

# RB1513

Ultra High Sensitivity SiRF StarIII 7989  
GPS Module with Miniature Dimension

## Documentation History

<b>Revision</b>	<b>Description</b>	<b>Date</b>	<b>Remark</b>
V0.1	RB1513 release	Mar 2009	
V1.0	Modified NMEA output message	Jul 2009	

# Content

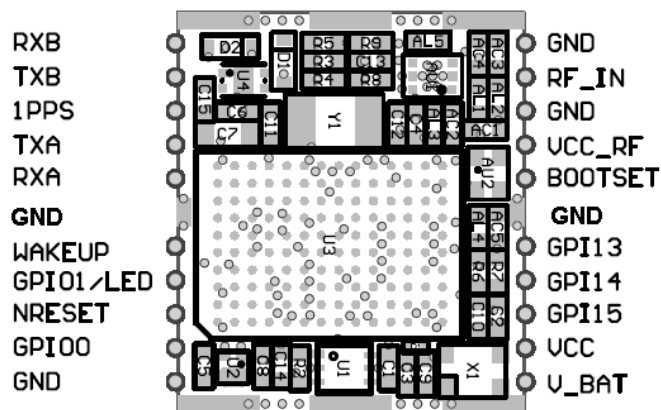
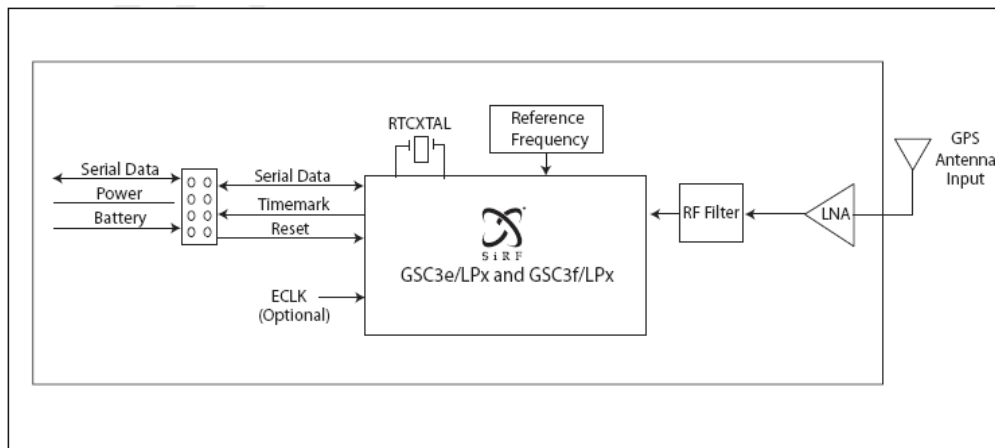
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## Features

- ✓ 20 channel SiRF StarIII7989 positioning engine
- ✓ Ultra high sensitivity to -158 dBm
- ✓ SBAS (WAAS, MSAS, and EGNOS) support
- ✓ Supports Power saving modes
- ✓ 15  $\mu$ A backup current
- ✓ Support 2 UART ports
- ✓ Ultra low power consumption 60mW
- ✓ Ultra miniature 15 x 13 mm dimension with SMT pad package
- ✓ Operating temperature range: -30 to 85°C
- ✓ RoHS compliant (lead-free)



## Block diagram



## Technical Specifications

### 1. Electrical

#### Characteristics

1.1 Chipset	SiRF StarII GSC3eLP	7989
1.2 General	Frequency	L1, 1575.42MHz
	Channels, C/A code	20, 1.023 MHz chip rate, 8192 time/frequency search windows
1.3 Accuracy	Position	5 meters CEP
	Time	50 nanosecond rms (1 PPS)
1.4 DGPS Accuracy	Position	2.0 meters CEP
1.5 Acquisition Rate	Reacquisition	< 1 sec, typical
	Cold start	35 sec, typical
	Warm start	35 sec, typical
	Hot start	1 sec, typical
1.6 Sensitivity	Tracking	-159dBm
	Acquisition/Reacquisition	-155dBm
	Cold start	-144dBm
1.7 Dynamic Condition	Altitude	18,000 meters (60,000 Feet) max.
	Velocity	515 meters /sec (1000 Knots) max.
1.8 Power	Main Power	3.3 VDC typical
	Supply current	30 mA
	Backup power	1.4 ~ 5V
	Backup current	15µA typical
1.9 Serial Port	Electrical interface	2 X UART,
	Protocols	NMEA0183 v3.0

