

# VERSASYNC M-CODE

## Rugged Time and Frequency Reference



### Accurate in All Conditions

- Military M-code and P(Y)-code receiver, with direct acquisition and continuous tracking of both L1 and L2 GPS satellite frequencies.
- Multi-Constellation GNSS capability
- Airborne, ground, and marine applications
- MIL-STD environmental qualified
- Up to 45,000 ft, -40 +71° C, IP 65

### Flexible

- Wide variety of analog and digital time and frequency signals
- Software configurable inputs/outputs
- Network sync, set-up and management
- Customized COTS available
- VICTORY compatible (optional)
- Low phase noise OCXO options
- High stability mini rubidium option
- Alternative Navigation option

### Compact/Rugged

- Optimized SwaP
- 1.18 Liter < 10 Watts, < 1 kg
- VITA 75 form factor
- Conduction-cooled
- Mil-performance connectors
- Standby power mode

### Applications

#### Ground

- Mobile radio and C31 sync
- Anti IED jamming systems
- Robotics
- Satcom On The Move (SOTM)

#### Airborne

- Communication network sync
- Intelligence, Surveillance, and Reconnaissance Platforms (radar, optical, electronic warfare) Flying test bench
- Flight analysis

#### Marine/Naval

- Communication network sync
- Sensor support (radar, sonar, optical, electronic warfare)
- Offshore/DSO platforms
- Buoys

**Safran Federal Systems is the trusted Resilient PNT mission partner to U.S. government and defense organizations, from the lab to the field.**

### High-Performance Time Server

VersaSync is a low SWaP high performance GNSS master clock and network time server that delivers accurate, software configurable time and frequency signals under all circumstances, including GNSS-denied environments. Its compact size and high level of ruggedization make VersaSync suitable for mobile applications in harsh environments. Its small footprint allows for easy integration of the time and frequency functionality into any systems' architecture.

Backed by more than four decades of timing solution expertise from Safran Federal Systems, VersaSync includes all the timing functionality required in modern, network-centric applications:

- NTP/PTP precise time transfer over Ethernet, including security protocols that prevent network vulnerabilities
- Low phase noise 10 MHz frequency distribution
- Configurable pulse signals, including IRIG or HaveQuick timecodes
- Serial link Time Of Day (ToD) messages

### A Perfect Fit for GNSS Challenged and GNSS-Denied Environments

VersaSync accommodates a wide range of precision oscillators, allowing the unit to maintain frequency and time accuracy for long periods of GPS/GNSS outage. These options include OCXO quartz oscillators and a mini-rubidium option, which brings unprecedented time stability and reliability in such a compact form factor. In addition, it can be re-synchronized by an alternative external reference. Adding the Alternative navigation option provides an additional layer of resiliency in GPS challenged environment.

VersaSync M-code includes the latest generation of modernized security architecture, modernized anti-spoofing and anti-jamming for GPS-degraded environments, operations in mixed P(Y)-code and M-code constellations, accelerated Direct-Y and Direct-M code acquisitions, and Over-The-Air-Rekeying (OTAR). VersaPNT M-code provides better than 41 dB J/S while tracking (state 5) and better than 54 dB J/S (state 3) while providing cryptographic key retention without battery backup.

### Highly Reliable, Versatile, and Configurable Solution

VersaSync physical inputs and outputs are software configurable and can adapt to various application requirements for mission-to-mission configurability.

I/O pins can be configured as TTL, 10 V pulse, RS232, or RS485. This allows VersaSync to provide a high number of outputs of the same, or different types, while still fitting into a small form factor. However, if the combination of software configurable outputs is not enough, VersaSync can accommodate an option board, designed to customer requirements to provide additional outputs of the standard types or future interfaces (IRIG-AM).

VersaSync is designed for exceptional intrinsic reliability. Comprehensive status monitoring capability, either locally or remotely, allows quick fault diagnoses. Physical alarm (dry contact) and network alarms (SNMP traps) are raised in real time. An internal, exportable log can be accessed either locally or remotely.

### Timing Interface Summary (Standard Configuration)

Some of the VersaSync I/O interfaces are configurable in terms of type and coding/modulation. When the number of available interfaces is identified as "Max" the actual number of available inputs or outputs is dependent on configuration of other signals. If "Max" is not identified for an interface, it does not depend on the product configuration.

### Timing and Frequency Performance

Performances	OCXO**	OCXO High Perf	mRO-50
<b>Timebase Performances</b>			
Relative Frequency Variation with Aging: - 24 hours - One month - One year	5 x 10 <sup>-10</sup> 1 x 10 <sup>-8</sup> 5 x 10 <sup>-8</sup>	2 x 10 <sup>-10</sup> 4 x 10 <sup>-9</sup> 2 x 10 <sup>-8</sup>	- 1 x 10 <sup>-10</sup> 1 x 10 <sup>-9</sup>
Relative Frequency Variation with Temperature	±1 x 10 <sup>-8</sup> (-40°C to 65°C)		4 x 10 <sup>-8</sup> (-10°C to 65°C)
Short Term Stability (Allan Deviation): @ 1s @ 10s @ 100s	2 x 10 <sup>-10</sup> 5 x 10 <sup>-11</sup> 3 x 10 <sup>-11</sup>		3 x 10 <sup>-10</sup> 5 x 10 <sup>-11</sup> 3 x 10 <sup>-11</sup>
Phase Noise on 10 MHz Output: @ 10 Hz @ 100 Hz @ 1 kHz @ 100 kHz	-120 dBc/Hz -140 dBc/Hz -150 dBc/Hz -155 dBc/Hz		-90 dBc/Hz -110 dBc/Hz -135 dBc/Hz -140 dBc/Hz
Harmonic Distortion	-40 dBc		
Spurious	-60 dBc		
<b>System Performance*</b>			
Frequency Accuracy Averaged Over 24 hours when Locked on GNSS	3 x 10 <sup>-12</sup>	2 x 10 <sup>-12</sup>	1 x 10 <sup>-12</sup>
Phase (1 PPS) Drift in Holdover (no reference available) - 4 hours - 24 hours - 7 days	3 µs 40 µs 1.2 ms	2.8 µs 30 µs 0.6 ms	0.2 µs 1.5 µs 20 µs
Phase (1 PPS) Accuracy to UTC	±50 ns		

