

Helping Customers Innovate, Improve & Grow



TX-708

## Description

The TX-708 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

- Low Phase Noise, Low g-sensitivity 0.1ppb/g
  - Frequency Range: 96 MHz to 160 MHz
  - Fully Hermetic Seal
  - High Shock Survival up to 20k g
  - Surface Mount, Low Profile
  - Fully RoHS Compliant \*
- \* (Except parts with Sn-Pb Solder Coated Option)

## Applications

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



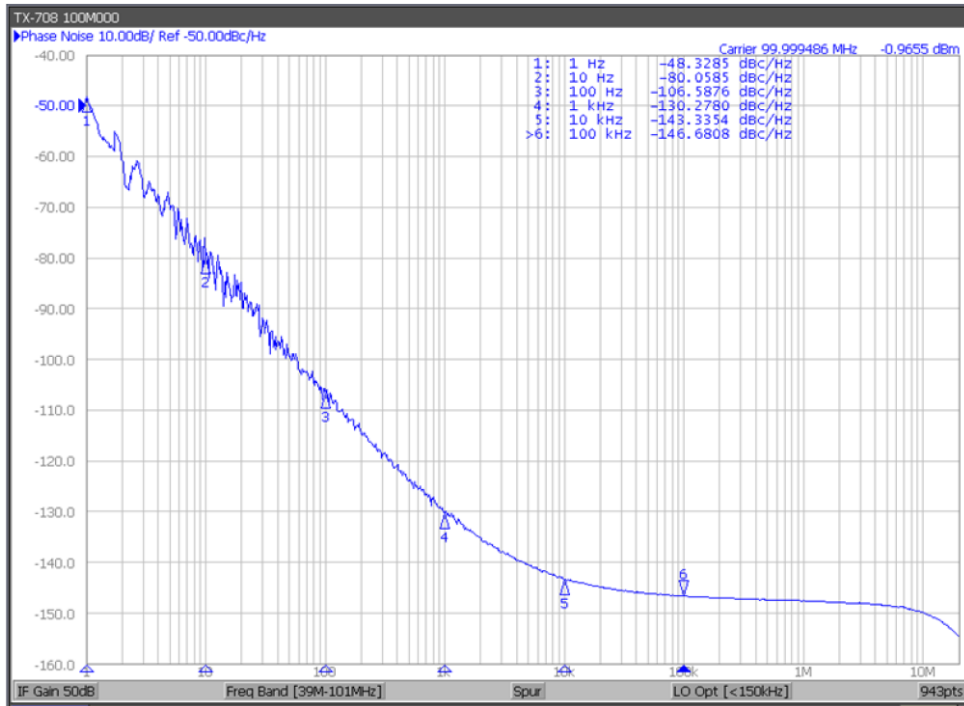
## Performance Specifications

Parameter	Min	Typ	Max	Units	Condition
<b>Frequency Stabilities<sup>1</sup></b>					
vs. operating temperature range (referenced to +25°C)	-1.0		+1.0	ppm	-40... +85°C
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	
<b>Supply Voltage (Vs)</b>					
Supply voltage	3.135	3.3	3.465	VDC	
Current consumption		25	35	mA	Increases with output frequency

