SKYLAB
Simplify Your System

SKM2302DR-40MXT 规格书/Datasheet 单北斗惯导/BDS-DR G-Mouse

系列型号/Serial model No.：

SKM2302DR-40M3T
SKM2302DR-40M5T
SKM2302DR-40M8T

文档信息/Document Information	
标题/Title	SKM2302DR-40MXT BDS-DR G-Mouse 规格书/Datasheet
文档类型/Document type	规格书/Datasheet
文档编号/Document number	
版本日期/Revision and date	V1.02 17-Jan-2023
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	Bennett	20231226
V1.02	增加防水防静电等级说明	Bennett	20240117

目录/**contents**

1 产品简介/Product introduction

　　SKYLAB SKM2302DR 具有嵌入式 BDS 双频天线(B1+B2)，该模块融合 GNSS 定位技术和惯性传感技术，为导航定位应用提供持续准确的定位服务。支持接收 BDS（北斗三代 B1C）卫星双频信号；结合传感融合算法即使在 BDS 信号质量较差甚至丢失的情况(比如，隧道、车库等环境)，仍可提供完美的导航定位解决方案。

SKYLAB SKM2302DR has an embedded BDS dual-frequency antenna (B1 + B2), which module integrates GNSS positioning technology and inertial sensing technology to provide continuous and accurate positioning services for navigation and positioning applications. Support receiving BDS (Beidou third-generation B1C) satellite dual-frequency signal; and combine the sensor fusion algorithm can provide perfect navigation and positioning solution even when BDS signal quality is poor or even lost (such as tunnel, garage and other environments).

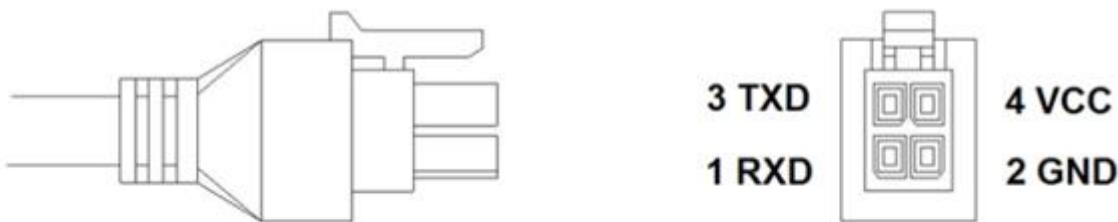**Figure 1：SKM2302DR-40MXT Top View**

2 典型应用/Applications

◆ 车辆高精度导航/High precision vehicle navigation

◆ 公交车智能交通/Intelligent transportation of buses

◆ 车辆远程监控/Remote vehicle monitoring

3 产品特点/Features

◆ 支持北斗三代 B1C 频段/Support the Beidou third-generation B1C frequency band

◆ 支持 BDS/INS 组合导航定位技术/Support for BDS / INS, combined navigation and positioning technology

◆ 在信号丢失的情况下可持续导航/Sustainable navigation in the case of signal loss

◆ 内置 6D IMU，支持 3 轴加速度计和 3 轴陀螺仪/Built-in 6D IMU, support 3 axis accelerometer and 3 axis gyroscope

◆ 嵌入式陶瓷天线 25 x 25 x 4.0mm 加 35 x35 x4.0mm/ Embedded ceramic antenna 25 x 25 x4.0mm and 35 x35 x4.0mm

◆ 即插即用的标准通信协议 NEMA0183/ Plug and play standard communication protocol NEMA0183

◆ 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 接口定义/Interface definition

图 2：SKM2302DR-40MXT 接口定义/Interface definition

5 接口描述/Interface description

电源：SKM2302DR 系列输入电压 VCC 范围为 5V(3.5 V~ 5.5V)，电流要求不小于 300mA。靠近接口电源的地方请放置去耦电容（10uF 和 1uF）。

Power supply: SKM2302DR series input voltage VCC range is 5V(3.5V ~ 5.5V), the current requirement is not less than 300mA. Place decoupling capacitors (10uF and 1uF) close to the interface power supply.

UART 端口：SKM2302DR 系列支持一个完整的双工系列通道 UART。

UART port: The SKM2302DR series supports a complete duplex series channel UART.

