

BE-880

GNSS+罗盘一体模块

Datasheet

Revision: 5.60

Date:2023.5



参数表:

参数	说明	
芯片特性	芯片	M10050
	频率	GPS L1 C/A, QZSS L1 C/A/S, BDS B1I/B1C, Galileo E1B/C, SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN
	工作模式	GPS, BDS, GALILEO
	辅助系统	SBAS, QZSS
	通道	N/A
灵敏度	跟踪	-166dBm
	重捕	-160dBm
	冷启动	-148dBm
	热启动	-160dBm
精度	水平精度	2.0 米 CEP
	速度精度	0.05m/s
	动态航向角精度	0.3 deg
	PPS时间精度	RMS 30ns
99% 60ns		
启动时间	冷启动	27s
	热启动	1s
	辅助启动	1s
输出数据	波特率	4800bps - 921600bps, 默认 38400bps
	输出电平	TTL 电平
	输出协议	NMEA, UBX
	NMEA 语句	RMC, VTG, GGA, GSA, GSV, GLL
	更新频率	0.25Hz-18Hz, 默认 1Hz
	FLASH	带 FLASH, 可以更改配置, 断电不丢失
	秒脉冲	0.25 Hz to 10 MHz 可配置, 默认周期 1s, 高电平持续 100ms
工作限制	高度	80,000m
	速度	500m/s
	重力加速度	<4g
电源消耗	电压	直流 3.6V-5.5V, 典型:5.0V
	电流	15mA/5.0V
物理参数	尺寸	28mm*28mm*11mm
	重量	12.0 克
	连接器	1.25 间距 6pin 座子
环境	操作温度	-40 °C ~ +85°C
	存储温度	-40°C ~ +105°C
指示灯	TX 灯	上电蓝灯闪烁, 表示有数据输出
	PPS 灯	未定位该灯不亮; 3D 定位后, 开始闪烁

罗盘	罗盘	内部带电子罗盘 QMC5883
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管脚定义:

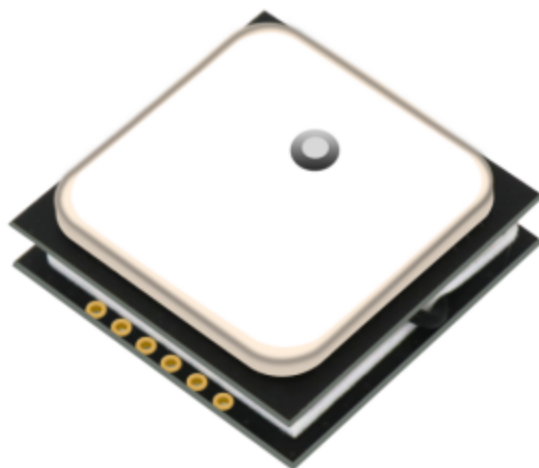


序号	名称	I/O	描述	特性
1	SDA	O	串行数据-I2C 总线主/从数据	罗盘数据引脚
2	GND	G	接 地	接 地
3	TX	O	UART 通讯接口,TTL 电平	GPS 数据输出引脚
4	RX	I	UART 通讯接口,TTL 电平	GPS 数据输入引脚
5	VCC	I	主电源, 直流输入	DC 3.6V-5.5V; 推荐 5.0V
6	SCL	I	串行时钟- I2C 总线主/从时钟	罗盘时钟引脚

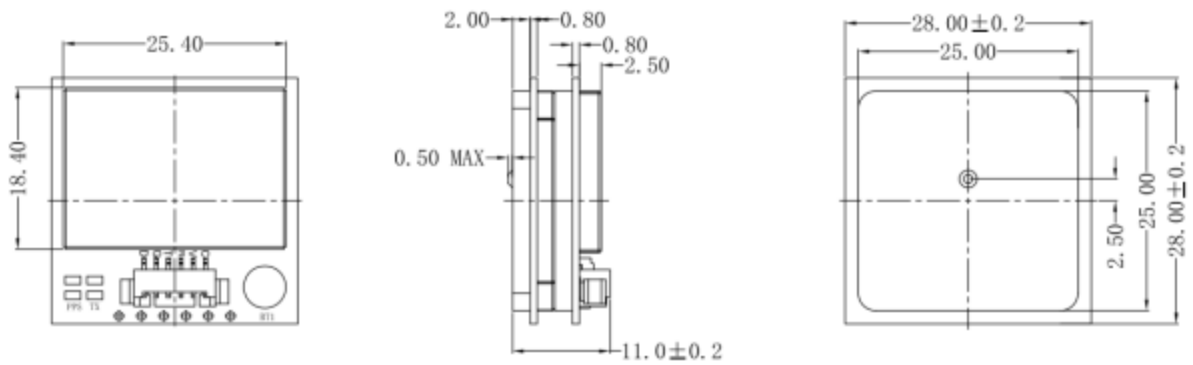
指示灯:

1. 蓝灯, TX 灯, 上电蓝灯闪烁, 表示有数据输出。
2. 红灯, PPS 灯, 未定位该灯不亮; 3D 定位后, 开始闪烁。

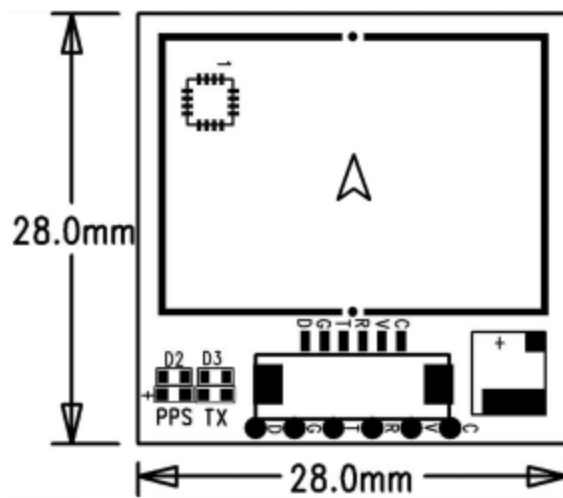
模块背面图:



尺寸图:



电子罗盘 IC QMC5883 的位置，指示方向：



数据输出协议

联合模式协议头-GN
GPS 模式协议头-GP
GLONASS 模式协议头-GL
北斗模式协议头-GB 或 BD

未定位:

```
$GNRMC,,V,,,,,,,,,N,V*37
$GNVTG,,,,,,,,,N*2E
$GNGGA,,,,,0,00,99.99,,,,,*56
$GNGSA,A,1,,,,,,,,,99.99,99.99,99.99,1*33
$GNGSA,A,1,,,,,,,,,99.99,99.99,99.99,3*31
$GNGSA,A,1,,,,,,,,,99.99,99.99,99.99,4*36
$GNGSA,A,1,,,,,,,,,99.99,99.99,99.99,5*37
$GPGSV,1,1,00,0*65
$GAGSV,1,1,00,0*74
```

```
$GBGSV,1,1,00,0*77
$GQGSV,1,1,00,0*64
$GNGLL,,,,,V,N*7A
```

已定位:

```
$GNRMC,054411.00,A,2243.08151,N,11401.10827,E,0.008,,230423,,A,V*1E
$GNVTG,,T,M,0.008,N,0.016,K,A*32
$GNGGA,054411.00,2243.08151,N,11401.10827,E,1,12,0.56,93.2,M,-2.7,M,,*64
$GNGSA,A,3,30,03,14,06,07,17,01,19,,,,,1.15,0.56,1.00,1*0D
$GNGSA,A,3,30,13,15,34,27,02,,,,,1.15,0.56,1.00,3*01
$GNGSA,A,3,27,28,30,01,02,03,37,38,40,,,,,1.15,0.56,1.00,4*04
$GNGSA,A,3,02,07,03,04,,,,,1.15,0.56,1.00,5*00
$GPGSV,3,1,12,01,27,034,37,03,44,087,39,06,38,241,42,07,15,180,35,1*64
$GPGSV,3,2,12,14,78,359,45,17,43,333,38,19,28,303,39,30,34,212,39,1*6C
$GPGSV,3,3,12,39,29,252,33,40,20,257,40,41,46,237,44,50,60,149,39,1*65
$GPGSV,1,1,01,11,00,228,,0*5C
$GAGSV,2,1,06,02,30,136,38,13,23,238,40,15,68,289,42,27,37,324,30,7*7E
$GAGSV,2,2,06,30,83,091,42,34,41,026,41,7*70
$GBGSV,3,1,11,01,47,123,36,02,46,234,37,03,63,189,38,04,,,31,1*49
$GBGSV,3,2,11,05,,,34,27,52,351,44,28,24,046,37,30,31,283,40,1*46
$GBGSV,3,3,11,37,43,178,40,38,70,172,40,40,57,034,39,1*48
$GQGSV,1,1,04,02,63,125,42,03,59,044,39,04,38,131,38,07,60,149,36,1*6C
$GNGLL,2243.08151,N,11401.10827,E,054411.00,A,A*71
```

\$xxGGA,time,lat,NS,lon,EW,quality,numSV,HDOP,alt,altUnit,sep,sepUnit,diffAge,diffStation*c
s<CR><LF>

Example:

```
$GPGGA,092725.00,4717.11399,N,00833.91590,E,1,08,1.01,499.6,M,48.0,M,,*5B
```

