SPECIFICATION

SPEC NO. : SP03B715750-0120

PART NO. : 03101403A0C0100

PRODUCT NAME : GPS MODULE/GMA-A10

DESCRIPTION : 1.8V/18dB/GPS Module (SMD)

RoHS Compliant Product

REVISION STATUS

VERSION	DATE	PAGE	REVISION DESCRIPTION	PREPARED	CHECKED	APPROVED
01	2012/7/19	Whole	New Issued	黃敏慎	黃敏慎	吳靖文

Prepared By	Checked By	Approved By
黃敏慎	黃敏慎	吳靖文

1. Functional Description

1.1 Overview

GMA-A10 GPS Smart antenna is a complete GPS Receivers based on SiRF StarIV GPS solution.It can provide superior sensitivity and high performance.To allow continuous position coverage in nearly all Application environments.

Application:

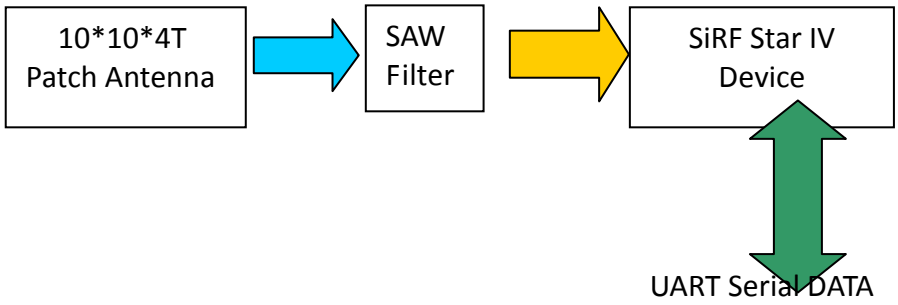
1. Navigation-Automotive/pedestrian/Marine
2. Positioning-Geotagging/Journey/LBS
3. Tracking-security/safety
4. Mobile gaming
5. Cellular handsets
6. Cameras
7. Asset tracking
8. Other location-aware consumer devices

1.2 Highlights and Features

High Performance Solution:

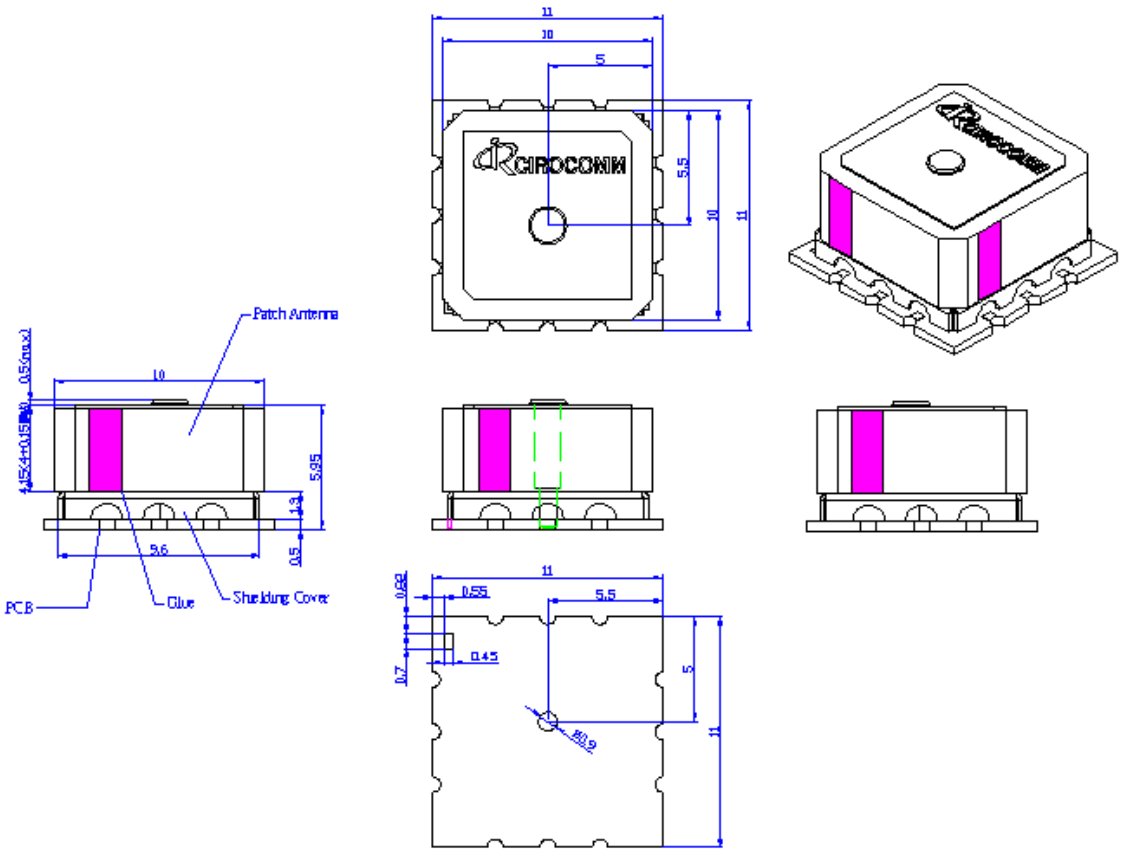
- ■ High sensitivity navigation engine (PVT) tracks as low as -163dBm
- ■ 48 track verification channels
- ■ SBAS (WAAS or EGNOS……etc.)
- ■ Only 50 to 500μA maintains hot start capability
- ■ <10mW required for TricklePower™ mode
- ■ Smart sensor I²C interface
- ■ Interrupt input for context change detection.
- ■ Small Size(11mm*11mm*5.95T)

