

Double Oven Controlled Crystal Oscillator NI-10MHz-3600 Series

NI-10M-3600 Series in 36.3x27.2mm DIP package

NI-10M-3600 Series oscillators are designed for applications where exceptional frequency stability and timing is required. The NI-10M-3600 units have both excellent temperature performance and short term stability. These characteristics make the NI-10M-3600 Series an excellent choice for timing applications requiring daily aging of < 0.05ppb/day. A choice of quartz resonators offers a variety of performance versus cost options to fit most applications.



RoHS Compliant Standard

ELECTRICAL SPECIFICATIONS

1. OUTPUT (PIN = "R.F. OUTPUT")

	Parameter	Min.	Typ.	Max.	Unit	Test Condition
1.1.	Frequency	10.000000			MHz	
1.2.	Initial Accuracy	-0.1		+0.1	ppm	@ +25 ±1°C after turn on power 30 ±5 minutes ≤ 90 days following date code VCO Input at Center Voltage ±0.001V
1.3.	Waveform	Rectangular				
1.4.	Level	CMOS				
	"1" level	+2.4			V	
	"0" level			+0.3	V	
1.5.	Load		15		pF	
1.6.	Duty cycle	45	50	55	%	@ +2.5V
1.7.	Spurious			-60	dBc	

2. FREQUENCY STABILITY

	Parameter	Min.	Typ.	Max.	Unit	Test Condition
2.1.	Ambient	±0.05, ±0.1, ±0.2, ±0.5			ppb	Refer to Table 1 : Ordering Information
		-10 ~ +70 -40 ~ +85			°C	
2.2.	Aging					
	Daily	±0.05, ±0.1, ±0.2			ppb	after 30 days
	Yearly	±10, ±20, ±40			ppb	Refer to Table 1 : Ordering Information
	10 Years	±50, ±100, ±200			ppb	
2.3.	Voltage	-0.1		+0.1	ppb	±5% change
2.4.	Short term			0.005	ppb/s	root Allan variance
				0.01	ppb/10s	
2.5.	Warm-up	-20		+20	ppb	in 5 minutes @ +25 ±1°C referenced to 1 hour

	Parameter	Min.	Typ.	Max.	Unit	Test Condition
2.6.	Phase Noise			-90	dBc/Hz	@ 1Hz
				-120	dBc/Hz	@ 10Hz
				-135	dBc/Hz	@ 100Hz
				-145	dBc/Hz	@ 1KHz
				-155	dBc/Hz	@ 10KHz
				-160	dBc/Hz	@ 100KHz
2.7.	Retrace	-5		+5	ppb	After 60 minutes from turn on, following 24 hours minimum on time, and 24 hours maximum off time. At constant temperature and voltage. Referenced to frequency at off time

3. ELECTRICAL FREQUENCY ADJUSTMENT (PIN = "VCO INPUT")

	Parameter	Min.	Typ.	Max.	Unit	Test Condition
3.1.	Tuning Range			-0.15	ppm	VCO @ Min. Voltage
		+0.15			ppm	VCO @ Max. Voltage
3.2.	Control Voltage	0		+5.0	V	Referenced to frequency at nominal Center Voltage
3.3.	Slope	Positive				
3.4.	Center Voltage		+2.5		V	When not connected, VCO INPUT is internally held at this voltage
3.5.	Linearity	-10		+10	%	
3.6.	Input Impedance	50			kΩ	

4. INPUT POWER (PIN = "+VDC")

	Parameter	Min.	Typ.	Max.	Unit	Test Condition
4.1.	Voltage	+4.75	+5.0	+5.25	V	
4.2.	Current					
	Steady State			2.5	W	@ +25°C
	During Warm-Up			1.75	A	@ turn on

5. ENVIRONMENTAL

	Parameter	Reference Std.	Test Condition
5.1.	Storage Temperature	-40°C to +85°C	
5.2.	Vibration (non-operating)	MIL-STD-202, Method 201	0.06" Total p-p, 10 to 55 Hz
5.3.	Shock (non-operating)	MIL-STD-202, Method 213, Test Condition J	30g, 11ms, half-sine

