SKM55 Datasheet

GNSS Module

Document Information	
Title	SKM55 Ultra High Sensitivity and Low Power GNSS Receiver Module Datasheet
Document type	Datasheet
Document number	SL-18100086
Revision and date	V3.06 20- May-2024
Disclosure restriction	Public

Revision History:

Revision	Description	Approved	Date
V1.01	Initial Release	Neil	20100601
V2.01	Change the PIN definitions	Neil	20111026
V3.02	Update office's address	George	20131119
V3.03	Update certification information	George	20170831
V3.04	Update the silab's web-site	Wendy	20220824
V3.05	Update information of 3.5mm connector	Bennett	20231207
V3.06	Update information of Mechanical Specification	Bennett	20240521

Contents

1 General Description

The SkyLab SKM55 Series with embedded GNSS antenna enables high performance navigation in the most stringent applications and solid fix even in harsh GNSS visibility environments.

It is based on the high performance features of the single module architecture, Its extremely high tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GNSS was not possible before. The UART or USB level design is the easiest and convenient solution to communication with other electronic equipment.

Figure 1: SKM55 Top View

2 Applications
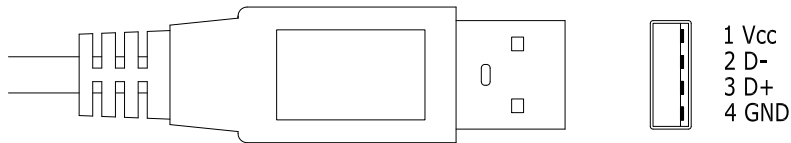
◆ LBS (Location Based Service)

◆ PND (Portable Navigation Device)

◆ Vehicle navigation system

◆ Vehicle monitoring

3 Features

◆ Only GPS or only BDS or GPS/BDS/GLONASS Multisystem reception

◆ NMEA protocols (default baud rate: 9600bps or 115200bps)

◆ Internal back-up battery

◆ One serial port(UART)

◆ Embedded patch antenna 25 x 25 x 4.0 mm

◆ Operating temperature range: -40 to 85℃

◆   RoHS compliance (Lead-free)

◆   FCC,CE compliance

◆   Shell size ：46 * 45 * 15mm

4 Pin Assignment

1 Vcc
2 D-
3 D+
4 GND

USB Connector

3 TXD   4 Vcc

1 RXD   2 GND

Micro-Fit 3.0 Connector

1 Vcc
2 TXD-RS232
3 RXD-RS232
4 RXD-LVTTL
5 GND
6 TXD-LVTTL

PS2 Male Connector

2 RXD-RS232
3 TXD-RS232
5 GND
9 VCC

DB9 Male Connector

PIN	Color	Signal
1	Red	VCC
2	White	TXD
3	Green	RXD
4	Black	GND
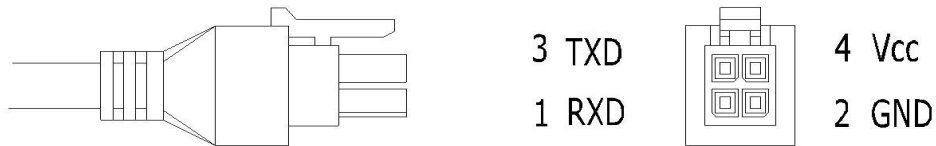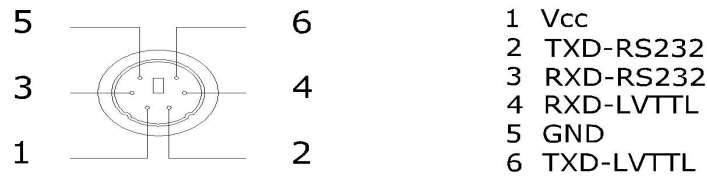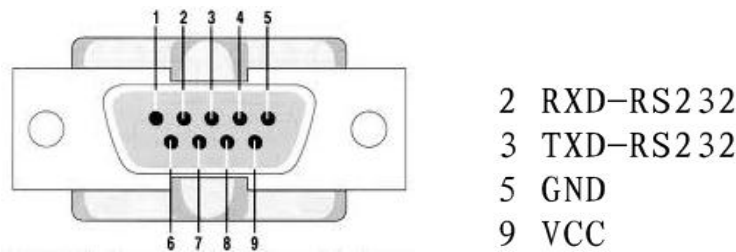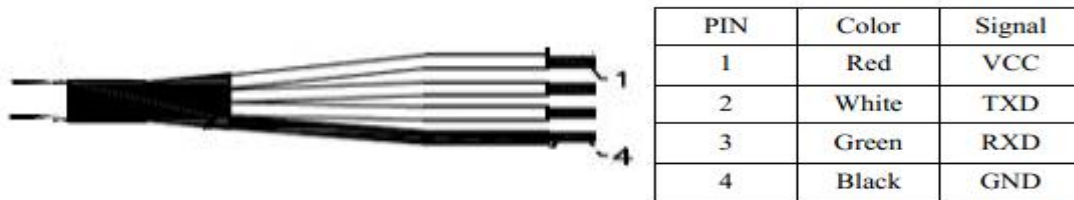
No Connector

