Modefone

PRODUCT USER MANUAL

GPS ENGINE BOARD

S1613

Rev1.1

modefone Company

深圳市福田区中航路新亚洲电子商城二期三楼 N3A059

Tel: +86-755 – 82565388 Fax: +86-755 82565388

E-mail : modefone@gmail.com

Website: www.modefone.com.cn

Specification

General

Chipset	SiRF StarⅢ
Frequency	L1, 1575.42 MHz
C/A code	1.023 MHz chip rate
Channels	20 channel all-in-view tracking

Accuracy

Position	10 meters, 2D RMS 5 meters, 2D RMS, WAAS enabled
Velocity	0.1 m/s
Time	1us synchronized to GPS time

Datum

Default	WGS-84

Acquisition Time

Reacquisition	0.1 sec., average
Hot start	1 sec., average
Warm start	38 sec., average
Cold start	42 sec., average

Dynamic Conditions

Altitude	18,000 meters (60,000 feet) max
Velocity	515 meters /second (1000 knots) max
Acceleration	Less than 4g
Jerk	20m/sec **3

Power

Main power input	3.3V +- 5% DC input
Power consumption	40mA (Avg Current)

Interface

Dimension	15.9mm * 13.1mm * 2.5mm
Baud rate	4,800 to 57,600 bps adjustable
Output message	SiRF binary or NMEA 0183 V3.0(GGA, GSA, GSV, RMC)
Antenna	Active

Environmental

Operating Temp	-30ºC to +85ºC

Pin description

Pin NO.	Pin Name	Remark
1.	RF IN	Connect to Patch Antenna or Connect to External Active Antenna,2.85V active antenna Bias output.
2.	GND	Ground.
3.	GND	Ground.
4.	GND	Ground.
5.	BAT	Apply 1.5~5.0V DC for RTC & SRAM.
6.	GND	Ground.
7.	Boot	Select download flash mode or run mode. HIGH:Flash Download;LOW:GPS working.
8.	GND	Ground.
9.	GND	Ground.
10.	GND	Ground.
11.	VDD	Apply 3.1~5.0V DC for Main power
12.	GND	Ground.
13.	RESET	External Reset,forcibly.
14.	GND	Ground.
15.	GND	Ground.
16.	ECLK	External CMOS clock source
17.	GND	Ground.
18.	NC	
19.	GND	Ground.
20.	1PPS	1 Pulse Per Second
21.	GND	Ground.
22.	GND	Ground.
23.	GND	Ground.
24.	GND	Ground.
25.	TIMESYNC	A timing pulse is triggered on the rising edge
26.	GND	Ground.
27.	ON/OFF	HIGH:OFF;LOW:ON
28.	GND	Ground.
29.	GND	Ground.
30.	TXA	This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written.Output TTL level,0V~2.85V.
31.	RXA	This is the main receive channel for receiving software commands to the engine board form SiRF demo software or from user written software.
32.	RXB	Auxiliary Serial UART interface, unused (only debugging)
33.	GND	Ground.
34.	TXB	Auxiliary Serial UART interface, unused (only debugging)
35.	GND	Ground.
36.	GND	Ground.

Function description

VDD (+3.3V DC Power Input)

This is the main DC power supply for a +3.3V powered board.

GND

GND provides the ground for the board.Connect all grounds.

Serial Data:RXA,TXA

The board supports two full duplex serial channales.All connections are at TTL levels,all support varials baud rates,and all can be controlled from the appropriate screens in GPS Monitor software.You can directly communicate with a PC serial port.(TTL level should be converted to RS-232 level)

BOOT

This pin is for program download.This pin should be high when the program is downloaded.If the BOOTTSEL is high then the module will boot from the serial port. And if the BOOTSEL is low then the module will begin execution from the on-board FLASH.

1PPS

This pin is 1 Pulse Per Second.