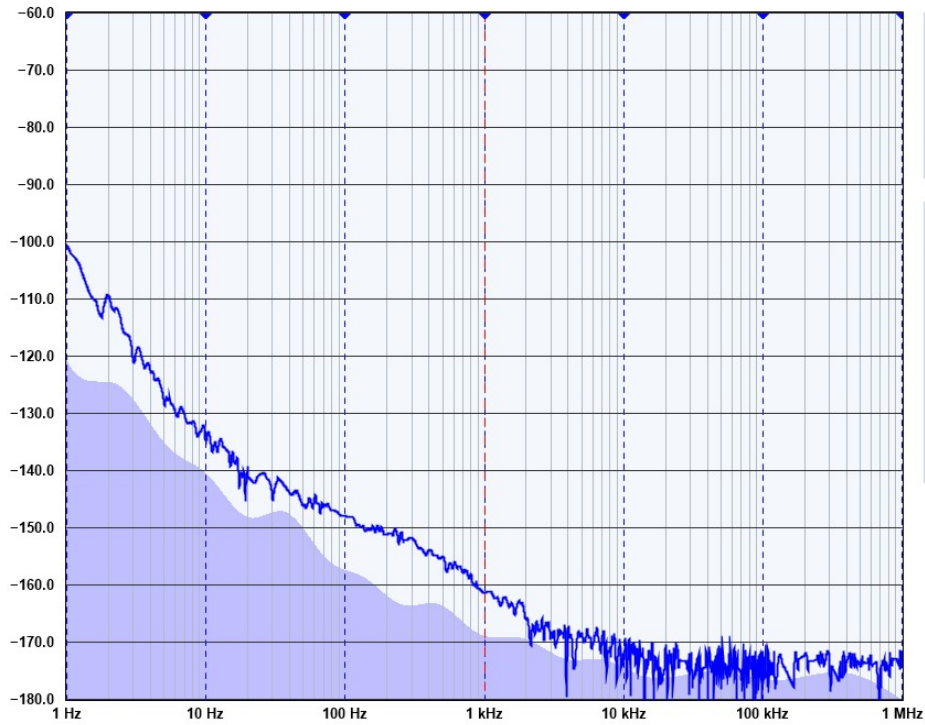
Table 1 : ORDERING INFORMATION

		Aging Performance		
		±0.05 ppb/Day ±10 ppb/Year	±0.1 ppb/Day ±20 ppb/Year	±0.2 ppb/Day ±40 ppb/Year
-40°C ~+85°C	±0.1 ppb	NI-10M-3600	NI-10M-3601	NI-10M-3602
	±0.2 ppb	NI-10M-3610	NI-10M-3611	NI-10M-3612
	±0.3 ppb	NI-10M-3620	NI-10M-3621	NI-10M-3622
	±0.5 ppb	NI-10M-3630	NI-10M-3631	NI-10M-3632
-10°C ~+70°C	±0.05 ppb	NI-10M-3650	NI-10M-3651	NI-10M-3652
	±0.1 ppb	NI-10M-3660	NI-10M-3661	NI-10M-3662
	±0.2 ppb	NI-10M-3670	NI-10M-3671	NI-10M-3672
	±0.3 ppb	NI-10M-3680	NI-10M-3681	NI-10M-3682

Other specifications may be available upon request.

