User's Manual

RX261 Group

Evaluation Kit for RX261 Microcontroller Group
EK-RX261 v1
User's Manual

Renesas RX Family
RX200 Series

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures:

• Ensure attached cables do not lie across the equipment.

• Reorient the receiving antenna.

• Increase the distance between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

• Power down the equipment when not in use.

• Consult the dealer or an experienced radio/TV technician for help.

Note: It is recommended that wherever possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken:

• The user is advised that mobile phones should not be used within 10 m of the product when in use.

• The user is advised to take ESD precautions when handling the equipment.

The Evaluation Kit does not represent an ideal reference design for an end product and does not fulfill the regulatory standards for an end product.

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Renesas RX Family

EK-RX261 v1 User's Manual

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List of Abbreviations and Acronyms

Table 1. List of Abbreviations and Acronyms

ADC	Analog to Digital Converter
BoM	Bill of Materials
bps	Bits Per Second
CAN	Controller Area Network
CAN FD	CAN with Flexible Data Rate
CS	Chip Select
CTS	Clear to Send
CTSU	Capacitive Touch Sensing Unit
E2 OB	E2 emulator On Board
EK	Evaluation Kit
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
EU	European Union
FIT	Firmware Integration Technology
GPIO	General Purpose Input Output
GPTW	General-Purpose PWM Timer
I^2C (or IIC)	Inter-Integrated Circuit
IDE	Integrated Development Environment
I/F	Interface
INT	Interrupt
I/O	Input/Output
IRQ	Interrupt Request
LED	Light Emitting Diode
LFQFP	Lead Free Quad Flat Package
MCU	Micro Controller Unit
MISO	Master In Slave Out
MOSI	Master Out Slave In
NC	Not Connected
PWM	Pulse Width Modulation
RIIC	Renesas I^2C
RSPI	Renesas SPI
RTC	Real Time Clock
RTS	Request to Send
RXD	Receive Data
SCI	Serial Communications Interface
SCK	Serial Clock
SCL	Serial Clock Line
SDA	Serial Data Line
SMT	Surface Mount Technology
SPI	Serial Peripheral Interface
TP	Test Point
TXD	Transmit Data
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
USB FS	USB Full Speed

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1. Kit Overview

The EK-RX261 v1, an Evaluation Kit for RX261 MCU Group, enables users to seamlessly evaluate the features of the RX261 MCU group and develop embedded systems applications using Firmware Integration Technology (FIT) and e^2 studio IDE. The users can utilize rich on-board features along with their choice of popular ecosystems add-ons to bring their big ideas to life.

The key features of the EK-RX261 v1 are categorized in three groups (consistent with the architecture of the kit) as follows:

MCU Native Pin Access

- R5F52618BGFP *1 MCU (referred to as RX MCU)
  - 64 MHz, 32-bit RX CPU (RXv3)
  - 512 kB Code Flash ROM, 8 kB Data Flash ROM, 128 kB RAM
  - 100 pins, LFQFP package
- Native pin access through 6 x 2-pin and 14 x 2-pin x 3-piece male headers
- MCU current measurement points for current consumption measurement
- Providing 8.000 MHz crystal oscillator as main clock
- Providing 32.768 kHz crystal oscillator as sub clock

Special Feature Access

- CAN FD transceiver IC and 3-pin male header for interface connector
- Touch interface with 2 touch buttons *2

System Control and Ecosystem Access

- Four 5 V input sources
  - USB (USB DEBUG1, USB FULL SPEED, USB SERIAL)
  - External power supply (using surface mount clamp test points and power input vias)
- Two Debug modes
  - On-board debugger / programmer (E2 emulator On Board (referred as E2OB, FINE Interface))
  - Debug in (FINE Interface)
- User LEDs and switches
  - Three User LEDs (red, blue, green)
  - Power LED (white) indicating availability of regulated power
  - Debug LED (yellow) indicating the debug connection
  - Two User switches
  - One Reset switch
- Five most popular ecosystems expansions
  - 2 Seeed Grove® system (I^{2}C / Analog) connectors (not fitted)
  - SparkFun® Qwiic® connector (not fitted)
  - 2 Digilent Pmod™ (UART / SPI / I^{2}C) connectors
  - Arduino® (Uno R3) connector
  - MikroElektronika mikroBUS™ connector
- USB serial converter interface
- RX261 USB Full speed host and function

*1: R5F52618BGFP has a built in encryption module.

*2: Two touch buttons connected to touch interface are not implemented on Special Feature Access Area, however, these functions are functionally categorized into Special Feature Access.

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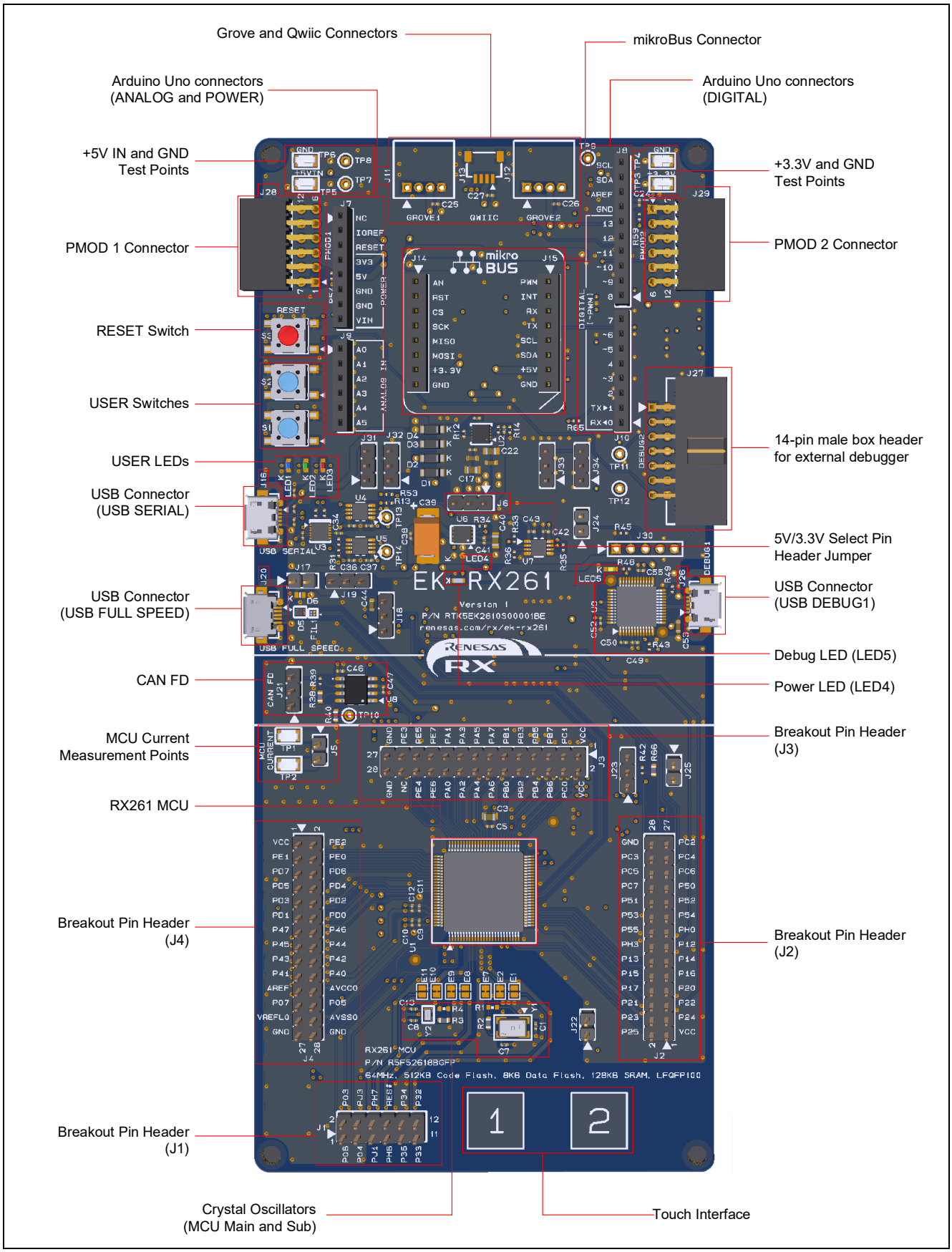


Figure 1. EK-RX261 v1 Top Side

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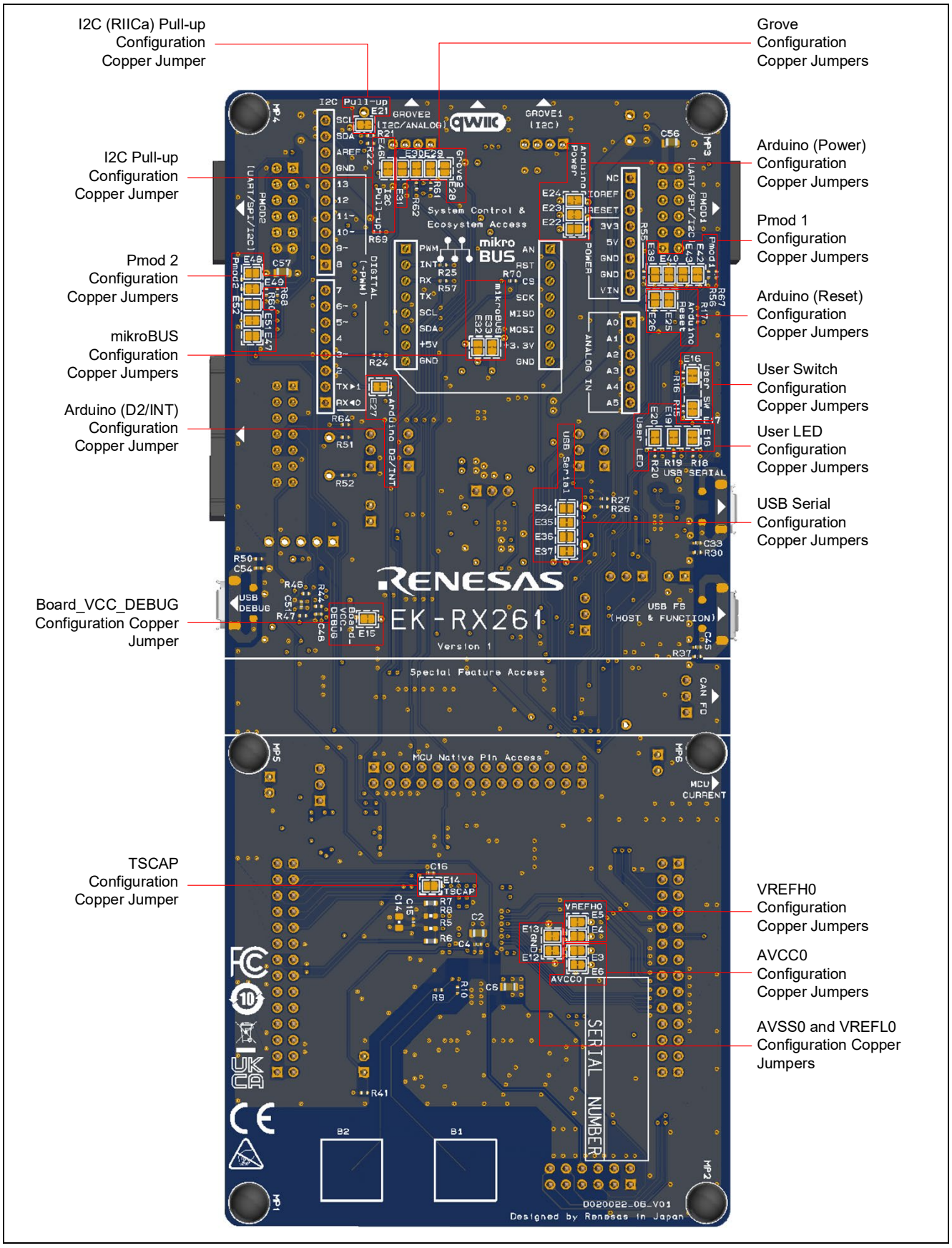


Figure 2. EK-RX261 v1 Bottom Side

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1.1 Assumptions and Advisory Notes

1. It is assumed that the user has basic understanding of microcontrollers and embedded systems hardware.
2. It is recommended that the user refers to the EK-RX261 Quick Start Guide to get acquainted with the kit and the Quick Start example project that EK-RX261 v1 comes pre-programmed with.
3. Firmware Integration Technology (FIT) and Integrated Development Environment (IDE) such as e^2 studio are required to develop embedded applications on EK-RX261 v1 kit.
4. Instructions to download and install software, import example projects, build them and program the EK-RX261 v1 are provided in the quick start guide.

