

# Model 1499

## 14 x 9 mm SMD OCXO

### Features

- Small 14x9 SMD package size
- Output frequency range up to 50MHz
- 3.3V operation
- Low Jitter/Phase Noise
- Tape and Reel Packaging



Part Dimensions: 14.6 × 9.6 × 6.7 mm

### Description

The CTS Model 1499 is a low cost, small size, high performance OCXO. The high quality SC cut Quartz Crystal used in this OCXO offers high stability and low jitter/phase noise, making it the ideal choice for any telecommunications system. Other applications include: Telecom Switching, Wireless Communication and Timing over Packet.

Table 1. Ordering Information

Model	Stability	Temp Range	Supply Voltage	Aging	Voltage Control	Frequency
1499	— <u>V</u>	<u>B</u>	<u>E</u>	<u>C</u>	<u>N</u> —	<u>XXMXXX</u>

Code	Stability
R	±100ppb
T	±50ppb
U	±20ppb
V	±10ppb

See Table 2 for available stability options versus temperature range.

Code	Spec
E	+3.3Vdc

Code	Temp Range
B	0 to 70°C
D	-20 to 70°C
G	-40 to 85°C
X	-40 to 95°C <sup>1</sup>

Code	Spec.
V	Voltage Control
N	Fixed Freq

Code	Per day	Per year
C	1ppb	0.3ppm
F	3ppb	0.8ppm

Note 1. Available with aging code F only

Table 2. Stability Options

Code	Temperature Range	Stability (ppb)			
		R ±100	T ±50	U ±20	V ±10
B	0 to 70°C	*	*	*	*
D	-20 to 70°C	*	*	*	*
G	-40 to 85°C	*	*	*	*
X	-40 to 95°C	*	*	*	*

Part Number Example:  
1499-VBECN-20M000



## Electrical Specifications

Parameter	Conditions & Remarks	Min	Typical	Max	Unit
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### Operating Conditions

<b>Operating Temperature Range</b>	See Table 1 options.	-40	-	+85	°C
<b>Supply Voltage</b>	V <sub>CC</sub>	+3.135	+3.3	+3.465	Vdc
<b>Current Consumption</b>	During warm up	-	-	750	mA
	Steady state @ 25°C	-	-	200	mA
<b>Load</b>	Output to Ground	-	15	-	pf

### Frequency Stability

<b>Frequency</b>	F <sub>NOM</sub>	10	-	50	MHz
<b>Calibration</b>	$\Delta F/F_{NOM}$ ; T <sub>A</sub> = 25°C; at time of shipment at V <sub>C</sub> = 1.65V	-	-	±500	ppb
<b>Temperature Stability</b> (See Table 1 options)	(F <sub>max</sub> +F <sub>min</sub> ) /2	-	-	±50	ppb
<b>Voltage Stability</b>	V <sub>CC</sub> ±2%, ref to V <sub>CC</sub> = +3.3V	-	±5	-	ppb
<b>Load Stability</b>	±5%, ref. to CL = 15 pf	-	±5	-	ppb
<b>Aging</b> (After 30 days operation. See Table 1 options)	Per day	-	-	±3	ppb
	Per year	-	-	±0.8	ppm
	10 years	-	-	±2	ppm
<b>Total Free-Run Accuracy</b>	Under all operating conditions for 10 years	-	-	±2.5	ppm
<b>Short Term Stability ADEV</b>	In still air; 1.0 sec after 1 hr operation	-	0.02	0.07	ppb
<b>Warmup-Up Time</b>	T <sub>A</sub> =25°C; to within 100ppb of freq. @ 30 min	-	-	3	minutes

### Electronic Frequency Control – EFC (option)

<b>Voltage Range</b>	V <sub>C</sub> , Control voltage range	0	1.65	3.3	V
<b>Pulling Range</b>	Sufficient for 10 years life	±2.6	-	±4	ppm
<b>Slope</b>	Positive, monotonic				
<b>Linearity</b>		-	-	5	%