RS232 电平：SKM2302DR 系列使用单芯片 UART TTL 和 RS232 电平转换器。

RS232 level: The SKM2302DR series uses a single-chip RS232 to UART bridge.

Pin No.	Pin name	I/O	描述/Description	备注/Remark
Micro-Fit 3.0 Connector				
1	RXD	I	UART 串行数据输入到 SKM2302/ UART Serial Data Input To SKM2302	RS232
2	GND	G	电源地/ Power Ground	参考地/Reference Ground
3	TXD	O	来自 SKM2302 的 UART 串行数据输出 /UART Serial Data Output From SKM2302	RS232
4	VCC	P	电源供电/Power Supply	VCC:5V(3.5~5.5V)

6 性能介绍/**Performance introduction**

项目/ Items		参数/Parameter
接收类型/Type of receipt		BDS：B1I，B1C，B2A
灵敏度/Sensitivity	跟踪/Tracking	-160dBm
	捕获/Acquisition	-152dBm
精度/Accuracy	定位精度/ Position	2.0m CEP50 (Open Sky)
	漂移速度/Velocity	0.1m/s
定位时间/Acquisition Time	冷启动/Cold Start	30s
	热启动/Hot Start	1s
NMEA 输出频率/ NMEA output frequency	1Hz	
使用范围/ Operational Limits	高度/Altitude	Max 18,000m
	速度 Velocity	Max 515m/s
	加速度/Acceleration	Less than 4g
机械特性/**Mechanical characteristics**		

尺寸/Size	50.7* 48.5 * 18.5mm
电源功耗/Power Consumption	
电压/Voltage	5.0V(3.5~5.5V)
电流/Electric current	50mA(Typical)
工作环境/Operating environment	
工作温度范围/ Operating temperature	-40 ~ +85 ℃ （不包括备份电池）
（线材和外壳）存储温度/ storage temperature	-40 ~ +105 ℃
湿度/ Humidity	≦95%
防水防尘等级	IP67
标准防静电等级	UART 数据接口：空气放电±15KV；接触放电±8KV； 电源接口 HBM 为 4KV,MM 为 400V
天线指标/Antenna design	
外型尺寸/External dimension	25 x 25 x 4.0mm+35 x35 x4.0mm
频点/Frequency point	支持 B1I、B1C 频点 支持 B2a 频点
阻抗/Impedance	50Ω±10%
轴比/Axial ratio	3 dB max
极化/Polarization	右极化(RHCP) /Right polarization (RHCP)

7 模块尺寸/Module size

图 3 SKM2302DR-40MXT Log 标签
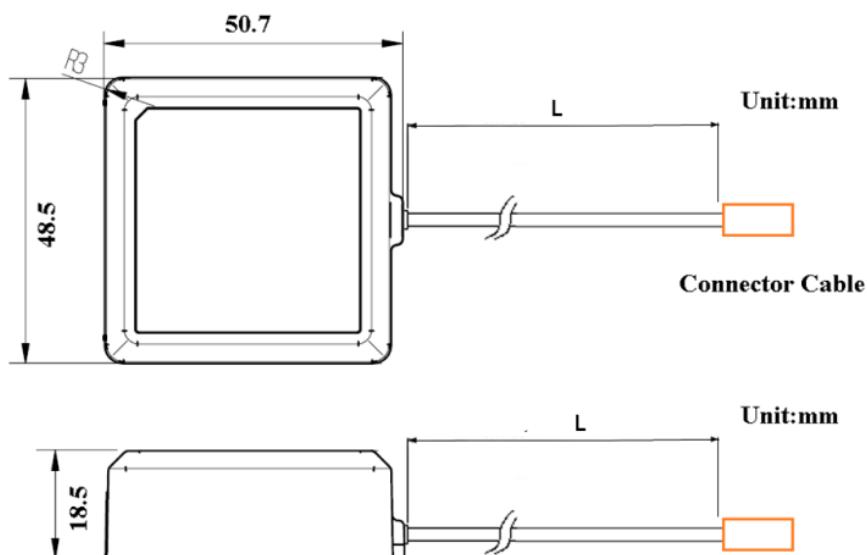
线长	长度/Length（mm）
L	3000±50
L	5000±50
L	8000±50

