
MD-203

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 | ppb | -20 to +70°C |
| | -8 | | +8 | ppb | -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 | -3 | | +3 | ppm | at time of shipment, |
| vs. supply voltage change | -4 | | +4 | ppb | V _s ±5% static |
| vs. load change | -3 | | +3 | ppb | Load ±5% static |
| vs. aging / day | -0.5 | | +0.5 | ppb | after 30 days of operation |
| vs. aging / year | -60 | | +60 | ppb | after 30 days of operation |
| vs. aging / 10 year | -500 | | +500 | ppb | 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 |

Performance Specifications

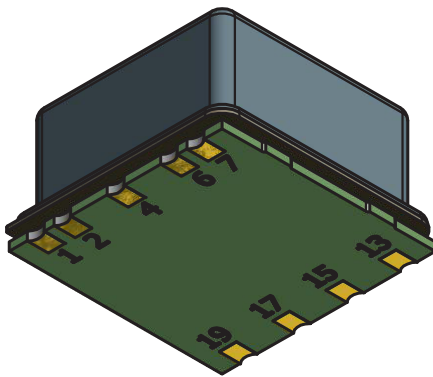
| Supply Voltage (Vs) | | | | | | |
|---------------------------|----------------------------|---------|------|--------|----------------------------|---------|
| Parameter | Min | Typical | Max | Units | Condition | |
| Supply voltage (standard) | 4.75 | 5.0 | 5.25 | VDC | | |
| Power consumption | | | 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 | -90 | dBc/Hz | 1 Hz | @ 10MHz |
| | | -129 | -120 | dBc/Hz | 10 Hz | |
| | | -140 | -130 | dBc/Hz | 100 Hz | |
| | | -145 | -140 | dBc/Hz | 1 kHz | |
| | | -153 | -148 | dBc/Hz | 10 kHz | |
| | | -155 | -150 | dBc/Hz | 100kHz | |
| 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 ² C bus timing. I ² C is a Phillips Semiconductor registered trademark. |
| SCL Clock Frequency | 0 | | 100 | kHz | |
| Communication | | | | | Product is to communicate via industry standard I2C bus timing. I ² C is a Phillips Semiconductor registered trademark. |
| EEPROM | I2C Device 7-bit Address: 1010100 | | | | |
| | | | | | |
| | | | | | |
| For full EEPROM Map please contact factory | | | | | |
| | | | | | |

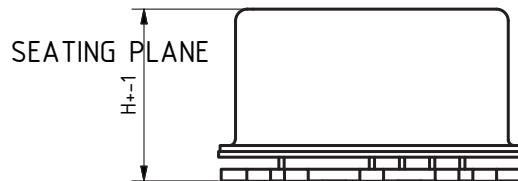
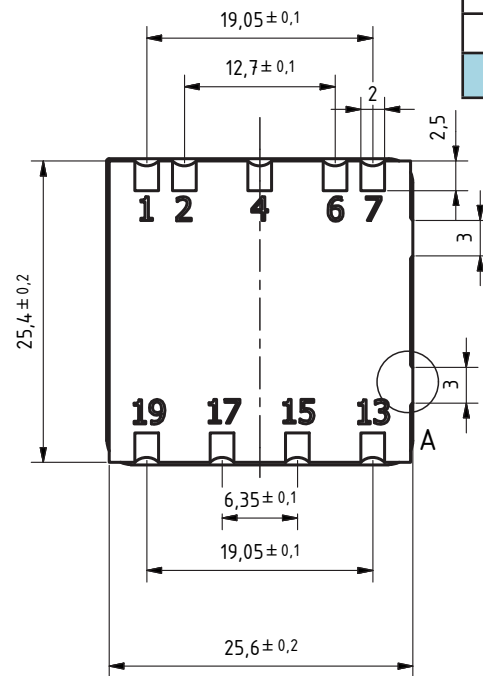
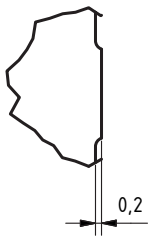
| Reference Voltage | | | | | |
|----------------------------|-----|--|-----|----|------------------|
| supply voltage (Vs) | | | 7.0 | V | with Vs= 5.0 VDC |
| Output Load | | | 50 | pF | |
| Operable Temperature Range | -40 | | +85 | °C | |
| Storage Temperature Range | -40 | | +85 | °C | |

| 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



A (5 : 1)



