AscenKorea Inc.

High Precision GPS
AKN1MBT

Revision: V 2.0

AscenKorea Inc.
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Title	**AscenKorea High Precision GPS AKN1MBT Datasheet**
Subtitle	**High Precision GPS AKN1MBT**
Doc Type	**Datasheet**
Doc Id	

Revision	Date	Author	Description
V1.0	2011-03-28	Dennis	First Release
V1.1	2011-04-06	Dennis	
V1.2	2011-05-13	Dennis	
V1.4	2011-05-13	Dennis	Changed use condition page 11
V2.0	2013-2-22	Dennis	Changed connector type and Pin assignment

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1. Highlights and Features

- High precision

  Single Point L1 1.5M RMS
  SBAS 0.7M RMS
- 14L1 channels, 2 of these are SBAS channels
- Fast reacquisition < 1.0 s L1 (typical)
- Low power consumption
- Position output update rate 1Hz (default), 10Hz(Optional)
- 1 PPS output for synchronization (Timing Accuracy 20ns RMS)
- Log set for maximum customization
- Outputs to Indicate LEDs(Power, Battery, GPS, Bluetooth, PPS)
- Bluetooth v1.2 support
- Serial Output, Bluetooth Output convertibility

1.1 Switch Function

Switch	SW Type	Function	Description & Note
Power	Tact	Power On/Off	Press for 1 seconds
Bluetooth	Tact	Change Serial or Bluetooth	Press for 2 seconds
GPS Reset	Tact	GPS Reset	Press for 5 seconds
Hard Reset	Push	Power Off by force	Press for 1 seconds

1.2 LED Indicator

	LED	Description
Power	Red	Power On -Always On, Power Off- Always Off
	Red	Power On- Blink 3 times
Bluetooth/ Serial	Blue	Power On- Blink 1 time. (not link)
		Bluetooth On- Always On.(BT device link each other)
		Serial On- Always Off.
GPS	Amber	3D fix before- Always Off.
		3D fix after- Always On
PPS	Red	If you don't choose 1PPS function, LED is always off
		PPS output – Blink per seconds (Optional)
Battery	Green/ Red	Charging- Red and Green
		Full charged-Always Green On.

2. Pin Assignment

Main device of GPS Receiver Dsub9(Female)

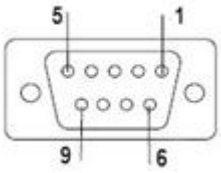
Pin	Name	I/O	Description & Note
1	1PPS	O	1PPS Output (optional)
2	**RX(TTL)**	I	**Serial Data input** for Firmware update
3	**TX(TTL)**	O	**Serial Data Output for NMEA output**
4	NC	-	Not use
5	**GND**	PI	**Ground**
6	NC	-	Not use
7	NC	-	Not use
8	NC	-	Not use
9	NC	-	Not use

RS232 (Dsub9) Cable -

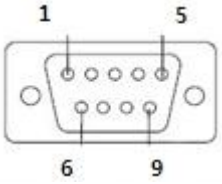
Pin	Name	I/O	Description & Note
1	NC	-	Not use
2	**RX(RS232)**	O	**Serial Data Output for NMEA output**
3	**TX(RS232)**	I	**Serial Data input**
4	NC	-	Not use
5	**GND**	PI	**Ground**
6	NC	-	Not use
7	NC	-	Not use
8	NC	-	Not use
9	NC	-	Not use

DC JACK (POWER)

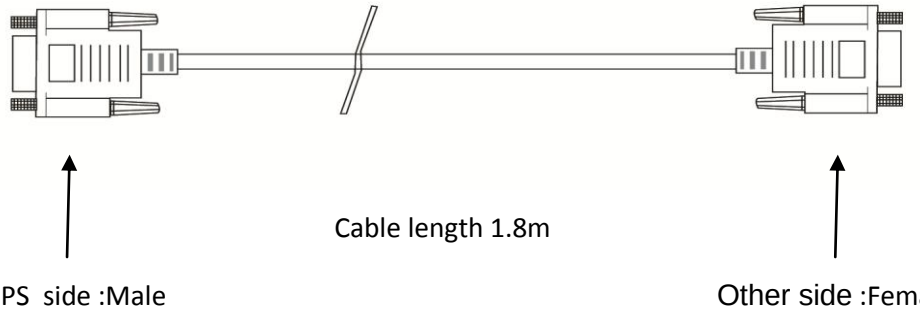
Pin	Name	I/O	Description & Note
1	GND		Ground , Outside
2	VCC	PI	5 VDC (MAX 5.25 VDC) , Inside pin



