Rev D

O-CDFEXYZXX-X-X-10MHz/100MHz Precision Ultra Low Phase Noise Dual Frequency OCXO Reference Module (DFRM)

The DFRM consists of 2 Ultra Low Phase Noise OCXO at 10 MHz and 100 MHz. The module is packaged in a very small hermetically sealed metal can ("Europack") 36x27x25 mm. The unit at 100 MHz is phase/frequency locked to the 10 MHz one. (The module also provides capability of locking 100 MHz OCXO to the external reference 5*). Lower frequency OCXO provides for excellent frequency stability over temperature, time (aging), supply and load variations, as well as exceptionally low phase noise close to the carrier, and short-term stability (Allan Variance). 100 MHz OCXO provides for ultra low phase noise on the noise floor and high output power.

Features:

- Two frequency outputs 10.000 MHz and 100.000 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, to -178 dBc/Hz at 100KHz for 100 MHz
- Excellent temperature stability from ±2 ppb
- Low aging from 0.25 ppb/day
- Excellent short term stability ADEV < 1E-12 at 1 s
- Very small, hermetically sealed package

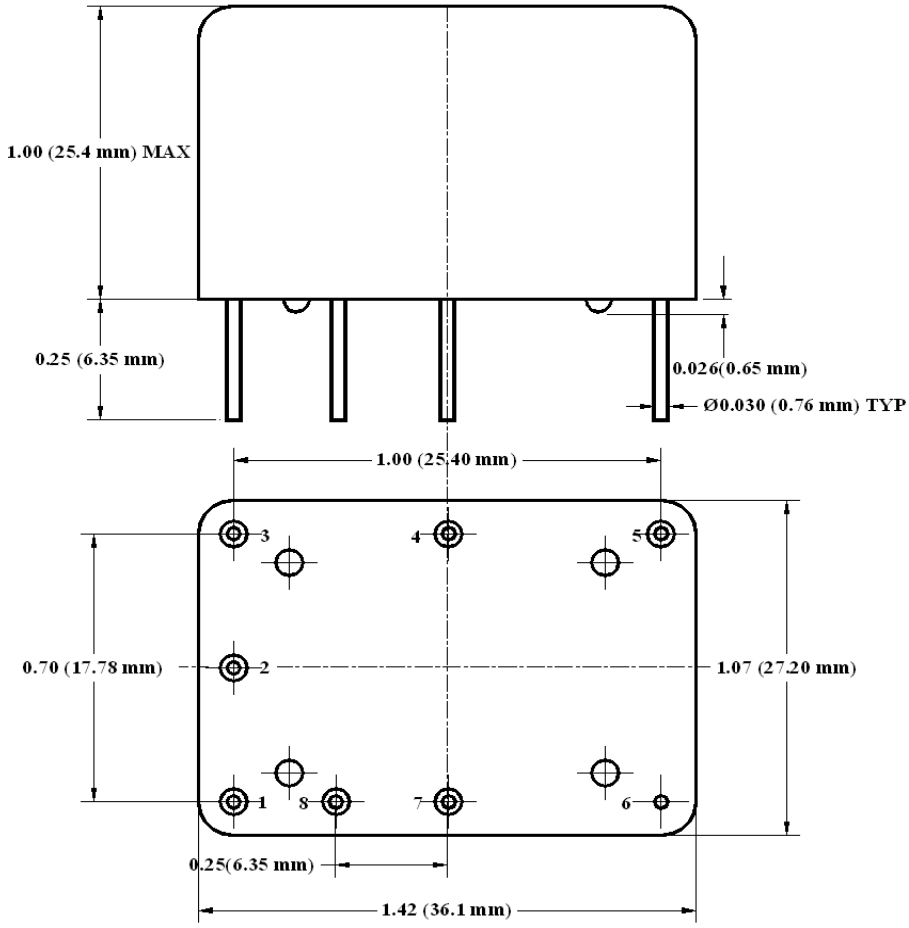
Applications:

- Instrumentation
- High Performance Synthesizers
- Radar
- Telecommunication Equipment

NEL FREQUENCY CONTROLS, INC.

357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881

Email: nelsales@nelfc.com www.nelfc.com



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

NEL FREQUENCY CONTROLS, INC.
357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881
Email: nelsales@nelfc.com www.nelfc.com

OVEN-CONTROLLED DUAL FREQUENCY REFERENCE

Data Sheet 1507A

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 -1		5.5 11	V	Slope option "P" Slope option "L"
Electrical (6)							
Frequency	F10			10.000		MHz	Pin4
	F100			100.000			Pin5
Frequency stability	ΔF/F	vs. Temp. 4*		±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)	£(Δf)	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			±10	ppb	24 Hours off 3*
G-sensitivity		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		2.2 4.5 5.0	2.5 6.0	W	
Spectral Purity		Subharmonics 10 MHz Spurious Harmonics		-70 -60 -35	-60 -50 -80 -30	dBc	At 100 MHz output At 100 MHz output Either output
Load	Internally AC-coupled 50 Ohm both outputs						
Warm-up time	τ	to 0.1ppm accuracy		3	5	minutes	
Output Waveform		Sinewave					
Output Power			+10	+13		dBm	Both Outputs
Control voltage	Vc		0 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	±0.3 ±0.4	±0.5 ±0.6		ppm	Slope option "P" Slope option "L"

NEL FREQUENCY CONTROLS, INC.

