

# YIC



**GPS & GLONASS Receiver (G-Mouse)**

**GT-302GG**

**GT-302MGG**

**Datasheet**

## Revision History

| Date       | Reversion | Description               |
|------------|-----------|---------------------------|
| 2022/01/13 | 1.0       | First Draft, Based on YIC |
|            |           |                           |

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## 1. Product Information

### 1.1 Product Description

The GT-302GG is a stand-alone UART interface GNSS receiver, featuring the high performance GOKE positioning engine. It is flexible and cost effective receiver offers numerous connectivity options in a miniature enclosure 45x38x13 mm.

Through the feature of 66-channel, the GT-302GG boasts a hot start in less than 1 second. Innovative design and technology suppresses jamming sources and mitigates multipath effects, assisting GT-302GG GNSS receivers excellent navigation performance even in the most challenging environment.

### Applications

- Automotive Navigation
- Personal Positioning
- Fleet Management
- Marine Navigation

### 1.2 Product Features

- Build on High Performance, Low-Power GOKE chipset
- Low Power Consumption: Max 45mA@3.3V
- Ultra High Track Sensitivity: -165dBm
- Built in High Gain LNA
- The built-in Super Capacitor for Backup Ephemeris
- Extremely Fast TTFF at Low Signal Level
- Communication Type: UART/TTL
- NMEA-0183 Compliant Protocol or Custom Protocol
- RoHS Compliant

## 1.3 Product Specifications

| GPS Receiver             |  |                                       |
|--------------------------|--|---------------------------------------|
| Chip                     | GOKE   |                                       |
| Frequency                | Code 66 search channels ,22 synchronous tracking channels<br>GPS&QZSS L1 1575.42MHz C/A<br>Beidou B1 1561.098MHz<br>GALILEO E1B/C1<br>GLONASS L1OF 1602MHz<br>SBAS: WAAS, EGNOS, MSAS, GAGAN |                                       |
| Update Rate              | 1Hz (default)  |                                       |
| Position Accuracy        | Position   | <2.5m CEP @-130dBm                    |
|                          | Accuracy of 1PPS Signal  | Time pulse signal: RMS 100ns          |
|                          | Acceleration Accuracy  | Without aid: 0.1m/s <sup>2</sup>      |
| Startup Time             | Cold start   | 35s typ @-130dBm                      |
|                          | Warm start   | 30s typ @-130dBm                      |
|                          | Hot start  | 1s typ @-130dBm                       |
| Sensitivity              | Acquisition  | -147Bm                                |
|                          | Re-acquisition   | -156Bm                                |
|                          | Tracking   | -165dBm                               |
| GNSS Operating limit     | Altitude   | 18,000m                               |
|                          | Velocity   | 515m/s                                |
|                          | Acceleration   | 4G                                    |
| Protocol Support         | UART Port: TXD and RXD<br>9600bps (default), Supports baud rate 4800bps to 460800bps<br>NMEA 0183 Protocol   |                                       |
| Environment              | Operation temperature  | -40°C ~ +85°C                         |
|                          | Storage temperature  | -45°C ~ +125°C                        |
| Physical Characteristics | Size   | 45±0.20(L) × 38±0.20(W) ×13±0.50(H)mm |
|                          | Weight   | Approx. 80g                           |