Pin 1 – RXD

Pin 2 – VCC

Pin 3 – TXD

Pin 4 - GND
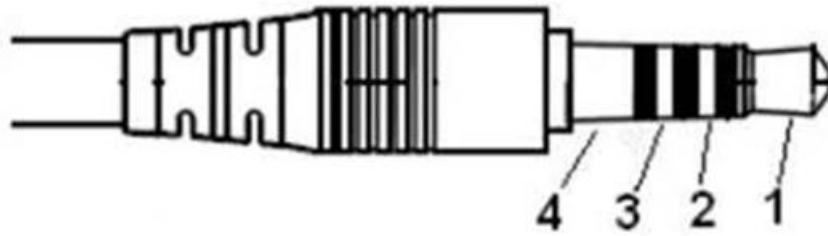
3.5mm TRRS

Figure 2: SKM55 Series Pin Package

5 Performance Specification

Parameter	Specification	
GNSS receiver		
Receiver Type	L1 frequency band, C/A code,	
Sensitivity	Tracking	-165dBm
	Acquisition	-148dBm
Accuracy	Position	3.0m CEP50 without SA(Typical Open Sky)
	Velocity	0.1m/s without SA
Acquisition Time	Cold Start	32s
	Warm Start	23s
	Hot Start	1s
	Re-Acquisition	<1s
Power Consumption	Tracking	30mA @3.3V Typical
	Acquisition	35mA @3.3V
Navigation Data Update Rate	1Hz	
Operational Limits	Altitude	Max 18,000m
	Velocity	Max 515m/s
	Acceleration	Less than 4g
Antenna Specifications		
Outline Dimension	25 x 25 x 4.0 mm	
Center Frequency	L1 band	
Impedance	50 Ω	

Axial Ratio	3 dB max
Polarization	RHCP
Mechanical requirements	
Dimension	46*45*15mm
Weight	90g
Power consumption	
VCC	3.5V~5.5V
Current	30mA(typical)
Environment	
Operating temperature	-40 ~ +85 ℃ (w/o backup battery)
Storage temperature	-40 ~ +125 ℃
Humidity	≦95%

6 Hardware Interfaces Configuration

Power Supply: Regulated power for the SKM55 series is required. The input voltage VCC should be 3.5V~5.5V, current is no less than 150mA. Suitable decoupling must be provided by external decoupling circuitry(10uF and 1uF). It can reduce the Noise from power supply and increase power stability.

UART Ports: The SKM55 series supports one full duplex serial channels UART. The serial connections are at 2.85V LVTTL logic levels, if need different voltage levels, use appropriate level shifters. the data format is however fixed: X, N, 8, 1, i.e. X baud rate, no parity, eight data bits and one stop bit, no other data formats are supported, LSB is sent first. The modules default baud rate is set up 9600bps.

USB Ports: The SKM55 series uses single-chip USB to UART bridge, It is a USB 2.0 compliant full-speed device with integrated transceiver. Before using it, please install the appropriate driver.

RS232 Ports: The SKM55 series uses single-chip RS232 to UART bridge, It is 3V powered EIA/TIA-232 and V.28/V.24 communication interfaces with low power requirements.

7 Pin Description

Pin No.	Pin name	I/O	Description	Remark
UART Port (Micro-Fit 3.0 Connector)				

1	TXD	O	TTL:3.1V-0.3V VOH:2.4V VOL:0.4V	
2	GND	G	Power Ground	Reference Ground
3	RXD	I	TTL:3.6V-0.3V VIH:2.0V VIL:0.8V	
4	VCC	P	Power Supply	3.3V~5.5V

UART Port (PS2 Connector)

1	VCC	P	Power Supply	3.5V~5.5V
4	RXD	I	TTL:3.6V-0.3V VIH:2.0V VIL:0.8V	
5	GND	G	Power Ground	Reference Ground
6	TXD	O	TTL:3.1V-0.3V VOH:2.4V VOL:0.4V	

