Model 149

Stratum 3E, 9x14 mm OCXO

Features

- 10 to 50 MHz Frequency Range
- Compliant to Stratum 3E of GR-1244-CORE
- Surface Mount
- 3.3V or 5.0V operation
- Low Jitter/Phase Noise
- Tape and Reel Packaging

Part Dimensions: 9.7 × 14.9 x 7.0 mm

Applications

- Telecom Switching
- Wireless Communication
- Timing over Packet

Description

The CTS Model 149 is a low cost, small size, high performance OCXO. The high quality SC Quartz Crystal used in this OCXO offers high stability and low jitter/phase noise, making it the ideal choice for any telecommunications system.

Ordering Information – Table 1

Model	Temp Range	Stability*	Supply Voltage	Electronic Freq Control	Frequency Code
149__	B	T	E	N	20M000

Code	
Blank	standard
8	See specs below

Code	Temp range
A	0 to 50°C
B	0 to 70°C
C	-10 to 60°C
D	-20 to 70°C
G	-40 to 85°C

Code	Stability (ppb)
R	±100
T	±50
U*	±20
V*	±10
W*	10 pk-pk (Std option only)

Code	Supply
D	5.0V ±5%
E	3.3V ±5%

Code	Spec
V	EFC
N	No EFC

Code	Frequency (MHz)
20M000	20.000
XXMXXX	XX.XXX

Standard Frequencies (MHz)
10.000
12.800
19.200
20.000
24.576
25.000
49.152

* For full GR-1244 Stratum 3E holdover and wander generation performance, choose:
Stability option U for compliance over any 25°C change, or
Stability option V for compliance over any 40°C change, or
Stability option W for compliance over -40°C/+85°C.

Note: Not all stabilities are available for all frequencies. Please consult factory.

Part Number Examples:
149BTEN20M000
or
1498GUEV10M000

Electrical Specifications

Parameter	Conditions & Remarks	Min	Typical	Max	Unit
Operating Conditions					
Operating Temperature Range	T_{OP}	-40	-	85	°C
Supply Voltage	V_{CC}: 3.3V or 5.0V	3.135 4.75	3.3 5.0	3.465 5.25	Vdc
Power Consumption	Warm-up Steady State; T_A = 25°C	- -	- 0.7	2.7 1	W
Load		13.5	15	16.5	pF
Frequency Stability					
Frequency	F_{NOM}	10	-	50	MHz
Initial Frequency Tolerance	@25°C, at time of shipment	-	-	±0.200	ppm
Freq. vs Temperature (See Table 1)	-40°C to 85°C (ref to +25C) 4°C change (option V)	- -	- -	±10 1	ppb ppb pk-pk
Freq. vs Supply Voltage	V_{CC} ±5%	-	±1	±5	ppb
Freq. vs Load	15 pf ±5%	-	±1	±5	ppb
Freq. vs Time (Aging). (Standard option)	After 30 days of operation (for 19.2 MHz)	- - -	- - -	±1 ±150 ±1.2	ppb/day ppb/year ppm/10 yrs
Freq. vs Time (Aging) (Model option code "8")	After 30 days of operation (for 19.2 MHz)	- - -	- - -	±1 ±100 ±0.5	ppb/day ppb/year ppm/10 yrs
Free run accuracy	All causes – 10 years	-	-	±1.6	ppm
Frequency Retrace	0.5 hours on after 24 hrs off, preceded by 24 hrs on. Ref to turn off frequency.	-	-	±50	ppb
Short Term Stability (ADEV)	1.0 sec	-	-	0.05	ppb
Warm-up time	@ 25°C, After 5 mins referenced to the freq after 1 hour on	-	-	±50	ppb
Holdover Stability (24 hours)	For any 40°C change over the operating temperature range (Stability options U and V. See Table 1)	-	-	11	ppb, pk-pk
Wander Generation	Meets Stratum 3E MTIE and TDEV per Telcordia GR-1244-CORE				
Output Parameters					
CMOS Output Levels	3.3V (LVCMOS) 5.0V (HCMOS)	V_{OL} V_{OL} V_{OH} V_{OH}	- - 2.4 3.0	- - - -	0.4 0.4 - -	Vdc
Rise/Fall Times	10% to 90%, 15pf load		-	-	5	ns
Duty Cycle	@50% of output signal		45	50	55	%

