



OH20TSE Temperature Sense Enabled OCXO Module

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Description:

The Temperature Sense Enabled OCXO model OH20TSE is specifically designed to operate with a Connor-Winfield self-compensating ICs (NS3D02 or FTC302) and modules (FT9-CC or FT9-TFC).



This TSE module contains an SC-cut ovenized crystal oscillator combined with a temperature sensor and internal EEPROM. The internal EEPROM contains polynomial coefficients calculated through a curve fitting of the frequency versus temperature data set. The module's I2C pins provide communication access to the temp sensor and stored data in the EEPROM available to be read directly by the compensating ICs or compensating modules when the pins are connected according to documented specifications.

The OH20TSE is hermetically sealed and is available at a nominal frequency of 10MHz. The OCXO module design provides aging rates of 0.5 ppb/day, short-term stability/ADEV of 8.0E-12 and native thermal stability of ± 3 ppb over the operating temperature ranges available. The part is an MSL-1 moisture level and meets RoHs and Reach standards.

Features:

- 10 MHz fixed frequency SC Cut crystal based OCXO
- Temperature Sense Enabled (TSE) design
- Native Frequency Stability ± 3 ppb max
- Low ± 0.5 ppb/day aging rate
- 8E-12 ADEV Performance
- 3.3Vdc Supply Voltage
- Temperature Range: -40 to 85°C
- Hermetic package
- 20x20mm Thru-hole footprint
- RoHS Compliant / Lead Free ✓RoHS

Ordering Information

OH20TSE-010.0M



RoHS
COMPLIANT



Operating Specifications

Frequency Stability

Parameter	Minimum	Nominal	Maximum	Units	Condition
Frequency		10.0		MHz	
Initial Frequency accuracy	-1.0	-	+1.0	ppm	@25°C, after 15 mins power on ref to nominal frequency.
Frequency Accuracy	-100	-	+100	ppb	@25°C, Within 90 days after shipment and 5 minutes warm up time (after reflow), Measurement referenced to initial frequency.
Supply Variation	-1.0	-	+1.0	ppb	Vs±5%,@25°C
Load Variation	-1.0		+1.0	ppb	CL±5%,@25°C
Aging per day	-0.5		+0.5	ppb	Aging after 30 days of operation
first year	-50		+50	ppb	
10 years	-0.5		+0.5	ppm	
Temperature Stability - without compensation	-3.0		+3.0	ppb	-40°C~+85°C
- with compensation	-0.3		+0.3	ppb	ref to fref=(fmax+fmin)/2
Short Term Stability (in still air)			0.01	ppb/s	after power on 1hour@25°C
Warm -up time			5.0	min	Within ±10ppb of final frequency with reference after 1 hour on
Start-up Time			1.0	s	

Supply Voltage/Current

Parameter	Minimum	Nominal	Maximum	Units	Condition
Voltage Supply	3.135	3.3	3.465	V	
Power consumption			1000	mA	during warm-up
			300	mA	at steady state

Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Condition
CMOS Load		15		pF	
Output Level(VOL)			0.4	V	
Output Level(VOH)	2.4			V	
Duty Cycle	45		55	%	
Rise Time/ Fall Time			5.0	ns	
Spurious			-70	dBc	

Phase Noise

Parameter	Minimum	Nominal	Maximum	Units	Condition
Phase Noise					
@1Hz	-	-	-90		@1Hz
@10Hz	-	-	-120		@10Hz
@100Hz	-	-	-140	dBc/Hz	@100Hz
@1KHz	-	-	-145		@1KHz
@10KHz	-	-	-150		@10KHz

Mechanical Specification and Package Characteristics

Package Size	Refer to the drawing on page 5
Pin Connector Size	Refer to the drawing on page 5
Pin Connector Definition	Refer to the drawing on page 5
ROHS	RoHS compliant

I2C interface Requirements

IIC BUS voltage VI2C	3.3V
IIC level (SCL&SDA)	Voh: $V_{I2C} * 0.7 < V_{oh} < V_{I2C} + 0.3V$ Vol: $-0.3V < V_{ol} < V_{I2C} * 0.3$
SCL clock	≤100kHz
IIC Addresses	1010100x EEPROM 1001000x (Temperature Sensor)

$$(A_3 * P^3 + A_4 * P^4 + A_3 * P^3 + A_2 * P^2 + A_1 * P + A_0) * (1e^{\wedge} - 9) = \frac{f(P) - f(P_{ref})}{f(P_{ref})}$$

A_x : Temperature compensation parameters. EEPROM

P : Parameter variables associated with the Temperature. (Temperature Sensor)

$f(P)$ measured frequency.

P_{ref} : Parameter variables associated with the reference Temperature (25).

