NanoSync IV - Low Profile

M-code Receiver Performance

BAE Systems MPE-M M-code GPS Receiver

For Use in Man-Portable, Surface Vehicle or Low Dynamic Environments
US Army Standard Embedded Receiver:
- Velocity (Surface Vehicle Limit): Up to ± 25 meters/sec
- Acceleration (Surface Vehicle Limit): Up to ± 3 meters/sec^2
- Jerk (Surface Vehicle Limit): Up to ± 2 meters/sec^3

All-in-view 24 Channel Receiver, with continuous independent tracking:
- Simultaneous L1 (C/A, P(Y),M-code) and L2 (P(Y),M-code) Dual Frequency Tracking
- Receiver Interface Protocols: ICD-TNL-153DM, NMEA 0183 v3.2
- FLASH/FLASH MPE-M standard (no battery back-up required)

Time Accuracy (in State 5, L1&L2, WAGE enabled & within other operating parameters)::
- UTC(GPS): ≤ 100 ns 2σ (95.5 %)

Acquisition Time /TTFF:
- Hot Start: ≤ 15 seconds
- Warm Start: ≤ 90 seconds

Position & Velocity Accuracy (in State 5, L1&L2, WAGE enabled & within operating parameters):
- Position: ≤ 5 meters CEP
- Velocity (Surface Vehicle): Better than 4.0 meters/sec (3D, 2σ)
- Low Dynamic Aircraft: Better than 10.0 meters/sec (3D, 2σ)

Supports GB-GRAM Type I and Type II Form-Factors

* U.S. Government policy restricts the sale of Precise Positioning Service (PPS) equipment to those authorized by the U.S. Department of Defense. Non-U.S. authorized users must purchase PPS equipment through the Foreign Military Sales (FMS) process.

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Designed, Manufactured and Supported in the U.S.A

Military-Grade Position, Navigation, Timing (PNT) & Frequency Reference System, With M-code GPS

- Suitable for Fixed, Ground Mobile, Airborne and Maritime Systems
- Flexible Choice of M-code or Coarse/Acquisition (C/A) Receivers for Specific Applications
- Oven-Controlled Crystal Oscillator (OCXO) for Very Low Phase Noise and Best-In-Class Allan Deviation on Frequency Outputs
- High Precision Time & Frequency Outputs with Holdover Performance when GPS is Degraded or Denied
- Ethernet Interface Supporting PTPv2 Grandmaster, NTP & Status & Control For Network-Based Applications
- JASA Version 3, Annex 1, TFNG Compliant

- High Performance Position & Navigation Engine
- Precise Time & Frequency Reference
- COTS for Military Applications
- Compact, Rugged Design
- Low Power - < 15 W Steady-State
- Wide Operating Temperature Range
- No Maintenance Required

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FEATURES

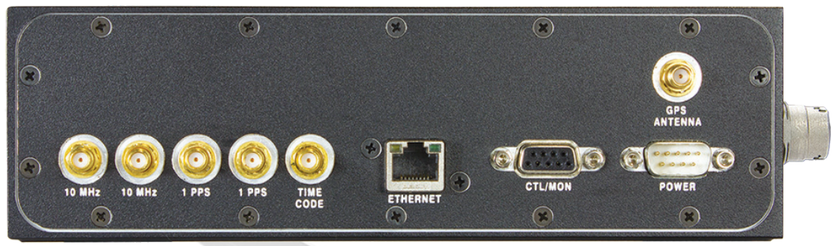
- **Accuracy**
  - **Time: < 25 ns to UTC(GPS)**
  - **Frequency: 1E-12 (24 hour average)**
- **M-code GPS Receiver Options**
  - **BAE Systems MPE-M**
- **Status & Control Ports**
  - **RS-232 Serial**
  - **10/100 Ethernet**
- **Standard Output Configuration:**
  - **(2) 1 PPS**
  - **(2) 10 MHz**
  - **NTP v2, v3, v4**
  - **PTPv2 IEEE 1588-2008**
  - **Time Code Output:**
    - **User Programmable**
      - **BCD: 24b or 40b**
      - **HaveQuick:**
        - **HQ2 (STANAG 4246)**
        - **PTTI HQ (ICD-GPS-060)**
        - **XHQ (STANAG 4430)**
      - **IRIG: B02x (x=2,3,6,7)**