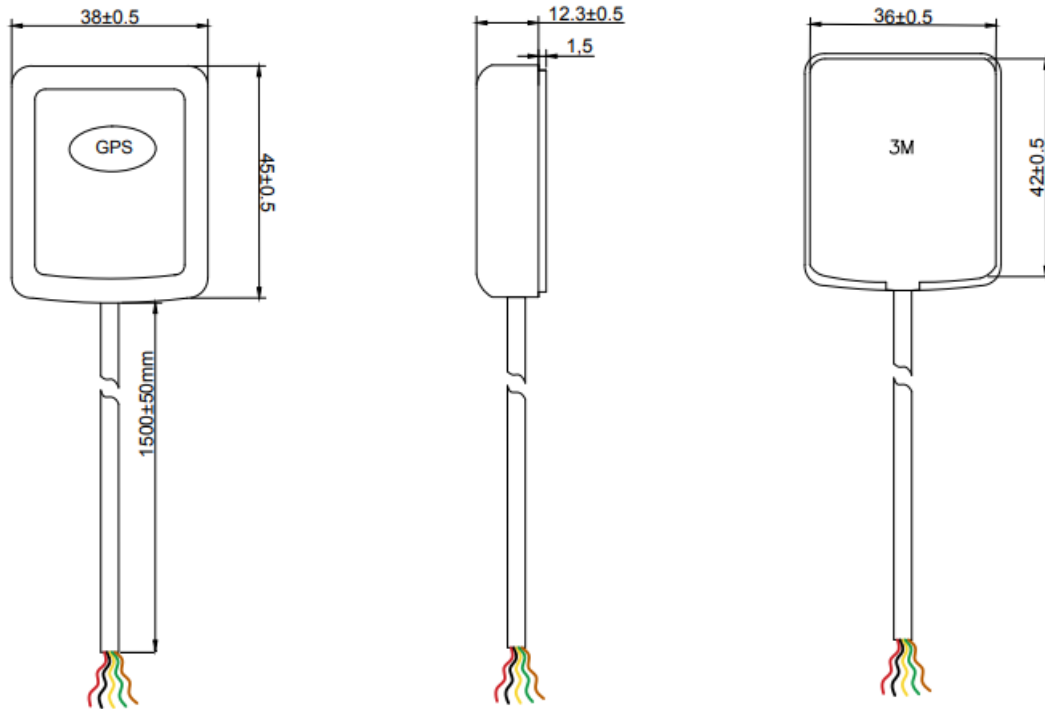
## 1.4 DC Electrical Characteristics

| Parameter                       | Min. | Typ. | Max. | Units |
|---------------------------------|------|------|------|-------|
| Input Voltage                   | 3.0  | 3.3  | 5.5  | Volt  |
| Acquisition                     |      | 40   |      | mA    |
| Tracking                        |      | 36   |      | mA    |
| Backup Battery                  |      | 15   |      | uA    |
| Low Level Output Voltage (VOL)  |      |      | 0.4  | Volt  |
| High Level Output Voltage (VOH) | 2.4  |      |      | Volt  |
| Low Level Input Voltage (VIL)   |      |      | 0.8  | Volt  |
| High Level Input Voltage (VIH)  | 2    |      |      | Volt  |
| Low Level Output Current (IOL)  |      | 2    |      | mA    |
| High Level Output Current (IOH) |      | 2    |      | mA    |

