


LT-802

Description

The LT-802 Temperature Compensated Crystal Oscillator (Low Earth Orbit TCXO) is a quartz stabilized, clipped sine wave or CMOS output, 6th order analog temperature compensated oscillator, operating off a 2.5V or 2.8 V supply in a 5x3.2 mm ceramic package. This NewSpace TCXO is a cost-effective COTS solution with a short lead time.

Features

- Radiation tolerant
- TID: 50 krad(Si) total dose
- SEL: 40 MeV*cm²/mg
- Excellent Temperature Stability
- CMOS and Clipped Sinewave Output
- Frequency Range: 6.4 - 52¹ MHz
- Standard Frequencies: 10, 12.8, 19.2, 20, 24.576, 25, 30.72, 32, 38.4, 40, 50MHz
- Sn/Pb/Ag (62%/36%/2%) Solder pad coating (Optional)
- COO: Germany

Applications

- Space - Low Earth Orbit

Performance Specifications

Parameter	Frequency Stabilities ^{1,2}				Condition
	Min	Typ	Max	Units	
vs. operating temperature range (referenced to (dfmax+dfmin)/2)	-280		+280	ppb	-40 to +85°C ¹
Holdover	-40		+40	ppb	In a 24h period at constant temperature
Initial tolerance	-1.0		+1.0	ppm	at time of shipment, @ 25°C & V _c =1.5V
vs. supply voltage change	-0.2		+0.2	ppm	V _s ±5% static @ HCMOS
	-0.1		+0.1	ppm	V _s ±5% static @ Clipped Sinewave
vs. load change	-0.2		+0.2	ppm	Load ±10% static @ HCMOS
	-0.1		+0.1	ppm	Load ±10% static @ Clipped Sinewave
vs. aging / 1st year	-0.5		+0.5	ppm	up to 25MHz, @ 40°C
	-1		+1	ppm	above 25MHz, @ 40°C
vs. aging / 10 Years	-3.0		+3.0	ppm	@ 40°C
G-sensitivity		1.5		ppb/g	

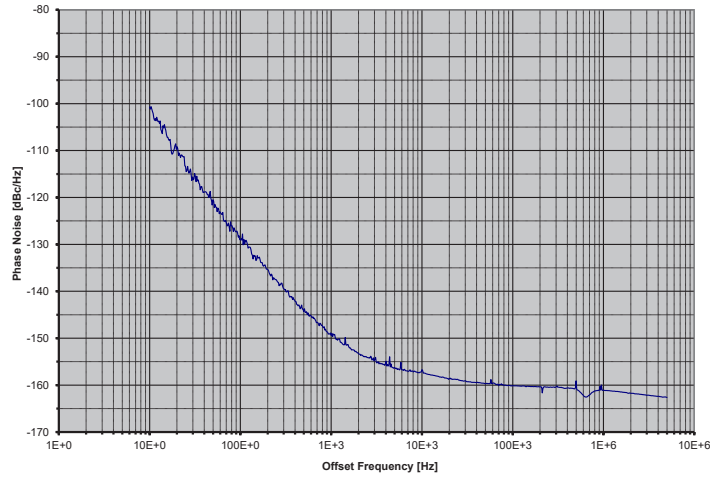
Performance Specifications

Supply Voltage (Vs) ⁶						
Parameter	Min	Typical	Max	Units	Condition	
Supply voltage (standard)	2.66	2.8	2.94	VDC		
Current consumption			3.5	mA	Clipped Sine @ 10MHz, steady state @ +25°C	
Current consumption			5	mA	LVCMOS @ 20MHz, steady state @ +25°C	
Current consumption			7	mA	LVCMOS @ 40MHz, steady state @ +25°C	
Current consumption			8	mA	LVCMOS @ 50MHz, steady state @ +25°C	
RF Output (Clipped Sinewave)						
Load R	9	10	11	kΩ		
Load C	9	10	11	pF		
Output Power	0.8	1.2	2.0	V _{pp}	@ 10kΩ 10pF	
RF Output (HCMOS)						
Load	13.5	15	16.5	pF		
Signal Level (Vol)			0.28	VDC	with Vs=2.8V and 15pF Load	
Signal Level (Voh)	2.52				with Vs=2.8V and 15pF Load	
Rise and Fall time			6.5	ns		
Duty Cycle	40	50	60	%	@ (Voh-Vol)/2	
Start-up time			10	ms	90% amplitude	
Frequency Tuning (EFC)						
Tuning Range	Fixed TCXO; No adjustment				Options ¹	
Tuning Range	±6.0		±10.0	ppm		
Linearity	10%					
Tuning Slope	Positive					
Control Voltage Range	0.5	1.5	2.5	VDC	@ V _s = 2.8V	
Freq. Control input impedance	100			kΩ		
Additional Parameters						
Weight			1.0	g		
Processing & Packing	Handling & Processing Note					
Reflow Profile	IPC / JEDEC J-STD-020 (latest version)					
Absolute Maximum Ratings						
Supply voltage (Vs)	-0.6		4.6	V		
Control voltage	0		Vs	V		
Operable Temperature Range	-40		+105	°C		
Storage Temperature Range	-55		+125	°C		
Phase Noise ³						
Phase Noise		-102 -129 -148 -156 -160		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz	@ 10MHz
Phase Noise		-96 -125 -145 -158 -159		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz	@ 20MHz
Additional Information	Bypass capacitor is recommended					

