YIC

Ultra Low Power GNSS Antenna Module

YIC73030PGMGG

Datasheet

www.yic.com.tw

Revision History

Date	Reversion	Description
2021/6/21	1.0	First Draft, Based on YIC73030PGMGG

Directory

1. Product Information

1.1 Product Description

YIC73030PGMGG is a complete ultra-low power and small form factor GPS&GLONASS engine module that features super sensitivity. The GPS&GLONASS module signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

Module of –165dBm tracking sensitivity extends coverage to positioning urban canyons and dense foliage environment. In additional, ultra-low power consumption helps IoT products improve battery life, e.g. PND, drone, smart helmet, camera, vehicle navigation systems, and so on.

Applications

- Automotive Navigation
- Personal Positioning
- Fleet Management
- Marine Navigation
- Any Application at Ultra-Low Power Consumption

1.2 Product Features

- Ultra-Low Power Consumption: Max 8mA@3.3V
- Ultra High Track Sensitivity: -165dBm
- Built in high gain LNA
- Build on high performance, low-power SONY chip set
- Extremely Fast TTFF at Low Signal Level
- Communication type: UART/TTL
- NMEA-0183 Compliant Protocol or Custom Protocol
- RoHS Compliant

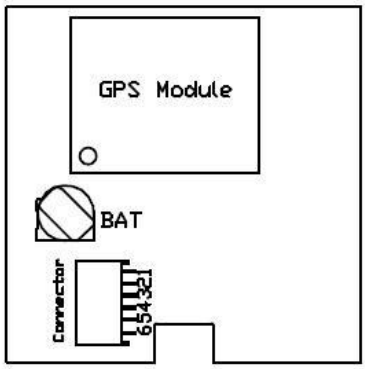
1.3 Product Specifications

GPS Receiver		
Chip	SONY	
Frequency	Code 66 search channels, 22 synchronous tracking channels GPS : L1 C/A 1575.42MHz QZSS : L1 C/A & L1S 1575.42MHz GLONASS : L1OF 1602MHz SBAS : WAAS, EGNOS, MSAS, GAGAN	
Update Rate	1Hz (default)	
Position Accuracy	Position	<2.5m CEP @-130dBm
Startup Time	Cold start	35s typ @-130dBm
	Warm start	30s typ @-130dBm
	Hot start	2s typ @-130dBm
Sensitivity	Acquisition	-148dBm
	Re-acquisition	-160dBm
	Tracking	-165dBm
GNSS Operating limit	Altitude	18,000m
	Velocity	515m/s
	Acceleration	4G
Protocol Support	UART Port: TXD and RXD 115200bps (default), Supports baud rate 4800bps to 460800bps NMEA 0183 Protocol	
Environment	Operation temperature	-40°C ~ +85°C
	Storage temperature	-45°C ~ +100°C
Physical Characteristics	Size	30±0.20 ×30±0.20 ×8.4±0.20mm
	Weight	Approx. 12.6g

1.4 DC Electrical Characteristics

Parameter	Min.	Typ.	Max.	Units
Input Voltage	3.0	3.3	5.5	Volt
Acquisition		7		mA
Tracking		5		mA
Idle Mode		2		mA
Sleep Mode 0		0.25		mA
Sleep Mode 1		0.17		mA
Sleep Mode 2		0.13		mA
Low Level Output Voltage (VOL)			0.4	V
High Level Output Voltage (VOH)	2.4			V
Low Level Input Voltage (VIL)			0.8	V
High Level Input Voltage (VIH)	2.0			V
Low Level Output Current (IOL)	2			mA
High Level Output Current (IOH)	2			mA