## 2. Physical Dimensions

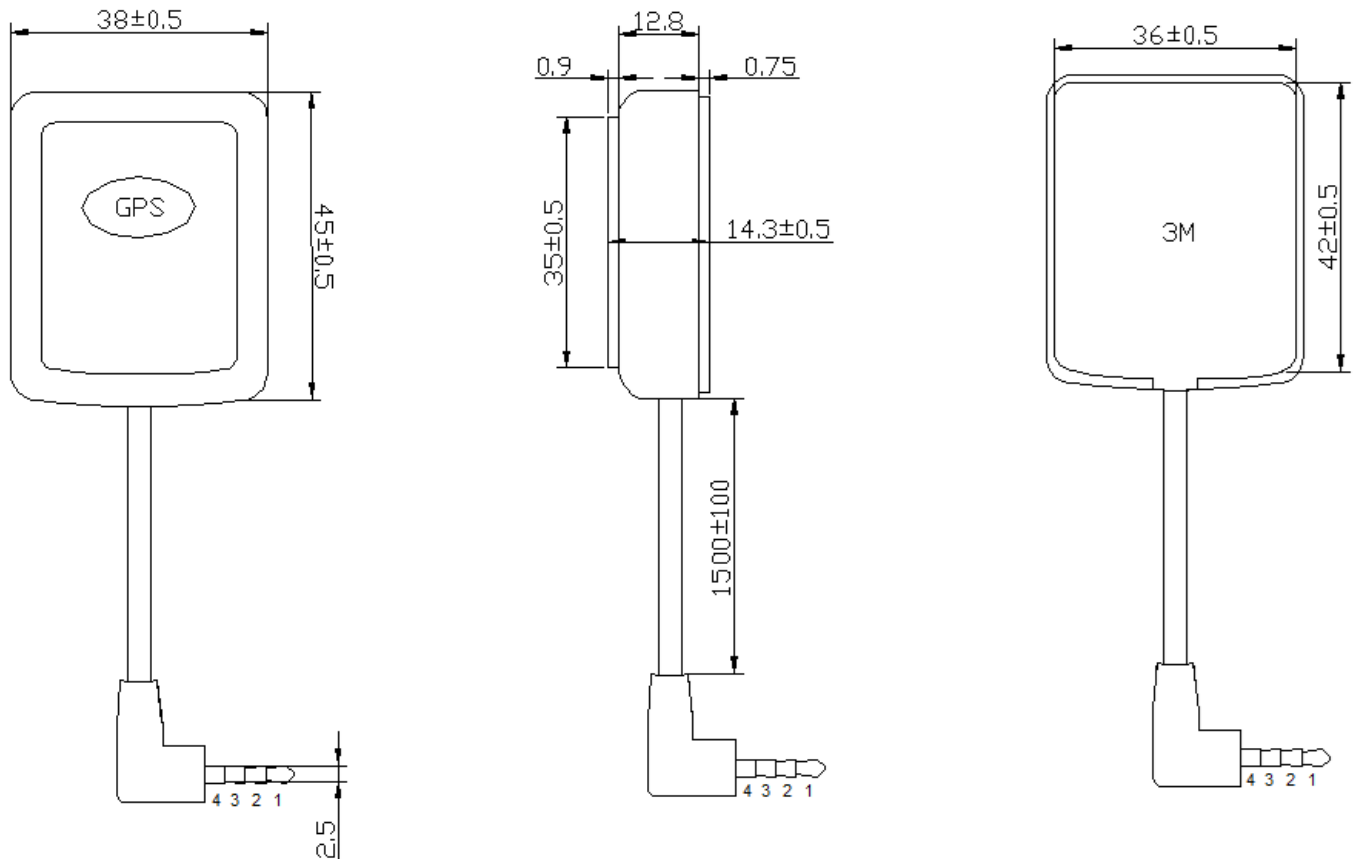
(Different Cables & Connectors can be Specified According to Requirements)

| P/N         | Mount               | Description                   |
|-------------|---------------------|-------------------------------|
| GT-302GG-N  | Adhesive            | No Connector, 5 Wire Open End |
| GT-302MGG-N | Adhesive + Magnetic | No Connector, 5 Wire Open End |



| Pin NO. | Pin Name | Remark                   |
|---------|----------|--------------------------|
| 1       | VCC      | Module Power Supply      |
| 2       | GND      | Ground                   |
| 3       | TXD      | UART/TTL Output          |
| 4       | RXD      | UART/TTL Input           |
| 5       | PPS      | Time Pulse (1PPS) Output |

| P/N            | Mount             | Description                 |
|----------------|-------------------|-----------------------------|
| GT-302PGG-E25  | Adhesive          | (4 pin 2.5mm Earphone Jack) |
| GT-302PMGG-E25 | Adhesive+Magnetic | (4 pin 2.5mm Earphone Jack) |
| GT-302PGG-E35  | Adhesive          | (4 pin 3.5mm Earphone Jack) |
| GT-302PMGG-E35 | Adhesive+Magnetic | (4 pin 3.5mm Earphone Jack) |