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2. Kit Contents

The following components are included in the kit:

1. EK-RX261 x 1
2. Micro USB function cable (type-A male to micro-B male) x 1
3. Micro USB host cable (type-A female to micro-B male) x 1
4. Ferrite core x 1

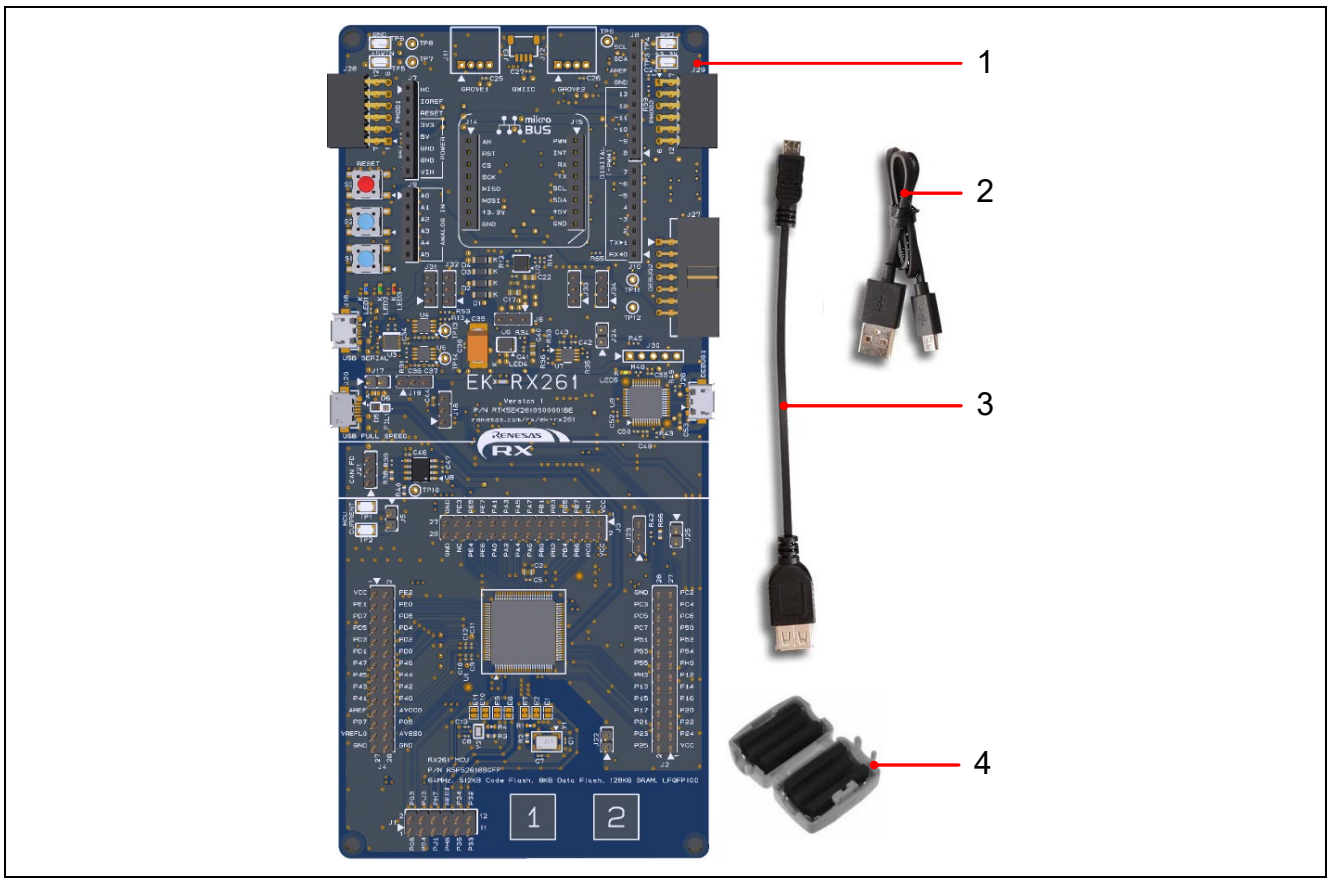


Figure 3. EK-RX261 v1 Kit Contents

3. Ordering Information

- EK-RX261 v1 orderable part number: RTK5EK2610S00001BE

  Note: The underlined character in the orderable part number represents the kit version.

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4. Hardware Architecture and Default Configuration

4.1 Kit Architecture

The EK-RX261 v1 is designed with three areas to help shorten the learning curve of the users and maximize the design and knowledge reuse among similar kits. The contents of these three areas are conceptually standardized among similar kits.

Table 2. Kit Architecture

Kit area	Area features	Area present on all similar kits	Functionality is:
MCU Native Pin Access Area	RX MCU, breakout pin headers for MCU I/O and power, current measurement, MCU Operating Mode Configuration *2	Yes	MCU dependent
Special Feature Access Area	MCU special features: CAN FD, Touch interface *1	Optional	MCU dependent
System Control and Ecosystem Access Area	Power, E2 OB circuit, User LEDs and switches, reset switch, ecosystem connectors, USB Full Speed Host and Function, USB serial converter interface	Yes	Same or similar across similar kits

*1: Two touch buttons connected to touch interface are not implemented on Special Feature Access Area, however, these functions are functionally categorized into Special Feature Access.

*2: MCU Operating Mode Configuration is configured by four pin headers (Refer to section 7.3). Some of the pin headers is implemented out of MCU Native Pin Access area, however, this function is functionally categorized into MCU Native Pin Access.

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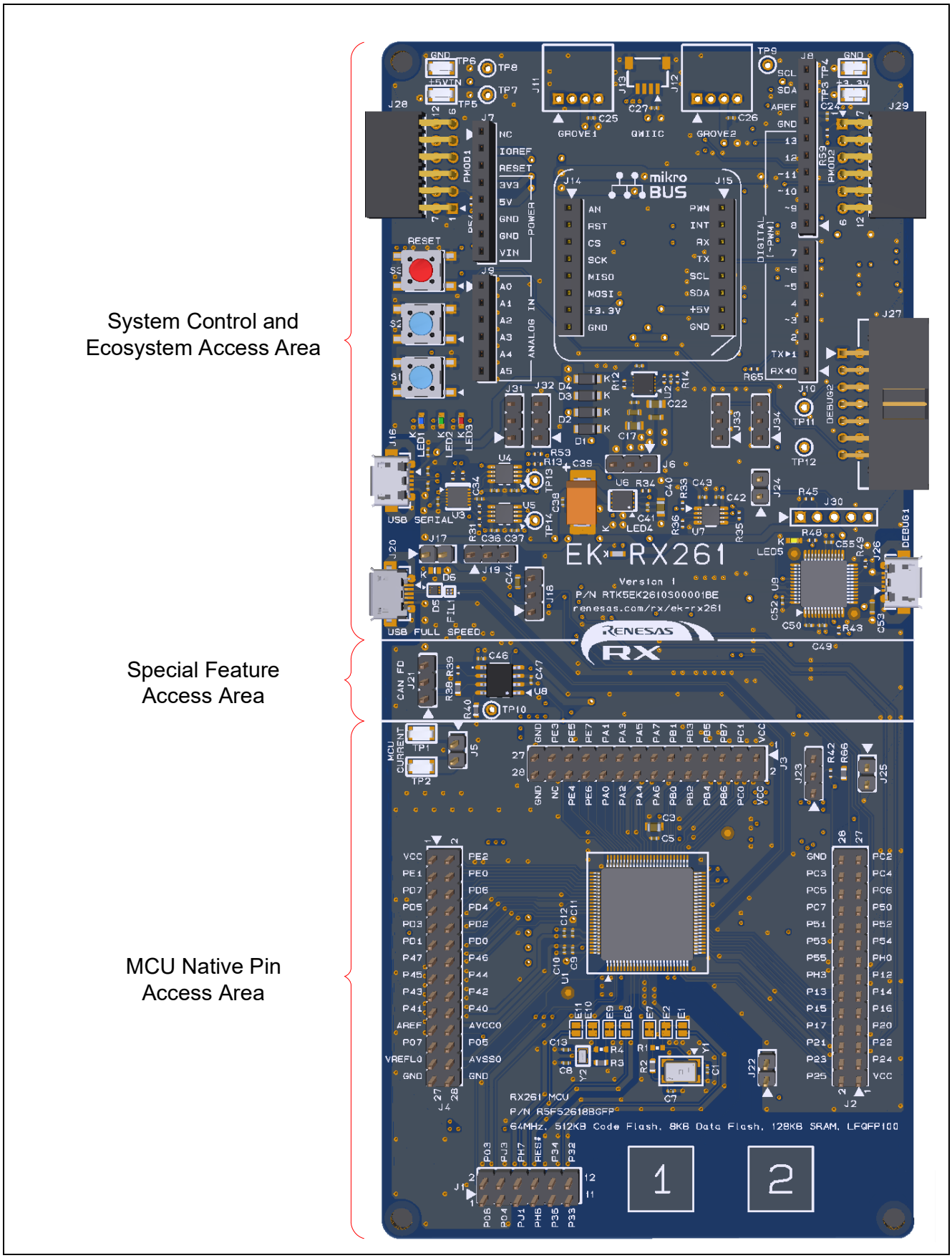


Figure 4. EK-RX261 v1 Area Definitions

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4.2 System Block Diagram

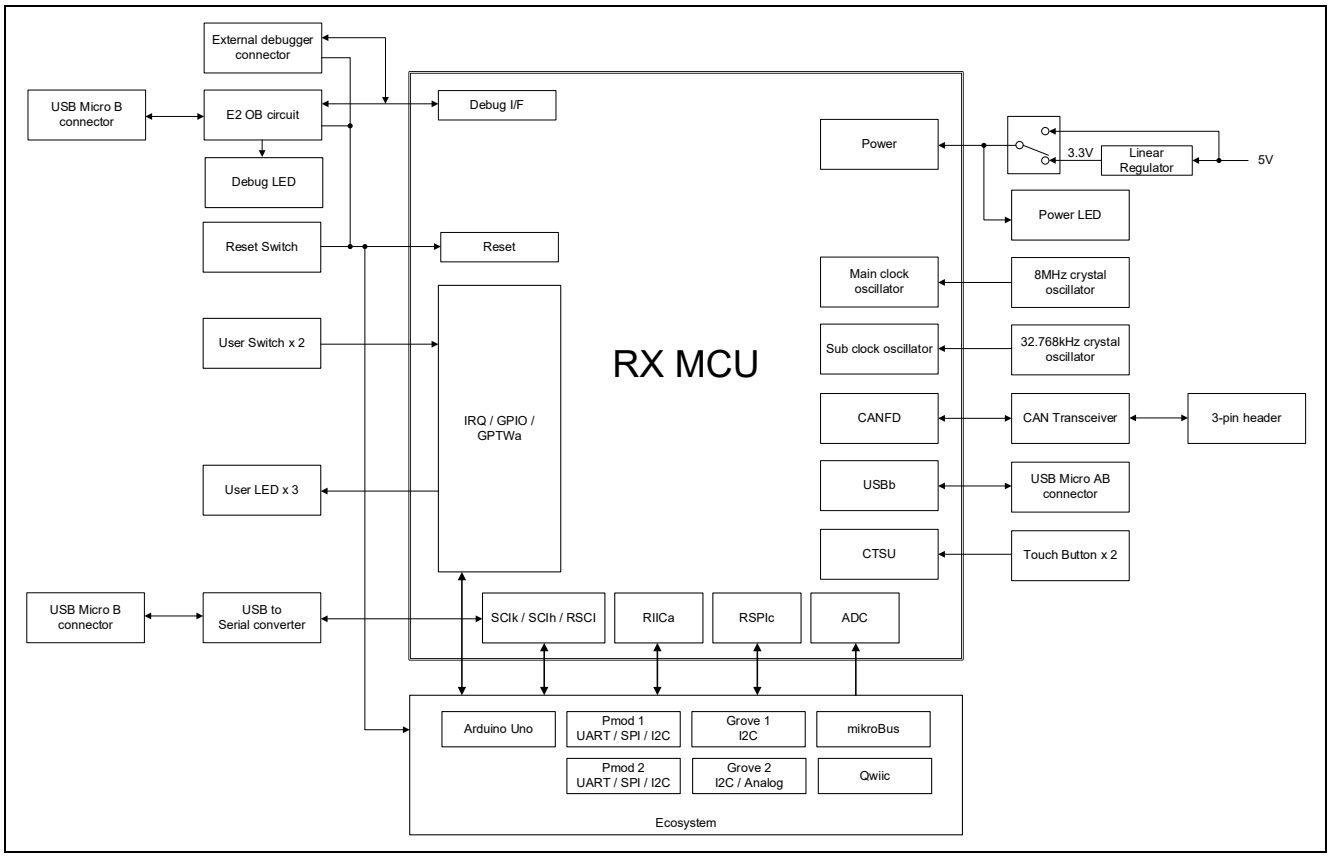


Figure 5. EK-RX261 v1 Block Diagram

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4.3 Component Placement Location and Dimension

Reference number for components on the EK-RX261 v1 is shown below.

