MD-203

I²C Interface Oven Controlled Crystal Oscillator

Preleminary version



The MD-203 is a Vectron module that contains a medium size ovenized crystal oscillator and an I²C interface that communicates with an onboard EEPROM and temperature sensors. The interface enables the customer to improve upon the already exceptional stability of the oscillator. Provided in a fully hermetic 25 x 25 mm package mounted on a SMD spreader board. The device is capable of aging rates of 0,5 ppb/day and temperature stabilities of 8ppb from -40 to 85 °C. Use of the information provided in the I²C interface provides a cost effective means of improving stability by as much as a factor of 10 depending upon environmental conditions.

Features

- Surface Mount package
- Low Profile Compact Package
- Standard frequency: 10, 20 MHz
- Temperature stability to 8 ppb
- Aging rate to 0.5 ppb/day
- I²C interface with frequency coefficients, temperature sensor for additional correction

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)	-8 -8		+8 +8	ppb ppb	-20 to +70°C -40 to +85°C
Residual error compare to fit curve	-0.3		0.3	ppb	
Improved Frequency versus temperature F(T) performance obtained using on board temperature sensor (T) and frequency vs. temperature coefficients (An)stored in EEPROM, using formula: $F(T)=A_4T^4+A_3T^3+A_2T^2+A_1T+A_0$					
Initial tolerance vs. supply voltage change vs. load change vs. aging / day vs. aging / year vs. aging / 10 year	-3 -4 -3 -0.5 -60 -500		+3 +4 +3 +0.5 +60 +500	ppm 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
holdover				µsec	over 8 hours and 5°C temp jump @ T_0
start up time					
Warm-up time			5	minutes	to ±100ppb of final frequency (1 hour reading) @ +25°C

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Performance Specifications

Supply Voltage (Vs)						
Parameter	Min	Typical	Max	Units	Condition	
Supply voltage (standard)	4.75	5.0	5.25	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			10	ns		
fall time			10	ns		
Duty Cycle	40		60	%	@ (Voh-Vol)/2	
Frequency Tuning (EFC)						
Tuning Range	Fixed OCXO; No adjust					
Additional Parameters						
Phase Noise[3]		-104 -129 -140 -145 -153 -155	-90 -120 -130 -140 -148 -150	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					

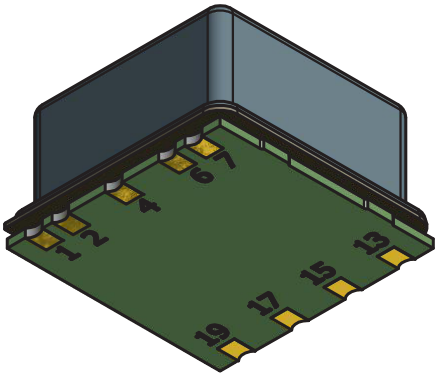
EEPROM (SCL, SDA) Pin 2; Pin 7					
Parameter	Min	Typical	Max	Units	Condition
I2C Bus Voltage		2,8		VDC	
DC Electrical Characteristics					
High Level Input Voltage (Vih)	0.7* VI2C		VI2C +0.3	Vdc	SDA (internally pulled-up to V_{I2C} with a 22kohm resistor) and SCL
Low Level Input Voltage (Vil)	-0.3		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					

Reference Voltage					
supply voltage (Vs)			7.0	V	with Vs= 5.0 VDC
Output Load			50	pF	
Operable Temperature Range	-40		+85	°C	
Storage Temperature Range	-40		+85	°C	

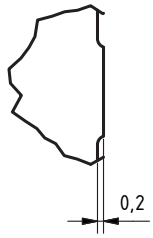
Absolute Maximum Ratings					
supply voltage (Vs)			7.0	V	with Vs= 5.0 VDC
Output Load			50	pF	
Operable Temperature Range	-40		+85	°C	
Storage Temperature Range	-40		+85	°C	