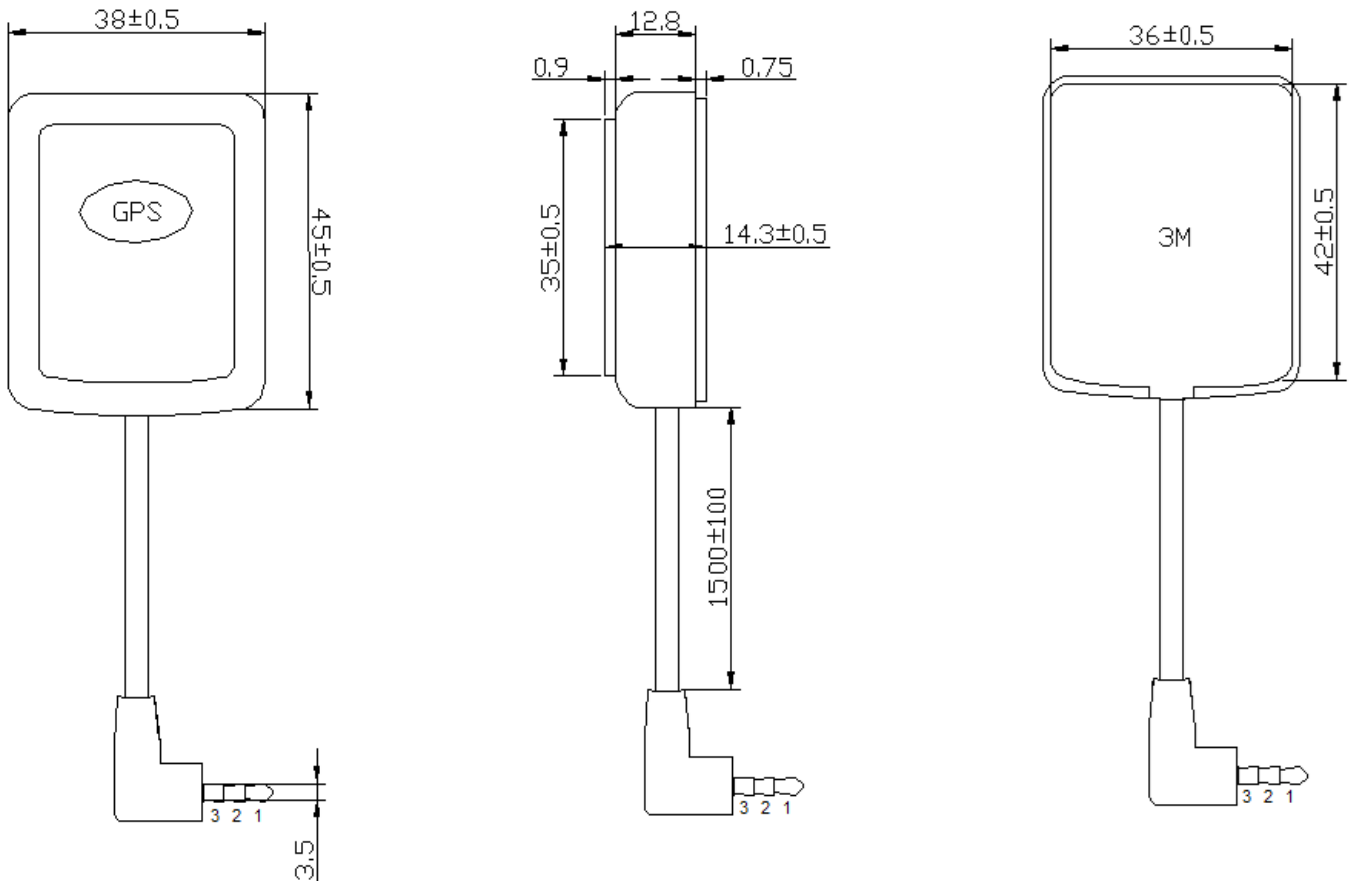


| I/O Interface             | Voltage level   |
|---------------------------|-----------------|
| 4 pin 2.5mm Earphone Jack | UART(TTL level) |
| 4 pin 3.5mm Earphone Jack | UART(TTL level) |

| Pin NO. | Pin Name | Remark          |
|---------|----------|-----------------|
| 1       | Vcc      | 3.0 - 5.0V DC   |
| 2       | RXD      | UART/TTL input  |
| 3       | TXD      | UART/TTL output |
| 4       | GND      | Ground          |