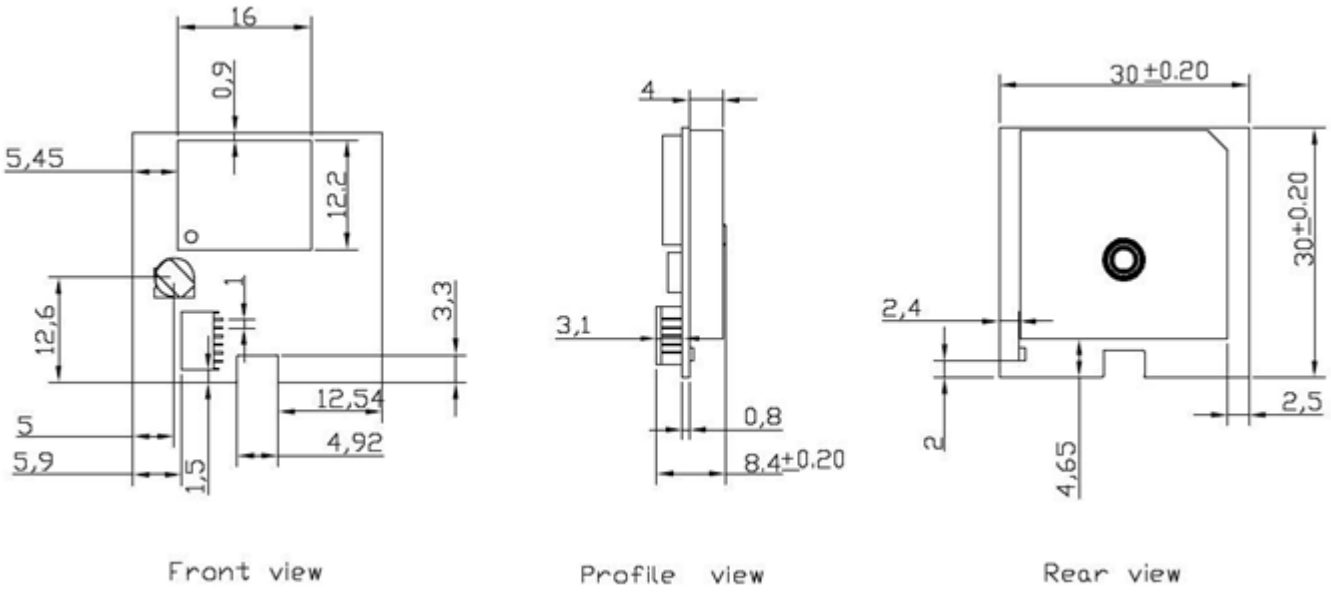
2. Pin Assignments



2.1 Pin Descriptions

Pin NO.	Pin Name	Remark
1	VCC	Module Power Supply
2	AGND	Ground
3	GND	Ground
4	TXD	UART Serial Data Output
5	RXD	UART Serial Data Input
6	PPS	Time Pulse(1PPS)

3. Dimensions

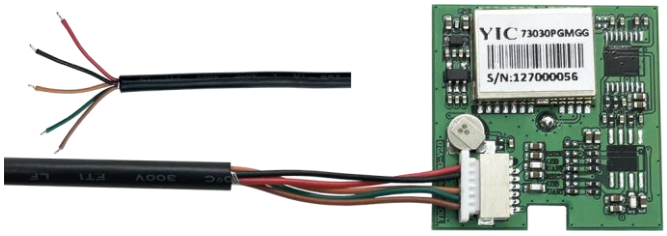


4. Additional ordering options

(Different cables & connectors can be specified according to requirements)

4.1 Modules include Cable & Connector

Y	I	C	7	3	0	3	0	P	G	M	G	G	-	N



Code	Connector 1 (Module)	Cable Length	Connector 2 (Host)
N	JST	1500 mm	Non-Connector

I/O Interface	Voltage level
5 Wire Open End	UART(TTL level)

CN1 Pin	Color	Pin define	Level
1	Red	VCC	3.0 - 5.0V DC
2	Black	GND	Ground
3	Orange	TXD	TTL output
4	Green	RXD	TTL input
5	Brown	PPS	Time Pulse(1PPS)