USB Port (USB Connector)

1	VCC	P	USB Power Supply	5.0V
2	D-	I\O	Data-	
3	D+	I\O	Data+	
4	GND	G	USB Power Supply	Reference Ground

RS232 (Micro-Fit 3.0 Connector)

1	RXD	O	Data input(RS232 level)	
2	GND	G	Power Ground	Reference Ground
3	TXD	I	Data output(RS232 level)	
4	VCC	P	Power Supply	3.5V~5.5V

RS232 (PS2 Connector)

1	VCC	P	Power Supply	3.5V~5.5V
2	TXD	O	Data output(RS232 level)	
3	RXD	I	Data input(RS232 level)	
5	GND	G	Power Ground	Reference Ground

RS232 (DB9 Connector)

| 3 | TXD | O | Data output(RS232 level) | |
| 2 | RXD | I | Data input(RS232 level) | |

5	GND	G	Power Ground	Reference Ground
9	VCC	P	Power Supply	3.5V~5.5V

TTL (3.5MM TRRS)

1	RXD	I	TTL:3.6V-0.3V　VIH:2.0V　VIL:0.8V	
2	VCC	P	Power Supply	3.5V~5.5V
3	TXD	O	TTL:3.1V-0.3V　VOH:2.4V VOL:0.4V	
4	GND	G	Power Ground	Reference Ground

