

# Model 1500002

## 12.8 MHz, 9x14mm Stratum 3 OCXO

### Features

- Industry Standard 9x14mm footprint
- 3.3Vdc Supply Voltage
- -40°C to 85°C Operating Temperature Range
- HCMOS Square Wave Output
- Stratum 3 per Telcordia GR-1244-CORE



### Description

CTS model 1500002 is a small size, high performance SMT OCXO for use in telecom switching, and wireless communication applications.

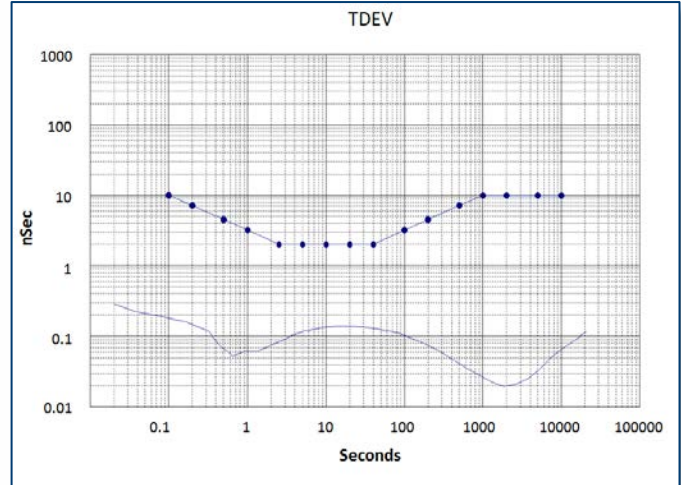
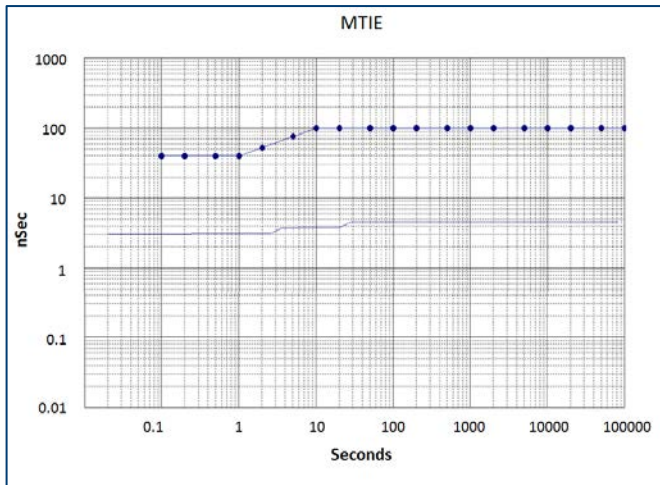
### Electrical Specifications

Parameter	Conditions & Remarks	Min	Typical	Max	Unit
<b>Operating Conditions</b>					
Operating Temperature Range	$T_{OP}$ ; max. rate of change 0.5°C/minute	-40	-	+85	°C
Supply Voltage	$V_{CC}$ ; $\pm 5\%$	3.135	3.3	3.465	Vdc
Power Consumption	$P_{MAX}$	-	-	2.5	W
	Steady State; $T_A = 25^\circ\text{C}$ ; Still Air	-	0.6	1.0	W
Load		13.5	15	16.5	pF
<b>Frequency Stability</b>					
Frequency	$F_{NOM}$		12.800		MHz
Calibration	$\Delta F/F_{NOM}$ ; $T_A = 25^\circ\text{C}$ ; $V_{CC} = 3.3\text{Vdc}$ at time of shipment	-	-	$\pm 0.5$	ppm
Temperature Stability	$\Delta F/F$ ; referenced to 25°C	-	-	$\pm 100$	ppb
Frequency vs. Voltage	$V_{CC} \pm 5\%$	-	-	$\pm 50$	ppb
Frequency vs. Load	15 pF $\pm 5\%$	-	-	$\pm 50$	ppb
Aging (After 30 days continuous operation)	Per day	-	$\pm 2$	-	ppb
	Per year	-	$\pm 300$	-	ppb
	20 years	-	$\pm 3$	-	ppm
Free run accuracy	All causes – 20 years	-	-	$\pm 4.6$	ppm
Short Term Stability (ADEV)	1.0 sec	-	-	0.1	ppb
Warm-up time	@ 25°C, After 5 mins referenced to the freq after 1 hour on	-	-	$\pm 500$	ppb
Holdover (still air)	- Constant temperature (24 hrs)	-	-	$\pm 10$	ppb
	- Variable temperature	-	-	250	ppb, pk-pk
Wander Generation	Meets Stratum 3 MTIE and TDEV per Telcordia GR-1244-CORE				

