







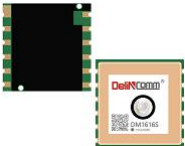


DelinComm DM series MT3333 scheme GPS Smart antenna module data list

Module appearance diagram	Module type	Description	weight	Version
	DM1513-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 15.3x13.2x7.5mm	Approx. 3.8g	V1.0
	DM1616-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 16.1x16.1x6.65mm	Approx. 5.5g	
	DM1818-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 18.1x18.1x6.41mm	Approx. 7.6g	
	DM2107-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 21x7.0x6.6mm	Approx. 3.1g	
	DM2222-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 22.1x22.1x8.6mm	Approx. 8.6g	
	DM2525-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 25.5x25.5x8.8mm	Approx. 11.4g	
	DM3026-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 30x26x8.0mm	Approx. 11.9g	
	DM3030-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 30x30x8.4mm	Approx. 12.6g	
	DM1616S-B	GPS Smart antenna module MT3333 UART/TTL, 9600BPS, 16x16x6.9mm	Approx. 6.0g	

General Description

DelinComm DM series MT3333 is a complete GPS engine module that features super sensitivity, ultra low power and small form factor.it with superior and performance even in urban canyon and dense foliage environment.

This module supports self-generate orbit prediction, EASYTM, to achieve faster cold start and warm start. The EASYTM is no need of both network assistance and host CPU's intervention. The predication is valid for up to 3 days and updates automatically from time to time when GPS module is powered on and satellites are available.

Applications

- LBS (Location Based Service)
- PND (Portable Navigation Device)
- Vehicle navigation system

- Mobile phone

Features

- Build on high performance, low-power MediaTek MT3333 chip set
- Ultra high Track sensitivity: -165dBm
- Extremely fast TTFF at low signal level
- Built in high gain LNA
- Low power consumption: Max 45mA@3.3V
- NMEA-0183 compliant protocol or custom protocol
- Operating voltage: 2.8V to 4.3V
- Operating temperature range:-40to85°C
- Communication type: UART/TTL
- RoHS compliant (Lead-free)
- IATF16949 quality control

1 Description

1.1. Key Features

Parameter	Specification
Power Supply	<ul style="list-style-type: none"> Supply voltage: 2.8V~4.3V Typical: 3.3V
Power Consumption	<ul style="list-style-type: none"> Acquisition: 45mA @VCC=VBAT=3.3V Tracking: 40mA @VCC=VBAT=3.3V Standby: 2.0mA @VCC=VBAT=3.3V Backup: 20uA @VBAT=3.3V
Receiver Type	<ul style="list-style-type: none"> Code 66 search channels, 22 synchronous tracking channels GPS&&QZSS L1 1575.42MHz C/A , Beidou B1 1561.098MHz SBAS: WAAS, EGNOS, MSAS, GAGAN
Sensitivity	<ul style="list-style-type: none"> Tracking: -165dBm Re-acquisition: -156dBm Acquisition: -148dBm
TTF (EASY enabled)	<ul style="list-style-type: none"> Cold start: 15s typ @-130dBm Warm start: 5s typ @-130dBm Hot start : 1s typ @-130dBm
TTF (EASY disabled)	<ul style="list-style-type: none"> Cold start(Autonomous): 35s typ @-130dBm Warm start (Autonomous): 30s typ @-130dBm Hot start (Autonomous): 1s typ @-130dBm
Horizontal Position Accuracy (Autonomous)	<ul style="list-style-type: none"> <2.5m CEP @-130 dBm
Max Update Rate	<ul style="list-style-type: none"> Up to 10Hz,1Hz by fault
Accuracy of 1PPS Signal	<ul style="list-style-type: none"> not enabled
Acceleration Accuracy	<ul style="list-style-type: none"> Without aid: 0.1m/s²
Dynamic Performance	<ul style="list-style-type: none"> Maximum altitude: 18,000m Maximum velocity: 515m/s Acceleration: 4G
UART Port	<ul style="list-style-type: none"> UART Port: TXD and RXD Supports baud rate from 4800bps to 115200bps, 9600bps by default UART port is used for NMEA output, MTK proprietary commands input and firmware upgrade
Temperature Range	<ul style="list-style-type: none"> Normal operation: -40°C ~ +85°C Storage temperature: -45°C ~ +125°C

1.2 Power Supply

Regulated power for this is required. The VCC Pin needs a stable DC voltage supply. Power supply ripple must be less than 30mV. The input voltage Vcc should be 2.8V~4.3V, Recommended power supply voltage is 3.3V. Maximum current is 28mA. Suitable decoupling must be provided by external decoupling circuitry.