| P/N             | Mount             | Description                 |
|-----------------|-------------------|-----------------------------|
| GT-502PGG-E253  | Adhesive          | (3 pin 2.5mm Earphone Jack) |
| GT-502PMGG-E253 | Adhesive+Magnetic | (3 pin 2.5mm Earphone Jack) |
| GT-502PGG-E353  | Adhesive          | (3 pin 3.5mm Earphone Jack) |
| GT-502PMGG-E353 | Adhesive+Magnetic | (3 pin 3.5mm Earphone Jack) |



| I/O Interface             | Voltage level   |
|---------------------------|-----------------|
| 3 pin 2.5mm Earphone Jack | UART(TTL level) |
| 3 pin 3.5mm Earphone Jack | UART(TTL level) |

| Pin | Pin define | Level           |
|-----|------------|-----------------|
| 1   | Vcc        | 3.0 - 5.0V DC   |
| 2   | TXD        | UART/TTL output |
| 3   | GND        | Ground          |

### 3. Software Interface

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

## 4. Protocol

### 4.1 GGA-Global Positioning System Fixed Data

For example:

```
$xxGGA,161229.487,3723.24751,N, 12158.34160,W, 1,07,1.0,9.0,M.0000*18
```

| Field | Name                   | Example     | Units  | Description                       |
|-------|------------------------|-------------|--------|-----------------------------------|
| 1     | Message ID             | \$xxGGA     |        | GGA protocol header               |
| 2     | UTC Position           | 161229.487  |        | hhmmss.sss                        |
| 3     | Latitude               | 3723.24751  |        | ddmm.mmmm                         |
| 4     | N/S indicator          | N           |        | N=north or S=south                |
| 5     | Longitude              | 12158.34160 |        | dddmm.mmmm                        |
| 6     | E/W Indicator          | W           |        | E=east or W=west                  |
| 7     | Position Fix Indicator | 1           |        | See Table 1-1                     |
| 8     | Satellites Used        | 07          |        | Range 0 to 12                     |
| 9     | HDOP                   | 1.0         |        | Horizontal Dilution of Precision  |
| 10    | MSL Altitude           | 9.0         | meters |                                   |
| 11    | Units                  | M           | meters |                                   |
| 12    | Geoids Separation      |             | meters |                                   |
| 13    | Units                  | M           | meters |                                   |
| 14    | Age of Diff.Corr.      |             | second | Null fields when DGPS is not Used |
| 15    | Diff.Ref.Station ID    | 0000        |        |                                   |
| 16    | Check sum              | *18         |        |                                   |
| 17    | <CR> <LF>              |             |        | End of message termination        |

**Table 1-1: 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               |

## 4.2 GLL-Geographic Position - Latitude/Longitude

For example:

\$xxGLL , 3723.24755, N,12158.34161, W,161229.487, A\*2C

| Field | Name          | Example     | Units | Description                      |
|-------|---------------|-------------|-------|----------------------------------|
| 1     | Message ID    | \$xxGLL     |       | GLL protocol header              |
| 2     | Latitude      | 3723.24755  |       | ddmm.mmmm                        |
| 3     | N/S Indicator | N           |       | N=north or S=south               |
| 4     | Longitude     | 12158.34161 |       | dddmm.mmmm                       |
| 5     | E/W Indicator | W           |       | E=east or W=west                 |
| 6     | UTC Position  | 161229.487  |       | hhmmss.sss                       |
| 7     | Status        | A           |       | A=data valid or V=data not valid |
| 8     | Check sum     | *2C         |       |                                  |
| 9     | <CR> <LF>     |             |       | End of message termination       |

## 4.3 GSA – GNSS DOP and Active Satellites

For example:

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

| Field | Name           | Example | Units | Description                      |
|-------|----------------|---------|-------|----------------------------------|
| 1     | Message        | \$GPGSA |       | GSA protocol header              |
| 2     | Mode 1         | A       |       | See Table 1-2                    |
| 3     | Mode 2         | 3       |       | See Table 1-3                    |
| 4     | Satellite Used | 07      |       | Sv on Channel 1                  |
| 5     | Satellite Used | 02      |       | Sv on Channel 2                  |
| 6     | ...            | ...     |       | ...                              |
| 7     | Satellite Used |         |       | Sv on Channel 12                 |
| 8     | PDOP           | 1.8     |       | Position Dilution of Precision   |
| 9     | HDOP           | 1.0     |       | Horizontal Dilution of Precision |
| 10    | VDOP           | 1.5     |       | Vertical Dilution of Precision   |
| 11    | Check sum      | *33     |       |                                  |
| 12    | <CR> <LF>      |         |       | End of message termination       |

