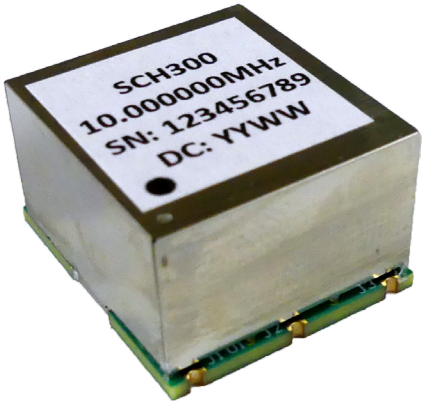
SCH300 Series OCXOs

Software Compensated, Ultra-High Stability, Surface Mount

Key Features

- Standard Frequencies:
  10, 12.8, 20, 25, and 100 MHz
- SMT package (22 mm x 25.4 mm)
- Temperature stability options up to +/- 0.25 ppb
- 3.3V or 5.0V supply options
- CMOS or Sine Output
- RoHS Compliant / Lead Free



Common Applications

- SATCOM terminals
- Cellular base stations
- Test Instrumentation
- Microwave Communications
- Military communication systems

Functional Description

The SCH300 highly stable product family utilizes Esterline Research and Design's patented MSAC compensation architecture to improve performance over the entire operating temperature range.

Traditionally, this level of stability over temperature has only been available in double-oven oscillators. Harnessing the power of our MSAC technology, the SCH300 series OXCO is able to achieve these ultra-high levels of stability in a single-oven design. Naturally, this results in a significantly smaller footprint, ideal for higher-level designs where space is at a premium. Additionally, the absence of a second oven provides a notable savings in power consumption.

This design allows the user to choose frequency stabilities as precise as ±0.25 ppb over the operating temperature range.

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Absolute Maximum Ratings:

Parameter	Minimum	Typical	Maximum	Units
Storage Temperature	-55	-	105	°C
Supply Voltage (Vcc)	-0.5	-	5.5	Vdc
Operating Supply Voltage 3.3V	3.135	3.30	3.465	Vdc
Operating Supply Voltage 5.0V	4.75	5.0	5.25	Vdc

Absolute Ratings: Exceeding values beyond those listed in the table above may cause permanent damage to the device. Exposure to conditions outside of those listed in the "Standard Specifications" table may adversely impact device reliability and result in failures not covered by warranty.

Standard Specifications:

Parameter	Minimum	Typical	Maximum	Units	Notes
Frequency Range	10.0, 12.8, 20.0, 25.0, or 100MHz			MHz	Other frequencies may be available upon request
Operational Temperature Range					See ordering options.
Frequency vs. Temperature[4]					See ordering options.
Calibration Tolerance	-200		+200	ppb	At time of shipment.
Frequency vs. Supply	-0.2		+0.2	ppb	1% Change
Frequency vs Load	-0.2		+0.2	ppb	1% Change
Startup Time			500	ms	To reach 90% of final amplitude and ±200ppb of 30-minute frequency
Warmup Time			5	Minutes	Within ±100ppb of 60-minute frequency at 25°C
Aging[2, 3]					See ordering options
Supply Voltage[5]				Volts	
Option 01	3.135	3.3	3.465	Volts	"Typical" column refers to nominal.
Option 02	4.75	5.00	5.25	Volts	"Typical" column refers to nominal.
Power Consumption					
3.3V Steady State at 25°C			1.5	Watts	Measured in still air.
3.3V Turn-on Power			3.6	Watts	Measured in still air.
5.0V Steady State at 25°C			2.5	Watts	Measured in still air.
5.0V Turn-on Power			4.2	Watts	Measured in still air.
Phase Jitter (BW: 10Hz to Fo/2)			1.0	ps rms	
Allan Deviation		2.0 E-12	1.0 E-11		Tau = 10s F = 10 MHz

Output Characteristics:

Parameter	Minimum	Typical	Maximum	Units	Notes
CMOS Output Option					Load = 15 pF
Output Voltage High (Voh)	3.0			Volts	
Output Voltage Low (Vol)			0.4	Volts	
Output Current High (Ioh)	-0.4			mA	
Output Current Low (Iol)			0.4	mA	
Duty Cycle	45	50	55	%	
Rise/Fall Time			6	ns	Measured between 10% and 90%
Sine Wave Output Option					Load = 50 Ω
Ourput Power	5	7	9	dBm	
Harmonics			-40	dBc	
Spurious			-70	dBc	