Field No.	Name	Unit	Format	Example	Description
0	xxGGA	-	string	\$GPGGA	GGA Message ID (xx = current Talker ID, see NMEA Talker IDs table)
1	time	-	hhmmss.ss	092725.00	UTC time, see note on UTC representation
2	lat	-	ddmm. mmmm	4717.11399	Latitude (degrees & minutes), see format description
3	NS	-	character	N	North/South indicator
4	lon	-	dddmm. mmmm	00833.91590	Longitude (degrees & minutes), see format description
5	EW	-	character	E	East/West indicator
6	quality	-	digit	1	Quality indicator for position fix, see position fix flags description Flags in NMEA 4.10 and above
7	numSV	-	numeric	08	Number of satellites used (range: 0-12)
8	HDOP	-	numeric	1.01	Horizontal Dilution of Precision

Field No.	Name	Unit	Format	Example	Description
9	alt	m	numeric	499.6	Altitude above mean sea level
10	altUnit	-	character	M	Altitude units: M (meters, fixed field)
11	sep	m	numeric	48.0	Geoid separation: difference between ellipsoid and mean sea level
12	sepUnit	-	character	M	Geoid separation units: M (meters, fixed field)
13	diffAge	s	numeric	-	Age of differential corrections (null when DGPS is not used)
14	diffStation	-	numeric	-	ID of station providing differential corrections (null when DGPS is not used)
15	cs	-	hexadecimal	*5B	Checksum
16	<CR><LF>	-	character	-	Carriage return and line feed

\$xxGLL,lat,NS,lon,EW,time,status,posMode*cs<CR><LF>

Example:

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

Field No.	Name	Unit	Format	Example	Description
0	xxGLL	-	string	\$GPGLL	GLL Message ID (xx = current Talker ID, see NMEA Talker IDs table)
1	lat	-	ddmm. mmmm	4717.11364	Latitude (degrees & minutes), see format description
2	NS	-	character	N	North/South indicator
3	lon	-	dddmm. mmmm	00833.91565	Longitude (degrees & minutes), see format description
4	EW	-	character	E	East/West indicator
5	time	-	hhmmss.ss	092321.00	UTC time, see note on UTC representation
6	status	-	character	A	Data validity status, see position fix flags description
7	posMode	-	character	A	Positioning mode, see position fix flags description (only available in NMEA 2.3 and later)
Field No.	Name	Unit	Format	Example	Description
8	cs	-	hexadecimal	*60	Checksum
9	<CR><LF>	-	character	-	Carriage return and line feed

\$xxGSA,opMode,navMode{,svid},PDOP,HDOP,VDOP,systemId*cs<CR><LF>

Example:

```
$GPGSA,A,3,23,29,07,08,09,18,26,28,,,,,1.94,1.18,1.54,1*0D
```

Field No.	Name	Unit	Format	Example	Description
0	xxGSA	-	string	\$GPGSA	GSA Message ID (xx = current Talker ID, see NMEA Talker IDs table)
1	opMode	-	character	A	Operation mode: M = Manually set to operate in 2D or 3D mode A = Automatically switching between 2D or 3D mode
2	navMode	-	digit	3	Navigation mode, see position fix flags description
Start of repeated block (12 times)					
3 + 1*N	svid	-	numeric	29	Satellite number
End of repeated block					
15	PDOP	-	numeric	1.94	Position dilution of precision
16	HDOP	-	numeric	1.18	Horizontal dilution of precision
17	VDOP	-	numeric	1.54	Vertical dilution of precision
18	systemId	-	numeric	1	NMEA defined GNSS System ID, see Signal Identifiers table (only available in NMEA 4.10 and later)
19	cs	-	hexadecimal	*0D	Checksum
20	<CR><LF>	-	character	-	Carriage return and line feed

```
$xxGSV,numMsg,msgNum,numSV{svid,elv,az,cno},signalId*cs<CR><LF>
```

Example:

```
$GPGSV,3,1,09,09,,,17,10,,,40,12,,,49,13,,,35,1*6F
```

```
$GPGSV,3,2,09,15,,,44,17,,,45,19,,,44,24,,,50,1*64
```

```
$GPGSV,3,3,09,25,,,40,1*6E
```

```
$GPGSV,1,1,03,12,,,42,24,,,47,32,,,37,5*66
```

```
$GAGSV,1,1,00,2*76
```

Field No.	Name	Unit	Format	Example	Description
0	xxGSV	-	string	\$GPGSV	GSV Message ID (xx = GSV Talker ID, see NMEA Talker IDs table). Talker ID GN shall not be used
1	numMsg	-	digit	3	Number of messages, total number of GSV messages being output (range: 1-9)
2	msgNum	-	digit	1	Number of this message (range: 1-numMsg)
3	numSV	-	numeric	10	Number of known satellites in view regarding both the talker ID and the signalId
Start of repeated block (1..4 times)					