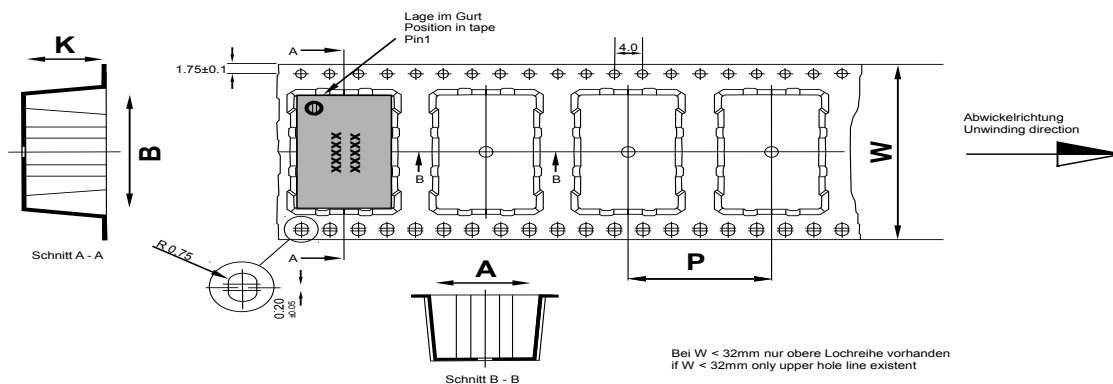
| MD-203 | |
|------------|----------------|
| Height "H" | cover material |
| 11.3 | metal |
| tbd | |

| 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

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Standard Shipping Method (MD-203)



Maßangaben in mm:

A, B und K Maße von Bauelement abhängig

Fertigungstoleranzen entsprechen der DIN IEC 286-3

Dimension in mm:

A, B und K are dependent upon 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-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 (dipping 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.

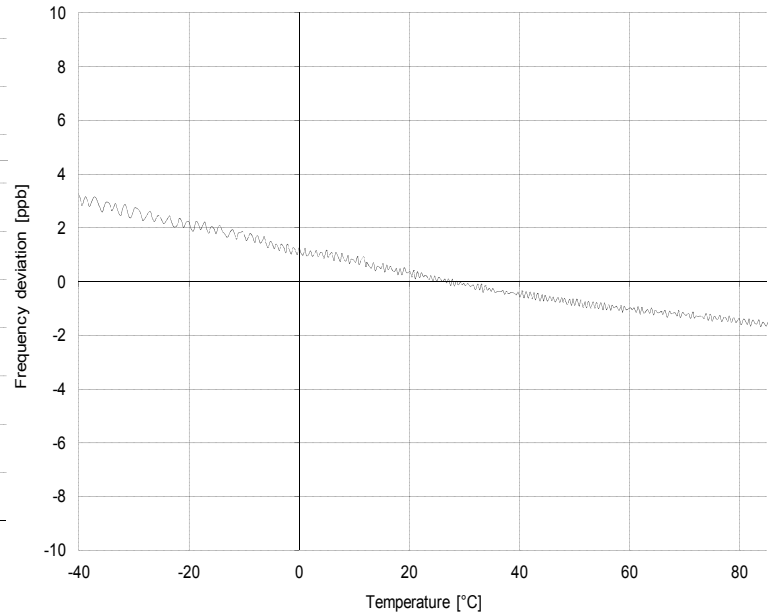
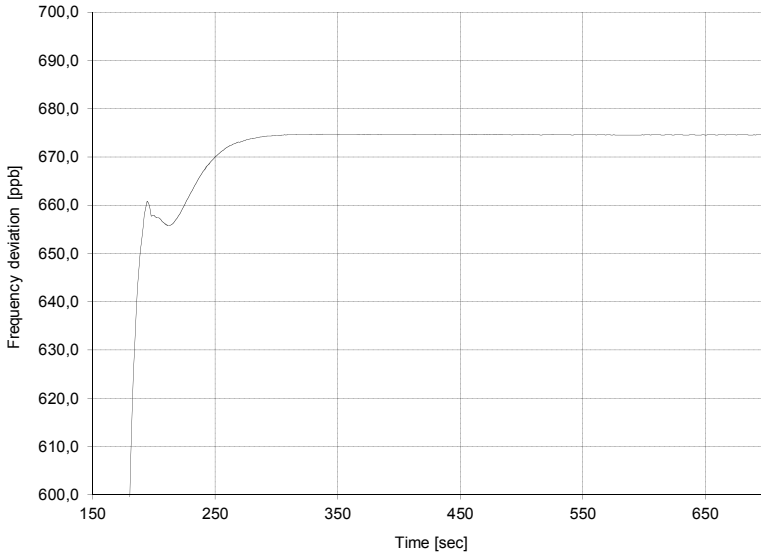
Typical Performance Data

