

# **EM-411**

**GPS RECEIVER ENGINE BOARD**

GLOBALSAT TECHNOLOGY CORPORATION

# GPS Engine Board Specifications

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## REVISIONS

V1.0	10-01-2006	Convert test to USG format
V1.1	10-23-2006	Update pin-out drawing
V1.2	10-05-2007	Corrected pin-out drawing

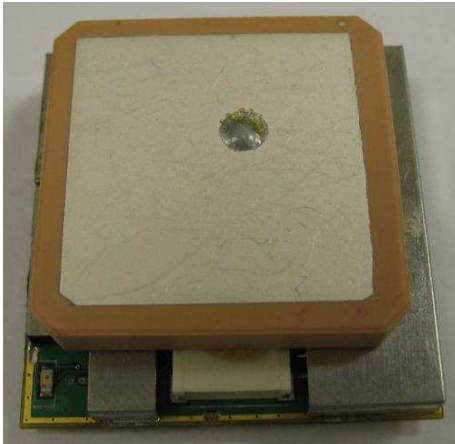
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## EM-411 GPS BOARD OVERVIEW

The EM-411 GPS engine board is low cost but maintains high reliability and accuracy making it an ideal choice for integration with OEM/ODM systems. The EM-411 features an integrated patch antenna for complete implementation.

### **FEATURES:**

1. SiRF Star III high performance GPS chipset
2. Very high sensitivity (Tracking Sensitivity: -159dBm)
3. Extremely fast TTFF (Time To First Fix) at low signal levels
4. Supports the NMEA 0183 data protocol
5. Built-in SuperCap to maintain system data for rapid satellite acquisition
6. Built-in patch antenna
7. Foliage Lock for weak signal tracking
8. Compact in size
9. All-in-view 20-channel parallel processing
10. Snap Lock 100ms re-acquisition time
11. Superior urban canyon performance
12. WAAS / EGNOS support
13. RoHS compliant

### **Only differences between the EM-411 and EM-406/406a Engine Boards:**

EM-406:TX and RX pins are transposed.

EM-406 PIN #3=RX & PIN #4=TX (non-lead-free)

EM-411 PIN #3=TX & PIN #4=RX (RoHS lead-free)

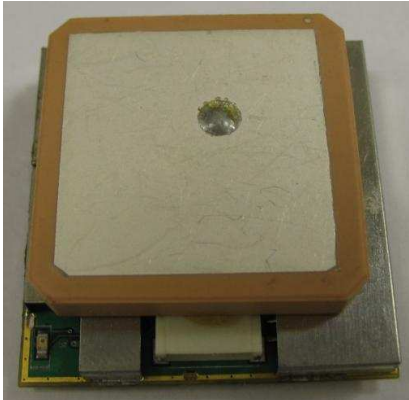
EM-406a:TX and RX pins are transposed.

EM-406a PIN #3=RX & PIN#4=TX (RoHS lead-free)

EM-406a has 1PPS output on header pin #6.

EM-411 PIN #3=TX & PIN#4= RX (RoHS lead-free)

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## SPECIFICATIONS

### General - Receiver

Chipset: SiRF Star III  
Frequency: L1, 1575.42 MHz  
C/A Code: 1.023 MHz chip rate  
Channels: 20 channel all-in-view tracking  
Sensitivity: -159dBm

### Accuracy

Position: 10 meters, 2D RMS  
5 meters, 2D RMS, WAAS enabled  
Velocity: 0.1 ms  
Time: 1 $\mu$ s synchronized to GPS time

### Datum

Default: WGS-84

### Acquisition Time

Reacquisition: 0.1 sec., average  
Hot Start: 8 sec., average  
Warm Start: 38 sec., average  
Cold Start: 42 sec., average

### Dynamic Conditions

Altitude: 18,000 meters (60,000 feet) max  
Velocity: 515 meters/second (1000 knots)  
max

### Power

Main Power Input: 4.5V~6.5V DC Input  
Power Consumption: 60mA (35mA trickle mode)  
Backup power: +2.5V to +3.6V  
Backup current: 10uA typical