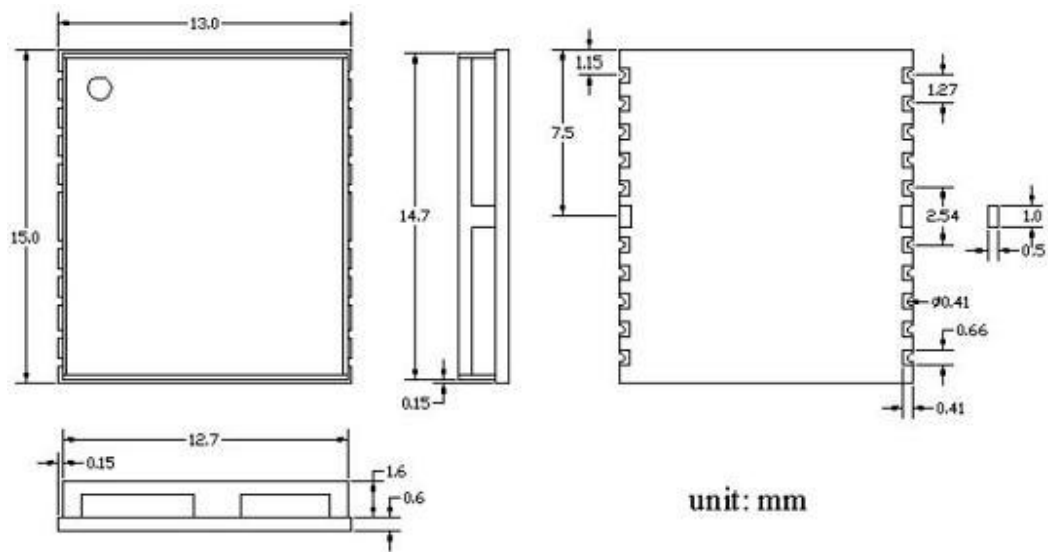
### 2. Environmental Characteristics

2.1 Temperature	Operating range	- 30 °C to + 85 °C
2.2 Mechanical dimensions	L x W x H	15.0 x 13.0 x 2.2 mm
2.3 Interface	I/O connector	22 pin SMD micro package

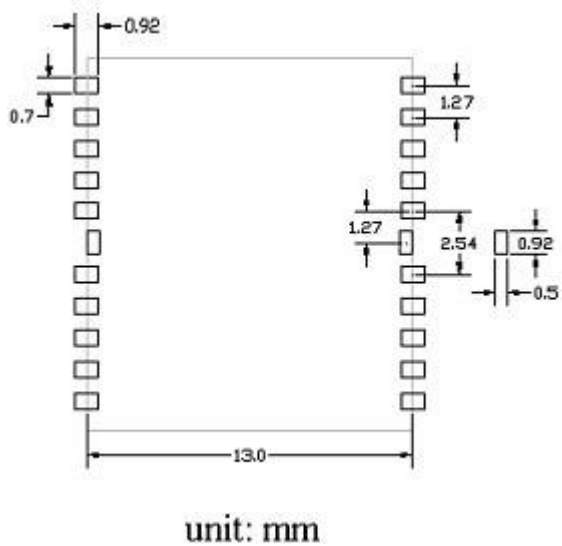
### 3 Antenna

Parameter	Specification
3.1 Antenna type	Passive and/or active antenna
3.2 Active Antenna	15 ~ 25 dB Gain recommended 1.5 dB noise figure max.
3.3 Antenna Supply	Using VCC_RF (pin #17) output pin to provide antenna bias voltage to RF_IN (pin #19)

## Dimension



## Recommended Solder Pad Layout



Note: The tolerance of foot pad is +/-10%.

## Pin Definition

Pin#	Name	Type	Description
1	RXB	Input	UART RXB input
2	TXB	Output	UART TXB output
3	1PPS	Output	Time plus
4	TXA	Output	UART TXA output
5	RXA	Input	UART RXA output
6	GND	PWR	Ground
7	WAKEUP	Input	Wakeup
8	GPIO1/LED	Output	General purpose I/O
9	NRESET	Input	Baseband RESET input. '0' = reset and '1' = normal operation
10	GPIO0	I/O	General purpose I/O
11	GND	PWR	Ground
12	V_BAT	PWR	Linear regulator battery input voltage: 1.4 - 5V.
13	VCC	PWR	DC power input 3.3 – 5V
14	GPIO15	I/O	General purpose I/O
15	GPIO14	I/O	General purpose I/O
16	GPIO13	I/O	General purpose I/O
17	GND	PWR	Ground
18	BOOTSET	Input	High Boot from Flash, Low Boot from serial port
19	VCC_RF	PWR	Output power. Range 3 – 5 V
20	GND	PWR	Ground
21	RF_IN	Input	GPS RF signal input
22	GND	PWR	Ground