Table 1-2

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

Table 1-3

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

## 4.4 GSV - GNSS Satellites in View

For example :

\$xxGSV , 2, 1, 07, 07, 79,048, 42, 02, 51,062, 43, 26, 36,256, 42, 27, 27, 138,42\*71

\$xxGSV, 2, 2, 07, 09, 23,313, 42, 04, 19, 159, 41, 15,12,041, 42\*41

| Field | Name               | Example | Units   | Description                           |
|-------|--------------------|---------|---------|---------------------------------------|
| 1     | Message ID         | \$xxGSV |         | GSV protocol header                   |
| 2     | Number of Message  | 2       |         | Range 1 to 3                          |
| 3     | Message Number     | 1       |         | Range 1 to 3                          |
| 4     | Satellites in View | 07      |         |                                       |
| 5     | Satellite ID       | 07      |         | Channel 1(Range 1 to 32)              |
| 6     | Elevation          | 79      | degrees | Channel 1(Maximum 90)                 |
| 7     | Azinmuth           | 048     | degrees | Channel 1(True, Range 0 to 359)       |
| 8     | SNR(C/NO)          | 42      | dBHz    | Range 0 to 99,null when not tracking  |
| 9     | ...                |         |         | ...                                   |
| 10    | Satellite ID       | 27      |         | Channel 4(Range 1 to 32)              |
| 11    | Elevation          | 27      | degrees | Channel 4(Maximum 90)                 |
| 12    | Azimuth            | 138     | degrees | Channel 4(True, Range 0 to 359)       |
| 13    | SNR(C/NO)          | 42      | dBHz    | Range 0 to 99, null when not tracking |
| 14    | Check sum          | *71     |         |                                       |
| 15    | <CR> <LF>          |         |         | End of message termination            |

## 4.5 RMC - Recommended Minimum Specific GNSS Data

Structure:

\$xxRMC, 161229.487, A, 3723.24751, N, 12158.34161, W, 0.13,309.62, 120598,, \*10

| Field | Name               | Example     | Description                      |
|-------|--------------------|-------------|----------------------------------|
| 1     | Message ID         | \$xxRMC     | RMC protocol header              |
| 2     | UTS Position       | 161229.487  | hhmmss.sss                       |
| 3     | Status             | A           | A=data valid or V=data not valid |
| 4     | Latitude           | 3723.24751  | ddmm.mmmmm                       |
| 5     | N/S Indicator      | N           | N=north or S=south               |
| 6     | Longitude          | 12158.34161 | dddmm.mmmmm                      |
| 7     | E/W Indicator      | W           | E=east or W=west                 |
| 8     | Speed Over Ground  | 0.13        |                                  |
| 9     | Course Over        | 309.62      | True                             |
| 10    | Ground             |             |                                  |
| 11    | Date               | 120598      | dummy                            |
| 12    | Magnetic variation |             | E=east or W=west                 |
| 13    | Check sum          | *10         |                                  |
| 14    | <CR> <LF>          |             | End of message termination       |

## 4.6 VTG - Course Over Ground and Ground Speed

Structure:

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

| Field | Name       | Example | Description                |
|-------|------------|---------|----------------------------|
| 1     | Message ID | \$xxVTG | VTG protocol header        |
| 2     | Course     | 309.62  | Measured heading           |
| 3     | Reference  | T       | True                       |
| 4     | Course     |         | Measured heading           |
| 5     | Reference  | M       | Magnetic                   |
| 6     | Speed      | 0.13    | Measured horizontal speed  |
| 7     | Units      | N       | Knots                      |
| 8     | Speed      | 0.2     | Measured horizontal speed  |
| 9     | Units      | K       | Kilometer per hour         |
| 10    | Check sum  | *6E     |                            |
| 11    | <CR> <LF>  |         | End of message termination |