### Electrical Specifications (Continued)

Parameter	Conditions & Remarks	Min	Typical	Max	Unit
<b>Output Parameters</b>					
Output Signal	LVCMOS Square Wave				
Amplitude	$V_{OL}$	-	-	0.4	Vdc
	$V_{OH}$	2.4	-	-	
Rise/Fall Times	10% to 90%, 15pf load	-	-	5	ns
Duty Cycle	@50% of output signal	45	50	55	%
Phase Noise	1Hz	-	-70	-	dBc/Hz
	10Hz	-	-100	-	
	100Hz	-	-125	-	
	1KHz	-	-142	-	
	10KHz	-	-148	-	
	100KHz	-	-151	-	

Typical Stratum 3 Wander Generation performance per Telcordia GR-1244-CORE  
(locked through a 0.1Hz loop bandwidth)

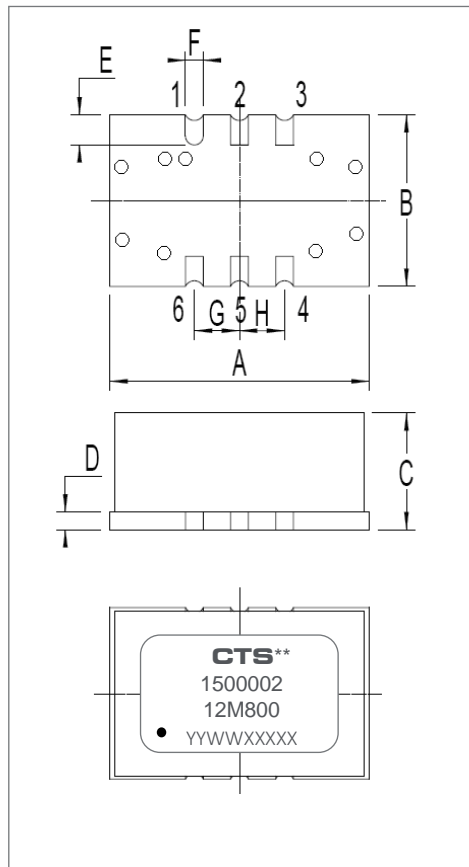


## Mechanical and Environmental

Storage Temp Range	-55 to +105°C
Operating Temp Range	-40 to +85°C
Reflow Profile	IPC/JEDEC J-STD-20; >217°C, 1.5 min and 245°C (Absolute max temperature), 10 secs. Note: Part is not designed to be reflowed in an inverted position
Mechanical Shock	100g, 6mS duration, 1/2 sine wave, 3 shocks each direction along 3 mutually perpendicular planes.
Drop	10 cm height, 3 times onto hard board with thickness 3cm. - IEC60028-2-32 test Ed
Vibration	Random: Frequency range: 1Hz-4Hz-100Hz-200 Acceleration: 0.0001g <sup>2</sup> /Hz-0.01g <sup>2</sup> /Hz-0.01g <sup>2</sup> /Hz-0.001g <sup>2</sup> /Hz Grms=1.15g – 30 minutes per axis Sine: 10 – 55 Hz, 0.75mm DA, Sweep time 30 minutes per axis
Thermal Shock	-40°C ~ +85°C; 0.5 hour dwells with <30 second transitions. 100 cycles
RoHS	Lead-Free. Fully compliant to RoHS Directive 2011/65/EU
MSL	Level 2

