

Precision Ultra Low Phase Noise Multi Frequency OCXO Reference Module (MFRM)



ESD Sensitive

81.3 x 50.8 x 19 mm
Datasheet #1326A

Features

- Three frequency outputs 10 MHz, 100 MHz, and 100xN MHz
- Ultra Low Phase Noise
 - -115 dBc/Hz at 1 Hz offset, -145 dBc/Hz at 10 Hz offset for 10 MHz
 - -123 dBc/Hz at 10 Hz offset, -180 dBc/Hz on the floor for 100 MHz
 - -105 dBc/Hz at 10 Hz offset, -160 dBc/Hz at 100 KHz for 1 GHz
- Excellent temperature stability from 2 ppb peak to peak (single oven option), and from ± 0.1 ppb for DOCXO
- Low aging from 0.20 ppb/day
- Excellent short-term stability ADEV < 1E-12 at 1s
- Optional External Reference
- Optional SMB connector for highest frequency output

Applications

- Instrumentation
- High Performance Synthesizers
- Radar
- Telecommunication Equipment

Absolute Maximum Ratings

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Input Break Down Voltage	Vcc	5 V supply	-0.5		5.5	V	
Storage temper.	Ts		-50		90	°C	
Control Voltage	Vc		-1 -5 -1		5.5 5 11	V	Slope option "P" Slope option "N" Slope option "L"

Electrical

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes	
Frequency	F10			10.000		MHz	Pin4	
	F100			100.000			Pin12	
	FXN			100xN			Pin8	
Frequency stability 7*	$\Delta F/F$	vs. Temp. 4*		± 10		ppb	See chart below	
		vs. Supply		0.2	0.3	ppb/10%Vcc		
Aging 7*		per day per year, first year second year		5E-10 1E-7 3E-8			after 30 days 0.2 ppb/day available	
Allan Deviation 7*		0.1s		5E-13				
		1s		2E-12				
		10s		5E-12				
SSB Phase Noise (achieved after 10 minutes warm-up) 7*, 8*	$\mathcal{L}(\Delta f)$	1Hz		-115		dBc/Hz	10 MHz output	
		10 Hz		-145				
		100 Hz		-157				
		1 KHz		-162				
		10 KHz		-170				
			100 KHz		-172	-170	dBc/Hz	100 MHz output
			10 Hz		-125	-123		
			100 Hz		-135	-132		
			1 KHz		-163	-162		
			10 KHz		-175	-173		
100 KHz		-180	-179					

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Electrical (cont.)

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes		
SSB Phase Noise (achieved after 10 minutes warm-up) 7*, 8*	$\mathcal{L}(\Delta f)$	10 Hz		-105			1,000 MHz output		
		100 Hz		-112					
		1 KHz		-142					
		10 KHz		-158					
		100 KHz		-160	-158				
				10 Hz		-122	-120		160 MHz output
				100 Hz		-130	-128		
				1 KHz		-160	-158		
				10 KHz		-170	-168		
				100 KHz		-175	-174		
				10 Hz		-120	-119		200 MHz output
				100 Hz		-130	-126		
				1 KHz		-160	-156		
				10 KHz		-173	-170		
				100 KHz		-175	-173		
Retrace 7*		After 30 minutes			±10	ppb	24 Hours off 3*		
G-sensitivity 7*		worst direction			±1.0	ppb/G			
Input Voltage	Vcc		4.75	5.0	5.25	V			
Power consumption, Still air	P	steady state, 25°C steady state, -30°C start-up @ -30°C		3.2 5.5 6.0	3.5 7.0	W	Standard Operating Temperature 1*.		
Spectral Purity		Subharmonics Spurious Harmonics		-50 -35	-40 -80 -30	dBc	At 1,000 MHz output Either output		
Load		Internally AC-coupled 50 Ohm					All Outputs		
Warm-up time	τ	to 0.1ppm accuracy		3	5	minutes			
Output Waveform		Sinewave							
Output Power			+13 +15 +10	+14 +18 +14	+16	dBm	10 MHz 100 MHz 100xN MHz		
External Reference		Sine Wave	+7			dBm			
Reference Select function		Floating Logic "0" (GND)	Internal Reference External reference				Pin6 9*, Option E		
Control voltage	Vc		0 -4.0 0		Vref 4.0 10.0	V	Slope option "P" Slope option "N" Slope option "L"		
Input impedance	Zin	At Vc pin	10			KOhm			
Modulation bandwidth	Fm				1	Hz			
Reference Voltage	Vref			4.5		V	Pin#2 is not connected with slope options "N" and "L"		
Output Impedance		At Vref pin		100		Ohm			
Pull range		from nominal F	±0.4	±0.6		ppm			
Deviation slope		Monotonic, positive Monotonic, negative Monotonic, positive		1.0/Vref -0.13 0.12		ppm/V	Slope option "P" Slope option "N" Slope option "L"		
Setability	Vc0	@25°C, Fnom. No internal bias for slope option "L"		Vref/2 ± 0.5 0 ± 0.5 5 ± 0.5		V	Slope option "P" 3* Slope option "N" Slope option "L"		

