



GlobalTop Technology Inc.

## Mouse-DG Data Sheet

Part Number: MiniGmousDG-PS2

Revision: V0B



Mouse-DG is a GNSS receiver. It provides a solution that is high position and speed accuracy performance, with high sensitivity and tracking capabilities in urban conditions.

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## Version History

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# 1. Functional Description

## 1.1 Overview

The GlobalTop Mouse-DG is a dual system GNSS receiver which acquires and tracks GPS/GLONASS systems concurrently to provide high sensitivity and tracking capabilities in various urban conditions which makes Mouse-DG a perfect solution for performance critical applications.

Mouse-DG supports up to 210 PRN channels with 99 search channels and 33 simultaneous tracking channels. With QZSS, SBAS (note1) ranging (WAAS, EGNOS, MSAS), QZSS and AGPS, Mouse-DG can provide even more accurate positioning.

Mouse-DG is capable of achieving the industry's highest level of sensitivity (-165dBm) and instant Time-to-First Fix (TTFF).

The integrated precise GNSS signal processing engine of Mouse-DG allows ultra-precise positioning under low receptive, high velocity conditions.

The ISSCC2011 awarded **12-Multi-Tone Active Interference Canceller** capable of removing 12 active noise sources enables customer to have more flexibility in system design.

## 1.2 Highlights and Features

- ◆ 33 tracking/ 99 acquisition-channel GPS/GLONASS receiver
- ◆ Supports QZSS, SBAS(WAAS, EGNOS, MSAS) ranging
- ◆ Ultra-High Sensitivity: -165dBm
- ◆ High Update Rate: up to 10Hz<sup>(note1)</sup>
- ◆ 12 multi-tone active interference canceller<sup>(Note2)</sup> [ISSCC 2011 Award -Section 26.5]  
([http://isscc.org/doc/2011/isscc2011.advanceprogrambooklet\\_abstracts.pdf](http://isscc.org/doc/2011/isscc2011.advanceprogrambooklet_abstracts.pdf))
- ◆ AGPS Support for Fast TTFF (EPO in flash™ Enable 7 days/14 days)
- ◆ EASY™<sup>(note2)</sup>: Self-Generated Orbit Prediction for instant positioning fix
- ◆ AlwaysLocate™<sup>(note2)</sup> Intelligent Algorithm (Advance Power Periodic Mode) for power saving
- ◆ Logger function Embedded<sup>(note2)</sup>
- ◆ Gtop Firmware Customization Services
- ◆ GPS+GLONASS Consumption current(@5V):
  - Acquisition: 48mA Typical
  - Tracking: 38mA Typical

Note 1: SBAS can only be enabled when update rate is equal or less than to 5Hz.

Note2: Some features need special firmware or command programmed by customer, please refer to "PMTK Command List" and "Firmware check list\_C33".