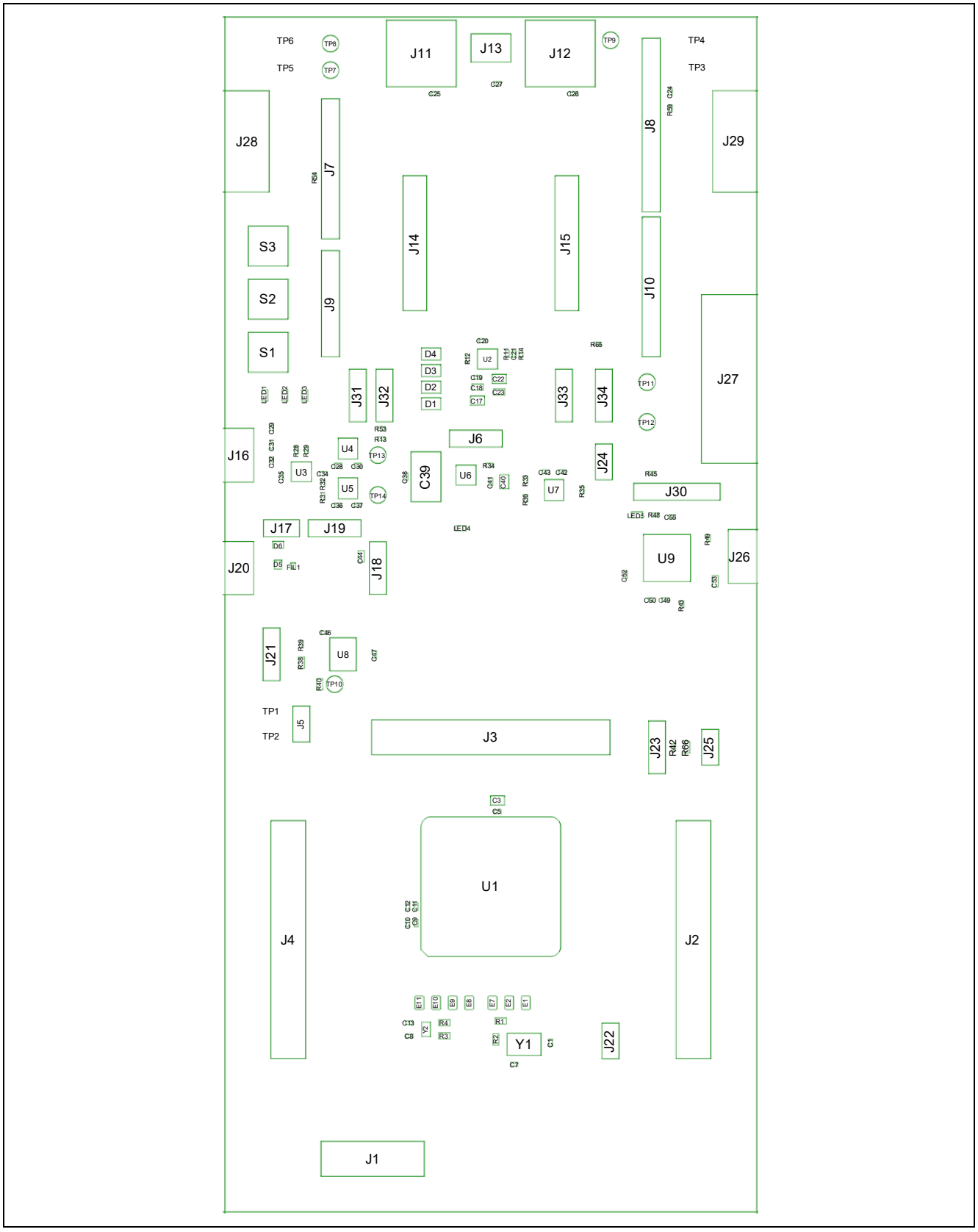


Figure 6. Reference number for components on the EK-RX261 v1 (top side)

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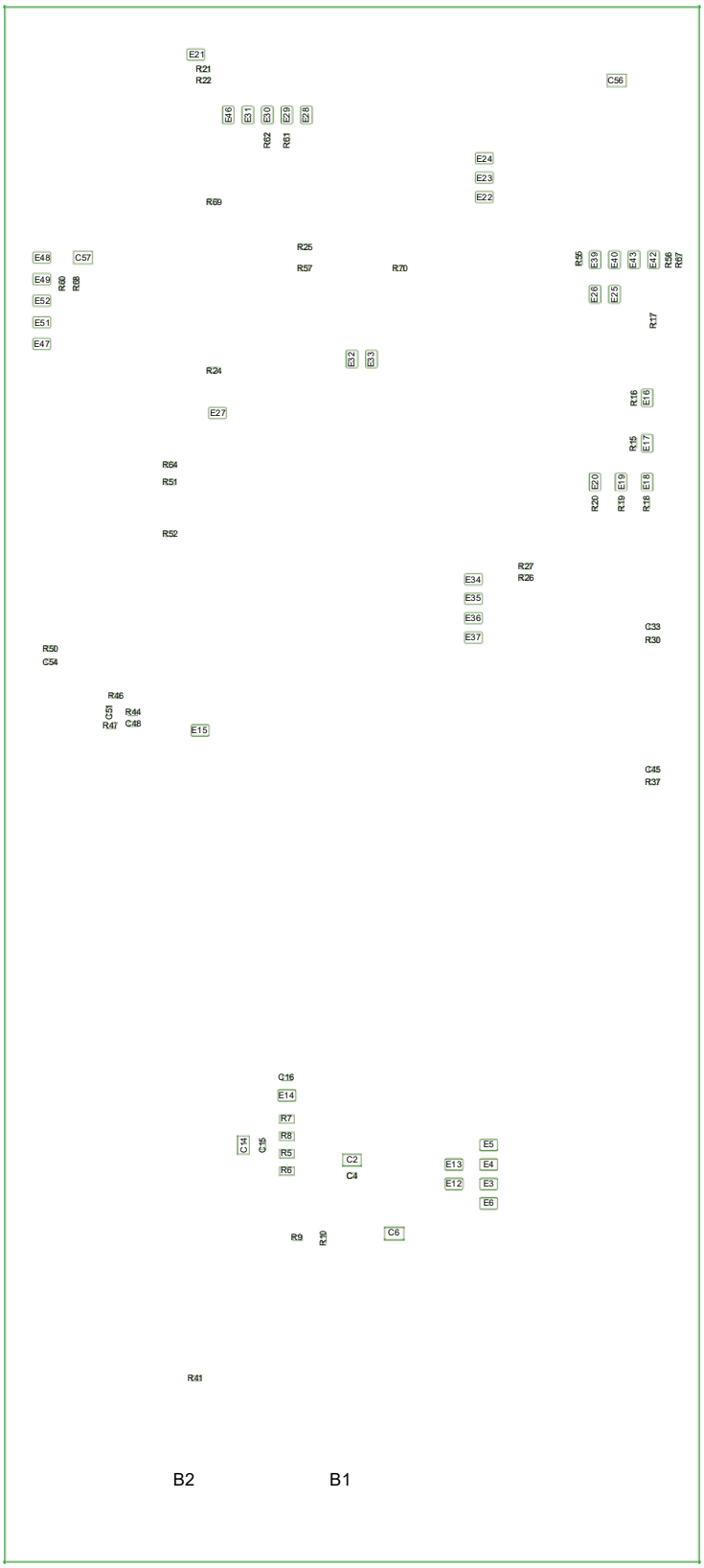


Figure 7. Reference number for components on the EK-RX261 v1 (bottom side)

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Dimension of the EK-RX261 v1 is shown below.

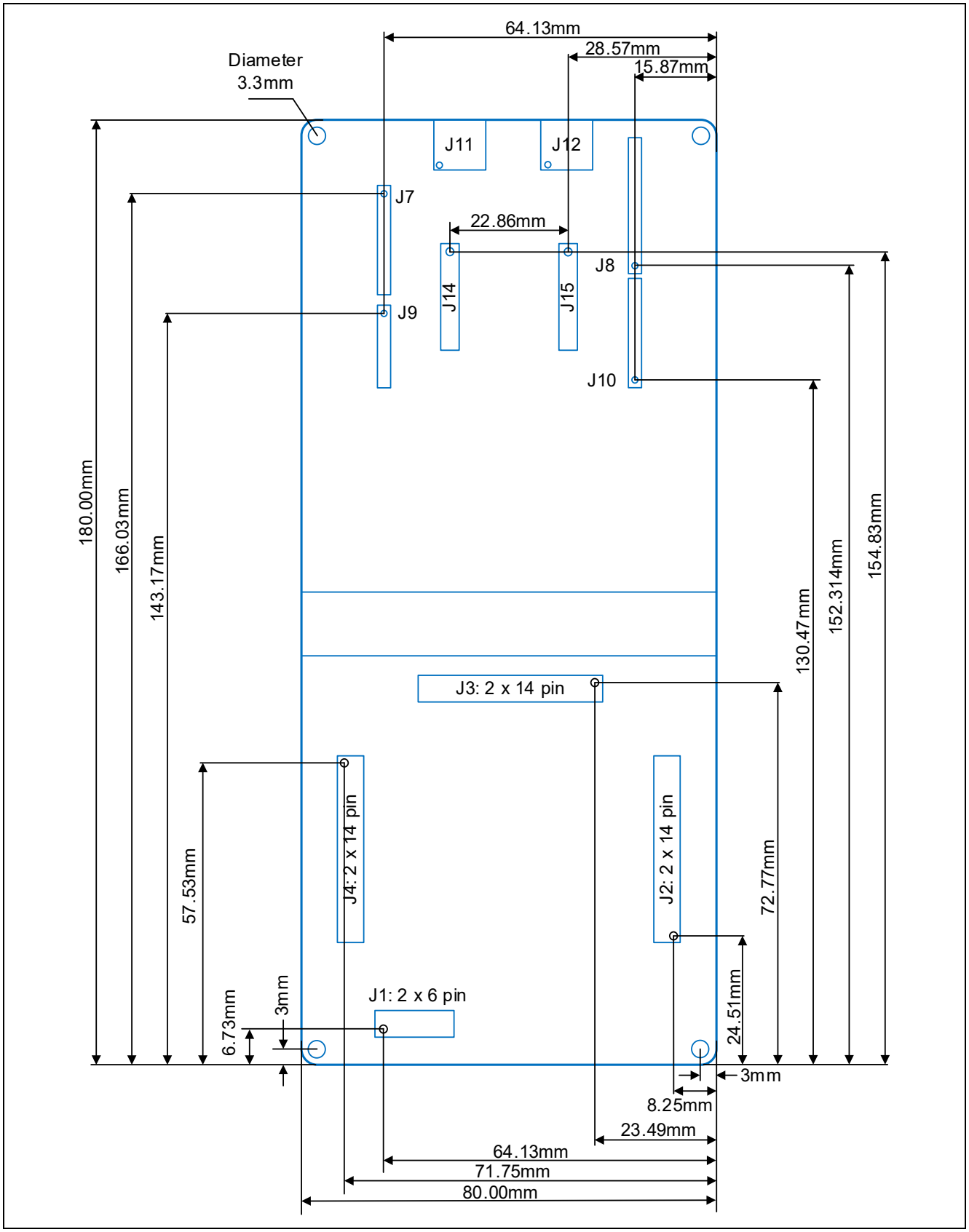


Figure 8. Dimension of the EK-RX261 v1

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4.4 Jumper Settings

Two types of jumpers are provided on the EK-RX261 v1.