typical warm up

@ MD-2031-DAE-1080-10M00

typical temperature stability

@ MD-2031-DAE-1080-10M00

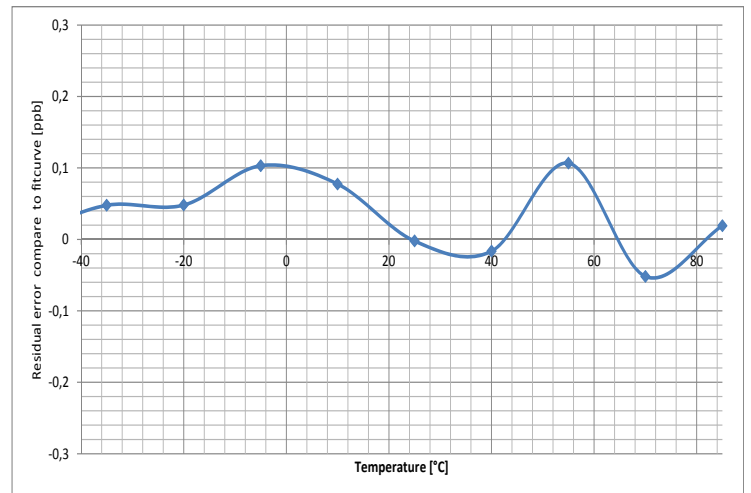
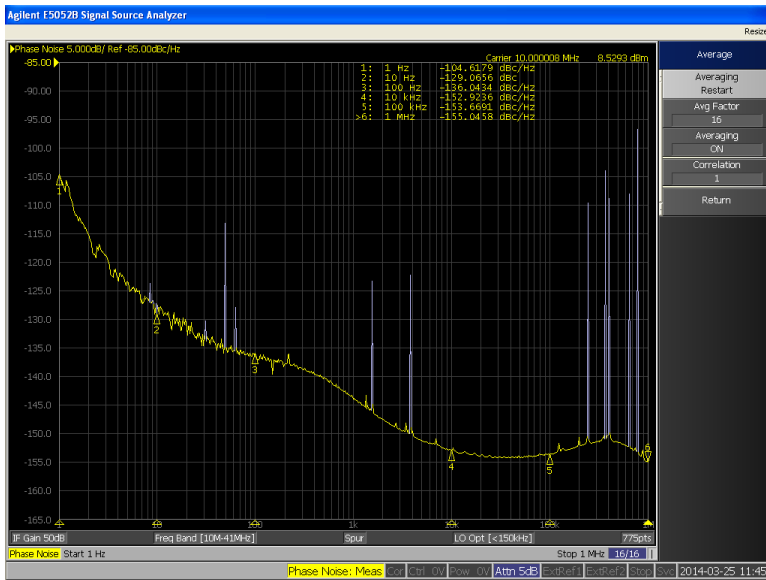