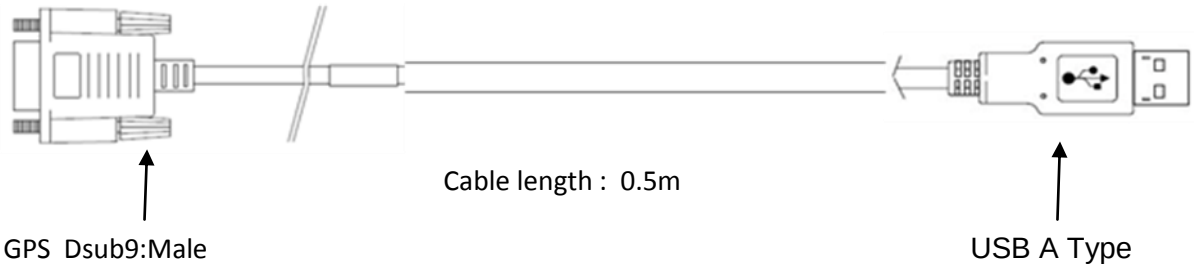
[**GPS device connection(Male)]**



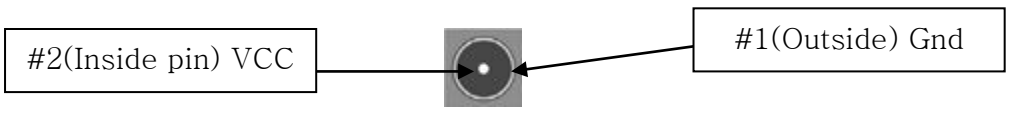
[Other side (Female)]



[RS232 Serial data cable]



[Convert RS232 to USB Data cable]



DC JACK (DC power input for charging)

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2.1 Description of I/O Pin

2.1.1 Main device connector (Dsub9 Female)

1 PPS, pin1

1 PPS (Pulse per second) Output, 20ns RMS , optional

If you want to use this function, you should ask to enable in advance

NC, Pin (4, 6, 7, 8, 9)

Not use

VARF, Pin6

Output reference frequency : 0~5 MHz , Optional

If you want to use this function, you should ask to enable in advance

RX, Pin2

Serial Data Input,

This is the UART receiver of the module. It is used to receive commands from system

TX, Pin3

Serial Data Output for NMEA output

This is the UART transmitter of the module. It outputs GPS information for application.

GND, Pin5

Ground

2.1.2 RS232 data cable(Dsub9)

NC, Pin(1, 4, 6, 7, 8, 9)