## Output NMEA Messages

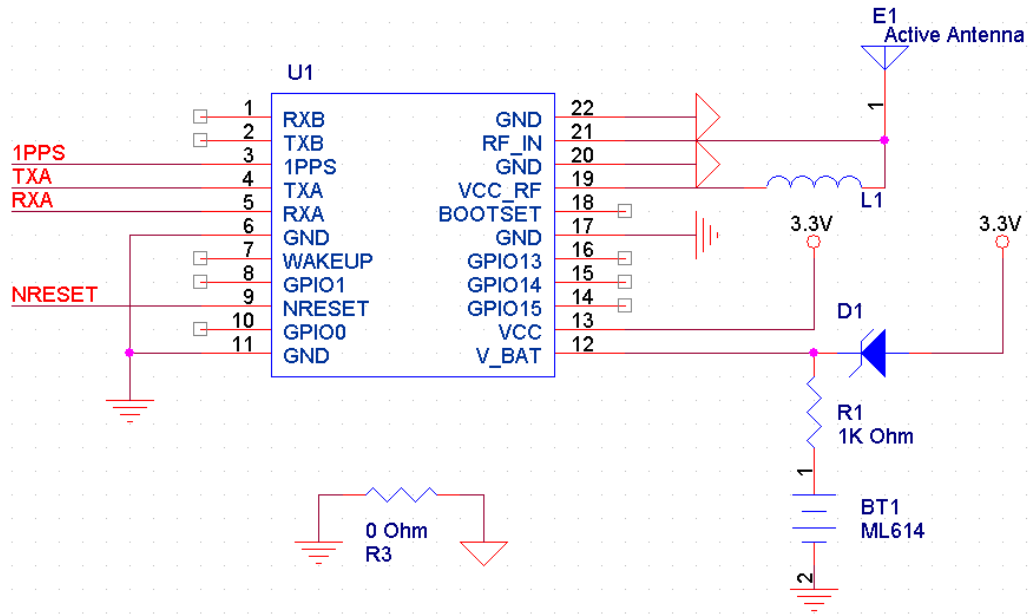
### NMEA-0183 V3.0 Output Messages

<b>NMEA Sentence</b>	<b>Description</b>
GGA (default)	Global Positioning System Fixed Data
GLL	Geographic Position - Latitude/Longitude
GSA (default)	GNSS DOP and Active Satellites
GSV (default)	GNSS Satellites in View
RMC (default)	Recommended Minimum Specific GNSS data
VTG	Course Over Ground and Ground Speed
ZDA	Time and Date

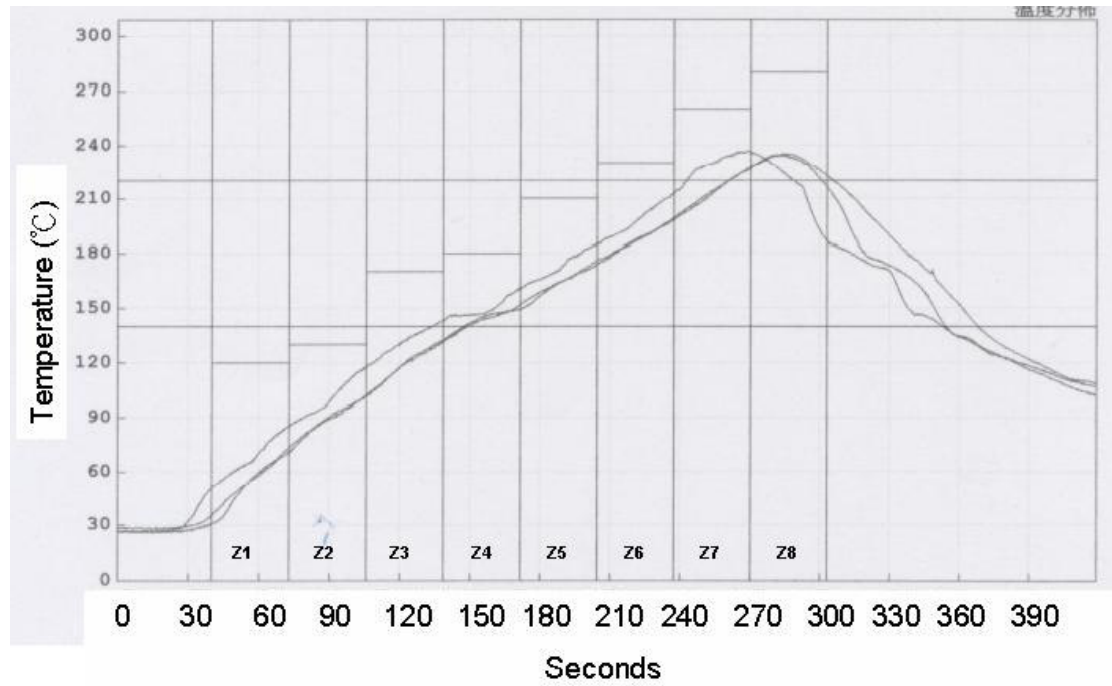
The detail information please refers to RBXXXX series GPS module NMEA protocol reference manual.



# Application Circuit



## Reflow Profile



Setpoints (°C)

Zone	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8
Top	120	130	170	180	210	230	260	280
Bottom	120	130	170	180	210	230	260	280

Conveyer Speed (cm/min): 73