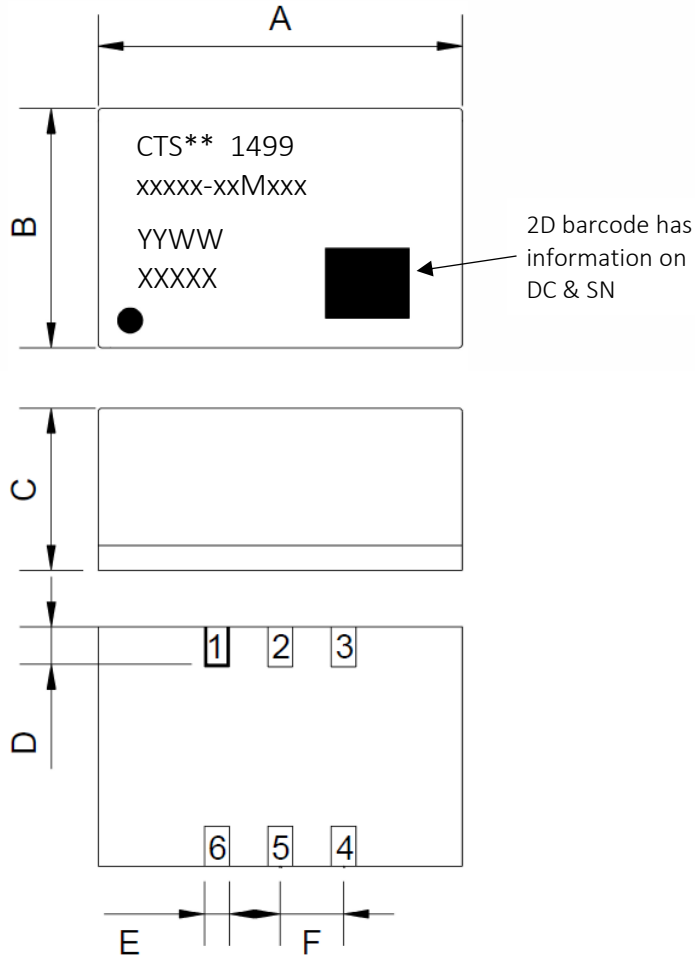
### Electrical Specifications (continued)

Parameter	Conditions & Remarks	Min	Typical	Max	Unit
<b>Output Parameters – Square Wave, LVCMOS</b>					
Waveform			LVCMOS		
Amplitude	V <sub>OL</sub>	-	-	0.3	Vdc
	V <sub>OH</sub>	2.7	-	-	
Rise / Fall Times	10% to 90% @ 15pf load	-	-	4	ns
Duty Cycle	@ 50% of output signal	45	50	55	%
Phase Noise (10MHz)	Offset = 1 Hz	-	-75	-	dBc/Hz
	10Hz	-	-105	-	
	100Hz	-	-127	-	
	1KHz	-	-145	-	
	10KHz	-	-157	-	
	100KHz	-	-158	-	
	1MHz	-	-159	-	

### Mechanical and Environmental

Parameter	Condition
Soldering	Maximum reflow temperature, 245°C for 10seconds, 240°C for 20seconds, per IPC/JEDEC J-STD-020D Note: Not intended for inverted reflow
MSL	Level 2
RoHS	Fully compliant to RoHS Directive EU 2015/863
Shock	1500G, 0.5msec, 6-axis 3 times per MIL-STD-883 Method 2002
Sinusoidal Vibration	20G, 10~2000Hz, 1.52mm, sweep 20minutes, 4 hours per axis per MIL-STD-883 Method 2007
Packaging	Tape and Reel
Storage Temperature Range	-55°C to +105°C

