

# RB1513S4

Ultra High Sensitivity SiRF StarIV GSD4e  
GPS Module with Miniature Dimension



## Documentation History

<b>Revision</b>	<b>Description</b>	<b>Date</b>	<b>Remark</b>
V0.B	1513 release	Mar 2011	

# Content

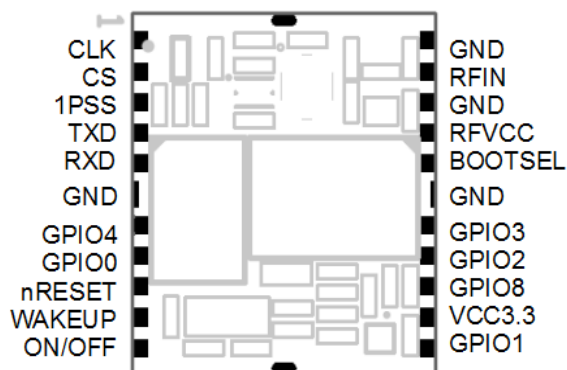
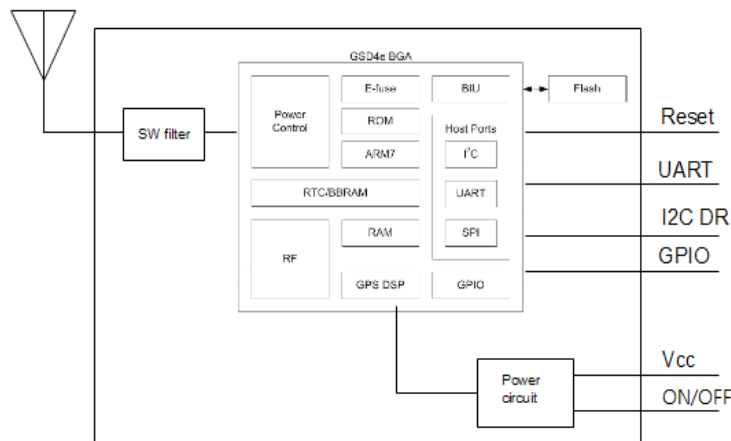
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## Features

- ✓ 48 channel SiRF StarIV GSD4e positioning engine.
- ✓ Ultra high sensitivity to -163 dBm.
- ✓ SBAS (WAAS, MSAS, and EGNOS) support.
- ✓ Support 5Hz Update rate
- ✓ Supports UART, I2C and SPI interface.
- ✓ Backup battery for quick position fix.
- ✓ I2C interface to connect with MEMS sensor.
- ✓ Ultra low power consumption. <10mW required for TricklePower™ mode
- ✓ 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 Chip set	SiRF StarIV GSD4e9411	
1.2 General	Frequency	L1, 1575.42MHz
	Channels, C/A code	48, 1.023 MHz chip rate, 8192 time/frequency search windows
1.3 Accuracy	Position	3 meters CEP
	Time	200 msec (1 PPS)
1.4 DGPS Accuracy	Position	2.5 meters CEP
1.5 Acquisition Rate	Reacquisition	< 1 sec, typical
	Cold start	32 sec, typical
	Cold start ( CGEE* )	Under 15 sec
	Hot start	1 sec, typical
1.6 Sensitivity	Tracking	-163dBm ( with external LNA )
	Navigation	-160dBm ( With external LNA )
	Autonomous Acquisition	-148dBm ( With external LNA )
1.7 Dynamic Condition	Altitude	18,288 meters (60,000 Feet) max.
	Velocity	515 meters /sec (1000 Knots) max.
1.8 Power	Main Power	3.3 VDC typical
	Supply current	46 mA ( Maximum )
	Peak current	130 mA
1.9 Serial Port	Electrical interface	UART, I2C or SPI,
	Protocols	NMEA0183 v3.0

