SAH1513

Ultra High Sensitivity Atheros GPS Module with Miniature Dimension

Smart Design Technology Co., Ltd.
20F-8, No.107, Sec 1,Jhongshan Rd. Sinjhuang City,
Taipei County 242, Taiwan
Phone: +886-2-8522-7628
Fax: +886-2-8522-7784
Contact: sales@smartdesign.com.tw

Documentation History

Revision	Description	Date	Remark
V0.1	SAH1513 release	Mar 2009	
V1.0	Reference circuit	Jul 2009	
V1.1	VCC range	Nov 2009	
V1.2	PIN definition statment	Feb. 2010	

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Content

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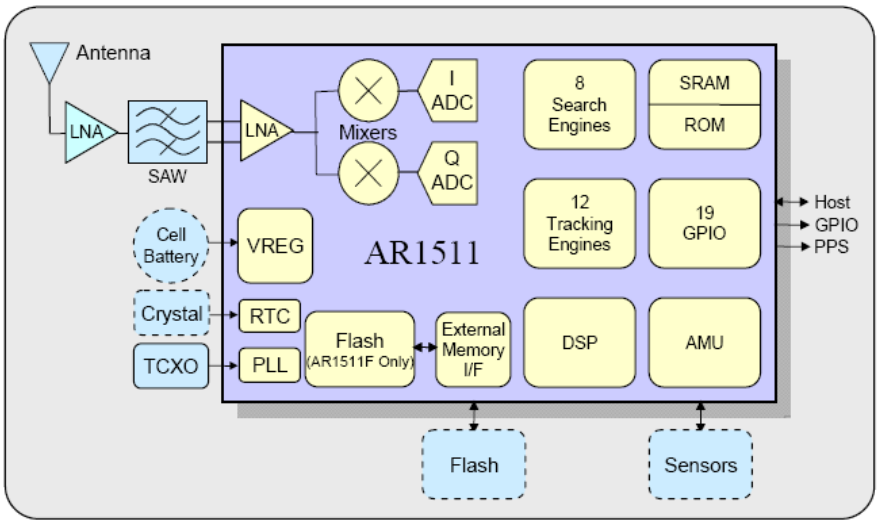
Features

- ✓ 44 channel Atheros AR1511 positioning engine
- ✓ Ultra high sensitivity to -160 dBm
- ✓ Supports AGPS, WAAS, EGNOS and MSAS
- ✓ Support 2 USART ports
- ✓ Support 5 Hz position update rate capability @ 3D fix
- ✓ Support power saving modes.
- ✓ Support external interrupt pin (wake up) in power saving mode
- ✓ Antenna short/open circuit detection and protection
- ✓ Low power consumption 43mA
- ✓ 14 μA backup current @ 3V
- ✓ Low position/velocity drift in static mode
- ✓ Small form factor 15 x 13 mm with SMT pads (micro package)
- ✓ RoHS compliant (lead-free)

Block diagram



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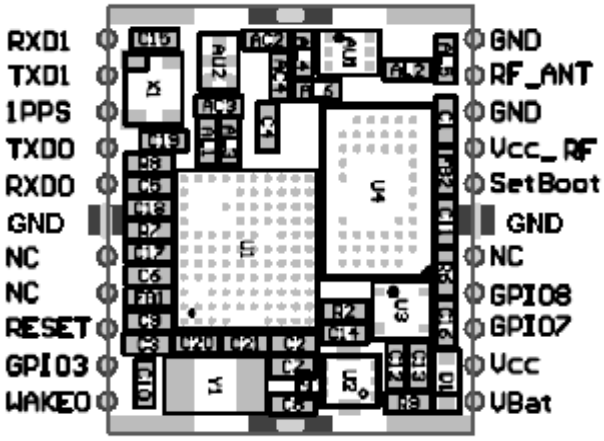

Technical Specifications

1. Electrical Characteristics

1.1 Chipset	AR1511	Atheros GPS chip
1.2 General	Frequency	L1, 1575.42MHz
	Channels, C/A code	44, 1.023 MHz chip rate, 8192 time/frequency search windows
1.3 Accuracy	Position	2.5 meters CEP
	Time	1 usecond rms (1 PPS)
1.5 Acquisition Rate		
	Cold start	35 sec, typical
	Warm start	33 sec, typical
	Hot start	1.3 sec, typical
1.6 Sensitivity	Tracking	-160dBm
	Navigation	-157dBm
	Cold start	-144dBm
1.7 Dynamic Condition	Altitude	18,000 meters (60,000 Feet) max.
	Velocity	400 Km /hr (1000 Knots) max.
1.8 Power	Main Power	3.0 VDC typical
	Maximum current	43 mA
	Backup power	1.5 ~ 3.6V
	Backup current	14μA @ 3V
1.9 Serial Port	Electrical interface	USART,
	Protocols	NMEA, 3GPP, 5 Hz position update rate capability @3D fix

