MD-228

I²C Interface Oven Controlled Crystal Oscillator
Preleminary version

The MD-228 is a module that contains a medium size ovenized crystal oscillator and an I²C interface that communicates with an onboard EEPROM; DAC and temperature sensors. The interface enables the customer to improve upon the already good Holdover stability of the oscillator or tune the OCXO by a digital word. Provided in a fully hermetic 22 x 24 mm package mounted on a SMD spreader board. The device is capable of aging rates of 0,1 ppb/day and temperature stabilities of ±3 ppb from -40 to 85 °C. Use of the information provided via the I2C interface, provides a cost effective method of improving the Holdover stability of the system.

Features

- Surface Mount package
- Low Profile Compact Package
- Standard frequency: 10, 20MHz
- Temperature stability to 3 ppb
- Aging rate to 0.1 ppb/day
- I²C interface with frequency coefficients, temperature sensor for additional correction, digital tuning

Applications

- Base stations
- Test equipment
- Synthesizers
- LTE Basestation

Performance Specifications

Frequency Stabilities[1] (10 & 20 MHz)					
Parameter	Min	Typical	Max	Units	Condition
vs. operating temperature range (referenced to +25°C, uncompensated)	-3		+3	ppb	-40 to +85°C
By using on board temperature sensor (T) and frequency vs. temperature coefficients (An)stored in EEPROM,it is possible to identify the real Aging performance of the device during the locked mode. This information can be used during the Holdover period to improve the system Holdover performance. Attached formula describes the Frequency versus temperature $F(T)=A_4T^4+A_3T^3+A_2T^2+A_1T+A_0$					
Initial tolerance vs. supply voltage change vs. load change vs. aging / day vs. aging / year vs. aging / 10 year	-200 -1 -1 -0.1 -20 -75		+200 +1 +1 +0.1 +20 +75	ppb ppb ppb ppb ppb ppb	at time of shipment, V_S ±5% static Load ±5% static after 30 days of operation after 30 days of operation after 30 days of operation
start up time		0.25	2	sec	
Warm-up time			5	minutes	to ±100ppb of final frequency (1 hour reading) @ +25°C

Performance Specifications

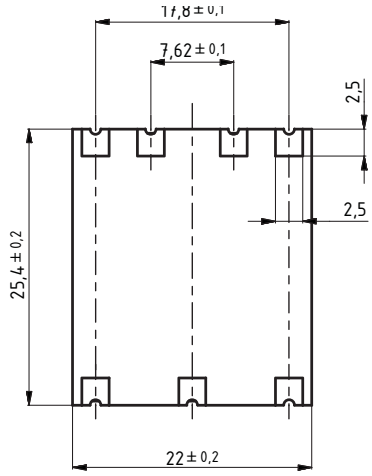
Supply Voltage (Vs)						
Parameter	Min	Typical	Max	Units	Condition	
Supply voltage (standard)	3.13	3.3	3.46	VDC		
Power consumption			3.25	Watts	during warm-up	
			1.5	Watts	steady state @ +25°C	
RF Output						
Signal [standard]	HCMOS					
Load		15		pF		
Signal Level (Vol)			0.8	VDC	with Vs=5.0V and 15pF Load	
Signal Level (Voh)	3.4		4.6	VDC	with Vs=5.0V and 15pF Load	
rise time			5	ns		
fall time			5	ns		
Duty Cycle	45		55	%	@ (Voh-Vol)/2	
Frequency Tuning (EFC)						
Tuning Range	;No adjust				Fixed OCXO	
Additional Parameters						
Phase Noise[3]				dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	1 Hz 10 Hz 100 Hz 1 kHz 10 kHz 100khz	@ 10MHz
Weight			12	g		
Processing & Packing	Handling & Processing Note					