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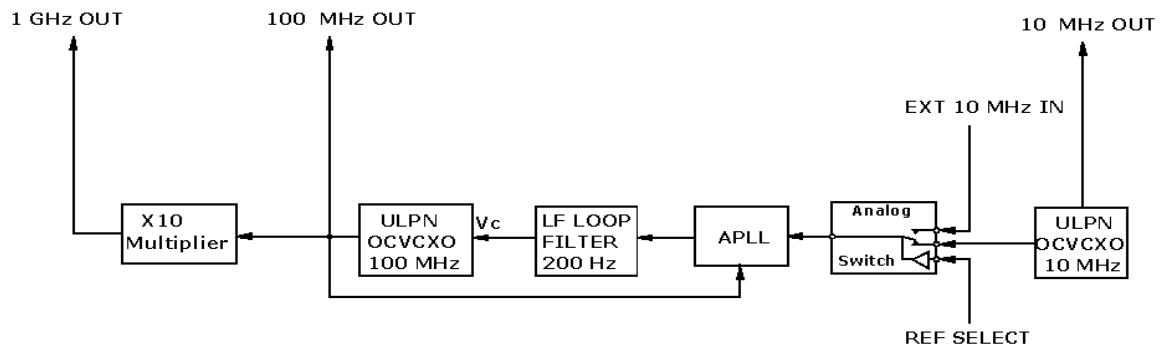
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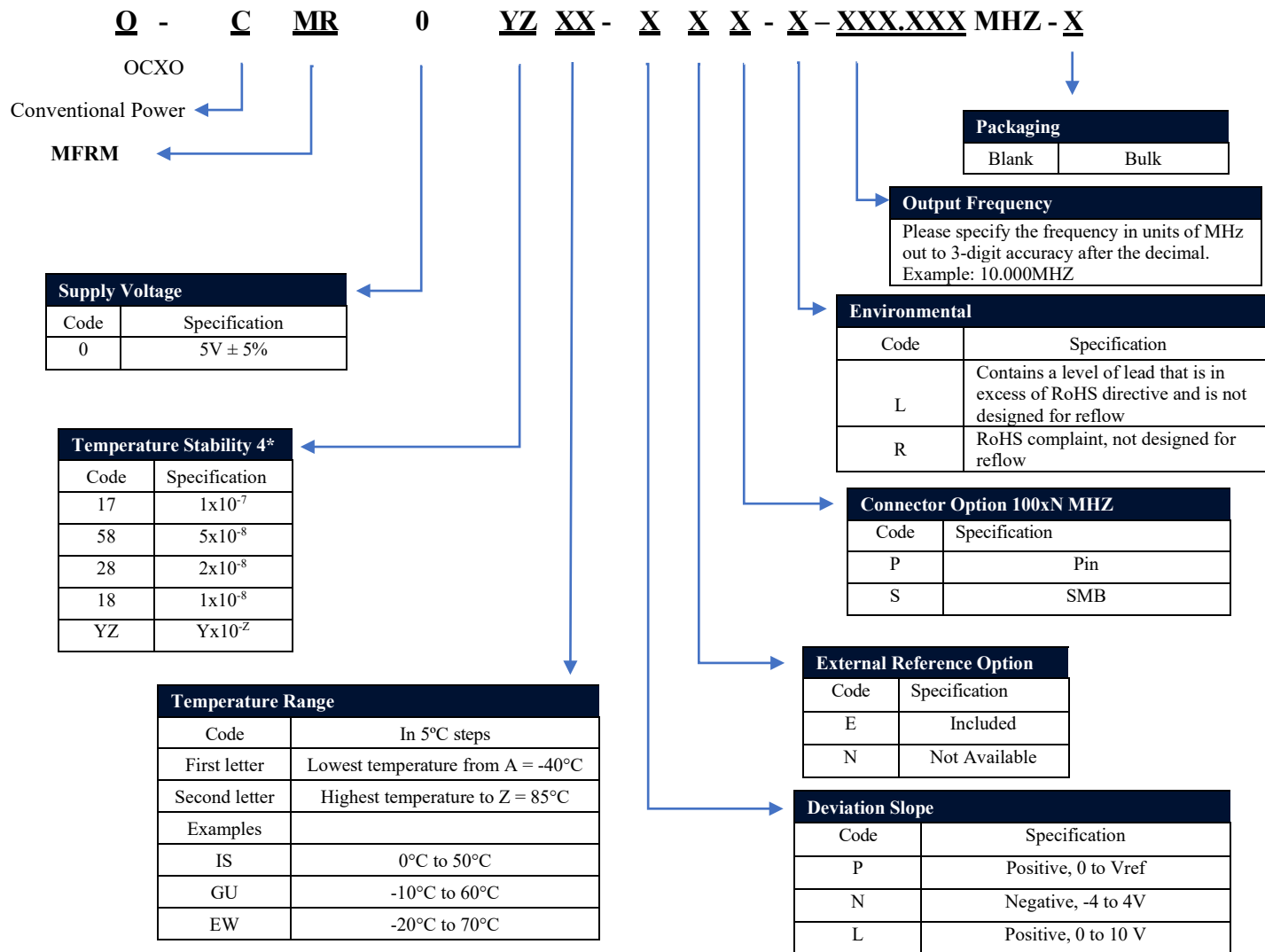
Environmental and Mechanical

