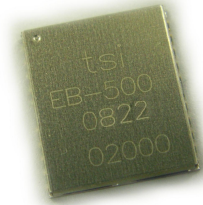


GPS Engine Board

EB-500/ EB-500L



EB-500 is an ultra miniature 13 x 15 mm² GPS engine board. It provides superior navigation performance under dynamic conditions in areas with limited sky view like urban canyons. High sensitivity up to **-165dBm** for weak signal operation without compromising accuracy. EB-500 series are your best choice for embedded applications.

Key Features :

- Small form factor: 13 x 15 x 2.2 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -165dBm
- Tracks 66-Channel of satellites
- Fast Position Fix
- Low power consumption
- With or without LNA
- 500 with LNA
- 500L without LNA
- 500 can used passive antenna.
- 500L must be used active antenna.

Applications :

- Handheld devices
- Automotive and Marine Navigation
- Automotive Navigator Tracking
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications : PDA, DSC, Smart phone, UMPC, PND, MP4



PIN Definition :

| | | | |
|----|------------|------------|----|
| 1 | RX1 | GND | 22 |
| | TX1 | RF_INPUT | |
| | PPS | GND | |
| | TX0 | V28A | |
| | RX0 | NC | |
| | GND | GND | |
| | GPIO [3] | GPIO [2] | |
| | GPS status | GPIO [8] | |
| | GPIO [12] | GPIO [7] | |
| | V28D | VIN_3V3 | |
| 11 | NC | V_RTC_3V3 | 12 |



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1 Introduction

EB-500 is an ultra miniature 13 x15mm² GPS engine board. It provides superior navigation performance under dynamic conditions in areas with limited sky view like urban canyons. High sensitivity up to -165dBm for weak signal operation without compromising accuracy. EB-500 series are your best choice for embedded applications.

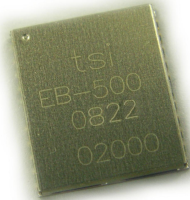
1.1 Key Features

- Small form factor: 13 x 15 x 2.2 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -165dBm
- Tracks 66-Channel of satellites
- Fast Position Fix, 35/ 34/ 1.5s for Cold/ Warm/ Hot start
- Low power consumption

1.2 Applications

- Handheld devices
- Automotive and Marine Navigation
- Automotive Navigator Tracking
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications such as: PDA, DSC, Smart phone, UMPC, PND, MP4