1.3 System Block Diagram

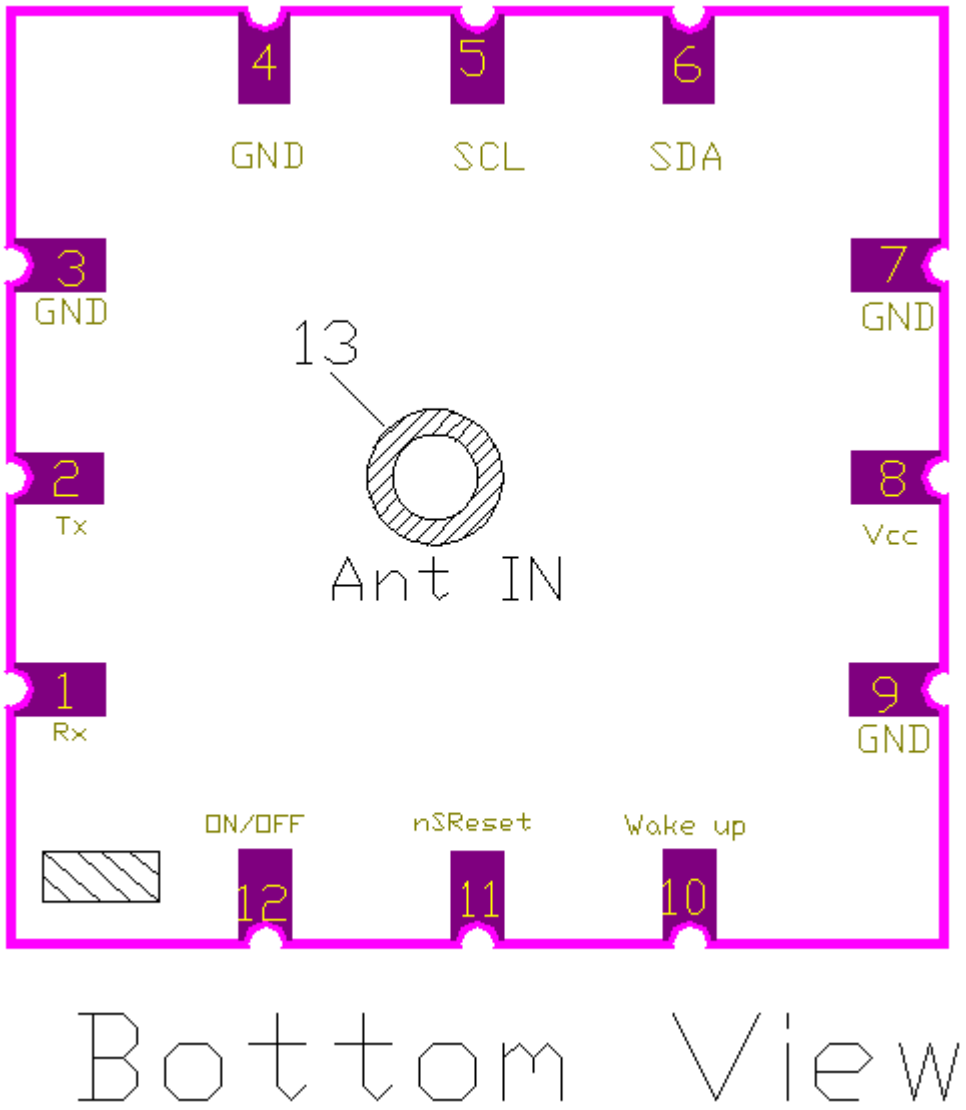


2. Specifications

2.1 Mechanical Dimension(11mm*11mm*5.95T)



2.2 Pin Configuration



Bottom View

2.3 Pin Assignment

PIN	NAME	I/O	DESCRIPTION
1	Rx	I	UART_RX UART data receive (RX).
2	Tx	O	UART_TX, UART data transmit (TX).
3	GND	G	GROUND.
4	GND	G	GROUND.
5	SCL	I	Serial Clock.
6	SDA	I/O	Serial Data.
7	GND	G	GROUND.
8	VCC	P	Main DC Power input(1.8V).
9	GND	G	GROUND.
10	Wake up	O	This pin is an output signal to enable an external PMIC.

11	nSRESET	I	It's an optional, external, emergency reset.
12	ON/OFF	I	Used to command the GSD4e WLCSP to turn on or off.
13	Ant In	I	Antenna feed in.

2.4 Description of I/O Pin

Pin1 RX

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

Pin2 TX

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

Pin3,Pin4, Pin7, Pin9 GND.

GROUND.

Pin5 SCL

This input signal is used to strobe all data in and out of the device. In applications where this signal is used by slave devices to synchronize the bus to a slower clock, the bus master must have an open drain output, and a pull-up resistor must be connected from Serial Clock (SCL) to VCC.

Pin6 SDA

This bidirectional signal is used to transfer data in or out of the device. It is an open drain output that may be wire-OR'ed with other open drain or open collector signals on the bus. A pull up resistor must be connected from Serial Data (SDA) to VCC.

Pin8 VCC

The main DC power supply for the module. The voltage should be 1.8V.

Pin10 Wake up

The WAKEUP pin is an output from the GSD4e WLCSP used to enable an external PMIC. A low on this output indicates that the GSD4e WLCSP is in one of its low-power states (KA-only, Hibernate, or Standby mode) and requires no more than 60µA of current on the Vcc 1.8V input. A high on this output indicates that the GSD4e WLCSP is in operational mode requiring an external regulator to provide enough current on both the Vcc 1.8V and VREG 1.8V inputs to handle the peak current requirements of the GSD4e WLCSP.

Pin11 nSRESET

The nSRESET pin is an optional, external, emergency reset. It only for use in the event of a malfunction. The internal POR that occurs when Vcc 1.8V is applied is the preferred system reset method.

Important Note:

During normal operation, the use of nSRESET after initial Vcc 18V application, degrades performance and results in non-volatile information loss.

Pin12 ON/OFF

The ON_OFF pin commands the GSD4e WLCSP ON or OFF. There are multiple methods of connecting this pin for different applications in order to minimise host resource requirements.

The ON_OFF pin is used to command the GSD4e WLCSP to turn on or off:

- The turn on command is a hardware feature of the Power Control FSM based on sensing a rising edge on the pin.