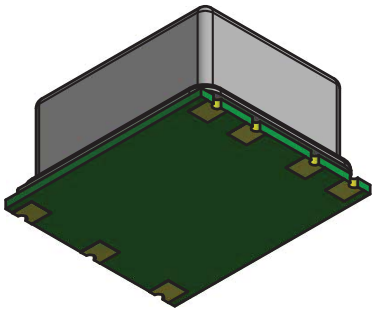
EEPROM (SCL, SDA) Pin 2; Pin 7					
Parameter	Min	Typical	Max	Units	Condition
I2C Bus Voltage		2,8		VDC	
DC Electrical Characteristics					
High Level Input Voltage (Vih)	0.7* VI2C		VI2C +0.3	Vdc	SDA (internally pulled-up to V_{I2C} with a 22kohm resistor) and SCL
Low Level Input Voltage (Vil)	-0.3		0.3 VI2C	Vdc	SDA (internally pulled-up to V_{I2C} with a 22kohm resistor) and SCL
Electrical Characteristic					Product is to communicate via industry standard I^2C bus timing. I^2C is a Phillips Semiconductor registered trademark.
SCL Clock Frequency	0		100	kHz	
Communication					Product is to communicate via industry standard I2C bus timing. I^2C is a Phillips Semiconductor registered trademark.
EEPROM	I2C Device 7-bit Address: 1010100				
For full EEPROM Map please contact factory					

Operation condition					
Air Flow			0	m/s	At -40 to +85°C
relative Humidity			95	%	over operating temperaure range
temp rate of change			1	°C/ Minutes	

Absolute Maximum Ratings					
supply voltage (Vs)			5.5	V	with Vs= 3.3 VDC
Output Load			50	pF	
Digital Input Voltage (SDA,SCL) to GND	-0,3		3,6	V	
Operable Temperature Range	-40		+85	°C	
Storage Temperature Range	-40		+85	°C	

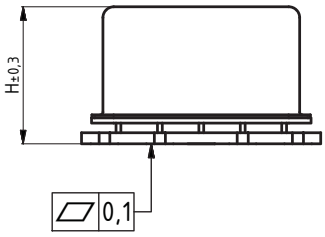
Outline Drawing / Enclosure

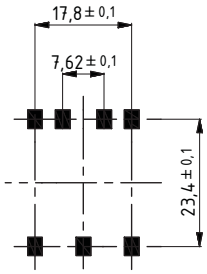




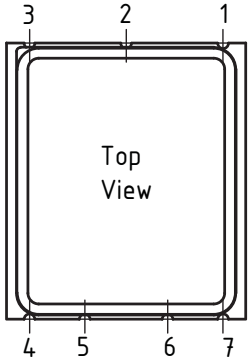
G343

MD-228	
Height "H"	cover material
12.1	metal





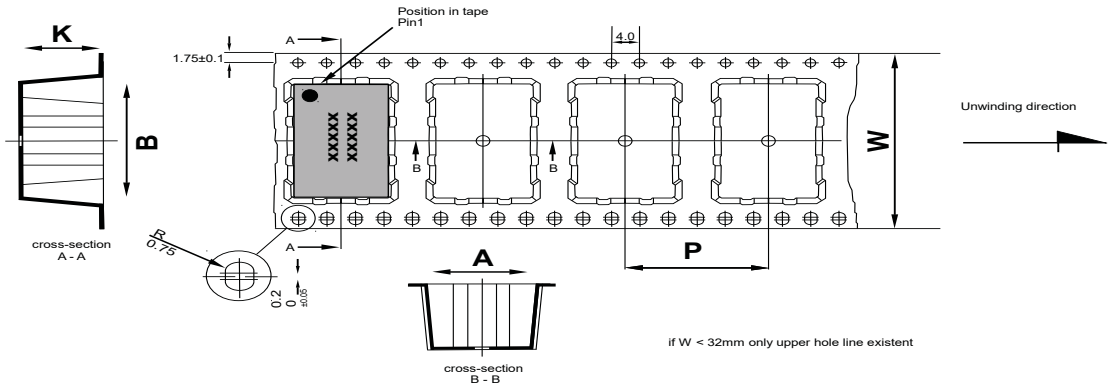
Padvorschlag
land pattern
recommendation



Pin Connections	
1	I.C (Do not connect)
2	Not Connected
3	Supply Voltage Input (Vs)
4	RF Output
5	SCL (I2C)
6	SDA (I2C)
7	GND

Dimensions in mm

Standard Shipping Method (MD-228)



Dimension in mm:
A, B and K are dependent uppon component dimensions
production tolerance complying DIN IEC 286-3

All dimensions in millimeters unless otherwise stated

Enclosure Type	Tape Width W (mm)	Quantity per meter	Quantity per reel	Dimension P
MD-228	44	35.7	175	28

Recommended Reflow Profile

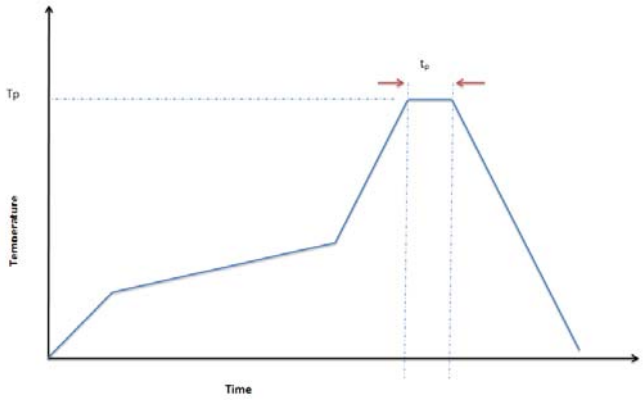
TP: max 260°C (@ solder joint, customer board level)

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.

