GPS Engine Board

EB-230

EB-230 is an ultra miniature 12 x 12 mm^2 GPS engine board. It provides superior navigation performance under dynamic conditions in areas with limited sky view like urban canyons. High sensitivity up to **-158dBm** for weak signal operation without compromising accuracy. EB-230 is your best choice for embedded applications.

ELECTROSTATIC SENSITIVE DEVICES

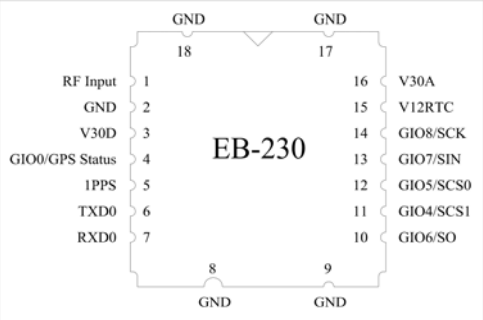
Key Features :

- Small form factor: 12 x 12 x 3 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -158dBm
- Tracks 32-Channel of satellites
- Fast Position Fix
- Low power consumption

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 :



PIN Coordinates Unit:mm

Pin #	X	Y	Pin #	X	Y
1	0.00	0.00	10	12.50	7.62
2	0.00	1.27	11	12.50	6.35
3	0.00	2.54	12	12.50	5.08
4	0.00	3.81	13	12.50	3.81
5	0.00	5.08	14	12.50	2.54
6	0.00	6.35	15	12.50	1.27
7	0.00	7.62	16	12.50	0.00
8	4.06	10.06	17	9.71	-2.44
9	9.71	10.06	18	2.79	-2.44

EB-230 Specifications

Specification	*Description*
General	L1 frequcney, C/A code (SPS) 32 independent tracking channels
Sensitivity	-158dBm /Tracking; -146dBm /Acquisition
Update Rate	Up to 5Hz
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: 36sec Warm Start: 33sec Hot Start: 1sec
Reacquisition	< 1sec
Dynamics	Altitude: 18000m (max.) Velocity: 515m/sec (max.) Vibration: 4G (max.)
Supply Voltage	DC 3.0V
Power Consumption	< 30mA @ 3.0V (w/o Active ANT) / Tracking
Backup Battery	DC 1.2V (RTC Vcc)
NMEA Message	NMEA0183 v3.1 baud rate 4800/9600/…/57600, default 9600 Protocol: 3V CMOS/TTL Selectable Output: GGA, GLL, GSA, GSV, RMC, and VTG
Datum	Default WGS-84
Antenna	External Active Antenna Output Voltage: 3.0 VDC
Serial Interface	RS-232, SPI
Operating Temperature	-30℃ to 85℃
Storage Temperature	-40℃ to 125℃
Operating Humidity	≦95%, non condensing
Mounting	SMT Type, 18 Pin
Dimension	12 x 12 x 3(H) mm

*Specifications subject to change without prior notice.

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1 Introduction

EB-230 is an ultra miniature 12 x12mm^2 GPS engine board. It provides superior navigation performance under dynamic conditions in areas with limited sky view like urban canyons. High sensitivity up to -158dBm for weak signal operation without compromising accuracy. EB-230 is your best choice for embedded applications.

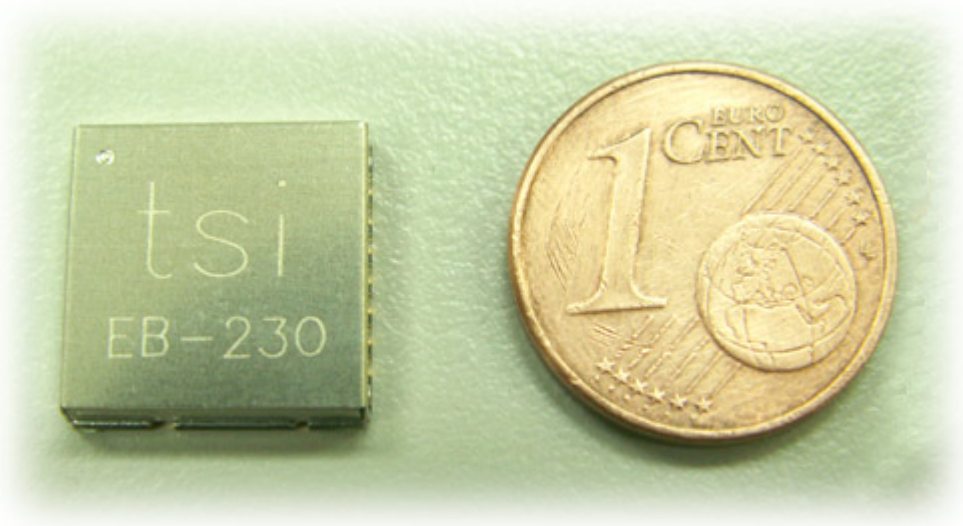
1.1 Key Features

- Small form factor: 12 x 12 x 3 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -158dBm
- Tracks 32-Channel of satellites
- Fast Position Fix, 36/ 33/ 1s for Cold/ Warm/ Hot start
- Low power consumption