\* While locked to GNSS, and at constant temperature

\*\* A Rugged, Low Phase Noise OCXO option is available for high-vibration environments such as aircraft and maritime. Contact Safran for details.

### Timing Signals

Timing Signal	Coding/Modulation	Input/Output	Connector
<b>Timebase Performances</b>			
GNSS RF	GPS, SAASM, M-code L1/L2 GPS	1 input	SMA, 3.3 VDC power supply to antenna
10 MHz	Sine 10 dBm	4 outputs	SMA
Pulse/DCLS TTL level	1 PPS, xPPS, IRIG, HaveQuick, alarm	Max: 2 inputs Max: 5 outputs	I/O connector
Pulse/DCLS 10 VDC	1 PPS, xPPS, IRIG, HaveQuick, alarm	Max: 1 input Max: 1 output	I/O connector
RS 232	NMEA 0183, other ASCII ToD formats	Max: 3 inputs Max: 3 outputs	I/O connector
RS 485	HaveQuick, xPPS	Max: 3 inputs Max: 4 outputs	I/O connector
NTP over LAN (GbE)	NTP v3, v4; client, server	2	LAN connector
PTP over LAN (GbE)	PTP v1, v2; Master	2	LAN connector

### Front Panel Connections

Interface	Type of Data	Connector*
GNSS RF in	GNSS signal	SMA
Power in	DC Power	Circular mil-type
Frequency out	10 MHz sine	SMA
Timing in/out	Pulse/DCLS, RS232, RS485; also USB communications	Circular mil-type
GbE	NTP, PTP Navigation messages Monitoring	Circular mil-type
M-code/SAASM Key Fill	DS101, DS102	Circular mil-type

\* connector pin-outs available in the user manual.

## Operational Readiness

1PPS time of day available (hot start)

- 60s: 1ms accuracy to UTC
- 200s: 1µs accuracy to UTC

## Management & Monitoring

User, local:

- Power and Status LEDs on front panel
- USB: ASCII Command Line Interface

User, remote (LAN):

- Status, configuration, event log, software update through web pages

Machine, remote (LAN):

- SNMP
- JSPN RPC

## M-Code Features

- **Connector:** SMA, +3.3V to power active antenna
- **Receiver input:** L1/L2
- **Crypto Key input:** DS101/DS102 key loading. Front panel connector
- **Security:** M-Code (MPE-M) MGUE
- **Antenna/preamplifier:** L1 1574.42 MHz & L2 1227.60 MHz, 40 dB gain (antenna sold separately)
- **Acquisition time:** TTFF (95%): <15 sec hot start, <90 sec warm start
- Purchases and Export of VersaSync M-Code requires coordination through the SMC Production Corps and an FMS case.

## Network Security

- Password protected administration accounts
- SSL/SSH-based https, ftps protocols supported for secured access to user interface
- NTP implementation supports MD5, Autokey

## Network Synchronization

- NTP v2, v3, v4: Conforms with or exceeds RFC 1305 and RFC 5905. Supports unicast, broadcast, multicast, peering, stratum 2, MD5 encryption, autokey
- PTP v1 and v2: Master – conforms with default profile IEEE 1588. Supports layer 2/layer 3, unicast/multicast
- GPSD (GNSS receiver data)
- VICTORY Interface compatible (optional)

## Environmental

- Tested to MIL-STD-810G CH1
- Temperature, in operation: -40°C to +71°C with OCXO (-10°C to +45°C with mRO)
- Mounting plate temperature, in storage: -45°C to +85°C
- Humidity: 95% RH, non-condensing at 40°C
- Altitude: 45,000 ft
- Environmental Protection: IP 65
- Vibrations: MIL-STD-810G Method 514.6E-1 (7.7 g rms, 20 to 1000 Hz) and 514.6E-2
- Shock: 20 g, 11 ms (pulse sawtooth) in accordance with MIL-STD 810G, Method 516.7 Procedure 1

## EMI/EMC

- Tested according to MIL-STD-461F

## Physical

- Size (WxHxD): 5.8" x 2.5" x 5.0" (147.3 x 127.5 x 63.0mm) VITA 75 compliant
- Weight: 0.91 kg (2.0 lbs)
- Mounting: On a plate, optimized for conduction cooling, 6 through holes

## Power

- Input Voltage: 10-32 VDC
- Typical Power Draw: 10 W
- Standby mode (only oscillator is powered): 0.5 W, DC power supply must be within 10 - 32 VDC

## Certification/Marking

- RoHS, WEEE compliant

## Warranty

- 2 years

## Accessories

- GPS/GNSS antenna, GNSS RF cables, lightning protection, splitters, line amplifiers

## Service Options

- Yearly Warranty extension

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BY TRUST**