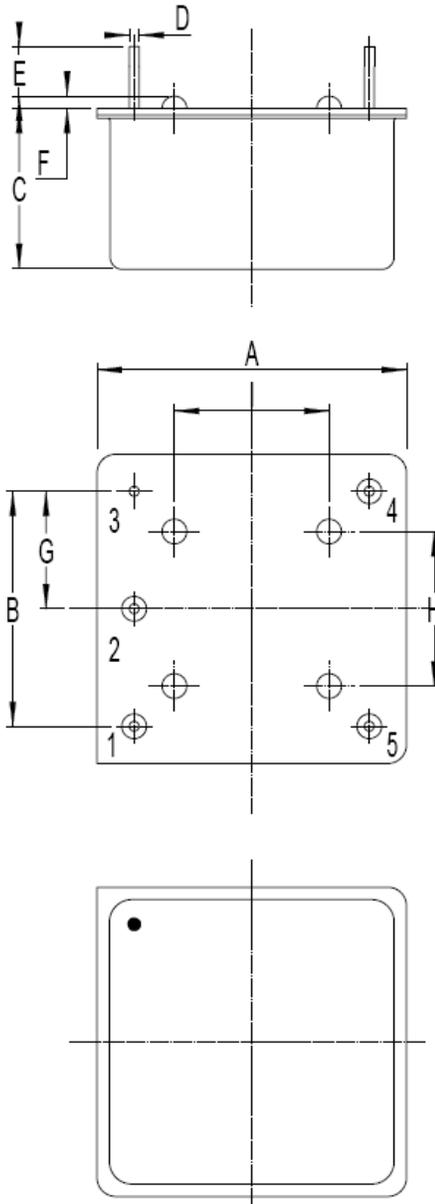
Address	Size bytes	Parameter	Format	Value
0000h~0000h	1	EEPROM map version	unsigned byte	01h
0001h~0001h	1	Reserved		00h
0002h~0004h	3	Vendor ID(3 characters)	ASCII	
0005h~0024h	32	Vendor Product ID	ASCII	
0025h~0028h	4	Nominal frequency in Hertz	32-bit unsigned integer	
0029h~002Ch	4	Device serial number	32-bit unsigned integer	
002Dh~0032h	6	Date code of manufacture	ASCII	
0033h~003Fh	13	Reserved		00h
0040h~0047h	8	A0	64-bit floating point	
0048h~004Fh	8	A1	64-bit floating point	
0050h~0057h	8	A2	64-bit floating point	
0058h~005Fh	8	A3	64-bit floating point	
0060h~0067h	8	A4	64-bit floating point	
0068h~006Fh	8	A5	64-bit floating point	
0070h~0077h	8	B0	64-bit floating point	
0078h~007Fh	8	B1	64-bit floating point	
0080h~009Fh	32	Reserved		00h
00A0h~00A1h	2	P min	16-bit unsigned integer	
00A2h~00A3h	2	P max	16-bit unsigned integer	
00A4h~00FFh		Vendor Reserved		



Environmental, Mechanical Conditions

Operating temperature range	-40°C~+85°C
Operable temperature range	-40°C~+85°C
Storage temperature range	-40°C~+105°C
ESD	HBM.2kV
MSL	MSL1
Drop Test	The test shall be carried out as the provisions of the IEC60068-2-32 test Ed. 10cm height, 3 times on hard board with thickness of 3cm
Bumping Test	The test shall be carried out as the provisions of the IEC60068-2-29 test Ed. Device are bumped to three mutually perpendicular axes at peak acceleration of 400m/s ² , each 4000±10 times , 6ms pulse duration time.
Vibration test	The test shall be carried out as the provisions of the IEC60068-2-34 test Ed. Frequency range: 1Hz-4Hz-100Hz-200Hz Acceleration: 0.0001g ² /Hz-0.01g ² /Hz-0.01g ² /Hz-0.001g ² /Hz Grms=1.15g Sweep time: 30 minutes (perpendicular axes each sweep time)
Mechanical Shock	The test shall be carried out as the provisions of the IEC60068-2-27 test Ed. 500g, 1mS duration, 1/2 sine wave, 3 shocks each direction along 3 mutually perpendicular planes.
Thermal shock	0.5h@-40°C, 0.5h@+85°C Note: the changing time < 30 seconds, cycling for 100 times

Package Outline



Pin Descriptions

Pin No.	Pin Function
1	VS
2	Output
3	GND
4	SCL
5	SDA

Symbol	Dimension (mm)	
	Min	Max
A		20.6
B	14.74	15.74
C		12
D	0.4	0.6
E	4.0	5.0
F	0.5	0.7
G	7.52	7.72
H	10.1 nominal	
I	10.1 nominal	

Revision History

Revision	Date	Description
00	08/22/23	New issue
01	02/01/24	Updatged with DigiKey information

Bulletin	Cx326
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Revision	01
Date	01 Feb 2024