

# 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



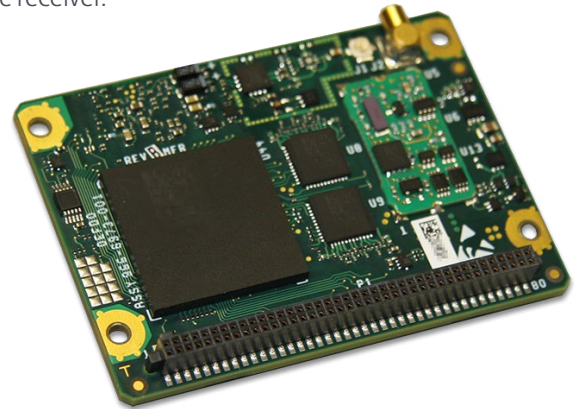
- Black key capabilities include Over-The-Air-Rekeying (OTAR) when available from GPS satellites
- Operations in a mixed Y-code and M-Code constellation
- Lowest power M-Code Type II (MPE-S)
- Modernized anti-spoofing security, aiding not required
- Anti-jamming and anti-spoofing for GPS-degraded environments\*
- 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

## 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.



# Mature, **proven** GPS technology

## System characteristics

|                                |                                                                                                                                                        |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dynamics (velocity)</b>     | Man-portable: 10 m/s maximum<br>Surface vehicle: 25 m/s maximum<br>Low dynamic aircraft: 250 m/s maximum                                               |
| <b>Dynamics (acceleration)</b> | Man-portable: 1 m/s <sup>2</sup> maximum<br>Surface vehicle: 3 m/s <sup>2</sup> maximum<br>Low dynamic aircraft: 20 m/s <sup>2</sup> maximum           |
| <b>Time accuracy</b>           | 100 nanoseconds                                                                                                                                        |
| <b>Position accuracy</b>       | PPS: <5 meters CEP*                                                                                                                                    |
| <b>Acquisition time</b>        | TTFB (95%): <15 sec hot start,<br><90 sec warm start<br>TTSF (95%): <20 sec, (Off or Stby <15 min)<br>TTSF (95%): <38 sec, (Off or Stby <60 min)       |
| <b>Velocity accuracy</b>       | Man-portable: 0.3 m/sec steady rate (3D 95%)<br>Surface vehicle: 4.0 m/sec steady rate (3D 95%)<br>Low dynamic aircraft: 10.0 m/s steady rate (3D 95%) |

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

## 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

|                          |                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------|
| <b>Power</b>             | Operating: +3.3 VDC, <1.0 W typical<br>Keep alive: +3.0 VDC to +6.0 VDC, 4 mW typical |
| <b>Weight</b>            | 1.4 oz (40 gm) nominal                                                                |
| <b>Size/volume</b>       | 2.45 x 1.76 x 0.285 in. maximum<br>(6.2 x 4.5 x 0.724 cm)                             |
| <b>Temperature range</b> | -40° C to 85° C operating<br>-55° C to 85° C storage                                  |

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