司 南 导 航

Product Specification/产品规范

K823M_EK0407

2023-11-19

REVISION HISTORY/ 修订历史

REVISION / 版本	MODIFICATION / 更改	DATE/ 日期
1.3	Add Signal Capture Sensitivity. / 增加信号捕获灵敏度	2023-11-19
1.2	Add electrical description. / 增加电气说明	2021-12-29
1.1	Add dimensional description. / 增加尺寸说明	2021-12-14
1.0	New Release. / 新发	2021-10-23

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FIGURE & TABLE 图表

I. INTRODUCTION/ 简介

K823M_EK0407 is high precision positioning OEM Modules based on a self-developed SoC, it has small size, single BDS system and multi-frequency. They track constellations including BDS-2, BDS-3, are mainly designed and used for UAV and handheld devices with size, weight, and power requirements.

In order to be convenient for using, this specification especially notes the corresponding adapter board.

K823M_EK0407 模块是司南导航自主研发的单北斗系统、多频点、小尺寸高精度定位、定向 OEM 模块， 满足多系统多频点导航卫星系统模块需求， 支持 BDS-2、BDS-3。适用于如无人机和手持设备等对模块尺寸、重量和功耗要求严格的领域。

为了更好地方便用户使用， 本规范着重介绍对应规格。

II. SPECIFICATION OF K823M_EK0407 ADAPTER BOARD/ K823M_EK0407 技术规范

Following table presents the detailed specification of ComNav K823M_EK0407 Adapter Board. Specific technical characteristics are listed.

下表中为司南 K823M_EK0407 的各项技术性能。

Table 1. K823M_EK0407 Adapter Board Specification

K823M_EK0407 ADAPTER BOARD SPECIFICATION/ K823M_EK0407 规范			
Signals 信号	K823M_EK0407	Positioning 定位	BDS-2: B1I, B2I, B3I BDS-3: B1I, B3I
		Orientation 定向	BDS-2: B1I, B3I BDS-3: B1I, B3I
Time to First Fix 首次定位时间		Cold Start 冷启动	< 30s（Adding Acceleration Capture Module,增加捕获加速模块）
		Hot Start (with RTC) 热启动（使用 RTC）	< 10s（Typical,典型）
Reacquisition 信号重捕		Reacquisition 失锁重捕	< 1s
		Signal Capture Sensitivity 信号捕获灵敏度	-138dBm
Measurement Precision		Pseudorange Precision 伪距精度	≤ 10cm

K823M_EK0407 ADAPTER BOARD SPECIFICATION/ K823M_EK0407 规范		
测量准确度	Carrier Phase Precision 载波相位精度	≤ 0.005c (c: carrier wave length of GNSS signal, in meter) (c: 载波波长，单位：米)
Accuracy 精度	Time Accuracy 授时精度	20ns
	SPP Accuracy 标准单点定位精度	H ≤ 1.5m, V ≤ 3m (1σ, PDOP≤4)
	Static Differential Accuracy (Supported by Compass Solution) 静态差分精度（Compass Solution 软件支持）	H: ±(2.5+1×10^{-6}×D) mm V: ±(5.0+1×10^{-6}×D) mm D 为基线长度(单位： km) D - Baseline length (Unit: km)
	Speed accuracy 测速精度	≤ 0.02 m/s (PDOP ≤4)
Inertial Navigation (Optional) 惯导 （选配）	While the GNSS antenna signal is losing lock for 3 seconds, the accuracy maintains at centimeter level. While the GNSS antenna signal is losing lock for 10 seconds, the accuracy maintains at meter level. GNSS 天线信号失锁 3s，精度保持 cm 级 GNSS 天线信号失锁 10s，精度保持 m 级	
Attitude Accuracy 测姿精度	Azimuth Accuracy 方位角精度	(0.15/R) °, R is baseline length in meter. R 为基线长度，单位为米
	Roll or Pitch Accuracy 横滚或俯仰角	(0.25/R) °, R is baseline length in meter. R 为基线长度，单位为米