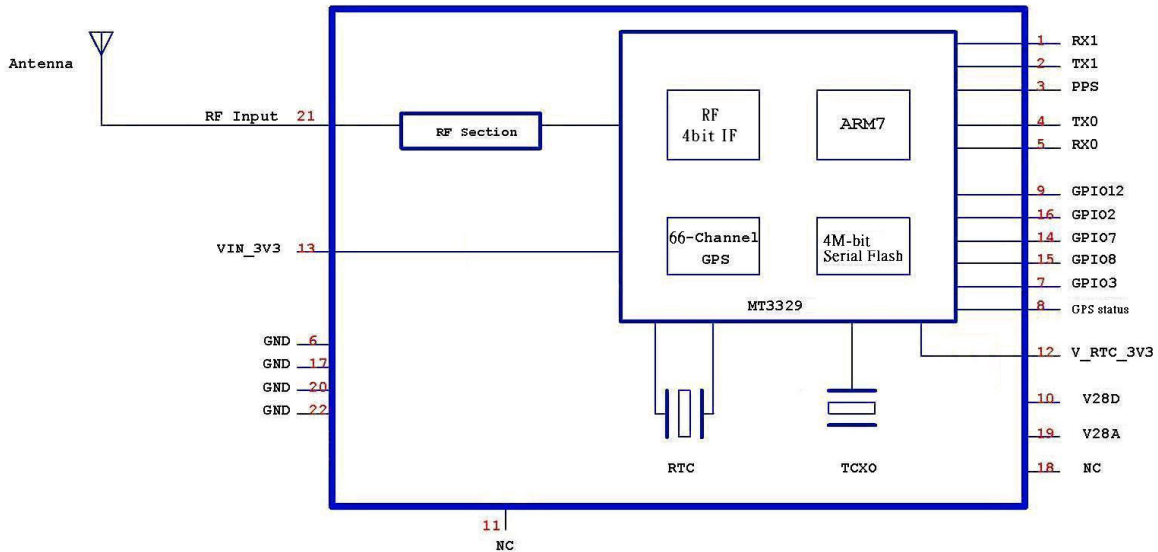
1.3 Look & Feel



2 Technical Description

2.1 Block Diagram

EB-500 Series System Block Diagram



2.2 Pin Definition

| Pin# | Signal Name | Type | Description |
|------|-------------|------|--|
| 1 | RX1 | I | GPS RX1 |
| 2 | TX1 | O | GPS TX1 |
| 3 | PPS | O | PPS |
| 4 | TX0 | O | GPS TX0 |
| 5 | RX0 | I | GPS RX0 |
| 6 | GND | P | Ground |
| 7 | GPIO[3] | I/O* | General input/ output |
| 8 | GPIO[15] | O | GPS status, blink when GPS has position fix |
| 9 | GPIO[12] | I/O* | General input/ output |
| 10 | V28D | P | Digital power indicator, 2.8V±2% |
| 11 | NC | I | NC |
| 12 | V_RTC_3V3 | P | RTC power 3.0~4.2V Quiescent current 1.5uA max |
| 13 | VIN_3V3 | P | Power Supply 3.0~4.2V DC |
| 14 | GPIO[7] | I/O* | General input / output |
| 15 | GPIO[8] | I/O* | General input / output |
| 16 | GPIO[2] | I/O* | General input / output |
| 17 | GND | P | Ground |
| 18 | NC (HRST) | NC | NC (GPS reset, active low. Internal pull high |
| 19 | V28A | P | Analog power indicator, 2.8V±2% |

EB-500 Series Data Sheet

| | | | |
|----|----------|---|--------------------------------------|
| 20 | GND | P | Ground |
| 21 | RF Input | I | Antenna port, L1, 1575.42MHz, 50 ohm |
| 22 | GND | P | Ground |

P: Power I: Input O: Output I/O*: Input or Output, Open if not used

Note : GIO current output default : 4mA

Max : 16mA

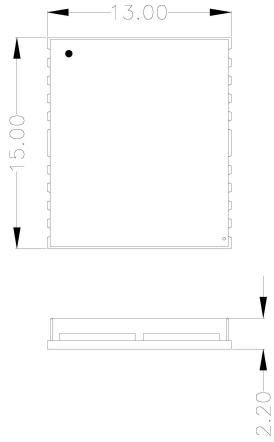
2.3 Specification

EB-500 Specifications

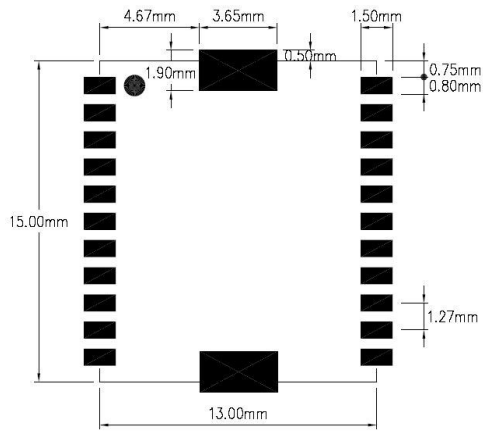
| <i>Specification</i> | <i>Description</i> |
|------------------------|--|
| General | L1 frequency, C/A code (SPS) 66 independent tracking channels |
| Sensitivity | -165dBm /Tracking; -148dBm /Acquisition |
| Update Rate | Up to 10Hz |
| Accuracy | Without aid: 3.0m 2D-RMS <3m CEP (50%) without SA (horizontal) DGPS (WAAS, EGNOS, MSAS, RTCM): 2.5m |
| Acquisition (open sky) | Cold start: 35sec Warm start: 34sec Hot start: 1.5sec With AGPS: <15sec |
| Reacquisition | < 1sec |
| Dynamics | Altitude: 18000m (max.) Velocity: 515m/sec (max.) Vibration: 4G (max.) |
| Supply Voltage | DC 3.0~4.2V |
| Power Consumption | EB-500: <28mA@4V (w/o Active ANT) / Tracking EB-500L: <25.5mA@4V (w/o Active ANT) / Tracking |
| Backup Battery | DC 2.0~4.3V (RTC Vcc) |
| NMEA Message | NMEA0183 v3.1 baud rate 4800/9600/.../57600, default 9600 Selectable Output: GGA, GLL, GSA, GSV, RMC, and VTG |
| Datum | Default WGS-84(total 219 Datum) |
| Antenna | External Antenna / External Active Antenna Output Voltage: 2.8 VDC |
| Serial Interface | UART |
| Operating Temperature | -30°C to 85°C |
| Storage Temperature | -40°C to 125°C |
| Operating Humidity | ≤95%, non condensing |
| Mounting | SMT Type, 22 Pin |
| Dimension | 13 x 15 x 2.2(H) m |