### 2. Environmental Characteristics

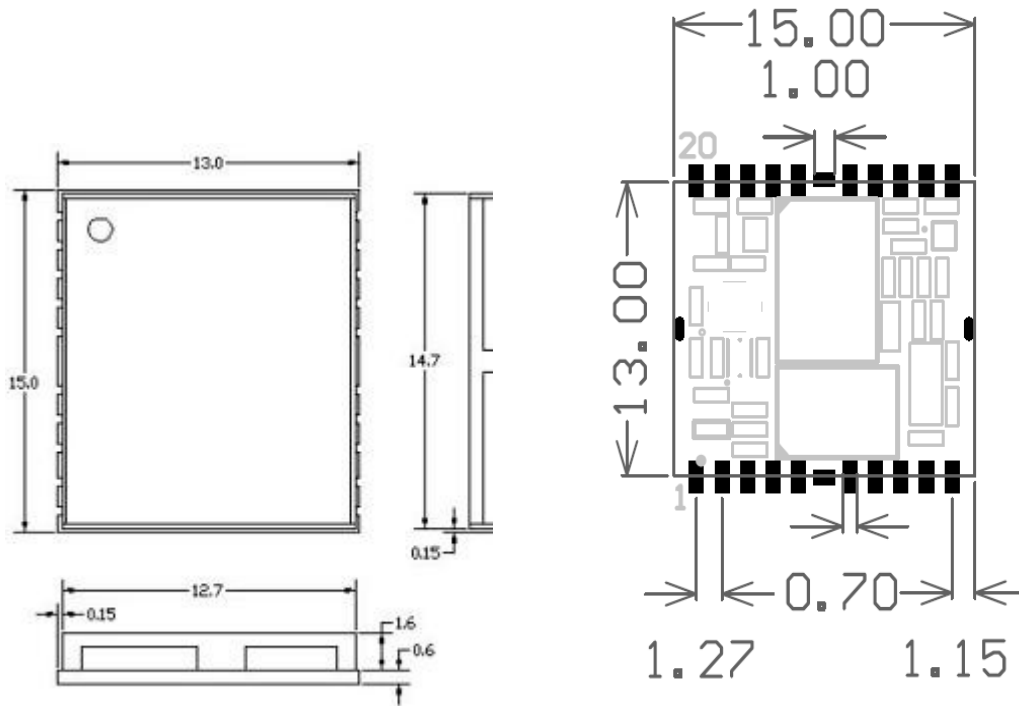
2.1 Temperature	Operating range	- 40 °C to + 85 °C
2.2 Mechanical dimensions	L x W x H	15.0 x 13.0 x 2.2 mm
2.3 Interface	I/O connector	22 pin SMD micro package

\*CGEE: Client Generated Extended Ephemeris

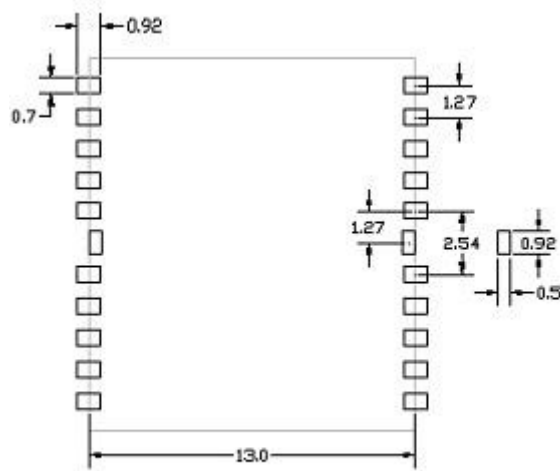
### 3 Antenna

Parameter	Specification
3.1 Antenna type	Passive or active antenna
3.2 Active Antenna	15 ~ 27 dB Gain recommended, 1.5 dB noise figure max.
3.3 Antenna Supply	Using VCC_RF (pin #17) input pin to provide antenna bias voltage to RF_IN (pin #19)

