

SKM2105QR-40FXT

规格书/Datasheet

L1 BDS3 GNSS G-Mouse

系列型号/Serial model No.:

SKM2105QR-40F3T

SKM2105QR-40F5T

SKM2105QR-40F8T

文档信息/Document Information

标题/Title	SKM2105QR-40FXT L1 BDS3 GNSS G-Mouse 规格书/Datasheet	
文档类型/Document type	规格书/Datasheet	
文档编号/Document number	SL-22100296	
版本日期/Revision and date	V1.01	22-Oct-2022
秘密等级/Disclosure restriction	公开/Public	

版本历史/Revision History

版本号/Revision	版本描述/Description	制定/Approved	日期/Date
V1.01	初始版本/Initial Release	Wendy	20221022

SKYLAB 保留本文档及本文档所包含的信息的所有权利。SKYLAB 拥有本文档所述的产品、名称、标识和设计的全部知识产权。严禁没有征得 SKYLAB 的许可的情况下复制、使用、修改或向第三方披露本文档的全部或部分内容。

SKYLAB 对本文档所包含的信息的使用不承担任何责任。没有明示或暗示的保证，包括但不限于关于信息的准确性、正确性、可靠性和适用性。SKYLAB 可以随时修订这个文档。可以访问 www.skylab.com.cn 获得最新的文件。

Copyright © 2022, 深圳市天工测控技术有限公司。

SKYLAB® 是深圳市天工测控技术有限公司在中国的注册商标。

SKYLAB reserves all rights to this document and the information contained herein. Products, names, logos and designs described herein may in whole or in part be subject to intellectual property rights. Reproduction, use, modification or disclosure to third parties of this document or any part thereof without the express permission of SKYLAB is strictly prohibited.

The information contained herein is provided “as is” and SKYLAB assumes no liability for the use of the information. No warranty, either express or implied, is given, including but not limited, with respect to the accuracy, correctness, reliability and fitness for a particular purpose of the information. This document may be revised by SKYLAB at any time. For most recent documents, visit www.skylab.com.cn.

Copyright ©2022, Skylab M&C Technology Co., Ltd.

SKYLAB® is a registered trademark of Skylab M&C Technology Co., Ltd in China

目录/contents

1 产品简介/Product introduction	4
2 典型应用/Applications	4
3 产品特点/Features	5
4 型号说明/Model Code	5
5 接口定义/Interface definition	5
6 接口描述/Interface description	6
7 性能介绍/Performance introduction	7
8 模块尺寸/Module size	8
9 应用配置/Application configuration	9
9.1 NMEA-0183 协议/NMEA 0183 Protocol	9
9.2 GGA-位置信息/GGA- Location information	10
9.3 GLL-地理定位信息/GLL- Geographic Position – Latitude/Longitude	11
9.4 GSA-GNSS 正在使用的卫星信息/GSA- GNSS satellites in using	12
9.5 GSV-GNSS 可见卫星信息/GSV- GNSS Satellites in View	13
9.6 RMC-推荐的最小定位信息/RMC- Recommended locating information	14
9.7 VTG-地面速度信息/VTG-Course Over Ground and Ground Speed	15
9.8 ZDA-时间和日期信息/ZDA-Date and Time	15
9.9 CMD 列表 (TBD) /CMD List (TBD)	16
10 联系方式/Contact Information	16

1 产品简介/Product introduction

SKM2105QR 是一款高性能的、多系统导航定位模块，模块能同时支持 GPS、GLONASS、GALILEO、BDS3 和 QZSS 的卫星接收模块，并使定位更快，精度更高，产品性能更可靠。该模组以其卓越性能，可以为车载和便携式手持等定位终端产品的制造提供了高灵敏度、高精度、低成本的定位、导航等解决方案，能满足专业定位的严格要求与个人消费需要。

SKM2105QR is a high-performance, multi-system navigation and positioning module, which can support GPS、GLONASS、GALILEO、BDS3 and QZSS satellite signal reception. At the same time, it makes positioning faster, higher accuracy and more reliable product performance. With its excellent performance, the module can provide positioning and navigation solutions with high sensitivity, high precision and low cost for the manufacturing of vehicle and portable positioning terminal products, which can meet the strict requirements of professional positioning and personal consumption needs.