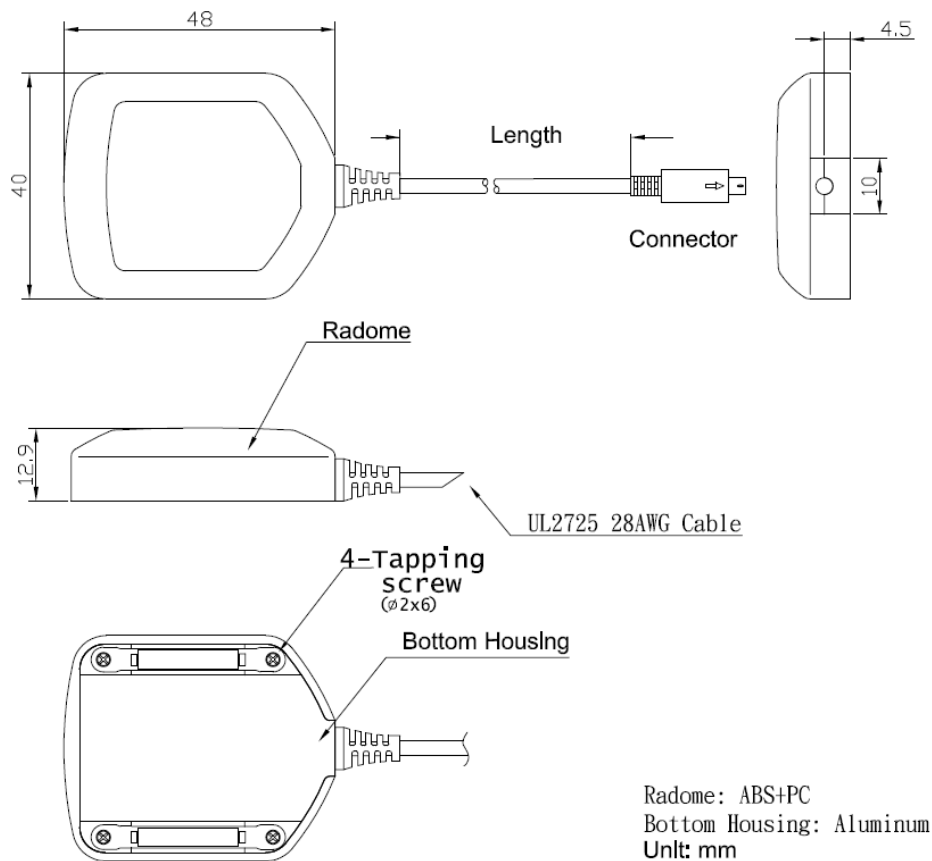
## 2. Specifications

### 2.1 Mechanical Data

Item	Specification
Size	48 x 40 x 12.9 mm
Cable Length	2,000 +/-40 mm
Connector	Mini Din 6 pin (PS2)

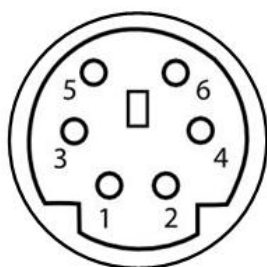
### 2.2 Mechanical Dimensions

Dimension: (Unit: mm, Tolerance: +/- 0.2mm)



## 2.3 Pin Assignment

Pin	Name	I/O	Description
1	+5VDC		
2	GND	P	Ground
3	NC		
4	RX(RS232)	I	Serial Data Input for PMTK command
5	TX(RS232)	O	Serial Date Output
6	NC		



## 2.4 Specification

Description	
GNSS Solution	MTK MT3333
Frequency	GPS L1, 1575.42MHz GLONASS L1, 1598.0625~1605.375MHz
Sensitivity	Acquisition: -148dBm, cold start Reacquisition: -163dBm Hot start Tracking: -165dBm
TTFF (No. of SVs>4, C/N>40dB, PDop<1.5)	Hot start: 1 second typical Warm start: 33 seconds typical Cold start: 35 seconds typical, 60 seconds Max
Position Accuracy	Without aid: 3.0m (50% CEP) DGPS(SBAS(WAAS,EGNOS,MSAS)): 2.5m (50% CEP)
Velocity Accuracy	Without aid: 0.1m/s DGPS(SBAS(WAAS,EGNOS,MSAS)):0.05m/s
Altitude	Maximum 50,000m (166,000 feet)
Velocity	Maximum 515m/s (1,000 knots)
Acceleration	Maximum 4G
Update Rate	1Hz (default), maximum 10Hz
Baud Rate	9600 bps (default)
DGPS	SBAS(default) [QZSS,WAAS, EGNOS, MSAS,GAGAN]
AGPS	Support
Power Supply	DC voltage: 5.0+/-10% V
Current Consumption @ 5.0V,1Hz Update Rate	GPS+GLONASS 48mA acquisition, 38mA tracking
Enclosure rating	IP67
Working Temperature	-40 °C to +85 °C
Dimension	48 x 40 x 12.9 mm
Weight	70g

## 3. Protocols

### 3.1 NMEA Output Sentences

**Table-1** lists each of the NMEA output sentences specifically developed and defined by MTK for use within MTK products

Table-1: NMEA Output Sentence	
Option	Description
GGA	Time, position and fix type data.
GSA	GNSS receiver operating mode, active satellites used in the position solution and DOP values.
GSV	The number of GNSS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
RMC	Time, date, position, course and speed data. Recommended Minimum Navigation Information.
VTG	Course and speed information relative to the ground.

