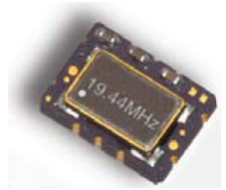


Description

DEI's 5.0x7.0mm Temperature Compensated Crystal Controlled Oscillators and Voltage Controlled Temperature Compensated Crystal Controlled Oscillators are designed for use in S3 Telecom Applications. Through the use of Analog Temperature Compensation, this device is capable of holding sub 1-ppm stabilities over the commercial or the industrial temperature ranges. All models meet +/-4.6ppm accuracies for twenty years.



Features

Miniature 5.0 x7.0mm Surface Mount Package
 3.3V Operation

LVC MOS or Clipped Sinewave Output Logic

Frequency Stabilities Available:

TCXO3185-50x / TCXO3185-60x: +/-0.28ppm

TCXO3185-51x / TCXO3185-61x: +/-0.50ppm

TCXO3185-52x / TCXO3185-62x: +/-1.00ppm

Temperature Ranges Available:

TCXO3185-5xx Series: 0 to 70°C

TCXO3185-6xx Series: -40 to 85°C

Frequency Tolerance: +/-4.60ppm for 20 yrs.

Low Jitter <1pS RMS

Tri-State Enable/Disable

Tape and Reel Packaging

RoHS Compliant / Lead Free

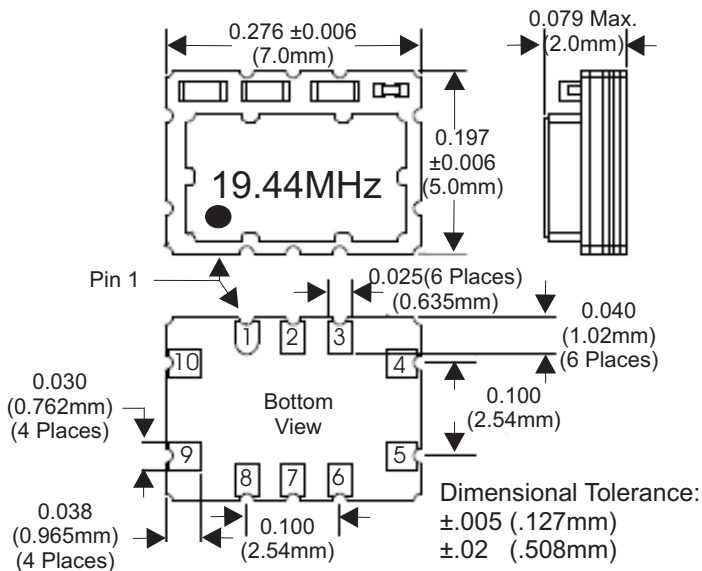
Recommended for New Designs

Applications

STRATUM 3 Applications

Timing Reference

Package Layout



Pin Connections

1	Do not connect
2	Do not connect
3	Do not connect
4	Ground
5	Output
6	Do not connect
7	Do not connect
8	Tri-state Enable / Disable
9	Supply, Vcc
10	Voltage Control (VCTCXO) N/C (TCXO)

Standard Frequencies Available *

6.4 MHz 9.72 MHz 10.0 MHz 10.24 MHz 12.5 MHz 12.8 MHz 13.5 MHz
 19.2 MHz 19.44 MHz 20.0 MHz 20.48 MHz 25 MHz 27 MHz 38.88 MHz

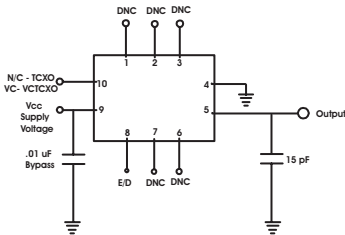
* Available frequencies from the factory for small quantity orders or quick delivery. Additional frequencies are available.