Typical Performance Data

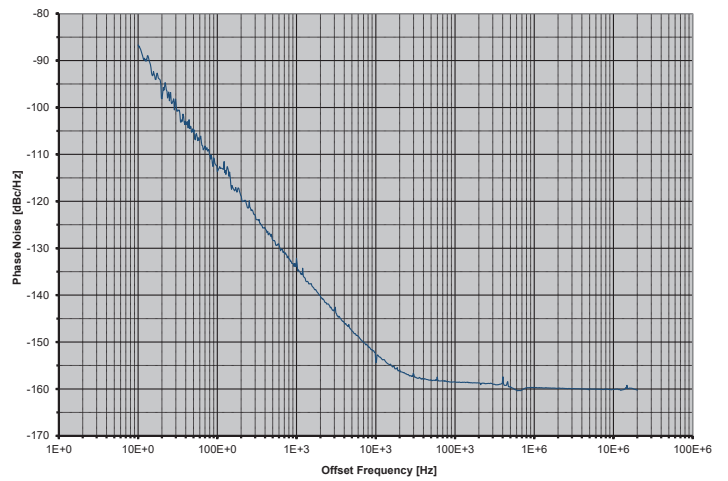
Phase Noise³

LT-802 @ 10MHz, CMOS



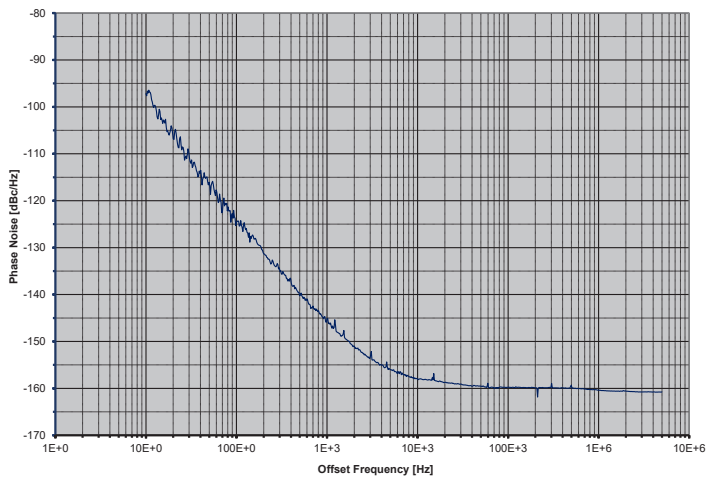
Phase Noise³

LT-802 @ 50MHz, CMOS



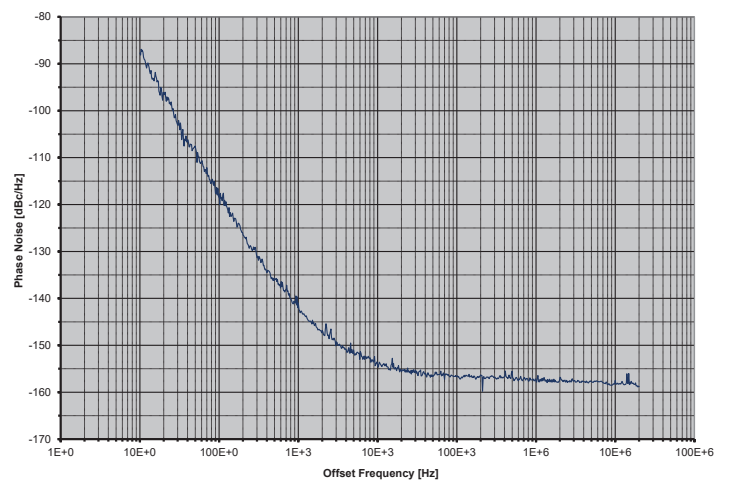
Phase Noise³

LT-802 @ 20MHz, CMOS

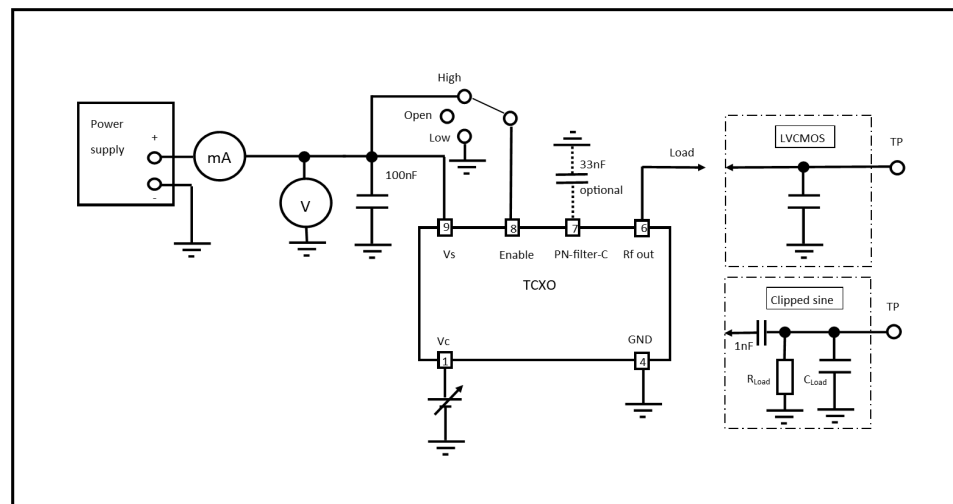


Phase Noise³