1.3 UART Ports

The module supports two full duplex serial channels UART. All serial connections are at 3V CMOS logic levels, if need different voltage levels, use appropriate level shifters. The baud rate of both serial ports are fully programmable, the data format is however fixed: X, N, 8, 1, i.e. X baud rate, no parity, eight data bits and one stop bit, no other data formats are supported, LSB is sent first. The module's default baud rate is set up 9600bps, however, the user can change the default baud rate to any value from 4800 bps to 115kbps. UART port can be used for firmware upgrade, NMEA output and PMTK proprietary commands input.

2 Application DM1513-B

The module is equipped with a 5-pin pad that connects to your application platform. The DM1513-B module consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator.

1. Pin Assignment



Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VBAT	I	RTC Battery Input	Voltage range: 1.5V~4.3V
2	TXD	O	UART Serial Data output	
3	RXD	I	UART Serial Data Input	
4	VCC	I	Module Power Supply	Voltage range: 2.8V~4.3V
5	GND	G	Ground	

2.Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM1513-B module. Size unit (mm)

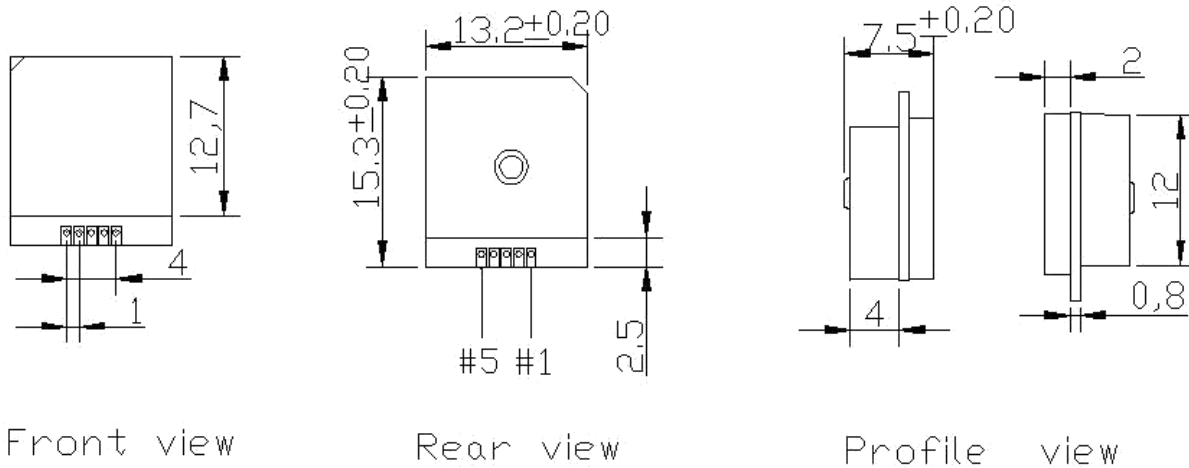


Figure 3: Specification size chart

2.1 Application DM1616-B

The module is equipped with a 5-pin pad that connects to your application platform. The DM1616-B module consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator.

1 .Pin Assignment

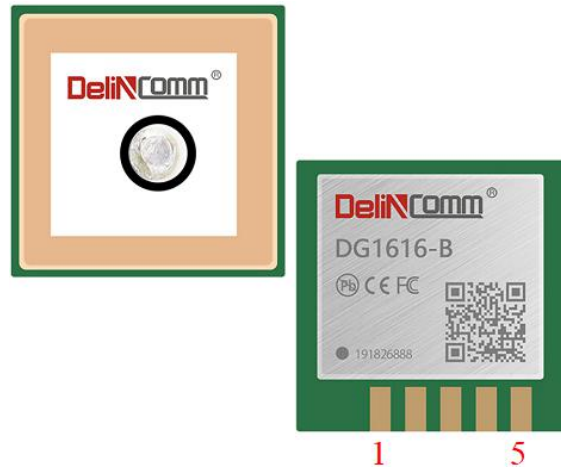


Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VBAT	I	RTC Battery Input	Voltage range: 1.5V~4.3V
2	TXD	O	UART Serial Data output	
3	RXD	I	UART Serial Data Input	
4	VCC	I	Module Power Supply	Voltage range: 2.8V~4.3V
5	GND	G	Ground	

2.Mechanical Dimensions

This chapter describes the mechanical dimensions of theDM1616-B module. Size unit (mm)

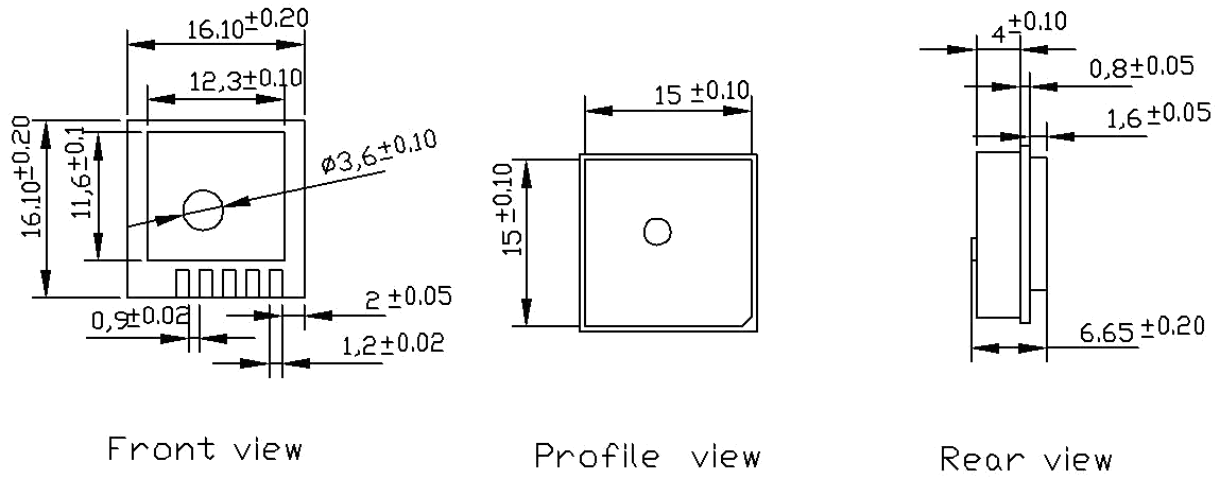


Figure 3: Specification size chart

2.2 Application DM1818-B

The module is equipped with a 5-pin pad that connects to your application platform. The DM1818-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator

1.Pin Assignment

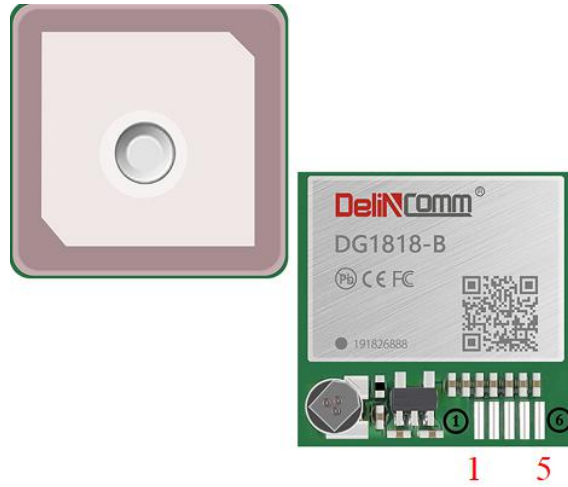


Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VBAT	I	RTC Battery Input	Voltage range: 1.5V~4.3V
2	TXD	O	UART Serial Data output	
3	RXD	I	UART Serial Data Input	
4	VCC	I	Module Power Supply	Voltage range: 2.8V~4.3V
5	GND	G	Ground	

2. Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM1818-B module. Size unit (mm)

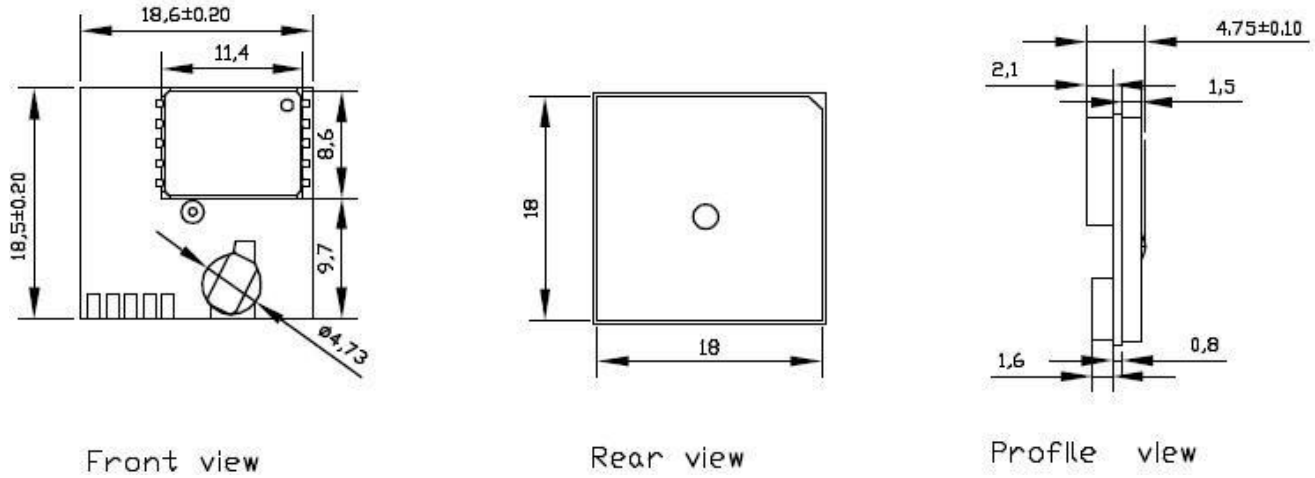


Figure 3: Specification size chart

2.3 Application DM2107-B

The module is equipped with a 5-pin pad that connects to your application platform. The DM2107-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator.