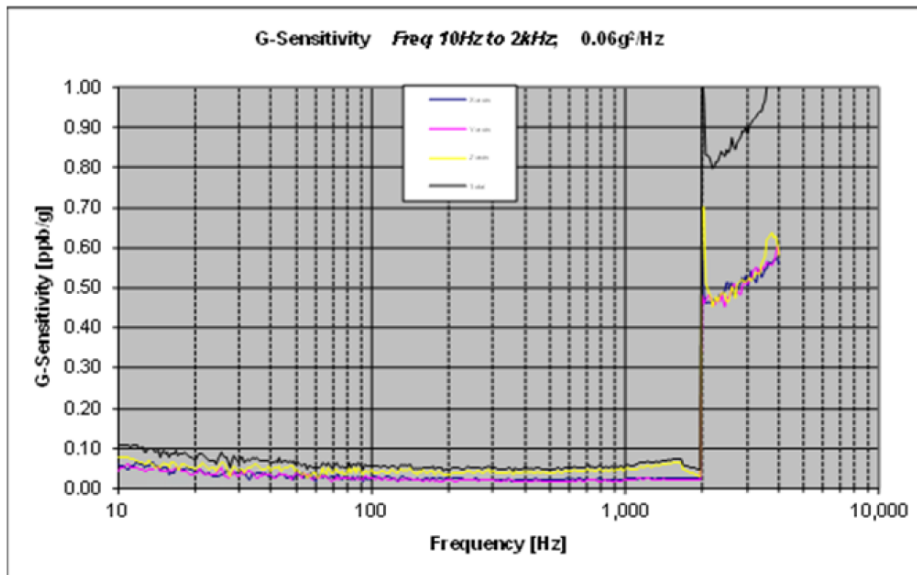
## Performance Specifications

Parameter	Min	Typ	Max	Units	Condition
<b>RF Output</b>					
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	
<b>Electronic Frequency Control (EFC)</b>					
Tuning Range (options A, C)	Fixed; No adjust				
Tuning Range (options B, D)	±5.0		±12	ppm	
Tuning Slope	Positive				
Control Voltage Range	0.0		Vs	VDC	
Freq. control input impedance	10			kohm	
<b>Additional Parameters<sup>1</sup></b>					
Phase Noise <sup>3</sup> (@ 100 MHz - no vibration)		-80 -105 -130 -143 -145		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Phase Noise <sup>3</sup> (@ 150 MHz - no vibration)		-75 -105 -128 -140 -145		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Jitter (RMS) @ 150 MHz		275		fs	BW (12 kHz to 20 MHz)
g-sensitivity		0.2		ppb/g	per axis (ordering code A and B)
g-sensitivity			0.1	ppb/g	per axis (ordering code C and D) 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
<b>Absolute Maximum Ratings</b>					
Supply voltage (Vs)			6.0	V	Damage will occur beyond this level
Control Voltage	0		Vs	V	
Operable temperature range	-45		+105	°C	
Storage temperature range	-55		+105	°C	

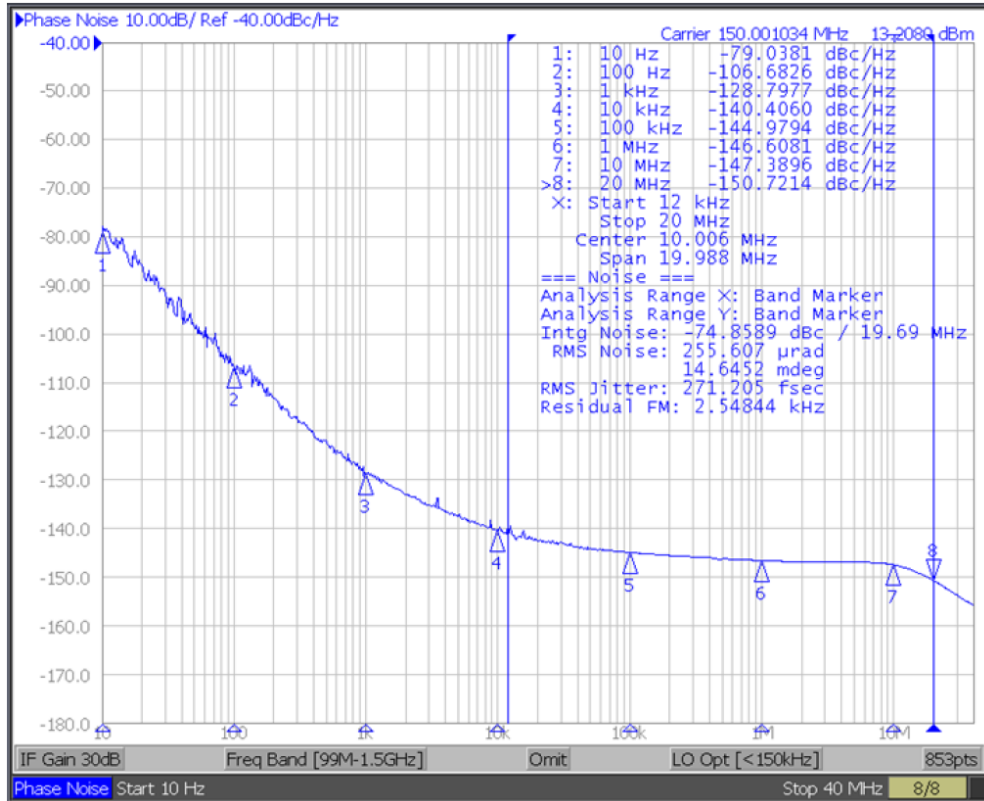
# Static Phase Noise Performance (100 MHz)



