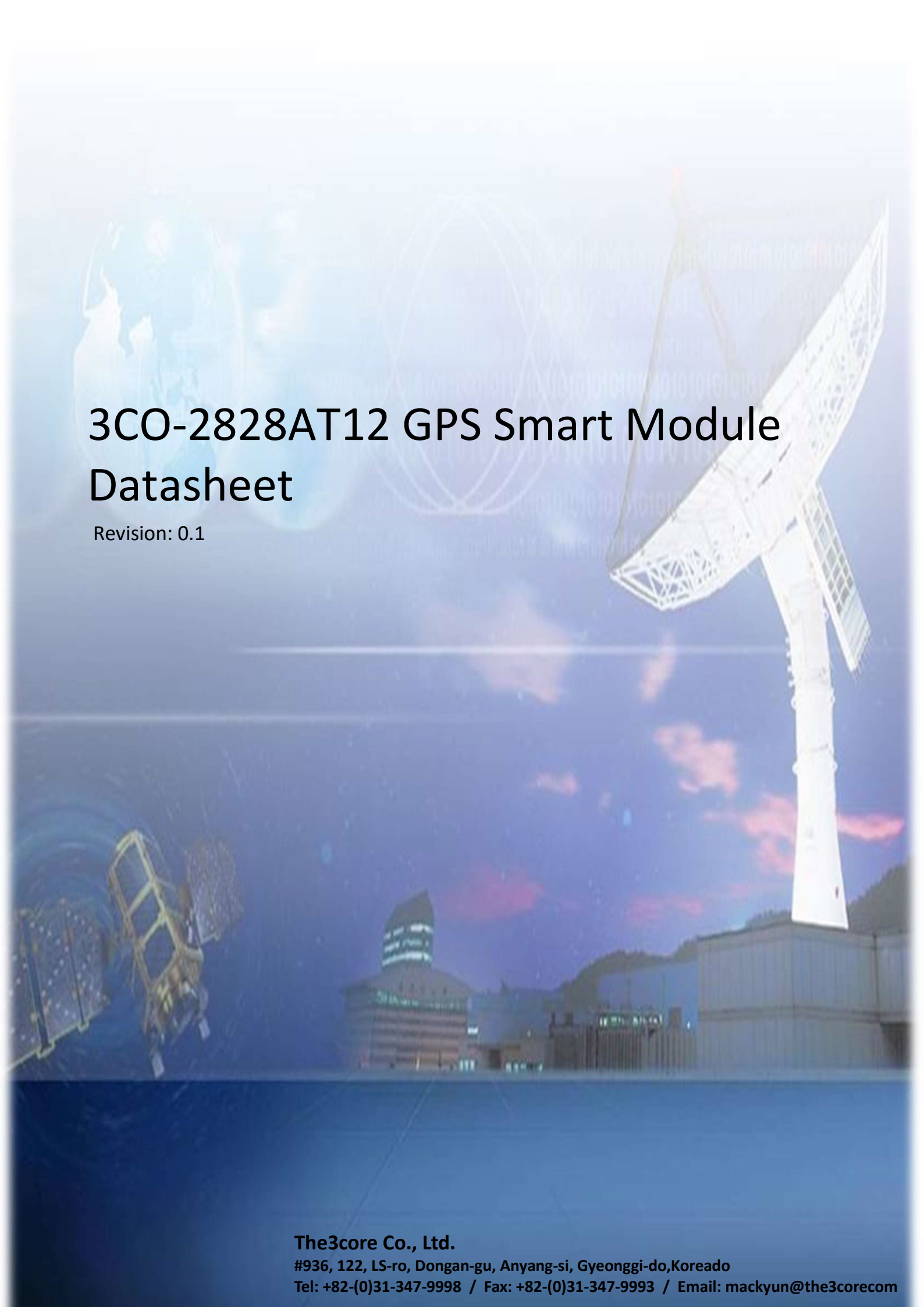

3CO-2828AT12 GPS Smart Module Datasheet

Revision: 0.1

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Human, Technology
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Table of Contents

1. Instruction

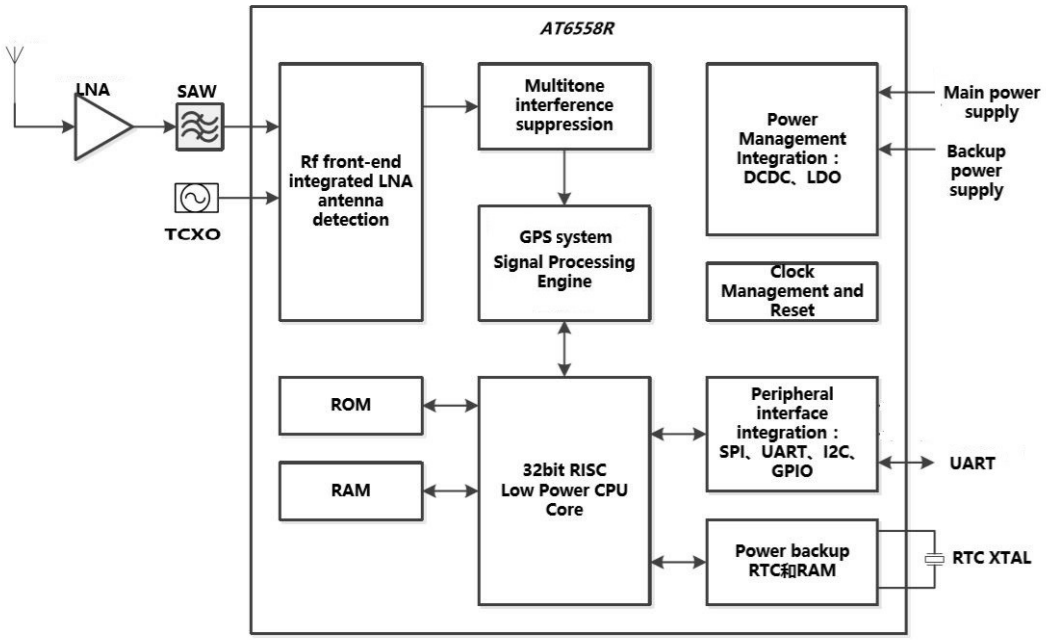
1.1 Overview

The suitable for integration in variety of consumer devices such as PDA, Personal Navigation Device, Digital Camera Vehicle Navigation, Telematics and other applications requiring Position, Velocity and Time. High Sensitivity GPS technology provides unprecedented indoor and outdoor positioning capability including urban canyon and under thick foliage. provides standard NMEA output for compatibility with all user applications, and map engines.

1.2 Features

* AT6558R-5N12 GPS Chip
* Active jammer detection and reduction
* Multi-path detection and compensation
* DGPS(WAAS/EGNOS/MSAS/GAGAN) QZSS support
* Update Rate: 1Hz (max up to 5Hz)
* RoHS compliant
* NMEA-0183 compliant protocol or custom protocol

1.3 System Block Diagram



1.4 Product Applications

* Handheld GPS receiver application
* Automotive application
* Car navigations and tracking
* Aviation application
* Ideal for PDA, Pocket PC and other consumer devices requiring positioning capability

2. Technical Specifications

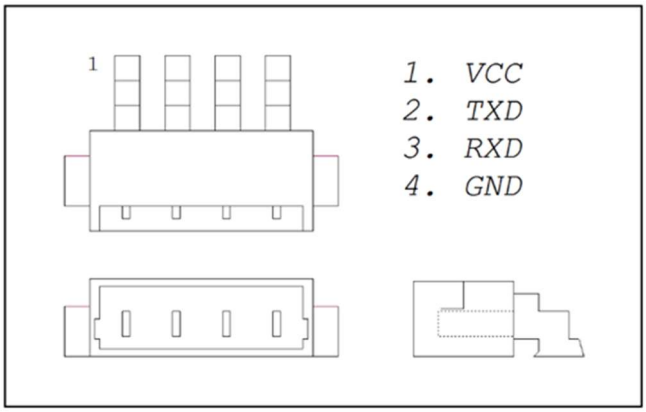
2.1 Specification List

Frequency	GPS L1, 1575.42MHz
Position	2.5m (Autonomous) / 2.0m SBAS(CEP50%)
Velocity	0.1 m/s
Time	1PPS
Hot start	<1sec., Autonomous
Cold start	<32sec., Autonomous
Tracking Sensitivity	-162dBm, typical
Acquisition sensitivity	-148dBm Autonomous cold start
Reacquisition	-160dBm, typical
Operation current	50mA_Tracking
Backup current	8uA
Altitude	50,000m
Velocity	500m/s
Acceleration	4g
Jerk	1g/s
Power Supply Voltage	+ 5V
Backup Voltage	+ 1.4 ~ + 3.6V
Dimension	28.0 x 28.0 x 8.6mm(±0.3mm)

3. Hardware interface

3.1 Pin Configuration

The 3CO-2828AT12 External pin connection is presented in the figure below.



3.2 Pin Assignment

Pin	Signal Name	I/O	Description
1	VCC	I	DC power Input
2	TXD	O	UART Serial Data Output
3	RXD	I	UART Serial Data Input
4	GND	G	Ground

VCC

This is the main DC power supply input pin. IT provides voltage to module.

TXD

This is the main transmitting channel and is used to output navigation and measurement data to debug software or user written software.

RXD

This is the main receiver channel and is used to receive software commands to the board from debug software or from user written software.

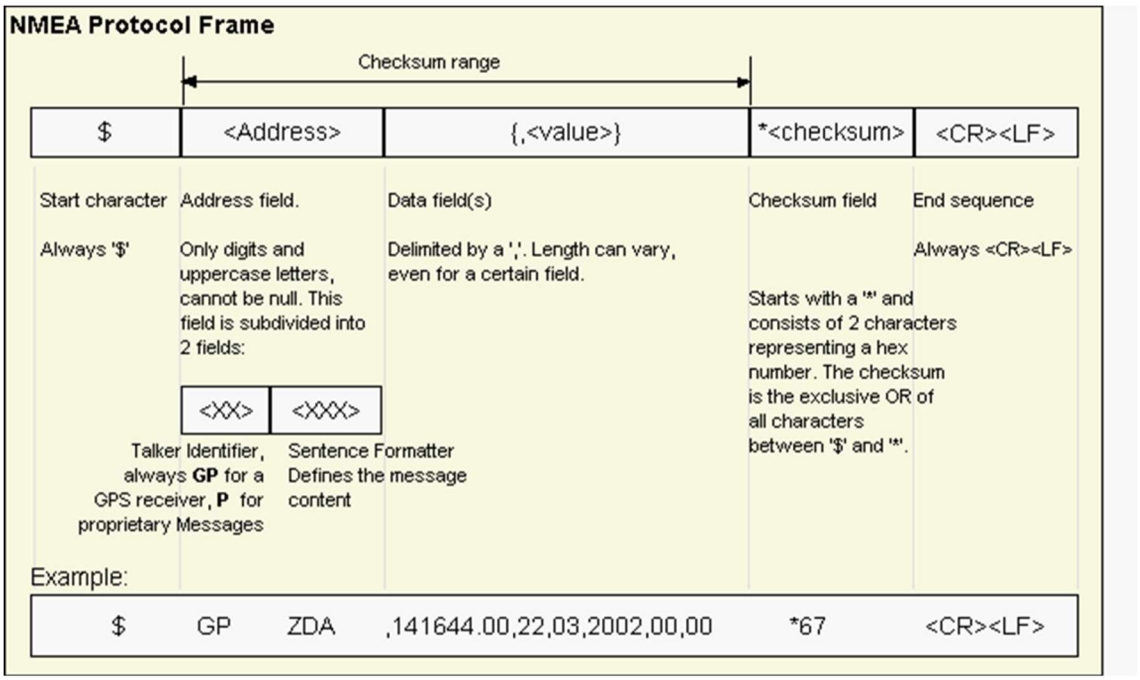
GND

GND provides the ground.

4. NMEA Output Sentences

NMEA messages sent by the GPS receiver are based on the NMEA 0183 Version 4.10.

The following picture shows the structure of a NMEA protocol message.



For further information on the NMEA Standard please refer to NMEA 0183 Standard For Interfacing Marine Electronic Devices, Version 2.30, March 1, 1998. See http://www.nmea.org/ for ordering instructions.

The NMEA standard allows for proprietary, manufacturer-specific messages to be added. These shall be marked with a manufacturer mnemonic.

GLL Latitude and longitude, with time of position fix and status

Message	**GLL**		
Description	**Latitude and longitude, with time of position fix and status**		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (Default: WGS84) -**		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x01	(9) or (10)	

Message Structure:

$GPGLL,Latitude,N,Longitude,E,hhmmss.ss,Valid,Mode*cs<CR><LF>

Example:

```
$GPGLL,4717.11364,N,00833.91565,E,092321.00,A,A*60
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGLL	String	$GPGLL	-	Message ID, GLL protocol header
1	4717.11364	ddmm.mmmm	Latitude	-	Latitude, Degrees + minutes, see Format description
2	N	Character	N	-	N/S Indicator, hemisphere N=north or S=south
3	00833.91565	dddmm. Mmmm	Longitude	-	Longitude, Degrees + minutes, see Format description
4	E	Character	E	-	E/W indicator, E=east or W=west
5	092321.00	hhmmss.sss	hhmmss.ss	-	UTC Time, Current time
6	A	Character	Valid	-	V = Data invalid or receiver warning, A = Data valid. See Position Fix Flags description
Start of optional block					
7	A	Character	Mode	-	Positioning Mode, see Position Fix Flags description
End of optional block					
8	*60	hexadecimal	cs	-	Checksum

GSA GPS DOP and Active satellites

Message	**GSA**		
Description	**GPS DOP and Active satellites**		
Type	Output Message		
Comment	• If less than 12 SVs are used for navigation, the remaining fields are left empty. If more than 12 SVs are used for navigation, only the IDs of the first 12 are being output. • The SV Numbers (Fields 'Sv') are in the range of 1 to 32 for GPS satellites, and 33 to 64 for SBAS satellites (33 = SBAS PRN 120, 34 = SBAS PRN 121 and so on)		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x02	19	

Message Structure:

$GPGSA,Smode,FS{,sv},PDOP,HDOP,VDOP*cs<CR><LF>

Example:

```
$GPGSA,A,3,23,29,07,08,09,18,26,28,,,,,1.94,1.18,1.54*0D
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGSA	String	$GPGSA	-	Message ID, GSA protocol header
1	A	character	Smode	-	Smode, see first table below
2	3	digit	FS	-	Fix status, see second table below and Position Fix Flags description
Start of repeated block (12 times)					
3 + 1*N	29	numeric	sv	-	Satellite number
End of repeated block					
15	1.94	numeric	PDOP	-	Position dilution of precision
16	1.18	numeric	HDOP	-	Horizontal dilution of precision
17	1.54	numeric	VDOP	-	Verticaldilution of precision
18	*0D	Hexadecimal	cs	-	Checksum

GSV **GPS Satellites in View**

Message	**GSV**		
Description	**GPS Satellites in View**		
Type	Output Message		
Comment	The number of satellites in view, together with each PRN (SV Id), elevation and azimuth, and C/No (Signal/Noise Ratio) value. Only four satellite details are transmitted in one message. There are up to 4 messages used as indicated in the first field NoMsg.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x03	7..16	

Message Structure:

$GPGSV,NoMsg,MsgNo,NoSv,{,sv,elv,az,cno}*cs<CR><LF>

Example:

```
$GPGSV,3,1,10,23,38,230,44,29,71,156,47,07,29,116,41,08,09,081,36*7F
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGSV	String	$GPGSV	-	Message ID, GSV protocol header
1	3	Digit	NoMsg	-	Number of messages, total number of GPGSV messages being output
2	1	Digit	MsgNo	-	Number of this message
3	10	Numeric	NoSv	-	Satellites in View
Start of repeated block (1..4 times)					
4+4*N	23	Numeric	sv	-	Satellite ID
End of repeated block					
5.. 16	*7F	Hexadecimal	cs	-	Checksum
6.. 16	-	Character	<CR><LF>	-	Carriage Return and Line Feed

RMC **Recommended Minimum data**

Message	**RMC**		
Description	**Recommended Minimum data**		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (Default: WGS84)** The Recommended Minimum sentence defined by NMEA for GPS/Transit system data.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x04	16	

Message Structure:

$GPRMC,time,status,lat,NS,lon,EW,spd,cog,date,mv,mvEW,posMode,navStatus*cs<CR><LF>

Example:

$GPRMC,083559.00,A,4717.11437,N,00833.91522,E,0.004,77.52,091202,,,A,V*57

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPRMC	String	$GPRMC	-	Message ID, RMC protocol header
1	083559.00	hhmmss.ss	time	-	UTC time. See section UTC representation in the integration manual for details.
2	A	Character	Status	-	Status, V = Navigation receiver warning, A = Data valid, see Position Fix Flags description
3	4717.11437	ddmm.mmmm	Latitude	-	Latitude, Degrees + minutes, see Format description
4	N	Character	N	-	N/S Indicator, hemisphere N=north or S=south
5	00833.91522	dddmm.Mmmm	Longitude	-	Longitude, Degrees + minutes, see Format description
6	E	Character	E	-	E/W indicator, E=east or W=west
7	0.004	Numeric	Spd	knots	Speed over ground
8	77.52	Numeric	cog	deg	Course over ground

9	091202	Ddmmyy	date	-	Date in day, month, year format
10	-	Numeric	mv	degr ees	Magnetic variation value, not being output by receiver
11	-	character	mvEW	-	Magnetic variation E/W indicator, not being output by receiver
12	A	character	posMode	-	Mode Indicator, see position fix flags description
13	V	character	navStatus	-	Navigational status indicator: V (Equipment is not providing navigational status information, fixed field, only available in NMEA 4.10 and later)
14	*57	Hexadecimal	cs	-	Checksum
15	-	Character	<CR><LF>	-	CarriageReturn and Line Feed

VTG **Course over ground and Ground speed**

Message	**VTG**		
Description	**Course over ground and Ground speed**		
Comment	Velocity is given as Course over Ground (COG) and Speed over Ground (SOG).		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x05	12	

Message Structure:

$GPVTG,cogt,T,cogm,M,sog,N,kph,K,mode*cs<CR><LF>

Example:

```
$GPVTG,77.52,T,,M,0.004,N,0.008,K,A*06
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPVTG	string	$GPVTG	-	Message ID, VTG protocol header
1	77.52	numeric	cogt	degrees	Course over ground (true)
2	T	character	T	-	Fixed field: true
3	-	numeric	cogm	degrees	Course over ground (magnetic), not output
4	M	character	M	-	Fixedfield: magnetic
5	0.004	numeric	sog	knots	Speed over ground
6	N	character	N	-	Fixedfield: knots
7	0.008	numeric	kph	km/h	Speed over ground
8	K	character	K	-	Fixed field: kilometers per hour
9	A	character	mode	-	Mode Indicator, see Position Fix Flags description
10	*06	hexadecimal	cs	-	Checksum
11	-	character	<CR><LF>	-	Carriage Return and Line Feed

ZDA **Time and Date**

Message	**ZDA**		
Description	**Time and Date**		
Type	Output Message		
Comment	-		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x08	9	

Message Structure:

$GPZDA,hhmmss.ss,day,month,year,ltzh,ltzn*cs<CR><LF>

Example:

$GPZDA,082710.00,16,09,2002,00,00*64

Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
0	xxZDA	-	string	$GPZDA	ZDA Message ID (xx = current Talker ID)
1	time	-	hhmmss.ss	082710.00	UTC Time, see note on UTC representation
2	day	day	dd	16	UTC day (range: 1-31)
3	month	mon th	mm	09	UTC month (range: 1-12)
4	year	year	yyyy	2002	UTC year
5	ltzh	-	-xx	00	Local time zone hours (fixed to 00)
6	ltzn	-	zz	00	Local time zone minutes (fixed to 00)
7	cs	-	hexadecimal	*64	Checksum
Field No.	*Name*	*Unit*	*Format*	*Example*	*Description*
8	<CR><LF>	-	character	-	Carriage return and line feed

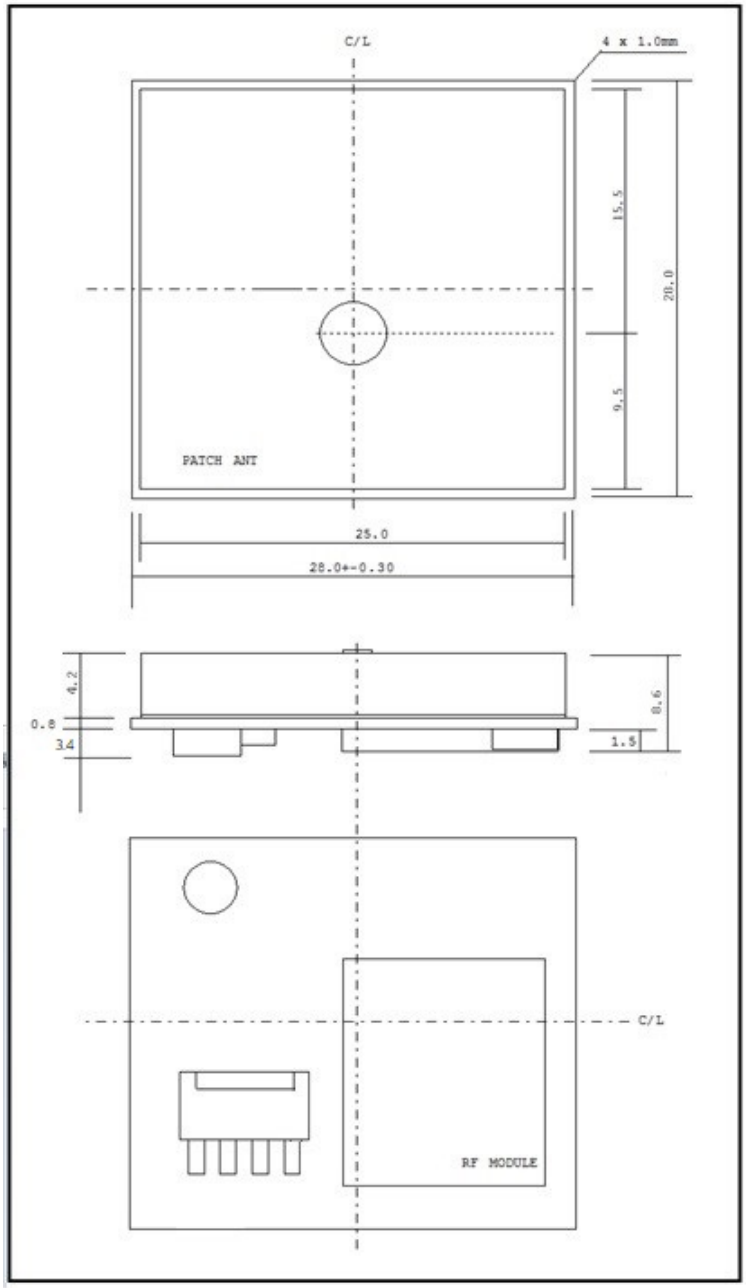
TXT **Antenna Detection Sentence**

Example:

$GPTXT,01,01,01,ANTENNA OPEN*25

5. Outline drawing

Dimension: (Unit: mm, Tolerance: +/- 0.3mm)



6. Contact Information Section

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