

Features

28 MHz Operating Frequency
 Better than +/- 1.5 PPM stability from -40C to 85C
 21.3 mm x 11.7 mm x 4.5 mm SMD Package
 5.0V; clipped sine output
 Mechanical Frequency Adjustment

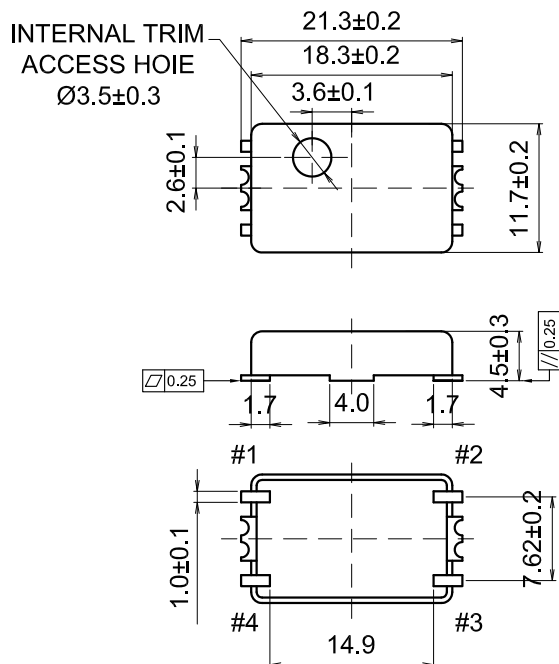
Typical Applications

Optimized for Mobile Radio Frequency Reference Oscillator

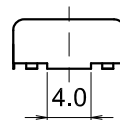
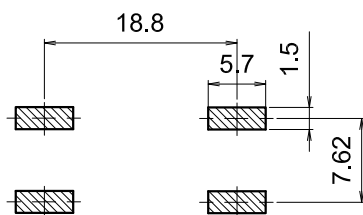
Description

The TCXO1811S-28MHz offers a high stability clipped sine output based on continuous analog temperature compensation for excellent phase noise performance. Excellent long term reliability is enhanced with aggressive thermal conditioning prior to shipment.

Mechanical Drawing and PIN Connections



Recommended Soldering Pattern



PIN CONNECTION

- #1 V.C or N.C
- #2 GND
- #3 OUTPUT
- #4 Vcc

Specification

TCXO Specification		Sym.	Condition	Value			Unit	Note
				Min.	Typ.	Max.		
Operational Frequency Range		f ₀			28.000		MHz	
Clipped Sine	Load				10 10		pF Kohm	
	Output voltage			1.00			V _{pp}	
Power supply								
Voltage		V _{cc}		4.75	5.00	5.25	V	
Current consumption						3	mA	
Frequency stability								
vs. temperature			From -40C to 85C	- 1.5		+ 1.5	PPM	
Tolerance at 25C ;			24 hrs after REFLOW	- 1.0		+ 1.0	PPM	
First Year Aging								
First Year Aging			After 30 days operation	- 1.0		+ 1.0	PPM	
SSB Phase noise At 50 MHz HCMOS			10 Hz		-90		dBc/Hz	
			100 Hz		-120		dBc/Hz	
			1KHz		-140		dBc/Hz	
			10KHz		-150		dBc/Hz	

Reliability Test Standard

ENVIRONMENTAL

TEST ITEM	TESTING PROCEDURE & CONDITIONS	EVALUATION
1. THERMAL SHOCK TEST	<p>1. The test should be performed in accordance with the following condition for 10 cycle.</p> <p>2. The crystal unit should be kept in room temperature for 1 hour then tested.</p>	The crystal unit should fulfill the specified requirements of the electrical characteristics and appearance.
2. HUMIDITY	<p>1. temperature : $+40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ RELATIVE HUMIDITY : 90~95% TEST PERIOD : 48 HOURS</p> <p>2. The crystal unit should be kept in room temperature for 1 hour then tested.</p>	The crystal unit should fulfill the specified requirements of the electrical characteristics and appearance.
3. COLD TEMPERATURE TEST	<p>1. TEMPERATURE : $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ TEST PERIOD : 2 HOURS</p> <p>2. The crystal unit should be kept in room temperature for 1 hour then tested.</p>	The crystal unit should fulfill the specified requirements of the electrical characteristics and appearance.
4. THERMAL TEST	<p>1. TEMPERATURE : $+85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ TEST PERIOD : 24 HOURS</p> <p>2. The crystal unit should be kept in room temperature for 1 hour then tested.</p>	The crystal unit should fulfill the specified requirements of the electrical characteristics and appearance.
5. RAPID CHANGE IN TEMPERATURE	<p>1. TEMPERATURE : $+85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ TEST PERIOD : 120 HOURS</p> <p>2. The crystal unit should be kept in room temperature for 1 hour then tested.</p>	The crystal unit should fulfill the specified requirements of the electrical characteristics and appearance.

