

# USER MANUAL

## UG-301

*Bluetooth GPS Navigator*



The UG-301 is optimized for good performance and low cost. Its 12 parallel channels and 4000 search bins provide short start-up time and fast signal acquisition. Having fast time-to-first-fix and enhanced acquisition sensitivity of  $-137\text{dBm}$  and tracking sensitivity of  $-145\text{dBm}$  provides excellent navigation performance even in urban canyons having limited sky view and under deep foliage, without compromising accuracy.

The onboard patch antenna provides good signal reception. In situations where the UG-301 is integrated into an application where the patch antenna has limited view of the sky, external active antenna may be directly connected via the MMCX connector to provide improved signal reception.

\* Class 2 Bluetooth offers up to 10 meters of wireless operation with Bluetooth-enabled devices such as PDA or Tablet-PC.

### **FEATURES**

- 12 channel GPS receiver
- Class 2 Bluetooth module
- 4000 simultaneous time-frequency search bins
- SBAS (WAAS, EGNOS) support
- $-137\text{dBm}$  acquisition sensitivity
- $-145\text{dBm}$  tracking sensitivity
- <10 second hot start
- <45 second cold start
- 5m CEP accuracy
- Low power consumption
- 8hrs operation time

**MECHANICAL DIMENTION**

Unit: mm



**ACCESSORIES**

**I. Standard: Adaptors (Car & Travel)**



**II. Optional: External Antenna & PDA Holder**



**HARDWARE SPECIFICATIONS**

	<b>Item</b>	<b>Description</b>
<b>1</b>	Receiver Type	12 channel (L1 frequency, C/A code)
<b>2</b>	Position Accuracy	5m CEP autonomous 2.0m CEP SBAS
<b>3</b>	Time to First Fix	<10 sec Hot Start <35 sec Warm Start <45 sec Cold Start
<b>4</b>	Signal Reacquisition	<1s
<b>5</b>	Sensitivity	-137dBm acquisition -145dBm tracking
<b>6</b>	Dynamics	<4G
<b>7</b>	Operational Limits	Altitude < 18,300m Velocity < 514m/se
<b>8</b>	Protocol	NMEA0183v3.01 Baud rate: 9600
<b>9</b>	Datum	WGS-84 (User definable)
<b>10</b>	Current Consumption	110mA
<b>11</b>	Operating Temperature	-20°C ~ 60°C
<b>12</b>	External antenna connector	MMCX
<b>13</b>	Bluetooth	SPP compatible Version 1.1 compliant Class-2 operation 4dBm output level Up to 10m of operation
<b>14</b>	LED Indicator	Blue - Bluetooth status Red - Battery low Green - Charging battery
<b>15</b>	Slide Switch	Power on/off
<b>16</b>	Battery	For BLC-2 type Li-ION (3.6V Rechargeable battery)
<b>17</b>	DC Input Voltage	5.0V
<b>18</b>	DC Input Connector	Mini-USB
<b>19</b>	Dimension	80mm×50mm×26mm
<b>20</b>	Weight	<180g

**NMEA OUTPUT MESSAGE SPECIFICATION**

**GGA - GPS FIX DATA**

Time, position and position-fix related data (number of satellites in use, HDOP, etc.).

**Format:**

\$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>,\*<13><CR><LF>

**Example:**

\$GPGGA,104549.04,2447.2038,N,12100.4990,E,1,06,01.7,00078.8,M,0016.3,M,,\*5C<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	2447.2038	Latitude in ddmm.mmmm format Leading zeros transmitted
3	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	1	Position fix quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode
7	06	Number of satellites in use, 00 ~ 12
8	01.7	Horizontal dilution of precision, 00.0 ~ 99.9
9	00078.8	Antenna height above/below mean sea level, -9999.9 ~ 17999.9
10	0016.3	Geoidal height, -999.9 ~ 9999.9
11		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12		Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	5C	Checksum

**Note:** The checksum field starts with a '\*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '\$' and '\*'.

**GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS**

Latitude and longitude of current position, time, and status.