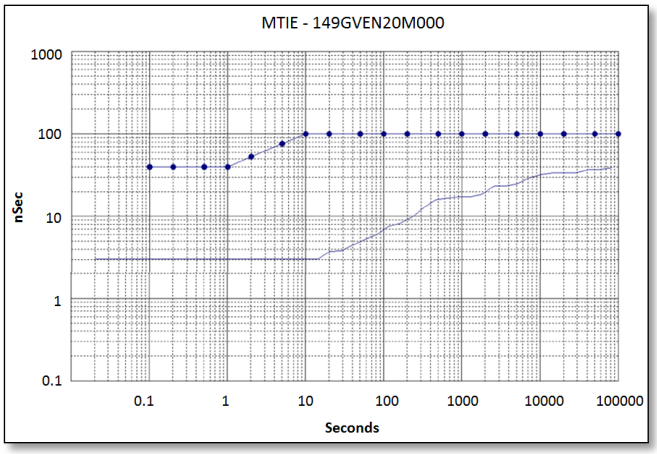
Electrical Specifications (Continued)

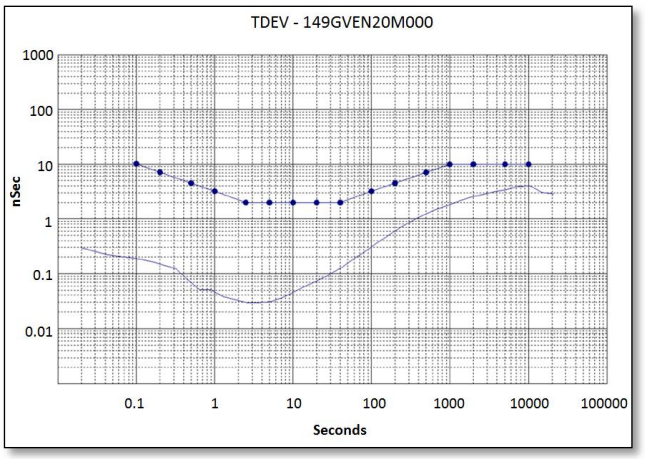
		Standard	Model Option Code "8"	
Phase Noise (Typical for 19.20 MHz)	1 Hz	-85	-85	dBc/Hz
	10 Hz	-115	-115	
	100 Hz	-138	-138	
	1 kHz	-148	-148	
	10 kHz	-152	-155	
	100 kHz	-154	-158	

Electronic Frequency Control - EFC (Optional)

Parameter	Conditions & Remarks		Min	Typical	Max	Unit
EFC Control Voltage	V_C	3.3V	0.0	1.65	3.3	Volts
		5.0V	0.0	2.5	5.0	
Frequency Adjust Range	Standard		±1.5	-	±4.0	ppm
	Model option Code "8"		±0.8	-	±2.0	
Slope	Positive, monotonic		-	-	-	
Input Impedance	Z_{IN}		100	-	-	Kohms
Linearity			-	-	10	%

Typical Stratum 3E Wander Generation performance per Telcordia GR-1244-CORE (locked through a 0.001Hz loop bandwidth)