Figure 1: SKM2105QR-40FXT Top View

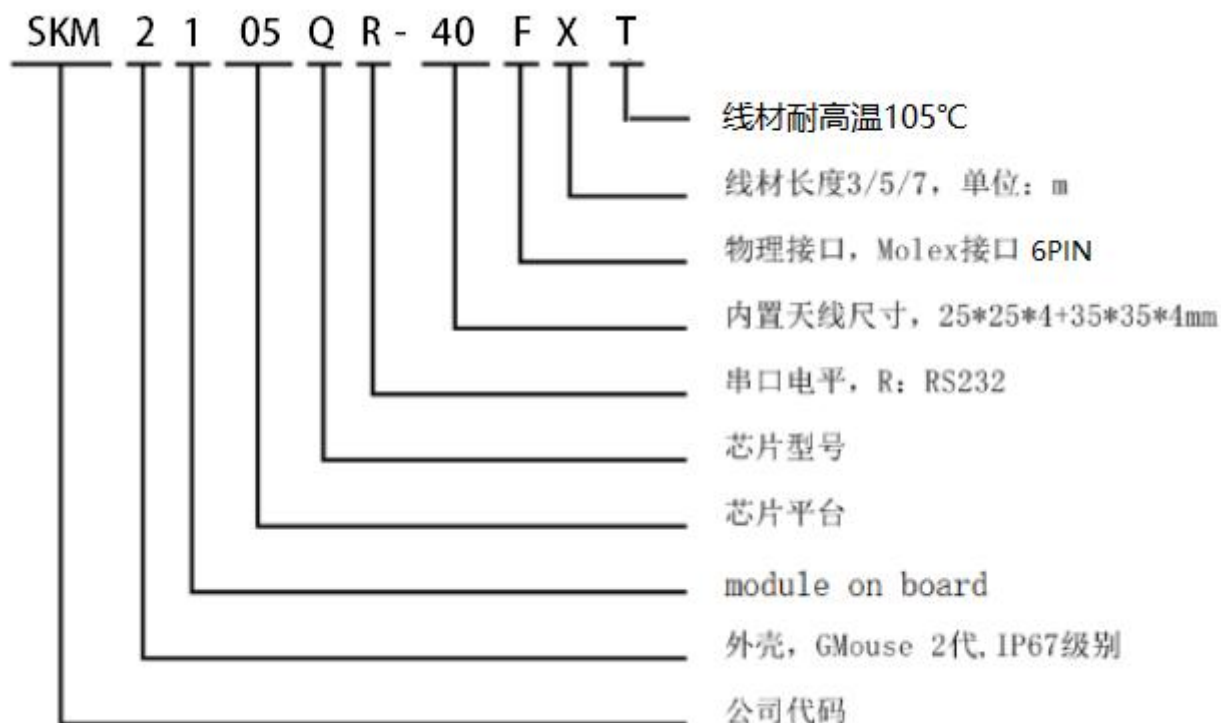
2 典型应用/Applications

- ◆ 汽车导航/ Auto navigation
- ◆ 个人导航设备/ Personal navigation equipment
- ◆ 汽车保全系统/ Car Security System
- ◆ 车辆监控/ Vehicle monitoring

