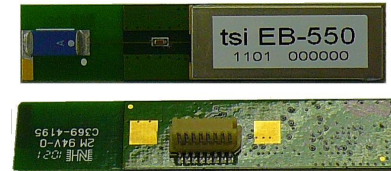


GPS Engine Board

EB-550

EB-550 is a complete GPS engine with antenna in miniature 43 x 9 x 4 mm dimension. It provides great 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-550 brings the best GPS reception with compact size for all kinds of embedded applications.



Key Features :

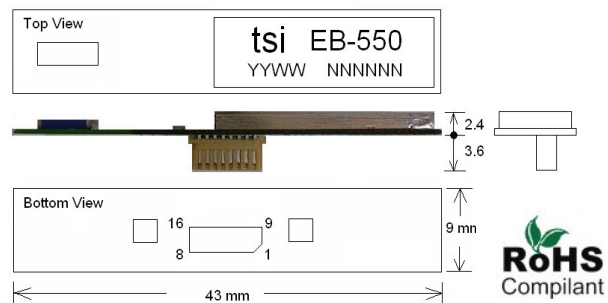
- Small form factor: 43 x 9 x 2.4 mm
- High sensitivity -165dBm*
- Tracks 66-Channel of satellites
- Fast Position Fix
- Low power consumption
- Integrate GPS antenna
- Support off line AGPS.
- Lead-Free – RoHS/WEEE compliant

Applications :

- Handheld devices
- Automotive and Marine Navigation
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications

PIN Definition :

Pin #	Name	Pin #	Name
1	GND	9	GND
2	GND	10	GND
3	GND	11	RXA
4	GND	12	TXA
5	GND	13	CTRL
6	GND	14	Vcc
7	GND	15	GND
8	GND	16	GND



* Refer to chip specifications



TRANSYSTEM INC.

An A+ Supplier of Microwave communication & GPS products

Ultimate

EB



Revision History

Rev.	Date	Description
0.1	12-20-2010	Initial draft
0.2	03-07-2011	Add Molex connector P/N
0.3	04-06-2011	Modify the pin location of the dimensional drawing
	MM-DD-YYYY	

PRELIMINARY



EB-550 is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Please handle with care to avoid permanent malfunction or performance degradation.

Use of GPS Data and Services at the User's own risk

The GPS data and navigation services providers, system makers and integrated circuit manufacturers ("Providers") hereby disclaim any and all guarantees, representations or warranties with respect to the Global Positioning Systems (GPS) data or the GPS services provided herein, either expressed or implied, including but not limited to, the effectiveness, completeness, accuracy, fitness for a particular purpose or the reliability of the GPS data or services.

The GPS data or services are not to be used for safety of life applications or for any other application in which the accuracy or reliability of the GPS data or services could create a situation where personal injury or death may occur. Any use therewith are at the user's own risk. The Providers specifically disclaims any and all liability, including without limitation, indirect, consequential and incidental damages, that may arise in any way from the use of or reliance on the GPS data or services, as well as claims or damages based on the contravention of patents, copyrights, mask work and/or other intellectual property rights.

No part of this document may be copied, distributed, utilized, and transmitted in any form or by any means without expressed authorization of all Providers. The GPS data and services are in part or in all subject to patent, copyright, trade secret and other intellectual property rights and protection worldwide.

Transsystem Inc. reserves the right to make change to specifications and product description without prior notification.



Table of Contents

1	Introduction	5
1.1	Key Features	5
1.2	Applications	5
1.3	Labeling	5
2	Technical Description	6
2.1	Block Diagram	6
2.2	Pin Definition	7
2.3	General Comment	7
2.4	Specifications	8
3	Electrical Characteristics	9
3.1	Absolute maximum ratings	9
3.2	Operating Conditions	9
3.3	DC Electrical Characteristics	9
4	Serial Port Interface	10
4.1	Protocol	10
4.2	NMEA Protocol	10
5	Dimension and Package	11
5.1	Mechanical Dimension	11
5.2	Packing	11
6	Application Information	12
6.1	Minimum Configuration	12
6.2	General GPS Receiver User's Tips	12
7	Quality and Reliability	13
7.1	Environmental Conditions	13
7.2	How to avoid ESD damage	13



1 Introduction

EB-550 is a complete GPS engine solution with integrated chip antenna in a miniature 43 x 9 x 2.4 mm dimension. The form factor best fit for board edge system configuration to minimize overall system size. It provides great GPS reception performance under dynamic conditions in areas with limited sky view like urban canyons. Its high sensitivity is the best for weak signal operation without compromising accuracy. EB-550 brings the best GPS reception with high integration in compact size for all kinds of embedded applications.