Features

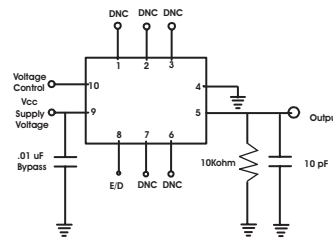
TCXO
 VCTCXO
 3.3V Operation
 LVCMOS Output
 Clipped Sinewave Output
 Frequency Stability:
 TCXO3185-50x/TCXO3185-60xSeries +/-0.28ppm
 TCXO3185-51x/TCXO3185-61xSeries +/-0.50ppm
 TCXO3185-52x/TCXO3185-62xSeries +/-1.00ppm

Temperature Range:
 TCXO3185-5xxSeries 0 to 70°C
 TCXO3185-6xxSeries -40 to 85°C
 Low Jitter <1pS RMS
 Tri-State Enable/Disable
 Surface Mount Package
 Tape and Reel Packing
 RoHS Compliant / Lead Free

LVCMOS Test Circuit



Clipped Sinewave Test Circuit



Absolute Maximum Ratings

Table 2.0

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	125	°C	
Supply Voltage (Vcc)	-0.5	-	6.0	Vdc	
Input Voltage (Vcc)	-0.5	-	Vcc+0.6	Vdc	

Model Specifications

Table 3.0
Notes

Model Number	TCXO3185-502	TCXO3185-503	TCXO3185-504	TCXO3185-505	Notes
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 40 MHz				
Frequency Stability	±0.28ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	0 to 70°C				
Holdover Stability	±0.32ppm				2

Table 4.0
Notes

Model Number	TCXO3185-602	TCXO3185-603	TCXO3185-604	TCXO3185-605	Notes
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 40 MHz				
Frequency Stability	±0.28ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	-40 to 85°C				
Holdover Stability	±0.32ppm				2

Model Number	TCXO3185-512	TCXO3185-513	TCXO3185-514	TCXO3185-515	Table 5.0 Notes
Output Type	LVC MOS	Clipped Sinewave	LVC MOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 40 MHz				
Frequency Stability	±0.50ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	0 to 70°C				

Model Number	TCXO3185-612	TCXO3185-613	TCXO3185-614	TCXO3185-615	Table 6.0 Notes
Output Type	LVC MOS	Clipped Sinewave	LVC MOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 40 MHz				
Frequency Stability	±0.50ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	-40 to 85°C				

Model Number	TCXO3185-522	TCXO3185-523	TCXO3185-524	TCXO3185-525	Table 7.0 Notes
Output Type	LVC MOS	Clipped Sinewave	LVC MOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 52 MHz				
Frequency Stability	±1.00ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	0 to 70°C				

Model Number	TCXO3185-622	TCXO3185-623	TCXO3185-624	TCXO3185-625	Table 8.0 Notes
Output Type	LVC MOS	Clipped Sinewave	LVC MOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range	6.4 to 52 MHz				
Frequency Stability	±1.00ppm				1
Supply Voltage	3.3Vdc				
Temperature Range	-40 to 85°C				

Notes:

- 1) Frequency stability vs. change in temperature. [$\pm(F_{\max} - F_{\min})/2.F_0$].
- 2) Inclusive of frequency stability, supply voltage change ($\pm 1\%$), aging, for 24 hours.

Electrical Specifications for all Models

Operating Specifications

Table 9.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
TCXO Frequency Calibration @ 25 C		-1.00	-	1.00	ppm	1
Supply Voltage Variation. (Vcc±5%)		-0.2	-	0.2	ppm	
Load Coefficient, ±5pF		-0.2	-	0.2	ppm	
Static Temperature Hysteresis		-0.4	-	0.4	ppm	2
Total Frequency Tolerance		-4.60	-	4.60	ppm	3
Supply Voltage	(Vcc)	3.135	3.3	3.465	Vdc	4
Supply Current	(Icc)	-	6	10	mA	
Period Jitter		-	3	5	ps rms	
Integrated Phase Jitter (BW=12kHz to 20MHz)		-	0.3	1.0	ps rms	
SSB Phase Noise at 10Hz offset		-	-80	-70	dBc/Hz	
SSB Phase Noise at 100Hz offset		-	-110	-100	dBc/Hz	
SSB Phase Noise at 1KHz offset		-	-135	-130	dBc/Hz	
SSB Phase Noise at >10KHz offset		-	-150	-145	dBc/Hz	
SSB Phase Noise at >100KHz offset		-	-150	-150	dBc/Hz	
Start Up Time		-	-	10	ms	

Input Characteristics For Enable / Disable Function (Pad 8)

Table 10.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
Enable Voltage (High) or open circuit	(Vih)	70% Vcc	-	-	Vdc	5
Disable Voltage (Low) Output Tri-stated	(Vil)	-	-	30% Vcc	Vdc	