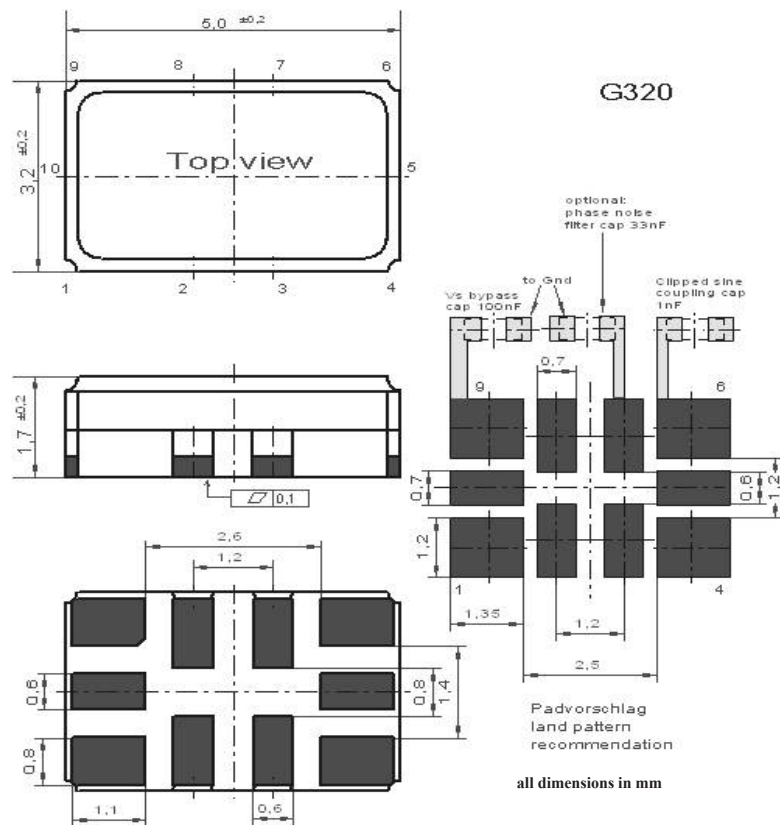
LT-802 @ 50MHz, clipped sinewave



Test schematic of LT-802



Outline Drawing / Enclosure



Enable pin function: LT-802

Pin 8 state:	Pin 6 output:
High >0.7 Vs	Output enabled and operating
Open	Output enabled and operating
Low <0.3 Vs	Output disabled
Marking: LT-802	
Frequency	
Serial Number	
AYYWW	

