SANAV
San Jose Technology, Inc.

Product Name: GPS Receiver

Part Number: GM-11B-AS-N01

Feature:

- 1~10 Hz updates for smooth and accurate location
- Supports SBAS including WAAS/EGNOS/MSAS
- Compact, rugged design for all marine environments and fully waterproof

Application:

- high-sensitivity reception and enhanced position acquisition

SANAV

GPS Receiver

MODEL: GM-11B-AS-N01

WI-RD-D-214 V1.0

I. Specifications:

Category	Specifications
PHYSICAL CONSTRUCTION	
Dimension	49.5 * 40.8 * 14.6 mm
Mounting	Magnetic mount
Case Material	Fully gasketed high-impact plastic, waterproof to IEC 60529 IPX7 standards
ENVIRONMENTAL CONDITIONS	
Temperature	Operating: -30 ~ +75 ℃
	Storage: -40 ~ +80 ℃
COMMUNICATION	
Protocol	NMEA 0183 V4.0
Interfaces	UART
INTERFACE CAPABILITY	
Output Sentences (Optional)	GGA(1sec), GSA(1 sec), GSV(5 sec), RMC(1sec),
Baud Rate	9600bps
PERFORMANCE	
Built in Antenna element	High-reliability ceramic patch
Frequency	GPS L1 C/A, SBAS L1C/A, GLONASS L1OF, QZSS L1C/A, Galileo E1B/C2
Channels	72 parallel
Sensitivity*	-167dBm
SBAS	Support : WAAS, EGNOS, MSAS
TTFF**	Hot start 1 sec. Typical Cold start 26 sec. Typical
Position accuracy**	2.5 m
Update Rate(Optional)	1Hz

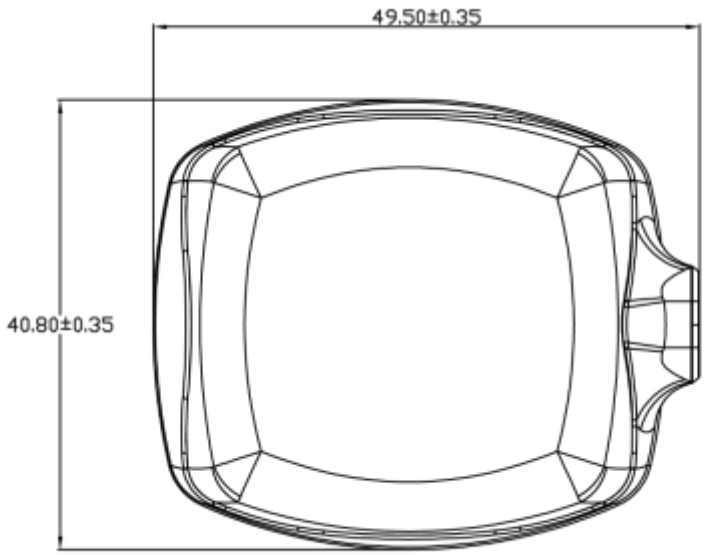
SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

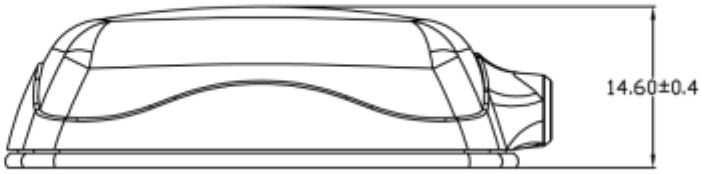
Input Voltage	5V
Power Consumption	Typical 50mA@5V DC

*All satellites at -130 dBm，Use u-blox u-center test

**CEP, 50%, 24 hours static, -130 dBm, > 6 SVs

II. Mechanical Drawing (Unit:mm):

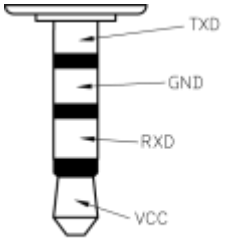




SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

III. Pin Assignment:

Pin No.	Title	I/O	Note
1	VCC	I	DC supply input
2	RXD	I	TTL Serial Data Input
3	GND	G	Ground
4	TXD	O	TTL Serial Data Output



Funtion	Cable Color	PIN No.
TXD	白色 White	4
GND	黑色 Black 編織網 BRAID	3
RXD	綠色 Green	2
VCC	紅色 Red	1

Pin description

VCC (DC power input):

This is the main DC supply for a 4.5V~5.5V DC input power.

TXD:

TTL Serial Data Output Voltage Range, 0V to 3.3V

RXD:

TTL Serial Data Input Voltage Range, 0V to 3.3V

GND:

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

IV. Available NMEA Messages

NMEA Output Messages

GGA	Global Positioning System Fixed Data
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Specific GNSS Data

NMEA Protocol

The NMEA protocol expresses the data in the format of ASCII. This is a standard format for GPS applications.