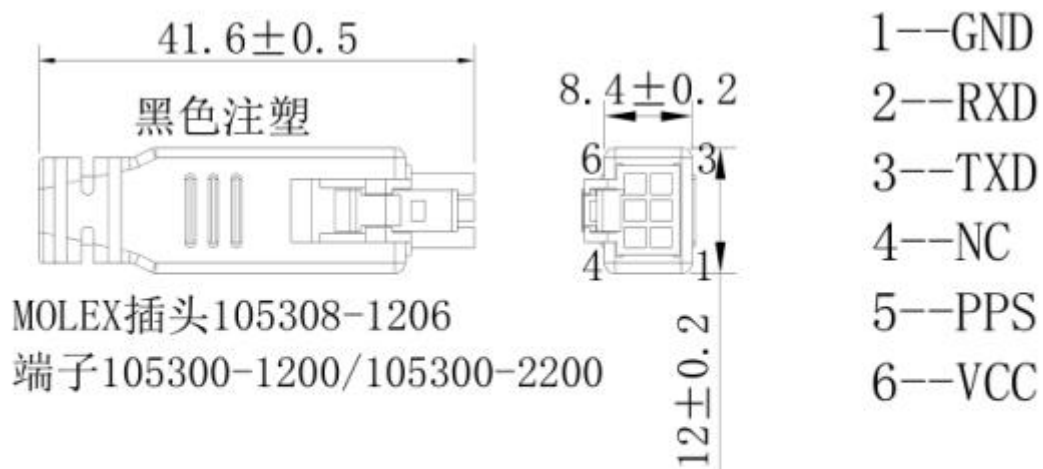
3 产品特点/Features

- ◆ 支持 BDS3、GPS、GLONASS、Galileo、QZSS、SBAS 系统/ Supports BDS3, GPS, GLONASS, Galileo, QZSS and SBAS systems
 - ◆ 极快的 TTFF: 冷启动小于 32s; 热启动小于 1s / Extremely fast TTFF: cold start less than 32s; Hot start less than 1s
 - ◆ 支持 A-GPS/ Support A-GPS
 - ◆ 工业级标准/Industrial Grade Standards
 - ◆ 符合 RoHS, FCC, CE 标准/Compliance with RoHS, FCC, CE standards
 - ◆ 获得最快的定位时间/Get the fastest location time
 - ◆ 弱信号下较好的定位精度和位置有效性/Better positioning accuracy and position validity are maintained under weak signal
- 优越的质量和可靠性/Superior quality and reliability

4 型号说明/Model Code



5 接口定义/Interface definition



RXD: Serial Data Input To Gmouse
TXD: Serial Data Output From Gmouse

图 2: SKM2105QR-40FXT 接口定义

6 接口描述/Interface description

电源: SKM2105QR 系列输入电压 VCC 范围为 3.5 V~ 5.5V, 电流要求大于 100mA。靠近接口电源的地方请放置去耦电容 (10uF 和 1uF)。

Power supply: SKM2105QR series input voltage VCC range is 3.5V ~ 5.5V, current requirement is greater than 100mA. Place decoupling capacitors (10uF and 1uF) close to the interface power supply.

UART 端口: SKM2105QR 系列支持一个完整的双工系列通道 UART。

UART port: The SKM2105QR series supports a complete duplex series channel UART.

RS232 电平: SKM2105QR 系列使用单芯片 RS232 到 UART bridge, 它是 3.3V 驱动的 EIA / TIA-232 和 V.28/V.24。

RS232 level: The SKM2105QR series uses a single-chip RS232 to UART bridge, which is 3.3V driven EIA/TIA-232 and V.28/V.24.

Pin No.	Pin name	I/O	Description	Remark
MOLEX 连接头 105308-1206/ MOLEX connector 105308-1206				
1	GND	G	Power Ground	Reference Ground
2	RXD	I	UART Serial Data Input To SKM2105	RS232
3	TXD	O	UART Serial Data Output From SKM2105	RS232
4	NC	/	/	/
5	PPS	O	Time Pulse Signal (Default 100ms)	
6	VCC	P	Power Supply	VCC:3.5V~5.5V

7 性能介绍/Performance introduction

表 4-1 基本参数/ Table 4-1 Basic parameters

参数/Parameter	描述/Description	性能指标/ Performance Evaluation
电压/Voltage		3.5~5.5V
射频输入/ RF Input	频率/Frequency	GPS/QZSS :L1C/A GLONASS: L1 BeiDou: B1I,B1C GALILEO: E1 SBAS: L1C/A(WAAS, EGNOS, MSAS, GAGAN, SDCM)
	驻波比 /Standing-wave ratio	≤1.5
	输入阻抗/ Input impedance	50Ω±10%
	天线增益/ Antenna Gain	0~32dB
物理尺寸 /Physical Size		50.7*48.5*18.5（单位：mm）
数据接口/ Data interface		1 个 UART, TTL 电平,波特率 1200~921600bps 可调, 默认 115200/ One UART, TTL level, baud rate adjustable from 1200 to 921600bps, 115200 by default
天线检测/ Antenna testing		可支持天线馈电, 需外置天线检测电路/ Support antenna feed, need external antenna detection circuit