## Dimension



## Recommended Solder Pad Layout



unit: mm

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

## Pin Definition

Pin#	Name	Type	Description
1	CS/GPIO7	Input	UART, I2C, SPI control PIN
2	CLK/GPIO6	Input	UART, I2C, SPI control PIN
3	1PPS	Output	Time plus 200msec
4	TXA	Output	UART TXA output
5	RXA	Input	UART RXA output
6	GND	PWR	Ground
7	GPIO4	Input	General purpose I/O
8	GPIO0	Output	General purpose I/O, connect 2.2K Ohm to VCC
9	nRESET	Input	Base band RESET input. '0' = reset and '1' = normal operation
10	WAKEUP	Output	"H" GPS in operational model, "L" GPS in low power model. GPS Wake up output for control of external LNA or active antenna, or can also enable an external regulator, e.g. battery to 1.8V for the main input to the switch-mode regulator when full current mode is entered.
11	ON/OFF	Input	Ground
12	GPIO1	PWR	Linear regulator battery input voltage: 2.4 - 5V.
13	VCC3.3	PWR	DC power input 3.3V
14	GPIO8	I/O	General purpose I/O. Please connect 100K Ohm to GND
15	GPIO2	I/O	General purpose I/O
16	GPIO3	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	Input power for antenna
20	GND	PWR	Ground
21	RF_IN	Input	GPS RF signal input
22	GND	PWR	Ground

## Output NMEA Messages

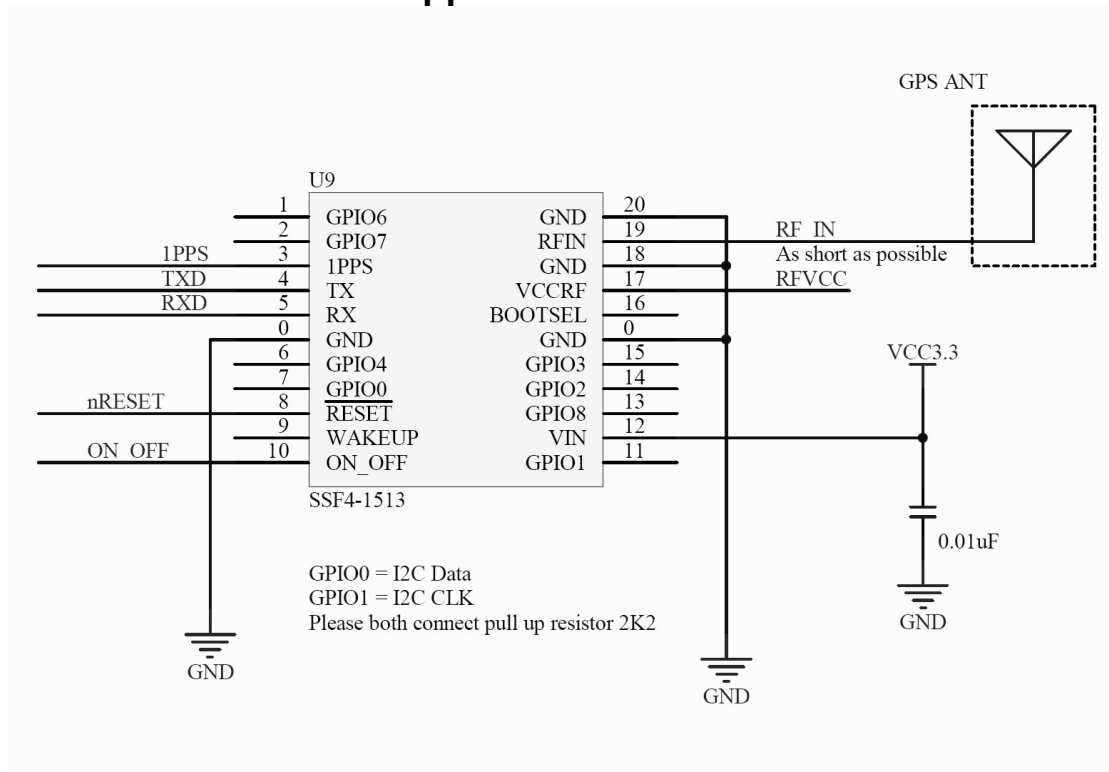
### NMEA-0183 V3.0 Output Messages

<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 RBXXXXXX series GPS module NMEA protocol reference manual.