2. Environmental Characteristics

2.1Temperature	Operating range	- 40 ℃ to + 85 ℃
2.2 Mechanical dimensions	L x W x H	15 x 13 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 (50dB max.) 1.5 dB noise figure max.
3.3 Antenna Supply	External voltage source V_RF (pin#19)

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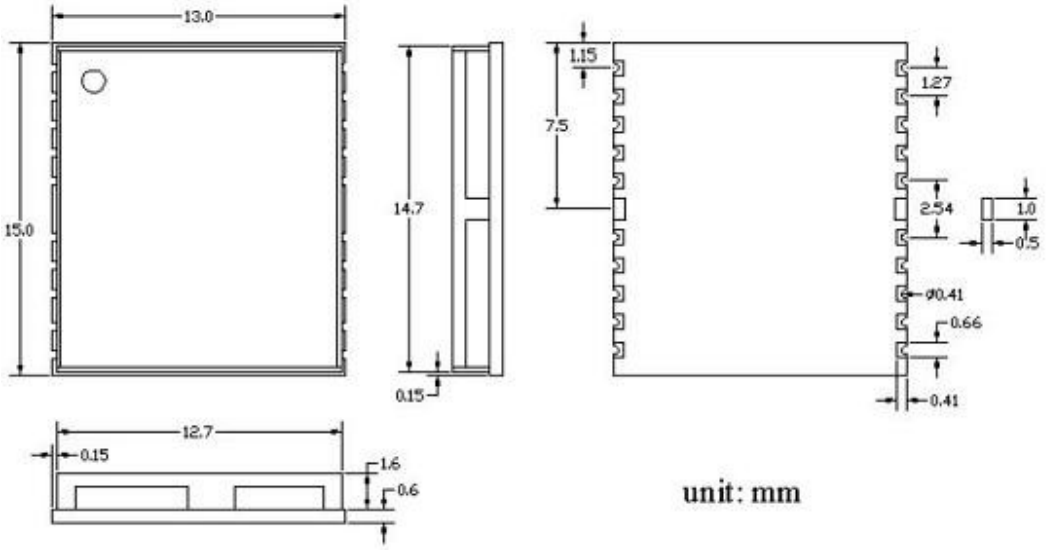
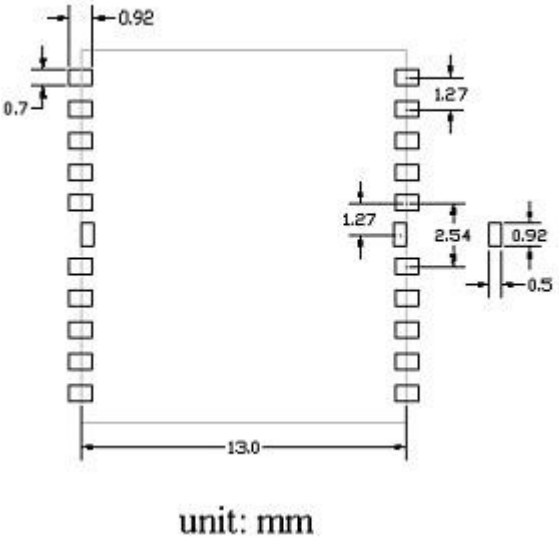
Dimension



Recommended Solder Pad Layout



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

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Pin Definition

Pin#	Name	Type	Description
1	RX1	Input	UART RX1 input
2	TX1	Output	UART TX1 output
3	1PPS	Output	Time plus
4	TX0	Output	UART TX0 output
5	RX0	Input	UART RX0 input
6	GND	PWR	Ground
7	NC		
8	NC		
9	RESET	Input	Baseband RESET input. '0' = reset and '1' = normal operation
10	GPIO3	I/O	General purpose I/O
11	WAKE0	Input	Wakeup
12	VBat	PWR	Linear regulator battery input voltage: 1.5 – 3.0V.
13	VCC	PWR	DC power input 2.85V ~ 3.0V
14	GPIO7	I/O	General purpose I/O
15	GPIO8	I/O	General purpose I/O
16	NC		
17	GND	PWR	Ground
18	SetBoot	Input	High Boot from Flash, Low Boot from serial port
19	VCC_RF	PWR	Output power for active antenna
20	GND	PWR	Ground
21	RF_IN	Input	GPS RF signal input
22	GND	PWR	Ground

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Output NMEA Messages

NMEA-0183 V3.0 Output Messages

NMEA Sentence	Description
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 SAHXXXX series GPS module NMEA protocol reference manual.

