

Helping Customers Innovate, Improve & Grow


TX-709

Description

The TX-709 Series TCXO combines innovative manufacturing and the latest technology to provide low phase noise and excellent g-sensitivity. The fully hermetic assembly includes a dual crystal circuit to cancel opposing g-sensitivity vectors enclosed in a 5x7mm ceramic package.

Features

- Standard Temperature Range -40°C to +85°C
- Extended Temperature Range -55°C to +125°C
- Low Phase Noise, Low g-sensitivity 0.1ppb/g
- Frequency Range: 8 MHz to 52 MHz & 96 MHz to 160 MHz
- Fully Hermetic Seal
- High Shock Survival up to 20k g
- Surface Mount, Low Profile
- Fully RoHS Compliant

Applications

- Military Portable Radios
- GPS Telemetry
- Test and Measurement Equipment
- Missile systems
- GNSS
- SATCOM



Performance Specifications

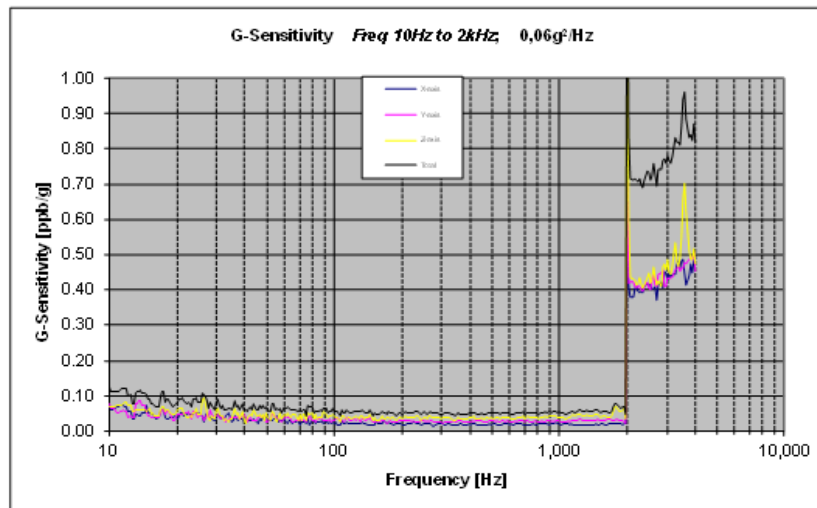
Parameter	Min	Typ	Max	Units	Condition
Frequency Stabilities ¹					
vs. operating temperature range (referenced to +25°C)	-1 -2		+1 +2	ppm ppm	-40... +85°C -55... +125°C (8 MHz to 52 MHz only)
Initial Tolerance	-1.0		+1.0	ppm	at time of shipment, nominal EFC Vs ± 5% Load ± 10% @ +40°C for 15 years
vs. supply voltage change	-0.25		+0.25	ppm	
vs. load change	-0.25		+0.25	ppm	
vs. aging / 1 year		±1		ppm	
vs. aging			4.0	ppm	
Supply Voltage (Vs)					
Supply voltage	3.135	3.3	3.465	VDC	
Current consumption		5 25	10 35	mA mA	8 MHz to 52 MHz output frequencies 96 MHz to 160 MHz output frequencies
Absolute Maximum Ratings					
Supply voltage (Vs)	-0.3		4.6	V	Damage may occur beyond this level
Control Voltage	0		Vs	V	
Operable temperature range	-60 -40		+125 +105	°C °C	for tuning options A, B, C, D for tuning options E, F, G, H
Storage temperature range	-55		+125	°C	