1. Copper jumpers (trace-cut type and solder bridge type)
2. Traditional pin header jumpers

The following sections describe each type and their default configuration.

4.4.1 Copper Jumpers

Copper jumpers are of two types, designated **trace-cut** and **solder-bridge**.

A **trace-cut jumper** is provided with a narrow copper trace connecting its pads. To isolate the pads, cut the trace between pads adjacent to each pad, then remove the connecting copper foil either mechanically or with the assistance of heat. Once the etched copper trace is removed, the trace-cut jumper is turned into a solder-bridge jumper for any later changes.

A **solder-bridge** jumper is provided with two isolated pads that may be joined together by one of three methods:

- Solder may be applied to both pads to develop a bulge on each and the bulges joined by touching a soldering iron across the two pads.
- A small wire may be placed across the two pads and soldered in place.
- A 0Ω SMD resistor may be placed across the two pads to short the pads together by soldering.

For any copper jumper, the connection is considered **closed** if there is an electrical connection between the pads (default for trace-cut jumpers.) The connection is considered **open** if there is no electrical connection between the pads (default for the solder-bridge jumpers.)

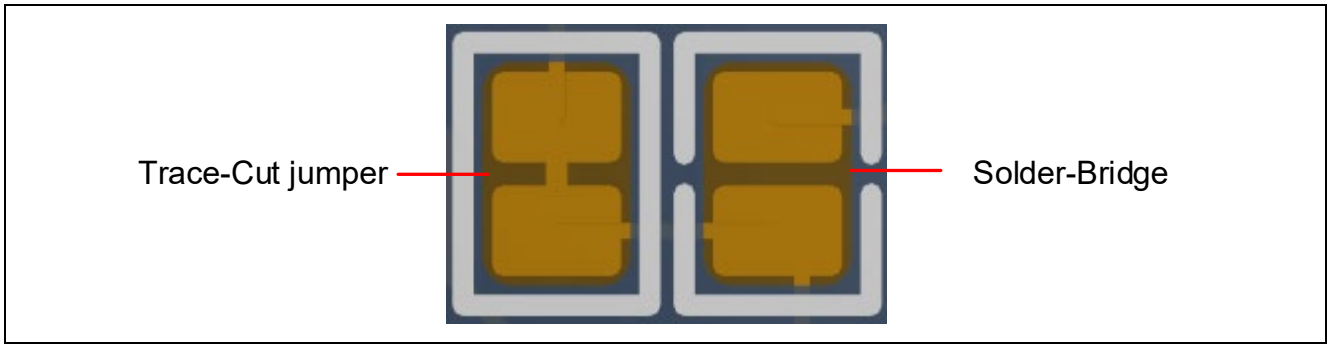


Figure 9. Copper Jumpers

4.4.2 Traditional Pin Header Jumpers

These jumpers are traditional small pitch jumpers that require an external shunt to open/close them. The traditional pin header jumpers on the EX-RX261 board are 0.1” (2.54 mm) pitch headers and use compatible 2.54 mm shunt jumpers.

4.4.3 Default Jumper Configuration

The following table describes the default settings for each jumper on the EK-RX261 v1. This includes copper jumpers (reference number Ex) and traditional pin header jumpers (reference number Jx).

Function for copper jumper Ex in the table describe function at Closed. The circuit group for each jumper is the reference number found in the board schematic (available in the Design Package). Functional details for many of the listed jumpers may be found in sections associated with each functional area of the kits.

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Table 3. Default Jumper Settings

Location	Circuit Group	Default	Function
J5	RX261 MCU	Closed	RX MCU Current Measurement
J6	Power Supply	Jumper on pins 1-2	Connect Board_VCC to 3.3V
J17	USB FS	Open	USB FS operating mode. Function (Self-power) mode is configured at shipping. (Refer to Table 20)
J18	USB FS	Jumper on pins 2-3	
J19	USB FS	Jumper on pins 2-3	
J22	Pin Headers	Open	RX MCU operating mode. Standalone Operation (Debug in) mode is configured at shipping. (Refer to Table 27)
J23	Pin Headers	Jumper on pins 2-3	
J24	Pin Headers	Closed	
J25	Pin Headers	Open	
J31	Pmod 1	Jumper on pins 1-2	Connect J31-Pin1 to Pmod1-Pin4(RTS / SCK / SDA)
J32	Pmod 1	Jumper on pins 1-2	Connect PC2(RXD5 / SMISO5) to Pmod1-Pin3 (RXD / MISO / SCL)
J33	Pmod 2	Jumper on pins 1-2	Connect PB7(TXD009 / SMOSI009 / SSDA009) to Pmod2-Pin2 (TXD / MOSI)
J34	Pmod 2	Jumper on pins 1-2	Connect J34-Pin1 to Pmod2-Pin4(RTS / SCK /SDA)
E1	RX261 MCU	Open	Connect P36(EXTAL) to Breakout Pin Header J1
E2	RX261 MCU	Closed	Connect P36(EXTAL) to crystal oscillator Y1
E3	RX261 MCU	Open	Connect AVCC0 to UC_VCC
E4	RX261 MCU	Open	Connect PJ6(VREFH0) to UC_VCC
E5	RX261 MCU	Closed	Connect PJ6(VREFH0) to Board_VCC
E6	RX261 MCU	Closed	Connect AVCC0 to Board_VCC
E7	RX261 MCU	Closed	Connect P37(XTAL) to crystal oscillator Y1
E8	RX261 MCU	Open	Connect PH6(XCOUT / EXCIN) to Breakout Pin Header J1
E9	RX261 MCU	Closed	Connect PH6(XCOUT / EXCIN) to crystal oscillator Y2
E10	RX261 MCU	Closed	Connect PH7(XCIN) to crystal oscillator Y2
E11	RX261 MCU	Open	Connect PH7(XCIN) to Breakout Pin Header J1
E12	RX261 MCU	Closed	Connect AVSS0 to GND
E13	RX261 MCU	Closed	Connect PJ7(VREFL0) to GND
E14	RX261 MCU	Open	Connect PC4(TSCAP) to Breakout Pin Header J2
E15	Power Supply	Closed	Connect Board_VCC to Board_VCC_DEBUG (Do not open copper jumper E15)
E16	Switches	Closed	Connect P32(IRQ2) to user switch S2
E17	Switches	Closed	Connect PD0(IRQ0) to user switch S1
E18	User LEDs	Closed	Connect PJ1(GTIOC6A) to user LED1
E19	User LEDs	Closed	Connect PC5(GTIOC7A) to user LED2
E20	User LEDs	Closed	Connect PA3(GTIOC7B) to user LED3

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Location	Circuit Group	Default	Function
E21	Arduino Uno	Closed	Connect P12(SCL0) and P13(SDA0) to Board_VCC(Pull-up)
E22	Arduino Uno	Open	Connect 5.0V to J7-Pin5(5V)
E23	Arduino Uno	Closed	Connect 3.3V to J7-Pin4(3.3V)
E24	Arduino Uno	Closed	Connect Board_VCC to J7-Pin2(IOREF)
E25	Arduino Uno	Closed	Connect RES# to J7-Pin3(RESET)
E26	Arduino Uno	Open	Connect P17(IRQ7) to J7-Pin3(RESET)
E27	Arduino Uno	Closed	Connect PD0(IRQ0) to J10-Pin3(D2 / INT)
E28	Grove 2	Open	Connect P46(AN006) to J12-Pin1(SCL / AN)
E29	Grove 2	Closed	Connect PB6(RXD009 / SMISO009 / SSCL009) to J12-Pin1(SCL / AN)
E30	Grove 2	Closed	Connect PB7(TXD009 / SMOSI009 / SSDA009) to J12-Pin2(SDA / AN)
E31	Grove 2	Open	Connect P47(AN007) to J12-Pin2(SDA / AN)
E32	mikroBUS	Open	Connect 5.0V to J15-Pin7(+5V)
E33	mikroBUS	Closed	Connect 3.3V to J14-Pin7(+3.3V)
E34	USB to Serial	Open	Connect P26(TXD1) to U3-Pin10(RXD) through U4(Level shift IC)
E35	USB to Serial	Closed	Connect PB1(TXD6) to U3-Pin10(RXD) through U4(Level shift IC)
E36	USB to Serial	Open	Connect P30(RXD1) to U3-Pin7(TXD) through U5(Level shift IC)
E37	USB to Serial	Closed	Connect PB0(RXD6) to U3-Pin7(TXD) through U5(Level shift IC)
E39	Pmod 1	Open	Connect PD3(IRQ3) to J28-Pin1(CTS / CS / INT)
E40	Pmod 1	Closed	Connect PC0(CTS5# / RTS5#) to J28-Pin1(CTS / CS / INT)
E42	Pmod 1	Closed	Connect PC1(SCK5) to J31-Pin1
E43	Pmod 1	Open	Connect PC0(CTS5# / RTS5#) to J31-Pin1
E46	Grove 2	Closed	Connect PB6(RXD009 / SMISO009 / SSCL009) and PB7(TXD009 / SMOSI009 / SSDA009) to Board_VCC(Pull-up)
E47	Pmod 2	Open	Connect PA2 to J29-Pin2(TXD / MOSI)
E48	Pmod 2	Open	Connect PD4(IRQ4) to J29-Pin1(CTS / CS / INT)
E49	Pmod 2	Closed	Connect PB4(CTS009# / RTS009#) to J29-Pin1(CTS / CS / INT)
E51	Pmod 2	Closed	Connect PB5(SCK009) to J34-Pin1
E52	Pmod 2	Open	Connect PB4(CTS009# / RTS009#) to J34-Pin1

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5. System Control and Ecosystem Access Area

The following figure shows the System Control and Ecosystem Access area on the EK-RX261 v1. Subsequent sections detail the features and functionality provided in the area.

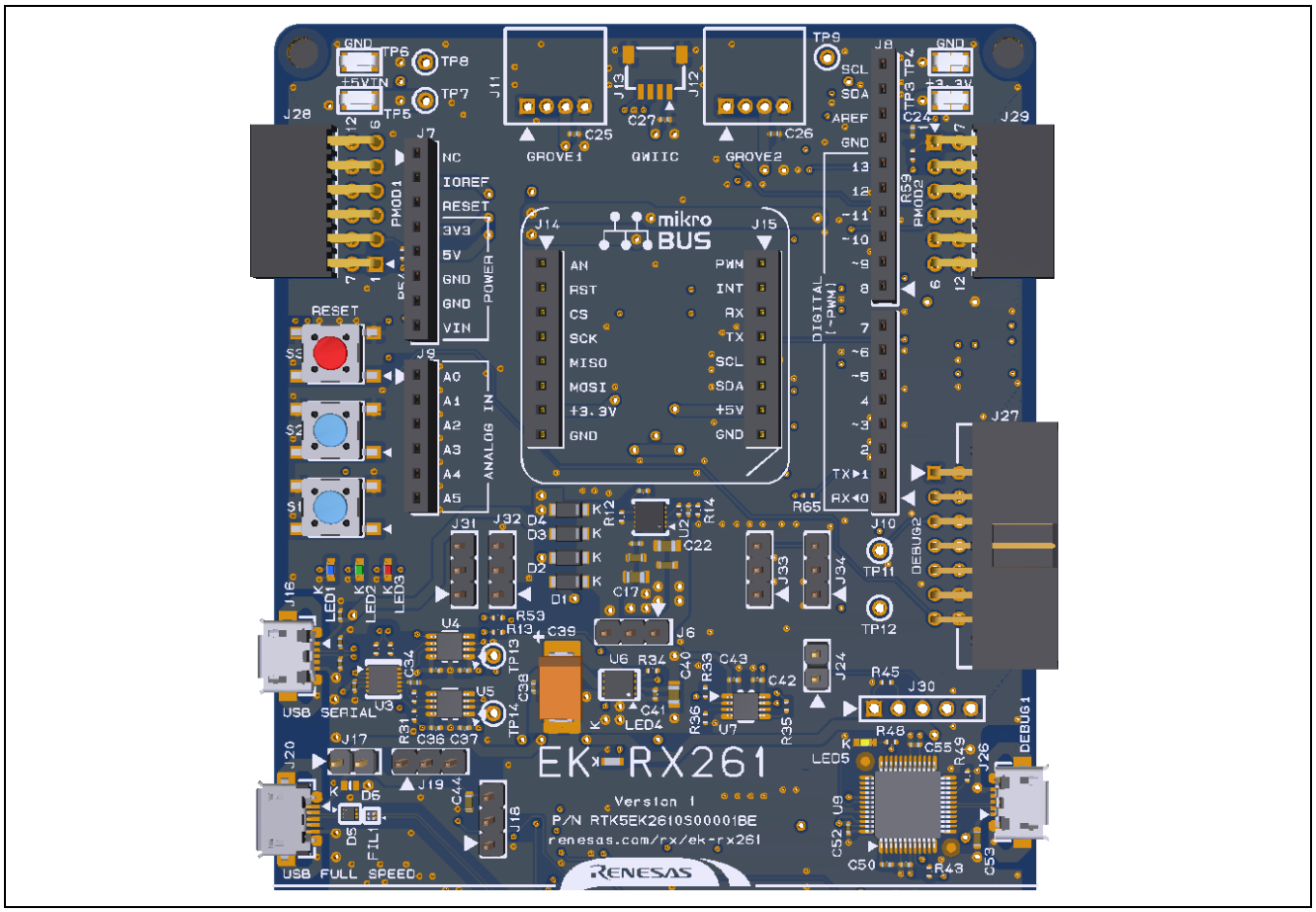


Figure 10. System Control and Ecosystem Access Area

5.1 Power

The EK-RX261 v1 is designed for 5 V operation. An on-board Linear Regulator is used to convert the 5 V supply to 3.3 V supply.

