V1.5 · 2026-11-04

SK-RF CO.,Ltd

DATASHEET

SKL5010 Module Datasheet

USB 2.0 Millimeter-Wave Contactless Connector

Document Type	Product Datasheet
Applicable Product	SKL5010A / SKL5010B
Release Date	2026-11-04
Document Version	V1.5

Document Summary: Describes SKL5010A/B USB 2.0 and low-speed auxiliary data channels, host/device roles, power, operating modes, status indicators, installation conditions and certification information for interface selection and mechanical integration.

Contents

1 Product Overview
2 Features
3 Applications
4 Block Diagram and Appearance
5 Interface Definitions
6 Mode Configuration
7 Electrical Characteristics
8 Status Indicators
9 Assembly Instructions
10 Product Model
11 Certification and Compliance
12 Revision History

1 Product Overview

SKL5010A/B are paired 60 GHz contactless connectivity modules based on the ST60A3 millimeter-wave transceiver with integrated antennas. They connect through existing USB Type-C interfaces to replace a short USB 2.0 cable. UART, GPIO or I2C low-speed tunneling is also supported, with the tunnel mode selected by the corresponding firmware.

SKL5010A is the host-side module, with a Type-C receptacle and configuration controller for connection to a computer or other USB host. SKL5010B is the device-side module, with a Type-C plug for USB devices such as flash drives and cameras. A and B operate as a pair.

2 Features

- 60 GHz V-band millimeter-wave link with integrated antennas.
- USB 2.0 High-Speed nominal signaling rate up to 480 Mbit/s.
- UART / GPIO / I2C low-speed channels, each requiring the corresponding firmware.
- Half-duplex RF transceiver architecture; SKL5010A and SKL5010B operate as a pair.
- Recommended opposing antenna-face spacing approximately 20 mm; installation spacing below 60 mm.
- Supports the illustrated 0° and 180° relative mounting orientations.

3 Applications

- Contactless accessories.
- Contactless docking hubs and data transfer for personal devices.
- Industrial contactless connectors.
- Contactless testing in factory automation and after-sales service.

4 Block Diagram and Appearance

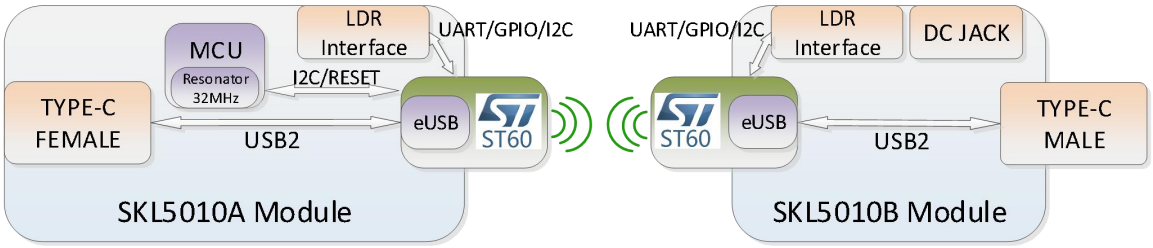

Figure 1. SKL5010A/B functional block diagram (Half Duplex, Alternating Transmit/Receive)

