GPS – KGM4646S5 [LM18IG]

제 품 승 인 원

(APPROVAL SHEET)

승인구분 : □checked ■ approval		
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Approved by:		
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Customer	
Model	KGM 4646 S5
Item	외장형 GPS 모듈
Customer Model	
Supplied Agent.	Kornix Technology Inc

비고	

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Kornix Technology
GPS Module
Hardware Specification

Product No. : KGM4646S5

(Revision 1.0)

Revision	Date	Description	Author
1.0	Feb., 2014	Original Approval	Don R. Oh

Contents

GPS – KGM4646S5 [LM18IG]

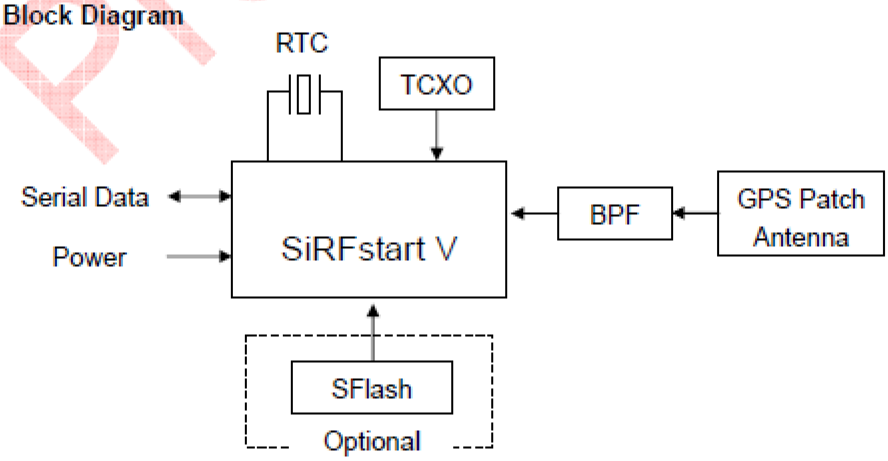
1. Introduction

KGM4646S5 is an antenna integrated GPS module using SiRF5 GPS solution and RF technology of Kornix, it gives you the excellent GPS sensitivity and good performance. The module has SiRFstarV in it, fine designed and fine tuned circuits stabilize the hardware operation of the module.
The module receives GPS and GLONASS signals simultaneously, the accuracy of the calculated location is much precise than GPS only device.
The module has a patch antenna, there is no needs extra GPS active antenna, it can reduce the material cost and easy to handle.
Data interface to the external device is TTL logic compatible serial signal, it directly connected to GPIO of MCU or logic circuitry.

1.1 Product Features

- High performance solution
  - High sensitivity navigation engine (PVT) tracks as low as -165dBm
  - Tracking L1, GPS CA code and GLONASS FDM channels
  - 52 track verification channels
- Active jammer removes
  - Removes in-band jammers up to 80dB-Hz
  - Tracks up to eight jammers
- 25mm X 25mm X 4t patch antenna in the module

1.2 Block Diagram



2 Technical Specification

2.1 GPS Specification

2.1.1 Receiver Capabilities

● GPS tracking	L1 C/A code
● GLONASS tracking	L1OF
● QZSS tracking	L1 C/A code
● SBAS	EGNOS, WAAS
● Channel	52
● Max. altitude	< 60,000ft
● Max. velocity	< 10,000 knots
● Protocol support	NMEA, OSP

2.1.2 Sensitivity

● Acquisition (GPS)	-146 dBm
● Tracking	
■ GPS	-165 dBm
■ GLONASS	-165dBm
● Navigation	
■ GPS	-162dBm
■ GLONASS	-158dBm
● GPS Time to First Fix (all satellites at -130dBm)	
■ Hot start	< 1 ~ 3s avg.
■ Warm start	< 26s avg.
■ Cold start	< 35s avg.