K823M_EK0407 ADAPTER BOARD SPECIFICATION/ K823M_EK0407 规范		
RTK	RTK Initialization time RTK 初始化时间	< 5s（baseline < 10km，基线长小于 10km）
	Initialization Reliability 初始化置信度	> 99.9 %
	RTK Accuracy RTK 精度	H: ± (8 + 10⁻⁶ × D) mm V: ± (15 + 10⁻⁶ × D) mm D 为基线长度(单位： km) D - Baseline length (Unit: km)
Data Rates 数据速率	Measurements & Position 测量&定位	Max 50Hz（Optional，选配项）
	RTK: Positioning & Heading RTK：定位定向	Max 50Hz（Optional，选配项）
Environmental 环境要求	Operating Temperature 工作温度	-40℃ — +85℃
	Storage Temperature 储存温度	-55℃ — +95℃
Data Formats 输出数据格式	NMEA-0183	GPGGA, GPGSV, GPGLL, GPGSA, GPGST, GPHDT, GPRMC, GPVTG, GPZDA etc.
	ComNav Binary（CNB） 司南二进制格式	ComNav Self-Defined Binary 司南自定义二进制
	CMR	CMROBS, CMRREF

K823M_EK0407 ADAPTER BOARD SPECIFICATION/ K823M_EK0407 规范		
Antenna Interface 天线接口	LNA Power 天线供电电压	External 外部供电: +3.3V ~ +5V ± 5%VDC @ 0-100mA
	LNA Gain 天线增益要求	20～35dB （Suggested 建议）
Electrical 电气特性	Voltage 供电电压	+3.3V~5.5V DC
	Power consumption 功耗	K823M_EK0407:1.6W(Anti-interference off，抗干扰关闭) Anti-interference on may consume 0.2W more. 开启抗干扰约增加 0.2W。

H.   DIMENSION/ 尺 寸

In this section,product photo,three-side views and the dimension of K823M_EK0407 is provided for customers'further hardware design and installation.

