

AscenKorea Inc.

## MiniGmouseDG-PS2

### Data Sheet

Revision : V0B



The MiniGmouseDG-PS2 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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Revision	Date	Author	Description
VOA	2014/8/10	Dennis Choi	First release
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# 1. Functional Description

## 1.1 Overview

The AscenKorea MiniGmouseDG-PS2 is a GNSS module. It is a GPS receiver providing a solution that high position and speed accuracy performances as well as high sensitivity and tracking capabilities in urban conditions that support various location and navigation applications, including autonomous GPS, GLONASS, QZSS, SBAS(note1) ranging (WAAS, EGNOS, MSAS), QZSS, and AGPS. It support up to 210 PRN channels with 99 search channels and 33 simultaneous tracking channels.

It is the industry's highest level of sensitivity (-165dBm) and instant Time-to-First Fix (TTFF). Precise GNSS signal processing give the ultra-precise positioning under low receptive, high velocity conditions. Up to 12 multi-tone active interference canceller (ISSCC2011 award), customer can 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>
- ◆ AGPS Support for Fast TTFF (EPO™ 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>
- ◆ AscenKorea 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 less than or equal to 5Hz.

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

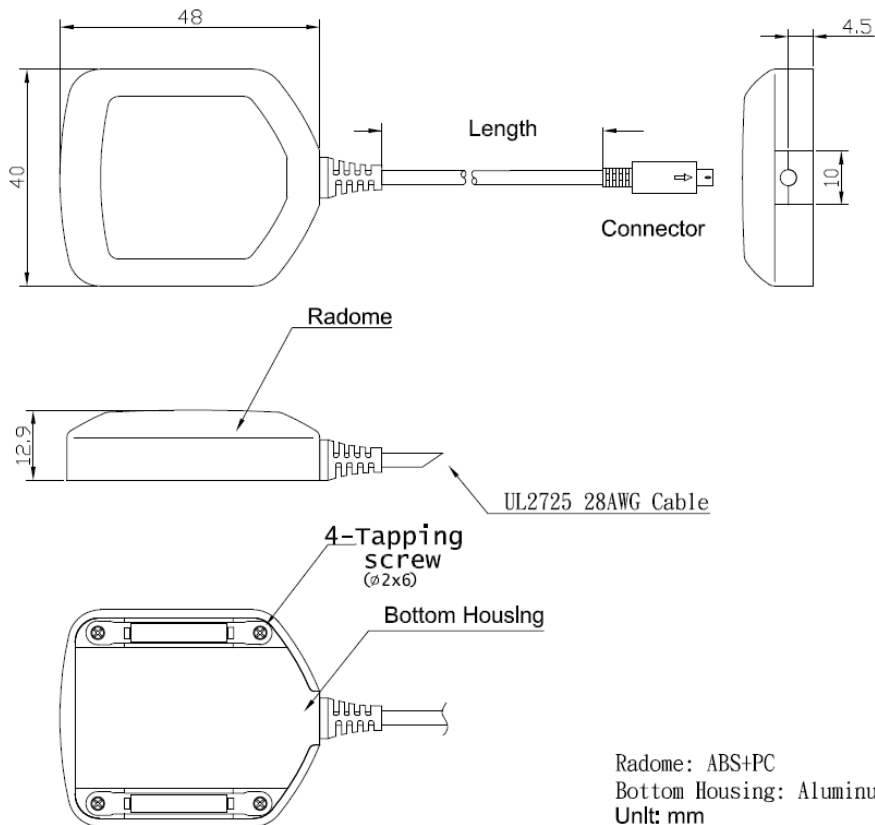
## 2. Specifications

### 2.1 Mechanical Data

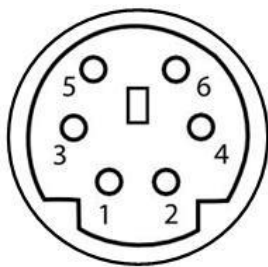
Item	Specification
Size	48 x 40 x 12.9 mm
Cable Length	2,000 +/-40 mm
Connector	Mini din 6 pin(PS2)

### 2.2 Mechanical Dimensions

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



### 2.3 Pin Assignment



Pin	Name	I/O	Description & Note
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		

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## 2.4 Specification List

	Description
<b>GNSS Solution</b>	MTK MT3333
<b>Frequency</b>	GPS L1, 1575.42MHz GLONASS L1, 1598.0625~1605.375MHz
<b>Sensitivity</b>	Acquisition: -148dBm, cold start Reacquisition: -163dBm Hot start Tracking: -165dBm
<b>TTF</b> (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
<b>Position Accuracy</b>	Without aid:3.0m (50% CEP) DGPS(SBAS(WAAS,EGNOS,MSAS)):2.5m (50% CEP)
<b>Velocity Accuracy</b>	Without aid : 0.1m/s DGPS(SBAS(WAAS,EGNOS,MSAS)):0.05m/s
<b>Altitude</b>	Maximum 50,000m (166,000 feet)
<b>Velocity</b>	Maximum 515m/s (1,000 knots)
<b>Acceleration</b>	Maximum 4G
<b>Update Rate</b>	1Hz (default), maximum 10Hz
<b>Baud Rate</b>	9600 bps (default)
<b>DGPS</b>	SBAS(default) [QZSS,WAAS, EGNOS, MSAS,GAGAN]
<b>AGPS</b>	Support
<b>Power Supply</b>	DC voltage: 5.0+/-10% V
<b>Current Consumption @ 5.0V,1Hz Update Rate</b>	GPS+GLONASS 48mA acquisition, 38mA tracking
<b>Waterproof rating</b>	IP67
<b>Working Temperature</b>	-40 °C to +85 °C
<b>Dimension</b>	48 x 40 x 12.9 mm
<b>Weight</b>	70g

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### 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 GNSS system.

Table-2: NMEA Output Sentence for GPS and GNSS					
System	GGA	GSA	GSV	RMC	VTG
GPS	GPGGA	GPGSA	GPGSV	GPRMC	GPVTG
GNSS(GPS+Glonass)	GPGGA	GNGSA	GPGSV GLGSV <sup>(Note1)</sup>	GPRMC <sup>(Note2)</sup> or GNRMC	GPVTG

(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:

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

GNSS (GPS+GLONASS) system:

```
$GPGGA,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,*65
$GNGSA,A,3,08,28,20,04,32,17,11,,,,,1.00,0.63,0.77*1B ←This line for GPS satellite
$GNGSA,A,3,77,76,86,78,65,88,87,71,72,,,,,1.00,0.63,0.77*17 ← This line for GLONASS satellite
$GPGSV,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
$GLGSV,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
$GNRMC,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

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**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)

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**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 <i>(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)</i>
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

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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

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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 <b>(Need AscenKorea Customization Service)</b>
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 <b>(Need AscenKorea Customization Service)</b>
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*2C		
<CR> <LF>			End of message termination

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## 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 AscenKorea 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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