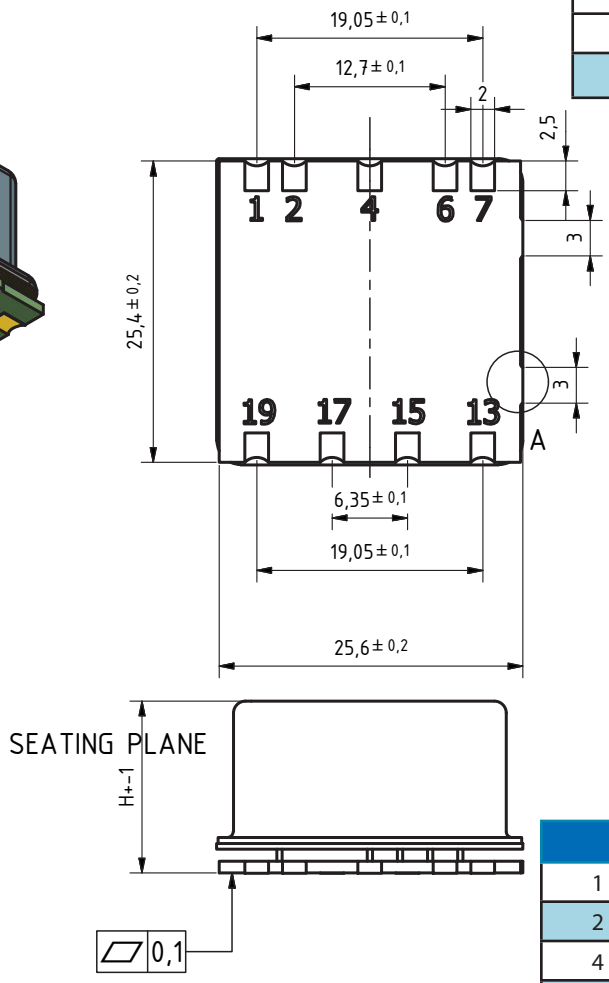
Outline Drawing / Enclosure

MD-203	
Height "H"	cover material
11.3	metal
tbd	



A (5 : 1)

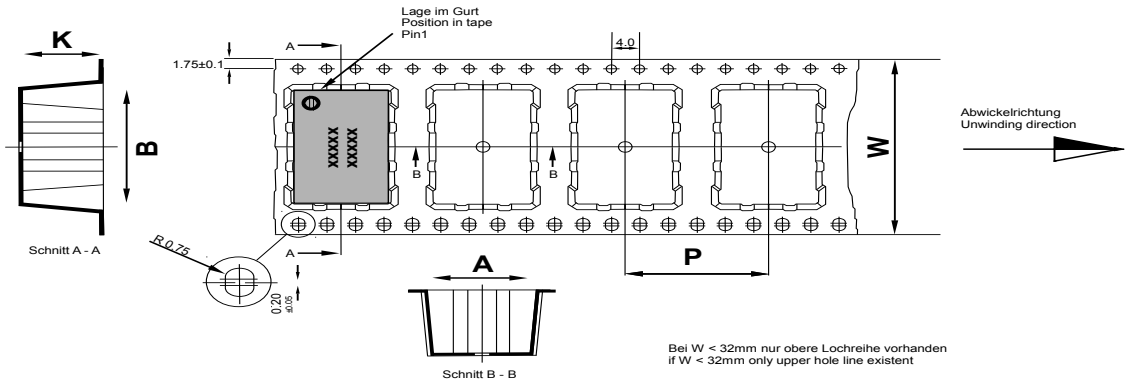




Pin Connections	
1	RF Output
2	EEPROM SDA (I2C)
4	GND
6	N.C
7	EEPROM SCL (I2C)
13	Vref (reference voltage)
15	N.C.
17	Vtemp output
19	Supply Voltage Input (Vs)

Dimensions in mm

Standard Shipping Method (MD-203)



Maßangaben in mm:	Dimension in mm:
A, B und K Maße von Bauelement abhängig	A, B und K are dependent uppon component dimensions
Fertigungstoleranzen entsprechen der DIN IEC 286-3	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-203	44	31.25	150	32

Recommended Reflow Profile

IPC/JEDEC J-STD-020 (latest revision)
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.