typical Phase Noise

@ MD-2031-DAE-1080-10M00

typical residual error compare to fit curve

@ MD-2031-DAE-1080-10M00



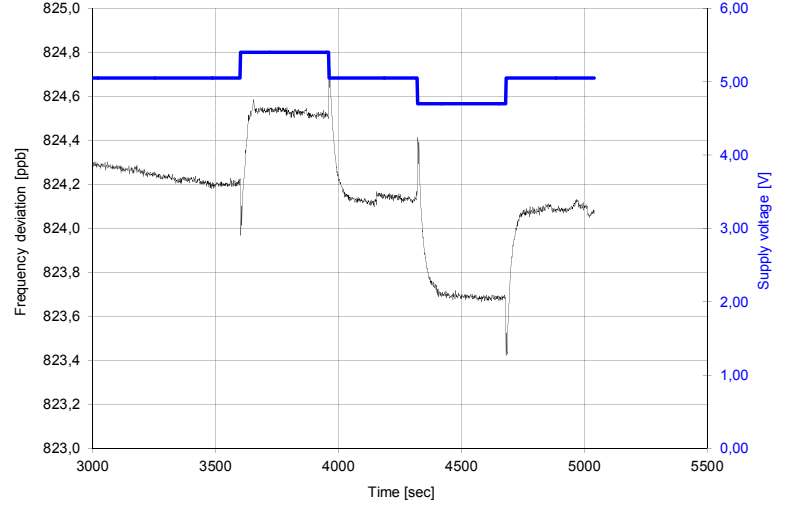
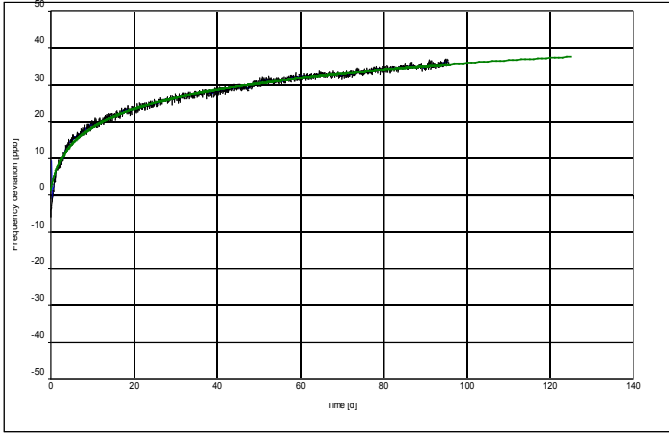
Typical Performance Data