8 Mechanical Specification

Micro-Fit 3.0 Connector
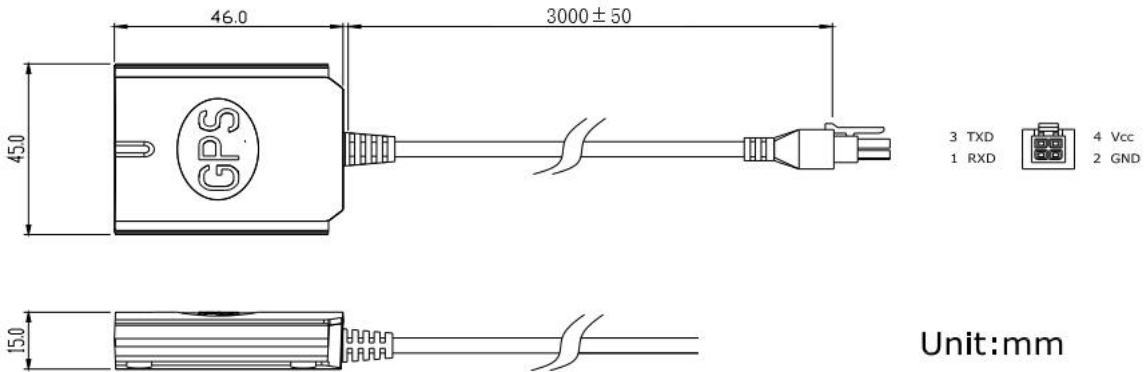
PS2 Connector
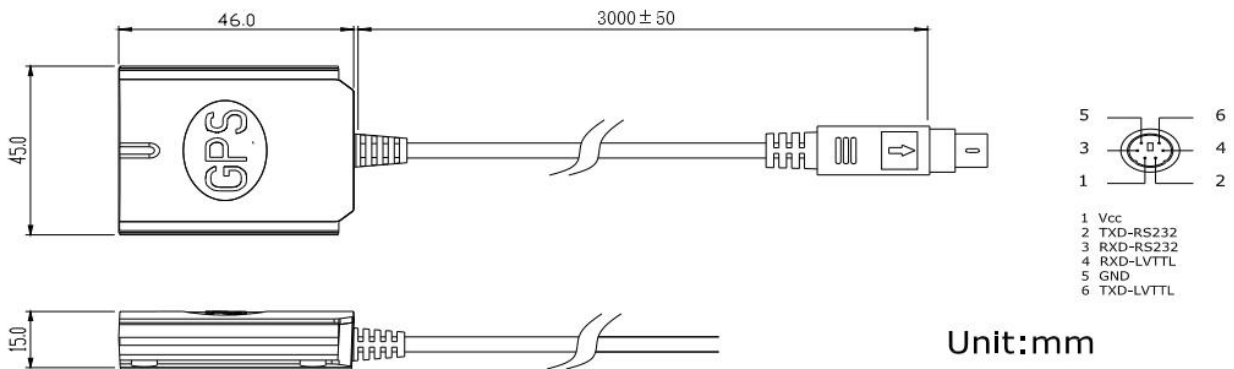
USB Connector
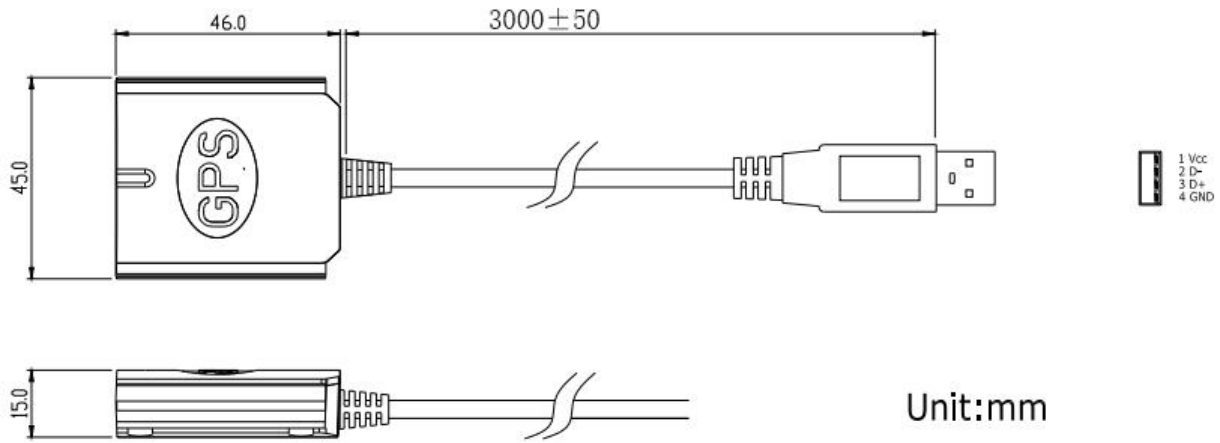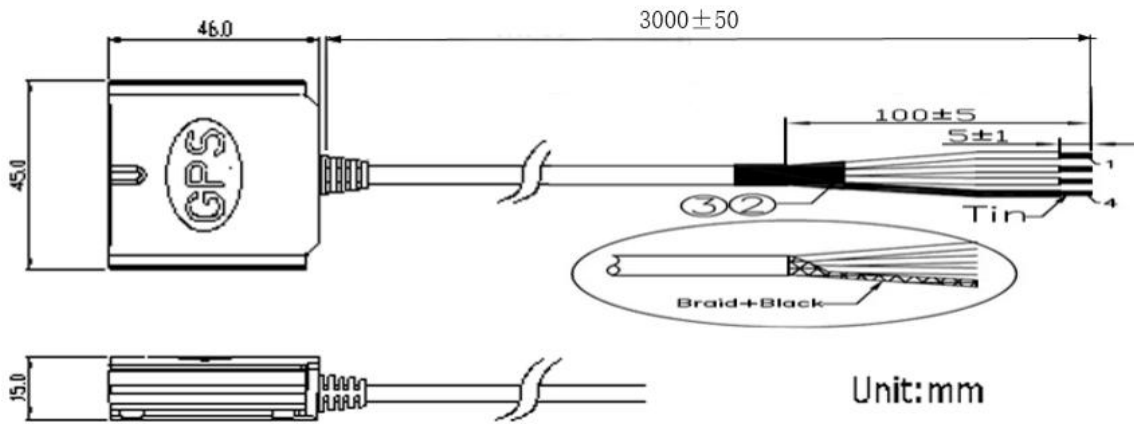
No Connector
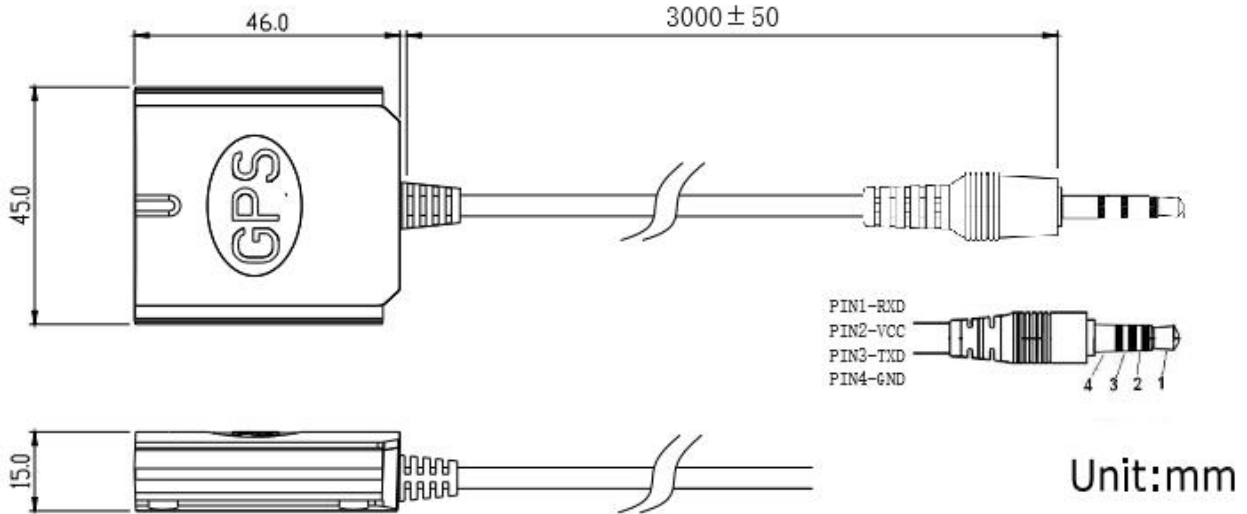
TRRS Connector

