M-code: MPE-M Receiver

Enhanced awareness in unfamiliar environments

Increased mission effectiveness and safety

BAE Systems brings its proven heritage of Selective Availability Anti-Spoofing Module (SAASM)-based products to M-code to facilitate surface mobility, augmenting alertness and preparedness.

Capable of receiving existing operational GPS signals along with the newer M-code signal, the BAE Systems Miniature PLGR Engine – M-code (MPE-M) receiver delivers geolocation and precise positioning capabilities for space-constrained applications while providing increased security, and anti-jamming capabilities. The MPE-M is size-compatible with the MPE-S receiver, while offering a new security architecture for enhanced integrity, exclusivity, and resiliency.

At its core, the MPE-M contains the required SAASM functionality while providing increased mission effectiveness and safety enabled through operation with the M-code signal.

Key capabilities for ground embedded applications

- Capabilities of the next-generation GPS YMCA ASIC developed by MGUE
- Advanced correlator engine for accelerated Direct-Y and Direct-M code acquisitions
- Next-generation modernized security architecture
- Black key capabilities include Over-The-Air-Rekeying (OTAR) when available from GPS satellites
- Operations in a mixed Y-code and M-code constellation
- Lowest power M-code Type II (MPE-S)
- Modernized anti-spoofing security, aiding not required
- Anti-jamming and anti-spoofing for GPS-degraded environments*
- All-in-view navigation of up to 12 GPS satellites continuously
- L1 and L2 dual-frequency GPS signal reception
- Performance in a jamming environment:
  - Better than 41 dB J/S while tracking (state 5)
  - Better than 54 dB J/S (state 3)
- External Augmentation System (EAS) support for acquisition assistance
- Blue Force Electronic Attack (BFEA) mitigation
- Small serial interface (SSI) Ground-Based GPS Receiver Application Module (GB-GRAM) Type II form factor compliant
- Field reprogrammability of the receiver application software
- Aggressive acquisition/reacquisition strategies to improve performance and reduce power consumption
- Mature, proven GPS technology
- Cryptographic key retention without battery backup

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Mature, proven GPS technology

Backward compatibility
The BAE Systems MPE-M is backward compatible for current users of the MPE-S embedded GPS receiver. The familiar 80-pin I/O connector and robust MMCX RF connector will be easily recognizable for current users, allowing for an economical upgrade to an embedded M-code receiver.

Dual-frequency RF
An advanced, dual-frequency RF front end enables continuous track of both L1 and L2 GPS satellite frequencies. Even when turned off, a precise, low-power time source runs continuously to allow rapid acquisition of GPS satellites when the receiver is turned on again. All this capability requires only a single, 3-volt power source.

System characteristics

Dynamics (velocity)
- Man-portable: 10 m/s maximum
- Surface vehicle: 25 m/s maximum
- Low dynamic aircraft: 250 m/s maximum

Dynamics (acceleration)
- Man-portable: 1 m/s² maximum
- Surface vehicle: 3 m/s² maximum
- Low dynamic aircraft: 20 m/s² maximum

Time accuracy
- 100 nanoseconds

Position accuracy
- PPS: <5 meters CEP*

Acquisition time
- TTF (95%): <15 sec hot start, <30 sec warm start
- TTSF (95%): <20 sec, (Off or Stby <15 min)
- TTSF (95%): <38 sec, (Off or Stby <60 min)

Velocity accuracy
- Man-portable: 0.3 m/sec steady rate (3D 95%)
- Surface vehicle: 4.0 m/sec steady rate (3D 95%)
- Low dynamic aircraft: 10.0 m/s steady rate (3D 95%)

Interfaces

Connectors
- Power and data (SAMTEC P/N SFM-140-L2-S-D-LC)
- RF input (Huber Suhner P/N 85MMCX-50-0-1/III)

Hardware interfaces
- Four independent serial data ports (full duplex)
- Three low-power CMOS serial data ports
- One standard RS-232 serial data port
- One PPS input
- Four independent 1 PPS/10 PPS configurable outputs
- L1/L2 active RF antenna port, 3.3 VDC
- DS-101 key loading, zeroize discrete
- HAVE QUICK (SS-110990 and ICD-GPS-060A compliant)

Physical characteristics

Power
- Operating: +3.3 VDC, <1.0 W typical
- Keep alive: +3.0 VDC to +6.0 VDC, 4 mW typical

Weight
- 1.4 oz (40 gm) nominal

Size/volume
- 2.45 x 1.76 x 0.285 in. maximum (6.2 x 4.5 x 0.724 cm)

Temperature range
- -40°C to 85°C operating
- -55°C to 85°C storage

* Export of precise positioning service (PPS) units requires coordination through the GPS Directorate.

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