357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881

Email: nelsales@nelfc.com www.nelfc.com

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 ± 0.5 5 ±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*

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 ± 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.

Environmental and Mechanical

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

Electrical Connections

Pin Out	Pin #1-Vc; Pin#2 – Vref; Pin #3 – Vcc; Pin #4- RF OUT 10 MHz ; Pin #5- RF OUT 100 MHz; Pin# 6 – GND, Pin#7 – EXT REF; Pin#8 – REF Select

NEL FREQUENCY CONTROLS, INC.
357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881
Email: nelsales@nelfc.com www.nelfc.com

OVEN-CONTROLLED DUAL FREQUENCY REFERENCE

Data Sheet 1507A

Creating a Part Number

O - C DF E 0 YZ XX - X - X - 10MHz/100MHz

OCXO
Conventional Power
DFRM
Europack

Supply Voltage

Code	Specification
0	5V ± 5%

Temperature Stability 4*

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

Temperature Range

Code	In 5ºC steps 8*
First letter	Lowest temperature from A = -40ºC
Second letter	Highest temperature to W = 70ºC
Examples	
IS	0°C to 50°C
GU	-10°C to 60°C
EW	-20°C to 70°C

Not all combinations available, consult factory

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

Deviation slope

Code	Specification
P	Positive, 0 to Vref
L	Positive, 0 to 10 V

8*Temperature Code Table

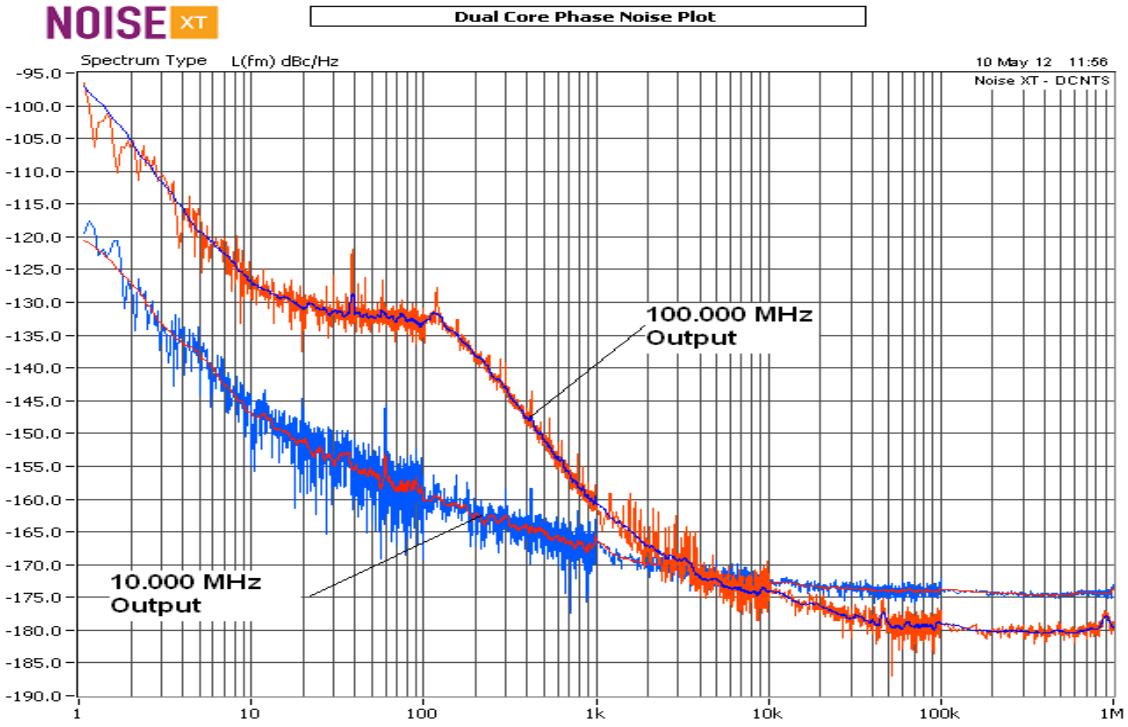
Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C
A	-40	**F**	-15	**K**	10	**P**	35	**U**	60	**Z**	85
B	-35	**G**	-10	**L**	15	**Q**	40	**V**	65		
C	-30	**H**	-5	**M**	20	**R**	45	**W**	70		
D	-25	**I**	0	**N**	25	**S**	50	**X**	75		
E	-20	**J**	5	**O**	30	**T**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

NEL FREQUENCY CONTROLS, INC.

357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881

Email: nelsales@nelfc.com www.nelfc.com

Grade "U" Phase Noise



NEL FREQUENCY CONTROLS, INC.
357 Beloit Street, P.O. Box 457, Burlington, WI 53105-0457 U.S.A. Phone 262/763-3591 FAX 262/763-2881
Email: nelsales@nelfc.com www.nelfc.com