Performance Specifications

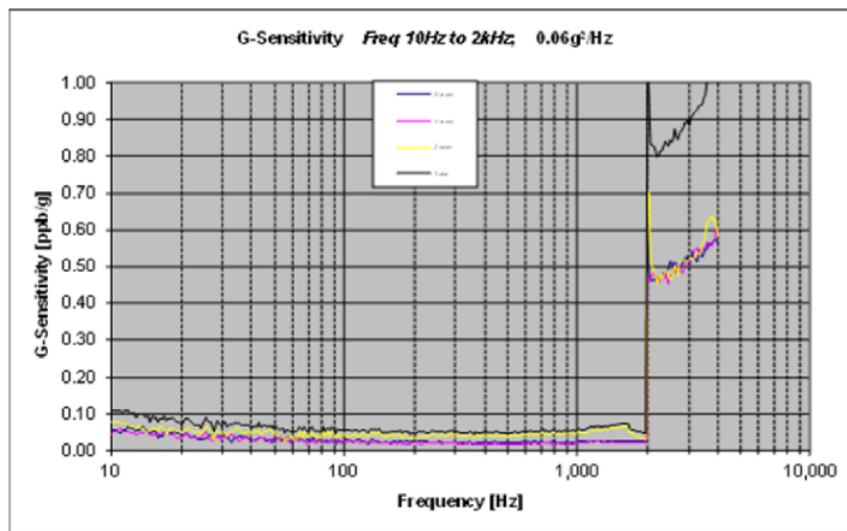
Parameter	Min	Typ	Max	Units	Condition
RF Output					
Signal	HCMOS				
Load		15		pF	
Signal Level (Vol)			0.1*Vs	V	
Signal Level (Voh)	0.9*Vs			V	
Rise/Fall Time			5	ns	@ nominal Load and 10% to 90% of waveform
Duty cycle	40	50	60	%	@ nominal Load and @ 50% level
Sub-Harmonics			-20	dBc	96 MHz to 160 MHz output frequencies
Signal	Clipped Sinewave				Frequencies of 15 MHz to 52 MHz only
Level		1		Vpp	with nominal Load
Load R		10		kohm	
Load C		10		pF	
Electronic Frequency Control (EFC)					
Tuning Range (options A, C, E, G)	Fixed; No adjust				
Tuning Range (options B, D, F, H)	±5.0		±25	ppm	
Tuning Slope	Positive				
Control Voltage Range	0.0		Vs	VDC	
Freq. control input impedance	10			kohm	
Additional Parameters¹					
Phase Noise ³ (@ 50 MHz - no vibration) Tuning options A, B, C, D		-80 -112 -134 -146 -150	-78 -109 -132 -144 -148	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Phase Noise ³ (@ 50 MHz - no vibration) Tuning options E, F, G, H		-82 -113 -135 -152 -156	-81 -110 -134 -148 -154	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Phase Noise ³ (@ 100 MHz - no vibration) Tuning options E, F, G, H		-82 -113 -134 -145 -147	-76 -108 -131 -140 -142	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Jitter (RMS) @ 150 MHz		350		fs	BW (12 kHz to 20 MHz)
g-sensitivity		0.2		ppb/g	per axis (tuning options A, B, E, F)
			0.1	ppb/g	per axis (tuning options C, D, G, H) parts 100% tested with 100 Hz sine vibration
Shock					MIL-STD-883G; Method 2002.4; Condition F
Vibration Sine					MIL-STD-202G, METHOD 204D, Test Condition D
Thermal Cycling					MIL-STD-202, METHOD 107, Test Condition A