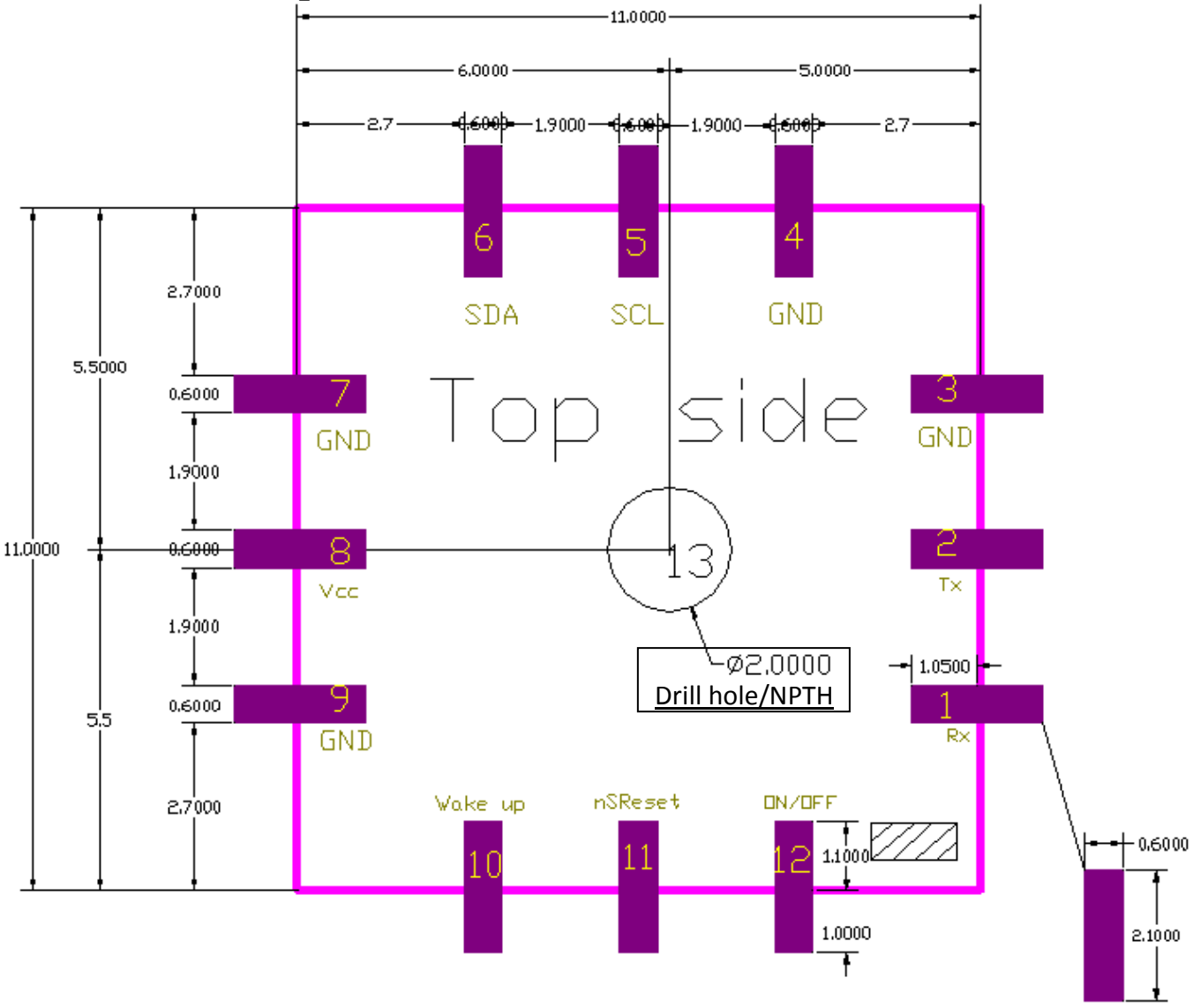
- The turn off command is a software feature based on interrupts related to rising and/or falling edges and/ or sensing of pin levels.