3 Dimension and Package

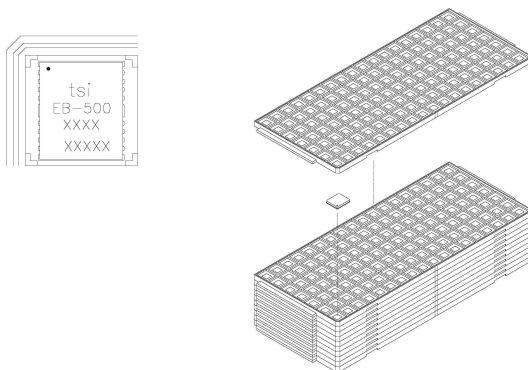
3.1 Mechanical Dimension



3.2 Recommend Layout Pattern



3.3 Package



4.2 General GPS Receiver User's Tips

- If the satellite signals can not be locked or experiencing receiving problem (while in urban area), following steps are suggested:
 - a) Please plug the external active antenna into GPS receiver and put the antenna outdoor or on the roof of the vehicle for better receiving performance.
 - b) Move to another open space or reposition GPS receiver toward the direction with least blockage.
 - c) Move the GPS receiver away from the interference sources.
 - d) Wait until the weather condition is improved.
- Some vehicles having heavy metallic sun protecting coating on windshields may affect signal receptions
- Driving in and around high buildings may affect signal reception.
- Driving under tunnels or in buildings may affect signal reception.
- In general, GPS receiver performs best in open space where it can see clean sky. Weather will affect GPS reception – rain & snow contribute to worsen sensitivity.
- When GPS receiver is moving, it will take longer time to get position fix. Wait for satellite signals to be locked at a fixed point when first power-on the GPS receiver to ensure quick GPS position fix.

4.3 How to avoid ESD damage to ICs

- Any person handling the ICs should be grounded either with a wrist strap or ESD-protective footwear used in conjunction with a conductive or static-dissipative floor or floor mat.
- The work surface where devices are placed for handling, processing, testing, etc., must, be made of static-dissipative material and be grounded to ESD ground.
- All insulator materials must either be removed from the work area or must be neutralized with an ionizer. Static-generating clothing must be covered with an ESD-protective smock.
- When ICs are being stored, transferred between operations or workstations, or shipped, they must be kept in a Faraday shield container with inside surfaces (surfaces touching the ICs) that are static-dissipative.

4.4 SMT IR Profile

Average ramp-up rate (217C to peak): 3 oC /sec. max.

Preheat : 150~200 oC · 60~180 seconds

Temperature maintained above 217 oC : 60~150 seconds

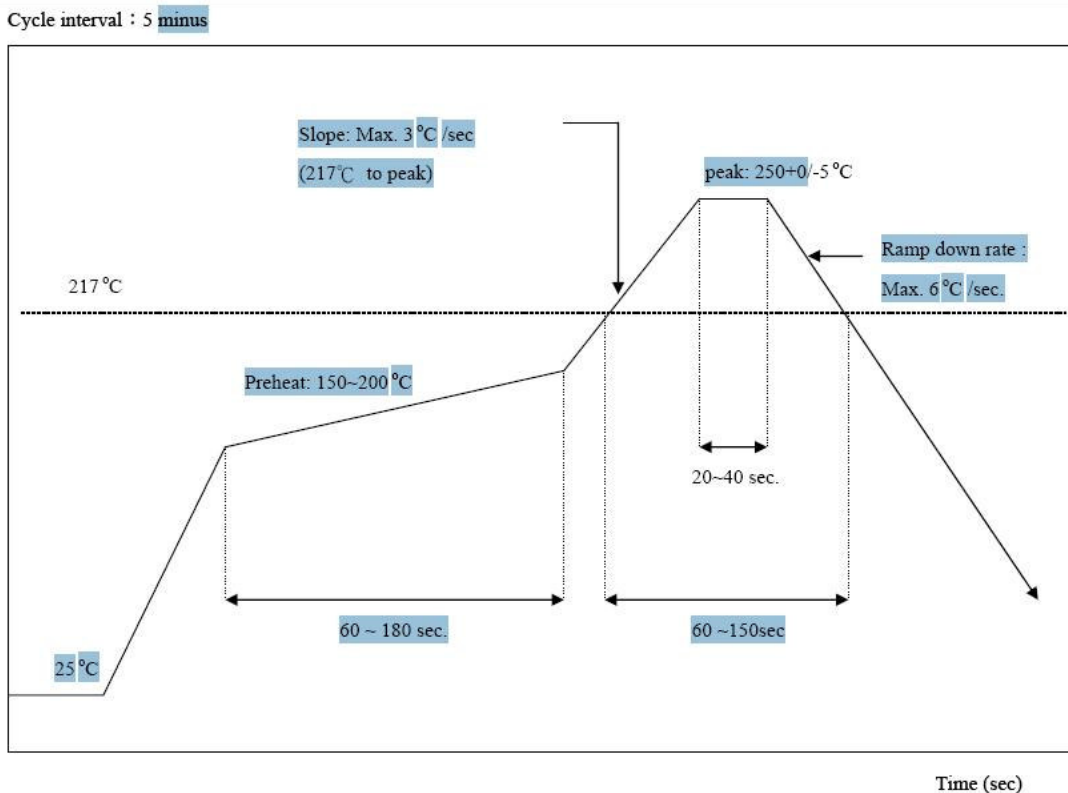
Time within 5 oC of actual peak temperature: 20 ~ 40 sec.

Peak temperature : 250+0/-5 oC

Ramp-down rate : 6 oC /sec. max.

Time 25 oC to peak temperature : 8 minutes max.

Cycle interval : 5 min



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