MECHANICAL

TEST ITEM	TESTING PROCEDURE & CONDITIONS	EVALUATION
1.LEAD TENSILITY	1. FIX THE UNIT. 2. APPLY 2LB OF WEIGHT AXIS TO THE LEADS. 3. TIME : 5 SECONDS	SHOULD PASS SEALING AND VISUAL TEST
2. LEAD BENDING	1. ATTACH 1 LB OF WEIGHT TO EACH OF THE LEADS. 2. BENDING ANGLE : 90° (FROM THE NORMAL POSITION TO 45° OPPOSITE DIRECTION) 3. BENDING TIME : 3 SECONDS(EACH DIRECTION) 4. NUMBER OF BENDING : 2 TIMES	SHOULD PASS SEALING AND VISUAL TEST
3. LEADS SOLDERABILITY	1. DIP THE LEADS INTO FLUX(ROJIN METHANOL) FOR 5 SECONDS 2. DIP THE LEADS INTO 250±5℃ 99% Sn DIPPING SOLUTION FOR 5 SECONDS.	THE DIPPED PART OF THE LEADS SHOULD HAVE 90~95% Sn COATING.
4. SOLDERING HEAT RESISTANCE TEST	1. PERFORM ELECTRICAL CHARACTERISTICS TEST BEFORE STARTING THIS PROCEDURE. 2. DIP THE LEADS INTO FLUX(ROJIN METHANOL) FOR 5 SECONDS. 3. DIP THE LEADS INTO 260±5℃ 99% Sn DIPPING SOLUTION FOR 5 SECONDS. 4. TAKE THE UNIT OUT, STORE AT ROOM TEMPERATURE FOR 30 SECONDS THEN MEASURE THE ELCTRICAL CHARACTERISTICS.	SHOULD PASS SEALING AND VISUAL TEST
5. VIBRATION	1. PERFORM ELECTRICAL CHARACTERISTICS TEST BEFORE STARTING THIS PROCEDURE. 2. THE UNIT SHOULD BE FIXED ONTO A VIBRATING MACHINE AND THEN SHAKEN X.Y.Z DIRECTIONS. VIBRATING FREQUENCY : 10 ~ 55 Hz AMPLITUDE : 0.03 Inch FACTOR TIME : 1 MINUTES TESTING TIME : 30 MINUTES EACH FOR X, Y, Z DIRECTIONS	SHOULD PASS SEALING AND VISUAL TEST
6. DROP TEST	1. PERFORM ELECTRICAL CHARACTERISTICS TEST BEFORE STARTING THIS PROCEDURE. 2. FROM THE HEIGHT OF 500mm DROP THE UNIT 3 TIMES ONTO A HARD RUBBER SURFACE.	SHOULD PASS SEALING AND VISUAL TEST
7. LEAK TEST	USE Helium Leak Detector. Bombing PRESSURE : 5kg/cm ² Bombing TIME : 2 HOURS LEAK SHOULD BE LESS THAN 1E-8 atm.cc/sec.	GAS OR AIR SHOULD NOT BE DETECTED.
8. MARKING ERASE	SUBMERGE THE UNIT INTO IPA[ISOPROPYL ALCOHOL] SOLUTION FOR 10 MINUTES AND BRUSH THE MARKING 10 TIMES WITH A TOOTH BRUSH.	MARKING SHOULD NOT BE ERASED.

Caution

* IN ORDER TO MAINTAIN QUALITY, WITHOUT CHANGE IN CHARACTERISTICS OF THE CRYSTAL UNITS, PLEASE FOLLOW BELOW RECOMMENDATION.