The following section describes the different ways in which EK-RX261 v1 can be powered. Power from each source is connected to the Main System 5 V Power (5.0 V). Reverse current protection is provided between each power input connector and the Main System 5 V Power so multiple power sources may be connected to the EK-RX261 v1 simultaneously.

The 3.3 V supply is used to power the RX MCU and other peripheral features by closing pin 1 and 2 of the pin header jumper J6. The 5 V supply is used to power the RX MCU and other peripheral features by closing pin 2 and 3 of the pin header jumper J6.

RX MCU specifies power-on VCC rising gradient. When suppling the 5 V to the RX MCU, the power-on VCC rising gradient depends on capability of the power supply that supplies 5 V to the EK-RX261 v1 because input 5 V to the EK-RX261 v1 is supplied to the RX MCU through the reverse protection diode.

Note: Power to the EK-RX261 v1 can't be supplied by external debugger (ex. E2 emulator Lite).

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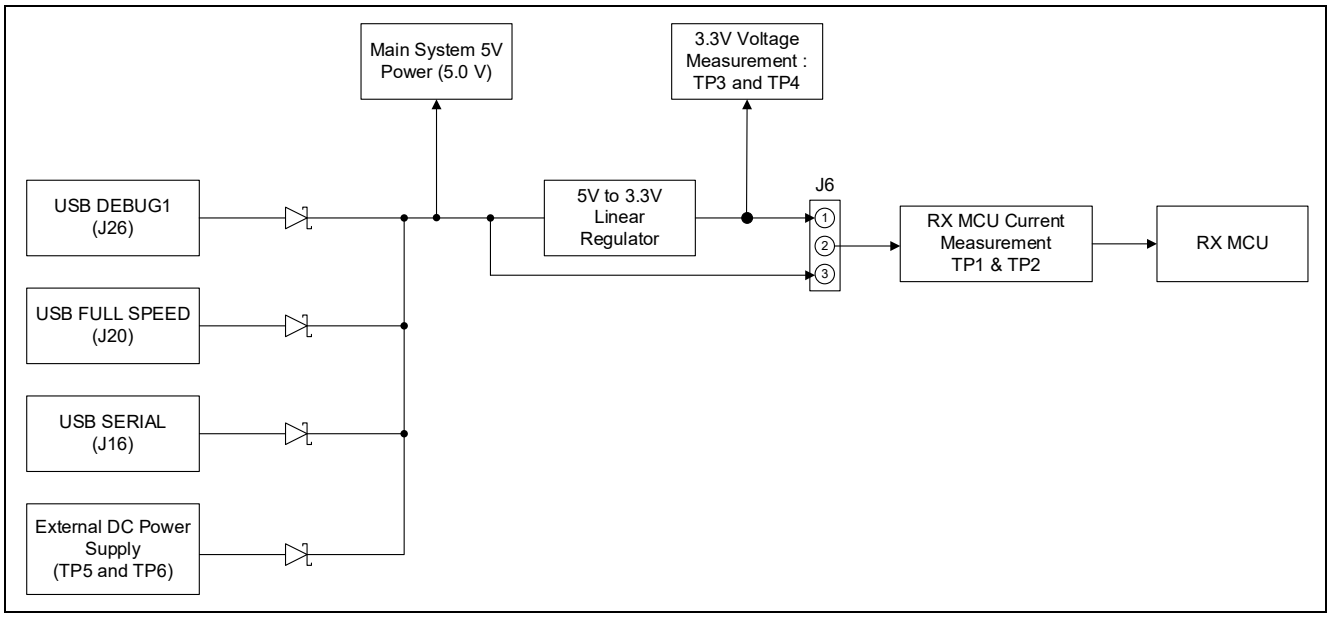


Figure 11. Power Supply

5.1.1 USB DEBUG1

5 V may be supplied from an external USB host to the USB connector (J26) labelled DEBUG1 on the board.

5.1.2 USB FULL SPEED

5 V may be supplied from an external USB host to the USB connector (J20) labelled USB FULL SPEED on the board.

5.1.3 USB SERIAL

5 V may be supplied from an external USB host to the USB connector (J16) labelled USB SERIAL on the board.

5.1.4 External DC Power Supply

5 V may be supplied from an external power supply to test points on the board. TP5 (5 V) and TP6 (GND) are loop-style test points, and TP7 and TP8 are large via style test points. The two types of test points are electrically equivalent, and both are provided for user convenience.

5.1.5 Power Supply Considerations

Voltage of Main System 5 V Power will be lower than the power supply voltage because of the forward voltage (max 0.55V@1A) of the reverse current protection diode. Please note the voltage drop, because Main System 5 V Power is 5 V power source which supplies to external devices connected to Arduino, Pmod 1, Pmod 2, Grove 1, Grove 2, mikroBUS and USB Full Speed (when the USB Full Speed module of the RX MCU operates at host mode).

The maximum current that could be supplied to the EK-RX261 v1 is 1 A including current consumption of external boards which are connected to the ecosystem connectors and the breakout pin headers.

5.1.6 Power-up Behavior

When powered, the white LED near the center of the board (the “dash” in the EK-RX261 name) will light up. For more details on initial power up behavior, see the *EK-RX261 Quick Start Guide*.

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5.2 Debug

The EK-RX261 v1 supports the following two debug modes.

Table 4. Debug Modes

Debug Modes	Debug MCU (one that connects to the IDE on PC)	Target MCU (one that is being debugged)	Debugging Interface/Protocol	Connector Used
Debug on-board	E2 OB circuit	RX MCU (on-board)	FINE	USB DEBUG1 connector (J26)
Debug in	External debugging tools (ex. E2 emulator Lite)	RX MCU (on-board)	FINE	14-pin male box header (J27)

Notes:

- See Table 6 for the USB DEBUG1 connector pin definition.
- See Table 9 for the 14-pin male box header definition.

The following table summarizes the jumper setting for each of the debug modes.

Table 5. Jumper Connection Summary for Different Debug Modes

Debug Modes	J22	J23	J24	J25
Debug on-board	Open	Jumper on pins 2-3	Open	Open
Debug in	Open	Jumper on pins 1-2 or Jumper on pins 2-3	Closed	Open

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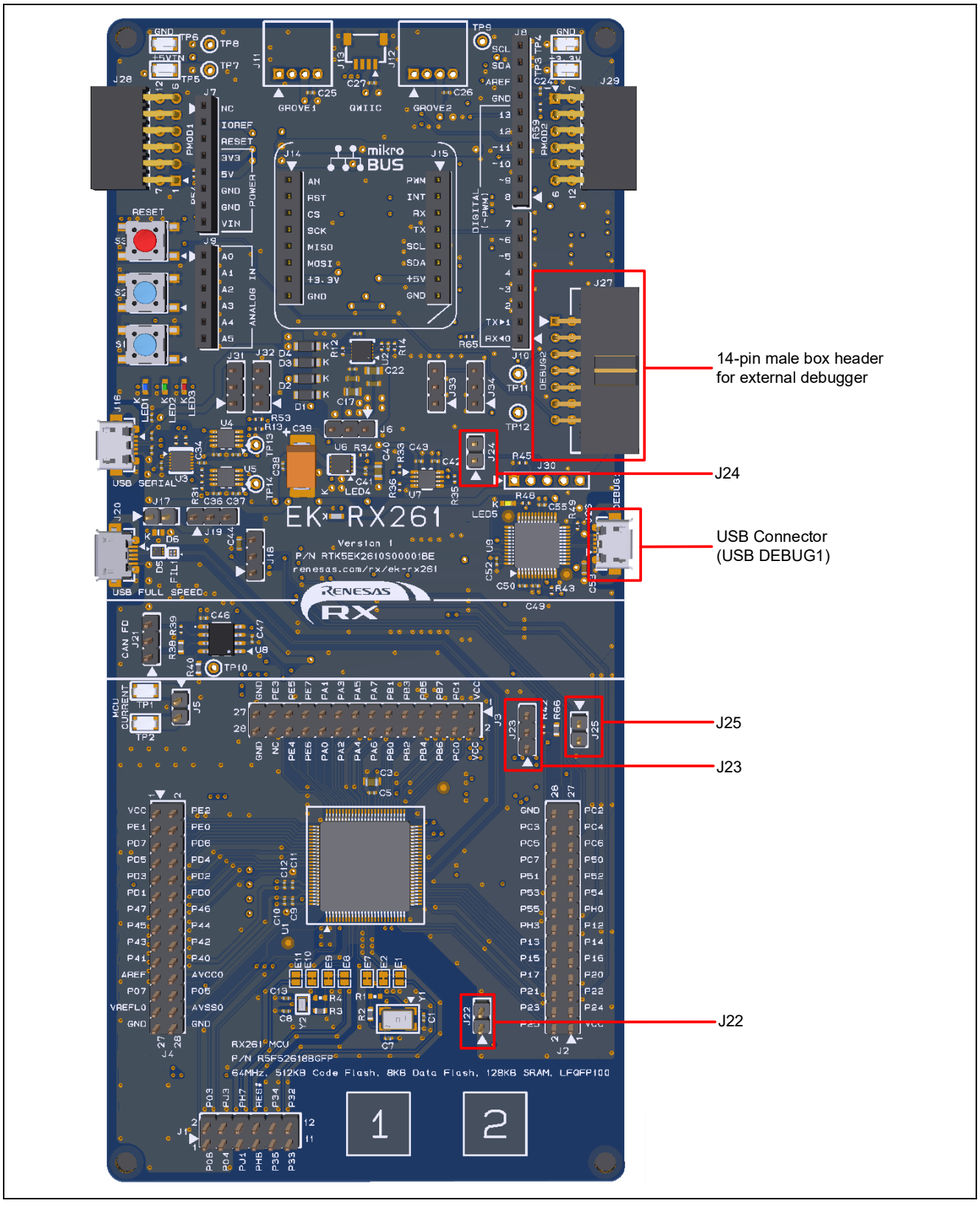


Figure 12. EK-RX261 v1 Debug Interface

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5.2.1 Debug On-Board

The debug on-board functionality is provided using E2 OB circuit on the EK-RX261 v1. USB DEBUG1 connector (J26) connects the E2 OB circuit to a host PC, allowing re-programming and debugging of the target RX MCU firmware.

The E2 OB circuit connects to the target RX MCU using the FINE interface. Please note that connecting the same host PC to multiple EK-RX261 v1 is not possible.