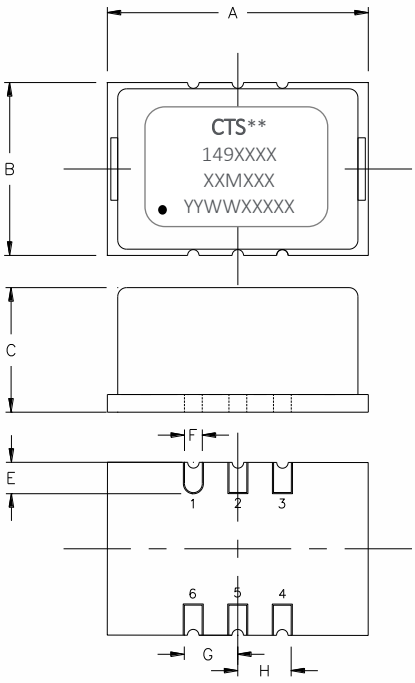


Mechanical and Environmental

Storage Temperature Range	-55°C to +105°C	
Operating Temperature Range	-40°C to +85°C	
Reflow Profile	Per IPC/JEDEC J-STD-020D; >217°C, 1.5min and 245°C (Absolute max temperature), 10 secs. **Note:** This product is not designed to be reflowed in an inverted position.	
Mechanical Shock	Standard option: Model Code option 8:	100g, 6ms, 1/2 sinewave, 3 shocks each direction along 3 mutually perpendicular planes. 500g, 1ms, 1/2 sinewave, 3 shocks each direction along 3 mutually perpendicular planes.
Drop	10 cm height, 3 times onto hard board with thickness of 3 cm. - IEC60028-2-32 test Ed.	
Bumping	40g, 6mS, 4000 ±10 times in each of three mutually perpendicular axes	
Mechanical Vibration	Random: Sine Standard option: Model code option 8:	Frequency range: 1Hz-4Hz-100Hz-200Hz Acceleration: 0.0001g²/Hz - 0.01g²/Hz - 0.01g²/Hz - 0.001g²/Hz Grms=1.15g. Duration: 30 minutes (per axis) 10 - 55 Hz, 0.75mm DA, Sweep time 30 minutes per axis 10-55 Hz, 1.5mm DA, 55-2000Hz 10G, 30 min sweep each axis
Thermal Shock	-40°C ~ +85°C. 0.5 hour dwells with <30 second transitions. 100 cycles	
RoHS	Lead Free, and fully compliant to RoHS Directive 2011/65/EU	
MSL	Level 2	

Mechanical Specifications

Pad termination finish: Gold flash < 10 µ inch, over Ni plated Cu

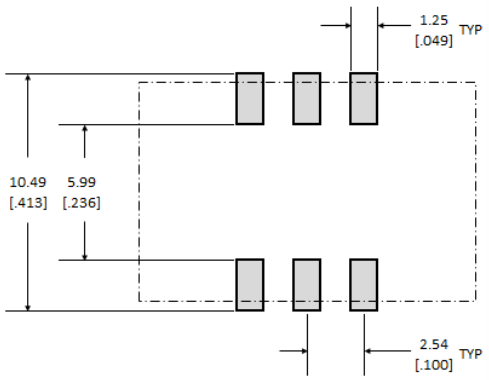


Dimension (mm)

Symbol	Min	Max
A	-	14.9
B	-	9.7
C	-	7.0
E	1.6	1.8
F	0.9	1.1
G	2.54 nominal	
H	2.54 nominal	

Pad	Connection
1	Vc or N/C
2	N/C
3	Ground
4	Output
5	N/C
6	Vcc

Recommended Solder Pad Geometry

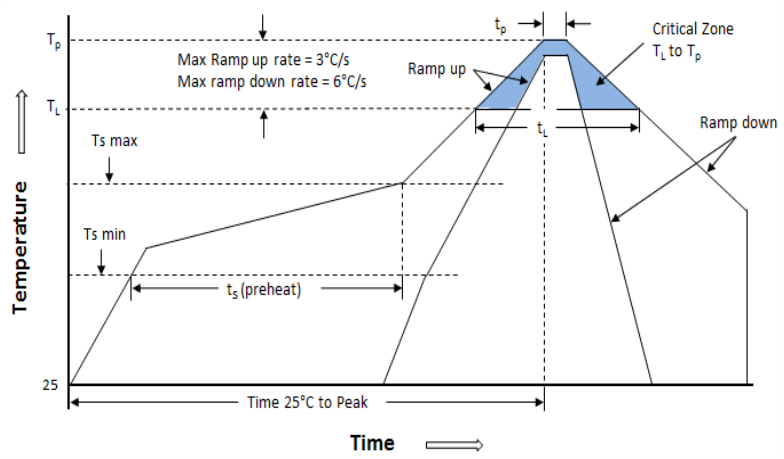


All dimensions are mm [inches]
All dimensions are nominal

Marking Key

**	Mfg site code
YYWWXXXXX	Serial Number (mfg date code = first 4 digits)

Solder Reflow



Ts max to TL(Ramp-up Rate)	3°C/s max
Preheat	
Temperature Min (Ts min)	150°C
Temperature typ (Ts)	175°C
Temperature max (Ts max)	200°C
Time (t_S)	60-120 seconds
Ramp-up Rate (T_L to T_P)	3°C/s max
Time maintained above:	
--Temperature (T_L)	217°C
--Time (t_L)	90 seconds max
Peak Temperature	245°C max for 10 seconds
Time within 5°C of peak (t_P)	20 seconds
Ramp-down Rate	6°C/s max
Time 25°C to Peak Temp (t)	8 minutes max

Note: Temperatures represent device body temperature.

Packing: Tape and Reel