**Table-2** lists NMEA output sentences in GPS system and GLONASS system.

Table-2: NMEA Output Sentence for GPS and GNSS					
System	GGA	GSA	GSV	RMC	VTG
GPS	GP GGA	GP GSA	GP GSV	GP RMC	GP VTG
GNSS(GPS+Glonass)	GP GGA	GN GSA	GP GSV GL GSV <sup>(Note1)</sup>	GP RMC <sup>(Note2)</sup> or GN RMC	GP VTG

(Note1): Talker ID “GP” means GPS satellite or “GL” means GLONASS satellite

(Note2): As soon as GNSS module receives GPS satellite and GLONASS satellite, it uses Talker ID “GN” to replace “GP” for GSA and RMC sentence.

#### Example:

GPS system:

```
$GP GGA,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,*65
$GP GSA,A,3,29,21,26,15,18,09,06,10,,,,,2.32,0.95,2.11*00
$GP GSV,3,1,09,29,36,029,42,21,46,314,43,26,44,020,43,15,21,321,39*7D
$GP GSV,3,2,09,18,26,314,40,09,57,170,44,06,20,229,37,10,26,084,37*77
$GP GSV,3,3,09,07,,,26*73
$GP RMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,3.05,W,A*2C
$GP VTG,165.48,T,M,0.03,N,0.06,K,A*37
```

GNSS (GPS+GLONASS) system:

```
$GP GGA,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,*65
$GN GSA,A,3,08,28,20,04,32,17,11,,,,,1.00,0.63,0.77*1B ←This line for GPS satellite
$GN GSA,A,3,77,76,86,78,65,88,87,71,72,,,,,1.00,0.63,0.77*17 ← This line for GLONASS satellite
$GP GSV,4,1,14,28,75,321,44,42,54,137,39,20,53,080,44,17,40,330,44*77 ←Talker ID “GP” for GPS satellite
```



\$GPGSV,4,2,14,04,33,253,43,32,28,055,41,08,26,212,40,11,14,055,33\*7F

\$GPGSV,4,3,14,10,12,198,,07,06,179,38,23,04,125,44,27,02,314,\*7E

\$GPGSV,4,4,14,193,,,42,01,,,36\*45

\$**GL**GSV,3,1,09,72,45,084,40,77,39,246,44,87,36,014,44,65,33,157,36\*62 ←Talker ID “GL” for GLONASS  
satellite

\$GLGSV,3,2,09,78,26,306,41,88,23,315,42,76,15,192,38,86,13,067,38\*64

\$GLGSV,3,3,09,71,12,035,38\*54

\$**GN**RMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,3.05,W,A\*2C ←Talker ID “GN” for  
GPS+GLONASS satellite

\$GPVTG,165.48,T,,M,0.03,N,0.06,K,A\*37

## GGA—Fixed Data. Time, Position and fix related data

**Table-3** contains the values for the following example:

\$GPGGA,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,\*65

Table-3: GGA Data Format			
Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	064951.000		hhmmss.sss
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See <b>Table-4</b>
Satellites Used	8		Range 0 to 14
HDOP	0.95		Horizontal Dilution of Precision
MSL Altitude	39.9	meters	Antenna Altitude above/below mean-sea-level
Units	M	meters	Units of antenna altitude
Geoidal Separation	17.8	meters	
Units	M	meters	Units of geoids separation
Age of Diff. Corr.		second	Null fields when DGPS is not used
Checksum	*65		
<CR> <LF>			End of message termination

Table-4: Position Fix Indicator	
Value	Description
0	Fix not available
1	GPS fix
2	Differential GPS fix

## GSA—GNSS DOP and Active Satellites

**Table-5** contains the values for the following example:

\$GNGSA,A,3,08,28,20,04,32,17,11,,,,,1.00,0.63,0.77\*1B (GPS Information)

\$GNGSA,A,3,77,76,86,78,65,88,87,71,72,,,,,1.00,0.63,0.77\*17 (Glonass Information)

Table-5: GSA Data Format			
Name	Example	Units	Description
Message ID	\$GNGSA		GSA protocol header
Mode 1	A		See <b>Table-6</b>
Mode 2	3		See <b>Table-7</b>
Satellite Used <sup>1</sup>	29		SV on Channel 1
Satellite Used <sup>1</sup>	21		SV on Channel 2
....	....	....	....
Satellite Used <sup>1</sup>			SV on Channel 12
PDOP	2.32		Position Dilution of Precision
HDOP	0.95		Horizontal Dilution of Precision
VDOP	2.11		Vertical Dilution of Precision
Checksum	*00		
<CR> <LF>			End of message termination