Options:

- **Low g-sensitivity Oscillator for Vibration & Shock Environments**
- **EMI Gasket for MIL-STD-461G compliance (RE & RS)**
- **Combination EMI/Drip Proof Gasket for MIL-STD-810E Rain/Drip (Method 506.5)**
- **MIL Circular Connectors (5015 or 38999 Series as req.) for ruggedization, EMI / Drip**

Custom Options Available, For More Information Call 714-933-4000 or Email sales@fei-zyfer.com

Model 424 Position, Navigation, Time (PNT) and Frequency Reference System, With M-code GPS

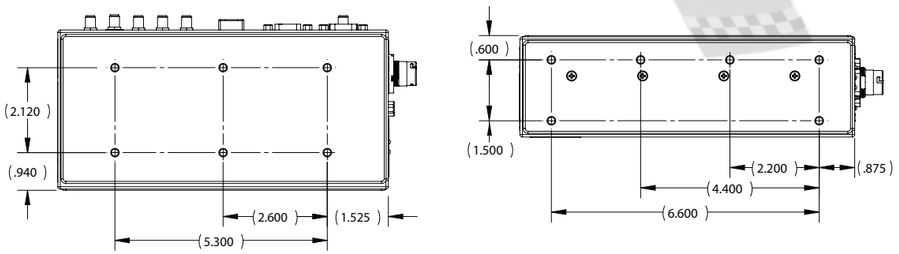


The NanoSync IV is a small form factor GPS Position, Navigation, Time (PNT) and Frequency reference system that provides multiple reference outputs and includes support for NTP & PTPv2 IEEE 1588-2008. The NanoSync IV has an OCXO oscillator and is equipped with a M-code receiver (BAE Systems MPE-M) for military users. The NanoSync IV is packaged in a small, rugged enclosure ideally suited for embedded electronic warfare applications.

The NanoSync IV incorporates proven features designed into all FEI-Zyfer products, including exceptional holdover performance when GPS signals are lost or degraded. This assures continued system operation as a time and frequency reference. The NanoSync IV can be monitored and controlled through an RS-232 port using FEI-Zyfer's Serial Communication Protocol and via the 10/100Base-TX RJ-45 Ethernet port.

As with all FEI-Zyfer time and frequency products, the NanoSync IV incorporates advanced, proprietary learning algorithms that compensate for external temperature changes and aging characteristics of the oscillator while operating in holdover. This FEI-Zyfer feature ensures accuracy and consistent performance throughout the specified operating temperature range.

Status LEDs, Key Load Port, PLGR/DAGR Port & Zeroize switch



NanoSync IV Mounting

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Specifications for MPE-M M-code GPS Receiver-based Models

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Output Specifications

10 MHz Output:

Waveform:	Sine wave, AC coupled
Connector:	(2) SMA Female
Amplitude:	13 dBm +3/-1 dBm @ 50 Ω
Coherency:	Coherent to 1 PPS
Harmonic Distortion:	≤ -50 dBc
Non-Harmonic Distortion:	≤ -60 dBc

Frequency Accuracy:

- **Locked to GPS:**
  ≤ 1E-12 (24 hr. average)
- **Holdover with OCXO (a):**
  ≤ 2E-10 (at 24 hours, ± 10 ºC change)

Phase Noise:

1 Hz:	≤ -92 dBc/Hz
10 Hz:	≤ -122 dBc/Hz
100 Hz:	≤ -142 dBc/Hz
1 kHz:	≤ -147 dBc/Hz
10 kHz	≤ -152 dBc/Hz

Short Term Stability (Allan Deviation, typical):