1. Pin Assignment



Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VBAT	I	RTC Battery Input	Voltage range: 1.5V~4.3V
2	TXD	O	UART Serial Data output	
3	RXD	I	UART Serial Data Input	
4	VCC	I	Module Power Supply	Voltage range: 2.8V~4.3V
5	GND	G	Ground	

2. Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM2107-B module. Size unit (mm)

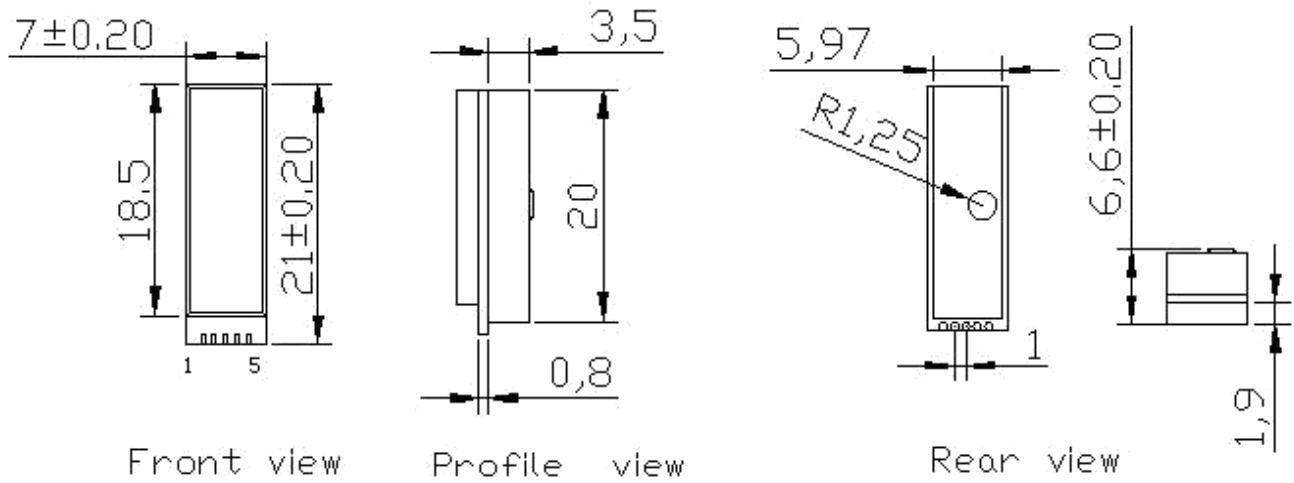


Figure 3: Specification size chart

2.4 Application DM2222-B

The module is equipped with a 6-pin 1.0mm distance Connector that connects to your application platform. The DM2222-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator, Also comes with a 0.22F crystal capacitor ,can backup satellite ephemeris about 2 hour.

1. Pin Assignment

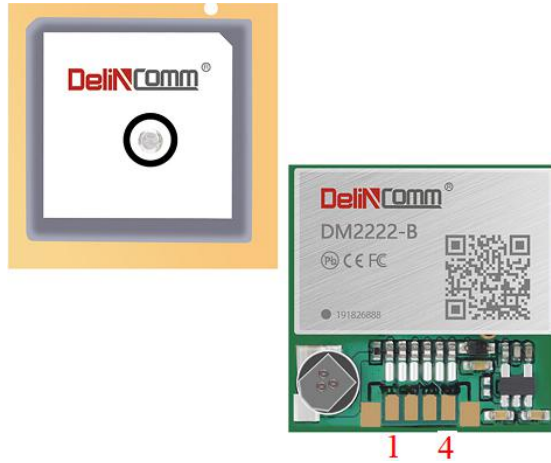


Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VCC	I	Module Power Supply	
2	GND	G	Ground	
3	TXD	O	UART Serial Data Output	
4	RXD	I	UART Serial Data Input	
5	GPIO2	I/O	General purpose I/O	
6	GPIO1	I/O	General purpose I/O	

2. Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM2222-B module. Size unit (mm)