1.1 Key Features

- Small form factor: 43 x 9 x 2.4 mm
- High sensitivity -165dBm*
- Tracks 66-Channel of satellites
- Fast Position Fix
- Low power consumption
- Integrate GPS antenna
- Support off line AGPS.
- Lead-Free – RoHS/WEEE compliant

1.2 Applications

- Handheld devices
- Automotive and Marine Navigation
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications

1.3 Labeling

There are 4 fields of top marking on the GPS engine and they are :



Area #1: TSI company icon

Area #2: Model number, i.e. EB-550

Area #3: Date code (YYWW), the year and week when the product is built.

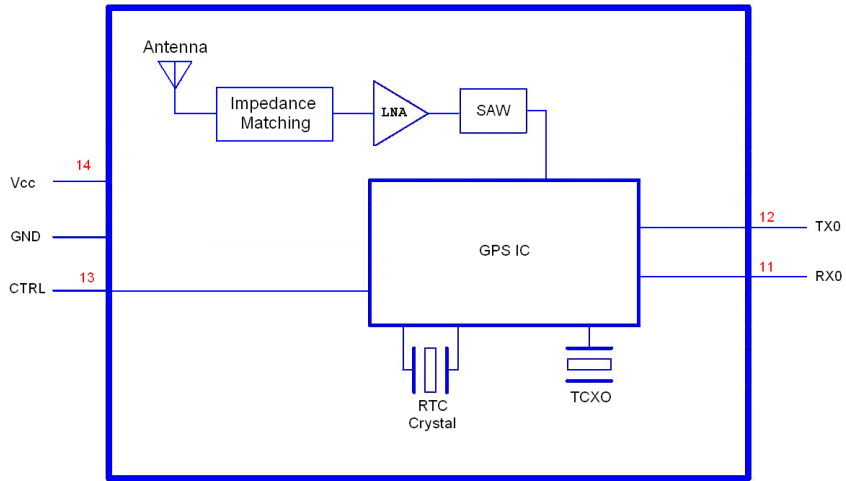
Area #4: Lot control code for TSI internal use



2 Technical Description

2.1 Block Diagram

EB-550 System Block Diagram



PRELIMINARY



2.2 Pin Definition

Pin#	Name	Type	Description
1	GND	P	Power ground
2	GND	P	Power ground
3	GND	P	Power ground
4	GND	P	Power ground
5	GND	P	Power ground
6	GND	P	Power ground
7	GND	P	Power ground
8	GND	P	Power ground
9	GND	P	Power ground
10	GND	P	Power ground
11	RX0	I	GPS RX0, input to EB-550
12	TX0	O	GPS TX0, output from EB-550
13	CTRL	I	GPS enable, open if not used
14	Vcc	P	Power input, 3.0~4.2Vdc
15	GND	P	Power ground
16	GND	P	Power ground

P: Power I: Input O: Output

2.3 General Comment

Following comments should be considered for a design using EB-550 module:

- Serial port default configuration: 115,200 baud, 8 data bits, no parity, 1 stop bit, no flow control