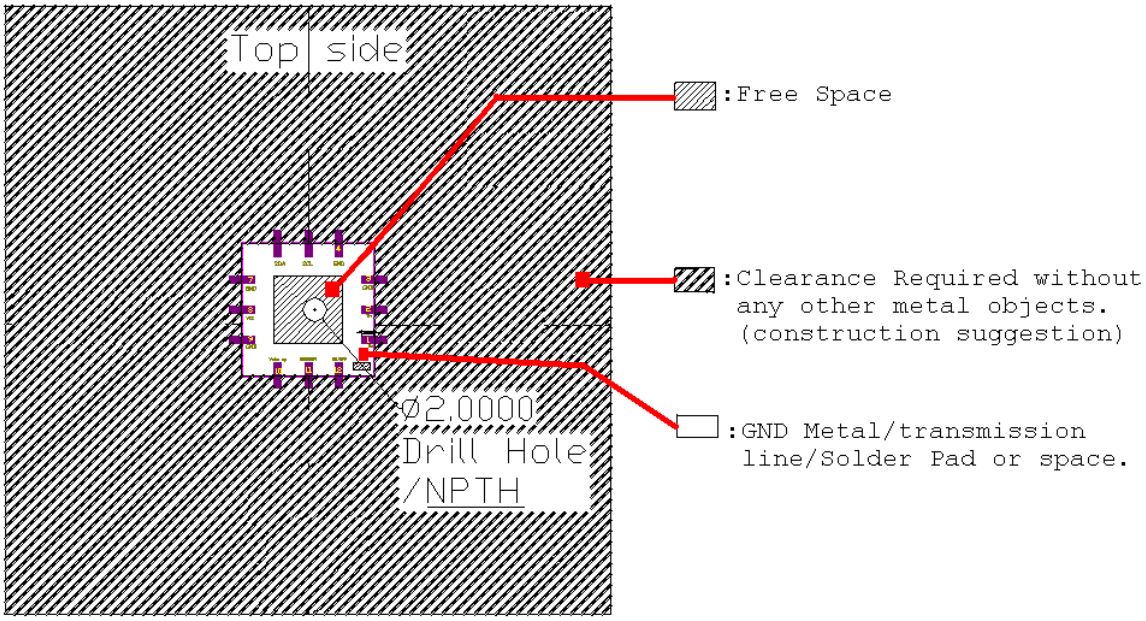
The ON_OFF pin processing is carried out by the Power Control FSM. The ON_OFF rising edge event during low power modes is recorded in a status register that is subsequently read by the processor once it is running. When the processor is running at the time of an ON_OFF event, the processor can poll the status or set-up an interrupt.

Pin13 Ant In

This PAD used to connect GPS antenna & GPS Module.

2.5 Recommend foot print for Evaluation Board





Install suggestion:

<a>.GMA-A10 Smart antenna need to soldered stably on the user board.In order to avoid that ground soldering no good to affect the smart antenna performance.

<b>.To avoid putting other metal objects around the smart antenna.

<c>. There should be a clearance require under the smart antenna.To avoid the antenna shorting pin connect to the ground.

2.6 Specification List

	Description
GPS Solution	SiRF IV
Frequency	L1,1575.42MHz
Sensitivity	Acquisition -147 dBm,cold start Reacqisition -160 dBm Tracking -163 dBm
Channel	48 channels
TTFF	Hot start:1 second typical Warm start:35 seconds typical Cold start:35 seconds typical
Position Accuracy	Without aid:<2.5m 2D-RMS
Acceleration Accuracy	Without aid:0.01m/s
Altitude	Maximum 18000m(60000 feet)
Velocity	Maximum 515m/s(1000 knots)
Acceleration	None
Update Rate	1Hz maximum.
Baud Rate	4800 bps
AGPS	Support SBAS(WAAS,EGNOS,MSAS,GAGAN)

Power Supply	Vcc:1.8V
Current Consumption	<10mW
Working Temperature	-40℃ to +85℃
Dimension	11mm*11mm*5.95T,SMD type.
Weight	2.7g
Reference to GPS chipset specification	

3. Protocols

3.1 NMEA Output Sentences

Its output signal level is TTL. It can support the following NMEA-0183 sentences. Messages: GGA, GLL, GSA, GSV, RMC and VTG. NMEA Output Messages: the Engine board outputs the following messages as shown in Table1

Table1:NMEA-0183 Output Messages	
NMEA Record	Description
GGA	Global positioning system fixed data.
GLL	Grographic-latitude/Iongitude
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course over ground speed