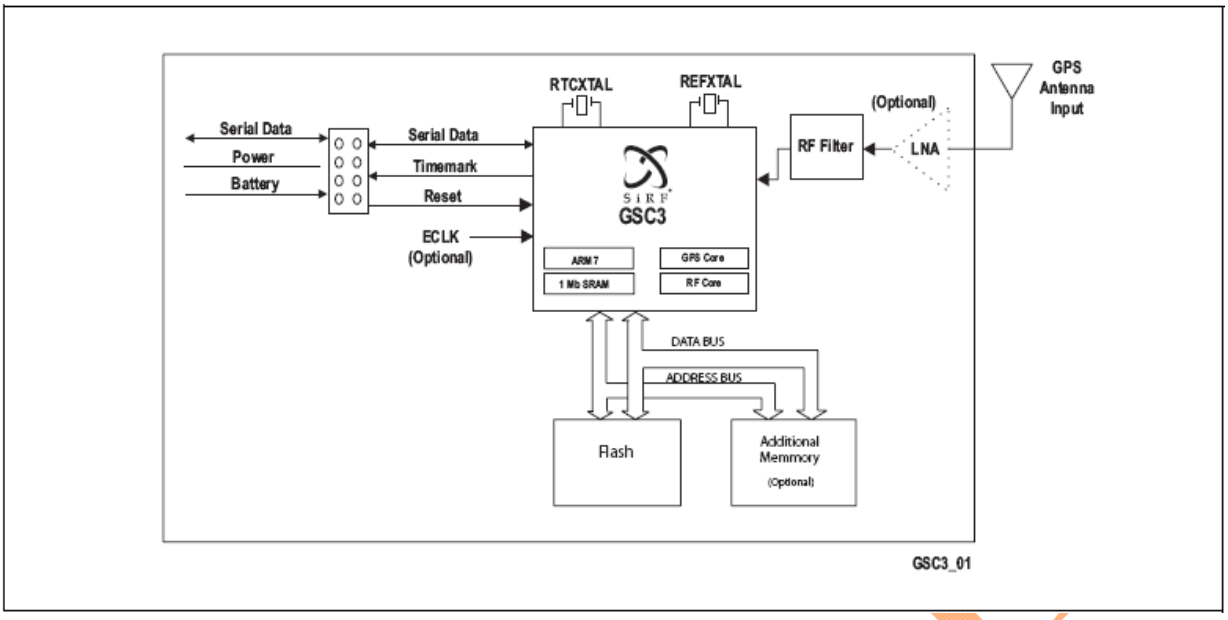
RFIN

This pin is for RF signal input.

RESET

This pin is external reset ,forcibly.

Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Power Supply Voltage	VCC	-0.3	5	V
Output Pin Voltage	VOUT	-0.3	3.4	V
Storage Temperature	TSTG	-40	85	℃

Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Power Supply Voltage	VCC	3.1	3.3	5.0	V
Operating Temperature	TOPR	-30		85	℃
Operating Current	ICC	--	40	--	mA

