

GPS Engine Board

EB-230

EB-230 is an ultra miniature 12 x 12 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 **-158dBm** for weak signal operation without compromising accuracy. EB-230 is your best choice for embedded applications.

Key Features :

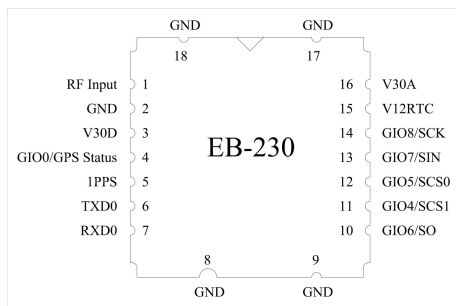
- Small form factor: 12 x 12 x 2.4 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -158dBm
- Tracks 51-Channel of satellites
- Fast Position Fix
- Low power consumption

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



TRANSYSTEM INC.

An A⁺ supplier of RF microwave & GPS products

Ultimate

EB

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1 Introduction

EB-230 is an ultra miniature 12 x12mm² 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.

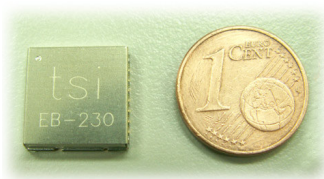
1.1 Key Features

- Small form factor: 12 x 12 x 2.4 mm
- Lead-Free – RoHS/WEEE compliant
- High sensitivity -158dBm
- Tracks 51-Channel of satellites
- Fast Position Fix, 36/ 33/ 1s for Cold/ Warm/ Hot start
- Low power consumption

1.2 Applications

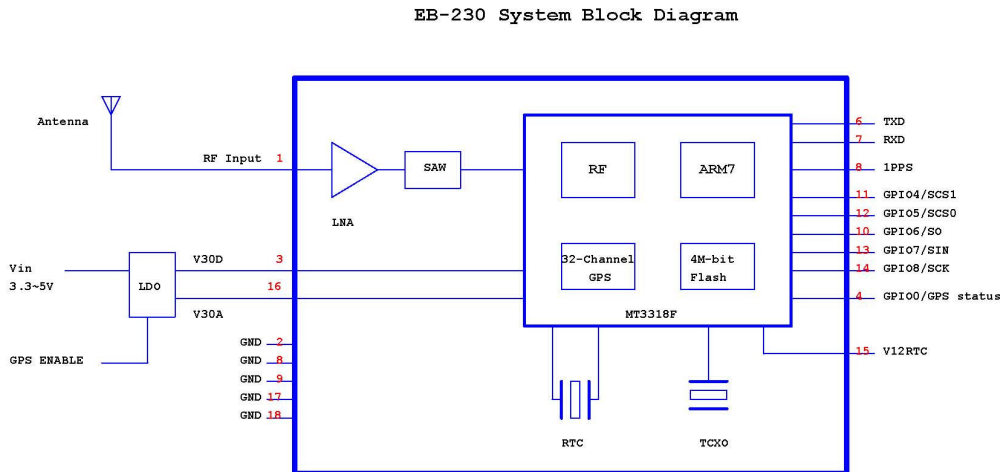
- Handheld devices
- Automotive and Marine Navigation
- Automotive Navigator Tracking
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications such as: PDA, DSC, Smart phone, UMPC, PND, MP4

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
11	GPIO4/SCS1	I/O*	General input/ output
12	GPIO5/SCS0	I/O*	General input/ output
13	GPIO7/SIN	I/O*	General input/ output
14	GPIO8/SCK	I/O*	General input/ output
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

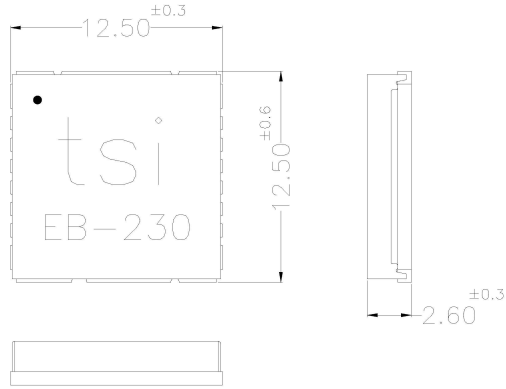
P: Power I: Input O: Output I/O*: Input or Output, Open if not used