Table-2 contains the values for the following example：

$ GPGGA,022043.00,2312.16435,N,14029.45462,E,1,06,2.74,65.4,M,19.2,M,,*61

Table-2:GGA Data Format			
Name	Example	Units	Description
Message ID	$ GPGGA		GGA protocol header
UTC Time	022043.00		hhmmss.sss
Latitude	2312.16435		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	14029.45462		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table-3
Satellites Used	06		Range 0 to 14
HDOP	2.74		Horizontal Dilution of Precision
MSL Altitude	65.4	Meters	Antenna Altitude above/below mean-sae-l
Units	M	Meters	Units of antenna altitude
Geodial Separation	19.2	Meters	
Units	M	Meters	Units of geoid separation
Age of Diff.Corr.		Second	Null field when DGPS is not used
Checksum	*61		
<CR><LF>			End of message termination

Table-3:Position Fix Indicator

Value	Description
0	Fix not available
1	GPS fix
2	Differential

GSA-GNSS DOP and Active Satellites
Table-4 contains the values for the following example:
$GPGSA,A,3,10,21,26,15,18,09,06,10,,,,,1.62,0.95,2.37*00

Table-4:GSA Data Format			
Name	Example	Unit	Description
Message ID	$ GPGSA		GSA protocol headew
Mode 1	A		See Table-5
Mode 2	3		See Table-6
Satellite Used	10		SV on channel 1
Satellite Used	21		SV on channel 2
….	….	….	….
Satellite Used			SV on channel 12
PDOP	1.62		Position Dilution of Precision
HDOP	0.95		Horizontal Dilution of Precision
VDOP	2.37		Vertical Dilution of Precision
Checksum	*00		
<CR><LF>			End of message termination

Table-5 Mode 1	
Value	Description
M	Manual-forced to operate in 2D or 3D
A	2D Automatic-allowed to automatically switch 2D/3D

Table-6 Mode 2	
Value	Description
1	Fix not available
2	2D(<4 SVs used)
3	3D(≧4 SVs used)

GSV—GNSS Satellites in View
Table-7 contains the values for the following example：
$GPGSV,3,1,09,29,36,029,42,21,46,314,43,26,44,020,43,16,25,124,39*7D
$GPGSV,3,2,09,18,26,314,40,09,57,170,44,06,20,229,37,10,26,084,
$GPGSV,3,3,09,07,,,26*73

Table-7:GSV Data Format			
Name	Example	Unit	Description
Message ID	$ GPGSV		GSV protocol
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 on 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	16		Channel 4(Range 1 to 32)
Elevation	25	degrees	Channel 4(Maximum 90)
Azimuth	125	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

RMC—Recommended Minimum Navigation Information

Table-8 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*55

Table-8 RMC Data Format

Name	Example	Units	Description
Message ID	$ GPRMC		RMC protocol header
UTC	064951.000		hhmmss.ss
Status	A		A=date valid or V=date 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
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-9 contains the values for the following example**:**