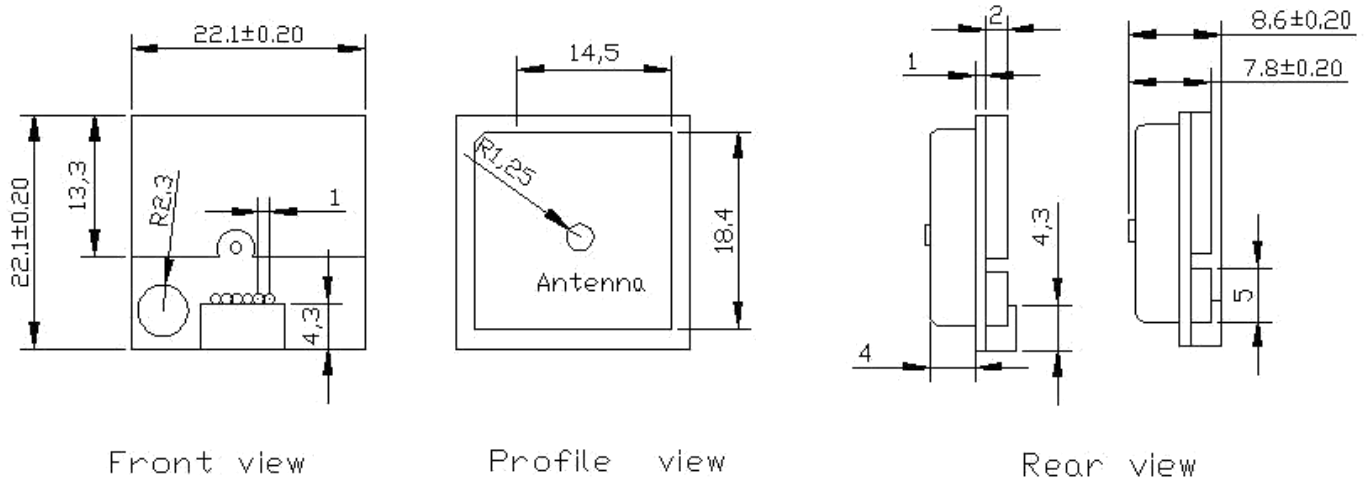


Figure 3: Specification size chart

2.5 Application DM2525-B

The module is equipped with a 4-pin 1.25mm spacing connector that connects to your application platform. The DM2525-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator, Also comes with a 0.22F crystal capacitor ,can backup satellite ephemeris about 2 hour.

1. Pin Assignment

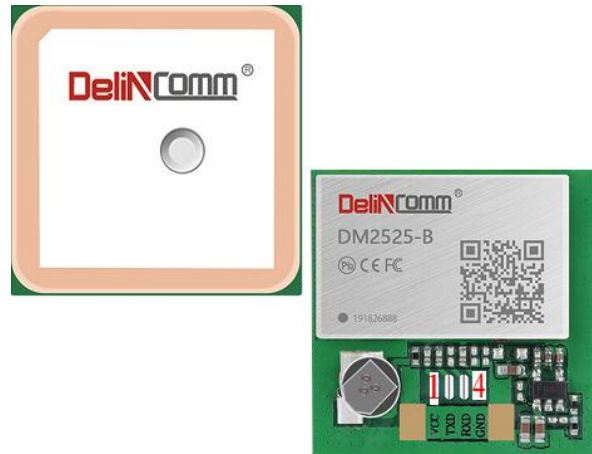


Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	VCC	I	Module Power Supply	Voltage range: 3.0V~5.0V
2	TXD	O	UART Serial Data Output	
3	RXD	I	UART Serial Data Input	
4	GND	G	Ground	

2. Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM2525-B module. Size unit (mm)

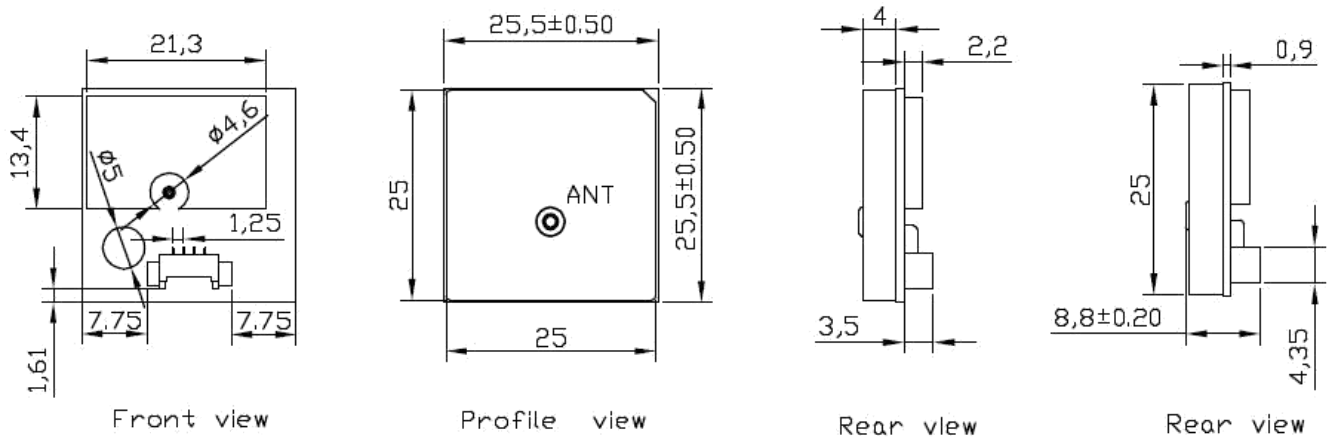


Figure 3: Specification size chart

2.6 Application DM3026-B

The module is equipped with a 5-pin pad that connects to your application platform. The DM3026-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator, Also comes with a 0.22F crystal capacitor ,can backup satellite ephemeris about 2 hour.