1.2 Applications

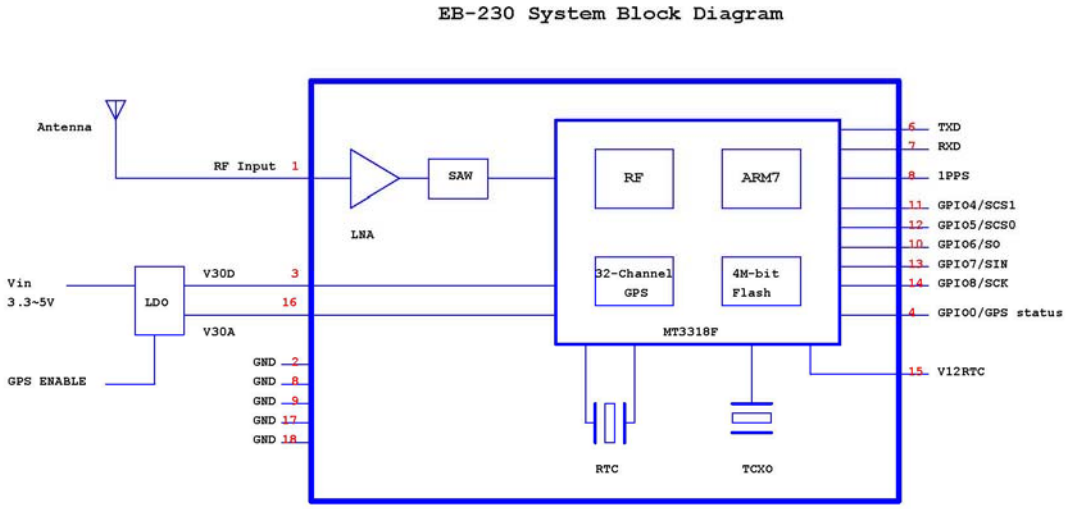
- Handheld devices
- Automotive and Marine Navigation
- Automotive Navigator Tracking
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications such as: PDA, DSC, Smart phone, UMPC, PND, MP4

1.3 Look & Feel



2 Technical Description

2.1 Block Diagram



2.2 Pin Definition

Pin#	Signal Name	Type	Description
1	RF Input	I	Antenna port, L1, 1575.42MHz, 50 ohm
2	GND	P	Ground
3	V30D	P	Digital power supply, 3.0V±10%
4	GPS status/ GPIO0	O	GPS status, blink when GPS has position fix General input/ output
5	1PPS	O	1Hz pulse 10% duty cycle when GPS has position fix
6	TXD	O	3V CMOS level, data output from EB-230
7	RXD	I	3V CMOS level, data into EB-230
8	GND	P	Ground
9	GND	P	Ground
10	GPIO6/SO	I/O*	General input/ output, SPI data output
11	GPIO4/SCS1	I/O*	General input/ output, SPI chip select 1
12	GPIO5/SCS0	I/O*	General input/ output, SPI chip select 0
13	GPIO7/SIN	I/O*	General input/ output, SPI data input
14	GPIO8/SCK	I/O*	General input/ output, SPI clock
15	V12RTC	P	RTC power 1.0~1.5Vdc, 500uA max
16	V30A	P	Analog power supply, 3.0V±10%
17	GND	P	Ground
18	GND	P	Ground

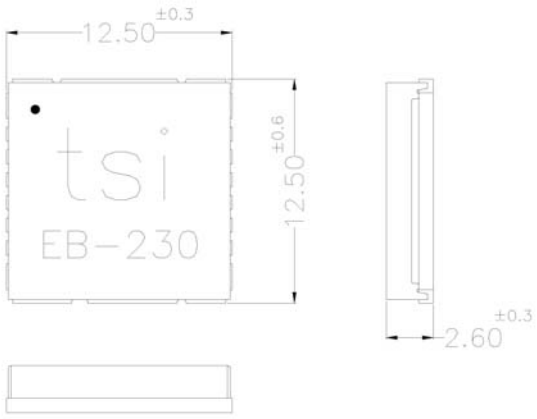
P: Power I: Input O: Output I/O*: Input or Output, Open if not used