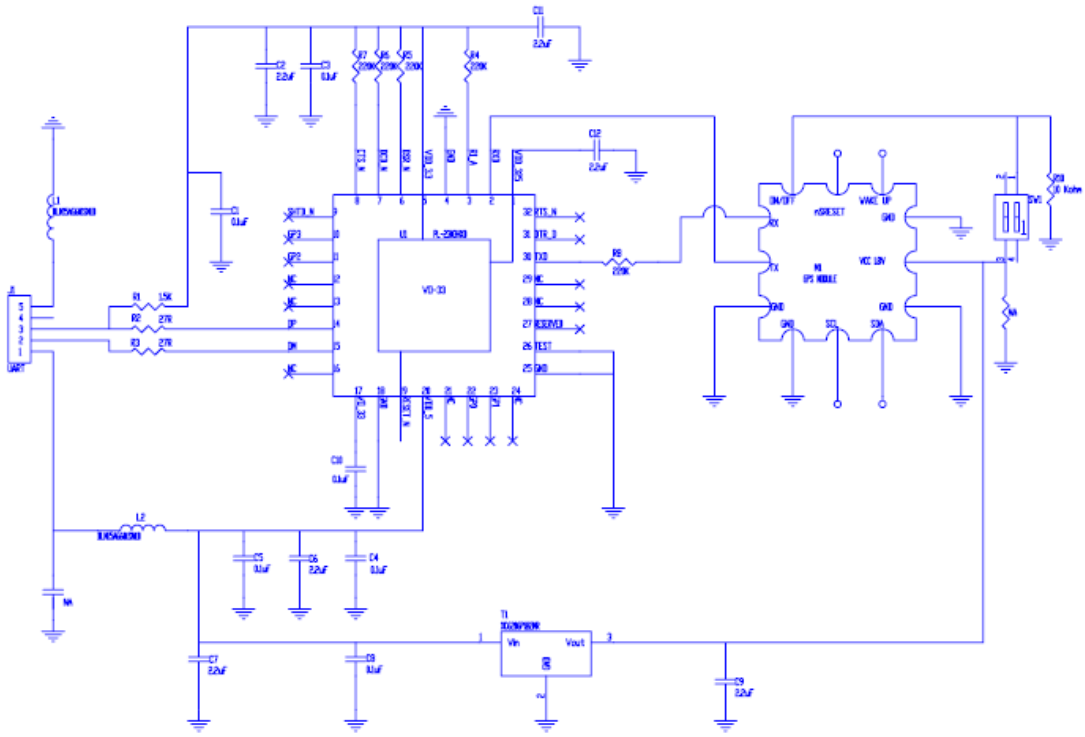
$GPVTG,165.48,T,,M,0.03,N,0.06,K,A*37

Table-9:VTG Data Format

Name	Example	Units	Description
Message ID	$ GPVT		VTG protocol header
Course	165.48	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic
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

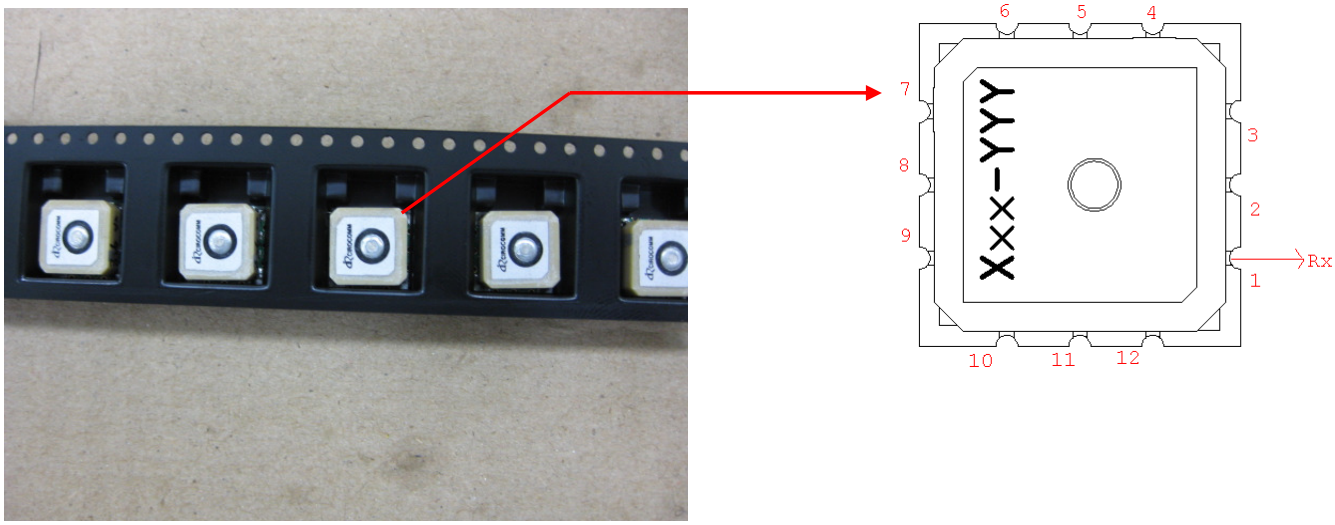
4. Test Board Design

4.1 Test Board Design Circuit



5.Packaging Specification:Reel tape.