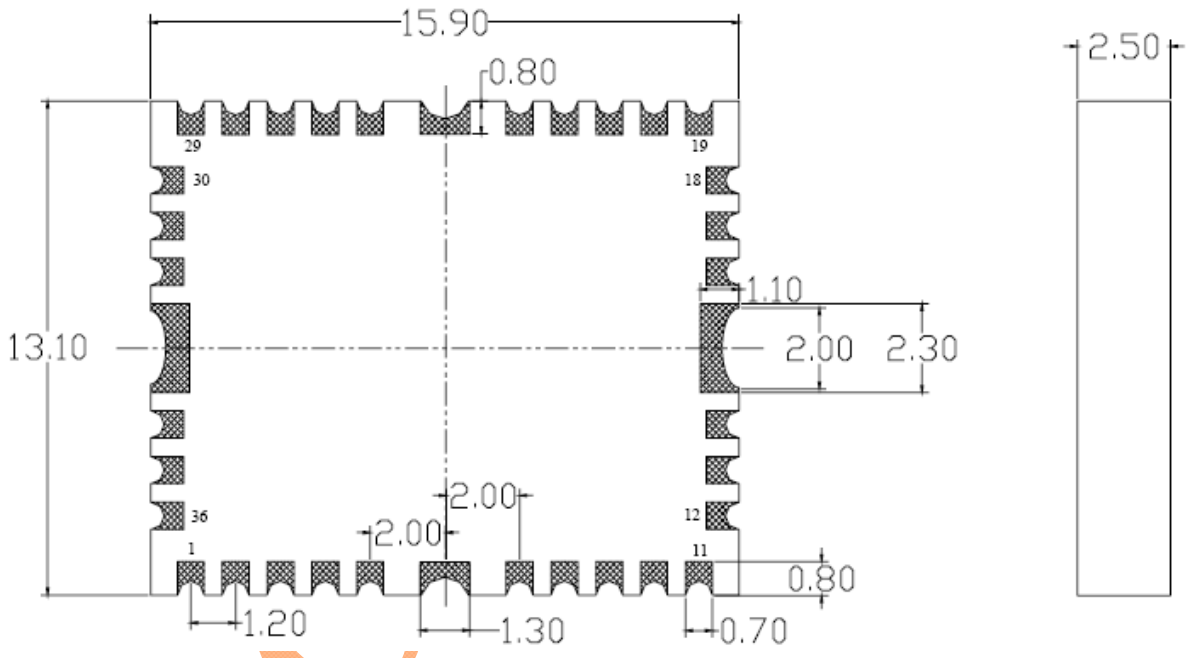
Backup Battery Conditions

Parameter	Symbol	Min	Typ	Max	Units
RTC(Battery) Power	BAT	1.5	2.8	5.0	V
Supply Current	IRTC		20		uA

DC Characteristics

Parameter	Symbol	Min	Max	Units
Input High Level	Vih	2.0	--	V
Intput Low Level	Vil	--	0.8	V
Output High Level	Voh	2.4		V
Output Low Level	Vol		0.4	V

Mechanical Dimensions



TOP VIEW

Output NMEA Messages

Its output signal level is TTL: 4800 bps (default), 8 bit data, 1 stop bit and no parity.

It supports the following NMEA-0183 Messages: GGA, GSA, GSV and RMC

NMEA Output Messages: the Engine board outputs the following messages as shown in Table 1-1:

Table 1-1 NMEA-0183 Output Messages

NMEA Record	Description
GGA	Global positoning system fixed data. Time, Position and fix related data
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data

GGA-Global Positioning System Fixed Data

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-2 contains the values of the following example:

$GPGGA, 161229.487, 3723.2475, N, 12158.3416, W, 1, 07, 1.0, 9.0, M, , , ,0000*18

Table 1-2 GGA Data Format

Name	Example	Units	Descripion
Message ID	$GPGGA		GGA protocol header
UTC Time	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 1-3
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 1-3 Position Fix Indicators

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not Supported
6	*Dead Reckoning Mode, fix valid*

GSA-GNSS DOP and Active Satellites

Table 1-4 contains the values of the following example:

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

Table 1-4 GSA Data Format

Name	Example	Units	Descripion
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 1-5
Mode 2	3		See Table 1-6
Satellite Used	07		Sv on Channel 1
Satellite Used	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 1-5 Mode 1

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

Table 1-6 Mode 2

Value	Description
1	Fix not available
2	2D (<4 SVs used)
3	3D (>3 SVs used)

GSV-GNSS Satellites in View

Table 1-7 contains the values of 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 1-7 GSV Data Format

Name	Example	Units	Descripion
Message ID	$GPGSV		GSV protocol header
Number of Messages[1]	2		Range 1 to 3
Messages Number[1]	1		Range 1 to 3

Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Maximum 90)
Azimuth	048	degrees	Channel 1(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
…			…
Satellite ID	27		Channel 4(Range 1 to 32)
Elevation	27	degrees	Channel 4(Maximum 90)
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<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

Note—Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-8 contains the values of the following example:

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

Table 1-8 RMC Data Format

Name	Example	Units	Descripion
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	
East/West Indicator[1]	E		E=east or W=west
Mode	*A*		*A=Autonomous, D=DGPS, E=DR*
Checksum	*10		
<CR><LF>			End of message termination

1. This GPS receiver does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.