SKM2102ER-35MXT
规格书/Datasheet
GNSS G-Mouse

文档信息/Document Information		
标题/Title	SKM2102ER-35MXT 规格书/Datasheet GNSS G-Mouse	
文档类型/Document type	规格书/Datasheet	
文档编号/Document number	SL-22040235	
版本日期/Revision and date	V1.01	29-Aug-2022
秘密等级/Disclosure restriction	外部公开/External 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	Wilson	20220829

目录/contents

1 产品简介/Product introduction

SKM2102ER 是一款高性能的 RTK 导航定位模块，模块能同时支持 GPS、北斗、GLONASS、GALILEO、QZSS 和 SBAS 的卫星接收模块，拥有定位快，精度高，产品性能可靠的优点。

SKM2102ER is a high-performance RTK positioning module, which can support GPS, Beidou, GLONASS satellite signal reception.It has the advantages of fast positioning, high precision and reliable product performance.

该模组集成了内部 RTK 解算算法，结合 RTK 服务可实现厘米级定位。通过配置可以使模组变为移动站。能满足专业定位的严格要求与个人消费需要。

The module integrates the internal RTK algorithm and implements centimeter level positioning with RTK service. Modules can be configured to become mobile stations. To meet the strict requirements of professional positioning and personal consumption needs.

Figure 1：SKM2102ER-35MXT Top View

2 典型应用/Applications

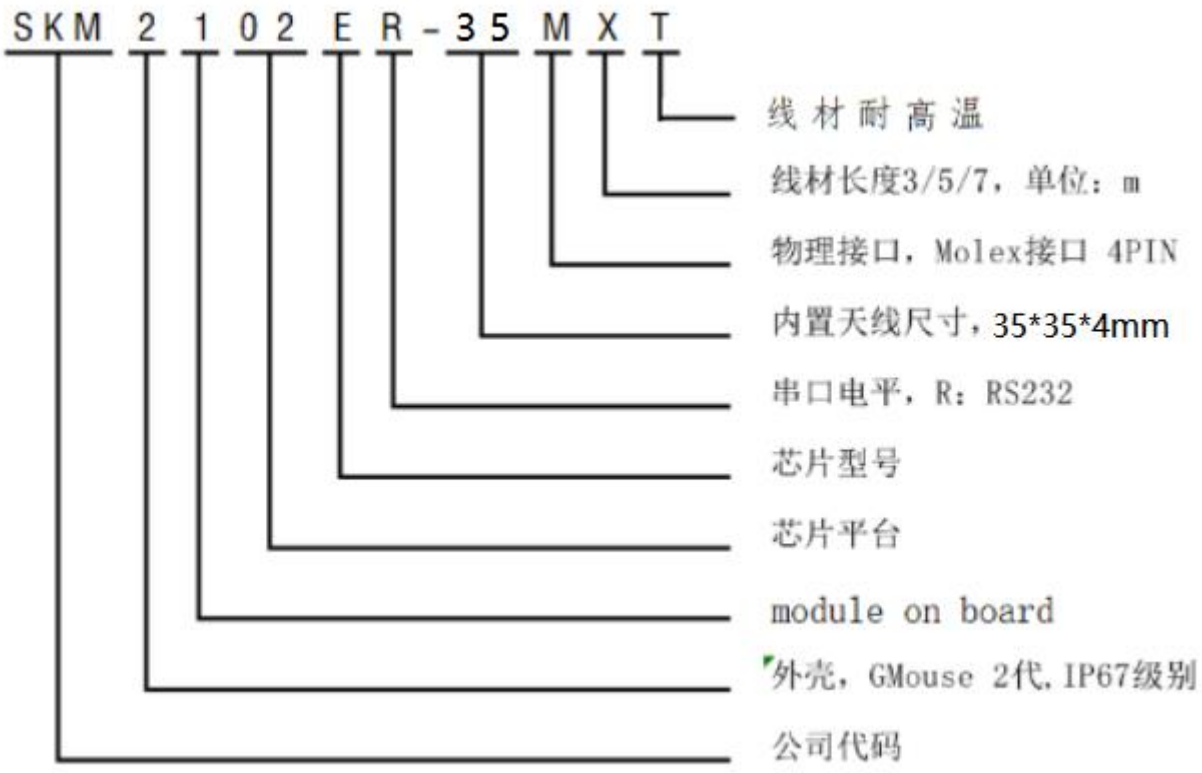
- 汽车导航/ Auto navigation
- 个人导航设备/ Personal navigation equipment
- 汽车保全系统/ Car Security System