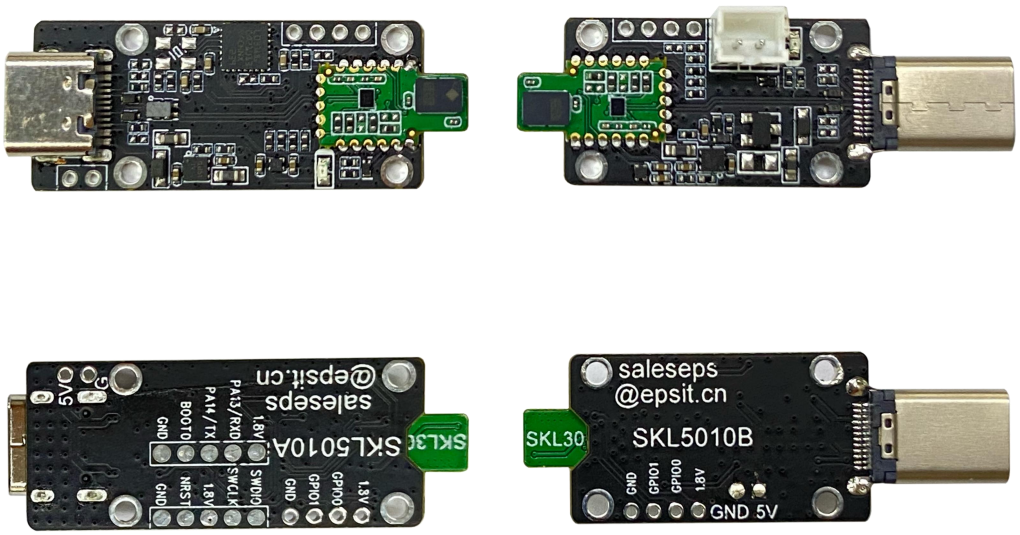

Figure 2. SKL5010A/B front and rear views (A on the left, B on the right)

The controller at end A configures the local module through I2C, then configures end B through wireless remote-register access to establish paired data channels. Depending on the firmware, the low-speed pins are multiplexed for UART, GPIO or I2C tunneling.

5 Interface Definitions

Table 1. Interfaces and Power at Ends A and B

Item	Description
SKL5010A	USB Type-C receptacle, host side; normally powered through the USB data cable connected to the host. Includes a controller for mode configuration.
SKL5010B	USB Type-C plug, device side; normally requires external 5 V through the PH2.0 2-pin connector when connected to a USB peripheral.
Alternative power inputs	When end B receives power through device-side Type-C or external 5 V at PH2.0, use only one source. Do not connect both simultaneously.
Peripheral power	End B supplies the connected USB device after the wireless link is established.

Check PH2.0 polarity against the 5V / GND markings on the board. On the auxiliary interface, 1V8 is a 1.8 V power pin and GPIO0 / GPIO1 use 1.8 V logic. Do not connect external 5 V to 1V8 or signal pins.

Table 2. Auxiliary Interface Definitions

Pin No.	Signal Name	Description
1	1V8	1.8 V supply.
2	GPIO0	UART RX / I2C SCL / GPIO tunneling, 1.8 V logic.
3	GPIO1	UART TX / I2C SDA / GPIO tunneling, 1.8 V logic.
4	GND	Ground.

6 Mode Configuration

PB0 high selects the USB 2.0 channel, the default configuration. PB0 low selects a low-speed tunnel; UART, GPIO or I2C tunneling is determined by the corresponding firmware at end A.

Table 3. Data Channels and Interface Rates

Data Rate Mode	Signal Channel	Maximum Interface Rate
USB 2.0	USB-DP、USB-DN	≤ 480 Mbit/s
UART tunnel (LP, full duplex)	GPIO0（RX）、GPIO1（TX）	≤ 2.4 Mbit/s
GPIO tunnel (LP, bidirectional)	GPIO0、GPIO1	≤ 2.4 Mbit/s
I2C tunnel	GPIO0（SCL）、GPIO1（SDA）	≤ 1 Mbit/s

The listed UART and GPIO rates apply to the low-power (LP) full-duplex UART tunnel and bidirectional GPIO tunnel, respectively. At 2.4 Mbit/s, the application must provide data-error detection. Without error detection, use a rate no higher than 1.6 Mbit/s.

(1) USB 2.0: uses USB-DP and USB-DN, with a maximum interface rate of 480 Mbit/s.

(2) UART tunnel (LP, full duplex): uses GPIO0 (RX) and GPIO1 (TX), with a maximum interface rate of 2.4 Mbit/s.

(3) GPIO tunnel (LP, bidirectional): uses GPIO0 and GPIO1, with a maximum interface rate of 2.4 Mbit/s.

(4) I2C tunnel: uses GPIO0 (SCL) and GPIO1 (SDA), with a maximum interface rate of 1 Mbit/s.

Low-speed signals use 1.8 V logic. External equipment and debugging tools must use compatible levels.

7 Electrical Characteristics

Table 4. SKL5010A Power Supply Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IN}	Input voltage	4.5	5	5.5	V
I_{IN}	Input current*	-	42	-	mA
P	Total power consumption	-	0.21	-	W

Table 5. SKL5010B Power Supply Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IN}	Input voltage	4.5	5	5.5	V
I_{IN}	Input current*	-	42	-	mA
P	Total power consumption	-	0.21	-	W

Note*: Module input current of 42 mA and total power consumption of 0.21 W are typical values.