### Mechanical Specifications

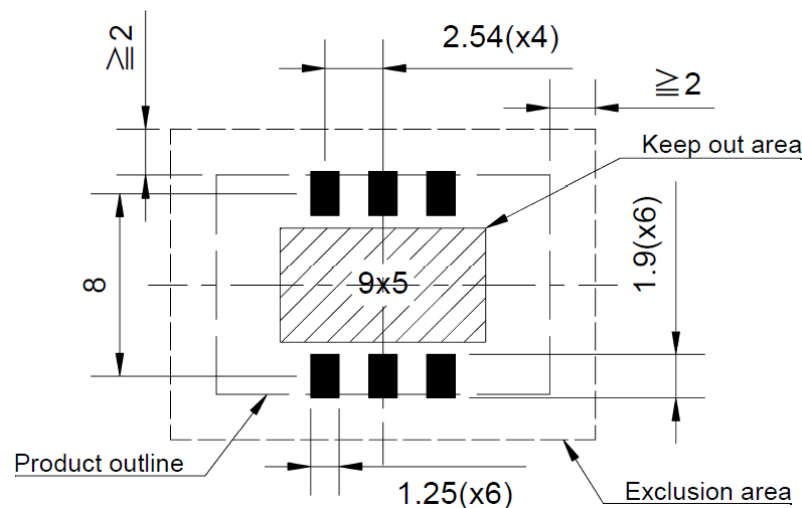


Marking		
**	=	Mfg Site Code
YYWW	=	Date Code
XXXXX	=	Serial Number

Pin Assignments	
Pin/Pad	Function
1	V <sub>C</sub> – Voltage control
2	DNC
3	Ground
4	RF Output
5	DNC
6	V <sub>CC</sub> – Supply voltage

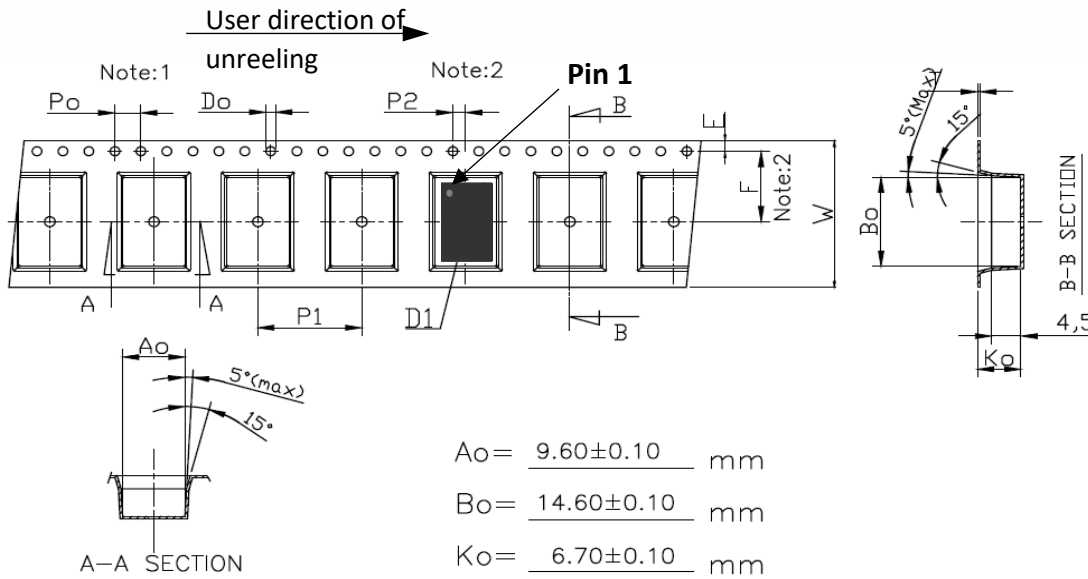
Dimension (mm)		
Symbol	Min	Max
A	-	14.6
B	-	9.6
C	-	6.7
D	1.6 (x6)	
E	1.0 (x6)	
F	2.54	

### Recommended Solder Pad Geometry



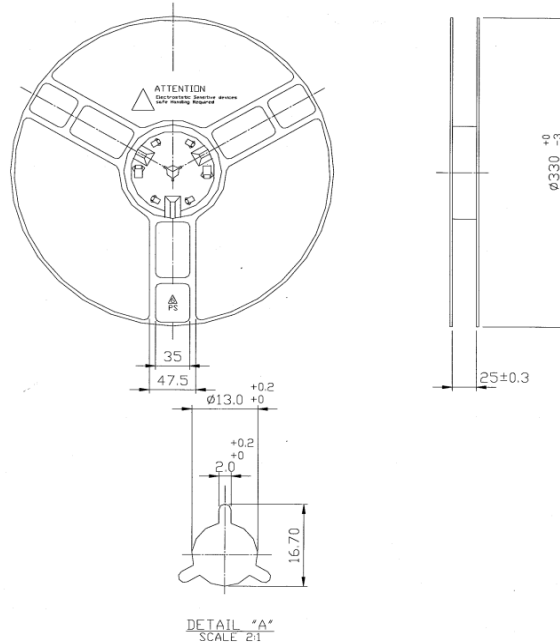
**Exclusion area** - To reduce thermal losses, a minimum 2 mm perimeter beyond the oscillator dimensions, free of surface or sub-surface ground or power planes, is recommended.