Note1: GPS SV No. : #1~#32    Glonass SV No.: #65~#96

Table-6: Mode 1	
Value	Description
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Table-7: Mode 2	
Value	Description
1	Fix not available
2	2D (< 4 SVs used)
3	3D (≥ 4 SVs used)

## GSV— Satellites in View, includes GPS (GPGSV) and GLONASS(GLGSV)

**Table-8** contains the values for the following example :

\$GPGSV,4,1,14,28,75,321,44,42,54,137,39,20,53,080,44,17,40,330,44\*77

\$GPGSV,4,2,14,04,33,253,43,32,28,055,41,08,26,212,40,11,14,055,33\*7F

\$GPGSV,4,3,14,10,12,198,,07,06,179,38,23,04,125,44,27,02,314,\*7E

\$GPGSV,4,4,14,193,,,42,01,,,36\*45

Table-8: GPGSV Data Format			
Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages	4		Range 1 to 4 (Depending on the number of satellites tracked, multiple messages of GSV data may be required.)
Message Number1	1		Range 1 to 4
Satellites in View	14		
Satellite ID	28		Channel 1 (Range 1 to 32)
Elevation	75	degrees	Channel 1 (Maximum 90)
Azimuth	321	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	44	dBHz	Range 0 to 99, (null when not tracking)
....	....	....	....
Satellite ID	17		Channel 4 (Range 1 to 32)
Elevation	40	degrees	Channel 4 (Maximum 90)
Azimuth	330	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	44	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7D		
<CR> <LF>			End of message termination

**Table-9** contains the values for the following example :

\$GLGSV,3,1,09,72,45,084,40,77,39,246,44,87,36,014,44,65,33,157,36\*62

\$GLGSV,3,2,09,78,26,306,41,88,23,315,42,76,15,192,38,86,13,067,38\*64

\$GLGSV,3,3,09,71,12,035,38\*54

Table-9: GLGSV Data Format			
Name	Example	Units	Description
Message ID	\$GLGSV		GSV protocol header
Number of Messages	4		Range 1 to 4 (Depending on the number of satellites tracked, multiple messages of GSV data may be required.)
Message Number1	1		Range 1 to 4
Satellites in View	09		
Satellite ID	78		Channel 1 (Range 1 to 32)
Elevation	26	degrees	Channel 1 (Maximum 90)
Azimuth	306	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	41	dBHz	Range 0 to 99, (null when not tracking)
....	....	....	....
Satellite ID	88		Channel 4 (Range 1 to 32)
Elevation	23	degrees	Channel 4 (Maximum 90)
Azimuth	315	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7D		
<CR> <LF>			End of message termination

**RMC—Recommended Minimum Navigation Information, includes GPS(GPRMC) or GNSS(GNRMC)**

**Table-10** contains the values for the following example :

\$GPRMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,3.05,W,A\*2C

Table-10: RMC Data Format			
Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	064951.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed over Ground	0.03	knots	
Course over Ground	165.48	degrees	True
Date	260406		ddmmyy
Magnetic Variation	3.05, W	degrees	E=east or W=west (Need GlobalTop Customization Service)
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*2C		
<CR> <LF>			End of message termination

**Table-11** contains the values for the following example :

\$GNRMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,3.05,W,A\*2C

Table-11: RMC Data Format			
Name	Example	Units	Description
Message ID	\$GNRMC		RMC protocol header
UTC Time	064951.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed over Ground	0.03	knots	
Course over Ground	165.48	degrees	True
Date	260406		ddmmyy
Magnetic Variation	3.05, W	degrees	E=east or W=west (Need GlobalTop Customization Service)
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*2C		
<CR> <LF>			End of message termination

## VTG—Course and speed information relative to the ground

**Table-12** contains the values for the following example:

\$GPVTG,165.48,T,,M,0.03,N,0.06,K,A\*37

Table-12: VTG Data Format			
Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	165.48	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic (Need GlobalTop Customization Service)
Speed	0.03	knots	Measured horizontal speed
Units	N		Knots
Speed	0.06	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*06		
<CR> <LF>			End of message termination

## 3.2 MTK NMEA Command Protocols

### Packet Type:

103 PMTK\_CMD\_COLD\_START

### Packet Meaning:

Cold Start : Don't use Time, Position, Almanacs and Ephemeris data at re-start.

### Example:

\$PMTK103\*30<CR><LF>

## 4. Contact Information

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