

# **MEB-1315T User Manual**

Version 0.3  
2008/12/24

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### 1 Introduction

RoyalTek MEB-1315T GPS board is the newest generation of RoyalTek GPS module. The module is powered by latest MTK single chip and RoyalTek proprietary navigation technology that provides you with stable and accurate navigation data. The smallest form factor and miniature design is the best choice to be embedded in a device such as Net book device, MID device, personal locator, speed camera detector and vehicle locator.

### Product Features

- ✧ 32 parallel channels
- ✧ SMT type with stamp holes
- ✧ High quality stereo audio output
- ✧ TCXO design
- ✧ 0.1 second reacquisition time
- ✧ NMEA-0183 compliant protocol/ customize protocol
- ✧ Enhanced algorithm for navigation stability
- ✧ Excellent sensitivity for urban canyon and foliage environments.
- ✧ Auto recovery while RTC crashes

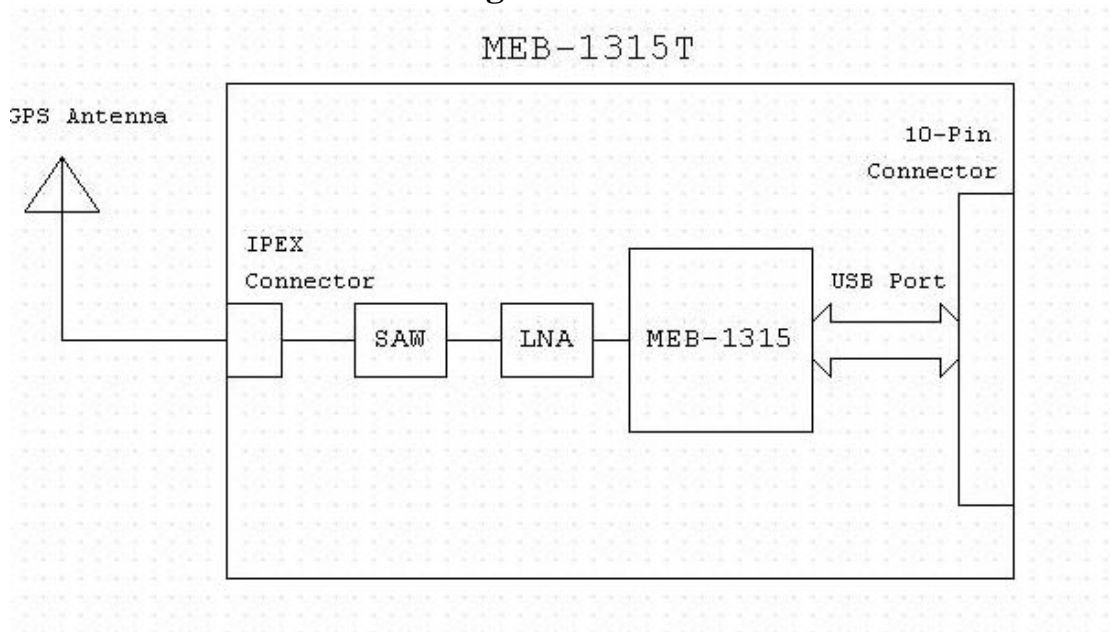
#### 1.1 Product Applications

- ✧ Automotive navigation
- ✧ Personal positioning and navigation
- ✧ Marine navigation
- ✧ MID or Net book application

### 1.2 Product Pictures



### 1.3 MEB-1315T Series Block Diagram

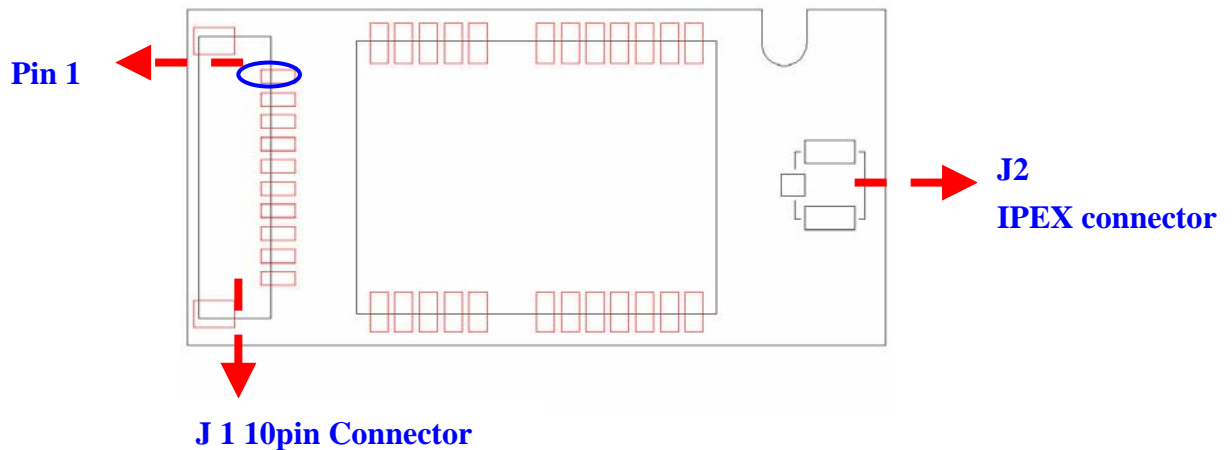


## 1.4 Specification

No	Function	Specification
GPS		
1	GPS Chipset	MTK MT3329 Internal Memory: Flash type on 4Mb
2	Frequency	- L1, 1,575.42 MHz
3	Channel	- 22 tracking/ 66 acquisition-channel
4	C/A Code	- 1,023 MHz
5	Sensitivity	Tracking – 165 dBm/Acquisition -148dBm
6	TTFF(chipset open sky)	- Hot start: less than 1s (avg.) - Warm start: less than 33s (avg.) - Cold start: less than 36s (avg.)
7	Accuracy	- Position: within 10m for 90% - Velocity: 0.1m/s
8	Interface Protocol	- NMEA 0183 standard V3.01 and backward compliance GGA(1),GLL(1),GSA(1),GSV(1),RMC(1),VTG(1), 9600bps
9	TCXO	- 16.369MHz
10	Navigation applications	-SBAS (WAAS, EGNOS, GAGAN, MSAS), DGPS (RTCM), and AGPS.
11	Voltages	3.3V±5%
12	System Currents	Avg. 55mA @3.3V w/o ext. Antenna
Power consumption		
13	Vcc	3.3V±5%
14	Current consumption	Avg. 60mA @3.3V w/o ext. Antenna
Interface		
15	I/O	10pin JST SSR connector (P/N:SM10B-SSR-H-TB (LF)(SN))
16	Interface	TTL interface / USB
Antenna connector		
17	Connector	IPEX
LNA		
18	Gain	Gain: 29 dB (Typ.) Noise Figure ≤ 2.5 dB(Max)
Environment		

18	Operating temperature	- Operating Temperature : -40 ~ +85℃ - Storage Temperature : -40 ~ +85℃
19	Humidity	≤ 95%
20	Size	- Dimension: 31 x 15 x 3.2 (±0.2mm)
21	weight	≤ 2.1g

### 1.5 The MEB-1315T Pin Definition



#### (1) J1 Pin Definition:

Pin#	Signal Name	Descriptions	Characteristic
1	N.C.	Connect to Test point	Non-Used
2	D+	USB Device Port Data +	I/O
3	D-	USB Device Port Data -	I/O
4	VDDBUS	Device power Supply	Power : $3V3 \pm 5\%$
5	GND	GND	GND
6	N.C.	N.C.	Non-Used
7	TXA	Data Transport out	Output VOH (max. +3.1V ; min. +2.4 V) VOL (max. +0.4V ; min. -0.3 V)
8	RXA	Data Receiver in	Input VIH (max. +3.6V ; min. +2.0 V) VIL (max. +0.8V ; min. -0.3 V)
9	N.C.	Connect to Test point	Non-Used
10	GND	GND	GND

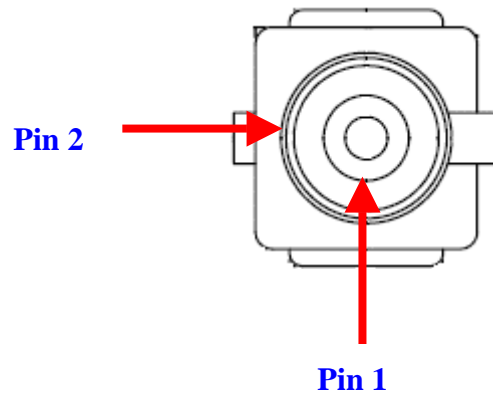
VOH : Output High-level Voltage

VOL : Output Low-level Voltage

VIH : Input High-level Voltage

VIL : Input Low-level Voltage

**(2) J2 IPEX connector**

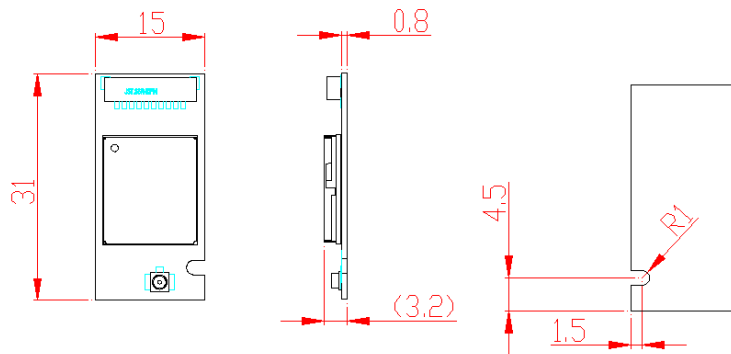


Pin#	Signal Name	Descriptions	Characteristic
1	RF Signal	RF Signal feed in	RF Signal
2	GND	GND	GND



### 1.6 Mechanical Dimension

MEB-1315T OUTLINE



Tolerance :  $\pm 0.2\text{mm}$

## 2 Software Interface

### NMEA Protocol

NMEA Output Messages: the Engine board outputs the following messages as shown in Table 1:

**Table 1 NMEA-0183 Output Messages**

NMEA Record	Description
GGA	Global positioning system fixed data
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
GLL	Geographic position – latitude/longitude
VTG	Course over ground and ground speed

### GGA-Global Positioning System Fixed Data

Table 2 contains the values of the following example:

\$GPGGA, 161229.487, 3723.2475, N, 12158.3416, W, 1, 07, 1.0, 9.0, M, , , ,0000\*18

**Table 2 GGA Data Format**

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		Dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	meters	
Units	M	meters	
Geoid Separation		meters	
Units	M	meters	
Age of Diff. Corr.		second	Null fields when DGPS is

			not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

**Table 3 Position Fix Indicators**

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not Supported
6	Dead Reckoning Mode, fix valid

### GSA-GNSS DOP and Active Satellites

Table 4 contains the values of the following example:

\$GPGSA, A, 3, 07, 02, 26, 27, 09, 04, 15, , , , , , 1.8,1.0,1.5\*33

**Table 4 GSA Data Format**

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 5
Mode 2	3		See Table 6
ID of Satellite Used	07		Sv on Channel 1
ID of Satellite Used	02		Sv on Channel 2
....			....
ID of Satellite Used			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR> <LF> >			End of message termination

**Table 5 Mode 1**

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

**Table 6 Mode 2**

Value	Description
1	Fix not available
2	2D
3	3D

### GSV-GNSS Satellites in View

Table 7 contains the values of the following example:

\$GPGSV, 2, 1, 07, 07, 79, 048, 42, 02, 51, 062, 43, 26, 36, 256, 42, 27, 27, 138, 42\*71

\$GPGSV, 2, 2, 07, 09, 23, 313, 42, 04, 19, 159, 41, 15, 12, 041, 42\*41

**Table 7 GSV Data Format**

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Total Number of Messages <sup>1</sup>	2		Range 1 to 3
Messages Number <sup>1</sup>	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Range 00 to 90)
Azimuth	048	degrees	Channel 1(True, Range 000 to 359)
SNR (C/No)	42	dBHz	Channel 1(Range 0 to 99, null when not tracking)
Satellite ID	27		Channel 4(Range 01 to 32)
Elevation	27	degrees	Channel 4(Range 00 to 90)

Azimuth	138	degrees	Channel 4(True, Range 000 to 359)
SNR (C/No)	42	dB-Hz	Channel 4(Range 00 to 99, null when not tracking)
Checksum	*71		
<CR> <LF>			End of message termination

<sup>1</sup>Depending on the number of satellites tracked multiple messages of GSV data may be required.

### RMC-Recommended Minimum Specific GNSS Data

Table 8 contains the values of the following example:

\$GPRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13, 309.62, 120598, ,\*10

**Table 8 RMC Data Format**

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	True
Course Over Ground	309.62	degrees	
Date	120598		ddmmyy
Magnetic Variation		degrees	
Variation sense			E=east or W=west (Not shown)
Mode	A		A=Autonomous, D=DGPS, E=DR
Checksum	*10		
<CR><LF>			End of message termination

### VTG-Course Over Ground and Ground Speed

Table 9 contains the values of the following example:

\$GPVTG,79.65,T,,M,2.69,N,5.0,K,A\*38

**Table 9 VTG Data Format**

Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course over ground	79.65	degrees	Measured heading
Reference	T		True
Course over ground		degrees	Measured heading
Reference	M		Magnetic
Speed over ground	2.69	Knots	Measured speed
Units	N		Knots
Speed over ground	5.0	Km/hr	Measured speed
Units	K		Kilometer per hour
Mode	A		A-autonomous, D=DGPS, E=DR
Checksum	*38		
<CR><LF>			End of message termination

### GLL-Geographic Position – Latitude/Longitude

Table 10 contains the values of the following example:

\$GPGLL,2503.6319,N,12136.0099,E,053740.000,A,A\*52

**Table 10 GLL Data Format**

Name	Example	Units	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	2503.6319		ddmm.mmmmm
N/S indicator	N		N=north or S=south
Longitude	12136.0099		Dddmm.mmmmm

E/W indicator	E		E=east or W=west
UTC Time	053740.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Mode	A		A=autonomous, D=DGPS, E=DR
Checksum	*52		
<CR><LF>			End of message termination

### 3. Contact Royaltek

Contact: sales@royaltek.com

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### 4. Revision History

Title	MEB-1315T GPS Receiver Module		
Doc Type	User Manual		
Revision Number	Date	Author	Change notice
0.1	2008/12/16	May Chen	Initial Release
0.2	2008/12/24	May Chen	Modified the pin definition and weight

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