SAH2217

Enhanced ATHEROS GPS Module with ultra high sensitivity and antenna open/short detection/protection

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Documentation History

Revision	Description	Date	Remark
V0.1	SAH2217 release	Aug 2008	
V1.0	Modify application circuit	Oct 2008	
V1.1	GPIO7: input High when use active antenna	Dec 2008	
V1.2	Modify Application schematics / PIN description/ NMEA / Antenna detection function message	Aug 2009	

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Content

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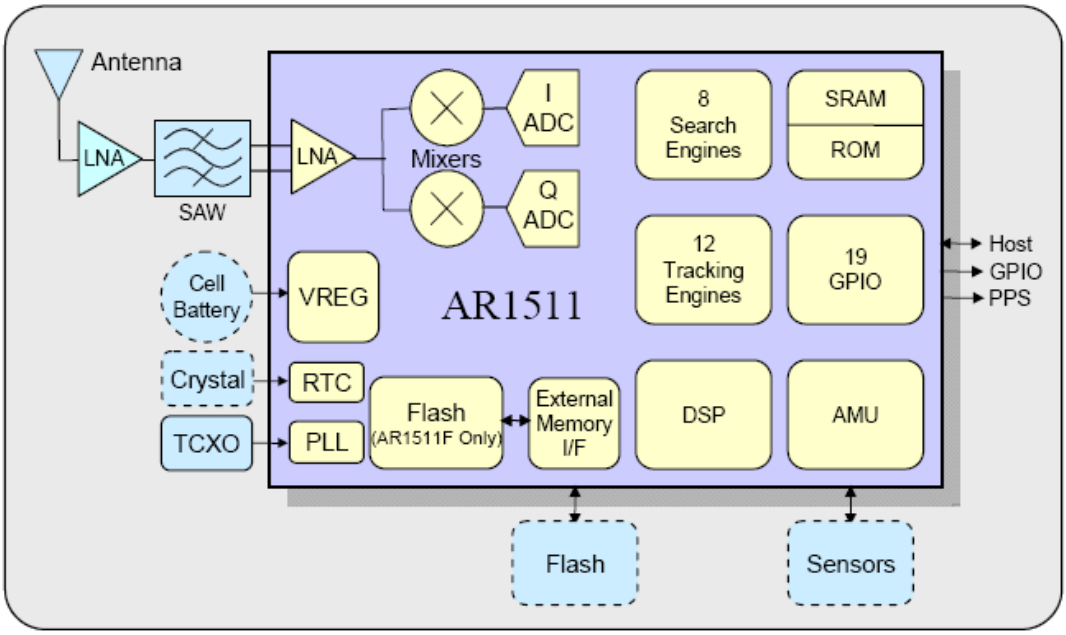
Features

- ✓ 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 22.4 x 17.0 mm with SMT pads (micro package)
- ✓ RoHS compliant (lead-free)

Block diagram



SAH2217 GPS module

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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	3.3 VDC typical
	Supply 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

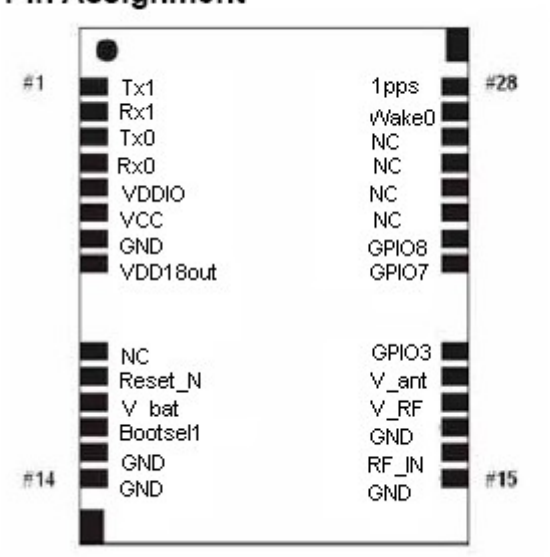
2. Environmental Characteristics

2.1Temperature	Operating range	- 40 ℃ to + 85 ℃
2.2 Mechanical dimensions	L x W x H	22.4 x 17.0 x 3.0 mm
2.3 Interface	I/O connector	28 pin SMD micro package

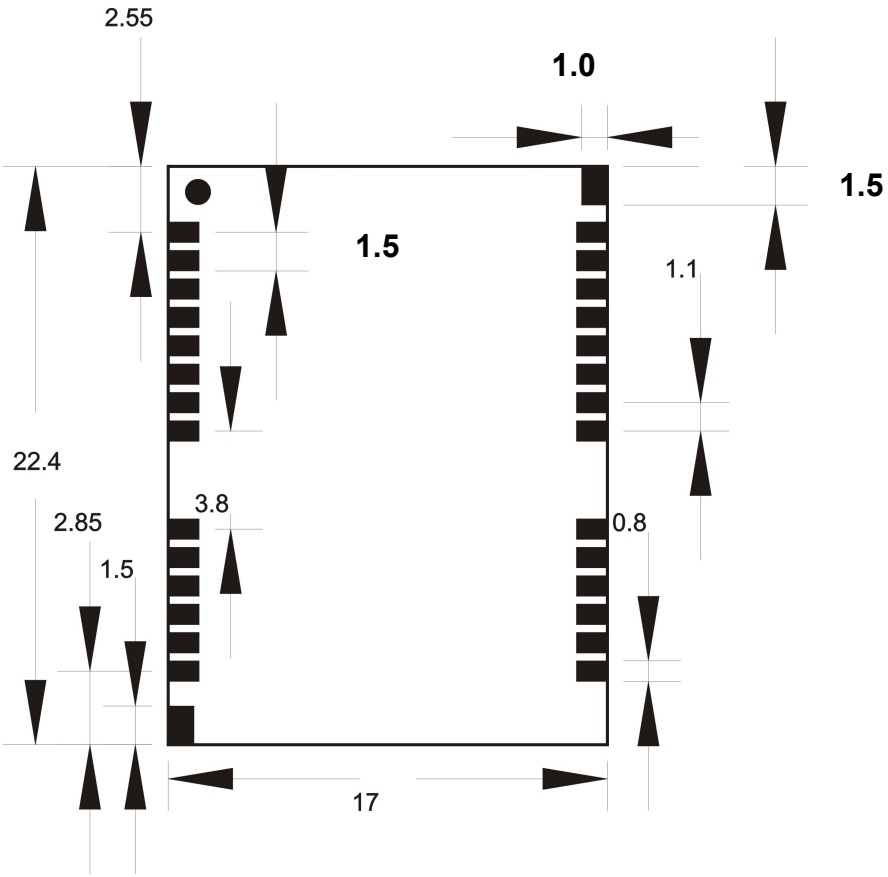
3 Antenna

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	Using VCC_RF (pin #18) or external voltage source V_ANT (pin#19)
3.4 Antenna Supervisor (see application circuit)	Short circuit detection (built-in) Open circuit detection enabled with external circuit

Pin Assignment



Top View



Unit: mm

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Pin Definition

Pin#	Name	Type	Description
1	Tx1	O	UART1 TXD output or GPIO1 input/output. Engineering debug. If no use, please keep floating
2	Rx1	I	UART1 RXD input or GPIO0 input/output. Engineering debug. If no use, please keep floating
3	Tx0	O	UART0 TXD output. The major GPS UART port for application.
4	Rx0	I	UART0 RXD input. The major GPS UART port for application. If no used, please use pull-up resistor to avoid incorrect output by Tx
5	VDDIO	PWR	GPIO Segment IO Power Input. 1.8 to 3V
6	Vcc	PWR	Digital Power Input. Typical 3.3V.
7	GND	GND	Digital GND
8	VDD18out		Linear regulator output voltage: (Nominally 1.8V). The maximum out put current 50mA.
9	NC		Not Connected, keep floating
10	Rest_N		Baseband RESET input. '0' = reset and '1' = normal operation
11	V_BAT	PWR	Linear regulator battery input voltage: 2 - 3.6V. For battery backup RTC and 1Kbyte NVRAM.
12	BootSEL1	I	Firmware download purpose High Boot from Flash, Low Boot from serial port. If no use, please keep floating.
13	GND	GND	Digital GND
14	GND	GND	Digital GND
15	GND_RF	GND	RF-GND
16	RF_IN	I	GPS single input
17	GND_RF	GND	RF-GND
18	V_RF	PWR	Output Voltage RF section. V_RF=VCC-0.3V
19	V_ant	PWR	Input Antenna Bias voltage
20	GPIO3/AADET	I/O	GPIO3, AADET, High level- ANTSTATUS=OPEN, Low level-ANTSTATUS=OK. Check page 10. Antenna message output format
21	GPIO7	I/O	GPIO7. Input High for Firmware version V2.X.(Before Aug.-09') Floating for Firmware version V3.X.(After Aug.-09')
22	GPIO8	I/O	GPIO8. Reserved. If no use, please keep floating.
23	NC		Not Connected, keep floating
24	NC		Not Connected, keep floating
25	NC		Not Connected, keep floating
26	NC		Not Connected, keep floating
27	Wake0	I	Wake 0 input, Sleep Timer Output
28	1 pps	O	The 1PPS unit is used for generating a timing pulse, typically once per second,

Output NMEA Messages

NMEA-0183 Output Messages

NMEA Sentence	Description
GGA **(default)**	Global Positioning System Fixed Data
GSA **(default)**	GNSS DOP and Active Satellites
GSV **(default)**	GNSS Satellites in View
RMC **(default)**	Recommended Minimum Specific GNSS data
GLL	Geographic Position - Latitude/Longitude
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.

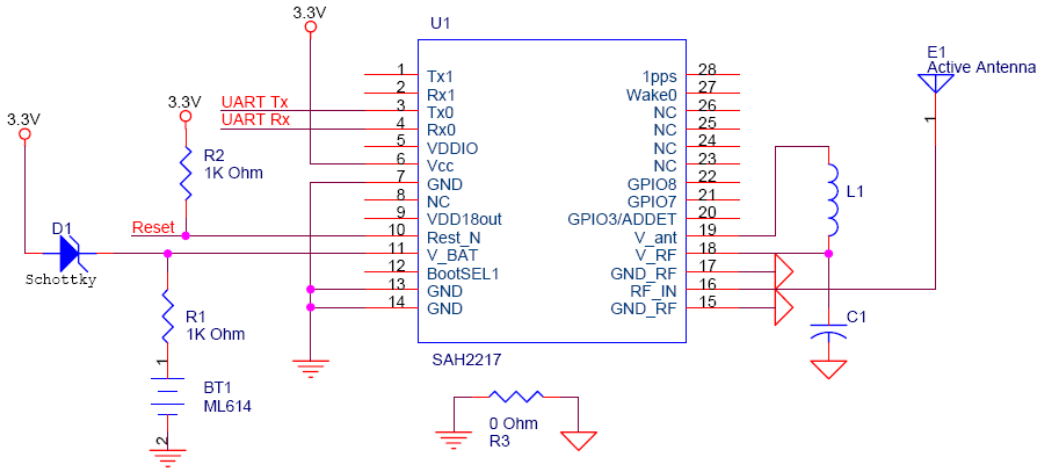
Output Baud Rate

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)

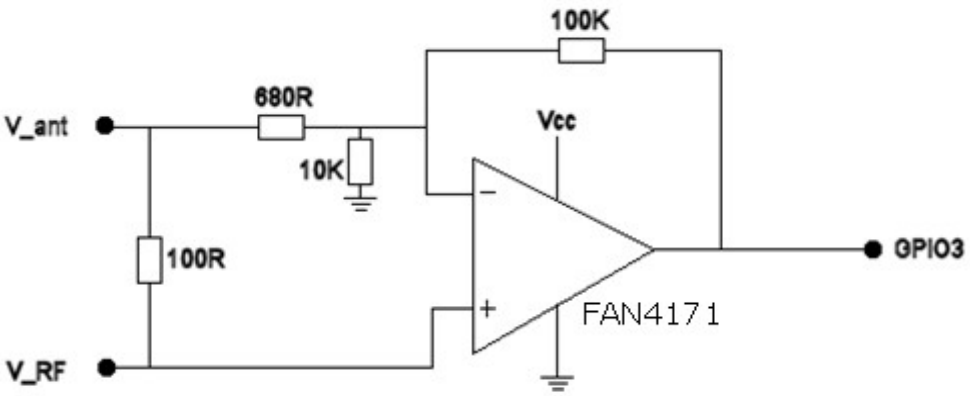
Default Setting:

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

Application Circuit



Antenna open/short detection/protection circuit



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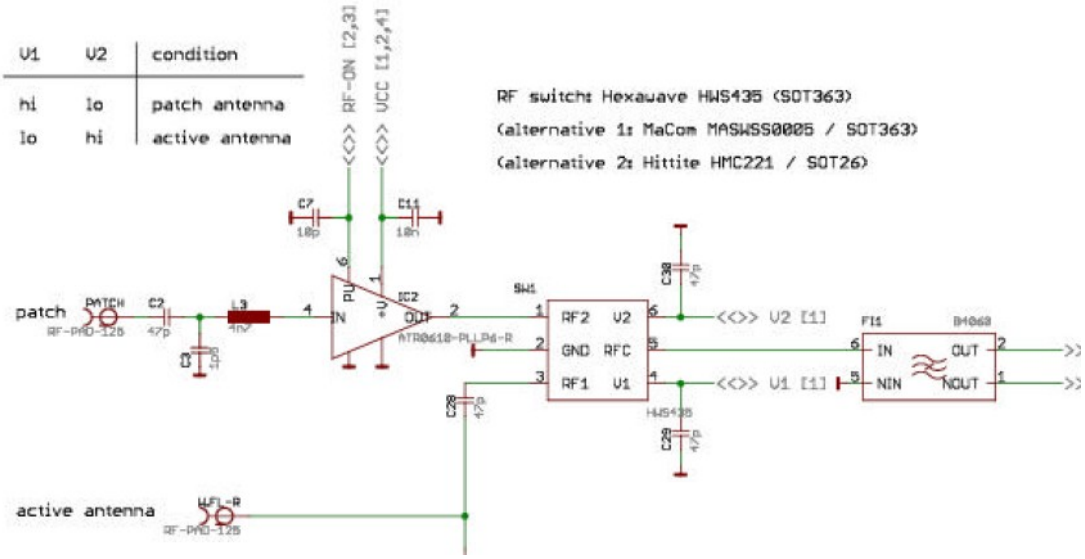
Antenna message output format

$GPTXT,xx,yy,zz,ascii data, cs<CR><LF>

Field No.	Example	Format	Name	Unit	Description
0	$GPTXT	string	$GPTXT	-	Message ID, TXT protocol header
1	01	numeric	xx	-	Total number of messages in this transmission, 01..99
2	01	numeric	yy	-	Message number in this transmission, range 01..xx
3	02	numeric	zz	-	Text identifier, - 00 = ERROR - 01 = WARNING - 02 = NOTICE - 07 = USER
4	modulestek	string	string	-	Any ASCII text
5	*67	hexadecimal	cs	-	Checksum
6	-	character	<CR><LF>	-	Carriage Return and Line Feed

AADET_N	ASCII text	Remark
Low	ANTSTATUS=OK	
High	ANTSTATUS=OPEN	
When Antenna Short	ANTSTATUS=SHORT	

Active/Passive antenna switch circuit



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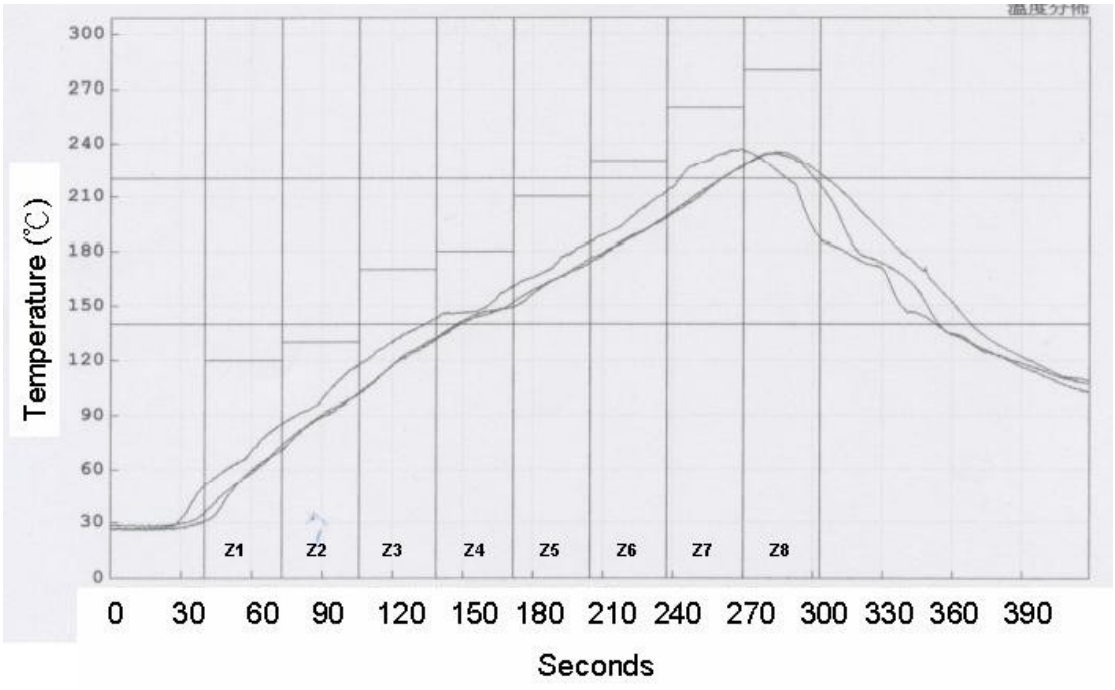
Reflow Profile



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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