Table 6. Temperature Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_A	Operating ambient temperature (ends A/B)	−20	-	+85	°C

Table 7. RF parameters

Symbol	Parameter	Min.	Typ.	Max.	Unit
F_{OSC}	Carrier frequency	-	60.5	-	GHz

The operating ambient temperature range for both ends is −20 to +85 °C. Typical carrier frequency is 60.5 GHz.

8 Status Indicators

Table 8. Green Indicator States

Indicator State	Meaning
Dimly lit	Module powered; wireless communication not yet established.
Brighter and flashing	Ends A and B are establishing communication.
Bright, continuously lit	Wireless link established.

9 Assembly Instructions

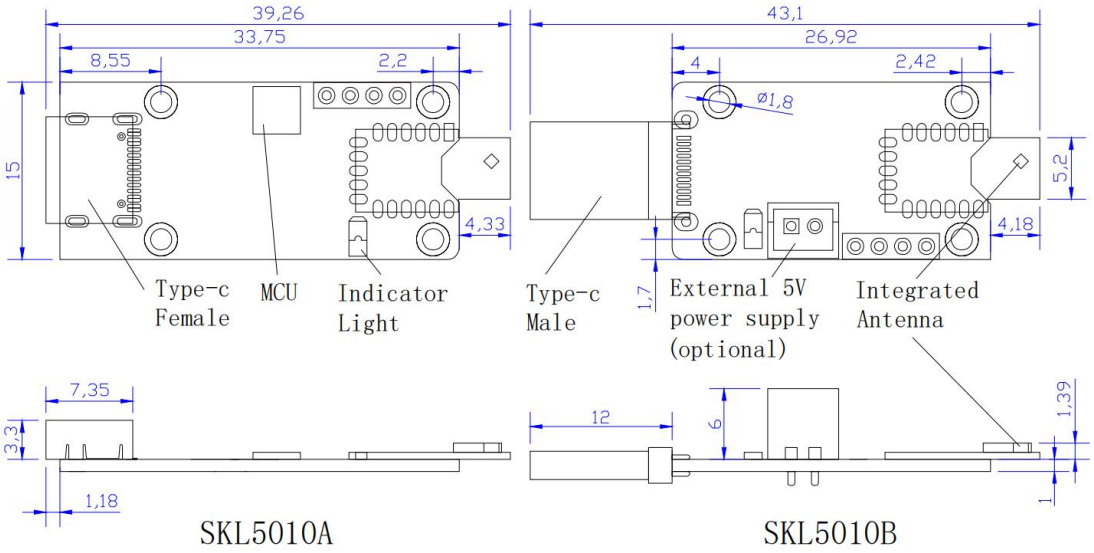

Figure 3. SKL5010A/B outline and interface positions (unit: mm)

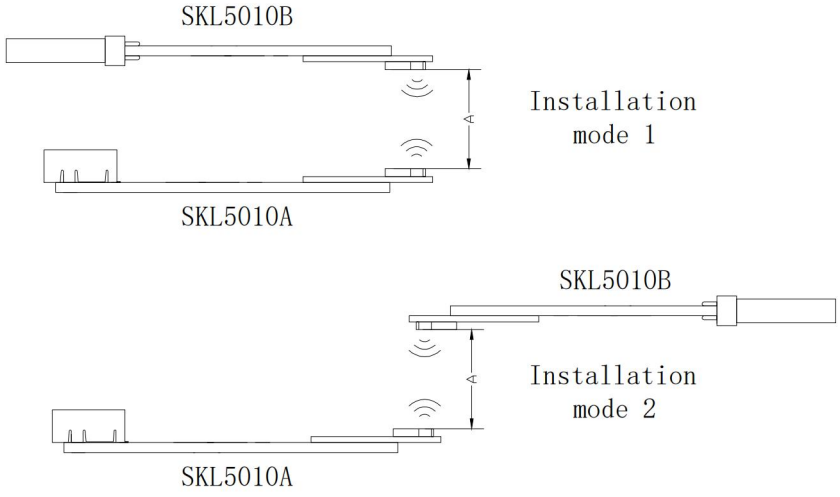

Figure 4. Relative mounting orientations of 0° and 180° for ends A/B

Place the A/B antenna faces opposite each other with centers aligned. The recommended initial spacing is 20 mm; installation spacing must be below 60 mm. For mechanical integration, a spacing no greater than 30 mm and lateral offset no greater than 5 mm are recommended.