1. Pin Assignment



Figure 2: Pin Assignment

CON Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	GND	G	Ground	
2	VCC	I	Module Power Supply	
3	VBAT	I	RTC Battery Input	
4	RXD	I	UART Serial Data Input	
5	TXD	O	UART Serial Data output	

2. Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM3026-B module. Size unit (mm)

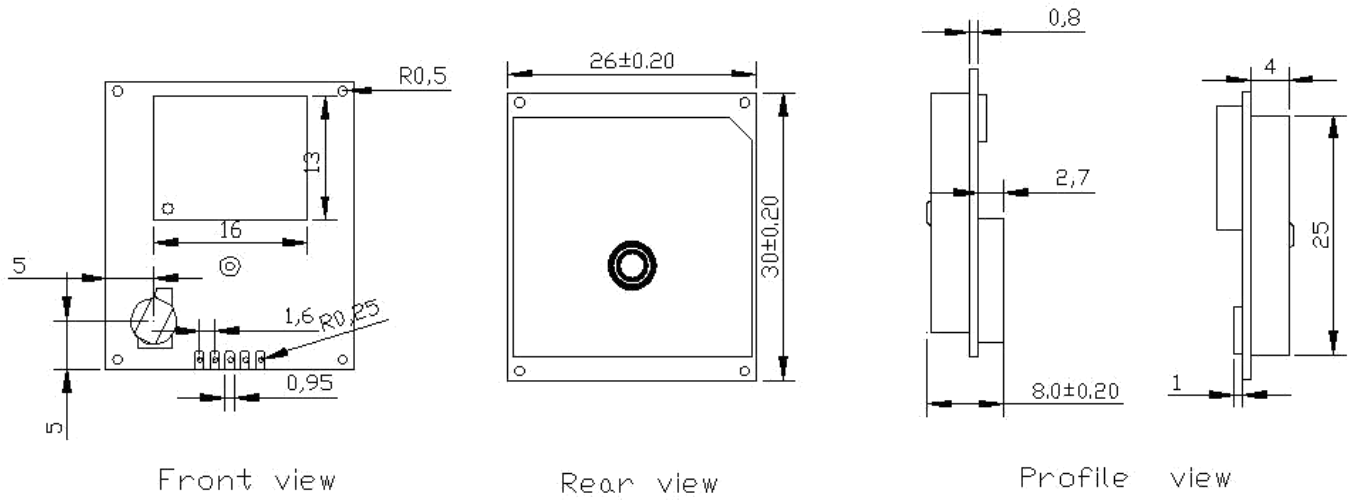


Figure 3: Specification size chart

2.7 Application DM3030-B

The module is equipped with a 5-pin 1.0mm distance Connector that connects to your application platform. The DM3030-B module It consists of a MediaTek MT3333 single chip GPS IC which includes the RF part and Baseband part, a patch antenna, a LNA, a SAW filter, a TCXO, a crystal oscillator, Also comes with a 0.22F crystal capacitor ,can backup satellite ephemeris about 2 hour.

1. Pin Assignment



Figure 2: Pin Assignment

Pin No.	Pin name	I/O	Description	Remark
1	VCC	I	Module Power Supply	3.0V~5.0V
2	AGND	G	Ground	
3	GND	G	Ground	
4	TXD	O	UART Serial Data output	
5	RXD	I	UART Serial Data Input	
6	PPS	O	Time Pulse(1PPS)	Typical accuracy: $\pm 10\text{ns}$ Time pulse width 100ms

2.Mechanical Dimensions

This chapter describes the mechanical dimensions of the DM3030-B module. Size unit (mm)