- 车辆监控/ Vehicle monitoring

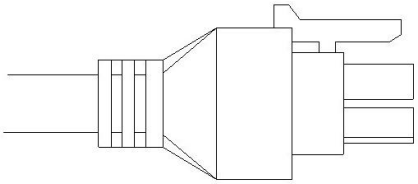
3 产品特点/Features

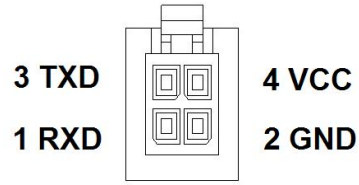
- 支持 BDS、GPS、GLONASS、Galileo、QZSS 系统/ Supports BDS, GPS, GLONASS, Galileo, QZSS systems
- 超高灵敏度/Ultra high sensitivity：-162dBm
- NMEA 协议（默认波特率：115200 bps）/NMEA protocol (default baud rate: 115200 BPS)
- 内部备用电池/Internal spare battery
- 嵌入式陶瓷天线 35 x 35 x 4.0 mm/ Embedded ceramic antenna 35 x 35 x4.0mm
- 高级特性/Advanced Features：Always Locate; AIC; EPO; EASY
- 工作温度范围/Operating temperature range：-40~85℃
- 符合 ROHS, CE, FCC 标准/Compliance with ROHS, CE, FCC standards
- 尺寸/ Size：50.7* 48.5* 18.5mm

4 型号说明/Model Code



5 接口定义/Interface definition





RS232	TTL Level
1 RXD	1 RXD
2 GND	2 GND
3 TXD	3 TXD
4 VCC	4 VCC

Note:

RXD: Serial Data Input To SKM2102

TXD: Serial Data Output From SKM2102

图 2：SKM2102ER-35MXT 接口定义

6 接口描述/Interface description

电源：SKM2102ER 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: SKM2102ER series input voltage VCC range is 3.5 V~ 5.5V, current requirement is greater than 100mA.Place decoupling capacitors (10uF and 1uF) close to the interface power supply.

UART 端口：SKM2102ER 系列支持一个完整的双工系列通道 UART。

UART port: The SKM2102ER series supports a complete duplex series channel UART.

RS232 电平：SKM2102ER 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 SKM2102ER series uses a single-chip RS232 to UART bridge, which is 3.3V driven EIA/TIA-232 and V.28/V.24.

序号/NO.	名称/Name	输入/输出 Input/Output	描述/Describe	备注/Remark
Micro-Fit 3.0 连接头/ Micro-fit 3.0 connector				
1	RXD	I	UART Serial Data Input	RS232 电平
2	GND	G	Power Ground	Reference Ground
3	TXD	O	UART Serial Data Output	RS232 电平
4	VCC	P	Power Supply	VCC:3.5V~5.5V

7 性能介绍/Performance introduction

项目/ Items	参数/Parameter	
接收类型/Type of receipt	GNSS	
灵敏度/Sensitivity	跟踪/Tracking 捕获/Acquisition	-162dBm -148dBm
精度/Accuracy	定位精度/ Position RTK 漂移速度/Velocity 1PPS	Open-Sky CEP=2.5m 2.5cm+1ppm(H) 0.1m/s 20ns
定位时间/Acquisition Time	冷启动/Cold Start 热启动/Hot Start 重捕获/Re-Acquisition	≤28s <1s ≤1s
电源功耗/Power Consumption	跟踪/Tracking 捕获/Acquisition	54~57mA @5V Typical 51~56mA @5V
NMEA 输出频率/NMEA output frequency		Maximum 20Hz
使用范围/Operational Limits	速度 Velocity 加速度/Acceleration	Max 515m/s <4g
天线指标/Antenna design		
外型尺寸/External dimension	35 x 35 x 4.0mm	
频点/Frequency point	GPS/QZSS :L1CA GLONASS: L1 BeiDou: B1I GALILEO: E1 SBAS:WAAS,EGNOS,MSAS,GAGAN,SDCM	
阻抗/Impedance	50Ω±10%	
轴比/Axial ratio	3 dB max	
极化/Polarization	右极化(RHCP) /Right polarization (RHCP)	
机械特性/Mechanical characteristics		
尺寸/Size	50.7* 48.5 * 18.5mm	
电源功耗/Power Consumption		
电压/Voltage	3.5V~5.5V	
电流/Electric current	53mA(typical)	
工作环境/Operating environment		
工作温度范围/Operating temperature	-40 ~ +85 ℃ （不包括备份电池）	
存储温度/storage temperature	-40 ~ +105 ℃	
湿度/ Humidity	≦95%	