Provide a transmissive window in any metal enclosure along the millimeter-wave path, using plastic or another nonconductive material suitable for millimeter-wave transmission. After assembly, verify the actual window material, thickness and mounting structure using the accompanying user manual.

10 Product Model

Table 9. Product Models

Product Models	Description
SKL5010A	USB 2.0 contactless module, end A, Type-C receptacle with configuration controller; connects to the USB host and configures operating modes.
SKL5010B	USB 2.0 contactless module, end B, Type-C plug without configuration controller; connects to the USB device and is configured wirelessly by end A.

11 Certification and Compliance

Certification and compliance information for SKL5010A / SKL5010B is listed below.

Table 10. Certification and Compliance Information

Region / Item	Applicable Models	Certificate or Report No.	Issue Date
United States FCC equipment authorization	SKL5010A / SKL5010B	FCC ID: 2AYEX-SKL5010	2023-12-14
European Union CE conformity assessment	SKL5010A / SKL5010B	MRT202309RSH20	2023-12-12

The FCC equipment authorization covers FCC Part 15C; RF testing is based on FCC Part 15.255. The associated RF report is 2309RSU048-U1 V02 (2023-12-12); the RF exposure assessment report is 2309RSU048-U2 (2023-12-04).

The CE conformity documentation lists the following assessment standards:

(1) RF: EN 305 550-2 V1.2.1 (2014-10).

(2) RF exposure: EN 62479:2010.

(3) EMC: EN 301 489-1 V2.2.3 (2019-11) and EN 301 489-3 V2.3.2 (2023-01).

(4) Safety: EN IEC 62368-1:2020/A11:2020.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter. Follow the supplied antenna installation instructions and transmitter operating conditions during installation and use to meet RF exposure requirements.

12 Revision History

Date	Revision	Description of Changes
2021-08-23	V0.9	Initial draft.
2021-08-31	V1.0	Added PCB length; removed minimum installation spacing A.
2022-03-17	V1.1	Updated product photographs.
2022-04-25	V1.2	Updated power supply instructions.
2023-09-25	V1.3	Renamed the product SKL5010 and updated all product features.
2023-12-08	V1.4	Updated the block diagram and added mode configuration.
2026-11-04	V1.5	(1) Prepared the English datasheet from the Chinese edition; organized A/B roles, interface modes and power requirements, with separate features and applications sections. (2) Described USB, UART, GPIO and I2C modes individually; organized interface logic levels and status indications. (3) Listed A/B power, temperature and carrier parameters separately; retained photographs, connection and assembly drawings; standardized contents, figure/table numbering and historical descriptions. (4) Equalized the Min., Typ. and Max. columns while retaining all values, conditions, units, font sizes and standard row spacing. (5) Arranged revisions from oldest to newest, retaining the original dates, revision numbers and historical changes. (6) Standardized chapter names and outline order against the reviewed product documents, retaining model-specific functions and detailed instructions; updated the contents, figure/table numbering and internal references. Listed applications individually using the original datasheet. (7) Refined the product overview to integrate the chipset platform naturally into the module, antenna and functional descriptions, retaining model-specific capabilities, pairing requirements and parameters. (8) Distinguished ST60A3 low-speed tunnel configurations: specified 2.4 Mbit/s for LP full-duplex UART and bidirectional GPIO, added error-detection requirements and the applicable 1.6 Mbit/s condition, and standardized tunnel terminology. (9) Added FCC equipment authorization, CE conformity documentation, applicable models, certificate numbers, dates, assessment standards and operating requirements; updated the contents, section numbers and product-model table numbering. (10) Moved Certification and Compliance immediately before Revision History; standardized the order of the assembly, product-model and certification sections and updated the contents, section numbers and table numbers. (11) Standardized chapter names, order and content allocation using the common outline, retaining technical descriptions and illustrations; updated the contents, figure/table numbering and internal references. (12) Checked figure numbering after manual photograph adjustments; corrected caption bookmarks and figure-reference links while preserving image sizes and positions. (13) Prepared and checked this English edition against the current Chinese edition, preserving numbered items, parameters, illustrations, commands and operating instructions.