Input Characteristics For Voltage Control (Pad10)

Table 11.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
Control Voltage Range (Vcc = 3.3V)	(Vc)	0.3	1.65	3.0	Vdc	
Frequency Tuning		±10	-	-	ppm	6
Linearity		±5	-	-	%	
Slope		Positive				

LVC MOS Output Characteristics

Table 12.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
LOAD		-	-	15	pF	
Voltage (High)	(Voh)	90%Vcc	-	-	Vdc	
(Low)	(Vol)	-	-	10%Vcc	Vdc	
Current (High)	(loh)	-4	-	-	mA	
(Low)	(lol)	-	-	4	mA	
Duty Cycle at 50% of Vcc		45	50	55	%	
Rise / Fall Time 10% to 90%		-	-	8	ns	

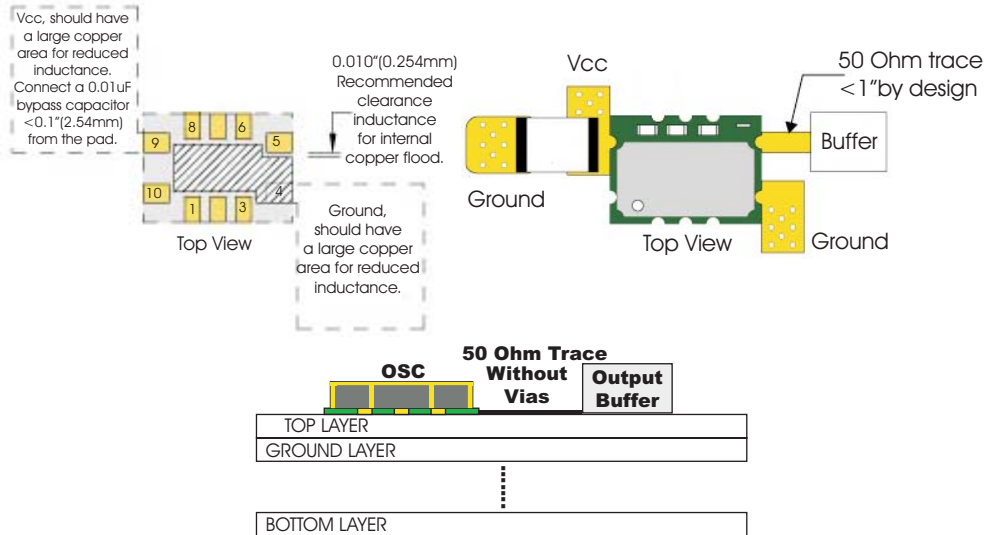
Clipped Sinewave Output Characteristics

Table 13.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
Load						7
Output Load Resistance		-	10K	-	Ohms	
Output Load Capacitance		-	10	-	pF	
Output Voltage (<= 40 MHz)		1.00	-	-	V pk-pk	
Output Voltage (> 40 MHz)		0.80	-	-	V pk-pk	

- 1) TCXO: Initial calibration @ 25 C. Specifications at time of shipment after 48 hours of operation.
- 2) Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C.
- 3) Inclusive of calibration @ 25 C, frequency vs. change in temperature, change in supply voltage (±5 %), load change (±5 %), reflow soldering process and 20 years aging.
- 4) For best in application performance, careful selection of an external power source is critical. Select an external regulator that meets or exceeds the following specifications regarding voltage regulation tolerance, initial accuracy, temperature coefficient, voltage noise, and low voltage noise density.
Factory Test Conditions: Initial Accuracy ± 2mv, Noise (0.1Hz to 10 KHz) 15uV p-p, Voltage Noise Density = 50nV/square root of Hz, Temperature Coefficient < 5ppm per degree C.
- 5) Leave Pad 8 unconnected if enable / disable function is not required. When tri-stated, the output stage is disabled but the oscillator and compensation circuit are still active (current consumption < 1 mA).
- 6) Additional pull ranges are available; please contact the factory for additional information.
- 7) Output is AC coupled.