表 4-2 GNSS 性能指标/ Table 4-2 GNSS performance specifications

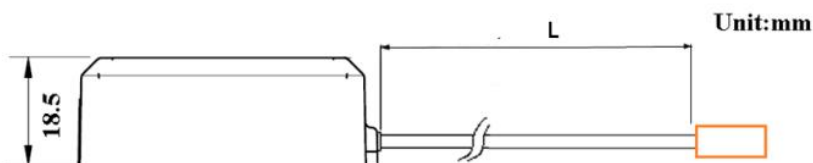
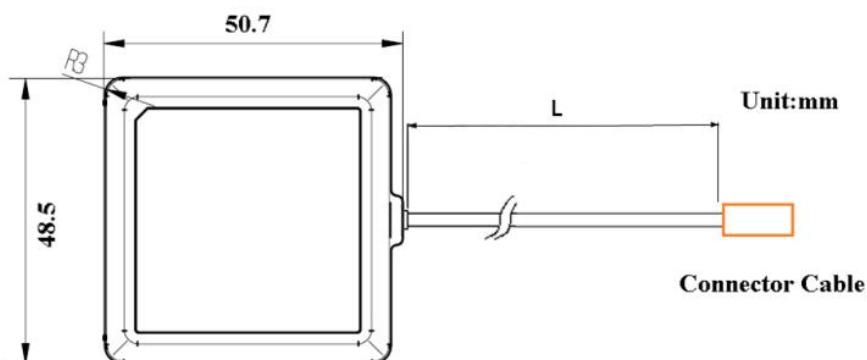
参数/Parameter	描述/Description	性能指标/ Performance Evaluation
首次定位时间 TTFF/ First positioning time TTFF	冷启动/Cold Start	≤32s
	热启动/Hot Start	≤1s
	重捕获/Re-Acquisition	≤1s
灵敏度/Sensitivity	跟踪/Tracking 捕获/Acquisition	-165dBm -148dBm
精度/precision	定位/Position	GNSS Open-Sky CEP<2.5m SBAS Open-Sky CEP<2.0m D-GNSS Open-Sky CEP<1.0m
	速度/Speed	GNSS 0.1m/s SBAS 0.05m/s D-GNSS 0.05m/s
动态性能/dynamic performance	速度/Speed	515m/s

	加速度/accelerated speed	4g
	高度/altitude	18000m
PPS		支持, 精度 20ns/ Supported, precision 20ns
数据更新率/data updating rate		默认: 1Hz~10Hz/ Default: 1Hz
导航数据格式/Navigation data format		NMEA 0183 V4.1 版

