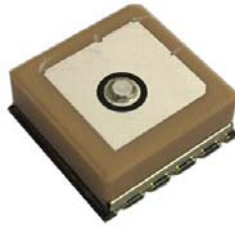


## GPS/GNSS Antenna Module



### 1. Product Information

1.1 Product Name: YIC51515GMS -37

#### 1.2 Product Description:

YIC51515GMS -37 is a compact, high performance, and low power consumption GPS/GNSS Antenna Module.

It uses the chipset which can track up to 66 channels at a time and perform fast TTFF in weak signal environments.

YIC51515GMS -37 is suitable for the following applications:

- Automotive navigation
- Personal positioning
- Fleet management
- Mobile phone navigation
- Marine navigation

#### 1.3 Product Features:

- High performance and low power consumption GPS Chipset
- Very high sensitivity
- Extremely fast TTFF (Time To First Fix) at low signal level
- Two serial ports
- Built-in LNA
- Compact size suitable for space-sensitive application
- Support NMEA 0183 and ublox binary protocol
- One size component, easy to mount on another PCB board

## 1.4 Product Specifications

### GPS Performance

GPS Receiver		
Chip	MT3337(ROM)	
Frequency	L1 1575.42MHz, C/A code	
Channels	Support 66 channels	
Update rate	1Hz default, up to 10Hz	
Sensitivity	Tracking	-163dBm, up to -165dBm (with external LNA)
	Cold Start	-143.5dBm, up to -148dBm (with external LNA)
Acquisition Time	Hot start (Open Sky)	< 1s (typical)
	Hot start (Indoor)	< 30s
	Cold Start (Open Sky)	32s (typical) without AGPS
		< 15s (typical) with AGPS (hybrid ephemeris prediction)
Position Accuracy	Autonomous	3m (2D RMS)
	SBAS	2.5m (depends on accuracy of correction data)
Max. Altitude	< 18,000 m	
Max. Velocity	< 515 m/s	
Protocol Support	NMEA 0183	9600 bps, 8 data bits, no parity, 1 stop bits (default)
		1Hz: GGA, GLL, GSA, GSV, RMC, VTG
Physical Characteristic		
Dimensions	15.5.m * 15.5 mm * 6.7mm	

## 1.5 DC Electrical characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input Voltage	VCC		2.8	3.3	4.3	V
Input Backup Battery Voltage	V_BCKP		2.0		3.6	V
Supply Current	Iss	VCC = 3.3V, w/o active antenna, Peak			150 <sup>(1)</sup>	mA
		Acquisition		30		mA
		Tracking		30 <sup>(2)</sup>		mA
		Standby		280		uA
Backup Battery Current	Ibat	VCC = 0V		7		uA
High Level Input Voltage	VIH		2.0		3.6	V
Low Level Input Voltage	VIL		-0.3		0.8	V
High Level Input Current	IIH	no pull-up or down	-1		1	uA
Low Level Input Current	IIL	no pull-up or down	-1		1	uA
High Level Output Voltage	VOH		2.4		3.3	V
Low Level Output Voltage	VOL				0.4	V
High Level Output Current	IOH			2		mA
Low Level Output Current	IOL			2		mA

**Note 1:** This happens when downloading AGPS data to Module.

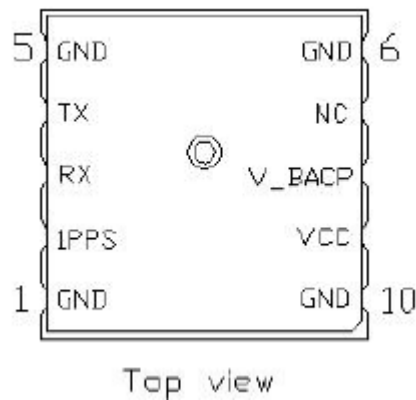
**Note 2:** Measured when position fix (1Hz) is available, input voltage is 3.3V and the function of self-generated ephemeris prediction is inactive.

## 1.6 Temperature characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Operating Temperature	Topr	-40	25	85	°C
Storage Temperature	Tstg	-40	25	85	°C