### Protocol

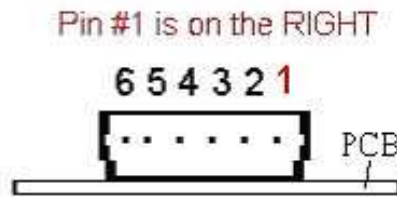
Electrical Level: TTL level,  
Output Voltage Level: 0V~2.85V  
Baud Rate: 4800 bps  
Output Message: NMEA 0183 GGA, GSA, GSV, RMC (VTG, GLL optional)

### Physical Characteristics

Dimensions: 1.181" x 1.181" x 0.413"  
(30mm x 30mm x 10.5mm)  
Operating Temperature: -40F to +176F  
(-40C to +85C)  
Humidity: Up to 95% non-condensing

# PIN ASSIGNMENT

- 1: GND
- 2: VCC
- 3: TX
- 4: RX
- 5: GND



## PIN DESCRIPTIONS

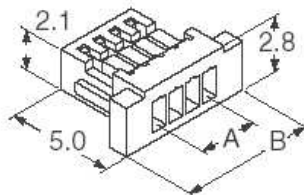
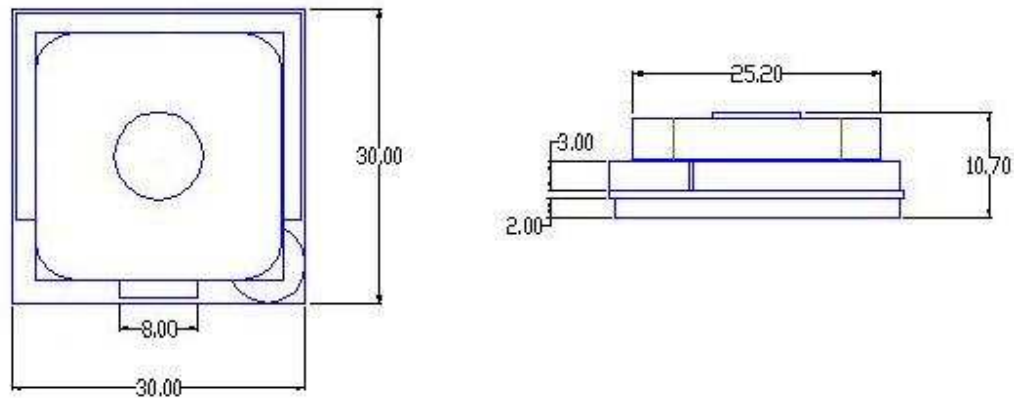
**VCC: (DC power input):** This is the main DC supply for a 4.5V ~ 6.5V power module board.

**TX:** This is the main transmit channel for outputting navigation and measurement data to user's navigation software or user-written software.

**RX:** This is the main receive channel for receiving software commands to the engine board from SiRfdemo software or from user-written software. Normally this pin must be kept High and if you don't use this pin please connect a resistor to 3.5V to pull it high.

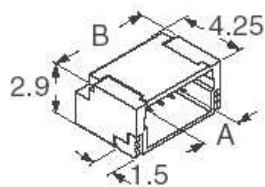
**GND:** GND provides the ground for the engine boards. Be sure to connect all grounds

## DIMENSIONS



**Female Cable Connector**

Digi-Key Part No: 455-1381-ND



**Male PCB Header**

Digi-Key Part No: 455-1806-1-ND

## MOUNTING

Recommended mounting methods:

- a. Use industrial grade double-sided foam tape. Place it on the bottom side of the engine board.
- b. A recessed cavity in your housing design with a foam pad to eliminate shifting or movement.
- c. Use provided mounting holes on the GPS engine board PCB.

## NMEA & SiRF COMMAND LINKS

Please download the latest output and control commands from our web-site:

**[NMEA Command Reference Manual](http://www.usglobalsat.com/downloads/NMEA_commands.pdf)**

([http://www.usglobalsat.com/downloads/NMEA\\_commands.pdf](http://www.usglobalsat.com/downloads/NMEA_commands.pdf))

**[SiRF Binary Protocol Reference Manual](http://www.usglobalsat.com/downloads/SiRF_Binary_Protocol.pdf)**

([http://www.usglobalsat.com/downloads/SiRF\\_Binary\\_Protocol.pdf](http://www.usglobalsat.com/downloads/SiRF_Binary_Protocol.pdf))

*All product specifications contained in this document are subject to change without notice.*

NOTES: