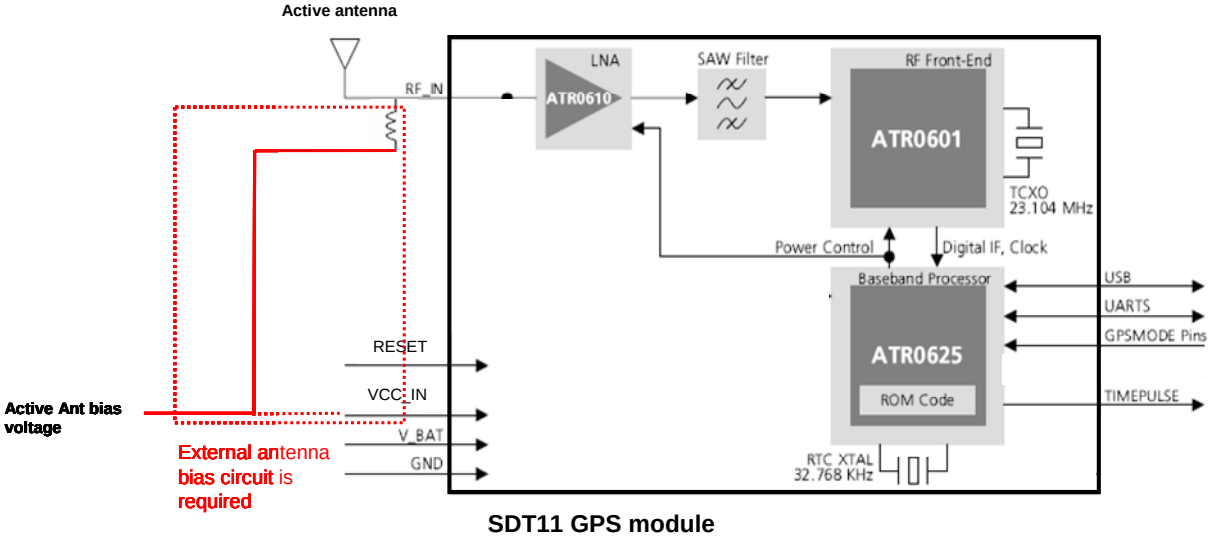
SDT11

ATMEL GPS Module with ultra high sensitivity (-158dBm)

Features

- ✓ 16 channel ANTARIS4 positioning engine
- ✓ Ultra high sensitivity to -158 dBm
- ✓ Supports DGPS, WAAS, EGNOS and MSAS
- ✓ Supports Power saving modes
- ✓ 5 µA backup current
- ✓ Support 1 USB and 1 UART ports
- ✓ Cost-optimized architecture (No Flash EPROM)
- ✓ Ultra low power consumption 39mA
- ✓ Small form factor with SMT pads (micro package)
- ✓ RoHS compliant (lead-free)

Block diagram



SDT11 GPS module

Technical Specifications

1. Electrical Characteristics

1.1 Chipset	ATR0601, ATR0625	ATMEL GPS chipset family (ARM7TDMI Thumb processor core embedded) with -158dBm sensitivity
1.2 General	Frequency	L1, 1575.42MHz
	Channels, C/A code	16, 1.023 MHz chip rate, 8192 time/frequency search windows
1.3 Accuracy	Position	2.5 meters CEP
	Time	50 nanosecond rms (1 PPS)
1.4 DGPS Accuracy	Position	2 meters CEP
1.5 Acquisition Rate	Reacquisition	< 1 sec, typical
	Cold start	34 sec, typical
	Warm start	33 sec, typical
	Hot start	3.5 sec, typical
1.6 Sensitivity	Tracking	-158 dBm
	Acquisition/Reacquisition	-148 dBm
	Cold start	-142 dBm
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
	Supply current	39 mA (80uA in power saving mode)
	Backup power	1.5 ~ 3.6V
	Backup current	5μA typical
1.9 Serial Port	Electrical interface	UART, USB
	Protocol	9600 baud, NMEA, Binary, RTCM

2. Environmental Characteristics

2.1Temperature	Operating range	- 40 ℃ to + 85 ℃
2.2 Mechanical dimensions	L x W x H	24 x 20 x 2.8 mm
2.3 Interface	I/O connector	28 pin SMD micro package

