
SF-6909
GPS/GLONASS
Engine Board

Version1.0
(2008-11)

UniStar
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1. Product Information

■ Product Name: SF-6909

■ Product Description:

SF-6909 is a high-sensitivity and ultra-compact GPS/GLONASS engine board. It is powered by UNISTAR GPS/GLONASS engine, which can perform excellent single reception capability and fast TTFF in weak signal environments. It is suitable for portable electronic devices such as automotive navigation devices, handheld navigation devices and other GPS/GLONASS applications.



■ Product Features:

- ◇ Unistar GLONASS/GPS chipset
- ◇ 24 GLONASS/GPS Compatible channels
- ◇ Fast TTFF at low signal environment
- ◇ 2 serial ports
- ◇ SMT type with stamp holes
- ◇ Small form factor (40X70X5mm)
- ◇ Support NMEA 0183 V3 (Default: GGA,GSA,GSV,RMC,VTG)
- ◇ Support direct interface with TTL levels
- ◇ Support direct interface with CMOS levels
- ◇ ROHS compliant

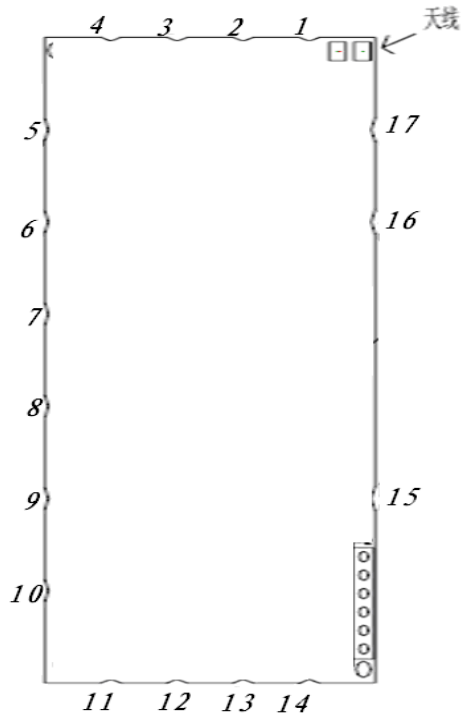
■ **Product Specification**

GPS/GLONASS Receive	
Chipset	UNISTAR GLONASS/GPS Chipset
Frequency	L1,1575.42MHZ 1598.0625 to 1615.5000MHZ
Code	C/A and digital processing
Protocol	NEMA0183v3
Serial I/O Port	2 Serials Ports
Available Baud Rate	9600/19200/38400/115200
Channels	24
Sensitivity	Tracking: -160dBm
Cold Start	180 seconds
Warm Start	90 seconds
Hot Start	30 seconds
Reacquisition	1 seconds
Accuracy	Position:<10m RMS
	Velocity:0.05m/s
	Time:1us(UTC)
Maximum Acceleration	18,000 meter
Maximum Altitude	<550 meter/second
Maximum Velocity	<10G
Update Rate	1HZ—10HZ

Interface	
I/O Pins	17-pin stamp holes
Physical Characteristic	
Dimensions	40X70X4mm
DC Characteristics	
Power supply	3.3--5.5V DC
Power Consumption	Acquisition:200mA
	Tracking:200mA
Environmental range	
Humidity Range	5% to 95% non-condensing
Operation Temperature	-40°C to +80°C
Storage Temperature	-55°C to +85°C

2. Technical Information

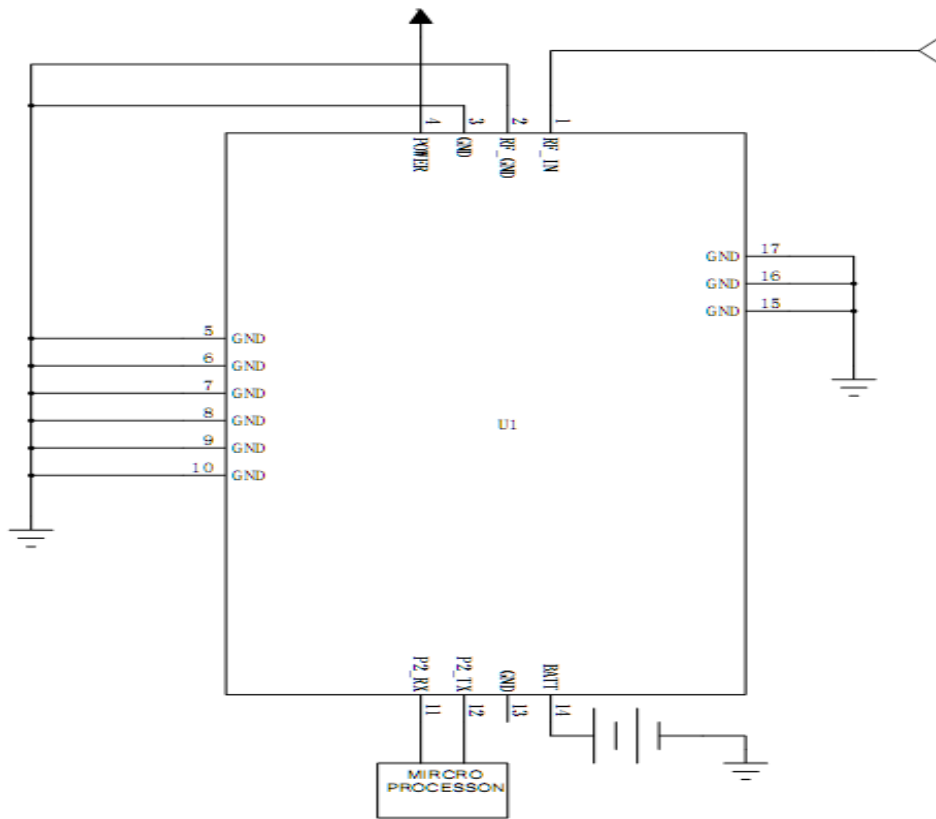
■ **Module Pin Assignment: (Picture 1)**