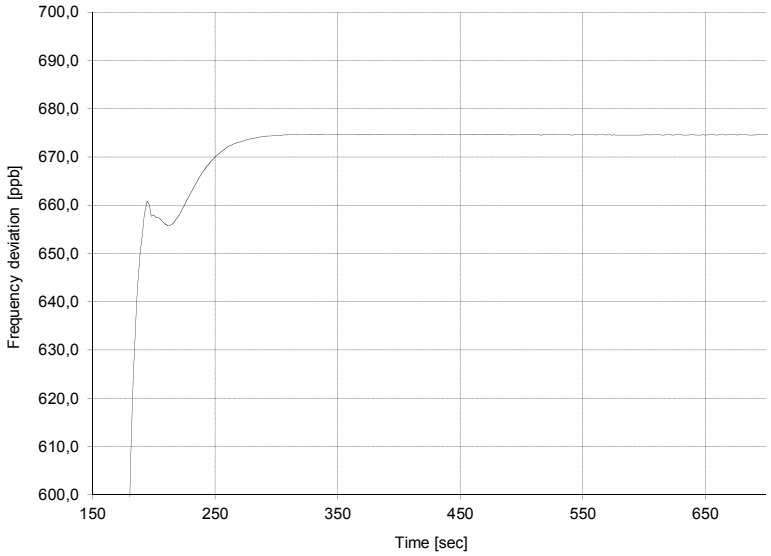
Additional Environmental Conditions

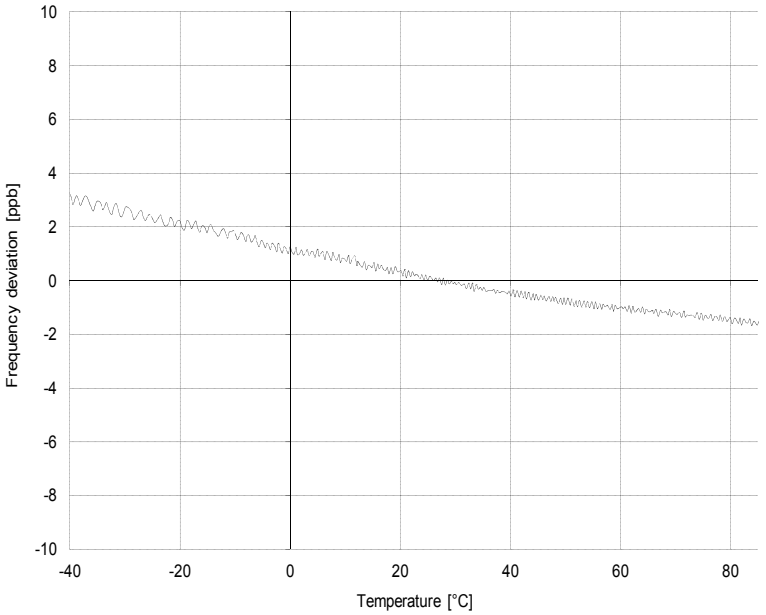
Parameter	Description
Rapid temperature changes	JESD22-A104D Condition G -40...125C
Vibration	MIL-STD-883 Meth 2007 Cond A 20G 20-2000Hz 4x in each 3axis 4 min
Shock	MIL-STD-202 Meth 213 Cond.C 100G 6ms 6 shocks in each direction
Solderability	J_STD_002C Cond A, Through hole device/ Cond. B, SMD 255C (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.

