MD-023

Extended HoldOver Oscillator

The MD-023 series is the first product to be in introduced in Vectron's Extended Holdover Crystal Oscillator platform. With aging rates of 0.08ppb/day and temperature stabilities of 0.1ppb from 0 to 70°C, the MD-023 is capable of providing holdover of 6 us for 24 hours over a 10°C temperature change. The product employs an ultrastable ovenized quartz oscillator with proprietary Vectron digital correction algorithms to achieve rubidium like performance at a fraction of the cost and power.

Features

- **Ultrastable 10 MHz OCXO**
- **Proprietarty digital correction algorithms**
- **Digital EFC adjust**
- **Serial communications interface standard**
- **Low Phase Noise Outputs**

Applications

- **3G Basestations (WCDMA, CDMA2000)**
- **LTE**
- **WiMAX Basestations**
- **Digital Video Broadcast**
- **E911 Location Systems**
- **General Timing and Synchronization**
- **Military Radio**

Block Diagram

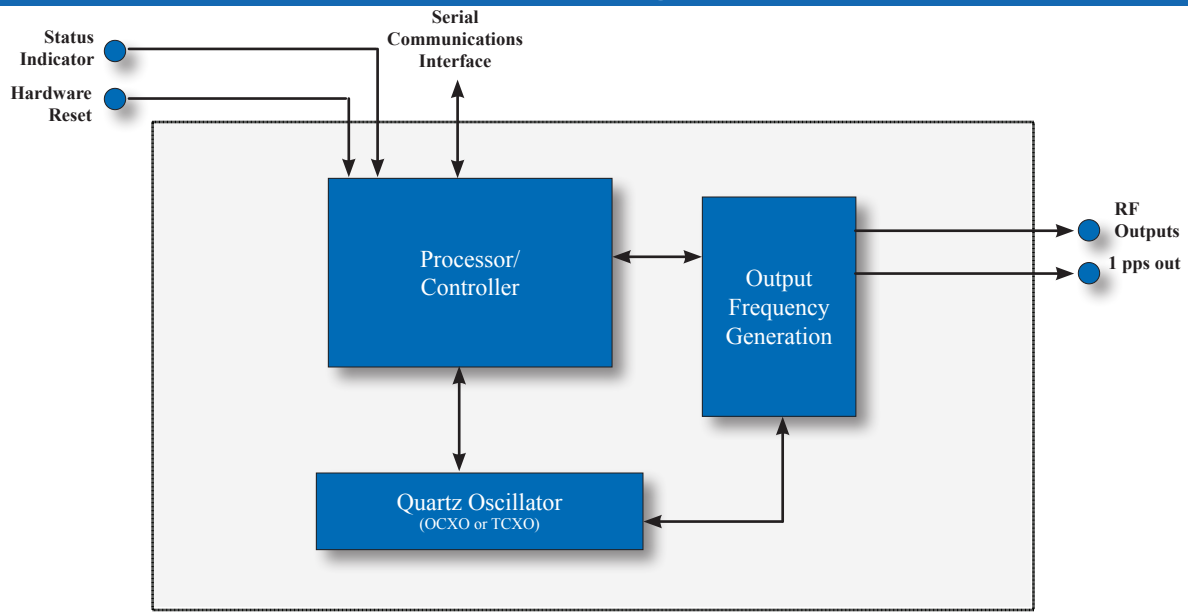
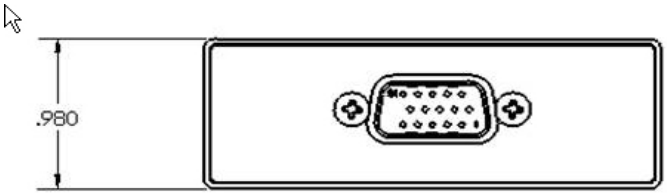


