

# LGXCLOK-500 GPS/GNSS OCXO CLOCK MODULE

SMART, LOW COST, ULTRA SMALL



The GXClock-500 is a smart, low cost, compact and fully integrated GPS/GNSS receiver & crystal oscillator module. It uses the adaptive SmarTiming+ technology, disciplining the GPS/GNSS reference noise at 1ns resolution, providing a host of complex time and frequency features in one package, while achieving state-of-the-art performance, reliability and extended lifetime.

## Applications

- Telecom
- Navigation
- Broadcast
- Defense
- Instrument

**Safran Electronics & Defense is with you every step of the way, building in the intelligence that gives you a critical advantage in observation, decision-making and guidance.**

## Key Features

- Low aging in holdover mode : <math>33E-10</math>/ day
- Low g sensitivity options available : <math>2E-10</math>\*
- Frequency offset over temperature : MMCX input connector (1575.42MHz signal from GPS/GNSS antenna)
- Integrated GPS/GNSS receiver : 1ns resolution
- SmarTiming+ GPS/GNSS disciplining technology : <math>2E-12</math> @ 1s
- Short-term stability : typical <math>31E-12</math> (avg 24 hrs)
- Output frequency accuracy/stability: : <math>10Qs</math> / 24hrs
  - PRs/Stratum 1 locked
  - Holdover (no GPS/GNSS/PRs)
- Output time accuracy/stability: : <math>50ns</math>
  - GPS locked
- Small volume : 3.6 inch<sup>3</sup> (3x0.8x1.5" / 76\*20\*38 mm)
- Single power supply : 12V
- Communication & control : RS232 interface (9600 b/s)  
NMEA 0183 messages (standard \$GPRMC and \$GPZDA)

\* For any 10°C temperature change within the full operating range

# Technical Specifications

## ELECTRICAL

Spec	Smart GXClock-500	
Type	Standard	Options
RFOUT Frequency	10 MHz	Not applicable
Frequency Change	≤6E-9	
Operating temperature range (Thermal chamber with air flow)	-10°C to +70°C	-40°C to +85°C <b>(order code : E85)</b>
Frequency Accuracy locked to GPS		+/- 1E-12 (24h avg)
Frequency Accuracy when not locked to GPS		+/- 3E-10 (24h avg)
Aging (After 3 months of continuous operation)	± 3E-10 / day	<b>(order code: A)</b> ± 1E-10 / day
Short Term Stability 1sec	5E-12	<b>(order code: S)</b> 2E-12
Phase Noise (dBc/Hz) (RFOUT=10MHz)		
1 Hz		-95
10 Hz		-120
100 Hz		-140
1k Hz		-145
10K Hz		-150
Frequency Retrace		< 1E-8
Off/On (In stable temperature, gravity, pressure & magnetic field conditions)		24 hrs / 15 minutes
Warm-up Time @ +25°C		< 7 minutes
Frequency Stability		< 1E-7
Frequency accuracy when locked to GPS signals		< 3 E-12
Digital Frequency Adjustment Internal crystal oscillator freq. Resolution (Through RS-232 commands)		>±4E-7 divided in 65536 steps  < 2E-11 / step
RFOUT SINE		<b>(order code: NF)</b>
Outputs	3 floating sine waves, 0.5 Vrms (± 10% / 50Ω)	No floating
Output impedance	50 Ω ±20%	
Harmonics	< -25dBc	
Spurious f0 ± 100kHz	< -80dBc	
RFOUT TTL Output level		0-5V (10mA sink/source)
RFOUT LVDS		Typ. 340 mV / 100Ω
Differential Output voltage magnitude		
Steady-state common-mode output voltage		Typ. 1.2V
Communication Interface	RS-232 control & monitoring (see commands below)	
Protocol speed	9600, n, 8, 1	
Supply Voltage (DC)	12V (11.7V to 12.9V)	
Max Power Supply Ripple	< 50 mV peak to peak (from 1Hz to 1 MHz frequency band)	
Input Current		
Warm up @+25°C (typical)	< 700 mA	
+25°C	< 250 mA	
Conformal coating	None	Included (order code: CC)
Reverse Voltage Protection	< -40V (up to -40V on power input / no damage)	

## ENVIRONMENTAL

Spec	Smart GXClock-500	
Type	Standard	Options
Magnetic Field Sensitivity	< 2E-10 / Gauss in worst axis	
Storage Temperature	- 55°C to + 85°C	
Humidity	GR-CORE-63, Section 5.1.2	
Operating Vibration	GR-CORE-63, Section 5.4.2 Random and Sinusoidal MIL-PRF-28800F, Class 3, 4	
Shock	Survival: 40g / 11ms	
G-Tip-Over Test	< 2E-9 / g in worst axis	

Dynamic sensitivity	< 2E-9 / g in worst axis	<b>(order code: g1)</b> < 1E-9 / g in worst axis <b>(order code: g2)</b> < 5E-10 / g in worst axis
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## PHYSICAL