typical aging data

@ MD-2031-DAE-1080-10M00

typical frequency vs. supply voltage

@ MD-2031-DAE-1080-10M00

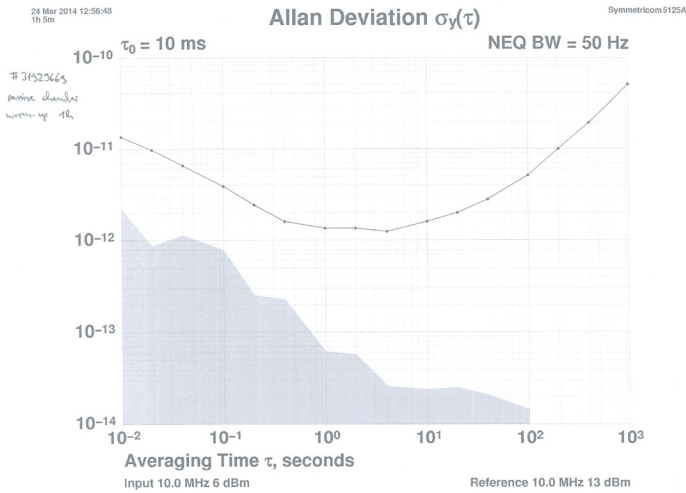


typical ADEV

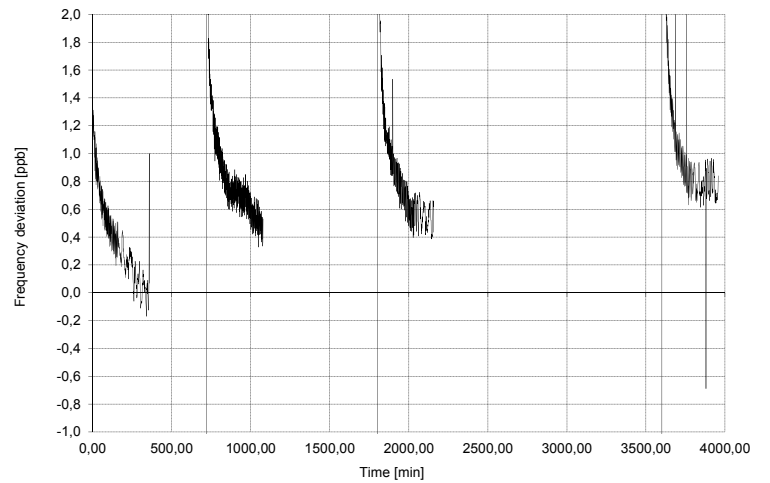
@ MD-2031-DAE-1080-10M00

typical retrace

@ 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 hours power on**



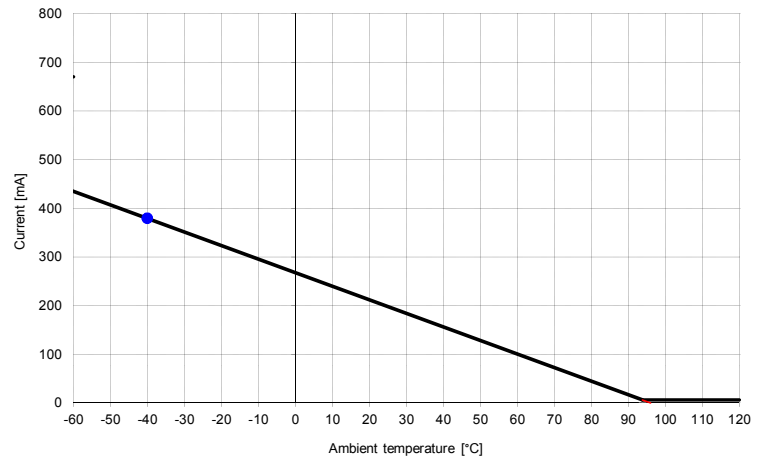
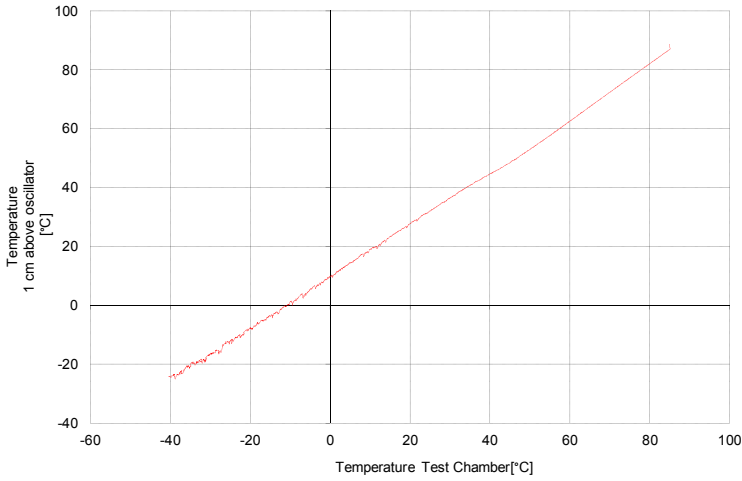
Typical Performance Data