2.1.3 Velocity Accuracy (@30m/s)

● Speed	< 0.01 m/s
● Heading	< 0.01°

2.1.4 Horizontal Position Accuracy (24hr static, all satellites at -130dBm)

● Autonomous	< 2.5 m (CEP 50%)

2.2 Electrical Specification

2.2.1 Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power Supply Voltage	V_{CC}	6.0	V
Digital Input Pin Voltage	$V_{IO,IN}$	3.6	V
Logic Input Low Level	V_{IL}	V_{SS} - 0.3	V
Logic Input High Level	V_{IH}	3.6	V
RF Input Power	RFIN	-50	dBm
Storage Temperature		-40 ~ +85	ºC

2.2.2 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Condition					
Power Supply Voltage	V_{CC}	3.0	3.3	5.5	V
Operating Temperature[1)]		-20		60	ºC
Operating Current					
Continuous tracking	I_{CC}		TBD		mA
Logic Signal Voltage Level					
Low level output voltage	V_{OL}			0.4	V
High level output voltag	V_{OH}	0.75 X Vcc[2)]		3.3	V
Low level input voltage	V_{IL}	-0.3		0.4	V
High level input voltage	V_{IH}	2.0		3.6	V

- Remark

1) The operating temperature of the backup battery : -20℃ ~ +60℃
(Except the backup battery, the operating temperature is -30℃ ~ +85℃)

2) The minimum voltage of V_{OH} measured when Vcc < 3.3V. Over this Vcc voltage, the minimum level of V_{OH} is same as when Vcc = 3.3V.

3 Pin Description and Assignment

3.1 Pin Description

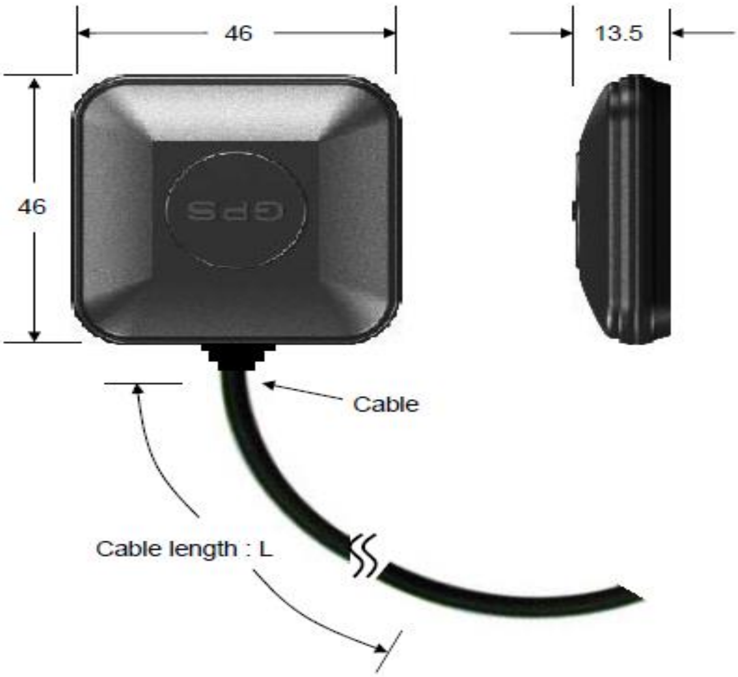
<케이블 은 고객사 사양 에 맞추어 제작 가능>

4 Ordering Information

$$\underbrace{\text{KGM4646}}_{\text{Model number}}\underbrace{\text{S5}}_{\text{SiRF5}}$$

5 Mechanical Dimension

(Unit : mm)
(Tolerance : ± 0.2mm)



6. NMEA Output

6.1 Electrical Interface

- Rata rate : 9,600bps (Standard)
  The data rate from the module can be changed due to the customer's requirement, please contact sales office for more information.
- Number of data bits: 8 (bit 7 is 0)
- Stop bits: 1 (or more)
- Parity: none
- Handshake: none
- Signal level : 0V for low, 3.3V for high

6.2 NMEA Data from KSM4646S5

KSM4646S5 transmits 6 kinds of NMEA data as $GNRMC, $GPGGA, $GNGNS, $GNGSA, $GPGSV and GLGSV.