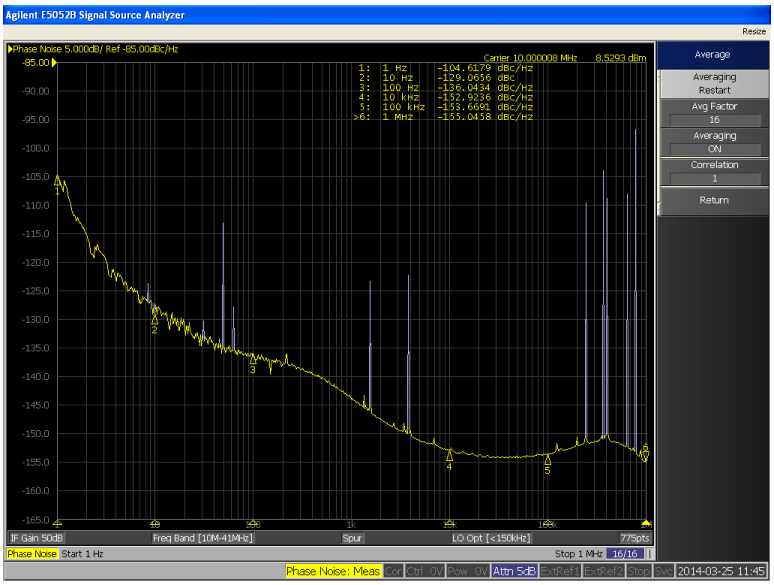
Typical Performance Data

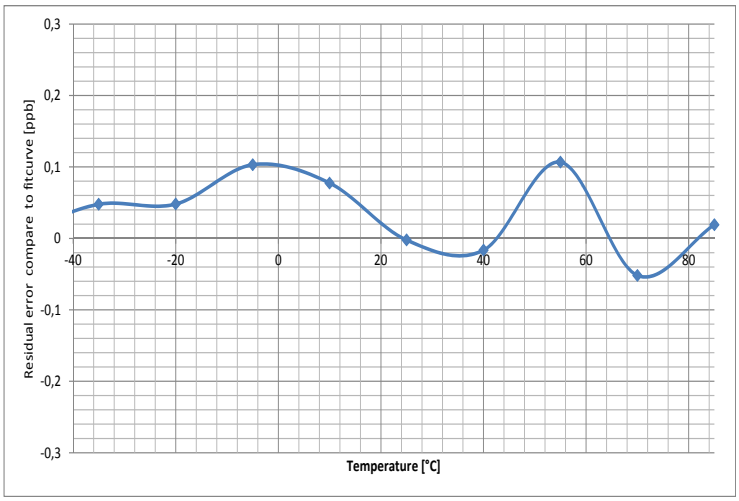
typical warm up	typical temperature stability
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00





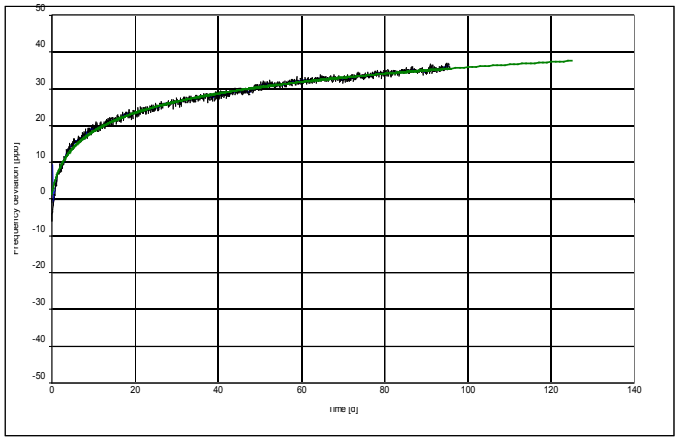
typical Phase Noise	typical residual error compare to fit curve
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00