### Packing: Tape and Reel



Unit: mm

Symbol	Spec.
Po	4.0±0.10
P1	16.0±0.10
P2	2.0±0.10
Do	1.50 <sup>+0.1</sup> <sub>-0.1</sub>
D1	1.50(Min)
E	1.75±0.10
F	11.50±0.10
10Po	40.0±0.20
W	24.0 <sup>+0.3</sup> <sub>-0.1</sub>
T	0.40±0.05

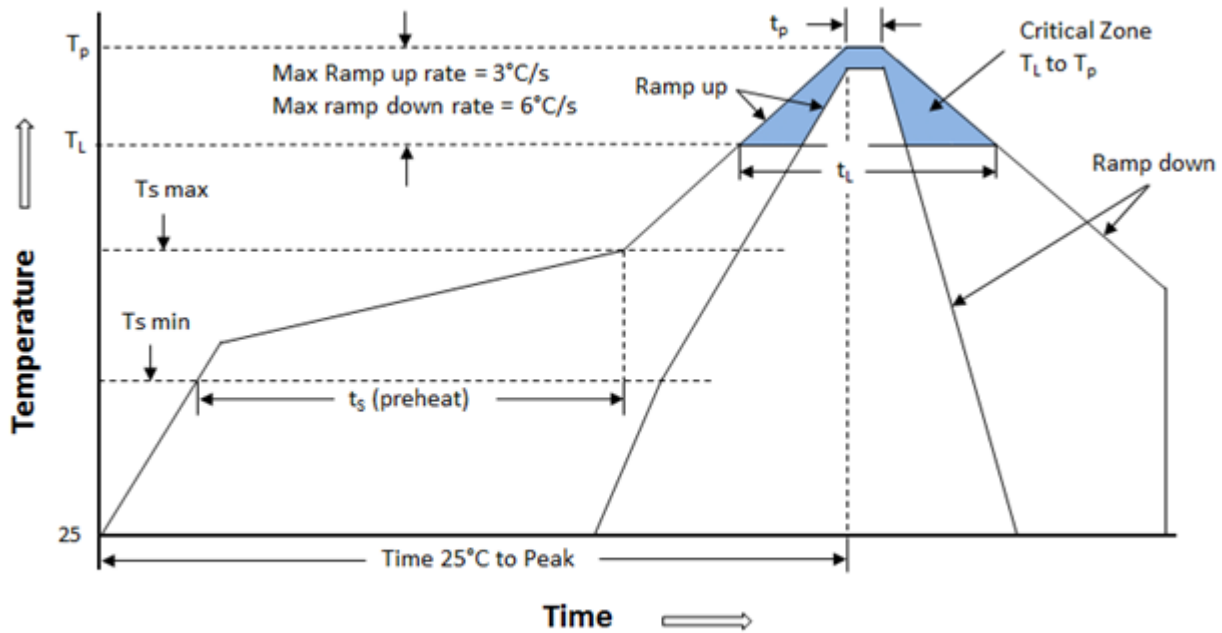


Standard reel quantity is 450pcs

#### Notes:

- 10 Sprocket hole pitch cumulative tolerance is ±0.1mm.
- Pocket position relative to sprocket hole measured as true position of pocket not pocket hole.
- Ao & Bo measured at 0.3mm above the bottom of the pocket.
- Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
- Carrier camber shall not be greater than 1mm per 100mm through length of 250mm.

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



Note: The temperatures shown below represent the device body temperature

$T_s$ max to $T_L$ (Ramp-Up Rate)	3°C/second max
<b>Preheat:</b>	
Temperature Min ( $T_s$ Min)	150°C
Temperature Typical ( $T_s$ Typ)	175°C
Temperature Typical ( $T_s$ Max)	200°C
Time ( $t_s$ )	60-120 seconds
Ramp-Up Rate ( $T_L$ to $T_p$ )	3°C/second max
<b>Time Maintained Above:</b>	
Temperature ( $T_L$ )	217°C
Time ( $T_L$ )	60-150seconds
Peak Temperature ( $T_p$ )	245°C max for 10 seconds
Time within 5°C of actual peak ( $T_p$ )	30 seconds
Ramp-Down Rate	6°C/second max
Time 25°C to Peak Temperature(T)	8 minutes max

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