

G2M1-A



G2M1-A

High-Performance 88 Channel GLONASS/GPS Mouse Receiver

Features

- 88 Channel GLONASS+GPS L1 C/A Code
- Perform 10 million time-frequency hypothesis testing per second
- Open sky hot start 1 sec
- Open sky cold start 29 sec
- Cold start sensitivity -145dBm
- Navigation sensitivity -159dBm
- Accuracy 2.5m CEP
- 1.8m PS2 cable
- Operating temperature -40 ~ +85°C
- RoHS compliant

Applications

- Navigation and Positioning
- Tracking and Locating
- Automatic Vehicle Location
- Fleet Management

The G2M1-A is a compact form factor GLONASS/GPS receiver, with complete housing and cable, intended for a broad range of OEM products, where fast and easy system integration and minimal development risk is required. The users only need to provide DC power of 3.8V ~ 6V; the G2M1-A will output navigation solution in standard NMEA-0183 protocol format.

The G2M1-A features 88 channel GLONASS/GPS receiver with fast time to first fix and improved -145dBm cold start sensitivity. The superior cold start sensitivity allows it to acquire, track, and get position fix autonomously in difficult weak signal environment. The receiver's -159dBm navigation sensitivity allows continuous position coverage in nearly all application environments. The high performance search engine is capable of testing 10,000,000 time-frequency hypotheses per second, offering industry-leading signal acquisition and TTFF speed.

The G2M1-A contains a complete GLONASS/GPS module with antenna inside.

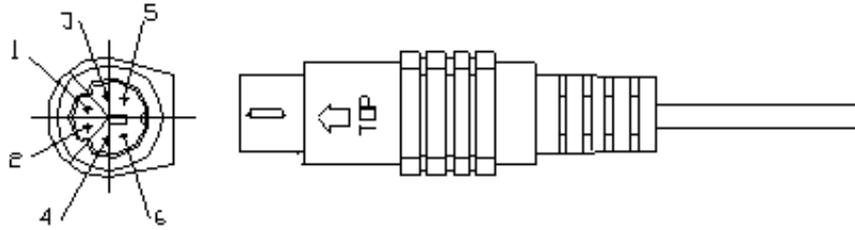
The receiver is optimized for applications requiring high performance, low power, and low cost; suitable for a wide range of OEM configurations including asset tracking and navigation products.

Both TTL and RS232 level signals are provided on the interface PS2 connector.

TECHNICAL SPECIFICATIONS

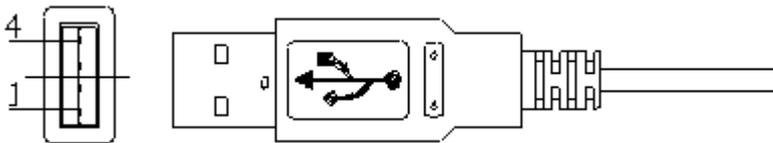
Receiver Type	L1 C/A code, 88-channel
Accuracy	Position 2.5m CEP Velocity 0.1m/sec Time 15ns
Startup Time	1 second hot start under open sky < 29 second warm start under open sky (average) 29 second cold start under open sky (average)
Reacquisition	1s
Sensitivity	-145dBm cold start -159dBm navigation
Update Rate	1Hz
Operational Limits	Altitude < 18,000m or velocity < 515m/s
Serial Interface	3.3V LVTTTL level and RS-232 level
Interface Connector	PS2 mini-DIN
Protocol	NMEA-0183 V3.01 GPGGA, GNGLL, GNGNS, GPGSA, GLGSA, GNGSA GPGSV, GLGSV, GNVTG, GNRMC 9600 baud, 8, N, 1
Datum	Default WGS-84 User definable
Input Voltage	3.8V ~ 6.0V
Current Consumption	120mA acquisition 75mA tracking
Dimension	61mm L x 51mm W x 20mm H
Weight:	70g with cable
Operating Temperature	-40°C ~ +85°C
Storage Temperature	-55 ~ +100°C
Humidity	5% ~ 95%

PS2 Mini-DIN CONNECOR PINOUT DESCRIPTION



Pin No.	Name	Description
1	GND	Ground
2	VCC	Main power supply, 3.8V ~ 6.0V DC
3	RX	UART serial data input, 3.3V LVTTTL.
4	RXA	UART serial data input, RS-232
5	TXA	UART serial data output, RS-232.
6	TX	UART serial data output, 3.3V LVTTTL.

OPTIONAL USB CONNECOR PINOUT DESCRIPTION



Pin No.	Name	Description
1	PWR	5V
2	D-	USB data
3	D+	USB data
4	GND	Ground

NMEA Output Description

The output protocol of SkyTraq GLONASS/GPS receiver supports NMEA-0183 standard. In SkyTraq receiver, Implemented messages include GGA, GLL, GSA, GSV, VTG, RMC, ZDA and GNS messages. The NMEA message output has the following sentence structure:

`$aacc,c--c*hh<CR><LF>`

The detail of the sentence structure is explained in Table 1.

Table 1: The NMEA sentence structure

character	HEX	Description
"\$"	24	Start of sentence.
aacc		Address field. "aa" is the talker identifier. "ccc" identifies the sentence type.
","	2C	Field delimiter.
c--c		Data sentence block.
*"	2A	Checksum delimiter.
hh		Checksum field.
<CR><LF>	0D0A	Ending of sentence. (carriage return, line feed)

By default, SkyTraq GLONASS/GPS receiver calculates its position and speed based on the combination of the GPS and GLONASS systems and output talker ID GN in the NMEA messages. Alternatively, talker ID "GP" is supported for compatibility purpose. Table 2 lists all the NMEA messages used by SkyTraq GLONASS/GPS receiver.

Table 2: Overview of SkyTraq receiver's NMEA messages

Mode 1 Talker ID GN (default)		Mode 2 Talker ID GP	
\$GNGGA	Time, position, and fix related data of the receiver.	\$GPGGA	Time, position, and fix related data of the receiver.
\$GNGLL	Position, time and fix status.	\$GPGLL	Position, time and fix status.
\$GNGSA \$GPGSA \$GLGSA	Used to represent the ID's of satellites which are used for position fix. When both GPS and GLONASS satellites are used in position solution, a \$GNGSA sentence is used for GPS satellites and another \$GNGSA sentence is used for GLONASS satellites. When only GPS satellites are used for position fix, a single \$GPGSA sentence is output. When only GLONASS satellites are used, a single \$GLGSA sentence is output.	\$GNGSA \$GPGSA \$GLGSA	Used to represent the ID's of satellites which are used for position fix. When both GPS and GLONASS satellites are used in position solution, a \$GNGSA sentence is used for GPS satellites and another \$GNGSA sentence is used for GLONASS satellites. When only GPS satellites are used for position fix, a single \$GPGSA sentence is output. When only GLONASS satellites are used, a single \$GLGSA sentence is output.
\$GPGSV \$GLGSV	Satellite information about elevation, azimuth and CNR, \$GPGSV is used for GPS satellites, while \$GLGSV is used for GLONASS satellites	\$GPGSV \$GLGSV	Satellite information about elevation, azimuth and CNR, \$GPGSV is used for GPS satellites, while \$GLGSV is used for GLONASS satellites
\$GNRMC	Time, date, position, course and speed data.	\$GPRMC	Time, date, position, course and speed data.
\$GNVTG	Course and speed relative to the ground.	\$GPVTG	Course and speed relative to the ground.
\$GNZDA	UTC, day, month and year and time zone.	\$GPZDA	UTC, day, month and year and time zone.
\$GNGNS	Time, position, and fix related data of the receiver.	\$GNGNS	Time, position, and fix related data of the receiver.

The formats of the supported NMEA messages are described as follows:

GGA - Global Positioning System Fix Data

Time, position and fix related data for a GPS receiver.

Format:

\$--GGA,hhmmss.ss,lll.lll,a,yyyyy.yyy,a,x,uu,v.v,w.w,M,x.x,M,,zzzz*hh<CR><LF>

Field	Name	Description
hhmmss.ss	UTC Time	UTC of position in hhmmss.sss format, (000000.000 ~ 235959.999)
lll.lll	Latitude	Latitude in ddmm.mmmm format. Leading zeros are inserted.
a	N/S Indicator	'N' = North, 'S' = South
yyyyy.yyy	Longitude	Longitude in dddmm.mmmm format. Leading zeros are inserted.
a	E/W Indicator	'E' = East, 'W' = West
x	GPS quality indicator	GPS quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode 3: GPS PPS Mode, fix valid 4: Real Time Kinematic. System used in RTK mode with fixed integers 5: Float RTK. Satellite system used in RTK mode. Floating integers 6: Estimated (dead reckoning) Mode 7: Manual Input Mode 8: Simulator Mode
uu	Satellites Used	Number of satellites in use, (00 ~ 24)
v.v	HDOP	Horizontal dilution of precision, (00.0 ~ 99.9)
w.w	Altitude	mean sea level altitude (-9999.9 ~ 17999.9) in meter
x.x	Geoidal Separation	In meter
zzzz	DGPS Station ID	Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
hh	Checksum	

GLL – Geographic Position – Latitude/Longitude

Latitude and longitude of vessel position, time of position fix and status.

Format:

\$--GLL,lll.lll,a,yyyyy.yyy,b,hhmmss.sss,A,a*hh<CR><LF>

Field	Name	Description
lll.lll	Latitude	Latitude in ddmm.mmmm format. Leading zeros are inserted.
a	N/S Indicator	'N' = North, 'S' = South
yyyyy.yyy	Longitude	Longitude in dddmm.mmmm format. Leading zeros are inserted.
b	E/W Indicator	'E' = East, 'W' = West
hhmmss.sss	UTC Time	UTC of position in hhmmss.sss format, (000000.000 ~ 235959.999)
A	Status	A= data valid, V= Data not valid
hh	Checksum	

GSA – GNSS DOP and Active Satellites

GPS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentence and DOP values.

Format:

\$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,u.u,v.v,z.z*hh<CR><LF>

Field	Name	Description
a	Mode	Mode 'M' = Manual, forced to operate in 2D or 3D mode 'A' = Automatic, allowed to automatically switch 2D/3D
x	Mode	Fix type 1 = Fix not available 2 = 2D 3 = 3D
xx's	Satellite ID	01 to 32 are for GPS; 33-64 are for WAAS (PRN minus 87); 65-96 are for GLONASS (64 plus slot numbers). Maximally 12 satellites are included in each GSA sentence.
u.u	PDOP	Position dilution of precision (00.0 to 99.9)
v.v	HDOP	Horizontal dilution of precision (00.0 to 99.9)
z.z	VDOP	Vertical dilution of precision (00.0 to 99.9)
hh	Checksum	

GSV – GNSS Satellites in View

Number of satellites (SV) in view, satellite ID numbers, elevation, azimuth, and SNR value. Four satellites maximum per transmission.

Format:

\$--GSV,x,u,xx,uu,vv,zzz,ss,uu,vv,zzz,ss,...,uu,vv,zzz,ss*hh<CR><LF>

Field	Name	Description
x	Number of message	Total number of GSV messages to be transmitted (1-3)
u	Sequence number	Sequence number of current GSV message
xx	Satellites in view	Total number of satellites in view (00 ~ 12)
uu	Satellite ID	01 to 32 are for GPS; 33-64 are for WAAS (PRN minus 87); 65-96 are for GLONASS (64 plus slot numbers). Maximally 12 satellites are included in each GSA sentence.
vv	Elevation	Satellite elevation in degrees, (00 ~ 90)
zzz	Azimuth	Satellite azimuth angle in degrees, (000 ~ 359)
ss	SNR	C/No in dB (00 ~ 99) Null when not tracking
hh	Checksum	

Note: The GN identifier is not used in the GSV message.