Parameter	Description
Operating temp. range	0°C to 70°C Standard, Other options – see chart below
Mechanical Shock	Per MIL-STD-202, 30G, 11ms
Vibration	Per MIL-STD-202, 5G to 2000 Hz
Soldering Conditions	260°C for 10s Max leads only





Creating a Part Number



Not all combinations are available. Consult Factory.

Temperature Code Table

Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C
A	-40	F	-15	K	10	P	35	U	60	Z	85
B	-35	G	-10	L	15	Q	40	V	65		
C	-30	H	-5	M	20	R	45	W	70		
D	-25	I	0	N	25	S	50	X	75		
E	-20	J	5	O	30	T	55	Y	80		

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Notes:

- 1* For highest operating temperature greater than 70°C the power consumption will be higher (about 20% for 85°C). Values listed are for test in still air environment, the values will go up while testing in the temperature chamber.
- 2) For recommended phase noise test, contact factory. Its assumed that phase noise test is performed under static conditions (no vibration), in still air, and care is taken for minimizing EMI.
- 3* Longer storage time, especially at low temperatures, may affect both retrace and stability parameters. It may require a few days on power for re-stabilization.
- 4*. If 10MHz is not used, it must be terminated into 50 Ohm.
- 5) Pin 3 is connected to Vref only for slope Option "P".
- 6) All parameters, unless otherwise specified, are at nominal conditions, i.e.: T=25°C, Nominal Vcc & Nominal Load.
- 7* All parameters are for internal reference only. All stability parameters will be determined by reference. With external reference the phase noise may deteriorate (significantly) at frequency offsets < 1 KHz
- 8* For output frequency 100xN, the phase noise typically would be by 20logN higher than the one at 100 MHz, with possible 1 – 2 dB deterioration at higher offset frequencies from the carrier.
- 9* If the use of external reference is not intended and not specified (option N), pins # 6 and #7 will not be connected.