8 模块尺寸/Module size



图 3 SKM2105QR-40FXT Log 标签



线长	长度/Length (mm)
L	3000±50

L	5000±50
L	8000±50

图 4: SKM2105QR-40FXT 尺寸

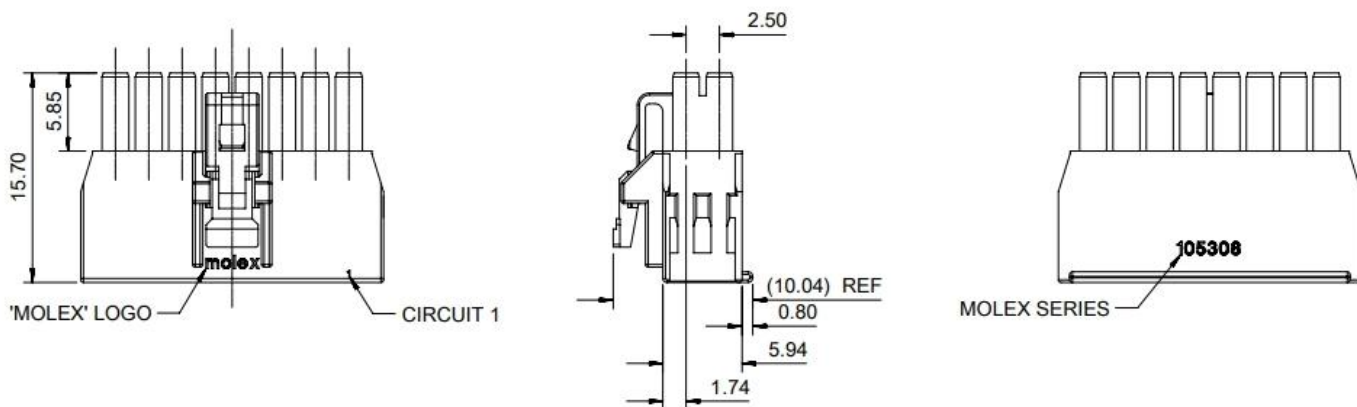


图 5: MOLEX 连接头 105308-1206 尺寸

9 应用配置/Application configuration

9.1 NMEA-0183 协议/NMEA 0183 Protocol

NMEA 协议是一种基于代码的协议，记录以\$开始，并带有回车/换行。GNSS 特定的消息都以\$GNxxx 开始，其中 xxx 是一个三字母的消息数据标识符。NMEA 消息有一个校验和，它允许检测损坏的数据传输。The NMEA protocol is an ASCII-based protocol, Records start with a \$ and with carriage return/line feed. GNSS specific messages all start with \$GNxxx 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.

Skylab SKM2105QR 支持以下 NMEA-0183 消息：GGA、GLL、GSA、GSV、RMC、VTG、ZDA。默认的 NMEA-0183 输出设置为 GGA、GLL、GSA、GSV、RMC、VTG、ZDA 和默认的波特率，设置为 115200bps。

The Skylab SKM2105QR supports the following NMEA-0183 messages: GGA, GLL, GSA, GSV, RMC, VTG, ZDA. The module default NMEA-0183 output is set up GGA, GSA, RMC, GSV, and default baud rate is set up 115200bps.

表 1: NMEA-0183 输出消息/NMEA-0183 Output Messages

NMEA 记录/NMEA Record	描述/Description	默认/Default
GNGGA	Global positioning system fixed data	Y
GNGLL	Geographic position—latitude/longitude	Y
GNGSA	GNSS DOP and active satellites	Y
GPGSV	GNSS satellites in view for GPS	Y
GLGSV	GNSS satellites in view for GLONASS	Y
GAGSV	GNSS satellites in view for Galileo	Y
GBGSV	Beidou satellites in view for BDS	Y
GNRMC	Recommended minimum specific GNSS data	Y
GNVTG	Course over ground and ground speed	Y
GNZDA	Date and Time	Y

表 2: 标识符助记码/Identifier mnemonic code

标识符/Identifier	数据类型/Data type
GB	北斗模式/ Beidou Model
GP	GPS 模式/ GPS Model
GL	GLONASS 模式/ GLONASS Model
GA	GALILEO 模式/ GALILEO Model
GN	多模模式/ Dual-mode Model

9.2 GGA-位置信息/GGA- Location information

包含导航定位的位置、时间和精度因子。

Contains the location, time, and precision factor of navigation positioning.

\$GNGGA,040529.000,2238.3501,N,11403.1008,E,1,15,1.33,50.8,M,-2.2,M,,*5F

表 2: GGA 数据格式/GGA Data Format

名称/Name	举例/Example	单位/Units	描述/Description
Message ID	\$GNGGA		GGA protocol header
UTC Position	040529.000		hhmmss.sss
Latitude	2238.3501		ddmm.mmmmm
N/S indicator	N		N=north or S=south

Longitude	11403.1008		ddmm.mm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	15		Range 0 to 12
HDOP	1.33		Horizontal Dilution of Precision
MSL Altitude	50.8	meters	Altitude (referenced to the Ellipsoid)
AltUnit	M	meters	Altitude Unit
GeoSep	-2.2	meters	Geoidal Separation
GeoSepUnit	M	meters	Geoidal Separation Unit
Age of Diff.Corr.	<Null>	second	Null fields when it is not Used
Diff.Ref.Station ID	<Null>		Null fields when it is not Used
Checksum	*5F		
EOL	<CR> <LF>		End of message termination

表 2-1: 位置固定指标/ Position Fix Indicators

Value	描述/Description
0	Fix not available or invalid
1	fix valid
2	Differential GPS, fix valid

9.3 GLL-地理定位信息/GLL- Geographic Position – Latitude/Longitude

包含纬度和经度信息。

This sentence contains the fix latitude and longitude.