**Format:**

\$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>,<7>\*<8><CR><LF>

**Example:**

\$GPGLL,2447.2073,N,12100.5022,E,104548.04,A,A\*65<CR><LF>

Field	Example	Description
1	2447.2073	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
3	12100.5022	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
5	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
6	A	Status, 'A' = valid position, 'V' = navigation receiver warning
7	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
8	65	Checksum

**GSA - GPS DOP AND ACTIVE SATELLITES**

GPS receiver operating mode, satellites used for navigation, and DOP values.

**Format:**

\$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>\*<7><CR><LF>

**Example:**

\$GPGSA,A,3,26,21,,,09,17,,,,,10.8,02.1,10.6\*07<CR><LF>

Field	Example	Description
1	A	Mode, 'M' = Manual, 'A' = Automatic
2	3	Fix type, 1 = not available, 2 = 2D fix, 3 = 3D fix
3	26,21,,,09,17,,,,,	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	10.8	Position dilution of precision, 00.0 to 99.9
5	02.1	Horizontal dilution of precision, 00.0 to 99.9
6	10.6	Vertical dilution of precision, 00.0 to 99.9
7	07	Checksum

**GSV - GPS SATELLITE IN VIEW**

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Only up to four satellite details are transmitted per message. Additional satellite in view information is sent in subsequent GSV messages.

**Format:**

\$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,...,<4>,<5>,<6>,<7> \* <8><CR><LF>

**Example:**

\$GPGSV,2,1,08,26,50,016,40,09,50,173,39,21,43,316,38,17,41,144,42\*7C<CR><LF>

\$GPGSV,2,2,08,29,38,029,37,10,27,082,32,18,22,309,24,24,09,145,\*7B<CR><LF>

Field	Example	Description
1	2	Total number of GSV messages to be transmitted
2	1	Number of current GSV message
3	08	Total number of satellites in view, 00 ~ 12
4	26	Satellite PRN number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	50	Satellite elevation number, 00 ~ 90 degrees
6	016	Satellite azimuth angle, 000 ~ 359 degrees
7	40	C/No, 00 ~ 99 dB Null when not tracking
8	7C	Checksum

**VTG - COURSE OVER GROUND AND GROUND SPEED**

Velocity is given as course over ground (COG) and speed over ground (SOG).

**Format:**

GPVTG,<1>,T,<2>,M,<3>,N,<4>,K,<5>\* <6><CR><LF>

**Example:**

\$GPVTG,221.0,T,224.3,M,016.0,N,0029.6,K,A\*1F<CR><LF>

Field	Example	Description
1	221.0	True course over ground, 000.0 ~ 359.9 degrees
2	224.3	Magnetic course over ground, 000.0 ~ 359.9 degrees
3	016.0	Speed over ground, 000.0 ~ 999.9 knots
4	0029.6	Speed over ground, 0000.0 ~ 1800.0 kilometers per hour
5	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
6	1F	Checksum

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### RMC - RECOMMENDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data.

**Format:**

\$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>\*<13><CR><LF>

**Example:**

\$GPRMC,104549.04,A,2447.2038,N,12100.4990,E,016.0,221.0,250304,003.3,W,A\*22<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	A	Status, 'V' = navigation receiver warning, 'A' = valid position
3	2447.2038	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
5	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
7	016.0	Speed over ground, 000.0 ~ 999.9 knots
8	221.0	Course over ground, 000.0 ~ 359.9 degrees
9	250304	UTC date of position fix, ddmmyy format
10	003.3	Magnetic variation, 000.0 ~ 180.0 degrees
11	W	Magnetic variation direction, 'E' = East, 'W' = West
12	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
13	22	Checksum

### ZDA TIME AND DATE

**Format:**

\$GPZDA,<1>,<2>,<3>,<4>,<5>,<6>\*<7><CR><LF>

**Example:**

\$GPZDA, 104548.04,25,03,2004,\*,6C<CR><LF>

Field	Example	Description
1	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	25	UTC time: day (01 ... 31)
3	03	UTC time: month (01 ... 12)
4	2004	UTC time: year (4 digit year)
5		Local zone hour Not being output by the receiver (NULL)
6		Local zone minutes Not being output by the receiver (NULL)
7	6C	Checksum