2.3 Specification

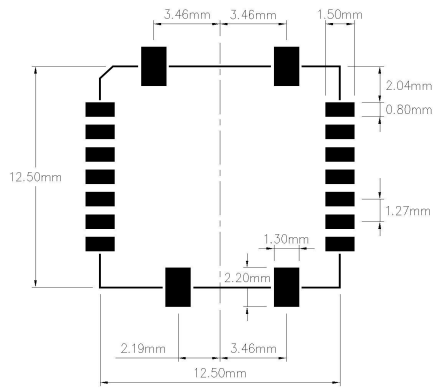
General	
GPS technology	MTK GPS chipset
Frequency	L1, 1575.42 MHz
C/A Code	1.023 MHz chip rate
Channels	51 channels all in view tracking
Sensitivity	Better than -158dBm
Receiver Accuracy	
Position	Without aid: 3.0 m 2D-RMS DGPS (WAAS, EGNOS, MSAS, RTCM): 2.5 m
Velocity	Without aid: 0.1 m/s
Time	100 ns 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	NMEA 0183 (V3.01) - GGA, GLL ,GSA, GSV, RMC, VTG Baud rate 9600 bps, Data bit: 8, Stop bit: 1 (default)
Update Rate	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 2.4mm
Temperature	
Operating	-30°C ~ +85°C
Storage	-40°C ~ +125°C
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