4 + 4*N	svid	-	numeric	23	Satellite ID
5 + 4*N	elv	deg	numeric	38	Elevation (range: 0-90)
6 + 4*N	az	deg	numeric	230	Azimuth (range: 0-359)
7 + 4*N	cno	dB Hz	numeric	44	Signal strength (C/N0, range: 0-99), null when not tracking
End of repeated block					
Field No.	Name	Unit	Format	Example	Description
5.. 16	signalId	-	numeric	0	NMEA defined GNSS Signal ID, see Signal Identifiers table (only available in NMEA 4.10 and later)
6.. 16	cs	-	hexadecimal	*7F	Checksum
7.. 16	<CR><LF>	-	character	-	Carriage return and line feed

\$xxRMC,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.	Name	Unit	Format	Example	Description
0	xxRMC	-	string	\$GPRMC	RMC Message ID (xx = current Talker ID, see NMEA Talker IDs table)
1	time	-	hhmmss.ss	083559.00	UTC time, see note on UTC representation
2	status	-	character	A	Data validity status, see position fix flags description
3	lat	-	ddmm. mmmm	4717.11437	Latitude (degrees & minutes), see format description
4	NS	-	character	N	North/South indicator
5	lon	-	dddmm. mmmm	00833.91522	Longitude (degrees & minutes), see format description
6	EW	-	character	E	East/West indicator
7	spd	kno ts	numeric	0.004	Speed over ground
8	cog	deg ree s	numeric	77.52	Course over ground

Field No.	Name	Unit	Format	Example	Description
9	date	-	ddmmyy	091202	Date in day, month, year format, see note on UTC representation
10	mv	deg rees	numeric	-	Magnetic variation value. Only supported in ADR 4.10 and later
11	mvEW	-	character	-	Magnetic variation E/W indicator. Only supported in ADR 4.10 and later
12	posMode	-	character	A	Mode Indicator, see position fix flags description (only available in NMEA 2.3 and later)
13	navStatus	-	character	V	Navigational status indicator: V (Equipment is not providing navigational status information, fixed field, only available in NMEA 4.10 and later)
14	cs	-	hexadecimal	*57	Checksum
15	<CR><LF>	-	character	-	Carriage return and line feed

\$xxVTG,cogt,cogtUnit,cogm,cogmUnit,sogn,sognUnit,sogk,sogkUnit,posMode*cs<CR><LF>

Example:

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

Field No.	Name	Unit	Format	Example	Description
0	xxVTG	-	string	\$GPVTG	VTG Message ID (xx = current Talker ID, see NMEA Talker IDs table)
1	cogt	deg rees	numeric	77.52	Course over ground (true)
2	cogtUnit	-	character	T	Course over ground units: T (degrees true, fixed field)
3	cogm	deg rees	numeric	-	Course over ground (magnetic). Only supported in ADR 4.10 and above
4	cogmUnit	-	character	M	Course over ground units: M (degrees magnetic, fixed field)
5	sogn	kno ts	numeric	0.004	Speed over ground
6	sognUnit	-	character	N	Speed over ground units: N (knots, fixed field)
Field No.	Name	Unit	Format	Example	Description

7	sogk	km/h	numeric	0.008	Speed over ground
8	sogkUnit	-	character	K	Speed over ground units: K (kilometers per hour, fixed field)
9	posMode	-	character	A	Mode Indicator, see position fix flags description (only available in NMEA 2.3 and later)
10	cs	-	hexadecimal	*06	Checksum
11	<CR><LF>	-	character	-	Carriage return and line feed

Flags in NMEA 4.10 and above

NMEA Message	GLL, RMC	GGA	GLL, VTG	RMC, GNS
Field	status	quality	posMode	posMode
No position fix (at power-up, after losing satellite lock)	V	0	N	N
GNSS fix, but user limits exceeded	V	0	N	N
Dead reckoning fix, but user limits exceeded	V	6	E	E
Dead reckoning fix	A	6	E	E
RTK float	A	5	D	F
RTK fixed	A	4	D	R
2D GNSS fix	A	1 / 2	A / D	A / D
3D GNSS fix	A	1 / 2	A / D	A / D
Combined GNSS/dead reckoning fix	A	1 / 2	A / D	A / D
	See below (1)	See below(2)	See below(3)	See below(3)

(1) Possible values for status: V = Data invalid, A = Data valid

(2) Possible values for quality: 0 = No fix, 1 = Autonomous GNSS fix, 2 = Differential GNSS fix, 4 = RTK fixed, 5 = RTK float, 6 = Estimated/Dead reckoning fix

(3) Possible values for posMode: N = No fix, E = Estimated/Dead reckoning fix, A = Autonomous GNSS fix, D = Differential GNSS fix, F = RTK float, R = RTK fixed