6.2.1 GNRMC : Recommended Minimum Navigation Information

```
$GNRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxx,x.x,a*hh
            1      2  3   4     5     6  7 8   9   10 11 12
```

1) Time (UTC)
2) Status, V = Navigation receiver warning
3) Latitude
4) N or S
5) Longitude
6) E or W
7) Speed over ground, knots
8) Track made good, degrees true
9) Date, ddmmyy
10) Magnetic Variation, degrees
11) E or W
12) Checksum

6.2.2 GPGGA : Global Positioning System Fix Data. Time, Position and fix related data for a GPS receiver

```
$GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh
        1         2  3    4      5 6  7 8  9 10  11 12 13  14  15
```

1) Time (UTC)
2) Latitude
3) N or S (North or South)
4) Longitude
5) E or W (East or West)
6) GPS Quality Indicator,
   0 - fix not available,
   1 - GPS fix,
   2 - Differential GPS fix
7) Number of satellites in view, 00 - 12
8) Horizontal Dilution of precision
9) Antenna Altitude above/below mean-sea-level (geoid)
10) Units of antenna altitude, meters
11) Geoidal separation, the difference between the WGS-84 earth ellipsoid and mean-sea-level (geoid), "-" means mean-sea-level below ellipsoid
12) Units of geoidal separation, meters
13) Age of differential GPS data, time in seconds since last SC104 type 1 or 9 update, null field when DGPS is not used
14) Differential reference station ID, 0000-1023
15) Checksum

6.2.3 GNGNS : Fix data for single or combined satellite navigation systems (GNSS)

```
$GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,xx,xx,x.x,x.x,M,x.x,M*hh
          1          2  3   4     5 6  7  8  9 10  11 12 13
```

1) Time (UTC)
2) Latitude
3) N or S (North or South)
4) Longitude
5) E or W (East or West)
6) Mode Indicator. The first character indicates the use of GPS satellites, the second character indicates the use of GLONASS satellites
    - N = No fix. Satellite system not used in position fix, or fix not valid
    - A = Autonomous. Satellite system used in non-differential mode in position fix
    - D = Differential. Satellite system used in differential mode in position fix
    - P = Precise. Satellite system used in precision mode. Precision mode is defined as: no deliberate degradation (such as Selective Availability) and higher resolution code (Pcode) is used to compute position fix
    - R = Real Time Kinematic. Satellite system used in RTK mode with fixed integers
    - F = Float RTK. Satellite system used in real time kinematic mode with floating integers
    - E = Estimated (dead reckoning) Mode
    - M = Manual Input Mode
    - S = Simulator Mode
7) Total number of satellites in use
8) Horizontal Dilution of precision

9) Antenna altitude, meters, re: mean-sea-level (geoid))
10) Geoidal separation, meters. the difference between the earth ellipsoid surface and mean-sea-level (geoid) surface defined by the reference datum used in the position solution, "-" = mean-sea-level surface below ellipsoid. The reference datum may be specified in the DTM sentence
11) Age of differential data and Differential Reference Station ID
12) Differential reference station ID
13) Checksum

6.2.4 GNGSA : DOP and active satellites

```
$GNGSA,a,a,x,x,x,x,x,x,x,x,x,x,x,x,x,x,x.x,x.x,x.x*hh
      | | |                        |  |   |    |   |
      1 2 3                       14 15  16   17  18
```

1) Selection mode
2) Mode
3) ID of 1st satellite used for fix
4) ID of 2nd satellite used for fix
...
14) ID of 12th satellite used for fix
15) PDOP in meters
16) HDOP in meters
17) VDOP in meters
18) Checksum

6.2.5 GPGSV : GPS Satellites in view

```
$GPGSV,x,x,x,x,x,x,x,...*hh
       | | | | | | |    |
       1 2 3 4 5 6 7    n
```

1) total number of messages
2) message number
3) satellites in view
4) satellite number
5) elevation in degrees
6) azimuth in degrees to true
7) SNR in dB, more satellite infos like 4)-7)
n) Checksum