Spec	Smart GXClock-500
Type	Standard
Volume / Size (L x W x H)	3.6inch3 (3x0.8x1.5" / 76*20*38 mm)
Weight	40g (1.4 oz)
Mounting & Mechanical Layout	See drawings
Connectors	
Dual in line 16 pins (2*8) 2mm	Hirose DF11-16DP-2DSA01
RFOUT coaxial	3 MMCX (10MHz output each)
GPS/GNSS Input coaxial	1 MMCX straight

## INTEGRATED GPS/GNSS RECEIVER WITH SMARTIMING+® DISCIPLINING TECHNOLOGY

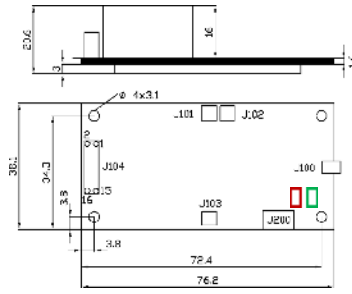
Spec	Smart GXClock-500	
Type	Standard	Options
Integrated GPS/GNSS Receiver	GPS/GNSS	-
GPS/GNSS Antenna Kit Input		<b>(order code: PA)</b>
Cable connector	None	MMCX
Active antenna voltage		5V
Antenna type		Patch antenna
		6 m/19.7' Included
GPS/GNSS Antenna Kit	Not applicable	<b>(order code: PA)</b> <b>(order code: RA)</b>
Antenna type		Patch antenna Rooftop antenna
Lightning surge protector		Not applicable Included
Cable length		≥5 m/16.4' <b>(order code: CA)</b> 5+15m/16.4' +49'
Antenna mounting bracket	Not applicable	<b>(order code: BRA)</b>
Disciplining mode	Auto-adaptive thru SmarTiming+® technology (request White Paper) Sync (phase alignment) or	Not applicable
Architecture Model	Track (frequency alignment) See Operational Principles below	
GPS/GNSS Receiver Control	Request GPS/GNSS iSync+ Connectivity AppNotes	
T-RAIM @ startup time	Auto-configured, if supported by receiver	Auto-configured
Position hold @ startup time	Auto-configured, if supported by receiver	Auto-configured
PPSOUT TTL		1PPS
Output Level	0-5V (10 mA sink/source) User settable,	
Pulse Width or duty cycle (PW)	0 to 1s in 50ns/step	
PPSOUT LVDS		1PPS
Differential Output voltage magnitude	Typ. 340 mV / 100Ω	
Steady-state common-mode output voltage	Typ. 1.2V	
PPSREF		1PPS IN
Level	CMOS 0-5V (< 0.8V, >3.7V)	
Pulse width	>100 ns, <0.5 sec	
Rising edge	<20 ns	
GPS/GNSS vs. PPSREF	User settable by software	

## MODEL ORDERING INSTRUCTIONS

**GXClock-500 / 10M / xx**

Type                      Frequency      Options (S/RA/etc)

## MECHANICAL DRAWING



J104 Connector*					
	I/O		I/O		I/O
1	+10MHz	O	2	-10MHz	O
3	10MHz	O	4	-1PPS	O
5	+1PPS	O	6	LVDS	I
7	Device OK	O	8	RX 232	I
9	TX RS232	O	10	1PPS	O
11	1PPSIN	I	12	GND	I
	Alarm				
13	Track/Sync	O	14	GND	I
15	+12V	I	16	+12V	I

### \*J104 Mating Connector Supplier:

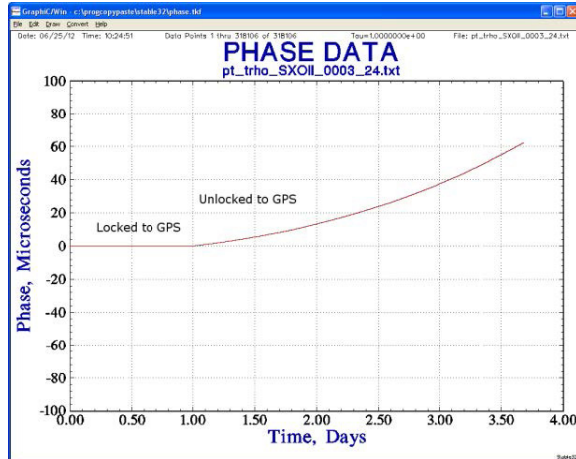
Header PN 1688348 at [www.newark.com/hrs-hirose/df11-16dp-2dsa-24/header-2mm-16way/dp/49P5026?Ntt=1688348](http://www.newark.com/hrs-hirose/df11-16dp-2dsa-24/header-2mm-16way/dp/49P5026?Ntt=1688348)