RMC – Recommended Minimum Specific GNSS Data

Time, date, position, course and speed data provided by a GNSS navigation receiver.

Format:

\$--RMC,hhmmss.sss,x,lll.ill,a,yyyy.yyy,a,x.x,u.u,xxxxx,,v*hh<CR><LF>

Field	Name	Description
hhmmss.sss	UTC time	UTC time in hhmmss.sss format (000000.000 ~ 235959.999)
x	Status	Status 'V' = Navigation receiver warning 'A' = Data Valid
lll.ill	Latitude	Latitude in dddmm.mmmm format. Leading zeros are inserted.
a	N/S indicator	'N' = North; 'S' = South
yyyyy.yyy	Longitude	Longitude in dddmm.mmmm format. Leading zeros are inserted.
a	E/W Indicator	'E' = East; 'W' = West
x.x	Speed over ground	Speed over ground in knots (000.0 ~ 999.9)
u.u	Course over ground	Course over ground in degrees (000.0 ~ 359.9)
xxxxxx	UTC Date	UTC date of position fix, ddmmyy format
v	Mode indicator	Mode indicator 'N' = Data not valid 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'S' = Simulator mode
hh	checksum	

VTG – Course Over Ground and Ground Speed

The actual course and speed relative to the ground.

Format:

\$--VTG,x.x,T,y,y,M,u.u,N,v.v,K,m*hh<CR><LF>

Field	Name	Description
x.x	Course	Course over ground, degrees True (000.0 ~ 359.9)
y.y	Course	Course over ground, degrees Magnetic (000.0 ~ 359.9)
u.u	Speed	Speed over ground in knots (000.0 ~ 999.9)
v.v	Speed	Speed over ground in kilometers per hour (0000.0 ~ 1800.0)
m	Mode	Mode indicator 'N' = not valid 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'S' = Simulator mode
hh	Checksum	

ZDA – Time and Date

UTC, day, month, year and local time zone.

Format:

\$--ZDA,hhmmss.sss,dd,mm,yyyy,xx,yy*hh<CR><LF>

Field	Name	Description
hhmmss.sss	UTC time	UTC time in hhmmss.sss format (000000.000 ~ 235959.999)
dd	UTC day	01 to 31
mm	UTC month	01 to 12
yyyy	UTC year	Four-digit year number
xx	Local zone hours	00 to +-13
yy	Local zone minutes	00 to +59
hh	Checksum	

GNS – GNSS Fix Data

Time, position, and fix related data of the receiver.

Format:

\$--GNS,hhmmss.sss,llll.lll,a,yyyyy.yyy,a,cc,uu,v.v,w.w,x.x,,*hh<CR><LF>

Field	Name	Description
hhmmss.sss	UTC time	UTC time in hhmmss.sss format (000000.000 ~ 235959.999)
llll.lll,	Latitude	Latitude in ddmm.mmmm format. Leading zeros are inserted.
a	N/S Indicator	'N' = North, 'S' = South
yyyyy.yyy	Longitude	Longitude in dddmm.mmmm format. Leading zeros are inserted.
a	E/W Indicator	'E' = East, 'W' = West
cc	Mode Indicator	The first character indicates the use of GPS satellites, and the second character indicates the use of GLONASS satellites. N: No fix A: Autonomous, non-differential mode D: Differential mode P: Precise, no SA, higher resolution (P-code) used R: Real Time Kinematic. System used in RTK mode with fixed integers F: Float RTK. Satellite system used in RTK mode. Floating integers E: Estimated (dead reckoning) Mode M: Manual Input Mode S: Simulator Mode
uu	Satellites Used	Number of satellites in use, (00 ~ 24)
v.v	HDOP	Horizontal dilution of precision, (00.0 ~ 99.9)
w.w	Altitude	Mean sea level altitude (-9999.9 ~ 17999.9) in meter
x.x	Geoidal Separation	In meter
hh	Checksum	

The following examples illustrate the use of NMEA GGA/GSA/GSV sentences under different satellite constellations.