Table 6. USB DEBUG1 Connector

USB DEBUG1 Connector		**EK-RX261 v1**
Pin	**Description**	**Signal**
J26-1	+5VDC	+5V_USB_DBG
J26-2	Data-	USBDBG_DM
J26-3	Data+	USBDBG_DP
J26-4	USB ID, jack internal switch, cable inserted	N.C.
J26-5	Ground	GND

A yellow indicator, LED5, shows the status of the debug interface. When the EK-RX261 v1 is powered, and LED5 is blinking, it indicates that the host PC recognizes the E2 OB circuit. When LED5 is on solid, it indicates that the host PC is connected to the E2 OB circuit.

To configure the EK-RX261 v1 to use the Debug on-board mode, configure the jumpers using the following table.

Table 7. Debug On-Board Jumper Configuration

Location	**Configuration**	**Function**
J22	Open	UPSEL connected to Board_VCC through a pull-up resistor
J23	Jumper on pins 2-3	UB connected to GND through a pull-down resistor
J24	Open	E2 OB circuit enabled
J25	Open	MD / FINED connected to Board_VCC through a pull-up resistor

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5.2.2 Debug In

One 14-pin male box header at J27 supports FINE debug. FINE may be used for external debug of the target RX MCU.

Note: Power to the EK-RX261 v1 can't be supplied by external debugger (ex. E2 emulator Lite).

To configure the EK-RX261 v1 to use the Debug in mode, configure the jumpers using the following table.

Table 8. Debug In Mode Jumper Configuration

Location	Configuration	Function
J22	Open	UPSEL connected to Board_VCC through a pull-up resistor
J23	Jumper on pins 1-2 or Jumper on pins 2-3	UB connected to Board_VCC through a pull-up resistor or UB connected to GND through a pull-down resistor
J24	Closed	E2 OB circuit disabled
J25	Open	MD / FINED connected to Board_VCC through a pull-up resistor

Table 9. 14-pin male box header for external debugger

14-pin male box header for external debugger		EK-RX261 v1
Pin	**FINE Pin Name**	**Signal**
J27-1	N.C.	N.C.
J27-2	GND	GND
J27-3	N.C.	N.C.
J27-4	N.C.	N.C.
J27-5	N.C.	P26 *1
J27-6	N.C.	N.C.
J27-7	MD / FINED	MD_FINED
J27-8	VCC	Board_VCC
J27-9	N.C.	N.C.
J27-10	UB	PC7 (UB)
J27-11	N.C.	P30 *1
J27-12	GND	GND
J27-13	RES#	RES#
J27-14	GND	GND

Note 1: The signals are available as TXD and RXD at using Renesas Flash Programmer.

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5.3 Ecosystem

The System Control and Ecosystem area provides users the means to connect third party add-on modules compatible with five most popular ecosystems using the following connectors:

1. Two Seeed Grove® system (I²C / Analog) connectors (not fitted)
2. SparkFun® Qwiic® connector (not fitted)
3. Two Digilent Pmod™ (UART / SPI / I²C) connectors
4. Arduino® (Uno R3) connector
5. MikroElektronika mikroBUS™ connector

Note.1: We do not guarantee connection to all types of third party add-on modules. Confirm the specifications of this product and any third party add-on modules you intend to use.

Note.2: Third party add-on modules may not be able to connect the EK-RX261 v1 simultaneously because the RX MCU pins which are connected to third party add-on modules are multiplexed. Confirm the specifications of this product and RX260 Group, RX261 Group User's Manual: Hardware.

5.3.1 Seeed Grove® Connectors

5.3.1.1 Grove 1

A Seeed Grove I²C connector (not fitted) is provided at J11. The RX MCU acts as a two-wire serial master, and a connected module acts as a two-wire serial slave.

Table 10. Grove 1 Connector

Grove 1 Connector		EK-RX261 v1
Pin	**Description**	**Signal**
J11-1	SCL	P12 (SCL0) *1
J11-2	SDA	P13 (SDA0) *1
J11-3	VCC	Board_VCC
J11-4	GND	GND

*1: The signals are shared with Arduino, mikroBUS, Pmod 1 and Qwiic.

Note: VCC power that supplies to J11-Pin3 is Board_VCC same as RX MCU power. Board_VCC voltage is selectable either 3.3 V or 5 V by configuring pin header J6.

5.3.1.2 Grove 2

A Seeed Grove I²C connector (not fitted) is provided at J12. The RX MCU acts as a two-wire serial master, and a connected module acts as a two-wire serial slave. Alternatively, this port can be configured to support two analog (ADC) inputs.

The I²C can be used by soldering trace between pads of copper jumper E29 and E30 and cutting trace between pads of copper jumper E28 and E31. The analog input can be used by cutting trace between pads of copper jumper E29 and E30 and soldering trace between pads of copper jumper E28 and E31.

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Table 11. Grove 2 Connector

Grove 2 Connector		EK-RX261 v1	Configuration	
Pin	**Description**	**Signal**	**Closed**	**Open**
J12-1	SCL / AN	PB6 (RXD009 / SMISO009 / SSCL009) *1	E29, E46	E28
		P46 (AN006) *2	E28	E29
J12-2	SDA / AN	PB7 (TXD009 / SMOSI009 / SSDA009) *1	E30, E46	E31
		P47 (AN007) *2	E31	E30
J12-3	VCC	Board_VCC		
J12-4	GND	GND		

*1: The pull-up resistors for the I²C may also be disconnected by cutting trace between pads of trace-cut jumper E46, however, please note that the I²C is also connected to Pmod 2.
*2: Open at shipping.

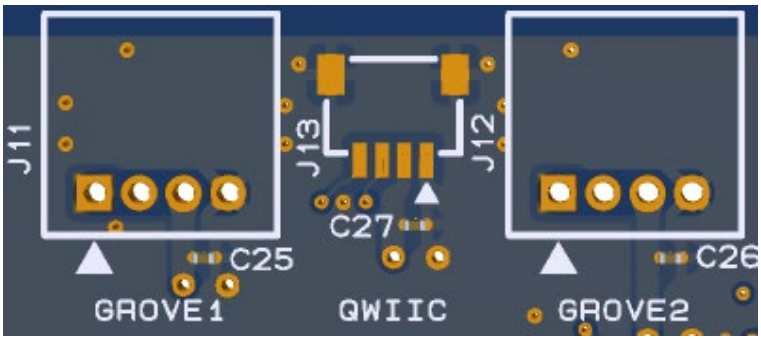


Figure 13. Seeed Grove and SparkFun Qwiic Connectors

Note: VCC power that supplies to J12-Pin3 is Board_VCC same as RX MCU power. Board_VCC voltage is selectable either 3.3 V or 5 V by configuring pin header J6.

5.3.2 SparkFun® Qwiic® Connector

A SparkFun® Qwiic® connector (not fitted) is provided at J13. The RX MCU acts as a two-wire serial master, and a connected module acts as a two-wire serial slave.

Table 12. Qwiic Connector

Qwiic Connector		EK-RX261 v1
Pin	**Description**	**Signal**
J13-1	GND	GND
J13-2	VCC	3.3V
J13-3	SDA	P13 (SDA0) *1
J13-4	SCL	P12 (SCL0) *1

*1: The signals are shared with Arduino, mikroBUS, Pmod 1 and Grove 1.

Note: VCC power that supplies to J13-Pin2 is 3.3 V. Please note that P13 (SDA0) and P12 (SCL0) are pulled up to 5 V when Board_VCC is set to 5 V by configuring pin header J6.

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5.3.3 Digilent Pmod™ Connectors

5.3.3.1 Pmod 1

A 12-pin Pmod Type-2A (expanded SPI), Type-3A (expanded UART) and Type-6A (expanded I²C) connector is provided at connector J28 labelled PMOD1. At Type-2A, the RX MCU acts as the SPI master, and the connected module acts as an SPI slave device. At Type-6A, the RX MCU acts as a two-wire serial master, and a connected module acts as a two-wire serial slave.

Table 13. Pmod 1 Connector

Pmod 1 Connector			**EK-RX261 v1**	**Pmod 1 Configuration**	
Pin	**Default Type-2A / Type-3A**	**Option Type 6A**	**Signal**	**Closed**	**Open**
J28-1	CS / CTS / GPIO		PC0 (CTS5# / RTS5#) *1	E40	E39, E43
		INT	PD3 (IRQ3) *3	E39	E40
J28-2	MOSI / TXD	RESET	PC3 (TXD5 / SMOSI5)		
J28-3	MISO / RXD		PC2 (RXD5 / SMISO5)	J32 Pin1-2	
		SCL	P12 (SCL0) *2 *3	J32 Pin2-3	
J28-4	SCK		PC1 (SCK5)	E42, J31 Pin 1-2	E43
	RTS / GPIO		PC0 (CTS5# / RTS5#) *1 *3	E43, J31 Pin 1-2	E40, E42
		SDA	P13 (SDA0) *2 *3	J31 Pin 2-3	
J28-5	GND		GND		
J28-6	VCC		Board_VCC		
J28-7	GPIO / INT (slave to master)		PD5 (IRQ5)		
J28-8	GPIO / RESET (master to slave)		PD7		
J28-9	GPIO / CS2		PE6		
J28-10	GPIO / CS3		PE7		
J28-11	GND		GND		
J28-12	VCC		Board_VCC		

*1: PC0 is available as CTS5# or RTS5#.

*2: The signals are shared with Arduino, mikroBUS, Qwiic and Grove 1.

*3: Open at shipping.

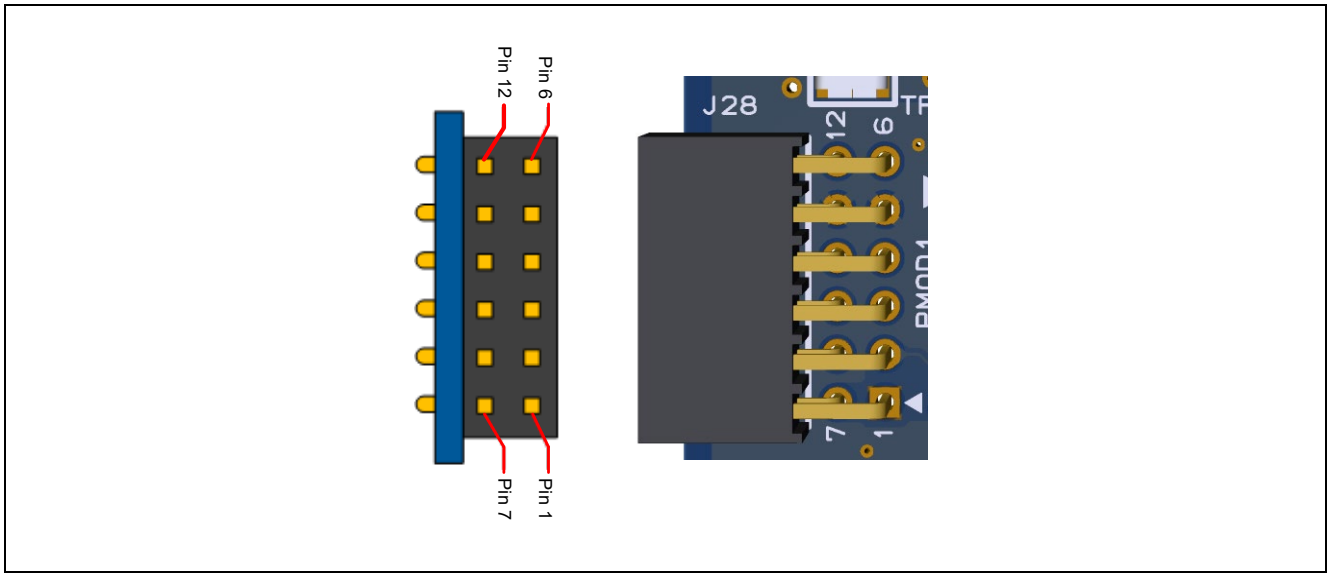


Figure 14. Pmod 1 connector

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Pmod 1 Type-6A connection

The option for Type-6A (I²C) can be configured at Pmod 1 and supports 3.3 V / 5 V devices. To configure the EK-RX261 v1 to use the I²C devices with 3.3 V / 5 V operation, configure the pin header jumpers and the copper jumpers using Table 13. Following figures show the pin header jumpers and copper jumpers to use the I²C devices.

Note: VCC power that supplies to J28-Pin6 and Pin12 is Board_VCC same as RX MCU power. Board_VCC voltage is selectable either 3.3 V or 5 V by configuring pin header J6.