\$GNGLL,2238.3501,N,11403.1008,E,040529.000,A,A*4F

表 3: GLL 数据格式/GLL Data Format

名称/Name	举例/Example	单位/Units	描述/Description
Message ID	\$GNGLL		GLL protocol header
Latitude	2238.3501		ddmm.mm
N/S Indicator	N		N=north or S=south
Longitude	11403.1008		ddmm.mm

E/W Indicator	E		E=east or W=west
UTC Position	040529.000		hhmmss.sss
Fix Status	A		A=data valid or V=data not valid
Fix Mode	A		A=autonomous, N = No fix, D=DGPS, E=DR
Checksum	*4F		
EOL	<CR> <LF>		End of message termination

9.4 GSA-GNSS 正在使用的卫星信息/GSA- GNSS satellites in using

包含卫星的 PRN，以及 PDOP、HDOP 和 VDOP。

PRN of the satellites used in the solution as well as PDOP, HDOP and VDOP.

\$GNSSA,A,3,194,01,21,07,195,09,,,,,1.62,1.33,0.93,1*02

\$GNSSA,A,3,79,,,,,,,1.62,1.33,0.93,2*02

\$GNSSA,A,3,,,,,,,1.62,1.33,0.93,3*0D

\$GNSSA,A,3,07,10,24,,,,,,,1.62,1.33,0.93,4*0A

表 4：GSA 数据格式/GSA Data Format

名称/Name	举例/Example	单位/Units	描述/Description
Message	\$GNSSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
ID of satellite used	194		Sv on Channel 1
ID of satellite used	01		Sv on Channel 2
...	...		...
ID of satellite used	<Null>		Sv on Channel 12 (Null fields when it is not Used)
PDOP	1.62		Position Dilution of Precision
HDOP	1.33		Horizontal Dilution of Precision
VDOP	0.93		Vertical Dilution of Precision
Checksum	*02		
EOL	<CR> <LF>		End of message termination

表 4 - 1：模式 2/ Mode 2

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

表 4 - 2: 模式 1/Mode 1

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

9.5 GSV-GNSS 可见卫星信息/GSV- GNSS Satellites in View

包含了所有可见卫星的 PRN、方位、仰角和信号强度。

This sentence contains the mode of operation, type of fix, PRN of the satellites used in the solution as well as PDOP, HDOP and VDOP.

\$GPGSV,2,1,07,07,74,271,19,01,67,151,25,21,66,073,42,194,65,088,39,1*5E

\$GPGSV,2,2,07,195,63,052,44,09,15,212,27,16,07,098,29,1*6F

\$GPGSV,2,1,05,01,67,151,32,194,65,088,33,195,63,052,38,09,15,212,20,8*6A

\$GPGSV,2,2,05,30,,,27,8*6E

\$GLGSV,1,1,01,79,61,018,29,1*42

\$GAGSV,1,1,01,21,,,42,7*77

\$GAGSV,1,1,01,21,,,32,1*76

\$GBGSV,2,1,05,07,59,023,39,24,56,329,42,10,52,334,36,08,49,160,24,1*78

\$GBGSV,2,2,05,09,37,216,22,1*4B

\$GBGSV,1,1,01,24,56,329,28,4*45

表 5: GSV 数据格式/ GSV Data Format

名称/Name	举例/Example	单位/Units	描述/Description
Message ID	\$GPGSV		GSV protocol header
Number of Message	2		Total number of GSV sentences (Range 1 to 3)
Message Number	1		Sentence number of the total (Range 1 to 3)
Satellites in View	07		Number of satellites in view
Satellite ID	07		Channel 1

Elevation	74	degrees	Channel 1(Range 00 to 90)
Azinmuth	271	degrees	Channel 1(Range 000 to 359)
SNR(C/NO)	19	dB-Hz	Channel 1(Range 00 to 99, null when not tracking)
...			...
Satellite ID	194		Channel 4
Elevation	65	degrees	Channel 4(Range 00 to 90)
Azimuth	088	degrees	Channel 4(Range 000 to 359)
SNR(C/NO)	39	dB-Hz	Channel 4(Range 00 to 99, null when not tracking)
Checksum	*5E		
EOL	<CR> <LF>		End of message termination

根据跟踪的卫星数量，可能需要使用 GSV 数据的多个消息。

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

9.6 RMC-推荐的最小定位信息/RMC- Recommended locating information

包含推荐的最小定位信息。

This sentence contains the recommended minimum locating information.

