OVEN-CONTROLLED MULTI FREQUENCY REFERENCE

Data Sheet 1326A

Rev J

O-CMR-0YZXX-XX-X-Freq
Precision Ultra Low Phase Noise Multi Frequency OCXO Reference Module (MFRM)

The MFRM consists of two Ultra Low Phase Noise (ULPN) OCXO at 10 MHz and 100 MHz. Both are packaged in hermetically sealed metal cans. The unit at 100 MHz is phase/frequency locked to the 10 MHz one. The output of 100 MHz unit is then multiplied integer number of times, up to 10 to achieve a ULPN output signal at from 200 MHz to up to 1,000 MHz (1 GHz). Lower frequency OCXO provides for excellent frequency stability over temperature, including optional double oven (DOCXO), time (aging), supply and load variations, as well as exceptionally low phase noise close to the carrier, and short-term stability (Allan Deviation). 100 MHz OCXO provides for ultra low phase noise on the noise floor, including multiplied outputs.

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 1 s
- Optional External Reference
- Optional SMB connector for highest frequency output

Applications:

- Instrumentation
- High Performance Synthesizers
- Radar
- Telecommunication Equipment

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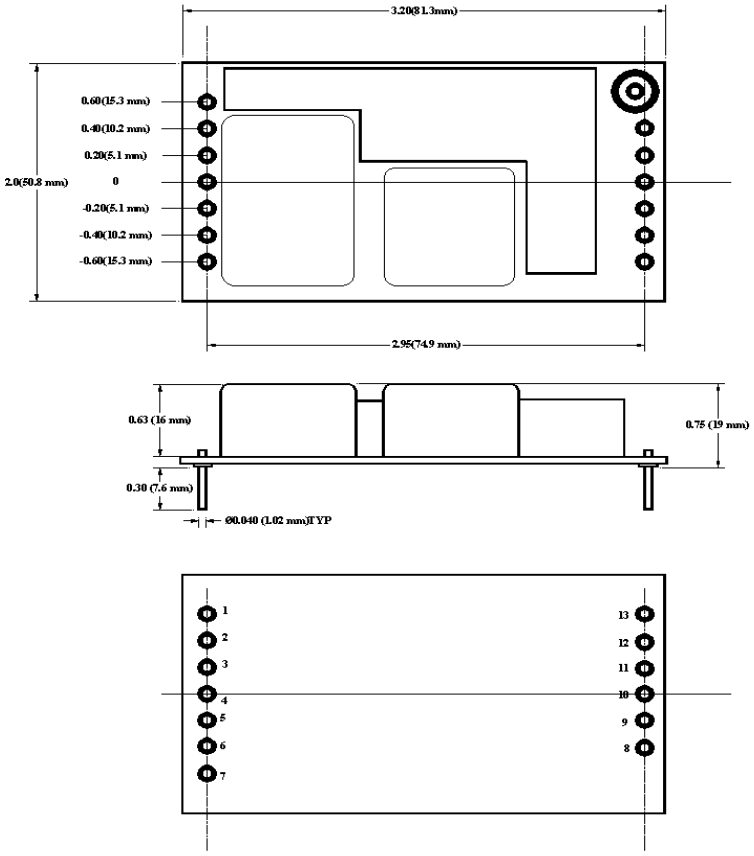
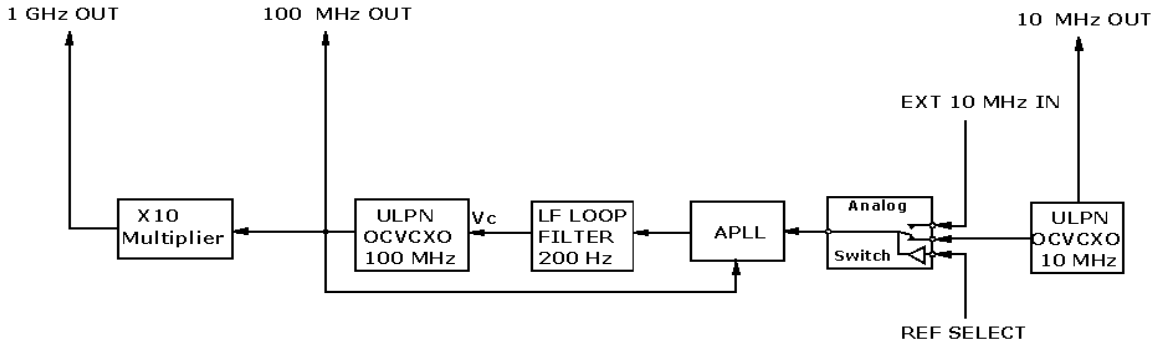