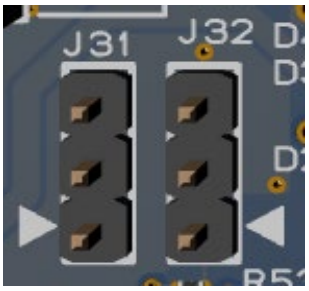


Figure 15. Pmod 1 Pin header jumpers (top side)

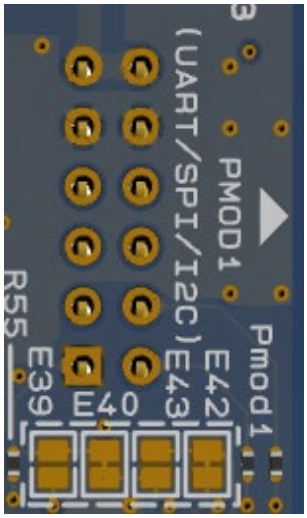


Figure 16. Pmod 1 Copper jumpers (bottom side)

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5.3.3.2 Pmod 2

A 12-pin Pmod Type-2A (expanded SPI), Type-3A (expanded UART) and Type-6A (expanded I²C) connector is provided at connector J29 labelled PMOD2. At Type-2A, the RX MCU acts as the SPI master, and the connected module acts as an SPI slave device. At Type-6A, the RX MCU acts as a two-wire serial master, and a connected module acts as a two-wire serial slave.

Table 14. Pmod 2 Connector

Pmod 2 Connector			**EK-RX261 v1**	**Pmod 2 Configuration**	
Pin	**Default Type-2A / Type-3A**	**Option Type 6A**	**Signal**	**Closed**	**Open**
J29-1	CS / CTS / GPIO		PB4 (CTS009# / RTS009#) *1	E49	E48, E52
		INT	PD4 (IRQ4) *2	E48	E49
J29-2	MOSI / TXD		PB7 (TXD009 / SMOSI009 / SSDA009)	J33 Pin 1-2	E47
		RESET	PA2 *2	E47	
J29-3	MISO / RXD	SCL	PB6 (RXD009 / SMISO009 / SSCL009)		
J29-4	SCK		PB5 (SCK009)	E51, J34 Pin 1-2	E52
	RTS / GPIO		PB4 (CTS009# / RTS009#) *1 *2	E52, J34 Pin 1-2	E49, E51
		SDA	PB7 (TXD009 / SMOSI009 / SSDA009) *2	J33 Pin 2-3 J34 Pin 2-3	
J29-5	GND		GND		
J29-6	VCC		Board_VCC		
J29-7	GPIO / INT (slave to master)		PD6 (IRQ6)		
J29-8	GPIO / RESET (master to slave)		P51		
J29-9	GPIO / CS2		P52		
J29-10	GPIO / CS3		P53		
J29-11	GND		GND		
J29-12	VCC		Board_VCC		

*1: PB4 is available as CTS009# or RTS009#.

*2: Open at shipping.

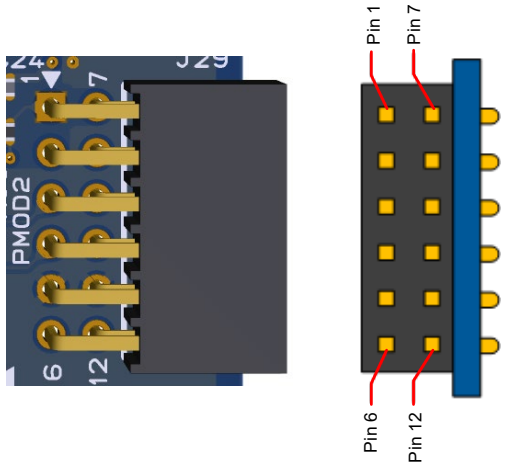


Figure 17. Pmod 2 connector

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Pmod 2 Type-6A connection

The option for Type-6A (I²C) can be configured at Pmod 2 and supports 3.3 V / 5 V devices. To configure the EK-RX261 v1 to use the I²C devices with 3.3 V / 5 V operation, configure the pin header jumpers and the copper jumpers using Table 14. Following figures show the pin header jumpers and copper jumpers to use the I²C devices.

Note: VCC power that supplies to J29-Pin6 and Pin12 is Board_VCC same as RX MCU power. Board_VCC voltage is selectable either 3.3 V or 5 V by configuring pin header J6.

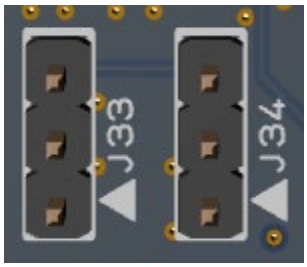


Figure 18. Pmod 2 Pin header jumpers (top side)

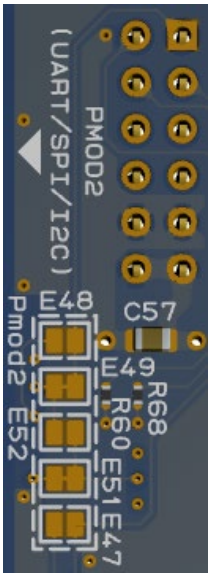


Figure 19. Pmod 2 Copper jumpers (bottom side)

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5.3.4 Arduino® Connector

Near the center of the System Control and Ecosystem Access area is an Arduino Uno R3 compatible connector interface.

Table 15. Arduino Uno Connections

Arduino Compatible Connector				EK-RX261 v1	Configuration	
Pin	**Description**			**Signal**	**Closed**	**Open**
J7-1	NC			NC		
J7-2	IOREF			Board_VCC	E24	
J7-3	RESET			RES#	E25	E26
				P17 (IRQ7) *1 *4	E26	E25
J7-4	3.3 V			3.3 V	E23	
J7-5	5 V			5.0 V *4	E22	
J7-6	GND			GND		
J7-7	GND			GND		
J7-8	VIN			NC		
J9-1	A0			P40 (AN000)		
J9-2	A1			P41 (AN001)		
J9-3	A2			P42 (AN002)		
J9-4	A3			P43 (AN003)		
J9-5	A4			P44 (AN004)		
J9-6	A5			P45 (AN005)		
J10-1	D0	RXD		PE2 (RXD12)		
J10-2	D1	TXD		PE1 (TXD12)		
J10-3	D2	INT0		PD0 (IRQ0) *2	E27	
J10-4	D3	INT1	PWM	PD1 (GTIOC2A / IRQ1)		
J10-5	D4			P04		
J10-6	D5		PWM	PA0 (GTIOC1A)		
J10-7	D6		PWM	PA1 (GTIOC0A)		
J10-8	D7			P03		
J8-1	D8			P06		
J8-2	D9		PWM	PB3 (GTIOC3A)		
J8-3	D10	SPI_SS	PWM	PA4 (SSLA0 / GTIOC4A)		
J8-4	D11	SPI_MOSI	PWM	PA6 (MOSIA / GTIOC5A)		
J8-5	D12	SPI_MISO		PA7 (MISOA)		
J8-6	D13	SPI_SCK		PA5 (RSPCKA)		
J8-7	GND			GND		
J8-8	AREF			PJ6 (VREFH0)		
J8-9	I2C_SDA			P13 (SDA0) *3	E21	
J8-10	I2C_SCL			P12 (SCL0) *3	E21	

*1: The signal is shared with mikroBUS.

*2: The signal is shared with user switch S1.

*3: The pull-up resistors for the I^2C may also be disconnected by cutting trace between pads of copper jumper E21, however, please note that the I^2C is also connected to mikroBUS, Qwiic, Grove 1 and Pmod 1.

*4: Open at shipping.

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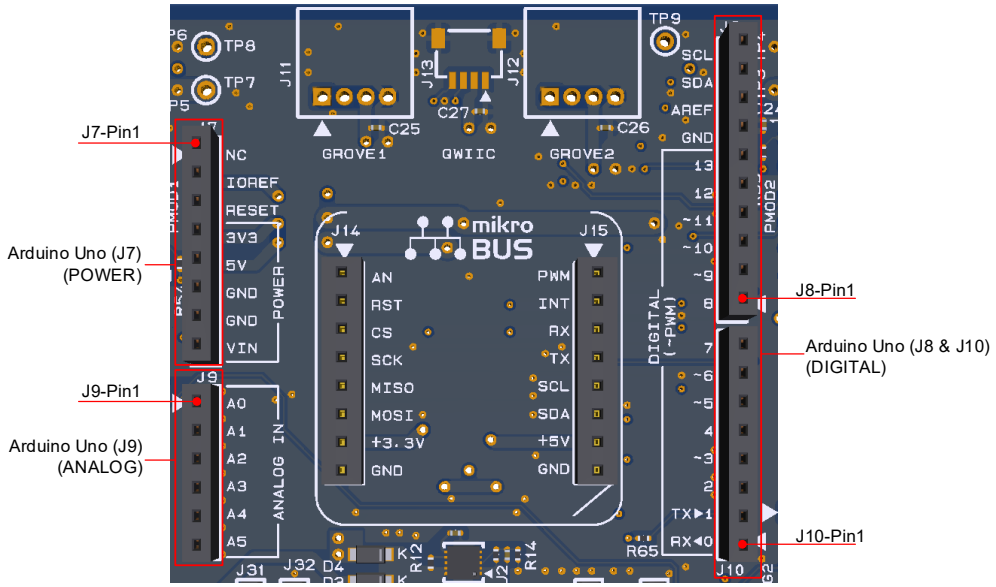


Figure 20. Arduino Uno Connectors (J7, J8, J9 and J10)

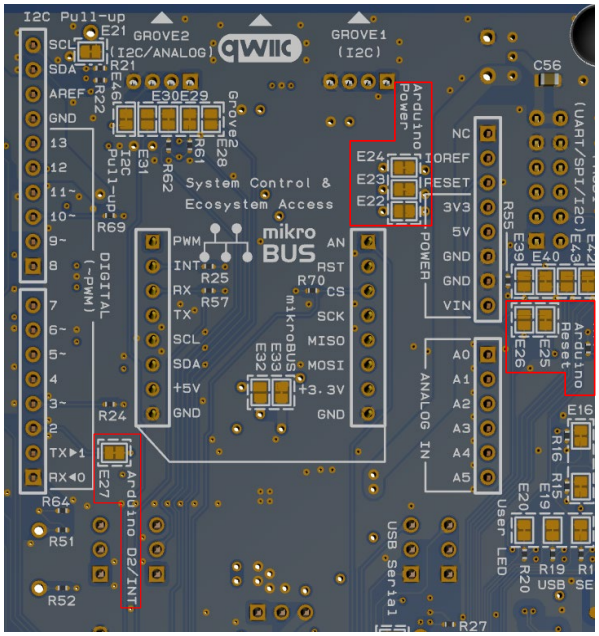


Figure 21. Arduino Uno Copper jumpers (bottom side)

Arduino Shield Considerations

AREF (J8-Pin8) output from Arduino Shield is connected to VREFH0 (Analog reference voltage supply pin for the 12-bit A/D converter) of RX MCU, however, Board_VCC is connected to VREFH0 at default condition. When Arduino AREF supplies power to VREFH0, the user must disconnect VREFH0 from Board_VCC power. Copper jumper E5 is provided on the EK-RX261 v1 to disconnect VREFH0 from on-board Board_VCC power.

The EK-RX261 v1 can supply 5 V power to J7-Pin5 of Arduino Shield by soldering copper jumper E22, however, some of the RX MCU pins which are connected to Arduino Shield are not 5 V tolerant. When the EK-RX261 v1 supplies 5 V power to Arduino Shield, however Board_VCC = 3.3 V, the user must confirm the RX260 Group, RX261 Group User's Manual: Hardware and the specification of Arduino Shield you intend to use.

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5.3.5 MikroElektronika mikroBUS™ Connector

In the center of the System Control and Ecosystem Access area is a mikroBUS compatible connector interface. This interface is compliant with mikroBUS Standard Specifications revision 2.00.