(Picture 1)

Description		
Pin#	Name	
1	RF_IN	GPS/GLONASS RF SINGNAL INPUT
2	RFIN_GND	RF GROUND
3	GND	GROUND
4	3.3-5.5V	DC Supply voltage input
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	P2_RX	Serial input for channel
12	P2_TX	Serial output for channel
13	GND	Ground
14	VBAT	Backup battery supply voltage
15	GND	Ground
16	GND	Ground
17	GND	Ground

■ Application Circuit(Figure 2)



(Picture 2)

3. Optional Connector

Input/Output

- Two high speed (115.2 Kbps) standard RS232 Serial Ports

Pin Description

Pin Description of XP_GPS Connector

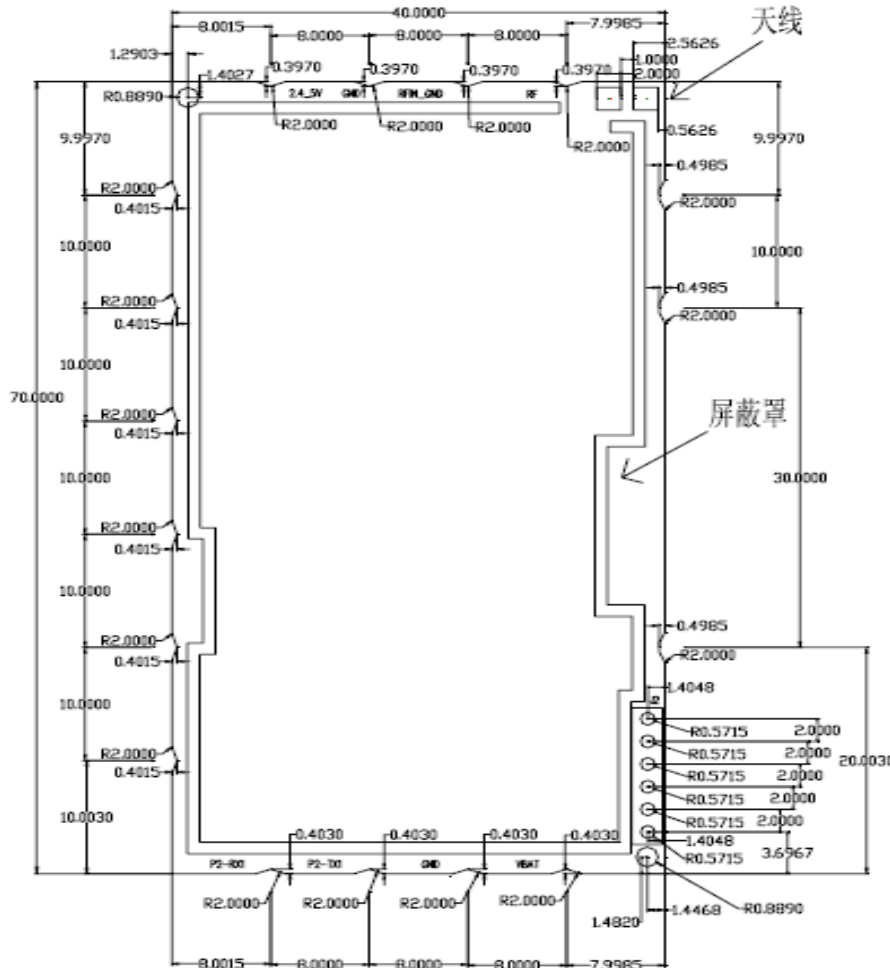
Pin#	Description
1	TXDA
2	RXDA
3	GND
4	GND
5	TXDB
6	RXDB
7	Reset
8	BOOT
9	GND
10	GND
11	Power
12	Power
13	Power ON/OFF
14	-
15	GND
16	1 PPS
17	Event
18	COMMSW
19	Red LED
20	Green LED

(Table 1)

4. GPS/GLONASS Active Antenna specification (Recommendation)

- ◇ Frequency: 1575 - 1615MHZ
- ◇ Axial Ratio: 3dB
- Typical
- ◇ Output Impedance: 50 OHM
- ◇ Polarization: RHCP
- ◇ Amplifier Gain: 21 - 25dB
- ◇ OUTPUT VSWR: 1.5Max
- ◇ Noise Figure: 1.5dB max

5. Dimensions (Picture 3)



(Picture 3)

6. NMEA Input/output Message

■ NMEA V3.0 Protocol

Messages: GGA, GLL, GSA, GSV, RMC and VTG.

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

Table 1 NMEA-0183 Output Messages

NMEA Record	Description
GGA	Global positioning system fixed data
GLL	Geographic position – latitude / longitude
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course over ground and ground speed

GGA-Global Positioning System Fixed Data

Table 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 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		ddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 2-1
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 Indicators

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 3 contains the values of the following

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

Table 3 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		ddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Position	161229.487		hhmmss.ss
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 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 4 GSA Data Format

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
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 4-1 Mode 1

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

Table 4-2 Mode 2

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 5 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 5 GGA Data Format

Name	Example	Units	Description
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

Table 6 contains the values of the following example:

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

Table 6 GGA 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
Checksum	*10		
<CR> <LF>			End of message termination

VTG-Course Over Ground and Ground Speed

Table 7 contains the values of the following example:

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

Table 7 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