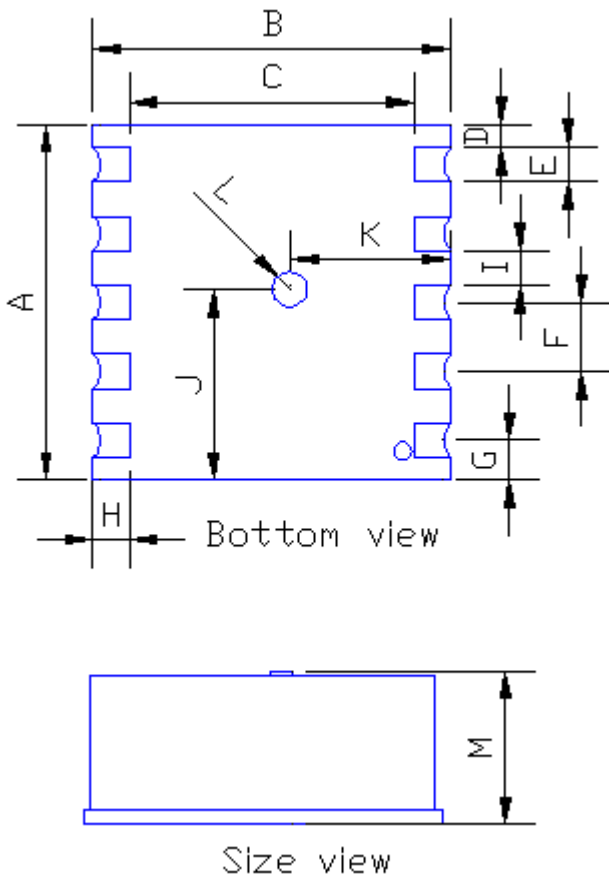
## 2. Technical Information

### 2.1 Module Pin Assignment



Pin No.	Pin name	Type	Description	Remark
1	GND	P	Ground	
2	1PPS	O	Pulse per second (default 100ms pulse/sec when 3D fix is available)	
3	RX	I	Serial data input	
4	TX	O	Serial data output	
5	GND	P	Ground	
6	GND	P	Ground	
7	NC		No connection	
8	V_BCKP	P	Backup battery supply voltage (2.0V~3.6V)	
9	VCC	P	DC Supply voltage (2.8V~4.3V)	
10	GND	P	Ground	

## 2.2 Dimensions



Parameter	Specification
A	15.5+0.3mm/-0.1mm
B	15.5±0.1mm
C	12.4±0.1mm
D	1±0.1mm
E	1.5±0.1mm
F	3±0.1mm
G	1.75±0.1mm
H	1.6±0.1mm
I	1.5±0.1mm
J	8.3±0.1mm
K	7.0±0.1mm
L	φ 1.5±0.1mm
M	6.7±0.2mm
Weight	28g

### 3. Application guideline

#### Layout Rules

Do not routing the other signal or power trace under the engine board .

#### Design Notes

##### VBAT

Plug-in RTC Battery Input.

##### TXD

This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software.

##### RXD

This is the main channel for receiving software commands from u-blox software or from your proprietary software.

##### VCC

Module Power Supply, Module Power Supply.

##### GND

Ground pin for the baseband circuit.

### 4. NMEA 0183 Protocol

The NMEA protocol is an ASCII-based protocol, Records start with a \$ and with carriage return/line feed. GPS specific messages all start with \$GPxxx where xxx is a three-letter identifier of the message data that follows. NMEA messages have a checksum, which allows detection of corrupted data transfers.

YIC51515GMS -37 modules support the following NMEA-0183 messages: GGA, GLL,GSA, GSV, RMC and VTG.

Table4. 1: NMEA-0183 Output Messages

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

## GGA-Global Positioning System Fixed Data

Table 4. 2 contains the values of the following example:

\$GPGGA, 161229.487,3723.24751,N, 12158.34160,W, 1,07,1.0,9.0,M.0000\*18

Table 4.2: GGA Data Format

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.24751		ddmm.mmmmm
N/S indicator	N		N=north or S=south
Longitude	12158.34160		ddmm.mmmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSLAltitude	9.0	meters	
Units	M	meters	
Geoids Separation		meters	
Units	M	meters	
Age of Diff.Corr.		second	Null fields when DGPS is not Used
Diff.Ref.Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

Table 4. 2.1: 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

## GLL-Geographic Position – Latitude/Longitude

Table 4. 3 contains the values of the following example:

\$GPGLL , 3723.24755, N,12158.34161,W,161229.487, A\*2C.

Table 4.3: GLL Data Format

Name	Example	Units	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	3723.24755		Ddmm.mmmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.34161		ddmm.mmmmm
E/W Indicator	W		E=east or W=west
UTC Position	161229.487		Hhmmss.sss
Status	A		A=data valid or V=data not valid
Checksum	*2C		
<CR> <LF>			End of message termination

## GSA-GNSS DOP and Active Satellites

Table 4. 4 contains the values of the following example:

\$GPGSA , A, 3, 07, 02, 26,27, 09, 04,15, , , , , , 1.8,1.0,1.5\*33.

Table 4. 4: GSA Data Format

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
Satellite Used	07		Sv on Channel 1
Satellite Used	02		Sv on Channel 2
...	...		...
Satellite Used			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR> <LF>			End of message termination



Table4. 4.1: Mode 1

Value	Description
1	Fix not available
2	2D
3	3D

Table4. 4.2: Mode 2

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

### GSV-GNSS Satellites in View

Table4. 5 contains the values of the following 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.

Table 4.5: GGA Data Format

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Message	2		Range 1 to 3
Message Number	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Maximum 90)
Azinmuth	048	degrees	Channel 1(True, Range 0 to 359)
SNR(C/NO)	42	dBHz	Range 0 to 99,null when not tracking
...			...
Satellite ID	27		Channel 4(Range 1 to 32)
Elevation	27	degrees	Channel 4(Maximum 90)
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)
SNR(C/NO)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination

Depending on the number of satellites tracked multiple messages of GSV data may be required

## RMC-Recommended Minimum Specific GNSS Data

Table 4.6 contains the values of the following example:

\$GPRMC, 161229.487, A, 3723.24751, N, 12158.34161,W, 0.13,309.62, 120598,, \*10

Table 4.6: RMC Data Format

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTS Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.24751		ddmm.mmmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.34161		Ddmm.mmmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	Knots	
Course Over	309.62	Degrees	True
Ground			
Date	120598		Dummy
Magnetic variation		Degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination

## VTG-Course Over Ground and Ground Speed

Table4. 7 contains the values of the following example:

\$GPVTG, 309.62, T, M, 0.13, N, 0.2, K\*6E

Table4. 7: VTG Data Format

Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	309.62	Degrees	Measured heading
Reference	T		True
Course		Degrees	Measured heading
Reference	M		Magnetic
Speed	0.13	Knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	Km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Checksum	K		Kilometer per hour
Date	*6E		
<CR> <LF>			End of message termination