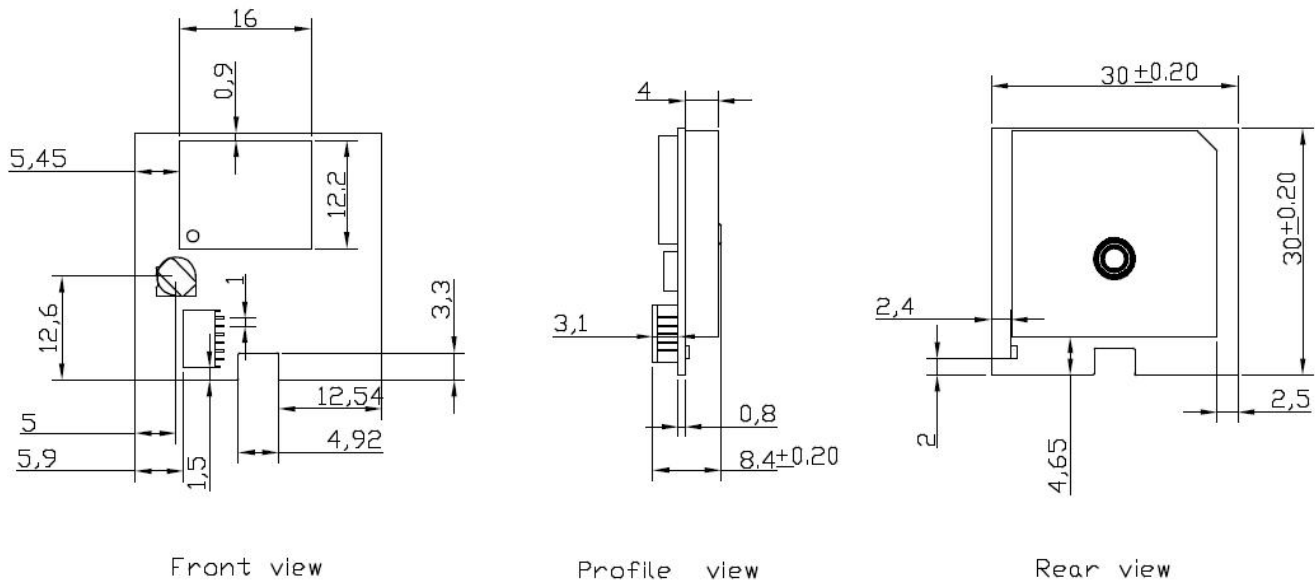


Figure 3: Specification size chart

2.8 Application DM1616S-B

The module is equipped with a 12-pin 2.54mm pitch SMT pad that connects to your application platform. Sub-interfaces included in the pad are described in details in the following chapters.

1. Pin Assignment

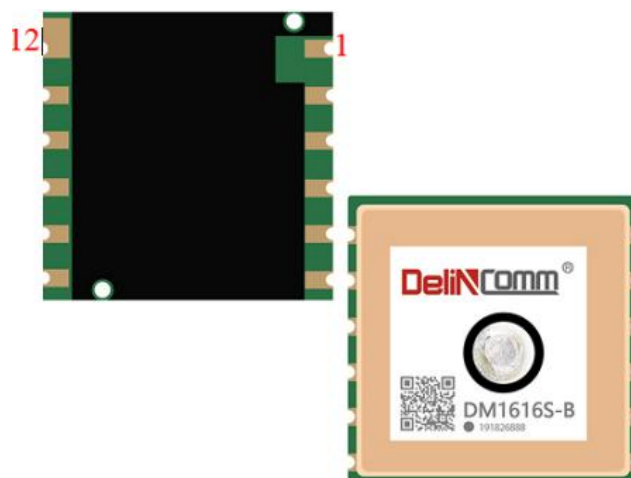


Figure 2: Pin Assignment

2.Pin Definition

Power Supply					
Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
VCC	4	I	Main power supply	Vmax=4.3V Vmin=2.8V Vnom=3.3V	Supply current not less than 100mA.
V_BCKP	5	I	Backup supply power	Vmax=4.3V Vmin=1.5V Vnom=3.3V	Supply power for RTC domain. The V_BCKP pin can be directly supplied power by battery or connect it to VCC.
Reset					
Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
RESET	10	I	System reset	VILmin=-0.3V VILmax=0.8V VIHmin=2.0V VIHmax=3.6V	Low level active. If unused, keep this pin open or connect it to VCC.

UART Port

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
RXD	1	I	Receive data	VILmin=-0.3V VILmax=0.8V VIHmin=2.0V VIHmax=3.6V	
TXD	2	O	Transmit data	VOLmin=-0.3V VOLmax=0.4V VOHmin=2.4V VOHmax=3.1V	

RF Interface

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
EX_ANT	11	I	External active antenna RF input	Characteristic impedance of 50Ω	If unused, keep this pin open.

Other Interfaces

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
1PPS	6	O	One pulse per second	VOLmin=-0.3V VOLmax=0.4V VOHmin=2.4V VOHmax=3.1V	Synchronized at rising edge, the pulse width is 100ms. If unused, keep this pin open.
TIMER	7	O	An open drain output signal can be used to control GPS module main power on/off	VOLmin=-0.3V VOLmax=0.4V VOHmin=1.1V VOHmax=3.1V	It belongs to RTC domain. If unused, keep this pin open or connect to Ground externally.
AADET_N	8	I/O	Active antenna detection	VOLmax=0.7V VOHmin=1.3V	If unused, keep this pin open. Refer to <i>chapter 2.3</i> .

3. Mechanical Dimensions

This chapter describes the mechanical dimensions of the module.

