

## Precision Ultra Low Phase Noise Dual Frequency OCXO Reference Module (DFRM)



ESD Sensitive

36.1 x 27.2 x 25.4 mm  
Datasheet #1507A

### Features

- Two frequency outputs 10.000MHz and 100.000MHz
- Ultra Low Phase Noise
  - 10MHz carrier:
    - 115 dBc/Hz at 1Hz offset
    - 145 dBc/Hz at 10Hz offset
  - 100MHz carrier:
    - 123 dBc/Hz at 10Hz offset
    - 178 dBc/Hz at 100KHz
- Excellent Temperature stability from  $\pm 2$  ppb
- Low aging from 0.25 ppb/day
- Excellent short term stability ADEV < 1E-12 at 1s
- Very small, hermetically sealed package

### 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		5.5	V	Slope option "P" Slope option "L"

### Electrical

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Frequency	F10			10.000		MHz	Pin4
	F100			100.000			Pin5
Frequency stability	$\Delta F/F$	vs. Temp. 4*		$\pm 20$		ppb	See chart below
		vs. Supply		0.2	0.3	ppb/10%Vcc	
Aging		per day per year, first year second year		5E-10 5E-8 2E-8			after 30 days 5*
Allan Deviation		0.1s 1s 10s		5E-13 2E-12 5E-12			5*
SSB phase noise (achieved after 10 minutes warm-up)	$\mathcal{L}(\Delta f)$	1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz			-115 -145 -157 -162 -167 -168	dBc/Hz	10 MHz output 5*
		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz 1MHz		-125	-90 -123 -130 -160 -172 -178 -180	dBc/Hz	100 MHz output, Grade "U" 5*
Retrace		After 30 minutes			$\pm 10$	ppb	24 Hours off 3*
G-sensitivity		worst direction			$\pm 1.0$	ppb/G	
Input Voltage	Vcc		4.75	5.0	5.25	V	
Power consumption, Still air	P	steady state, 25°C		2.2	2.5	W	
		steady state, -30°C		4.5			
		start-up @ -30°C		5.0	6.0		

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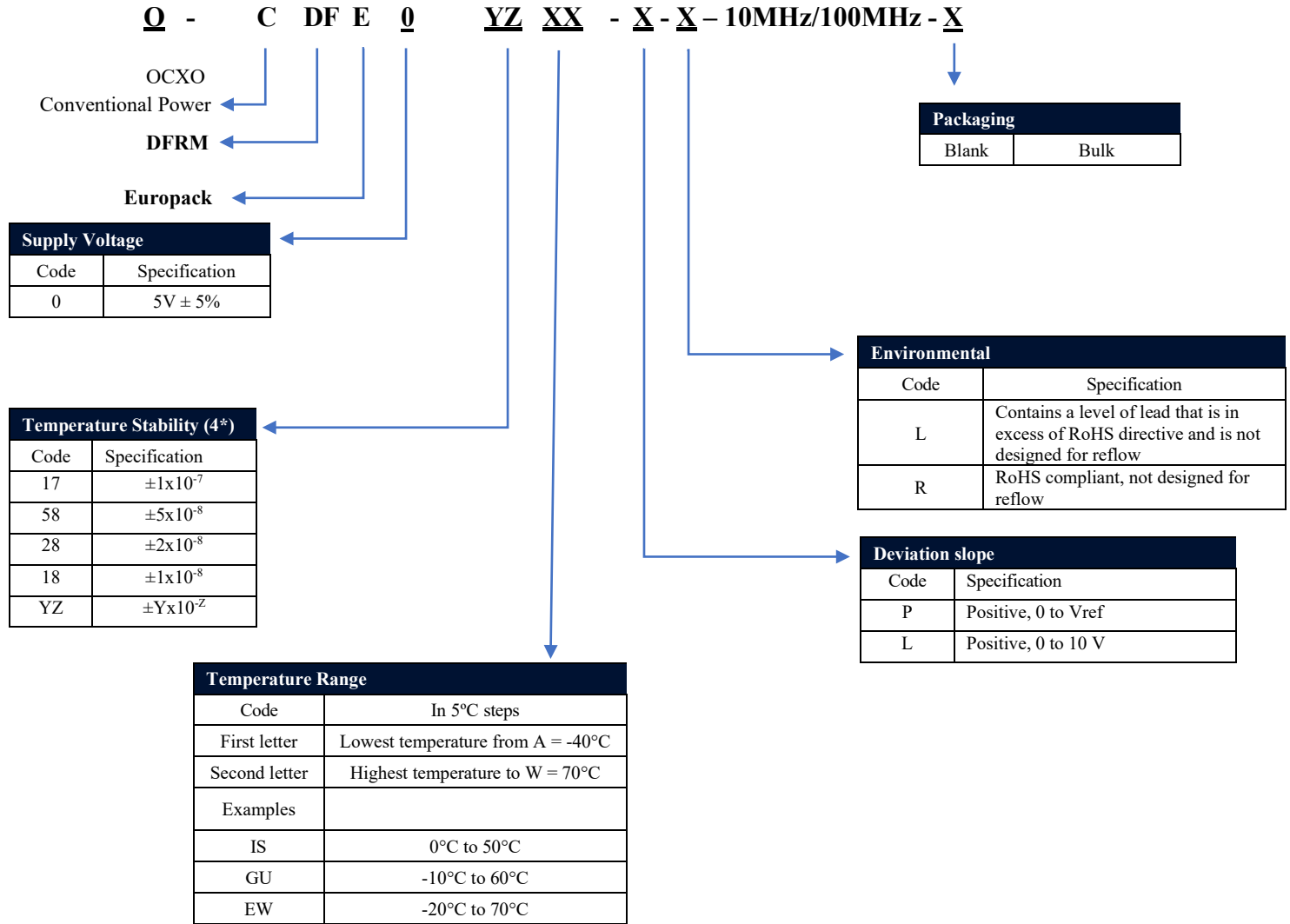
### Electrical (cont.)