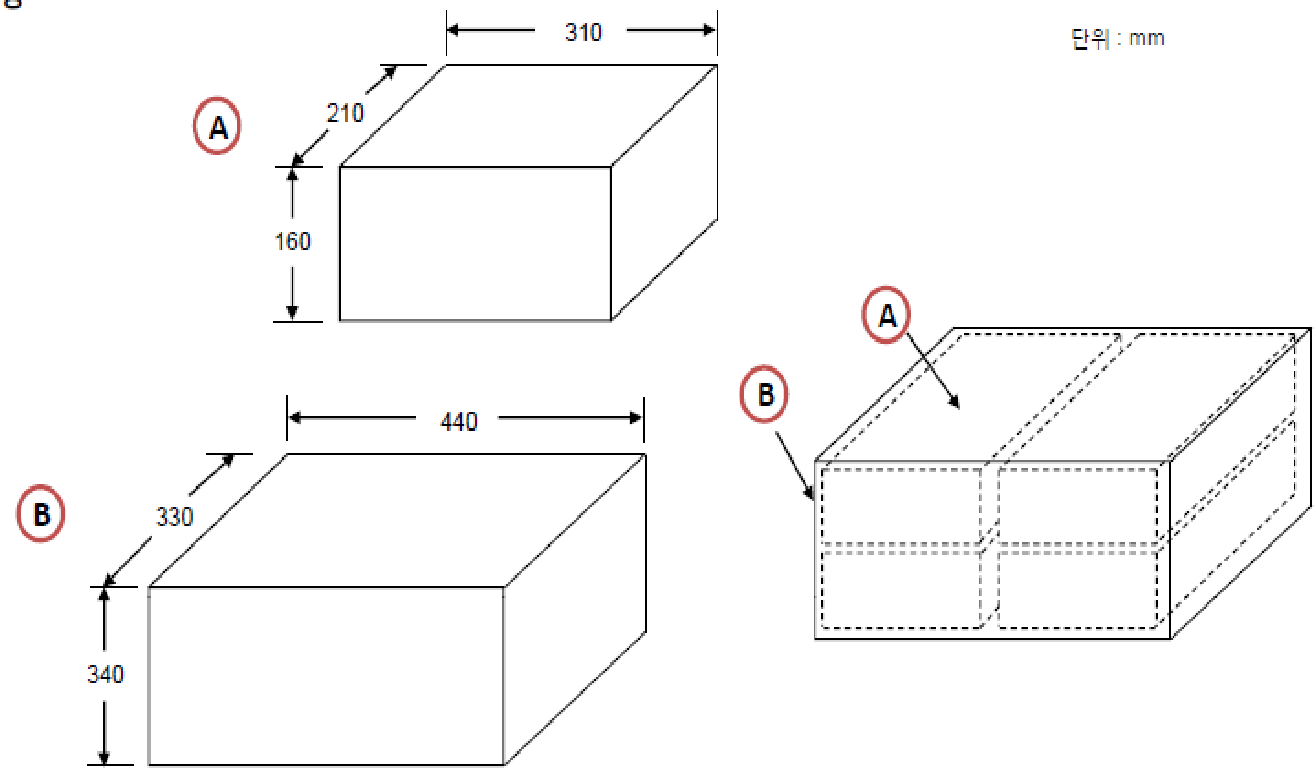
6.2.5 GLGSV : GLONASS Satellites in view, same format as GPGSV

6.3 Example of NMEA data from KSM4646S5 module

$GNRMC,024859.000,A,3727.9521,N,12653.2360,E,0.41,109.82,071013,,,A*7B
$GPGGA,024900.000,3727.9522,N,12653.2360,E,1,10,0.9,62.1,M,19.3,M,,0000*6C
$GNGNS,024900.000,3727.9522,N,12653.2360,E,AA,12,0.9,62.1,19.3,,0000*5A
$GNGSA,A,3,28,11,17,07,08,19,09,32,57,01,,,1.8,0.9,1.6*2B
$GNGSA,A,3,80,82,,,,,,,,,,,1.8,0.9,1.6*29
$GPGSV,4,1,13,28,50,316,42,11,63,046,40,17,18,280,34,07,26,211,29*78
$GPGSV,4,2,13,08,42,247,28,19,29,069,26,09,35,248,23,32,31,120,21*73
$GPGSV,4,3,13,57,60,152,20,01,86,066,18,03,11,090,16,20,25,158,24*78
$GPGSV,4,4,13,27,02,085,*41
$GLGSV,3,1,10,80,40,309,18,82,42,293,08,65,19,047,22,88,10,061,17*6D
$GLGSV,3,2,10,81,51,016,23,79,50,224,,66,26,101,,78,09,180,*6A
$GLGSV,3,3,10,67,05,149,,73,00,339,*61

포장 Box 사양

단위 : mm



N O	DESCRIPTION	SPECIFICATION	Q'TY	REMARKS
A	소Box	310(L) X 210(W) X 160(H)	100EA	
B	대Box	440(L) X 330(W) X 340(H)	400EA	

설 계	제도	승인	품 명	포장Box
작성일자	CORD	KORNIX TECHNOLOGY		
	NO.			

포장단위	A Box : B형 Box 4개 B Box : GPS Module 100pcs