2.4 Specifications

Item	Description
General	L1 frequency, C/A code (SPS) 66 independent tracking channels
Sensitivity*	-165dBm /Tracking; -148dBm /Acquisition
Update Rate	Up to 10Hz
Accuracy	<3m CEP (50%) without SA 2.5m DGPS (WAAS, EGNOS, MSAS, RTCM)
Acquisition (open sky)	Cold Start: 35sec Warm Start: 34sec Hot Start: 1.5sec
Reacquisition	< 1sec
Dynamics	Altitude: 18000m (max.) Velocity: 515m/sec (max.) Vibration: 4G (max.)
NMEA	NMEA0183 v3.1 GGA, GSA, GSV, RMC (Default) / GLL, VTG (Optional)
Datum	Default WGS-84
Antenna	Build-in chip antenna
Power Supply	DC 3.0V ~ 4.2V
Current	30mA @ 3.3V / Tracking
Interface	UART, Baud rate : 4800/9600(Default)/.../115200
Mounting	Molex 16 pin male (52465-1629) board to board connector
Dimension	43 x 9 x 2.4 (H, include shielding box) mm
Operating Temp.	-30°C to 85°C
Storage Temp.	-40°C to 85°C
Operating Humidity	≤ 95%, non condensing



3 Electrical Characteristics

3.1 Absolute maximum ratings

Symbol	Parameter	Min	Max	Unit
Vcc	power supply	-0.3	+4.2	V
Vin	voltage to any pin	-0.3	+3.6	V
Iov	input current on any pin	-10	10	mA
Itdv	absolute sum of all input currents during overload condition		200	mA
Tst	storage temperature	-40	85	°C

Table 5: Absolute maximum ratings

Note:

- (1) Stresses beyond absolute maximum ratings may cause permanent damage to the device.
- (2) Exposure to absolute maximum rating conditions for extended period may affect device reliability.

3.2 Operating Conditions

Pin	Description	Min	Typical	Max
14	Vcc	3.0V	3.3V	4.2V
	Peak Acquisition Current (1)			30mA
	Tracking Current (2)		23mA	

Table 6: Electrical characteristics

Note:

- (1) Peak acquisition current is the maximum current with passive antenna.
- (2) Tracking current is the average current with passive antenna includes tracking and post acquisition portion.

3.3 DC Electrical Characteristics

Symbol	Parameter	Min	Max	Unit
TX0	Voh	2.4	3.9	V
	Vol	-0.3	0.4	V
RX0, CTRL	Vih	2.0	3.6	V
	Vil	-0.3	0.8	V



4 Serial Port Interface

EB-550 provides 2-wire digital UART port for communication of GPS position data using NMEA protocol or MTK extension protocol. UART port is capable of 4800 to 115200 baud rate.

4.1 Protocol

EB-550 is default to support standard NMEA-0183 protocol. In addition, a series of MTK extensions (PMTK messages) have been developed that can be used to provide extended capabilities common to many applications. Please refer to “GPS Engine Board UART Port Command” for detailed command information.

4.2 NMEA Protocol

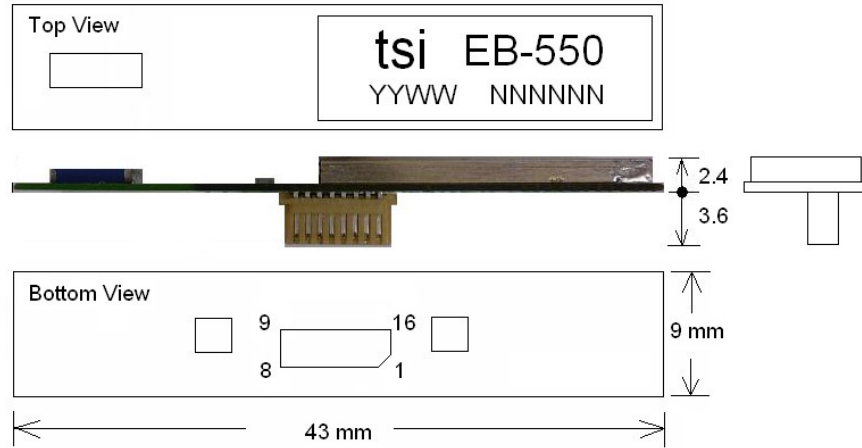
EB-550 is capable of supporting following NMEA formats:

NMEA Prefix	Format	Direction
\$GPGGA	GPS fix data	Out
\$GPGLL	Geographic position Latitude / Longitude	Out
\$GPGSA	GNSS DOP and active satellites	Out
\$GPGSV	Satellites in view	Out
\$GPRMC	Recommended minimum specific GNSS data	Out
\$GPVTG	Velocity and track over ground	Out
\$GPZDA	Date and time	Out



5 Dimension and Package

5.1 Mechanical Dimension



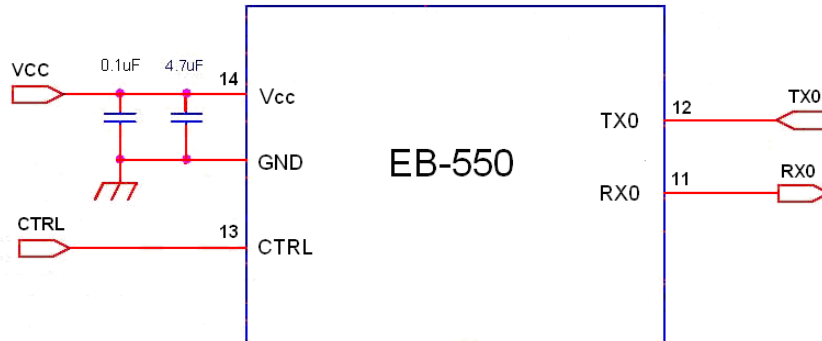
5.2 Packing

EB-550 comes in sealed individual package to provide maximum protection to the module against moisture and ESD during storage and shipment.

PRELIMINARY

6 Application Information

6.1 Minimum Configuration



- Note :
- 1) Keep EB-550 top side away from metal parts and RF transmitter to avoid interference of GPS signal reception.
 - 2) Provide good grounding to the connector interface as well as the two square contacts on the bottom side of EB-550.
 - 3) Use of noise-free power source to supply VCC to EB-550.
 - 4) Keep at least 1mm spacing from all directions of the GPS chip antenna.

6.2 General GPS Receiver User's Tips

In general, GPS receiver performs best in open space where it can see clean sky. Weather condition will affect GPS reception – rain & snow contribute to worsen sensitivity.

If the satellite signals can not be locked or experiencing receiving problem (while in urban area), following steps are suggested:

- Use of external active antenna if that option exists.
- Move to another open space or reposition GPS receiver toward the direction with least blockage.
- Move the GPS receiver away from the interference sources.
- Wait until the weather condition is improved.

Some vehicles using heavy metallic sun protecting coating on windshields may affect GPS signal reception.

- Driving in and around high buildings may affect signal reception.
- Driving in tunnels or in building structure may affect signal reception.
- 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.



7 Quality and Reliability

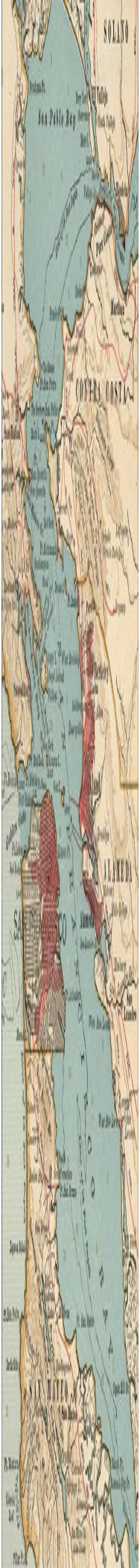
Each module is electrically tested prior to packing and shipping to ensure state of the art product quality and best GPS receiver performance and accuracy.

7.1 Environmental Conditions

Operating temperature	-30 ~ +85 °C
Operating humidity	Max. 95%, non-condensing
MSL JEDEC (Moisture Sensitivity Level)	3
Storage temperature	-40 ~ +85 °C
Storage	12 months in original package.

7.2 How to avoid ESD damage

- Any person handling the module 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 module 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 module) that are static-dissipative.



Contact Information

Transsystem Inc.
No. 1-2 Li-Hsin Rd. I, ,
Hsinchu 300, Taiwan, R.O.C.
t : +886.3.578.0393
f : +886.3.578.4111
sales@transystem.com.tw
www.transystem.com.tw

PRELIMINARY