Pin-out:
Pin #1 = Vcc 10; Pin #2 = Vc; Pin#3 = Vref; Pin#4 = RF OUT 10 MHz
Pin #5 = GND; Pin#6 = EXT REF IN (optional);
Pin #7 = REF Select (optional); Pin #8 = RF OUT High Freq.; Pin #9 = GND;
Pin #10 = GND; Pin #11 = GND; Pin #12 = RF OUT 100 MHz; Pin #13 = Vcc 100



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Specifications:

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Absolute Maximum Ratings							
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 (6)							
Frequency	F10			10.000		MHz	Pin4
	F100			100.000			Pin12
	FXN			100xN			Pin8
Frequency stability 7*	ΔF/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 1s 10s		5E-13 2E-12 5E-12			
SSB Phase Noise (achieved after 10 minutes warm-up) 7*, 8*	£(Δf)	1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-115 -145 -157 -162 -170 -172		dBc/Hz	10 MHz output
		10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-125 -132 -163 -175 -180	-123	dBc/Hz	100 MHz output
		10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-105 -112 -142 -158 -160		dBc/Hz	1,000 MHz output
		10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-119 -126 -156 -170 -173		dBc/Hz	200 MHz output
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*.
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					

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Output Power			+10 +12 +10	+13 +15 +13		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"

Notes:

*. For highest operating temperature greater than 70ºC the power consumption will be higher (about 20% for 85ºC). 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. It's 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 setability parameters. It may require 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 be not connected.

Environmental and Mechanical

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

Electrical Connections

Pin Out	Pin #1 = Vcc 10; Pin #2 = Vc; Pin#3 = Vref; Pin#4 = RF OUT 10 MHz Pin #5 = GND; Pin#6 = EXT REF IN (optional); Pin #7 = REF Select (optional); Pin #8 = RF OUT 100xN MHz; Pin #9 = GND; Pin #10 = GND; Pin #11 = GND; Pin #12 = RF OUT 100 MHz; Pin #13 = Vcc 100

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Creating a Part Number

O - C MR 0 YZ XX - X X X - X

OCXO
Conventional Power

MFRM

Supply Voltage

Code	Specification
0	5V ± 5%

Temperature Stability 4*

Code	Specification
17	$1x10^{-7}$
58	$5x10^{-8}$
28	$2x10^{-8}$
18	$1x10^{-8}$
YZ	$Yx10^{-Z}$

Temperature Range

Code	In 5ºC steps
First letter	Lowest temperature from A = -40ºC
Second letter	Highest temperature to Z = 85ºC
Examples	
IS	0°C to 50°C
GU	-10°C to 60°C
EW	-20°C to 70°C

Deviation slope

Code	Specification
P	Positive, 0 to Vref
N	Negative, -4 to 4V
L	Positive, 0 to 10 V

External Reference Option

Code	Specification
E	Included
N	Not Available

Connector Option 100xN MHz

Code	Specification
P	Pin
S	SMB

Environmental

Code	Specification
L	Contains a level of lead that is in excess of RoHS directive and is not designed for reflow
R	RoHS compliant, not designed for reflow

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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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