Examples:

Case 1: Only GPS satellites are available for the navigation solution.

```
$GNGGA,083613.333,2447.0963,N,12100.5393,E,1,07,1.6,138.8,19.6,,0000*60
$GPGSA,A,3,03,19,24,08,20,32,28,,,,,,,,,2.7,1.0,2.5*23
$GPGSV,3,1,12,11,82,240,20,07,62,241,21,08,45,304,28,19,35,038,31*72
$GLGSV,1,1,01,75,67,268,25,,,,,,,,,,,,,*B3 (this sentence will be output if GLONASS satellites are tracked by the receiver)
:
:
:
```

Case 2: Only GLONASS satellites are available for the navigation solution.

```
$GNGGA,083613.333,2447.0963,N,12100.5393,E,1,04,1.6,138.8,19.6,,0000*60
$GLGSA,A,3,71,72,87,86,,,,,,,,,2.7,1.0,2.5*25
$GPGSV,1,1,1,11,82,240,20,,,,,,,,,,,,,*2A (this sentence will be output if GPS satellites are tracked by the receiver)
$GLGSV,2,1,05,71,73,268,38,72,45,279,37,87,42,000,33,86,36,287,35*65
$GLGSV,2,2,05,74,39,268,28,,,,,,,,,,,,,*34
:
:
:
```

Case 3: Both GPS and GLONASS satellites are available for the navigation solution.

```
$GNGGA,083613.333,2447.0963,N,12100.5393,E,1,08,1.6,138.8,19.6,,0000*60
$GNGSA,A,3,03,19,24,08,20,32,,,,,,,,,2.7,1.0,2.5*23
$GNGSA,A,3,87,72,,,,,,,,,2.7,1.0,2.5*25
$GPGSV,3,1,7,03,82,240,41,19,62,241,40,24,45,304,39,08,35,038,38*72
$GPGSV,3,2,7,20,35,143,38,32,51,221,37,02,04,135,27,,,,*72
$GLGSV,1,1,03,87,73,268,38,72,42,041,36,65,36,287,,,,*78
:
:
```

Summary

The supported NMEA messages of SkyTraQ GLONASS/GPS receiver and the meaning are summarized in the following list.

NMEA message with the talker identifier	Meaning
GPGGA/GNGGA	The fix data of the GLONASS/GPS receiver.
GNGNS	The fix data of the GLONASS/GPS receiver.
GPGSA	Fix status and the ID numbers of the satellites used in GPS-only navigation solution
GLGSA	Fix status and the ID numbers of the satellites used in GLONASS-only navigation solution
GNGSA	Fix status and the ID numbers of the satellites used in combined (GLONASS and GPS) navigation solution. Two sentences are output for every navigation epoch. The first and the second sentence provide information about GPS and GLONASS satellites which are used in the navigation solution, respectively.
GPGSV	The information of the GPS satellites in view of the receiver.
GLGSV	The information of the GLONASS satellites in view of the receiver.
GNRMC/GPRMC	Time, date, position, course and speed information for GPS/GLONASS receiver.
GNVTG/GPVTG	Course and speed information relative to the ground for GPS/GLONASS receiver.

ORDERING INFORMATION

Model Name	Description
G2M1-A	GLONASS/GPS Mouse Receiver, PS2 Connector
G2M1-B	GLONASS/GPS Mouse Receiver, USB Connector

The information provided is believed to be accurate and reliable. These materials are provided to customers and may be used for informational purposes only. No responsibility is assumed for errors or omissions in these materials, or for its use. Changes to specification can occur at any time without notice.

These materials are provided "as is" without warranty of any kind, either expressed or implied, relating to sale and/or use including liability or warranties relating to fitness for a particular purpose, consequential or incidental damages, merchantability, or infringement of any patent, copyright or other intellectual property right. No warrant on the accuracy or completeness of the information, text, graphics or other items contained within these materials. No liability assumed for any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of these materials.

The product is not intended for use in medical, life-support devices, or applications involving potential risk of death, personal injury, or severe property damage in case of failure of the product.