Phase Noise Characteristics:

Parameter	Minimum	Typical	Maximum	Units
1 Hz Offset			-85	dBc/Hz
10 Hz Offset			-115	dBc/Hz
100 Hz Offset			-140	dBc/Hz
1 KHz Offset			-145	dBc/Hz
10 KHz Offset			-150	dBc/Hz
100 KHz Offset			-150	dBc/Hz

Restabilization Time:[6]

Off Time	Restabilization Time
< 1 Hour	< 2 Hours
< 6 Hours	< 12 Hours
< 24 Hours	< 48 Hours
1 - 16 Days	48 Hours + 1/4 Off Time
> 16 Days	< 6 Days

Environmental Characteristics:

Environmental Phenomenon	Response
Shock	500 G's 1ms, Half sine, 2 shocks per direction, per MIL-STD 202G, Method 213B, Test Condition D
Sinusoidal Vibration	0.06" Displacement Amplitude or 10G's peak, 10 to 500 Hz, per MIL-STD-202G, Method 204D, Test Condition A
Random Vibration	5.35 G's RMS, 20 – 2000 Hz per MIL-STD-202G, Method 214, Test Condition 1A, 15 minutes per axis.
Moisture	10 Cycles, 95% RH, per MIL-STD-202G, Method 112
Marking Permanency	Per customer requirements.

Manufacturing Processes:

Process	Instructions
Solder Process	RoHS-compliant, lead-free. See figure 1.
In-Line reflow	Refer to recommended reflow pre-heat and reflow temperatures in figure 1. Package material consists of metal cover with FR4 substrate. Component solder is lead-free high temperature eutectic alloy with melting point of 221°C
In-Line Oven profile	We recommend using KIC profiler or similar device placing one of the thermocouples on the device to ensure that the internal package temperature does not exceed 221°C
Removal of Device:	If for any reason the device needs to be removed from the board, use a temperature-controlled repair station with profile monitoring capabilities. Following a monitored profile will ensure the device is properly heated prior to reflow.
Cleaning Process	Device is non-hermetic, water resistant with weep holes in each corner that allow moisture to be removed during the drying cycle. We recommend in-line warm-water wash with air knife and drying capabilities. If cleaner does not have drying capabilities, then use hot-air-circulated oven. Boards should be placed vertically in the oven for good water runoff. *Device must be dried properly prior to use! Do not submerge the device!*
Saponifier	If saponifier is used, make sure the device is rinsed properly to ensure all residues are removed. pH of saponifier should not exceed 10.
Drying Temperature	Between 85 and 100 °C
Drying Time	Varies depending on final assembly size and thermal mass.

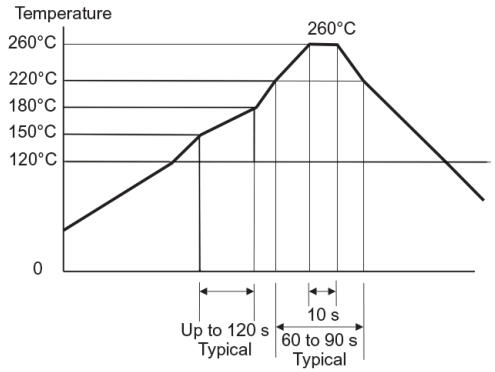

Figure 1: Solder Profile *(Meets IPC/JEDEC J-STD-020C)*

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Ordering Information:[1]

SCH300-A-01-A-01-A-01-12M345678

Temperature Stability[4]

DASH #	Stability
A	±3.0 ppb
B	±2.0 ppb
C	±1.0 ppb
D	±0.5 ppb
E	±0.25 ppb

Supply Voltage[5]

DASH #	Voltage (V)
01	5.0
02	3.3

Output Frequency

Output Frequency is specified to the nearest 1Hz

12.345678 MHZ in the above example.

Output Waveform

DASH #	Stability
A	50Ω sine
B	LVCMOS

Long Term Aging[3]

DASH #	ppb/20 yr
01	±1000
02	±750
03	±500
04	±400

Temperature Range

DASH #	Stability
01	0 to +70°C
02	-20 to +70°C
03	-40 to +70°C
04	-40 to +85°C

Short Term Aging[2]

DASH #	ppb/day
A	±1.0
B	±0.75
C	±0.50

Notes:

1.) Not all combinations of options are available. Consult factory for additional guidance.