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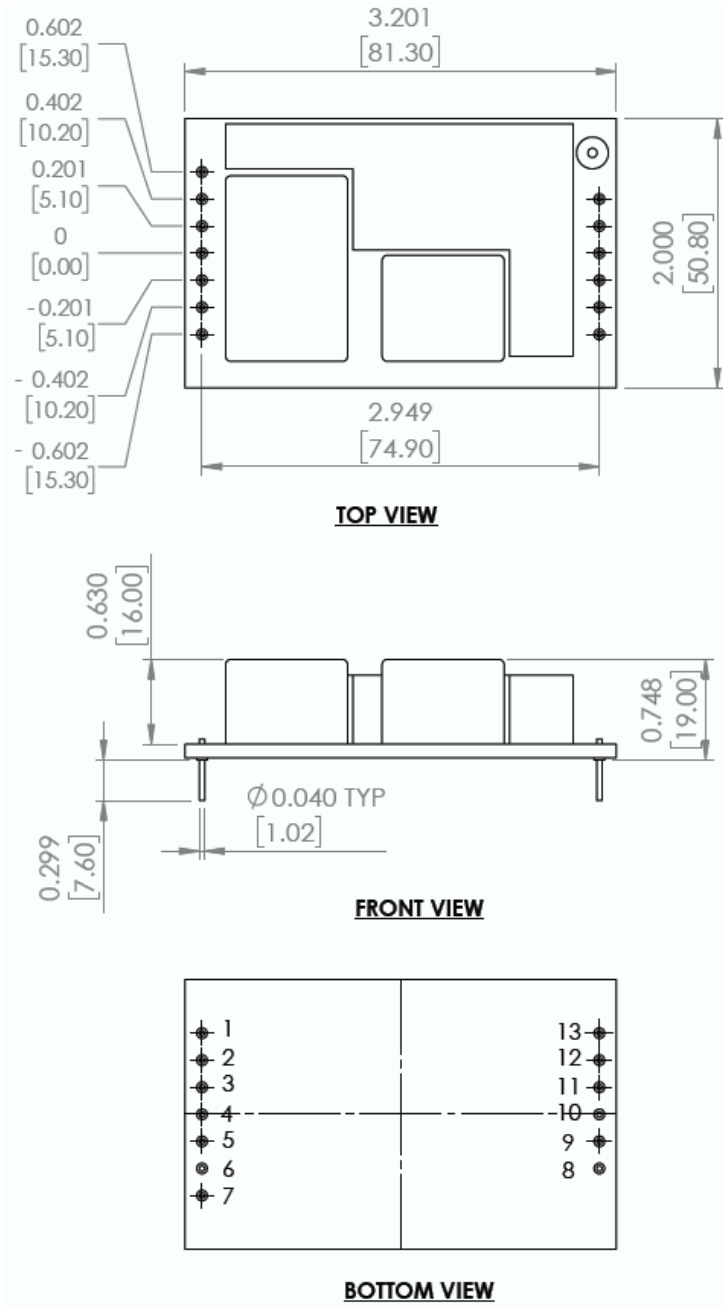


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Mechanical Dimensions



Pin #	Function
1	Vcc 10
2	Vc
3	Vref
4	RF OUT 10MHz
5	GND
6	EXT REF IN (optional)
7	REF Select (optional)
8	RF OUT High Freq.
9	GND
10	GND
11	GND
12	RF OUT 100 MHz
13	Vcc 100

Dimensions: inches [mm]