Not use

RX, Pin2

Serial Data Input

TX, Pin3

Serial Data Output for NMEA output

GND, Pin5

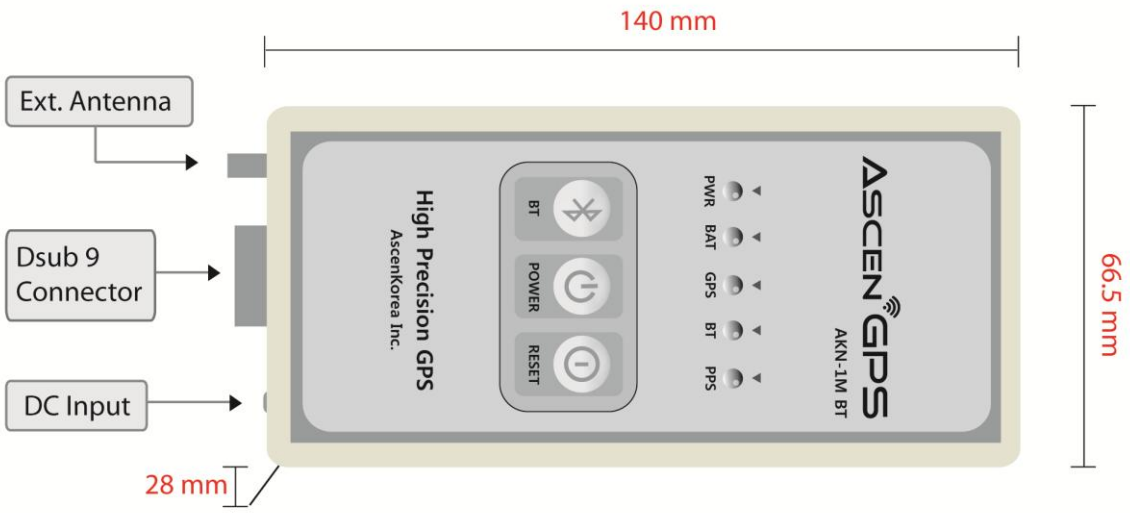
Ground

2.1.3 DC Jack (∅ 5.5)

The main DC power supply for charging or operating the GPS main device.

The voltage should be kept 5V (MAX 5.25). The ripple must be limited under 100mVpp (Typical: 5V) when you use this GPS receiver while charging

3. Dimensions



Main device dimension : L 140 x W 66.5 x H28 [mm]

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4. Specification List

Parameter	Description
Frequency	L1, 1575.42MHz
Channel	14 channels
Time To First Fix[1]	Hot: 45 s (Almanac and recent ephemeris saved, and approximate position and time entered) Cold: 75 s (No almanac or ephemeris and no approximate position or time)
Position Accuracy[a]	Single Point L1 1.5M RMS SBAS 0.7M RMS
Velocity Accuracy	0.05m/s RMS
Timing Accuracy[b]	20ns RMS
Altitude	Maximum 18,000m (60,000 feet)
Velocity	Maximum 515m/s (1000 knots)
Update Rate	1Hz (default), 10 Hz output rates(Option)
Baud Rate	9600 bps (default)
DGPS	SBAS(MSAS):Enable(Default)
Power Supply	VCC：5V (Max 5.25V) Allowable Input Voltage Ripple 100 mV p-p (max.)
Current Consumption	0.46 W
Working Temperature	-10 °C to +60 °C (Operating) -40 °C to +80 °C (Storage)
Dimension	66.5x140x28 mm
Weight	200g (main device only)

a. Typical values. Performance specifications are subject to GPS system characteristics, U.S. DOD operational degradation,ionospheric and tropospheric conditions, satellite geometry, baseline length and multipath effects

b. Time accuracy does not include biases due to RF or antenna delay.

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5. Protocols

NMEA Output Sentence

Table-1 lists each of the NMEA output

Table-1: NMEA Output Sentence

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

GGA—Global Positioning System Fixed Data. Time, Position and fix related data

Table-2 contains the values for the following example：

$GPGGA,064951.00,2307.1256167,N,12016.4438725,E,1,08,0.95,39.90,M,17.80,M,,*65

Table-2: GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	064951.00		hhmmss.ss
Latitude	2307.1256167		ddmm.mmmmmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438725		dddmm.mmmmmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See **Table-3**
Satellites Used	08		Range 00 to 14
HDOP	0.95		Horizontal Dilution of Precision
MSL Altitude	39.90	meters	Antenna Altitude above/below mean-sea-level
Units	M	meters	Units of antenna altitude
Geoidal Separation	17.80	meters	
Units	M	meters	Units of geoid separation
Age of Diff. Corr.		second	Null fields when DGPS is not used
Stn ID			Differential base station ID, 0000-1023
Checksum	*65		
<CR> <LF>			End of message termination

Table-3: Position Fix Indicator

Value	Description
0	Fix not available
1	GPS fix
6	DR(Dead Reckoning)
9	Differential GPS fix