2.) Daily rate is measured after 48 hours of continuous operation.

3.) Long-term aging include temperature performance, sullpy voltage change, and load change.

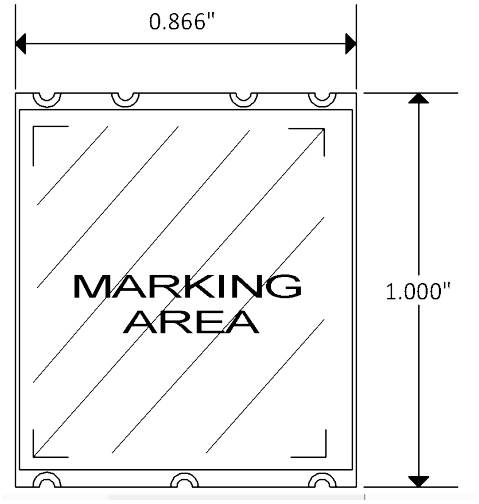
4.) Temperature stability is based on $(F_{max} - F_{min})/2$

5.) Supply voltage must reach V_{cc} levels monotonically with a ramp- up time of < 12ms.

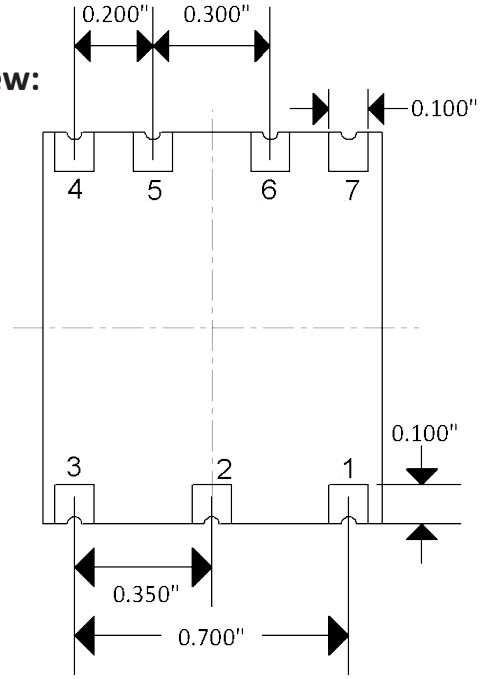
6.) For a given off time, the time required to meet daily aging and ADEV requirements.

Mechanical Specifications:

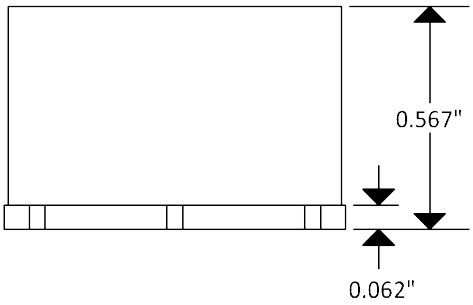
Top View:



Bottom View:

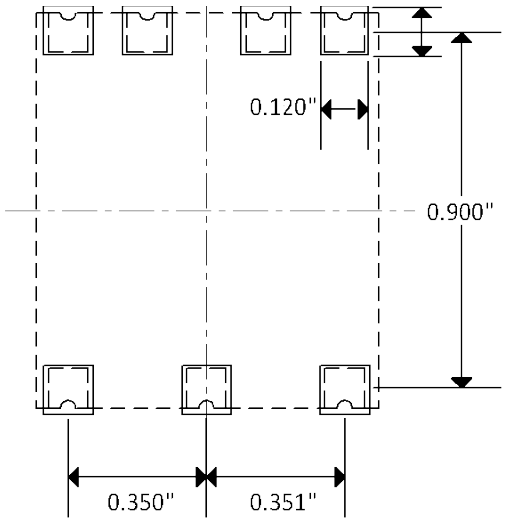


Side View:



PIN FUNCTIONS	
Pin #	**Function**
1	NC
2	DNC
3	Supply Voltage
4	RF Output
5	DNC
6	DNC
7	GROUND

Recommended Pad Layout



For best signal integrity, do not run traces beneath the part, and ensure the area under the board is ground plane.

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