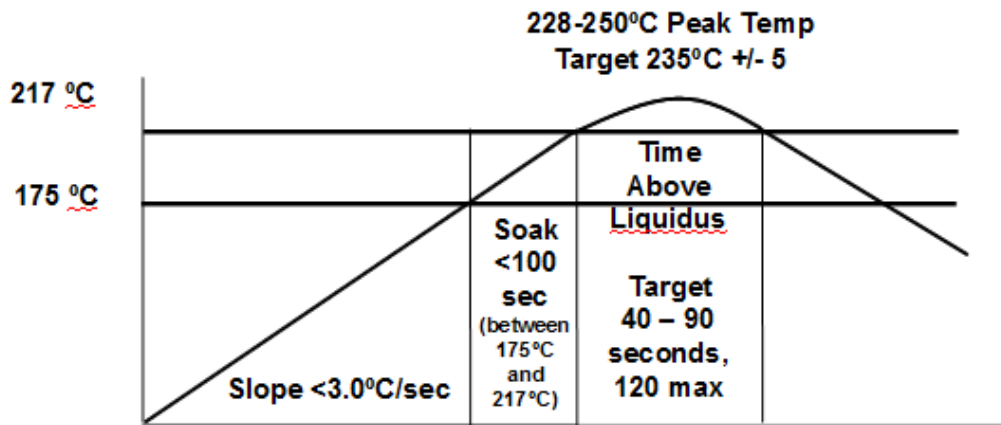
# Application Circuit



## Reflow information

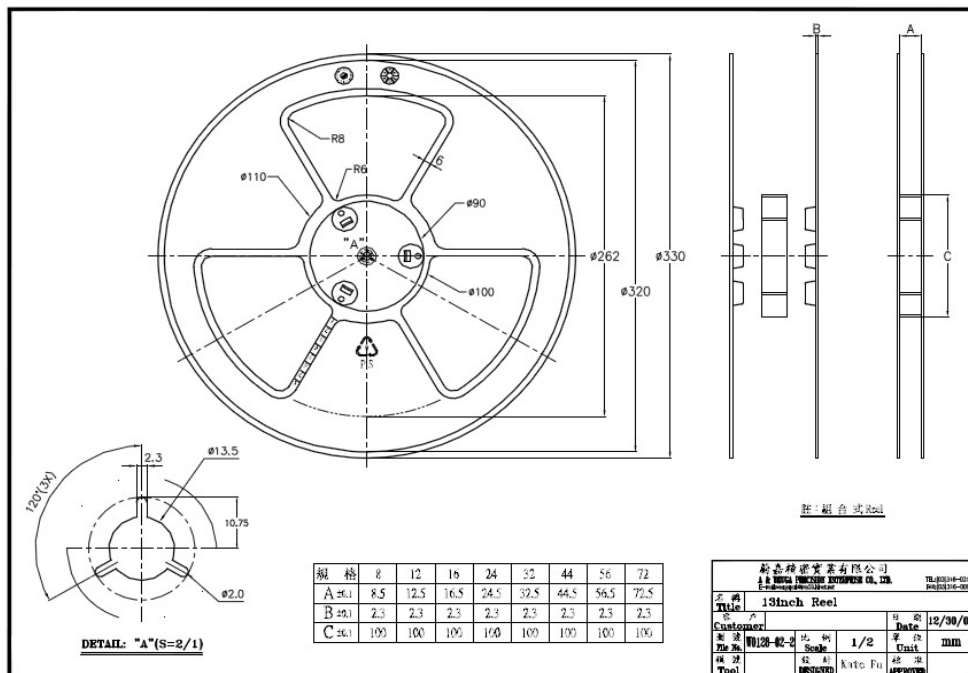
Reflow Profile Graphic, assuming:

1. Kester R905 Sn/4Ag/0.5Cu solder paste.
2. All solder ball alloys melt at 217°C.
3. Component joints do not exceed temperatures as per J-STD-02

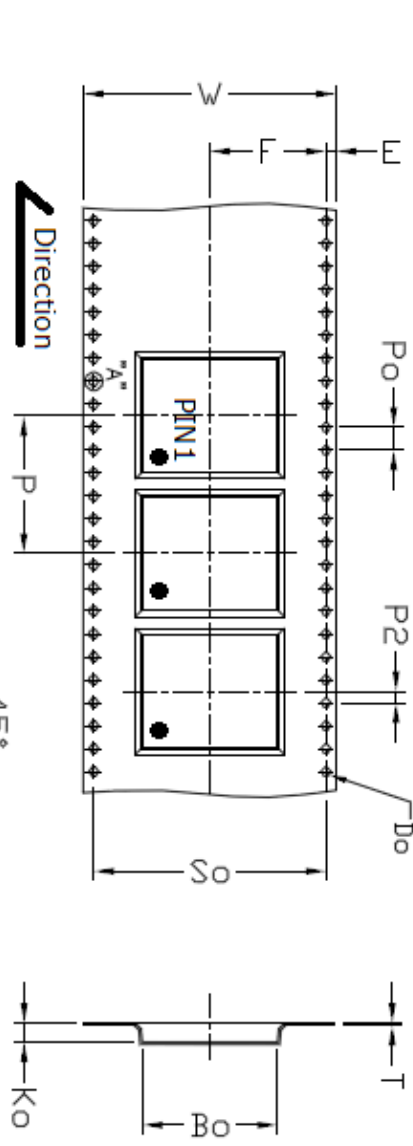


## Packing handling

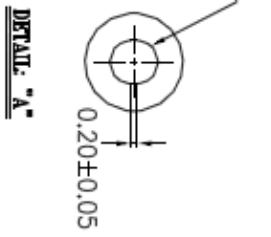
1000pcs per reel



REV	NOTES	APPRO	DATE
Δ			
Δ			
Δ			



ITEM	DIM	TOLERANCE
W	44.00	+0.30 -0.30
E	1.75	+0.10 -0.10
F	20.20	+0.15 -0.15
S0	40.40	+0.10 -0.10
P	24.00	+0.10 -0.10
P0	4.00	+0.10 -0.10
P2	2.00	+0.15 -0.15
D0	Ø1.50	+0.10 -0.00
T	0.40	+0.05 -0.05
A0	19.60	+0.10 -0.10
B0	23.55	+0.10 -0.10
K0	3.3	+0.10 -0.10
K1	3.50	+0.10 -0.10



DETAIL: "A"

1. 10 sprocket hole pitch cumulative tolerance 10.20mm.
2. Carrier camber not to exceed 1mm in 250mm.
3. A and B measured on a plane 0.3mm above the bottom of the pocket.
4. K measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
5. All dimensions meet EIA-481-B requirements.
6. Packing length per 22" reel : 48.6 Meters.
7. Component load per 13" reel : 650 pcs. (CC-131 : 4'core)

料帶 材質 黑色抗靜電 PS		客戶確認 Confirmed by Customer		日期: Date	
黑色抗靜電 PS		<input type="checkbox"/> 接受 Accept	<input type="checkbox"/> 拒絕 Reject	控制的原因: Causes	
名稱 Title 23.13X19.20X3.0		客戶 Customer 興聯		日期 Date 99.11.25	
料號 File No. T1125-10-01		比例 Scale 1/1		單位 Unit MM	
核准 Tooling		設計 DESIGNER EDEN		核准 APPROVED	

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