G-Sensitivity Performance

TX-709 @ 50MHz

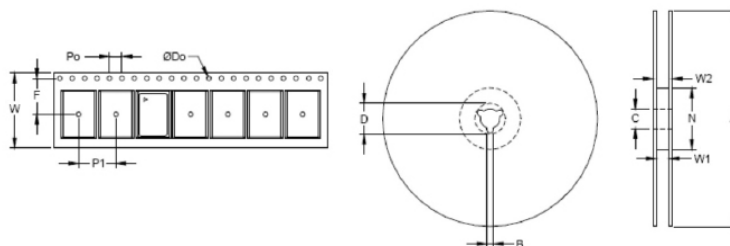


TX-709 @ 100MHz

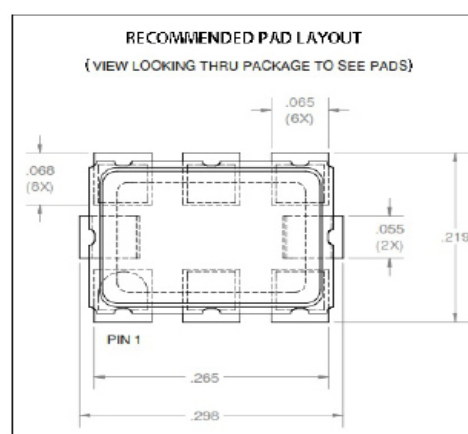
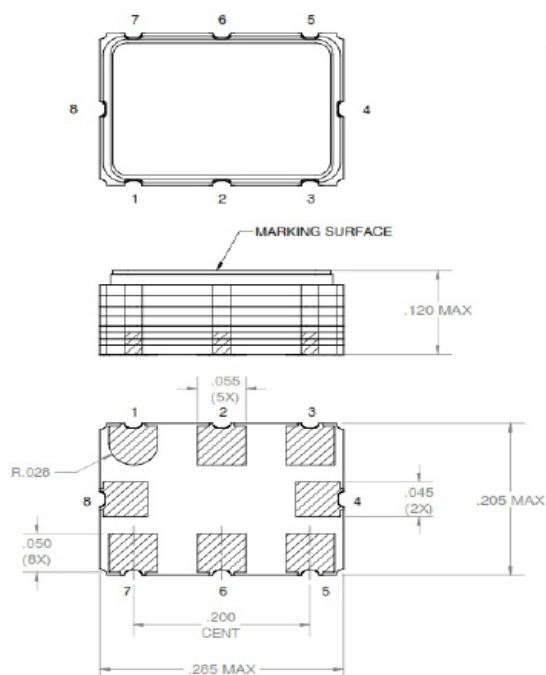


Standard Shipping Method

Tape and Reel Information					Reel Dimensions (mm)						
Tape Dimensions (mm)					Reel Dimensions (mm)						
W	F	Do	Po	P1	A	B	C	D	N	W1	W2
16	7.5	1.5	4	8	180	1.5	13	20.2	60	16.4	20.4



Outline Drawing / Enclosure



Plating Composition of TX-709 pads:

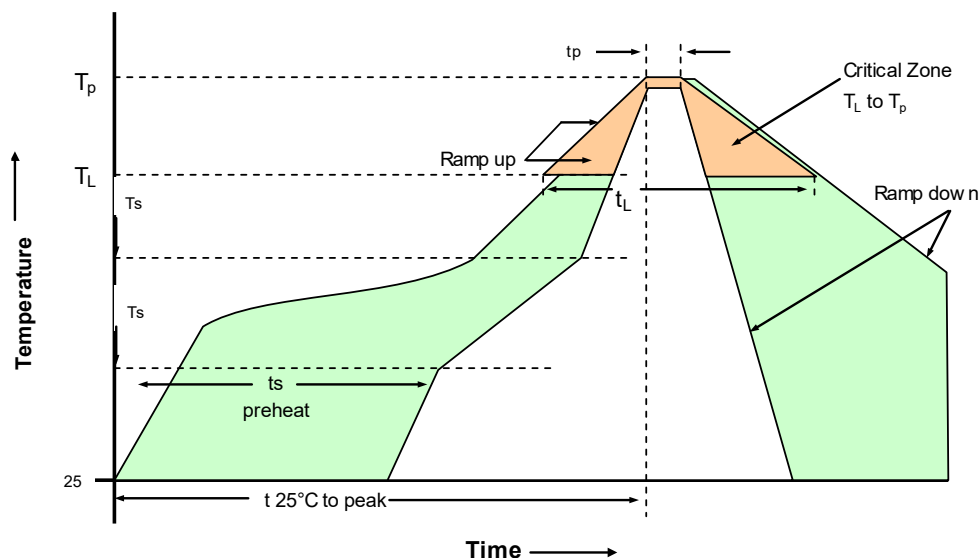
30-90 microinches electroless Gold over 50-350 microinches electroless Nickel
Contact factory for tin dipped parts. Tinning increases overall height of units to 0.130 Max