typical case temperature vs. outside temperature

@ MD-2031-DAE-1080-10M00

typical power consumption vs. operating temperature

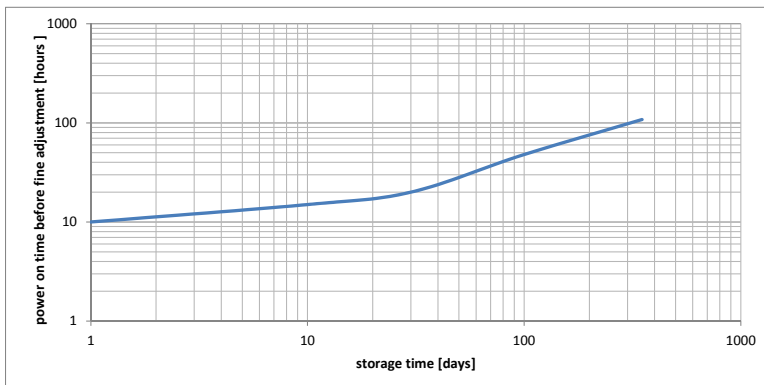
@ MD-2031-DAE-1080-10M00



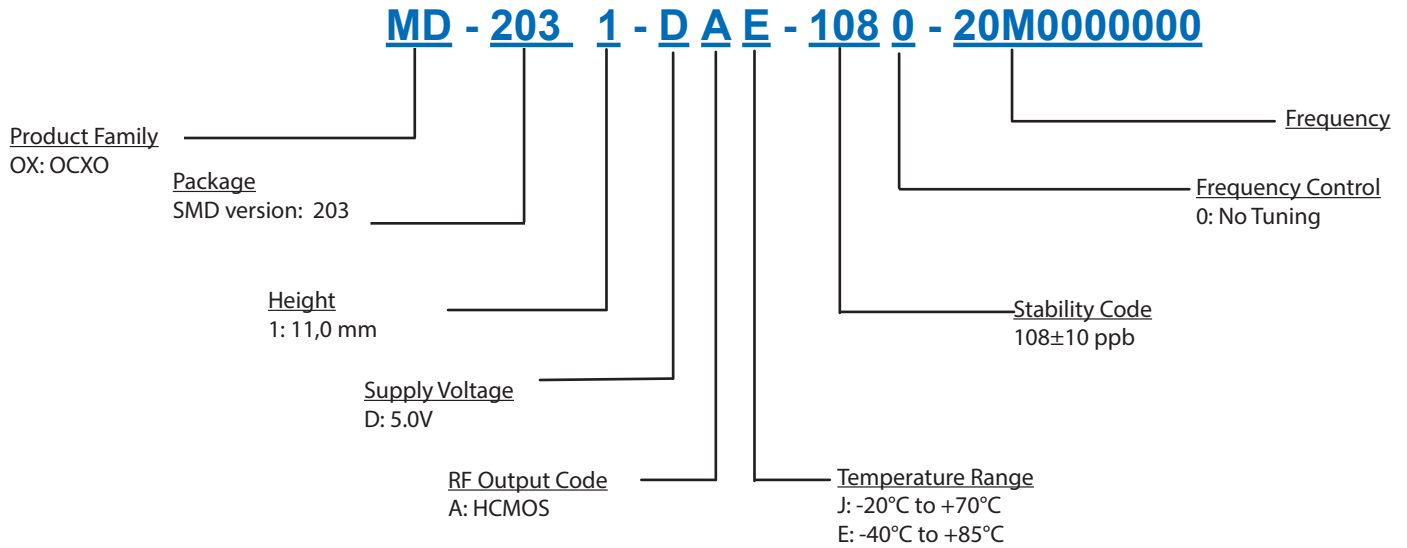
recommended power on time after x days of power off

@ 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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