Figure 1. *Functional Block Diagram*

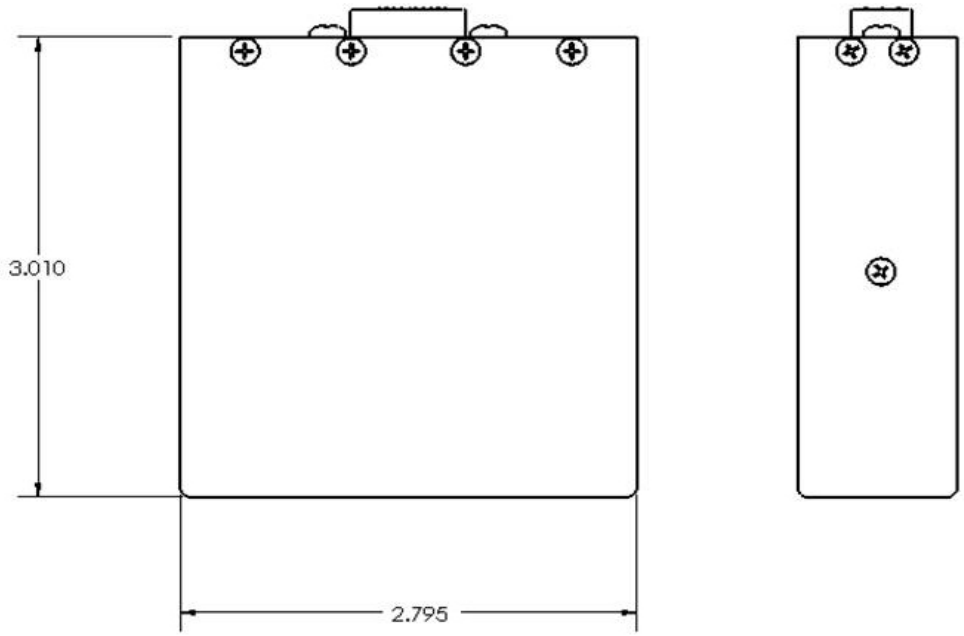
Specifications

RF Output Stability					
Parameter	**Min**	**Typical**	**Max**	**Units**	**Condition**
Nominal Frequency		10		MHz	
Short-term stability		5	10	E-12	@ Tau = 1 sec
(All conditions after 24 hours)		15	20	E-12	@ Tau = 10 sec
Phase noise (All conditions)			-95	dBc/Hz	@ 10Hz offset
			-125	dBc/Hz	@ 100Hz offset
			-140	dBc/Hz	@ 1kHz offset
			-145	dBc/Hz	@ 10kHz offset
			-145	dBc/Hz	@>10kHz offset
Frequency Temperature Stability	0.1		0.1	E-9	0 to 70 °C
Aging			0.8	ppb/day	after 7 days on power
Frequency Pullability	+/-500			ppb	
Frequency resolution		1		E-12	20 bit DAC
Holdover Capability					
Holdover Time	**Min**	**Typical**	**Maxi-mum**	**Units**	**Conditions**
24 hours			6	us	after 7 days on power with a 10°C temperature change during holdover
RF Output Waveform Characteristics					
Waveform	CMOS				
High-Level Output Voltage (V_{OH})	3.0		3.3	V_{DC}	< -0.5mA Load
Low-Level Output Voltage (V_{OL})		0.0	0.3	V_{DC}	< 0.5mA Load
Rise/Fall Time		3	5	nSec	15pF
Duty Cycle	40	50	60	%	15pF
1pps Output Characteristics					
Waveform	TTL				
High-Level Output Voltage (V_{OH})	2.4		3.6	V_{DC}	TTL pulse
Low-Level Output Voltage (V_{OL})		0.0	0.5	V_{DC}	
Pulse width		10		uSec	programmable from 10 to 100 us
Supply Voltage					
Supply voltage	+11.4	+12	+12.6	V_{DC}	
Current consumption			1500 700	mA mA	During Warm-up During steady state operation
AC ripple			200	mVpk-pk	10Hz to 1MHz
Status Indicator					
Module Hardware OK	0		0.5	V_{DC}	<10mA Load
Module Hardware Failure	3.3			V_{DC}	<10mA Load
Module Hardware Reset					
Reset Module	0		0.3	V_{DC}	Load able to sink >2mA
Serial Communications Interface					
Parameter	**Min**	**Typical**	**Max**	**Units**	**Condition**
Rx high-level input voltage (V_{IH})	3.0		3.3	V_{DC}	
Rx low-level input voltage (V_{IL})	-0.3	0.0	0.3	V_{DC}	
Tx high-level output voltage(V_{OH})	3.0	3.3		V_{DC}	
Tx low-level output voltage (V_{OL})	-0.3	0.0	0.3	V_{DC}	
Communications Protocol	Command List is Vectron Custom - available on request				

Package Outline



15 Pin I/O Connections		
Number	**Name**	**Description**
1	Vcc	12VDC in
2	Ground	
3	Ground	
4	Ground	
5	RF output	10 MHz
6	Vcc	12VDC in
7	Ground	
8	N/C	
9	N/C	
10	Ground	
11	1pps	1pps TTL out
12	Status Indicator	
13	Hardware Reset	
14	Rx	Serial communications Receive
15	Tx	Serial Communcations Transmit



Absolute Maximum Ratings

Parameter	Value
Supply Voltage (Vcc)	18 V_{DC}
DC Voltage on any I/O pin	5.5 V_{DC}
Output Load	10 Ohms

Environmental Conditions

Parameter	Conditions
Operating temperature	-0 ˚C to +70 ˚C
Humidity @ 40˚C	90 %
Storage Temperature	-55 ˚C to +125 ˚C

Reliability

VI qualification includes aging various extreme temperatures, shock and vibration, temperature cycling, and IR reflow simulation. The MD-023 is capable of meeting the following qualification tests:

Environmental Compliance	
Parameter	**Conditions**
Mechanical shock	MIL-STD-2002, Method 213 condition B
Mechanical vibration	MIL-STD-2002, Method 204 condition A
Resistance to solvents	MIL-STD-2002, Method 215

Handling Precautions

Although ESD protection circuitry has been designed into the MD-023, proper precautions should be taken when handling and mounting. VI employs a human body model (HBM) and a charged-device model (CDM) for ESD susceptibility testing and design protection evaluation.

ESD Ratings		
Model	**Minimum**	**Conditions**
Human body model	1500 V	MIL-STD-833, Method 3015
Charged device model	1000 V	JEDEC, JESD22-C101

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