Output Baud Rate

Baud	Update	Static Holding	DGPS	Description
4800	1Hz	Enable/ Disable	Enable/ Disable	GSV(5); GSA(1): GGA(1); RMC(1)
9600	1Hz	Enable/ Disable	Enable/ Disable	GSV(1); GSA(1): GGA(1); RMC(1)
19200	1Hz / 5Hz	Enable/ Disable	Enable/ Disable	GSV(1); GSA(1): GGA(1); RMC(1)
38400	1Hz / 5Hz	Enable/ Disable	Enable/ Disable	GSV(1); GSA(1): GGA(1); RMC(1)

Default Setting:

Baud	Update	Static Holding	DGPS	Description
9600	1Hz	Disable	Disable	GSV(1); GSA(1): GGA(1); RMC(1)

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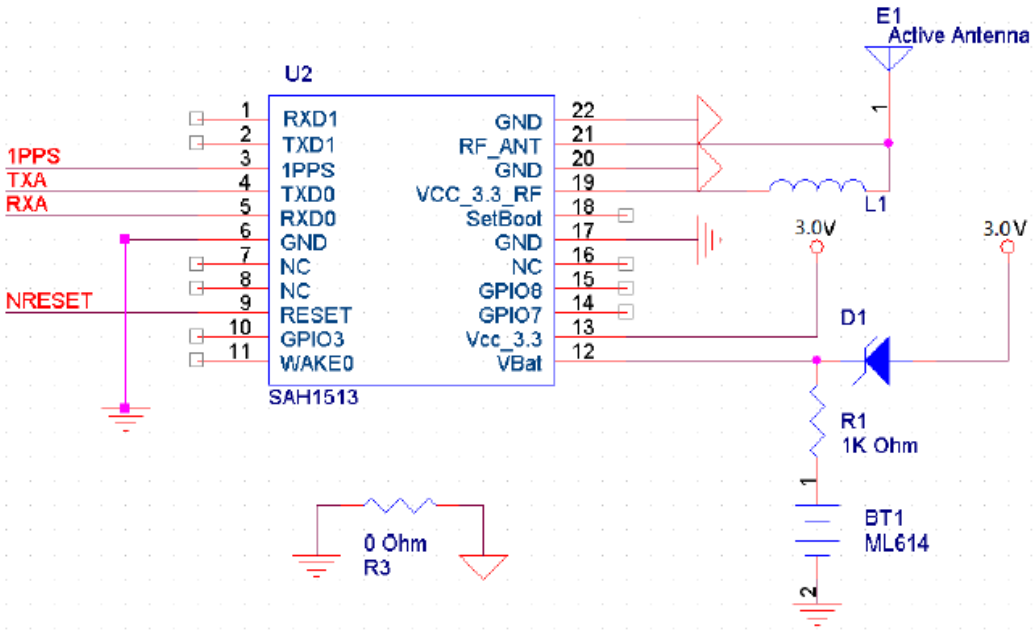
Application Circuit



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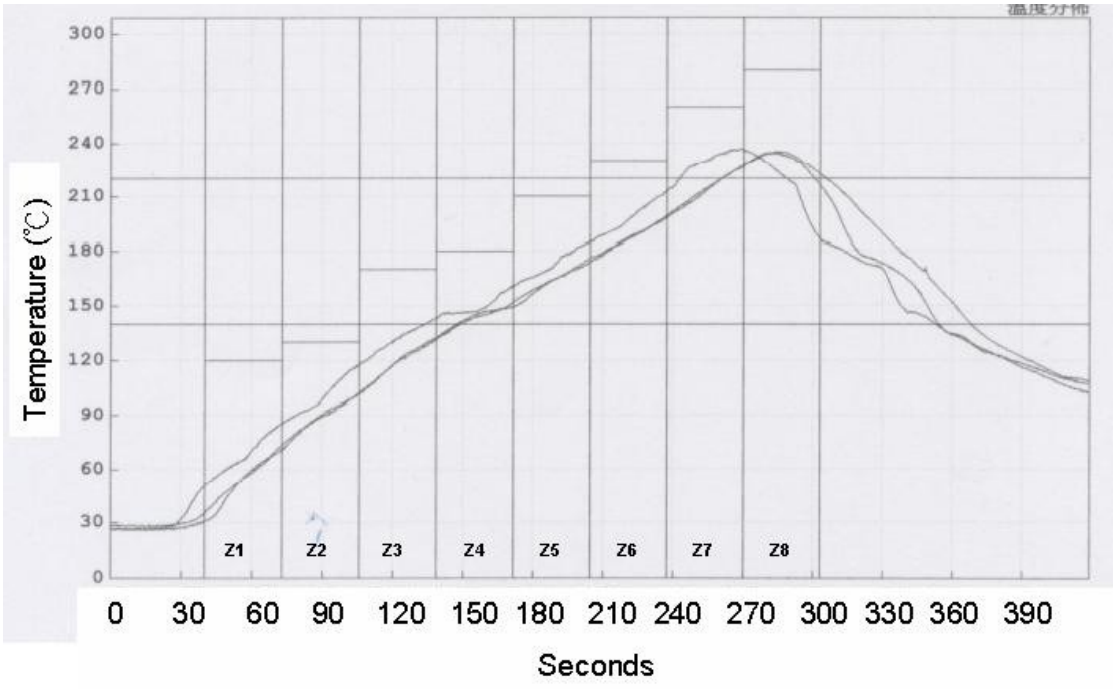
Reflow Profile



Setpoints (℃)

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

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