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Spectral Purity		Subharmonics		-70	-60	dBc	At 100 MHz output At 100 MHz output  Either output
		10 MHz		-60	-50		
		Spurious			-80		
		Harmonics		-35	-30		
Load		Internally AC-coupled 50 Ohm both outputs					
Warm-up time	$\tau$	to 0.1ppm accuracy		3	5	minutes	
Output Waveform		Sinewave					
Output Power			+10	+13		dBm	Both Outputs
Control voltage	Vc		0		Vref 10.0	V	Slope option "P" Slope option "L"
Input impedance	Zin	At Vc pin	10			KOhm	
Modulation bandwidth	Fm		DC		1	KHz	
Reference Voltage	Vref			4.5		V	
Output Impedance		At Vref pin		100		Ohm	
Pull range		from nominal F	$\pm 0.3$ $\pm 0.4$	$\pm 0.5$ $\pm 0.6$		ppm	Slope option "P" Slope option "L"
Deviation slope		Monotonic, positive Monotonic, positive		0.22 0.12		ppm/V	Slope option "P" Slope option "L"
Setability	Vc0	@25°C, Fnom. No internal bias for slope option "L"	Vref/2 $\pm$ 0.5 5 $\pm$ 0.5			V	Slope option "P" 3* Slope option "L"
External Reference		Sine Wave	+7			dBm	5*
Reference Select function		Floating Logic "0" (GND)	Internal Reference External reference				Pin8 5*

### Environmental and Mechanical

Parameter	Description
Operating temp. range	-30°C to 70°C MAX, 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:

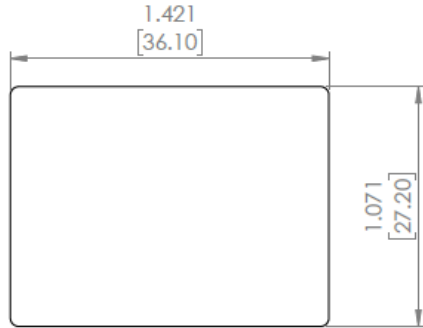
- 1) If not used 10MHz output must be terminated into 50 Ohms.
- 2) For recommended phase noise test, contact factory. It's assumed that phase noise test is performed under static conditions (no vibration), in still air, and care is taken for minimizing EMI.
- 3\* Longer storage time, especially at low temperatures, may affect both retrace and setability parameters. It may require few days on power for re-stabilization.
- 4\* Temperature stability is specified as  $\pm$  vs. frequency at 25°C.
- 5\* It is highly recommended (in case external reference must be used) for better performance, instead of switching to external reference, using an external PLL and lock internal 10 MHz reference to external reference with very narrow (<1 Hz) loop bandwidth. In case of using external reference, the performance will be determined by its quality.
- 6) All parameters, unless otherwise specified, are at nominal conditions, i.e.: T=25°C, Nominal Vcc & Nominal Load.

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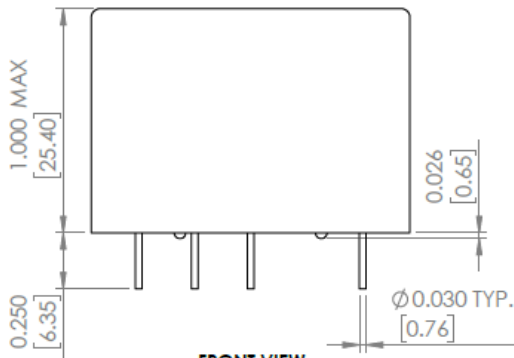


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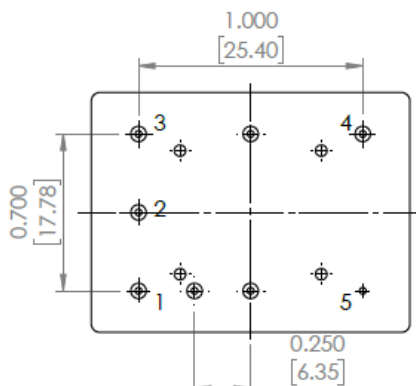
### Mechanical Dimensions



**TOP VIEW**



**FRONT VIEW**



**BOTTOM VIEW**

Pin #	Function
1	Vc10
2	Vref
3	Vcc
4	RF OUT 10 MHz
5	RF OUT 100 MHz
6	GND
7	EXT REF IN
8	REF Select

Dimensions: inches [mm]

## Phase Noise Plot

### Grade “U” Phase Noise