5. Software Interface

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

6. Protocol

6.1 GGA – Global Positioning System Fix Data

For example:

$GPGGA, 161229.487,3723.2475,N, 12158.3416,W, 1,07,1.0,9.0,M.0000*18

Field	Name	Example	Units	Description
1	Message ID	$GPGGA		GGA protocol header
2	UTC Position	161229.487		hhmmss.sss
3	Latitude	3723.2457		ddmm.mmmm
4	N/S indicator	N		N=north or S=south
5	Longitude	12158.3416		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

6.2 GLL – Latitude/Longitude

For example:

$ GPGLL , 3723.2475, N,12158.3416, W,161229.487, A*2C

Field	Name	Example	Units	Description
1	Message ID	$GPGLL		GLL protocol header
2	Latitude	3723.2475		ddmm.mmmm
3	N/S Indicator	N		N=north or S=south
4	Longitude	12158.3416		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

6.3 GSA – GNSS DOP and Active Satellites

For example:

$ GPGSA , 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

6.4 GSV – GNSS Satellites in View

For example：

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

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

Field	Name	Example	Units	Description
1	Message ID	$GPGSV		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

6.5 RMC – Recommended Minimum Specific GNSS Data

Structure:
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a,a*hh<CR><LF>

Field	Name	Example	Description
1	Header	$	
2	Talker ID	--	GP : Using only GPS for positioning GL : Using only GLONASS for positioning QZ : Using only QZS for positioning GN : Using combined satellite systems for positioning
3	Sentence ID	RMC	
4	UTC of position fix	hhmmss.ss	hh [hour] mm [min] ss.ss [sec]
5	Status	A	A : Data valid, V : Data not valid
6	Latitude	llll.ll	dd [degree] mm.mmmm [min]
7	Latitude – N/S	a	N : North latitude, S : South latitude
8	Longitude	yyyyy.yy	ddd [degree] mm.mmmm [min]
9	Longitude – E/W	a	E : East longitude, W : West longitude
10	Speed over ground	x.x	[knot]
11	Course over ground	x.x	[degree]
12	Date	xxxxxx	dd [day] mm [month] yy [year]
13	Magnetic variation	x.x	[degree]
14	Magnetic variation – E/W	a	E : East, W : West
15	Mode Indicator	a	A : Autonomous mode D : Differential mode E : Dead reckoning mode N : Data not valid
16	Checksum	*hh	
17	Termination	<CR><LF>	

6.6 VTG – Course Over Ground and Ground Speed

Structure:

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

Field	Name	Example	Description
1	Header	$	
2	Talker ID	--	GP : Using only GPS for positioning GL : Using only GLONASS for positioning QZ : Using only QZS for positioning GN : Using combined satellite systems for positioning
3	Sentence ID	VTG	
4	Course over ground - True	x.x,T	[degrees]
5	Course over ground - Magnetic	x.x,M	NULL
6	Speed over ground	x.x,N	[knot]
7	Speed over ground	x.x,K	[km/h]
8	Mode Indicator	a	A : Autonomous mode D : Differential mode E : Dead reckoning mode N : Data not valid
9	Checksum	*hh	
10	Termination	<CR><LF>	

6.7 ZDA – TIME AND DATE

Structure:

$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>

Field	Name	Example	Description
1	Header	$	
2	Talker ID	--	GP : Using only GPS for positioning GL : Using only GLONASS for positioning QZ : Using only QZS for positioning GN : Using combined satellite systems for positioning
3	Sentence ID	ZDA	
4	UTC	hhmmss.ss	hh [hour] mm [min] ss.ss [sec]
5	Day	xx	
6	Month	xx	
7	Year	xxxx	
8	Local zone hours	xx	NULL
9	Local zone minutes	xx	NULL
10	Checksum	*hh	
11	Termination	<CR><LF>	