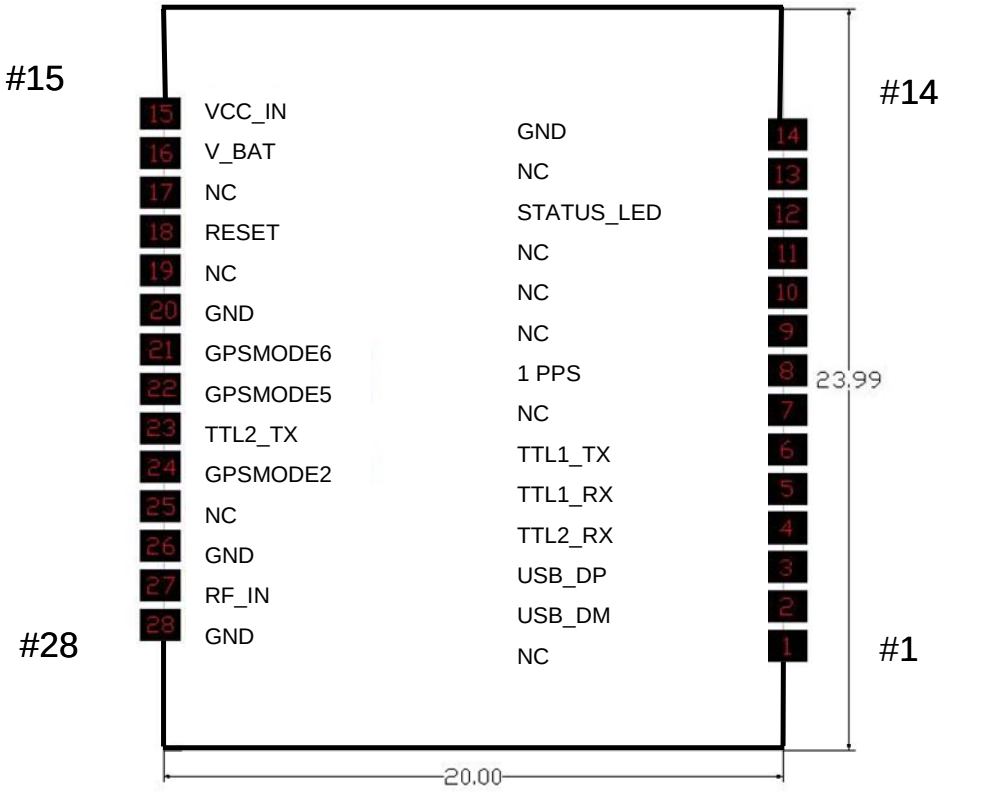
3 Antenna

Parameter	Specification
3.1 Antenna type	Active antenna recommended
3.2 Active Antenna	15 ~ 20 dB Gain recommended (50dB max.) 1.5 dB noise figure max.
3.3 Antenna bias supply	Using external active antenna voltage (depending on active antenna required bias voltage)