本 节 提 供 了K823M_EK0407 的实物图。

K823M_EK0407

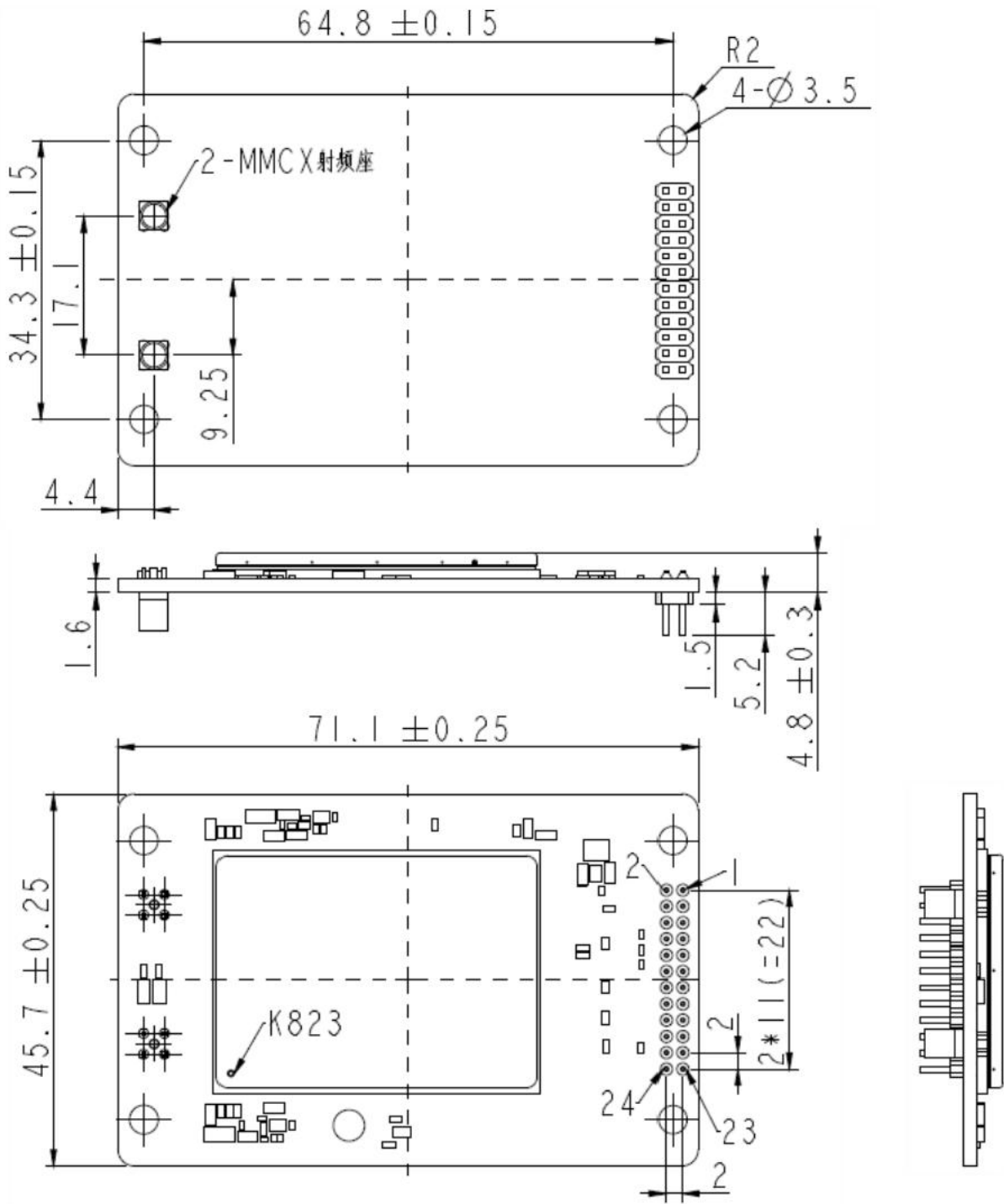***Figure 1.Product Photo***

图1.1:1实物图

Figure 2.Dimensions of K823M_EK0407

图2．K823M_EK0407尺寸图

IV. PIN ARRANGEMENT AND DEFINITION OF K823M_EK0407 BOARD/ K823M_EK0407 引脚标识和定义

K823M_EK0407 has one 24-Pin connector (12 Pin, 2mm Dual Row vertical T/H HDR), is compatible with K726.

K823M_EK0407 板卡包括 24 针连接头（针脚间距 2mm，双排），兼容 K726。

Table 2. Pin Definition of K823M_EK0407 24-Pin Connector

PIN	SIGNAL	TYPE	DESCRIPTION	
1	SPI_CLK	O	SPI Clock	SPI 时钟信号
2	SPI_CS	O	SPI CS	SPI 片选信号
3	LNA_PWR	PWR	Power supply for external LNA	天线供电
4	VIN	PWR	Power supply for board	板卡供电
5	Reserved	-	Reserved	保留
6	COM3_RX	I	UART3 RX	COM3 串口输入
7	RST_SYS	I	System reset	系统复位信号
8	Reserved	-	Reserved	保留
9	EVENT2	I	Event2 mark	外部事件 2 输入
10	LED_RTK	O	RTK data indicator	RTK 数据指示灯
11	COM3_TX/EVENT1	I/O	UART3 TX/ Event1 mark Default: UART3 TX	COM3 串口输出/外部事件 1 输入 默认： COM3 串口输出
12	GND	GND	Ground Reference	参考地
13	COM1_TX	O	UART1 TX	COM1 串口输出
14	COM1_RX	I	UART1 RX	COM1 串口输入
15	GND	GND	Ground Reference	参考地
16	COM2_TX	O	UART2 TX	COM2 串口输出
17	COM2_RX	I	UART2 RX	COM2 串口输入
18	GND	GND	Ground Reference	参考地