2.3 Specification

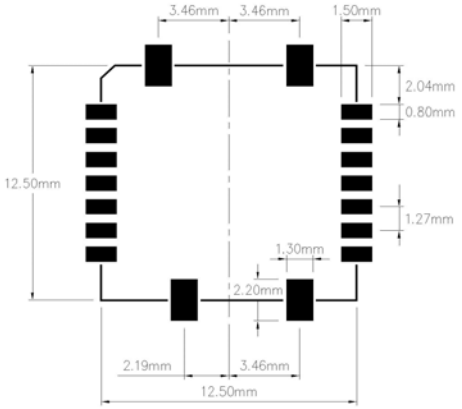
General		
GPS technology		MTK GPS chipset
Frequency		L1, 1575.42 MHz
C/A Code		1.023 MHz chip rate
Channels		32 channels all in view tracking
Sensitivity		Better than -158dBm
Receiver Accuracy		
Position		Without aid: 3.0 m 2D-RMS DGPS (WAAS, EGNOS, MSAS, RTCM): 2.5 m
Velocity		Without aid: 0.1 m/s
Time		100 ns RMS
Datum		
Datum		WGS84(Default) total 219 datums
Time to First Fix		
Hot start		1 sec, average
Warm start		33 sec, average
Cold start		36 sec, average
Reacquisition		<1sec
Protocol		
GPS Output Data Update Rate		NMEA 0183 (V3.01) - GGA, GLL ,GSA, GSV, RMC, VTG Baud rate 9600 bps, Data bit: 8, Stop bit: 1 (default) 1HZ(default)
1PPS		Enable (1Hz pulse 10% duty cycle)
Limitations		
Acceleration Limit		<4G
Altitude Limit		<18,000 meters
Velocity Limit		<515 meters/sec.
Jerk Limit		20 m/sec.
Power		
Operation Current		Acquisition: 55 mA Tracking: <30 mA (w/o Active ANT)
DC Input Range		VCC 3.0Vdc ±10% VBAT 1.0~1.5Vdc
Physical		
Dimension		12 x 12 x 3mm
Temperature		
Operating		-30℃ ~ +85℃
Storage		-40℃ ~ +125℃
Humidity		5% to 95% non-condensing
Antenna		
Impedance		50Ω
Protection		Build-in Short circuit and Over current protection
Output Voltage		3.0VDC
Mounting		
SMT Type		18Pin