4. Mechanical Dimensions of the Module

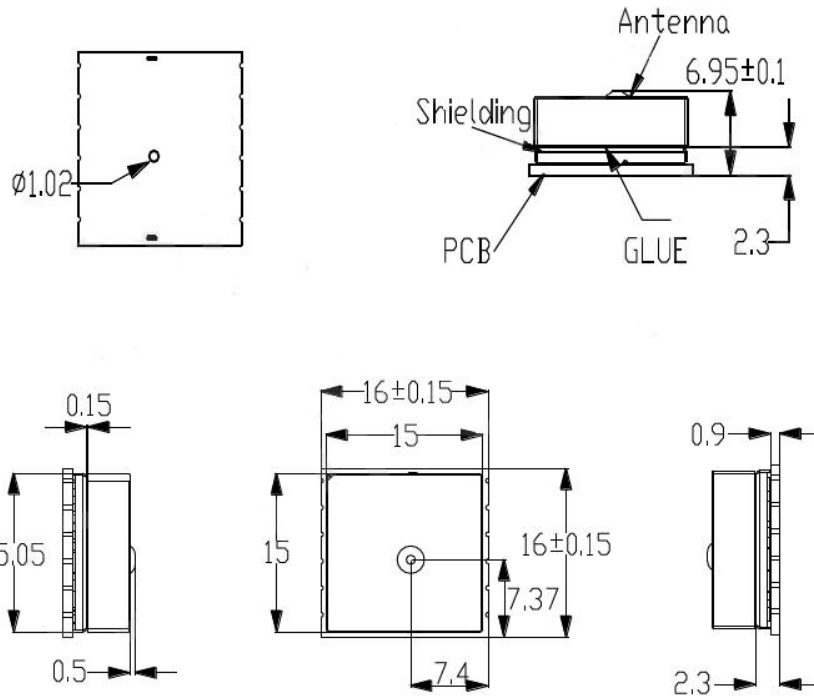


Figure 23: Mechanical Dimensions (Unit: mm)

5. Bottom View Dimensions and Recommended Footprint

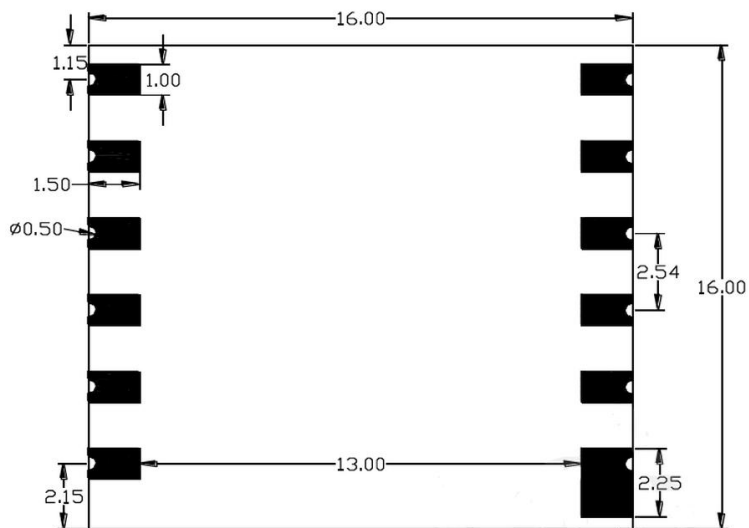


Figure 24: Bottom View Dimensions (Unit: mm)

3 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 check sum, which allows detection of corrupted data transfers. Delin Comm DL-1513-GCMR supports the following NMEA-0183 messages: \$GPGGA, \$GPGLL,\$GPGSA,\$GPSV, \$GPRMC and \$GPVTG.

Table 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

3.1 GGA-Global Positioning System Fixed Data

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

Table 2: GGA Data Format

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2457		ddmm.mmmm
N/S indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
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
MSL Altitude	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		
Check sum	*18		
<CR> <LF>			End of message termination

Table 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

3.2 GLL-Geographic Position - Latitude/Longitude

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

Table 3: GLL Data Format

Name	Example	Units	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
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
Check sum	*2C		
<CR> <LF>			End of message termination

3.3 GSA-GNSS DOP and Active Satellites

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

Table 4: GSA Data Format

Name	Example	Units	Description
Message	\$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
Check sum	*33		
<CR> <LF>			End of message termination

Table 4-1

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

Table 4-2

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

3.4 GSV-GNSS Satellites in View

\$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 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
Check sum	*71		
<CR> <LF>			End of message termination

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

3.5 RMC-Recommended Minimum Specific GNSS Data

\$GPRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13,309.62, 120598,, *10

Table 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	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
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
Check sum	*10		
<CR> <LF>			End of message termination

3.6 VTG-Course Over Ground and Ground Speed

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

Table 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
Check sum	*6E		
<CR> <LF>			End of message termination