Figure 3: SKM55 Series Connector

9 Ordering Information

	PS2	Micro-Fit 3.0 (43025-0400)	USB	Audio	DB9	No connector
UART(TTL)	SKM55TP	SKM55TM		SKM55TA	SKM55TD	SKM55TX
RS232	SKM55RP	SKM55RM		SKM55RA	SKM55RD	SKM55RX
USB			SKM55U			SKM55UX

10 User's Guide

Installing the USB Driver to you Laptop

Driver updates can be found at Silab's web-site:

https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers?tab=downloads

Com Port Verification

1. Once your USB Driver has been installed, you will need to confirm which COM Port your PC has assigned to it in order to properly configure any software that will be utilizing the GNSS data being received.

2. Your USB GNSS must be plugged into your USB port at this time.

3. Using Window's Control Panel, select System > Hardware > Device Manager

4. Then look under the heading of: PORTS (Com & LPT)

5. There should be a listing for: CP210x USB to UART Bridge Controller (COM x) ("x" will actually be the number your PC has assigned the USB GNSS receiver).

6. Once you have identified the COM port number, any software that you utilize must be configured to read GNSS data from this COM port.

We strongly suggest that you first test your USB GNSS with the included GNSS Info utility program to confirm that the GNSS receiver if functioning properly on your PC and that you have successfully configured the right COM Port setting. Once this has been done, close the GNSS Info program and start your application for COM port configuration.

NOTE: By default, your PC will not allow you to run multiple applications from a single COM port. It is important that you close any previously opened GNSS application before switching to another GNSS application as the GNSS receiver and data will not be found by the new program.

There are special utilities available to split data into multiple COM ports for use by more than one application simultaneously. (see: http://franson.com/GNSSgate/)

Initialing your GNSS receiver

Before using your USB GNSS receiver for navigation (especially for the first time), the receiver must obtain a local GNSS fix (coordinates) of the current position. To do this, take your laptop (with your USB driver and the mapping software loaded and configured) to an open area that has a clear view to the sky (such as a park or empty field). Start your software (or the included GNSS Info utility program) and wait for initialization of the GNSS to complete. This may take a few minutes depending on various factors such as the distance of the current coordinates from the last time the GNSS receiver was activated, GNSS signal strength and surrounding terrain (tall trees and buildings can block the satellite signals). In some cases initialization can take up to several minutes depending on the conditions .

Coordinates scrolling with zero's means that the port connection is complete, but the satellite data is not being received yet (possibly still initializing or in a bad area for satellite reception).

Using/Testing your GNSS Receiver

Once the USB GNSS receiver's driver and your personal mapping software have been installed and

configured properly, you can begin to use your navigation system by plugging the USB GNSS into your laptop's USB port and launching your mapping software.

11 Software Protocol

NMEA 0183 Protocol

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.

The SkyLab SKM55 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 9600bps.

Table 1: NMEA-0183 Output Messages

NMEA Record	Description	Default
GGA	Global positioning system fixed data	Y
GLL	Geographic position—latitude/longitude	N
GSA	GNSS DOP and active satellites	Y
GSV	GNSS satellites in view	Y
RMC	Recommended minimum specific GNSS data	Y
VTG	Course over ground and ground speed	N
ZDA	Date and Time	N

12 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:**86-0755 8340 8210（Sales Support）

电话/**Phone:** 86-0755 8340 8510（Technical Support）

传真/**Fax:** 86-0755-8340 8560

邮箱/**E-Mail:** sales1@skylab.com.cn

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