3 Dimension and Package

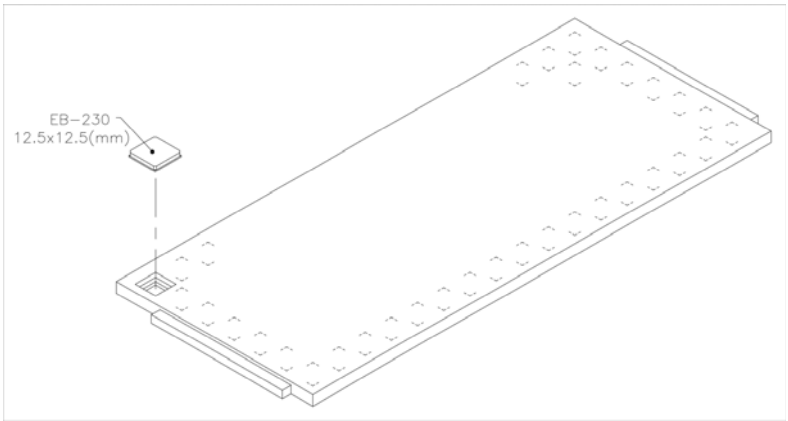
3.1 Mechanical Dimension



3.2 Recommend Layout Pattern



3.3 Package



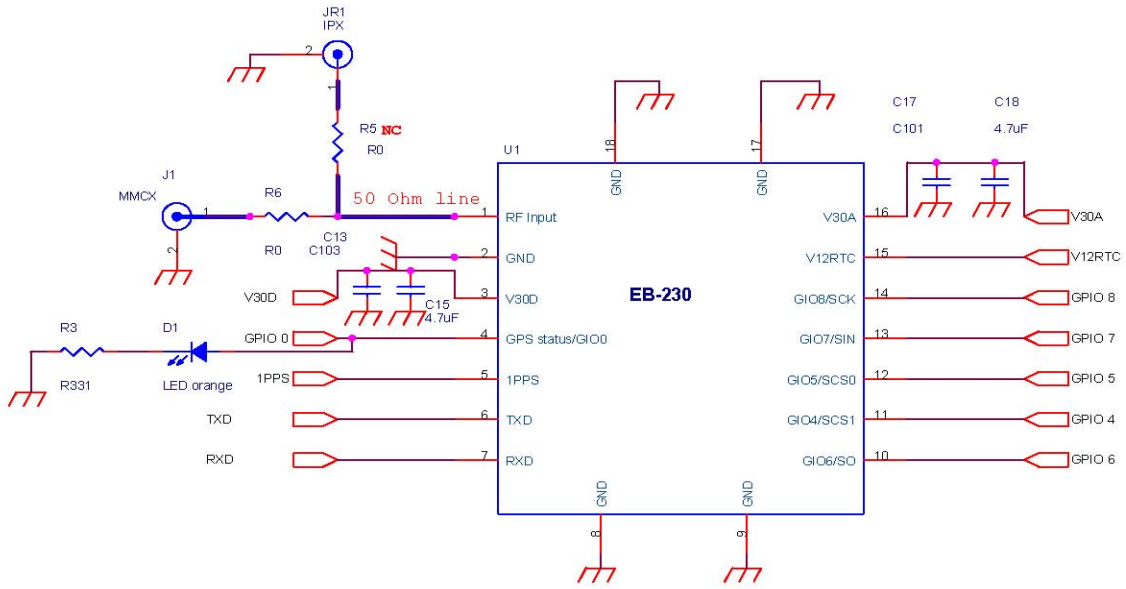
4 Application Information

4.1 GPS Antenna Recommendations

Follow below recommendations when choosing GPS antenna for EB-230 for best system performance. Transystem also offers active antenna products for optimal performance with EB-230. For details, please contact your Transystem sales contact directly.

- Use active antenna that works with 3V power supply
- Receiving frequency 1575.42 ± 1.032MHz
- Polarization RHCP (right hand circular polarized)
- Output impedance = 50 Ohm
- 15dB ≦ LNA Gain ≦ 20dB
- Noise figure ≦ 2.0dB
- Connector: surface mounted on main PCB, Ipex or MMCX

4.2 Application Circuit



【Note1】: GPS Status (pin#4) can be used as GPS position fix indicator.
【Note2】: V12RTC (pin#15) could connect to 1.0 ~1.5Vdc power supply directly.
【Note3】: Separate V30D (pin#3) from V30A (pin#16) for optimal performance.

4.3 General GPS Receiver User's Tips

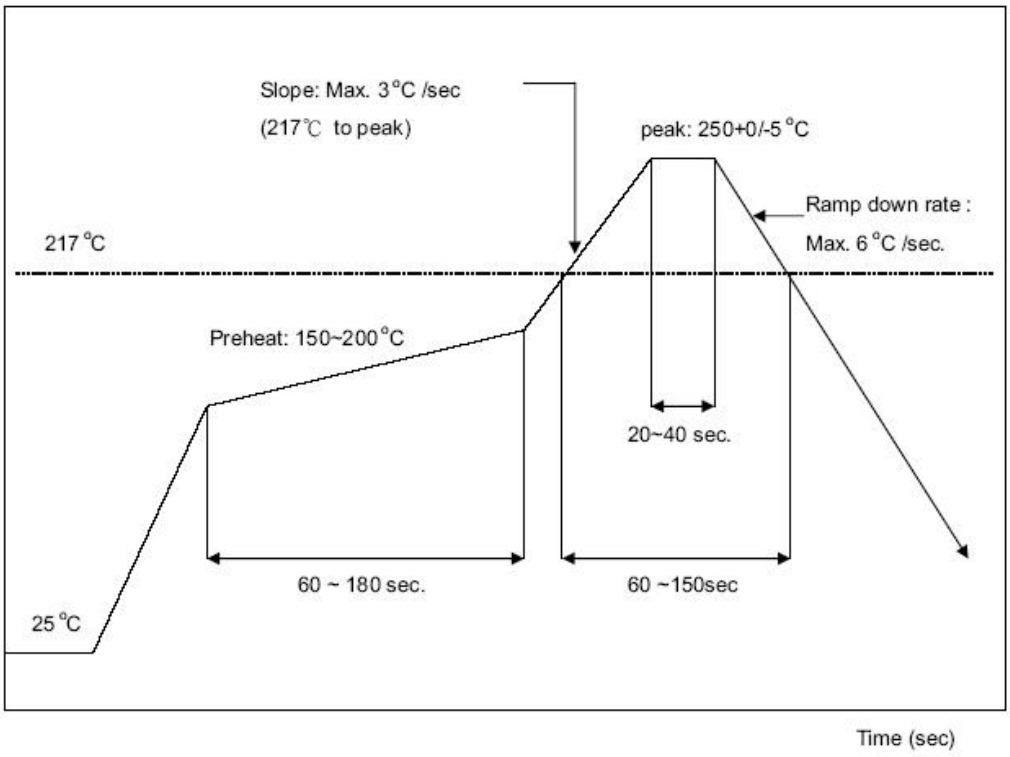
- If the satellite signals can not be locked or experiencing receiving problem (while in urban area), following steps are suggested:
  a) Please plug the external active antenna into GPS receiver and put the antenna outdoor or on the roof of the vehicle for better receiving performance.
  b) Move to 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.

4.4 EB-230 SMT Profile

Ramp-down rate : 6 °C /sec. max.

Time 25 °C to peak temperature : 8 minutes max.

Cycle interval : 5 minus



4.5 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.

Contact Information

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