图 4：SKM2302DR-40MXT 尺寸

8 安装与校准/Installation and calibration

8.1 安装须知/ Installation notice

模块须与车辆载体进行刚性连接，确保其在初始化过程和行驶过程中与安装体无相对位移。在车 辆行驶过程中，模块若出现任何相对于车体坐标系的位置变化，将导致模块工作异常。

The module must be rigidly connected to the vehicle carrier to ensure that it has no relative

displacement with the mounting body during initialization and driving. In the process of vehicle driving, if

the module appears any position change relative to the vehicle body coordinate system, will cause the

module to work abnormally.

8.2 安装方式/ Way to install

模块包含一个三轴陀螺仪和一个三轴加速度计，并内置精细自校准算法，支持模块以相对于车体坐标系任意安装角的自由安装。例如：完全水平安装、倾斜一定角度安装和翻转安装等。

The module contains a three-axis gyroscope and a three-axis accelerometer, and has built-in fine

The self-calibration algorithm supports the free installation of the module at any installation angle

relative to the coordinate system of the car body. For example: fully horizontal installation, tilt a certain

amount

Angled installation and flip installation, etc.

8.3 校准/ Calibration

安装、拆卸、在线升级后均需进行校准操作，对自身安装状态和传感器参数进行估算。

After installation, disassembly, and online upgrade, calibration operations are required to estimate the

installation status and sensor parameters.

整个校准过程中，要求车辆在相对开阔，路面水平的环境（可进入 3D 定位、 pdop < 3 且 CNR > 28dB）。

Throughout the calibration process, the vehicle is required to be in a relatively open, road-level

environment (3D positioning, PDOP < 3 and CNR > 28dB are available).

校准基本步骤：

Basic steps for calibration:

1) 模块固定安装好，在相对开阔且水平路面停车上电后，开始自动校准，期间需保证良好的卫星可见性，满足校准环境要求。

1) The module is fixed and installed, and after the relatively open and horizontal road surface is stopped and powered on, the automatic calibration will begin, during which good satellite visibility should be ensured to meet the requirements of the calibration environment.

2)模块定位后，需再静止 20s 以上，然后短时间内直线加速达到 40km/h 以上，并在开阔环境下以 ≥20km/h 速度行驶至少 10s。

2) After the module is positioned, it needs to stand still for more than 20s, then accelerate in a straight line to more than 40km/h in a short time, and drive at a speed of ≥20km/h for at least 10s in an open environment.

3) 在正常行驶状态下，以正常转弯速度各经过一个近 90°的左转弯和右转弯。

3) In normal driving conditions, pass a left turn of nearly 90° and a right turn at normal turning speed.

8.4 状态查询/Status query

校准完成后，用户可查看 NMEA 消息确认是否成功激活模块的 INS 状态。
Once the calibration is complete, the user can check the NMEA message to confirm that the module has been successfully activated for INS status.

$GNTXT…INS, A…类似 NMEA 消息表示 INS 可用 。
$GNTXT…INS, A…An NMEA-like message indicates that an INS is available.

$GNTXT…INS, V…类似 NMEA 消息表示 INS 不可用 。
$GNTXT…INS, V…An NMEA-like message indicates that the INS is unavailable.

$GNTXT…INS, E…类似 NMEA 消息表示 INS 评估中 。
$GNTXT…INS, E…An NMEA-like message indicates that the INS is being evaluated.

$GNTXT…INS, G…类似 NMEA 消息表示 BDS 定位。
$GNTXT…INS, G…NMEA-like messages indicate BDS positioning.

$GNZDA,122042.000,16,08,2021,00,00*41
$GNTXT,01,01,04,INS,V,1,,,,FLG,1,0000,1,0*1B ➯ 惯导状态信息

图 7 INS 状态输出 (INS 可用)/Figure 7 INS Status Output (INS is activated)

9 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： 深圳市龙华区福城街道鸿创科技中心 6 栋 11 楼

Address: 11th Floor, Building 6, Hongchuang Science and Technology Center, Fucheng Street,

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