Dual cable PN 1688308 at [www.newark.com/hrs-hirose/df11-16ds-2c/wire-to-board-connector-receptacle/dp/49P5027?Ntt=1688308](http://www.newark.com/hrs-hirose/df11-16ds-2c/wire-to-board-connector-receptacle/dp/49P5027?Ntt=1688308)

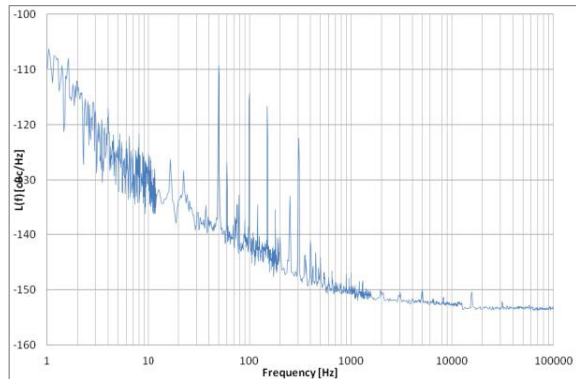
End cable crimp tin PN at 1688393 at [www.newark.com/hrs-hirose/df11-2428sc/contact-socket-28-24awg-crimp/dp/49P5045?Ntt=1688393](http://www.newark.com/hrs-hirose/df11-2428sc/contact-socket-28-24awg-crimp/dp/49P5045?Ntt=1688393)

Crimp tool PN 1688394 at [www.newark.com/hrs-hirose/df11-ta2428hc/tool-crimp-df11-awg-24-28/dp/49P5012?Ntt=1688394](http://www.newark.com/hrs-hirose/df11-ta2428hc/tool-crimp-df11-awg-24-28/dp/49P5012?Ntt=1688394)

### HOLDOVER (Locked & Unlocked to GPS) Condition: Lab environment

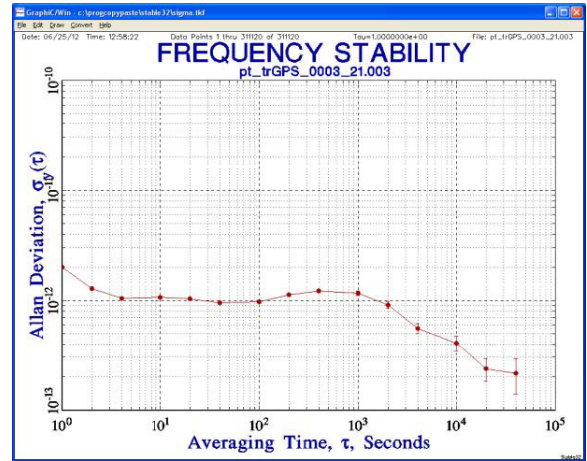


### PHASE NOISE (10MHz) Condition: Lab environment

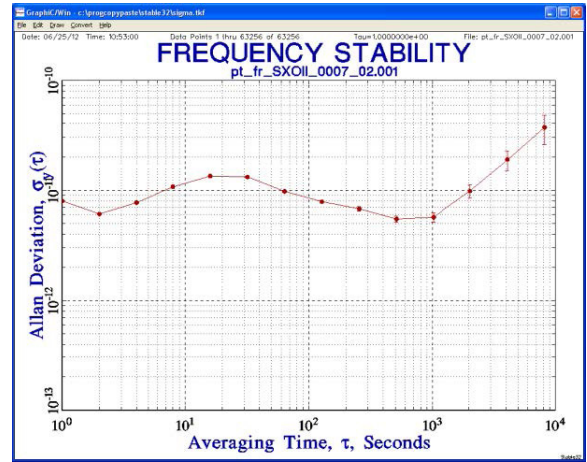


## TYPICAL PERFORMANCE DATA

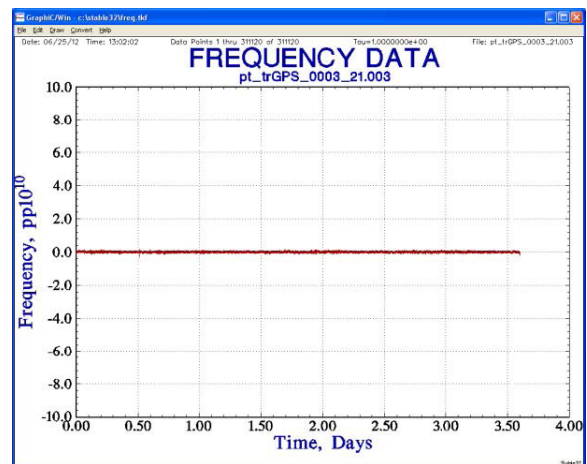
### FREQUENCY STABILITY (Locked to GPS) Condition: Time constant set at 4000s & insulated environment



### FREQUENCY STABILITY (Unlocked) Condition: Lab environment



### FREQUENCY (Locked to GPS) Condition: Time constant set at 4000s & insulated environment



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