0.1 seconds:	≤ 1E-11
1 second:	≤ 1E-11
10 seconds:	≤ 1E-11
100 seconds:	≤ 2E-11

1 PPS Output (b): Pulse, Rising Edge on-time

Connector:	(2) SMA Female
Drive Level:	TTL into 50 Ω
Pulse Width:	2 ms
Synchronization:	Rising edge on-time
Pulse Rise Time:	≤ 20 ns
1PPS Jitter:	≤ ± 5 ns 2σ (95 %)

Time Accuracy:

- **Locked to GPS:**
  < 25 ns 2σ (95 %) to UTC
- **Holdover with OCXO (a):**
  @ 24 hours after 48 hrs locked operation: < 8 µs

Time Code Output Options (User Programmable):

Connector: (1) SMA Female

BCD: 24b or 40b

HaveQuick:

- HaveQuick 2 (STANAG 4246)
- PTTI HaveQuick (ICD-GPS-060)
- Extended HaveQuick (STANAG 4430)

IRIG: B02x (x=2,3,6,7)

GPS Antenna Interface:

Power:	5 VDC @ 100 mA
Connector Type:	SMA Female
Input Gain Required:	+10 dB

Status & Control Ports:

Serial Port:

Interface:	RS-232C
Connector:	(1) DE-9 (9-pin D-sub), Female
Baud Rate:	19200 Fixed 1 Start Bit, 8 Data Bits, 1 Stop Bit No Parity
Protocol:	FEI-Zyfer Serial Comm Protocol

Ethernet Port:

Ethernet Type:	10/100Base-TX
Connector:	RJ-45
Configuration:	IPv4, IPv6 address, netmask & gateway user-selectable
Compatibility:	TCP/IP, Ethernet ver. 2.0 / IEEE 802.3 TELNET, SSH, SNMP (v1, v2c, v3)

Time & Synchronization Protocols:

- **NTP v2, v3, v4 & SNTP v4**
  NTP Server Performance: Stratum 1
  Client synchronization accuracy: 1-10 ms (typical)
  NTP requests per second: ≥ 100
- **PTPv2 Grandmaster Performance:**
  Packet throughput: > 100 Delay Requests/second

Input Voltage / Power Consumption:

+ 24 VDC (18 V to 28 VDC) (externally regulated)

Warm Up:	20 W maximum @ 25 °C* Warm Up time: ≤ 10 minutes
Steady State:	15 W maximum @ 25 °C*

* With all inputs & outputs operating

Note: Input return connected to chassis/signal ground

Key Load Interface:

- Electrical Interface per IS-GPS-154C & IS-GPS-164
- Communication Protocol per DS-102

PLGR/DAGR Interface:

- Electrical Interface per IS-GPS-154C & IS-GPS-164 (RS-232 I/O and 1 PPS I/O supported)
- Serial Interface Protocol per IS-GPS-153C

Chassis Dimensions:

Height: 2.52" (64 mm)
Width: 4.02" (102 mm) excluding I/O connectors
Length: 8.27" (211 mm) excluding connectors
Weight: < 2.5 lbs. (1.14 kg)

Environmental:

Operating Temperature:	-20 °C to 50 °C (@ Baseplate)
Rate of Change:	10 °C / Hour maximum
Storage Temperature:	-40 °C to +100 °C
Relative Humidity:	5 % to 95 %, non-condensing
Altitude, Operating:	0 to 35000 feet
Altitude, Storage:	0 to 40000 feet

Notes:

(a) After 48 hours of GPS locked operation, fixed antenna location and antenna delays entered.

(b)1 PPS output can be disabled until GPS lock is achieved and time offset error is less than a user programmable amount.

Specifications subject to change without notice.

Additional information on our website:

- **NanoSync IV User Manual**
- **NanoSync IV Serial Comm. Protocol Manual**

Visit www.fei-zyfer.com