BAE SYSTEMS

MicroGRAM GPS Receiver

Precise positioning

Enhancing awareness in any environment

Today's warfighters must be prepared to find their way in unfamiliar environments. Enhanced situational awareness in unpredictable territory prepares the military against its adversaries. BAE Systems' proven heritage of the Miniature PLGR Engine – SAASM (MPE™-S) family of products facilitates surface mobility, augmenting alertness and preparedness.

Retaining key functionality in a much smaller and lighter package than its predecessor MPE-S, the BAE Systems MicroGRAM delivers geolocation and precise positioning capabilities for military applications such as tactical communications, field computers, and unmanned aircraft. MicroGRAM is size competitive with commercial GPS receiver chipsets. At its core, the MicroGRAM contains the Selective Availability Anti-Spoofing Module (SAASM). SAASM encapsulates all classified data and signal processing into one tamper-proof module, increasing the security of the MicroGRAM.

SAASM features

- Capabilities of the Jaguar 12-channel GPS signal processor
- True All-In-View navigation of up to 12 GPS satellites
- Advanced correlator engine (ACE) turbocharges the engine for accelerated Direct-Y code acquisitions
- Next-generation security architecture provided by the key data processor (KDP 4)
- Unclassified-when-keyed operation
- Black key capable, for Over-The-Air-Rekeying (OTAR), when available from GPS satellites

Key features and benefits

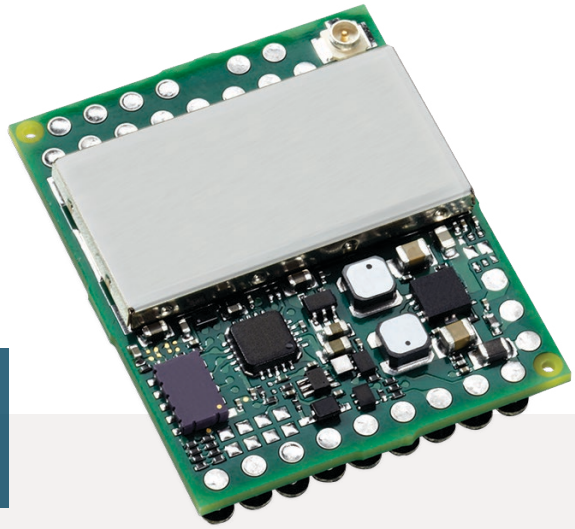
- Pick and place compatible
- Same serial interface protocol as MPE-S
- Selective SAASM security
- 12-channel continuous satellite tracking
- L1 and L2 dual frequency GPS signal reception
- Aggressive satellite acquisition/reacquisition
- Extended performance in a jamming environment
- User setup of units datums and coordinate formats
- RTCM 194-93/SC 104 differential GPS correction input

Interface compatible

The MicroGRAM is an optimized, lightweight, low-power design that uses CMOS logic for efficient message protocol compatible with the MPE-S. The two low-power serial data ports are full duplex interfaces with the MPE-S heritage of ICD-GPS-153C. There are 1 pulse per second input and output timing pulses available for the host application to synchronize time. MicroGRAM provides DS-101 and DS-102 keying interfaces.

Dual frequency RF

An advanced dual frequency RF front end allows track with both L1 and L2 GPS frequencies while minimizing the footprint on this miniaturized SAASM GPS receiver. Even when turned off, a precision time source runs continuously when auxiliary power is supplied to allow rapid acquisition of the GPS satellites when the MicroGRAM is turned on. All this capability requires only a single 3-volt power source.



Extended performance in a jamming environment

System characteristics

Dynamics	Velocity: 1,200 m/sec maximum* Acceleration: 9 g maximum
Time accuracy	100 nanoseconds
Position accuracy	DGPS: <2 meters CEP*
WAGE	<4 meters CEP*
PPS	<12 meters CEP*
Acquisition time	TTFF (95%): <10 sec hot start, 90 sec warm start TTSF (95%): <20 sec (Off or Stby <15 min) TTSF (95%): <55 sec (Off or Stby <60 min)
Velocity accuracy	0.04 m/sec steady rate (3D 95%)
Coordinate system	8 predefined
Datums	260 predefined, 6 user defined

* Export of precise positioning service (PPS) units is authorized for GPS Memorandum of Understanding countries only. PPS security modules must be obtained through foreign military sales (FMS) procurement.

Interfaces

Interconnect

- RF connector — Amphenol AMC RF Jack #A1JB
- Power and data — Mini solder ball pins

Hardware interfaces

- Two independent serial ports (full duplex CMOS)
- 1 pulse per second input (CMOS)
- 1 pulse per second output (CMOS)
- L1/L2 active RF antenna port, 3.3 V dc
- DS-101 and DS-102 key loading

Physical characteristics

Power	Operating: 3.3 V dc, <0.5 W typical Keep alive: 3.3 V dc, <0.3 mW typical
Weight	0.25 oz (7 gm) nominal
Size/volume	1.0 x 1.25 x 0.275 in. maximum (25.4 x 31.75 x 7 mm)
Temperature range	-40° C to +85° C operating -55° C to +85° C storage
Shock, all axes	600g, ½ sine, 1 msec

For more information contact:
BAE Systems

P. O. Box 868
Nashua, New Hampshire 03061-0868
W: baesystems.com/gps

Cleared for open publication on 07/20
Approved for public release: unlimited distribution.
Not export controlled per ES-NSS-071420-0005