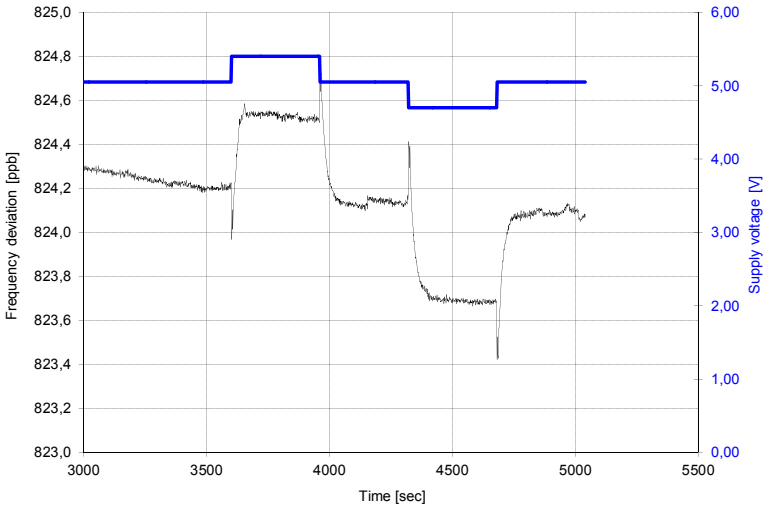




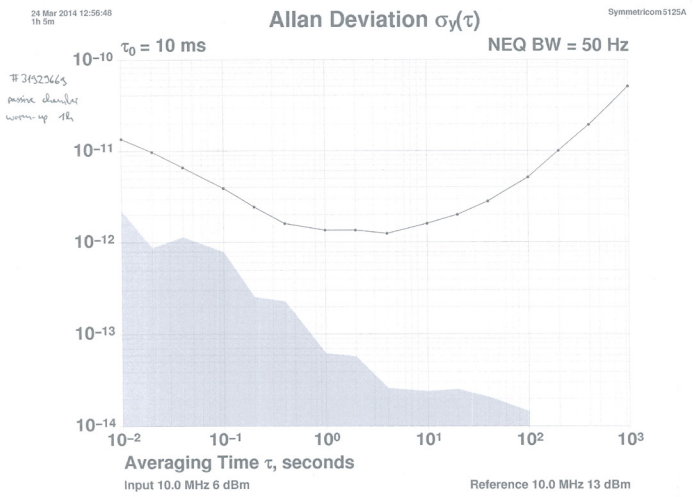
Typical Performance Data

typical aging data	typical frequency vs. supply voltage
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00

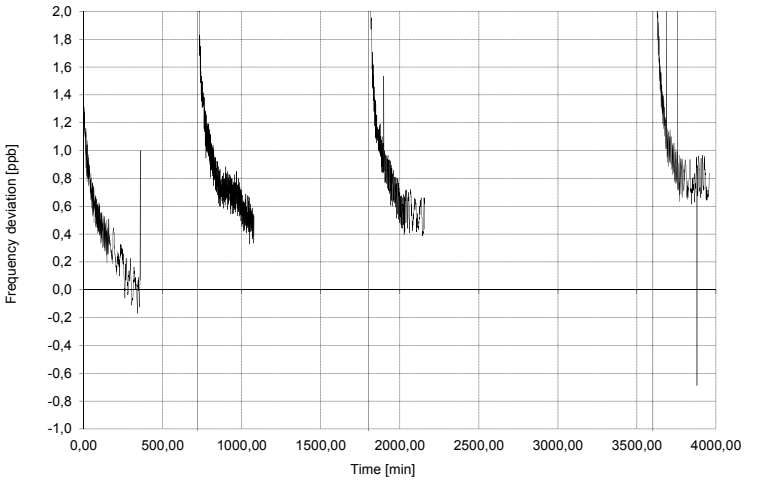




typical ADEV	typical retrace
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00



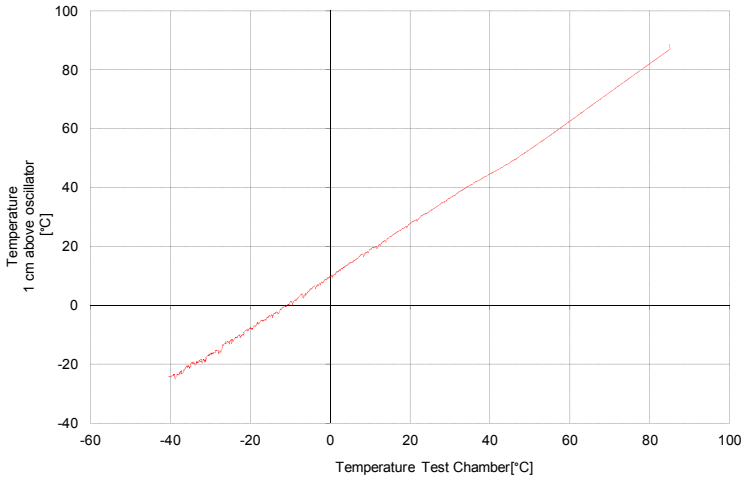
6 hours power on; 6 hours power off; 6 hours power on
12 hours power off; 6 hours power on; 24 hours power off
6 hors power on