SHOCK

ALL CRYSTAL UNITS HAVE A THIN CRYSTAL BLANKS WITHIN. IF IT IS DROPPED ABOVE THE RECOMMENDED DROPPING HEIGHT(500mm), THE SPECIFIC CHARACTERISTICS AND APPEARANCE CAN BE CHANGED. PLEASE PAY SPECIAL ATTENTION TO EXTERNAL SHOCK.

ENVIRONMENTAL

CRYSTAL UNITS' FREQUENCY CAN BE CHANGED DUE TO SURROUNDING TEMPERATURE. IF IT IS STORED NEXT TO A HIGH TEMPERATURE HEATER (ABOVE+85°C) OR BELOW 40°C, AND A STRONG LIGHT SOURCE FOR LONG PERIOD OF TIME, THE ELECTRICAL CHARACTERISTICS CAN BE CHANGED. IT IS SUGGESTED THAT THESE ENVIROMENTS BE AVOIDED.

IF THE UNIT IS PLACED IN A HUMID ENVIRONMENT, LEAD TERMINAL CAN BE DAMAGED; THEREFORE, DO NOT STORE THE CRYSTAL UNITS IN A HUMID ENVIRONMENT.

CRYSTAL UNIT HAS VIBRATING CHARACTERISTICS. IF IT IS PLACED WHERE VIBRATION EXISTS, THE OPERATING CHARACTERISTICS CAN BE ALTERED; THEREFORE, THIS ENVIRONMENT SHOULD BE AVOIDED.

LEADS

IF THE LEADS ARE BENT 90° FROM ITS AXIS FOR MORE THAN 2 TIMES THE TERMINAL COULD BE DISCONNECTED; THEREFORE, DO NOT BENT THE LEADS EXCESSIVELY.

AFTER SOLDERING CRYSTAL UNITS INTO A PCB, IMPACTING THE UNIT FROM THE TOP, BOTTOM, LEFT OR RIGHT SIDE OF THE UNIT CAN SHATTER THE GLASS PORTION OF THE BASE, RENDERING THE UNIT USELESS.

ASSEMBLY METHOD

CORRECT ULTRASONIC FREQUENCY FOR CLEANING SHOULD BE LESS THAN 20KHz.

SOLDERING SHOULD BE DONE USING IEC 61760-1 OR Pb-Free Products.

STORAGE

IF THE CRYSTAL UNITS ARE STORED IN HUMID OR SALTY ENVIRONMENT, APPEARANCE CAN BE CHANGED AND SOLDERABILITY CAN DETERIORATE; THEREFORE, AVOID STORING IN SUCH ENVIRONMENT. DO NOT STORE THE CRYSTAL UNIT MORE THAN 3 MONTHS.

Pb-Free Products

Sunny Pb-free program.

The Sunny Pb-free program is implemented in accordance with European Union (EU) Legislation titled "Restriction of the use of certain Hazardous Substances (RoHS)" including banning the use of Pb in electronic assemblies after July 1, 2006.

Sunny Definitions

•**Pb-Free Classification:** Component and Assembly Pb content shall be less than 0.1% by weight of the device (in accordance to IPC/EIA J-STD-006) and shall not be intentionally introduced

•**Components:** Sunny's definition of components apply to quartz crystal devices

•**Assemblies:** Sunny's definition of assemblies apply to oscillator devices (XO, VCXO and TCXO's)

•**Recommended Solder Composition**

Sunny's is following industry trend of using alloy range Sn-Ag(3.4-4.1)-Cu(0.45-0.9) for reflow and wave soldering.

•**Pb-free Part Number Identification:**

When applicable, the Sunny specification sheet shall indicate if the device is classified as Pb-free.

•**Process Compatibility**

The Sunny specification sheet identifies the suggested solder reflow profile(s). All Sunny Pb-free products are backwards compatible to earlier lower temperature reflow profile(s).

- Time maintained above a reflow temperature of 217°C, 60 to 150 seconds

- Target Peak Temperature of 250°C +0/-5°C, 20 to 40 seconds

•**Marking and Labeling:**

Sunny has a Pb-free labeling method for the packaging of all Pb-free products. The lowest level shipping container shall identify the products as Pb-free.