	MHz Dppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c	M735 Clipped Sinewa VCTCX0	Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage	M732 LVCMOS TCX0 M632	6.4 to 52 ±1.00 3.3V -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vd -20 to 7 M633	MHz pppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c 0°C M634	M735 Clipped Sinewa VCTCX0 M635	Notes Notes Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range	M732 LVCMOS TCX0	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3vd -20 to 7 M633 Clipped Sinewave	MHz)ppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c 0°C M634 LVCMOS	M735 Clipped Sinewa VCTCX0	Notes Notes Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type Temperature Range Model Number Output Type TCXO/VCTCXO	M732 LVCMOS TCX0 M632	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3vd -20 to 7 M633 Clipped Sinewave TCX0	MHz)ppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c 0°C 0°C M634 LVCMOS VCTCXO	M735 Clipped Sinewa VCTCX0 M635	Notes Notes Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range	M732 LVCMOS TCX0 M632 LVCMOS	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3vd -20 to 7 M633 Clipped Sinewave TCX0 6.4 to 52	MHz)ppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c 0°C M634 LVCMOS VCTCXO MHz	M735 Clipped Sinewa VCTCX0 M635 Clipped Sinewa	Notes Notes Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Range Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Range Frequency Stability	M732 LVCMOS TCX0 M632 LVCMOS	6.4 to 52 ±1.00 3.33 -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3Vd -20 to 7 M633 Clipped Sinewave TCX0 6.4 to 52 ±2.00	MHz)ppm /dc 85°C M734 LVCMOS VCTCXO MHz pm 0°C M634 LVCMOS VCTCXO MHz)ppm	M735 Clipped Sinewa VCTCX0 M635 Clipped Sinewa	Notes Notes Notes
Frequency Stability Supply Voltage Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range Frequency Stability Supply Voltage Temperature Range Model Number Output Type Temperature Range Model Number Output Type TCXO/VCTCXO Frequency Range	M732 LVCMOS TCX0 M632 LVCMOS	6.4 to 52 ±1.00 3.3v -40 to M733 Clipped Sinewave TCX0 6.4 to 52 ±2.00p 3.3vd -20 to 7 M633 Clipped Sinewave TCX0 6.4 to 52	MHz ppm /dc 85°C M734 LVCMOS VCTCXO MHz pm c c 0°C M634 LVCMOS VCTCXO MHz pm /dc	M735 Clipped Sinewa VCTCX0 M635 Clipped Sinewa	Notes Notes Notes Notes

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Notes: 1) Frequency stability vs. change in temperature. [±(Fmax - Fmin)/2.Fo]. 2) Inclusive of frequency stability, supply voltage change (±1%), aging, for 24 hours.

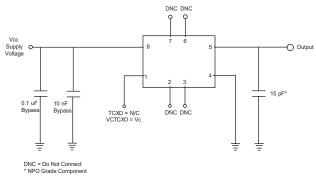


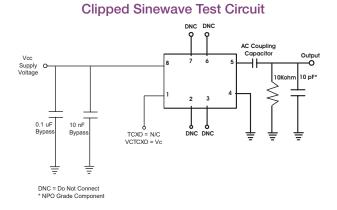
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Environmental Characteristics

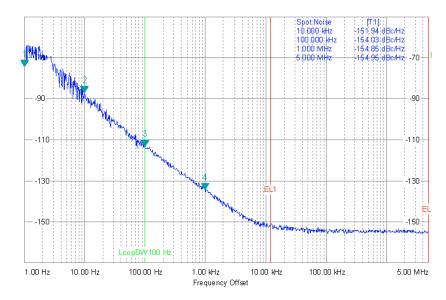
Vibration:	Vibration per Mil Std 883E Method 2007.3 Test Condition A	
Shock:	Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B.	
Soldering:	RoHS compliant lead free. See soldering profile on page 6.	
Solderability	Solderability per Mil Std 883E Method 2003	
Package Terminations:	ge Terminations: 0.5 to 1.0um (20 to 40 micro-inches) Gold over minimum of 2.0um (80 micro-inches) Nickel.	

LVCMOS Test Circuit

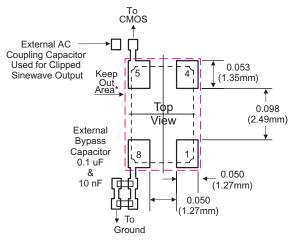




Typical Phase Noise for M602-020.0M



Suggested Pad Layout



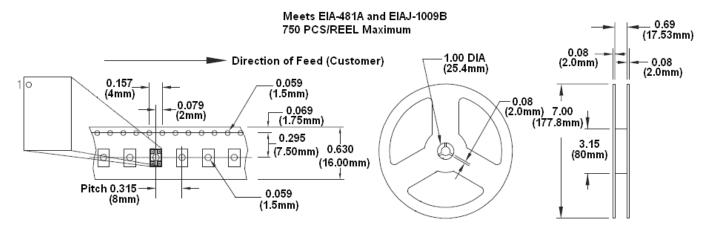
* Do not route any traces in the keep out area. It is recommended that the next layer under the keep out area is to be ground plane.

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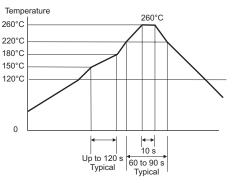


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Tape and Reel Specifications

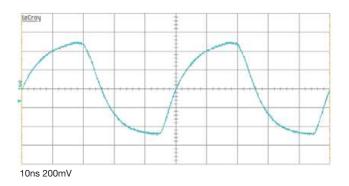




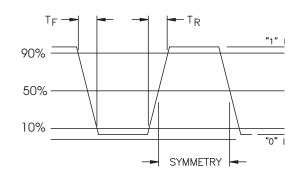


Meets IPC/JEDEC J-STD-020C

Clipped Sinewave Output Waveform



LVCMOS Output Waveform



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