Its output signal level is 9600 bps(default), 8 bit data, 1 stop bit and no parity. It supports the following NMEA-0183

Messages: GGA, GSA, GSV, RMC,

The following will summarize the available NMEA messages. More information about the NMEA messages refers to "NMEA 0183, Standard for Interfacing Marine Electronic Devices, Version 4.0.

GGA

Global positioning system fix data

Message	**GGA**		
Description	**Global positioning system fix data**		
Firmware	Supported on: • u-blox 8 / u-blox M8 protocol versions 15, 15.01, 16, 17, 18, 19, 19.1, 19.2, 20, 20.01, 20.1, 20.2, 20.3, 22, 23 and 23.01		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (default: WGS84). The NMEA specification indicates that the GGA message is GPS specific.** **However, when the receiver is configured for multi-GNSS, the GGA message contents will be generated from the multi-GNSS solution. For multi-GNSS use, it is recommended that the NMEA-GNS message is used instead.** Time and position, together with GPS fixing related data (number of satellites in use, and the resulting HDOP, age of differential data if in use, etc.).		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x00	17	

Message Structure:

$xxGGA,time,lat,NS,long,EW,quality,numSV,HDOP,alt,M,sep,M,diffAge,diffStation*cs<CR><LF>

Example:

$GPGGA,092725.00,4717.11399,N,00833.91590,E,1,08,1.01,499.6,M,48.0,M,,*5B

Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
0	xxGGA	-	string	$GPGGA	GGA Message ID (xx = current Talker ID)
1	time	-	hhmmss.ss	092725.00	UTC time,
2	lat	-	ddmm.mmmmm	4717.11399	Latitude (degrees & minutes),

SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

3	NS	-	character	N	North/South indicator
4	long	-	dddmm.mmmmm	00833.91590	Longitude (degrees & minutes),
5	EW	-	character	E	East/West indicator
6	quality	-	digit	1	Quality indicator for position fix, see table below
7	numSV	-	numeric	08	Number of satellites used (range: 0-12)
8	HDOP	-	numeric	1.01	Horizontal Dilution of Precision
9	alt	m	numeric	499.6	Altitude above mean sea level
10	uAlt	-	character	M	Altitude units: meters (fixed field)
11	sep	m	numeric	48.0	Geoid separation: difference between ellipsoid and mean sea level
12	uSep	-	character	M	Separation units: meters (fixed field)
13	diffAge	s	numeric	-	Age of differential corrections (blank when DGPS is not used)
14	diffStation	-	numeric	-	ID of station providing differential corrections (blank when DGPS is not used)
15	cs	-	hexadecimal	*5B	Checksum
16	<CR><LF>	-	character	-	Carriage return and line feed

Table Quality Indicator

Quality Indicator	*Description*
0	No Fix / Invalid
1	Standard GPS (2D/3D)
2	Differential GPS
4	RTK fixed solution
5	RTK float solution
6	Estimated (DR) Fix

GSA

GNSS DOP and Active Satellites

Message	**GSA**		
Description	**GNSS DOP and Active Satellites**		
Firmware	Supported on: • u-blox 8 / u-blox M8 protocol versions 15, 15.01, 16, 17, 18, 19, 19.1, 19.2, 20, 20.01, 20.1, 20.2, 20.3, 22, 23 and 23.01		
Type	Output Message		
Comment	The GNSS receiver operating mode, satellites used for navigation, and DOP values. • If less than 12 SVs are used for navigation, the remaining fields are left empty. If more than 12 SVs are used for navigation, only the IDs of the first 12 are output. • The SV numbers (fields 'sv') are in the range of 1 to 32 for GPS satellites, and 33 to 64 for SBAS satellites (33 = SBAS PRN 120, 34 = SBAS PRN 121, and so on) **In a multi-GNSS system this message will be output multiple times, once for each GNSS.**		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x02	21	

Message Structure:

```
$xxGSA,opMode,navMode{,sv},PDOP,HDOP,VDOP,systemId*cs<CR><LF>
```

Example:

```
$GPGSA,A,3,23,29,07,08,09,18,26,28,,,,,1.94,1.18,1.54,1*0D
```

Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
0	xxGSA	-	string	$GPGSA	GSA Message ID (xx = current Talker ID)
1	opMode	-	character	A	Operation mode, see first table below
2	navMode	-	digit	3	Navigation mode, see second table below
Start of repeated block (12 times)					

SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

3 + 1*N	sv	-	numeric	29	Satellite number
End of repeated block					
15	PDOP	-	numeric	1.94	Position dilution of precision
16	HDOP	-	numeric	1.18	Horizontal dilution of precision
17	VDOP	-	numeric	1.54	Vertical dilution of precision
18	systemId	-	numeric	1	NMEA defined GNSS System ID **NMEA v4.1 and above only**
19	cs	-	hexadecimal	*0D	Checksum
20	<CR><LF>	-	character	-	Carriage return and line feed