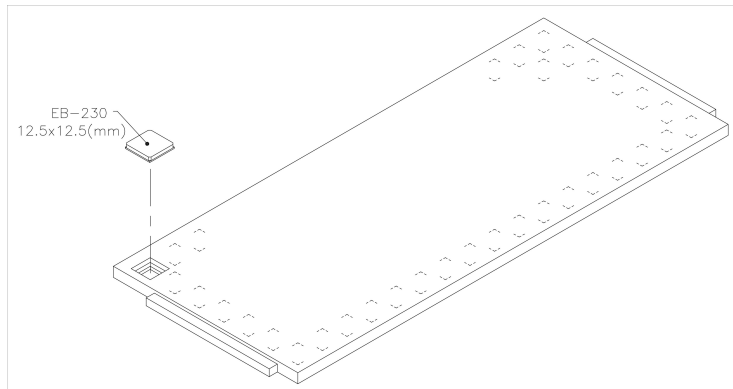
3.1 Mechanical Dimension



3.2 Recommend Layout Pattern



3.3 Package



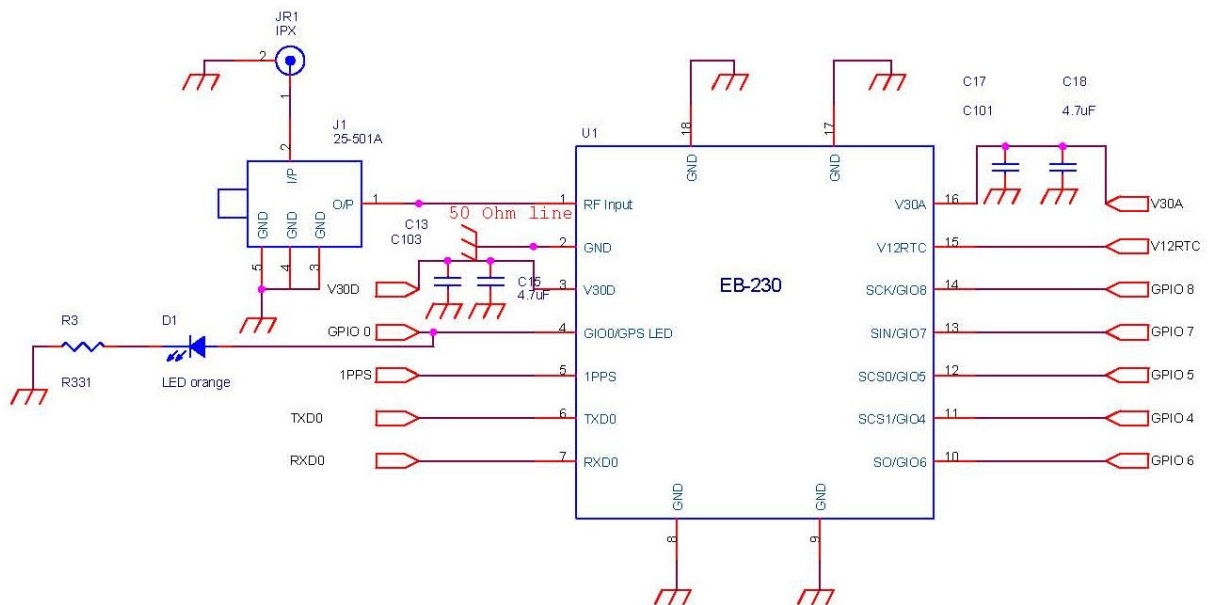
4 Application Information

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 $1575.42 \pm 1.032\text{MHz}$
- Polarization RHCP (right hand circular polarized)
- Output impedance = 50 Ohm
- $15\text{dB} \leq \text{LNA Gain} \leq 20\text{dB}$
- Noise figure $\leq 2.0\text{dB}$
- 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.

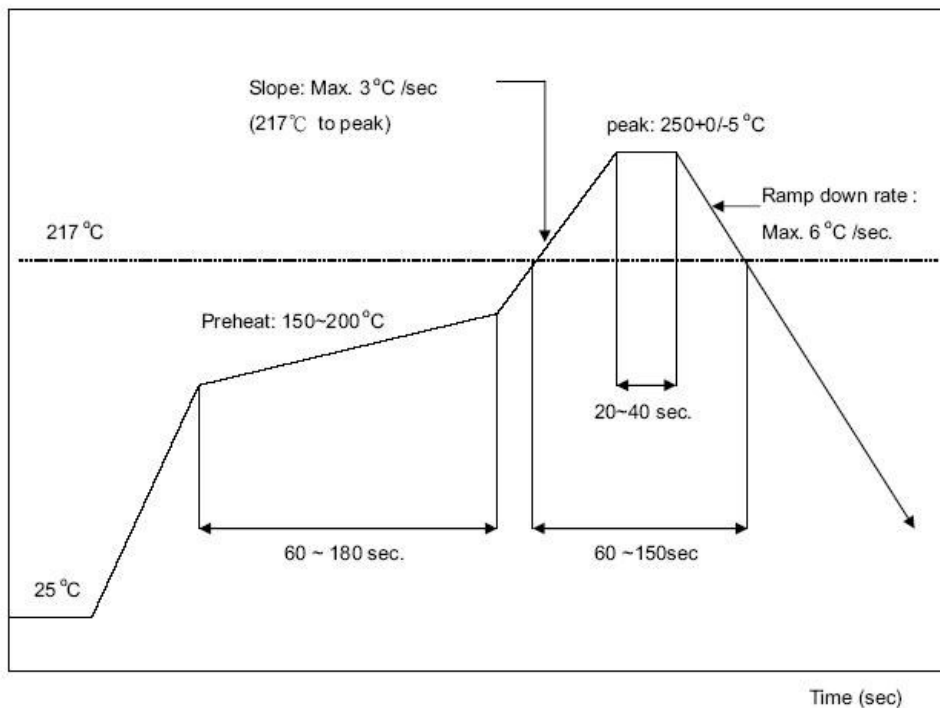
【Note3】 : Separate V30D (pin#3) from V30A (pin#16) for optimal performance.

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.

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