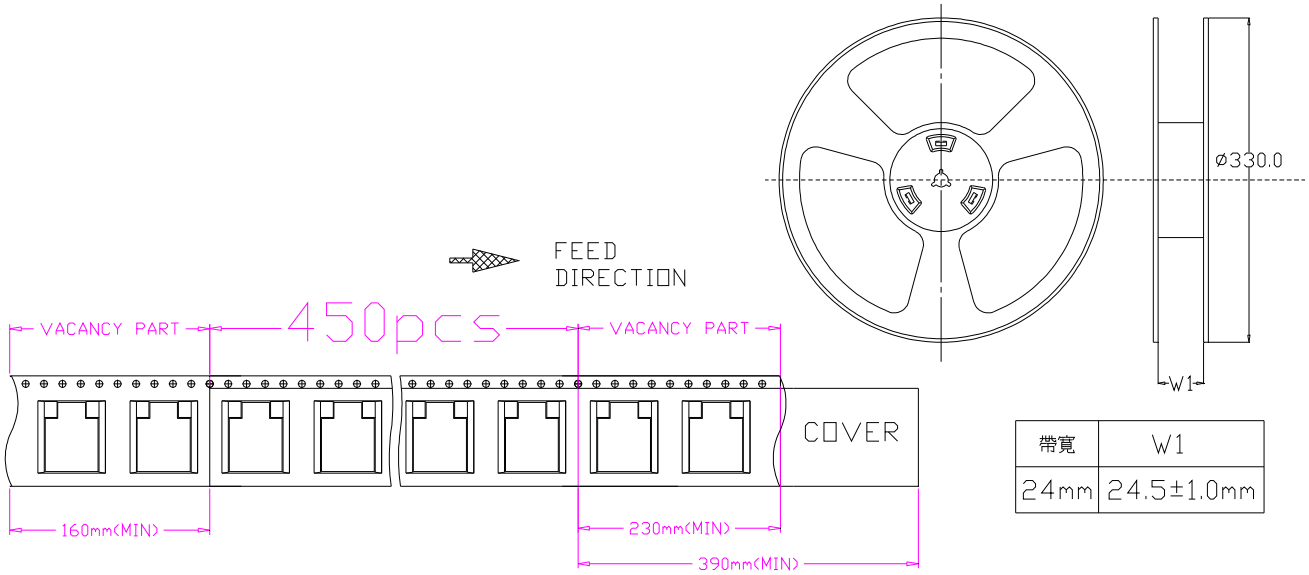
5.1 Antenna Placement



5.2 Reel Diemension :

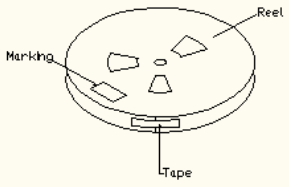
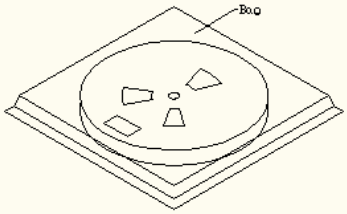
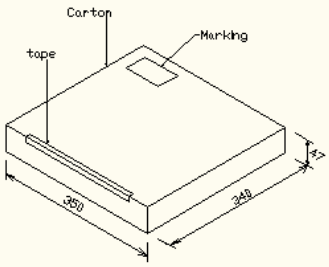
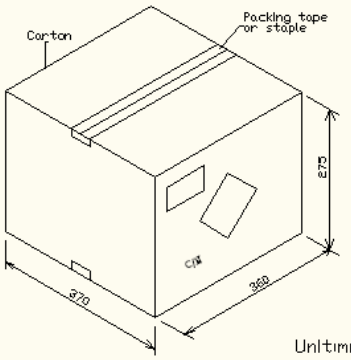
Amount: 450 Pieces/Reel.

Amount: 5 Reels/Carton.



帶寬	W1
24mm	24.5±1.0mm

5.3 Package Flow:

1.Taping	2.Bag	3.Inner Carton	4.Outer Carton
 Unit:mm	 Unit:mm	 Unit:mm	 Unit:mm