Table Operation Mode

Operation Mode	*Description*
M	Manually set to operate in 2D or 3D mode
A	Automatically switching between 2D or 3D mode

Table Navigation Mode

Navigation Mode	*Description*
1	Fix not available
2	2D Fix
3	3D Fix

SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

GSV

GNSS Satellites in View

Message	**GSV**		
Description	**GNSS Satellites in View**		
Firmware	Supported on: • u-blox 8 / u-blox M8 protocol versions 15, 15.01, 16, 17, 18, 19, 19.1, 19.2, 20, 20.01, 20.1, 20.2, 20.3, 22, 23 and 23.01		
Type	Output Message		
Comment	The number of satellites in view, together with each SV ID, elevation azimuth, and signal strength (C/No) value. Only four satellite details are transmitted in one message. **In a multi-GNSS system sets of GSV messages will be output multiple times, one set for each GNSS.**		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x03	8..16	

Message Structure:

```
$xxGSV,numMsg,msgNum,numSV,{,sv,elv,az,cno},signalId*cs<CR><LF>
```

Example:

```
$GPGSV,3,1,10,23,38,230,44,29,71,156,47,07,29,116,41,08,09,081,36,0*7F

$GPGSV,3,2,10,10,07,189,,05,05,220,,09,34,274,42,18,25,309,44,0*72

$GPGSV,3,3,10,26,82,187,47,28,43,056,46,0*77
```

Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
0	xxGSV	-	string	$GPGSV	GSV Message ID (xx = GSV Talker ID)
1	numMsg	-	digit	3	Number of messages, total number of GSV messages being output
2	msgNum	-	digit	1	Number of this message
3	numSV	-	numeric	10	Number of satellites in view
Start of repeated block (1..4 times)					

SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

4 + 4*N	sv	-	numeric	23	Satellite ID
5 + 4*N	elv	deg	numeric	38	Elevation (range 0-90)
6 + 4*N	az	deg	numeric	230	Azimuth, (range 0-359)
7 + 4*N	cno	dBHz	numeric	44	Signal strength (C/N0, range 0-99), blank when not tracking
End of repeated block					
5..16	signalId	-	numeric	0	NMEA defined GNSS Signal ID (0 = All signals, **NMEA v4.1 and above only**
6..16	cs	-	hexadecimal	*7F	Checksum
7..16	<CR><LF>	-	character	-	Carriage return and line feed

SANAV San Jose Technology, Inc.
11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)
Tel: 886-2-22694456 | Fax: 886-2-22694451 | sanav@sanav.com

RMC

Recommended Minimum data

Message	**RMC**		
Description	**Recommended Minimum data**		
Firmware	Supported on: • u-blox 8 / u-blox M8 protocol versions 15, 15.01, 16, 17, 18, 19, 19.1, 19.2, 20, 20.01, 20.1, 20.2, 20.3, 22, 23 and 23.01		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (default: WGS84)** The recommended minimum sentence defined by NMEA for GNSS system data.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x04	16	

Message Structure:

```
$xxRMC,time,status,lat,NS,long,EW,spd,cog,date,mv,mvEW,posMode,navStatus*cs<CR><LF>
```

Example:

```
$GPRMC,083559.00,A,4717.11437,N,00833.91522,E,0.004,77.52,091202,,,A,V*57
```

Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
0	xxRMC	-	string	$GPRMC	RMC Message ID (xx = current Talker ID)
1	time	-	hhmmss.ss	083559.00	UTC time
2	status	-	character	A	Status, V = Navigation receiver warning, A = Data valid
3	lat	-	ddmm.mmmmm	4717.11437	Latitude (degrees & minutes)
4	NS	-	character	N	North/South indicator
5	long	-	dddmm.mmmmm	00833.91522	Longitude (degrees & minutes)

6	EW	-	character	E	East/West indicator
7	spd	knots	numeric	0.004	Speed over ground
8	cog	degrees	numeric	77.52	Course over ground
9	date	-	ddmmyy	091202	Date in day, month, year format,
10	mv	degrees	numeric	-	Magnetic variation value. Only supported in ADR 4.10 and above.
11	mvEW	-	character	-	Magnetic variation E/W indicator. Only supported in ADR 4.10 and above.
12	posMode	-	character	A	Mode Indicator, **NMEA v2.3 and above only**
13	navStatu s	-	character	V	Navigational status indicator (V = Equipment is not providing navigational status information) **NMEA v4.1 and above only**
14	cs	-	hexadecima l	*57	Checksum
Field No.	Name	Unit	Format	Example	Description
15	<CR><LF>	-	character	-	Carriage return and line feed