\$GNRMC,040529.000,A,2238.3501,N,11403.1008,E,0.14,59.79,070521,,,A,V*34

表 6: RMC 数据格式/ RMC Data Format

名称/Name	举例 /Example	单位 /Units	描述/Description
Message ID	\$GNRMC		RMC protocol header
UTS Position	040529.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2238.3501		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	11403.1008		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.14	Knots	
Course Over Ground	59.79	Degrees	True Course
Date(UTC)	070521		ddmmyy

Magnetic variation	<Null>	Degrees	Null fields when it is not Used
Magnetic Variation Direction	<Null>		E=east or W=west (Null fields when it is not Used)
Fix Mode	A		A=autonomous, N = No fix, D=DGPS, E=DR
Checksum	*34		
EOL	<CR> <LF>		End of message termination

9.7 VTG-地面速度信息/VTG-Course Over Ground and Ground Speed

\$GNVTG,59.79,T,,M,0.14,N,0.26,K,A*10

表 7: VTG 数据格式

名称/Name	举例/Example	单位/Units	描述/Description
Message ID	\$GPVTG		VTG protocol header
Tcourse	59.79	Degrees	True Course
Reference	T		T = True
Mcourse	<Null>	Degrees	Magnetic Course (Null fields when it is not Used)
Reference	M		M = Magnetic (Null fields when it is not Used)
Speed over ground	0.14	Knots	Nautical Miles per Hour
Units	N		Knots
Speed over ground	0.26	Km/hr	in Kilometers per Hour
Units	K		Kilometer per hour
Mode	A		A=Autonomous, N=No fix, D=DGPS, E=DR
Checksum	*10		
EOL	<CR> <LF>		End of message termination

9.8 ZDA-时间和日期信息/ZDA-Date and Time

包含 UTC 日期和时间信息。

This sentence contains UTC date & time, and local time zone offset information.

\$GNZDA,040529.000,07,05,2021,,*41

表 8: ZDA 数据格式/ZDA Data Format

名称/Name	举例/Example	单位	描述/Description
---------	------------	----	----------------

		/Units	
Message ID	\$GNZDA		ZDA protocol header
UTC Time	040529.000		hhmmss.sss
Day	07		UTC time: day (01 ... 31) dd
Month	05		UTC time: month (01 ... 12) mm
Year	2021		UTC time: year (4 digit year) yyyy
local zone hours	<null>		Local Time Zone Offset Hours (Null fields when it is not Used)
local zone minutes	<null>		Local Time Zone Offset Minutes (Null fields when it is not Used)
Checksum	*41		
EOL	<CR> <LF>		End of message termination

9.9 CMD 列表 (TBD) /CMD List (TBD)

表 9: CMD 列表/CMD List

CMD 命令/CMD command	CMD Example:
热启动/Hot start	\$PMTK101*32<CR><LF>
温启动/Warm start	\$PMTK102*31<CR><LF>
冷启动/Cold start	\$PMTK103*30<CR><LF>
擦除所有数据后冷启动/ Cold start after wiping all data	\$PMTK104*37<CR><LF>
只搜索 GPS 卫星/ Search GPS satellites only	\$PMTK353,1,0,0,0,0*2A<CR><LF>
只搜索北斗卫星 /Search BEIDOU satellites only	\$PMTK353,0,0,0,0,1*2A<CR><LF>
搜索 GPS 和北斗卫星/Search GPS and BEIDOU satellites	\$PMTK353,1,0,0,0,1*2B<CR><LF>
搜索 GPS 和 Glonass 卫星/Search GPS and Glonass satellites	\$PMTK353,1,1,0,0,0*2B<CR><LF>

10 联系方式/Contact Information

SkyLab M&C Technology Co., Ltd.

深圳市天工测控技术有限公司

地址: 深圳市龙华区龙华街道工业东路利金城科技工业园 9#厂房 6 楼

Address: 6 Floor, No.9 Building, Lijincheng Scientific & Technical park, Gongye East Road,
Longhua District, Shenzhen, Guangdong, China

电话/Phone: 86-755 8340 8210 (Sales Support)

电话/Phone: 86-755 8340 8510 (Technical Support)

传真/Fax: 86-755-8340 8560

邮箱/E-Mail: technicalsupport@skylab.com.cn

网站/Website: www.skylab.com.cn www.skylabmodule.com