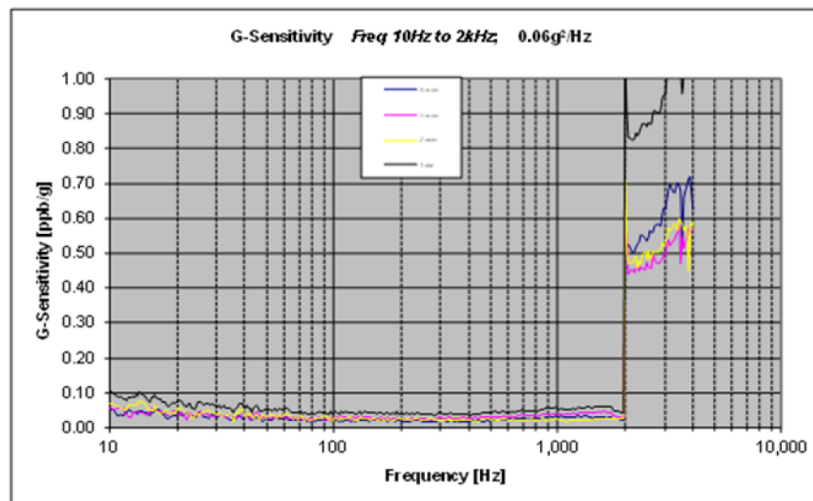
# G-Sensitivity Performance (100 MHz)