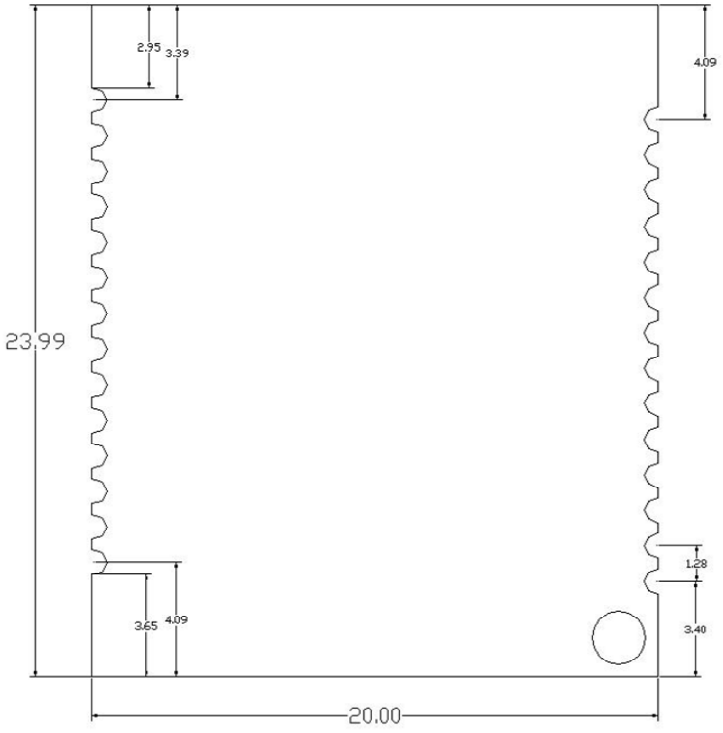
I/O Pin Description

Pin#	Name	Type	Description
1	NC		Not connected
2	USB_DM	I/O	USB data
3	USB_DP	I/O	USB data
4	TTL2_RX	I	TTL UART2 Input, if not used keep floating
5	TTL1_RX	I	TTL UART1 Input, if not used keep floating
6	TTL1_TX	O	TTL UART1 Output, if not used keep floating
7	NC		Not connected
8	1PPS	O	1PPS time mark output
9	NC		Not connected
10	NC		Not connected
11	NC		Not connected
12	STATUS LED	O	Fix Signal output, if not used keep floating
13	NC		Not connected
14	GND	PWR	Ground
15	VCC_IN	PWR	3.3V Supply Input
16	V_BAT	I	1.5V~3.6V Input for backup RTC& SRAM, if not used keep floating
17	NC		Not connected
18	RESET	I	Reset Pin, active high, if not used keep floating
19	NC		Not connected
20	GND	PWR	Ground
21	GPSMODE6	I	GPSMODE6 configuration, if not used keep floating
22	GPSMODE5	I	GPSMODE5 configuration, if not used keep floating
23	TTL2_TX	O	TTL UART2 Output, if no use keep floating
24	GPSMODE2	I	GPSMODE2 configuration, if not used keep floating
25	NC		Not connected
26	GND	PWR	Ground
27	RF_IN	I	For GPS signal input
28	GND	PWR	Ground

Pin Assignment



Unit: mm



Unit: mm

NMEA Output Message

Table 1 NMEA-0183 Output Messages

NMEA Sentence	Description
GGA **(Default)**	Global positioning system fixed data
GLL **(Default)**	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 **(Default)**	Course over ground and ground speed

GGA--- Global Positioning System Fixed Data

Table 2 contains the values for 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 3
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 Indicator

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

GLL--- Geographic Position – Latitude/Longitude

Table 4 contains the values for the following example:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C

Table 4 GLL Data Format

Name	Example	Units	Description
Message ID	$GPGLL		GLL protocol header
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
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Checksum	*2C		
<CR> <LF>			End of message termination

GSA---GNSS DOP and Active Satellites

Table 5 contains the values for the following example:

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

Table 5 GSA Data Format

Name	Example	Units	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 7
Mode 2	3		See Table 6
Satellite Used in solution	07		Sv on Channel 1
Satellite Used in solution	02		Sv on Channel 2
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 6 Mode 2

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

Table 7 Mode 1

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

GSV---GNSS Satellites in View

Table 8 contains the values for 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 8 GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages[1]	2		Range 1 to 3
Message Number[1]	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	Degrees	
Azimuth	048	Degrees	Channel 1 (Maximum 90)
SNR (C/No)	42	DBHz	Channel 1 (True, Range 0 to 359)
Satellite ID	27		Range 0 to 99, null when not tracking
Elevation	27	Degrees	Channel 4 (Range 1 to 32)
Azimuth	138	Degrees	Channel 4 (Maximum 90)
SNR (C/No)	42	DBHz	Channel 4 (True, Range 0 to 359)
Checksum	*71		Range 0 to 99, null when not tracking
<CR> <LF>			End of message termination

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

RMC---Recommended Minimum Specific GNSS Data

Table 9 contains the values for the following example:

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

Table 9 RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Position	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	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation		degrees	E=east or W=west (Not shown)
Checksum	*10		
<CR> <LF>			End of message termination

VTG---Course Over Ground and Ground Speed

Table 10 contains the values for the following example:

$GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

Table 10 VTG Data Format

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Checksum	*6E		
<CR> <LF>			End of message termination