PIN	SIGNAL	TYPE		DESCRIPTION
19	GPIO	I/O	GPIO	通用 IO
20	GND	GND	Ground Reference	参考地
21	PPS	O	Pulse output synchronized to GNSS time	同步卫星时间脉冲
22	LED_SAT	O	Tracked satellite number indicator	跟踪卫星数量指示灯
23	SPI_MISO	I/O	SPI_MISO	SPI 主输入从输出
24	SPI_MOSI	I/O	SPI_MOSI	SPI 主输出从输入

REMARKS/ 说明:

1. Electronic characteristic/电气特性

   LED_RTK, LED_SAT, COM1_TX, COM1_RX, COM2_TX, COM2_RX, COM3_TX, COM3_RX, RST_SYS, SPI_CLK, SPI_CS, SPI_MOSI, SPI_MISO, are LVCMOS 3.3V.

   LED_RTK, LED_SAT, COM1_TX, COM1_RX, COM2_TX, COM2_RX, COM3_TX, COM3_RX, RST_SYS, SPI_CLK, SPI_CS, SPI_MOSI, SPI_MISO, 为LVCMOS 3.3V电气标准。

   LVCMOS 3.3V电气标准

Symbols 符号	Description 描述	Min 最小	Max 最大
VIH	Input high voltage 输入高电压	2V	3.6V
VIL	Input low voltage 输入低电压	-0.3V	0.8V
VOH	High-level output voltage 高电平输出电压	2.9V	--
VOL	Low-level output voltage 低电平输出电压	--	0.4V
IOH	Sourcing current 拉电流	8mA	
IOL	Sinking current 灌电流	8mA	

2. PPS, EVENT2 and VARF are LVTTL 3.3V All these signals are compatible with LVCMOS/LVTTL 3.3.

   PPS, EVENT2和VARF为LVTTL 3.3 V电平，所有这些信号兼容LVCMOS / LVTTL 3.3V。

Symbols/符号	Description/描述	Min/最小	Max/最大
VIH	Input high voltage 输入高电压	2.0V	——
V_{IL}	Input low voltage 输入低电压	-0.3V	0.8V
V_{OH}	High-level output voltage 高电平输出电压	2.4V	----
V_{OL}	Low-level output voltage 低电平输出电压	---	0.4V
I_{OH}	Sourcing current 拉电流	8mA	
I_{OL}	Sinking current 灌电流	8mA	

3. Absolute maximum rating is -0.3V~3.6V of following signals:/所能承受电压的最大值范围是-0.3V~3.6V的信号如下：

   LED_RTK, LED_SAT, COM1_RX, COM1_TX, COM2_RX, COM2_TX, COM3_RX, COM3_TX, EVENT2, PPS, VARF, RST_SYS, SPI_CLK, SPI_CS, PI_MOSI, SPI_MISO.

4. VIN

   Main power supply, voltage range is 3.3VDC~5.5V DC.

   Voltage ripple and spike requirement: <100mV

   主供电电源（输入），电压范围：3.3V~5.5V（直流）。电压纹波和尖峰脉冲需求： <100mV。

5. RST_SYS

   Low active, it can be used to reset the whole OEM board, which is 3.0V compatible.

   低电平有效，可用于复位整个OEM板。

6. LED_RTK/LED_SAT

   LED_SAT is used to indicate the satellite number. LED_RTK indicates that RTK is undergoing. Both LED_RTK and LED_SAT are all high active. External LED driver is needed for normal use.

   LED_RTK闪烁指示接收到基准站的数据， LED_SAT指示卫星数量， 一次连续闪烁的次数表示当前搜到卫星的数量。LED_RTK与LED_SAT均为高电平驱动LED，需要外加LED驱动。