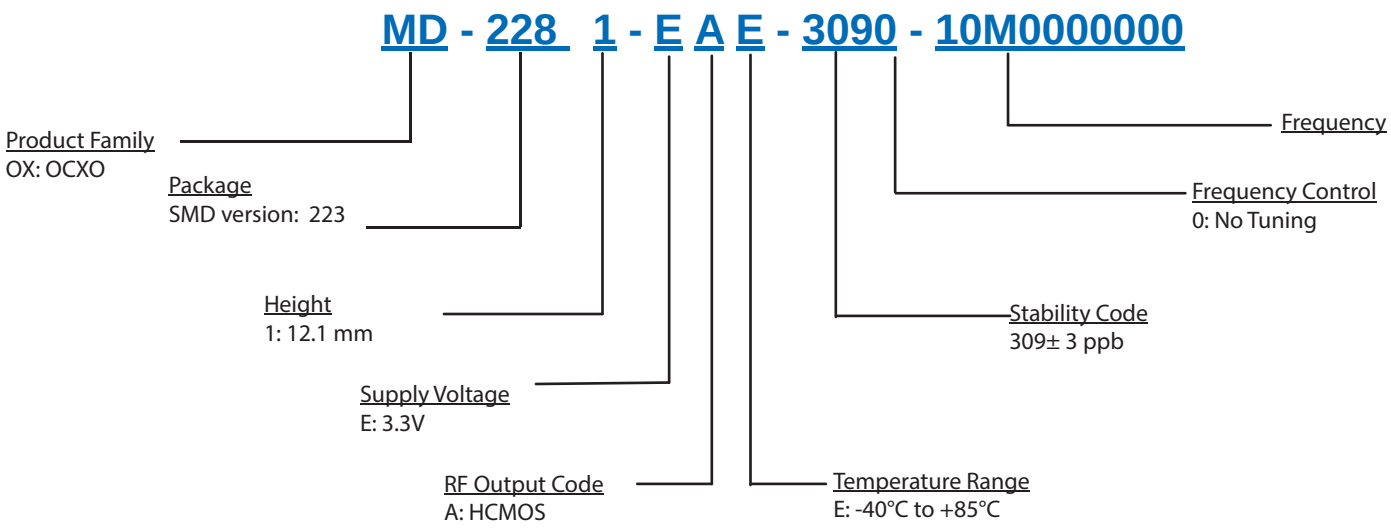


Additional Environmental Conditions

Parameter	Description
Rapid temperature changes	JESD22-A104D Condition G -40...125C
Vibration	MIL-STD-883 Meth 2007 Cond A 20G 20-2000Hz 4x in each 3axis 4 min
Shock	MIL-STD-202 Meth 213 Cond.C 100G 6ms 6 shocks in each direction
Solderability	J_STD_002C Cond A, Through hole device/ Cond. B, SMD 255C (diving time 50,5sec.) Dip+Look with 8h damp pre-treatment: solder wetting >95%
Solvent resistance	MIL-STD-883 Meth 2015 Solv. 1,3,4
ESD	HBM JESD22-A114-F Class 1C 10* 1000V
Moisture Sensit.	Level 1 JESD22-A113-B
RoHS compliance	100% RoHS 6 compliant
Washable	washable device

Note: All temperatures refer to topside of the package, measured on the package body surface.

Ordering Information



Notes:

1. Contact factory for improved stabilities or additional product options. Not all options and codes are available at all frequencies.
2. Unless other 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 degrades with increasing output frequency.
4. Subject to technical modification.
5. Contact factory for availability.

Microsemi Headquarters
One Enterprise, Aliso Viejo, CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Sales: +1 (949) 380-6136
Fax: +1 (949) 215-4996
email: sales.support@microsemi.com
www.microsemi.com

Rev: 03.08.2018