8 模块尺寸/Module size

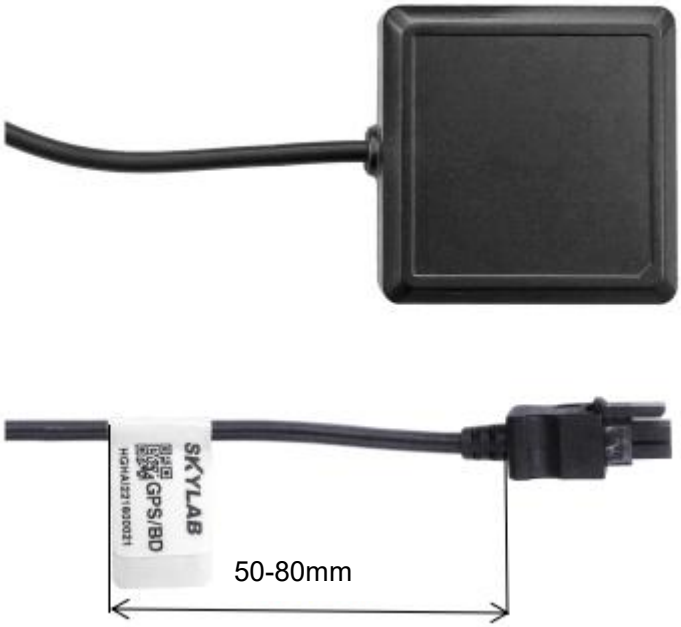
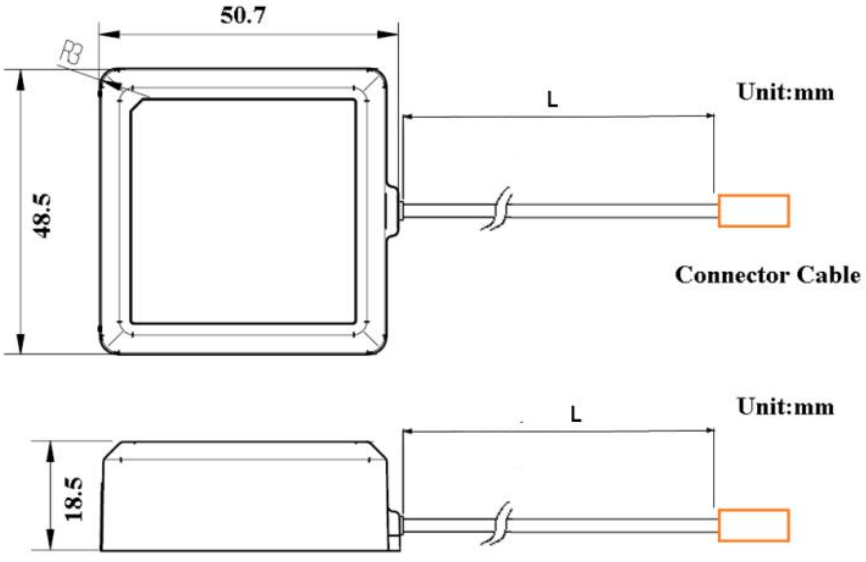


图 3 SKM2102ER-35MXT Log 标签



线长	长度/Length（mm）
L	3000±50

图 4：SKM2102ER-35MXT 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$1 开始，并带有回车/换行。GNSS 特定的消息都以$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 SKM2102ER 支持以下 NMEA-0183 消息：GGA、GSA、GSV、RMC、ZDA、GST。默认的 NMEA-0183 输出设置为 GGA、GSA、GSV、RMC、ZDA、GST 和默认的波特率，设置为 115200bps。

The Skylab SKM2102ER supports the following NMEA-0183 messages:GGA、GSA、GSV、RMC、ZDA、GST.The module default NMEA-0183 output is set up GGA、GSA、GSV、RMC、ZDA、GST , 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
GGA	定位数据信息/ Positioning system fixed data	Y
GSA	当前卫星信息/ DOP and active satellites	Y
GSV	可见卫星信息/ Satellites in view	Y
RMC	推荐定位信息/Recommended minimum specific data	Y
ZDA	时间和日期信息/Date and Time	Y
GST	三维坐标标准偏差信息/Reports statistical information on the quality of the position solution	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 mode
GP	GPS 模式/ GPS mode
GN	GNSS 模式/ GNSS mode
GA	Galileo 模式/ Galileo mode
GL	GLONASS 模式/ GLONASS mode

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.mmmm
N/S indicator	N		N=north or S=south
Longitude	11403.1008		dddmm.mmmm
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 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.

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

$GNGSA,A,3,79,,,,,,,,,,,,1.62,1.33,0.93,2*02

$GNGSA,A,3,,,,,,,,,,,,,1.62,1.33,0.93,3*0D

$GNGSA,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	$GNGSA		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

9.4 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.

9.5 RMC-推荐的最小定位信息/RMC-Recommended Minimum 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

9.6 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 /Units	描述/Description
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

9.7 GST -三维坐标标准偏差信息/ GST -reports statistical information on the quality of the position solution

$GNGST,033427.000,4.336,,,,4.194,4.197,4.348*5C

表 10.7-1: GST 语句格式/Table 10.7-1: Formats of GST statements

名称/Name	示例/Example	单位/ Unit	描述/Description
语句 ID/ Statement ID	$GNGST		表明此语句为 GST 信息 / Indicates that the statement is TXT information
UTC 时间/ UTC time	033427.000		hhmmss（时分秒）格式
均方根偏差/RMS deviation	4.336		Total RMS standard deviation of ranges inputs to the navigation solution
...	...		...

纬度误差的偏差/Latitude error deviation	4.194		Standard deviation (meters) of latitude error
经度误差的偏差/Longitude error deviation	4.197		Standard deviation (meters) of longitude error
高度误差的偏差/Altitude error deviation	4.348		Standard deviation (meters) of latitude error
校验值/Proof test value	*5C		
EOL	<CR> <LF>		结束标志符/ End identifier

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