## Static Phase Noise Performance (150 MHz)

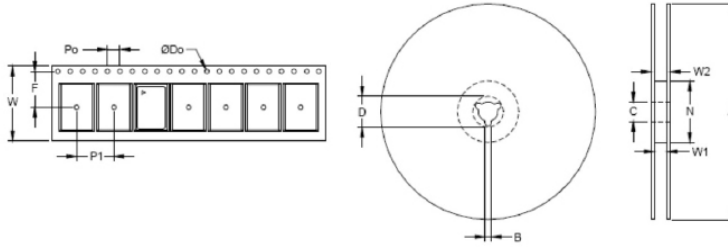


## G-Sensitivity Performance (150 MHz)

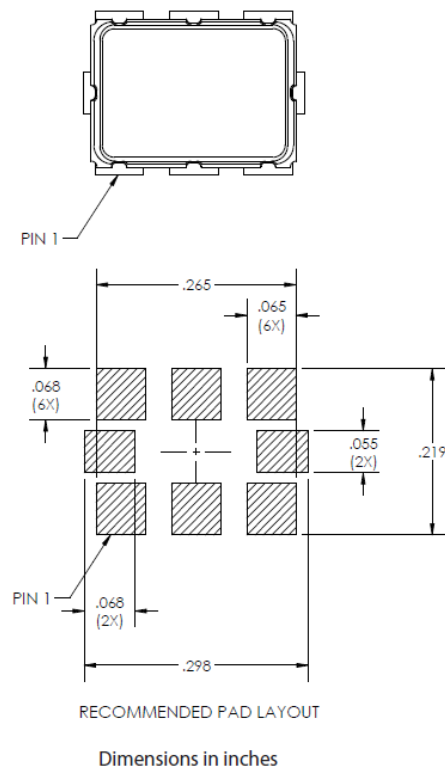
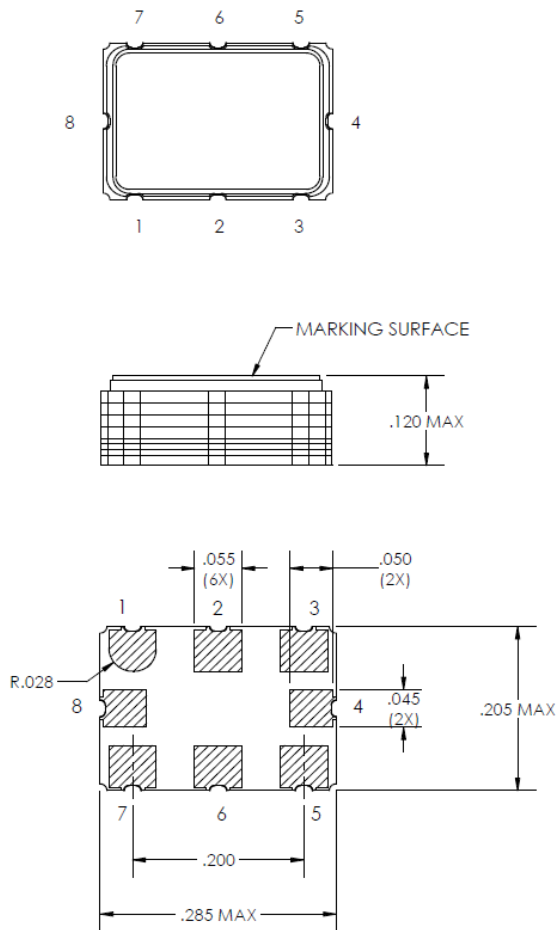


# Standard Shipping Method

Tape and Reel Information											
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



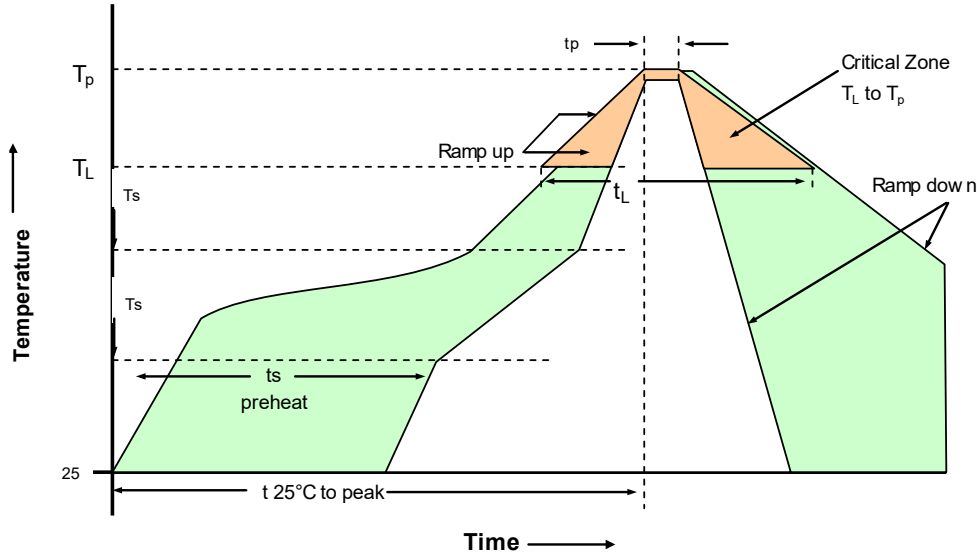
### Plating Composition of TX-708 pads:

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

\* Do not connect to this pin - Vectron reserved

TX-708 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*

## 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 $T_{smin}$ - Temperature Min $T_{smax}$ - Time (min to max) ( $t_s$ )	135°C 155°C 60-90 seconds	Time maintained above - Temperature (TL) - Time ( $t_L$ )	183°C 45-60 seconds
$T_{smax}$ to TL -Ramp-up Rate	3°C/secod max.		
Time maintained above - Temperature (TL) - Time (TL)	183°C 40-60 seconds	Time within 5°C of actual Peak Temperature ( $t_p$ )	10-20 seonds max.
Peak Temperature ( $T_p$ )	max 230°C	Ramp-down Rate	6°C/second max.

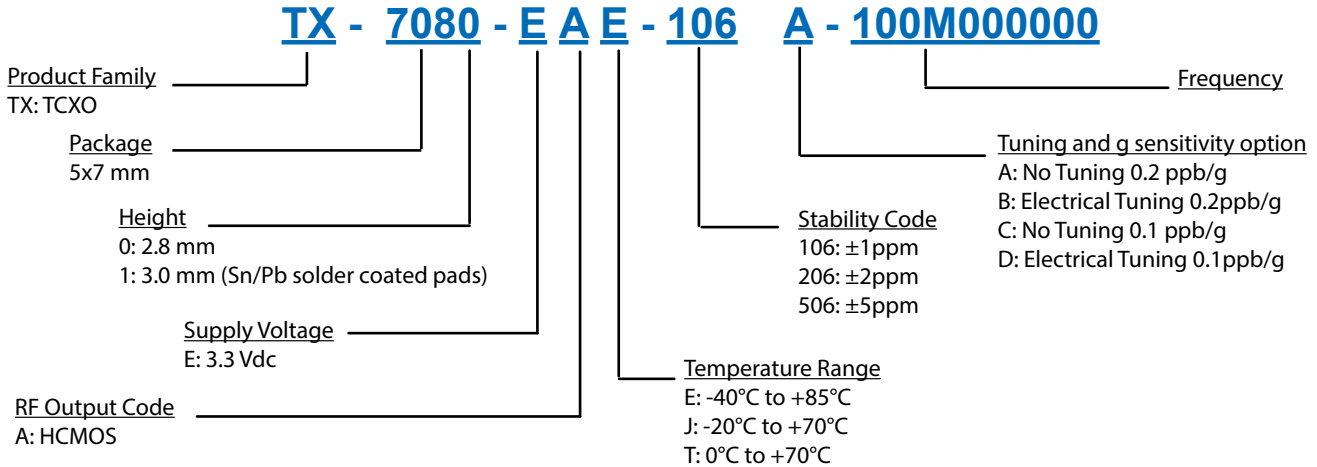
**Note:** All temperatures refer to toposide of the package, measured on the package body surface.

### 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 $T_{smin}$ - Temperature min $T_{smax}$ - Time (min to max) ( $t_s$ )	150°C 200°C 60-180 seconds	Time maintained above - Temperature (TL) - Time ( $t_L$ )	217°C 60-150 seconds
$T_{smax}$ to TL -Ramp-up Rate	3°C/secod max.		
Time maintained above - Temperature (TL) - Time (TL)	217°C 60-150 seconds	Time within 5°C of actual Peak Temperature ( $t_p$ )	20-40 seonds max.
Peak Temperature ( $T_p$ )	max 260°C	Ramp-down Rate	6°C/second max.

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

# Ordering Information



Available Standard Frequencies (MHz) <sup>6</sup>			
98.208	100.000	115.200	120.000
144.000	150.000	155.520	160.000

**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

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