RMC—Recommended Minimum Navigation Information

Table-4 contains the values for the following example：

$GPRMC,064951.00,A,2307.1256218,N,12016.4438672,E,0.041,165.4,260406,,E,A*55

Table-4: RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	064951.00		hhmmss.ss
Status	A		A=data valid or V=data not valid
Latitude	2307.1256218		ddmm.mmmmmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438672		dddmm.mmmmmmm
E/W Indicator	E		E=east or W=west
Speed over Ground	0.041	knots	
Course over Ground	165.4	degrees	True
Date	260406		ddmmyy
Magnetic Variation		degrees	
Variation Indicator	E		E=east or W=west
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*55		
<CR> <LF>			End of message termination

VTG—Course and speed information relative to the ground

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

$GPVTG,114.990,T,114.990,M,0.041,N,0.076,K,A*37

Table-5: VTG Data Format			
Name	**Example**	**Units**	**Description**
Message ID	$GPVTG		VTG protocol header
Course	114.990	degrees	Measured heading
Reference	T		True
Course	114.990	degrees	Measured heading
Reference	M		
Speed	0.041	knots	Measured horizontal speed
Units	N		Knots
Speed	0.076	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

GSV—GNSS Satellites in View

Table-6 contains the values for the following example：

$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

Table-9: GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages	3		Range 1 to 3 *(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)*
Message Number1	1		Range 1 to 3
Satellites in View	09		
Satellite ID	29		Channel 1 (Range 1 to 32)
Elevation	36	degrees	Channel 1 (Maximum 90)
Azimuth	029	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, (null when not tracking)
....	….	….	....
Satellite ID	15		Channel 4 (Range 1 to 32)
Elevation	21	degrees	Channel 4 (Maximum 90)
Azimuth	321	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	39	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7D		
<CR> <LF>			End of message termination

GSA—GNSS DOP and Active Satellites

Table-7 contains the values for the following example：

$GPGSA,M,3,29,21,26,15,18,09,06,10,,,,,2.5,1.3,2.1*00

Table-4: GSA Data Format			
Name	**Example**	**Units**	**Description**
Message ID	$GPGSA		GSA protocol header
Mode 1	M		See **Table-8**
Mode 2	3		See **Table-9**
Satellite Used	29		SV on Channel 1
Satellite Used	21		SV on Channel 2
....	….	….	....
Satellite Used			SV on Channel 12
PDOP	2.5		Position Dilution of Precision
HDOP	1.3		Horizontal Dilution of Precision
VDOP	2.1		Vertical Dilution of Precision
Checksum	*00		
<CR> <LF>			End of message termination

Table-8: Mode 1	
Value	**Description**
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Table-9: Mode 2	
Value	**Description**
1	Fix not available
2	2D (＜4 SVs used)
3	3D (≧4 SVs used)

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6. Active Antenna (External Antenna)

ELECTRICAL SPECIFICATIONS	
Frequency range	1575.42 MHz ± 5MHz
Gain	> 38 dB
Polarization	RHCP
DC Power	5.0±0.5 V
Current	33~43 mA
Noise Figure(LNA Part)	<1.5 dB
Impedance	50Ω (Nominal)
VSWR	< 2.0

MECHANICAL SPECIFICATION	
Housing – RF Connector	TNC FEMALE
Housing – Diameter	90.6 mm
Housing – Main Element Height	76 mm
Support Pipe	SUS (Inner diameter : 24 mm)
Water Proof	IP55
Weight	463g (Antenna + Adaptor) / 273g (Pipe)
Operating Temperature	−40°C ~ +80°C

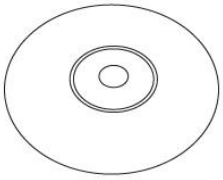
[Active Antenna Dimensions]

7. Accessories

1. RS232 Data cable

2. **Convert RS232 to USB Data cable**

3. CD ROM (Manual and Driver)



3. External Active Antenna

4. Indoor DC Charger & Charging Cable

Input AC 220V
Output -> DC 5V

5.5 DC Jack <–>
USB A type

5. Antenna cable (L 3m)

RG58, TNC-SMA

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