Design Recommendations



Package Characteristics

Table 14.0

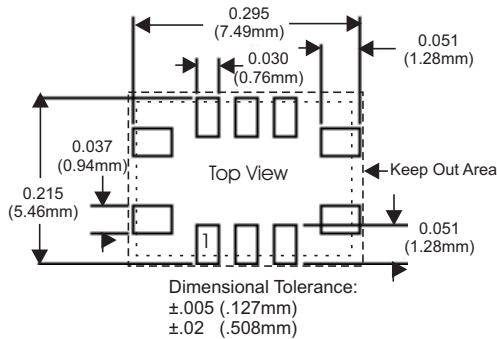
Package	Ceramic Surface Mount Package.
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Environmental Characteristics

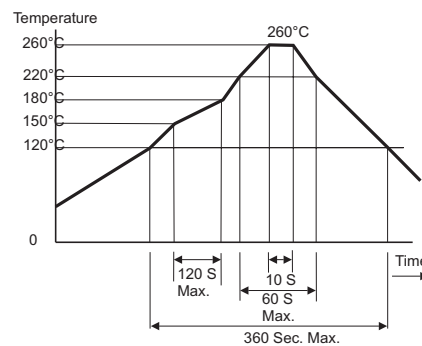
Table 15.0

Vibration:	Vibration per Mil Std 883E Method 2007.3 Test Condition A
Shock:	Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B.
Soldering:	SMD product suitable for Convection Reflow soldering. Peak temperature 260 C. Maximum time above 220 C, 60 seconds.
Solderability	Solderability per Mil Std 883E Method 2003

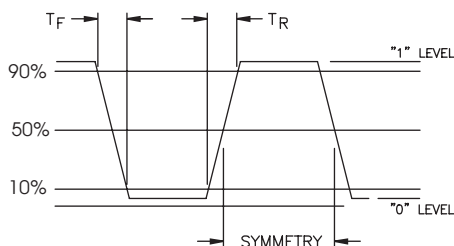
Suggested Pad Layout



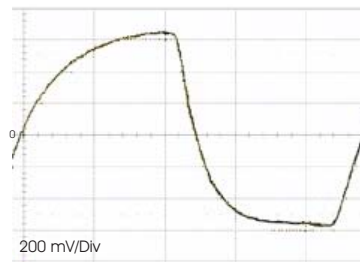
Solder Profile



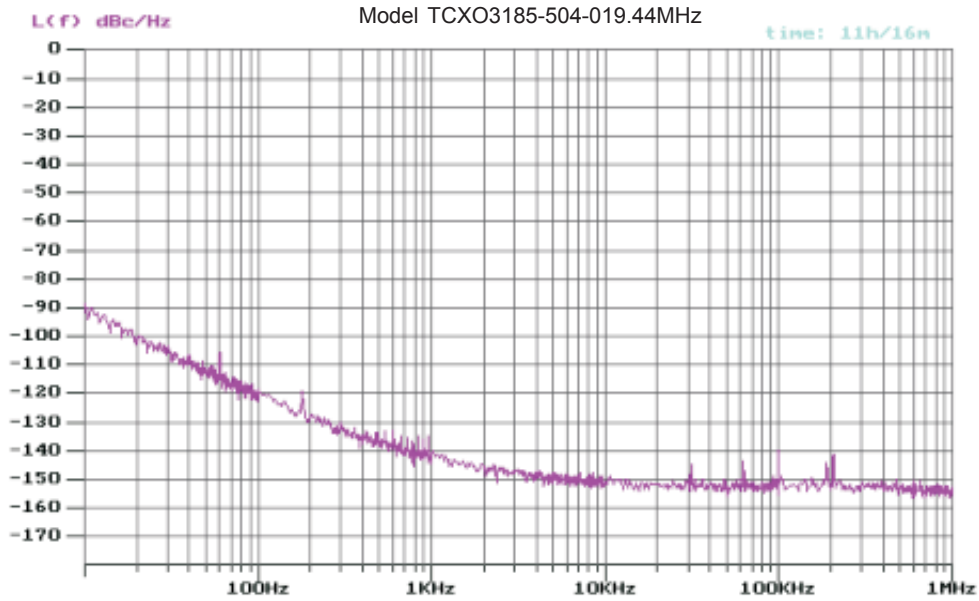
LVC MOS Output Waveform



Clipped Sinewave Output Waveform



Typical Phase Noise



Tape and Reel Specifications