Dimensions in inches

TX-709 Pin Connections	
1	Electronic Frequency Control (EFC) Option or No Connect*
2	No connect*
3	Ground
4	No connect*
5	RF Output
6	No Connect*
7	Supply Voltage
8	No Connect*

* Do not connect to this pin - Vectron reserved

Recommended Reflow Profiles for Pb-Free & Sn-Pb



230°C Reflow Profile

Profile Feature	Sn-Pb Assembly	Profile Feature	Sn-Pb Assembly
Average ramp-up rate (TL to TP)	3°C/secod max.	Time 25°C to Peak Temperature	4 minutes max.
Preheat - Temperature min T _{smin}	135°C	Time maintained above	
- Temperature Min T _{smax}	155°C	- Temperature (TL)	183°C
- Time (min to max) (ts)	60-90 seconds	- Time (tL)	45-60 seconds
T _{smax} to TL -Ramp-up Rate	3°C/secod max.		
Time maintained above - Temperature (TL)	183°C	Time within 5°C of actual	10-20 seonds max.
- Time (TL)	40-60 seconds	Peak Temperature (tp)	
Peak Temperature (Tp)	max 230°C	Ramp-down Rate	6°C/second max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

260°C Reflow Profile

Profile Feature	Pb-Free Assembly	Profile Feature	Pb-Free Assembly
Average ramp-up rate (TL to TP)	3°C/secod max.	Time 25°C to Peak Temperature	8 minutes max.
Preheat - Temperature min T _{min}	150°C	Time maintained above	
- Temperature min T _{max}	200°C	- Temperature (TL)	217°C
- Time (min to max) (ts)	60-180 seconds	- Time (tl)	60-150 seconds
T _{max} to TL -Ramp-up Rate	3°C/secod max.		
Time maintained above - Temperature (TL)	217°C	Time within 5°C of actual	20-40 seonds max.
- Time (TL)	60-150 seconds	Peak Temperature (tp)	
Peak Temperature (Tp)	max 260°C	Ramp-down Rate	6°C/second max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

Ordering Information

TX - 7090 - E A E - 106 A - 10M0000000

Product Family TX: TCXO						Frequency
Package 5x7 mm						Tuning and g sensitivity option A: No Tuning 0.2 ppb/g B: Electrical Tuning 0.2ppb/g C: No Tuning 0.1 ppb/g D: Electrical Tuning 0.1ppb/g E: Low Phase Noise; No Tuning 0.2 ppb/g F: Low Phase Noise; Electrical Tuning 0.2ppb/g G: Low Phase Noise; No Tuning 0.1 ppb/g H: Low Phase Noise; Electrical Tuning 0.1ppb/g
Height 0: 2.8 mm 1: 3.0 mm (Sn/Pb coated pads)					Stability Code 106: ± 1 ppm (E Temp code only) 206: ± 2 ppm	
Supply Voltage E: 3.3 Vdc					Temperature Range E: -40°C to +85°C C: -55°C to +125°C (only available with A, B, C, or D tuning options, 8 MHz to 52 MHz output frequencies only)	
RF Output Code A: HCMOS F: Sinewave, clipped (for Frequencies 15 to 52 MHz only)						

Notes:

1. Contact factory for improved stabilities or additional product options. Not all options and codes are available at all frequencies.
2. Unless otherwise stated, all values are valid after warm-up time and refer to typical conditions for supply voltage, frequency control voltage, load, and temperature (25°C).
3. Phase noise degrades with increasing output frequency.
4. Subject to technical modification.
5. Contact factory for availability.
6. Frequencies not listed above will require NRE charges and additional lead times.

Contact Information

USA:

100 Watts Street
Mt Holly Springs, PA 17065
Tel: 1.717.486.3411
Fax: 1.717.486.5920

Europe:

Landstrasse
74924 Neckarbischofsheim
Germany
Tel: +49 (0) 7268.801.0
Fax: +49 (0) 7268.801.281



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