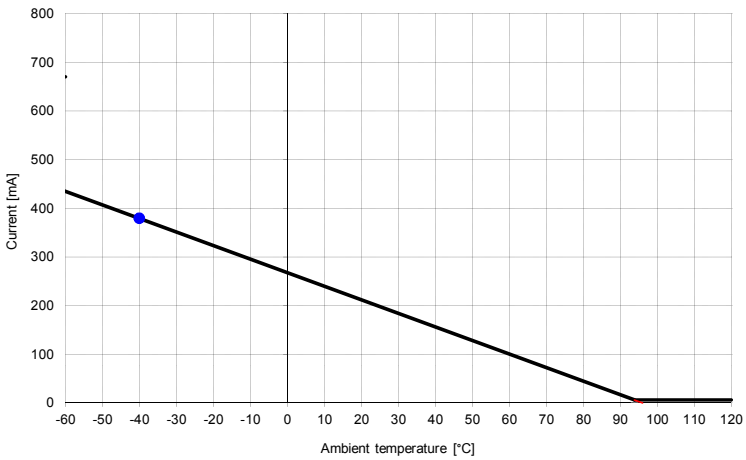


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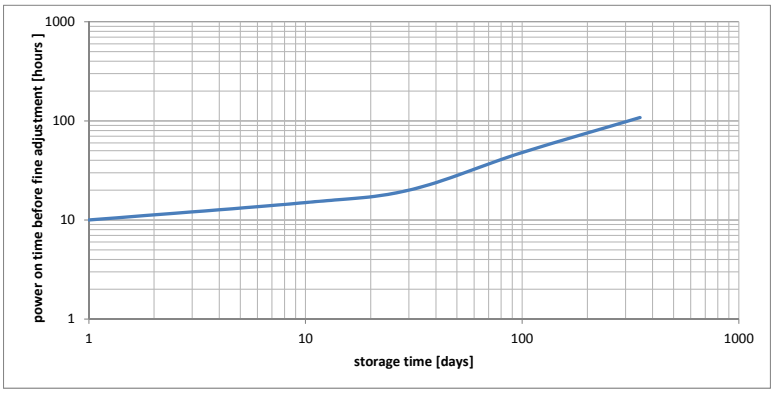
Typical Performance Data

typical case temperature vs. outside temperature	typical power consumption vs. operating temperature
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00

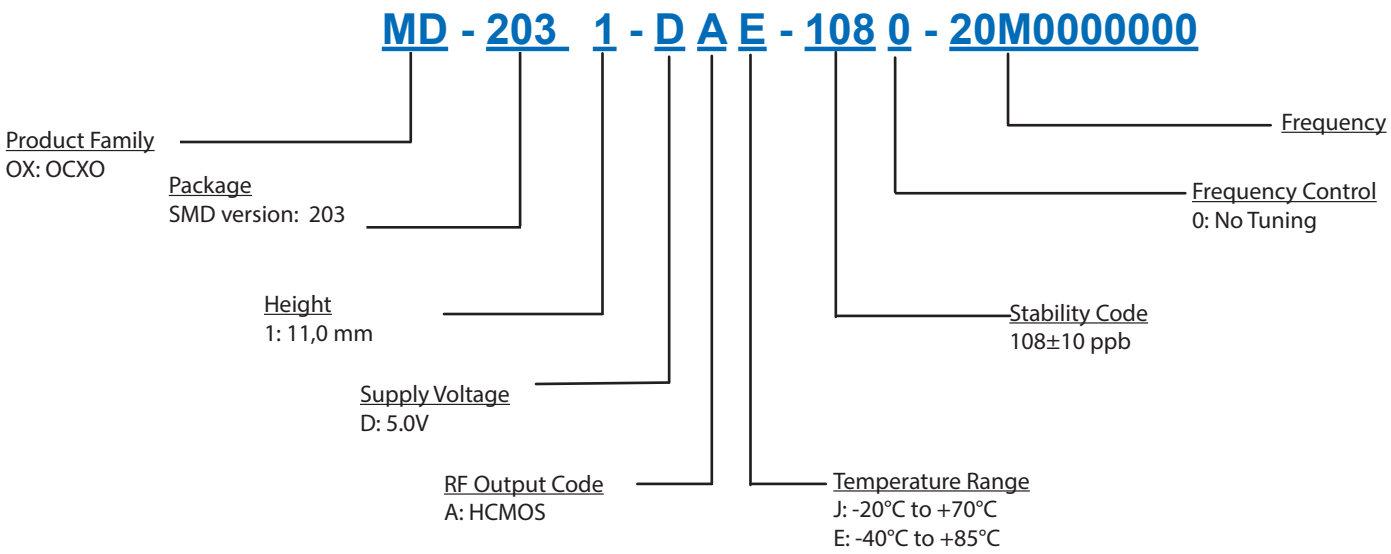




recommended power on time after x days of power off	
@ MD-2031-DAE-1080-10M00	@ MD-2031-DAE-1080-10M00



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.

For Additional Information, Please Contact

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Rev: 16.01.2015