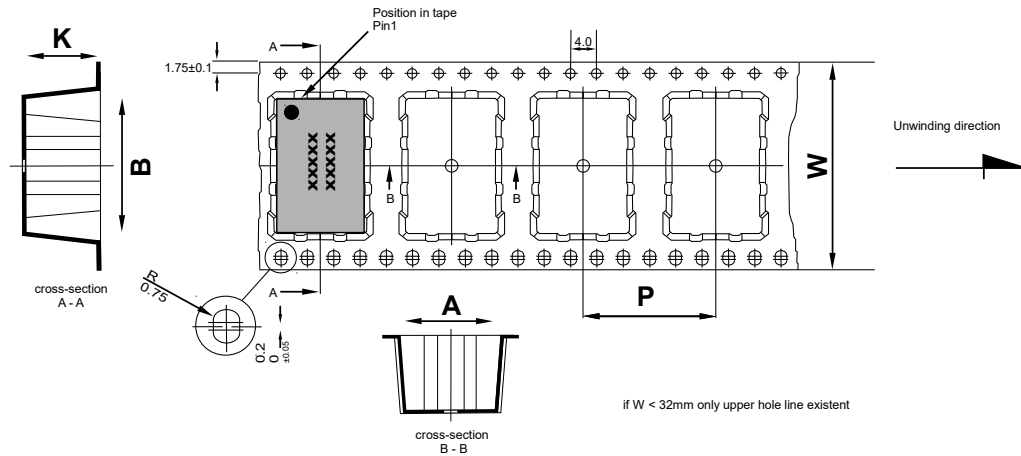
Pin Connections

1	Voltage Control (V_c) or No Connect (option)
2	Do not connect
3	Do not connect
4	Ground (GND)
5	Ground (GND)
6	RF Output
7	N.C. or Phase Noise Filter Capacitor (option)
8	Enable Control
9	Supply Voltage Input (V_s)
10	Ground (GND)

Termination Finish

Package Codes	10pad ceramic package with the following finish
0	Gold over Nickel; Au 0.76µm min. Ni 1.91µm min.
1	Terminations tin lead solder dipped with 6 - 10 µm Sn/Pb/Ag (62%/36%/2%)

Standard Shipping Method



Enclosure Type	Tape Width W (mm)	Quantity per meter	Quantity per reel	Dimension P
G320	12	150	750	8

Recommended Reflow Profile

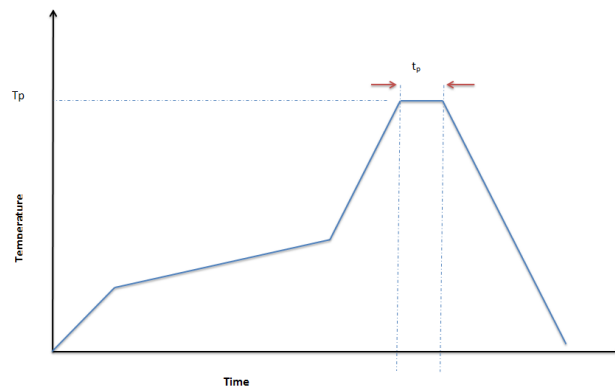
TP: max 250°C (@ solder joint, customer board level)

T_p: max: 10...30 sec

Additional Information:

This SMD oscillator has been designed for pick and place reflow soldering

SMD oscillators must be on the top side of the PCB during the reflow process.



Environmental Conditions

Rapid Temperature Changes	MIL-STD-883G Meth 1010.8 Cond.B - 1000cycles -55/+125°C; cycle time 30min
Vibration	MIL-STD-883 Meth 2007 Cond A 20g 20-2000Hz 4x in each 3axis 4 min sweep time
Shock	MIL-STD-202 Meth 213B Cond. F; 1500g 0,5ms 6 shocks in each direction
Solderability	J_STD_002C Cond A, Through hole device/ Cond. B, SMD 255°C (dipping time 5+/-0,5sec.) Dip+Look with 8h damp pre-treatment: solder wetting >95%
Humidity Bias Life Test	JESD22-A101; 85°C/85% RH 1008h
ESD	JEDEC JS-001 Class 2 10* 2000V
Moisture Classification Level	J-STD-020 acc. JESD22-A113-B
High temp operating life(HTOL)	MIL-STD-202 Meth108A Cond C - 1000h @ 105°C power on
RoHS Compliance	100% ROHS compliant
Reflow Simulation Test	MIL-STD-202 Method 108A Cond. K - Total 3x Lead free profile (for SMD)
MSL Level	MSL 1

Ordering Information⁵

LT - 802 0 - G A E - 287 0 - 10M0000000

Product Family
LT: LEO TCXO

Package
5x3.2 mm²

Package Code
0: 10 pad ceramic package
1: 10 pad ceramic package solder coated

Supply Voltage⁶
G: 2.8V
H: 2.5V

RF Output Code
A: HCMOS
F: Clipped Sinewave

Temperature Range
E: -40°C to +85°C

Frequency

Frequency Control
0: No Tuning
1: EFC: ±6 to ±10ppm

Stability Code¹
287: ±280ppb
507: ±500ppb
106: ±1.0ppm

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, temperature (25°C).
3. Phase noise with optional Phase noise Filter Capacitor. Phase noise degrades with increasing output frequency.
4. Subject to technical modification.
5. Contact factory for availability.
6. Contact factory for 3.0 or 3.3V supply

Contact Information

USA:

100 Watts Street
Mt Holly Springs, PA 17065
Tel: 1.717.486.3411
Fax: 1.717.486.5920

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