## Mechanical Specifications

### Package Drawing



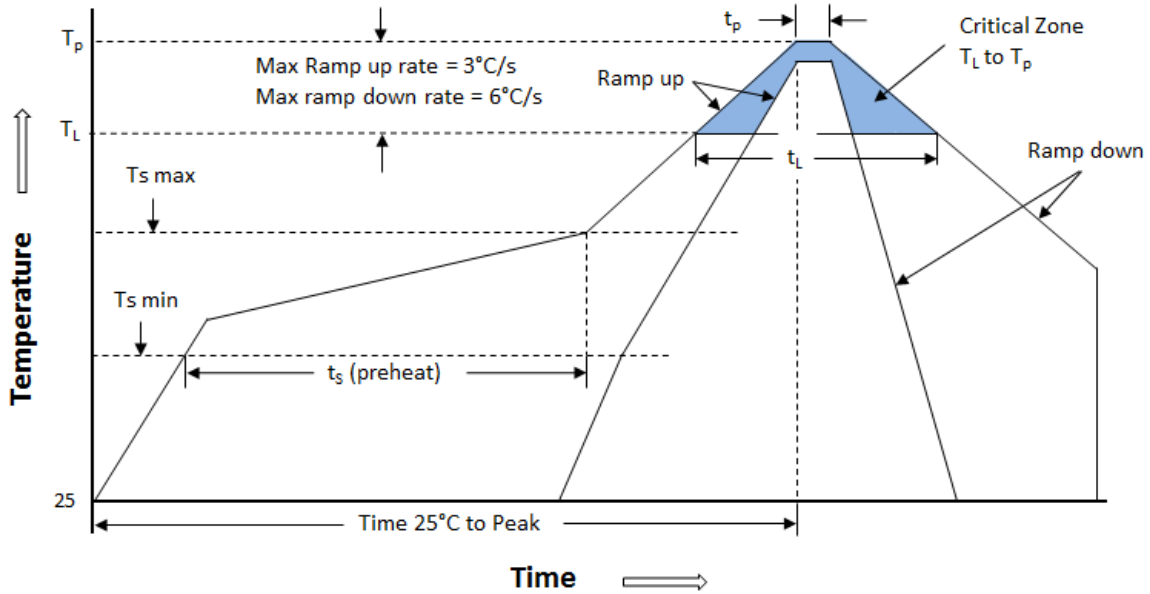
PAD	Connection
1	N/C
2	N/C
3	Ground
4	Output
5	N/C
6	V <sub>CC</sub>

Symbol	Dimension (mm)	
	Min	Max
A		14.9
B		9.7
C		7.0
D	0.9	1.1
E	1.6	1.8
F	0.9	1.1
G	2.54 nominal	
H	2.54 nominal	

Marking	
**	Mfg Site Code
YYWWXXXXX	Serial Number (mfg date code = first 4 digits of s/n)



### Reflow profile per IPC/JEDEC J-STD-020D



Note: The temperatures shown below represent the device body temperature

Ts max to $T_L$ (Ramp-up Rate)	$5^\circ\text{C/second max}$
Preheat	
Temperature Min ( $T_s \text{ Min}$ )	$150^\circ\text{C}$
Temperature Max. ( $T_s \text{ Max}$ )	$200^\circ\text{C}$
Time ( $t_s$ )	60-120 seconds
Ramp-up Rate ( $T_L$ to $T_p$ )	$3^\circ\text{C/second max}$
Time Maintained Above:	
--Temperature ( $T_L$ )	$217^\circ\text{C}$
--Time ( $t_L$ )	90 seconds max.
Peak Temperature ( $T_p$ )	$245^\circ\text{C max for 10 seconds}$
Time within $5^\circ\text{C}$ of actual peak ( $t_p$ )	30 seconds
Ramp-down Rate	$6^\circ\text{C/second max}$
Time $25^\circ\text{C}$ to Peak Temperature ( $t$ )	8 minutes max