Phase Noise & Short Term Stability Test Data

Phase Noise $\mathcal{L}(f)$ in dBc/Hz

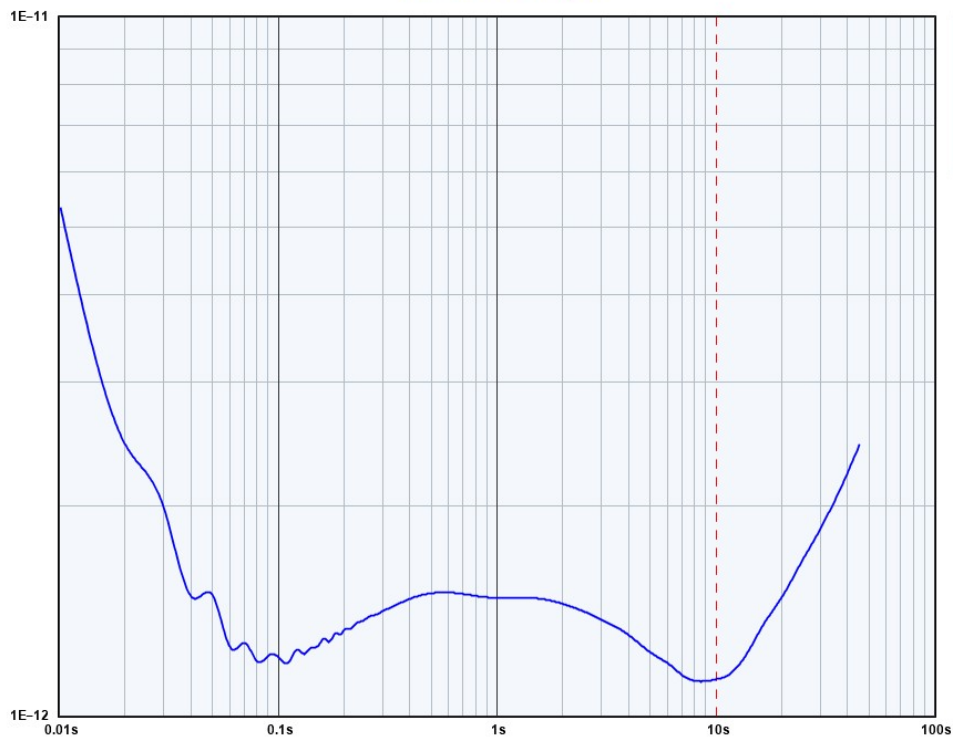


Noise Marker (Hz)	dBc/Hz
1 Hz	-100.6
10 Hz	-134.7
100 Hz	-148.0
1 kHz	-161.3
10 kHz	-171.8
100 kHz	-174.5
1 MHz	-172.0

PM Spur Offset (Hz)	dBc
36	-130.3
100	-133.4
200	-136.2
10600	-144.4
36760	-140.6
42470	-142.7
50250	-143.3
52200	-142.5
53780	-142.8
55360	-143.8
99230	-144.5
655040	-131.1
667190	-132.0
997750	-130.7

Trace	Notes	Input Freq	dBc/Hz at 1 kHz	Duration	Elapsed	Acquired	Instrument
#1 (Unsaved)	NI-10M-3600	10.0 MHz	-161.3	3m 0s	3m 0s	18000 pts	Phase Station 53100A

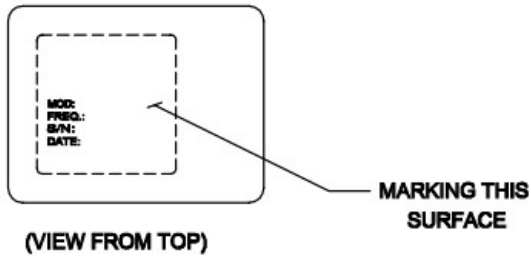
Allan Deviation $\sigma_y(\tau)$



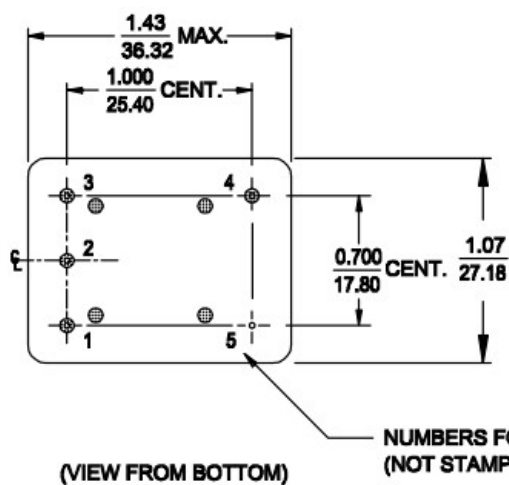
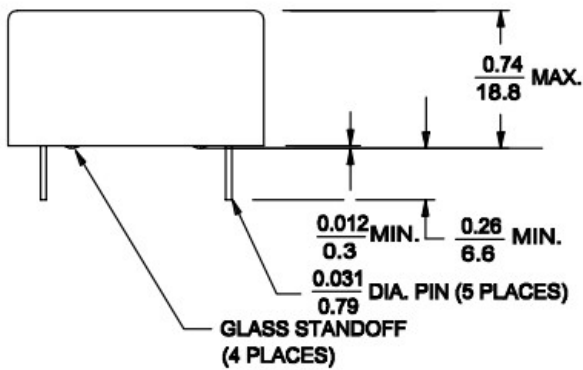
Tau	Sigma(Tau)
1s	1.48E-12
2s	1.45E-12
4s	1.30E-12
8s	1.13E-12
10s	1.13E-12
20s	1.49E-12
40s	2.26E-12

Trace	Notes	Input Freq	ADEV at 10s	Duration	Elapsed	Acquired	Instrument
#1 (Unsaved)	NI-10M-3600	10.0 MHz	1.13E-12	3m 0s	3m 0s	18000 pts	Phase Station 53100A

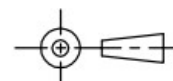
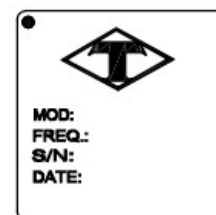
OUTLINE DRAWING



PIN CONNECTIONS	
PIN	FUNCTION
1	V _{CON}
2	NOT CONNECTED
3	+VDC
4	R. F. OUTPUT
5	0 VOLTS & CASE



MARKING



INCH
mm (REFERENCE ONLY)