Table 16. mikroBUS Connections

mikroBUS Connector		EK-RX261 v1	Configuration	
Pin	**Description**	**Signal**	**Closed**	**Open**
J14-1	AN (Analog)	PD2 (AN026)		
J14-2	RST (Reset)	P50		
J14-3	CS (SPI Chip Select)	P23 (SS000#)		
J14-4	SCK (SPI Clock)	P22 (SCK000)		
J14-5	MISO	P21 (SMISO000)		
J14-6	MOSI	P20 (SMOSI000)		
J14-7	+3.3 V	3.3 V		
J14-8	GND	GND		
J15-1	PWM	P25 (GTIOC1B)		
J15-2	INT (Hardware Interrupt)	P17 (IRQ7) *1		
J15-3	RX (UART Receive)	PC6 (RXD008)		
J15-4	TX (UART Transmit)	PC7 (UB / TXD008) *2		
J15-5	SCL (I^2C Clock)	P12 (SCL0) *3		
J15-6	SDA (I^2C Data)	P13 (SDA0) *3		
J15-7	+5 V	5.0 V *4	E32	
J15-8	GND	GND		

*1: The signals are shared with Arduino.

*2: The signal is shared with UB.

*3: The signals are shared with Arduino, Qwiic, Grove 1 and Pmod 1.

*4: Open at shipping.

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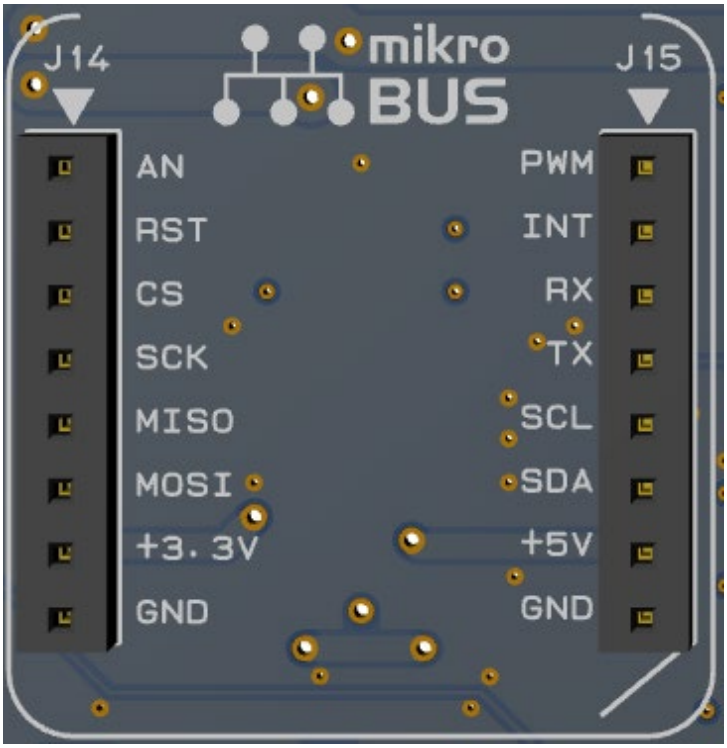


Figure 22. mikroBUS Connectors

mikroBUS CLICK BOARD™ Considerations

The EK-RX261 v1 can supply 5 V power to J15-Pin7 of mikroBUS CLICK BOARD by soldering copper jumper E32, however, some of the RX MCU pins which are connected to mikroBUS CLICK BOARD are not 5 V tolerant. When the EK-RX261 v1 supplies 5 V power to mikroBUS CLICK BOARD at Board_VCC = 3.3 V, the user must confirm the RX260 Group, RX261 Group User's Manual: Hardware and the specification of mikroBUS CLICK BOARD you intend to use.

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5.4 Connectivity

5.4.1 USB to Serial

The USB Micro-B connecter (J16) connects the RX MCU SCI interface to an external USB interface through FTDI FT234XD-T (U3) with maximum baud rate of 3Mbps. The RX MCU SCI can be configured either SCI6 (default configuration) or SCI1. Power from an external USB Host on this connection can be used to provide 5 V power to the EK-RX261 v1.

Table 17. USB to Serial Connector

USB to Serial Connector		EK-RX261 v1
Pin	**Description**	**Signal**
J16-1	+5 VDC	+5V_USB_SER
J16-2	Data-	USBSER_DM
J16-3	Data+	USBSER_DP
J16-4	USB ID, jack internal switch, cable inserted	N.C.
J16-5	Ground	GND

Table 18. FT234XD-T and RX MCU Connection

FT234XD-T		EK-RX261 v1		Configuration	
Pin	**Description**	**Signal**	**Function**	**Closed**	**Open**
U3-10	RXD	P26 (TXD1) *1	SCI 1 Transmit Data	E34	E35
		PB1 (TXD6)	SCI 6 Transmit Data	E35	E34
U3-7	TXD	P30 (RXD1) *1	SCI 1 Receive Data	E36	E37
		PB0 (RXD6)	SCI 6 Receive Data	E37	E36
U3-8	RTS#	PB2 (CTS6#)	SCI 6 Clear to Send		
U3-11	CTS#	PJ3 (RTS6#)	SCI 6 Request to Send		

*1: Open at shipping.

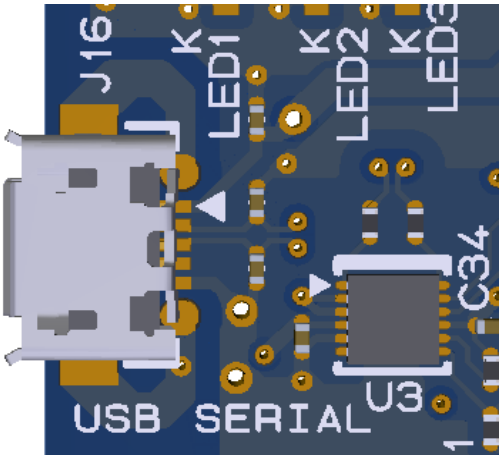


Figure 23. USB to Serial Connector

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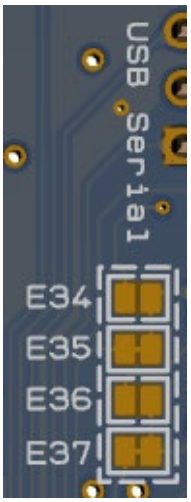


Figure 24. USB to Serial Copper jumpers (bottom side)

The user must install FTDI Virtual COM Port (VCP) driver from FTDI's web site to use FT234XD-T.

https://ftdichip.com/

5.4.2 USB Full Speed

The USB Micro-AB connecter (J20) connects the RX MCU USB Full Speed interface to an external USB interface, allowing communications for testing and use of the RX MCU firmware. This connection can be configured as either an USB Function or an USB Host interface.

The USB Function mode can be configured as either bus-power or self-power mode. For the USB Function configuration (with bus-power mode or self-power mode), set jumpers according to Table 20, and configure the RX MCU firmware to use the USB Full Speed ports in function mode. Power from an external USB Host on this connection can be used to provide power to the EK-RX261 v1.

For the USB Host configuration, set jumpers according to Table 20, and configure the RX MCU firmware to use the USB Full Speed ports in host mode. In this configuration, power to J20 is supplied from U6 (Power supply IC). The total current available from U6 is 500 mA. To enable U6 and monitor overcurrent detection of U6, configure the RX MCU firmware according to Table 21. Note that the input power sources must be configured with enough power for both the EK-RX261 v1 and the USB Full Speed port in host mode. Connect the included USB type-A female to micro-B male cable to J20. USB function cables or function can be connected to the USB Full Speed port using this cable.

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Table 19. USB Full Speed Connector

USB Full Speed Connector		EK-RX261 v1
Pin	**Description**	**Signal**
J20-1	+5 VDC	+5V_USBFS (Function Mode) +5V_H_USBFS (Host Mode)
J20-2	Data-	USB0_DM
J20-3	Data+	USB0_DP
J20-4	USB ID, jack internal switch, cable inserted	N.C.
J20-5	Ground	GND

Table 20. USB Full Speed Pin Header Jumper Configuration

USB Operating Mode		J17	J18	J19
Host Mode		Open	Open	Jumper on pins 1-2
Function Mode	Bus-power	Closed	Jumper on pins 1-2	Jumper on pins 2-3
	Self-power	Open	Jumper on pins 2-3	Jumper on pins 2-3

Table 21. USB FS Power Supply IC

U6 Power Supply IC		EK-RX261 v1
Signal	**Function**	**Signal**
USB0_VBUSEN	VBUS supply enable signal	P24 (USB0_VBUSEN)
USB0_OVRCURA	Overcurrent detection signal	P14 (USB0_OVRCURA)

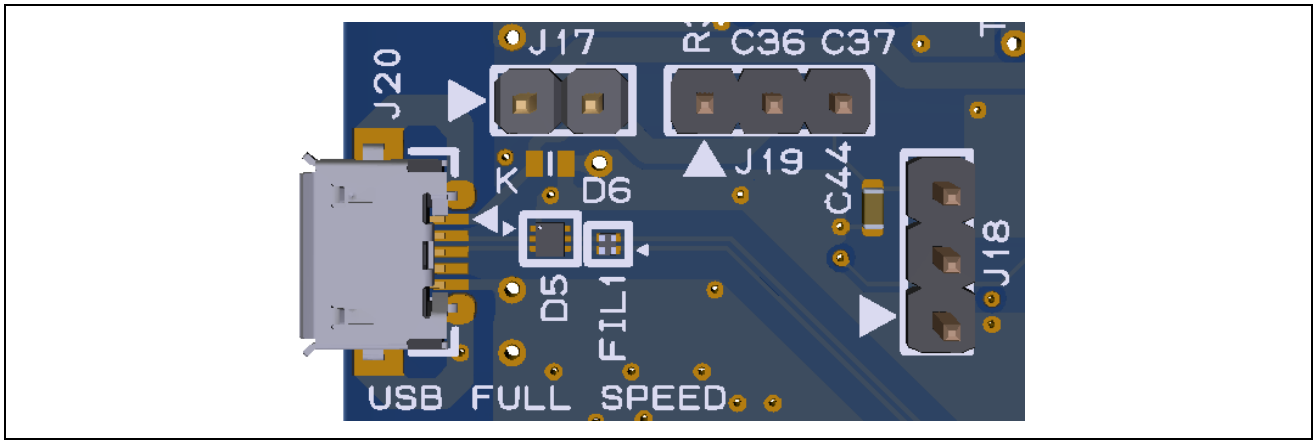


Figure 25. USB Full Speed Connector

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5.5 Miscellaneous

5.5.1 LED

5 LEDs are provided on the EK-RX261 v1.

Behavior of the LEDs on the EK-RX261 v1 is described in the following table. User LEDs are active high on the RX MCU ports.

Table 22. EK-RX261 v1 LED Functions

LED			EK-RX261 v1	Configuration	
Designator	**Color**	**Function**	**Signal**	**Closed**	**Open**
LED1	Blue	User LED	PJ1 (GTIOC6A)	E18	
LED2	Green	User LED	PC5 (GTIOC7A)	E19	
LED3	Red	User LED	PA3 (GTIOC7B)	E20	
LED4	White	Power LED	Board_VCC		
LED5	Yellow	Debug LED	E2 OB circuit		

The User LEDs may be isolated from the Main MCU, so the associated ports can be used for other purposes. To separate LED1 from PJ1, copper jumper E18 must be open. To separate LED2 from PC5, copper jumper E19 must be open. To separate LED3 from PA2, copper jumper E20 must be open.

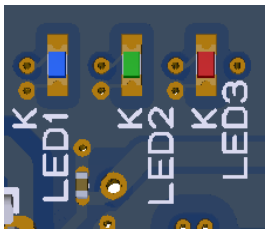


Figure 26. User LEDs



Figure 27. Power LED

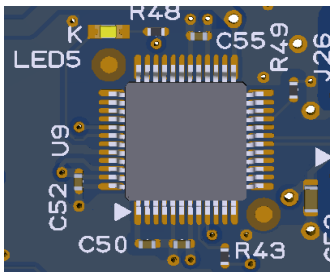


Figure 28. Debug LED

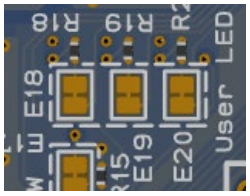


Figure 29. User LEDs Copper jumpers (bottom side)

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5.5.2 User and Reset Switches

Three miniature, momentary, mechanical push-button type SMT switches are mounted on the EK-RX261 v1.

Pressing the Reset switch (S3) generates a reset signal to reset the RX MCU.

Table 23. EK-RX261 v1 Switches

Switch			EK-RX261 v1	Configuration	
Designator	**Function**	**Color**	**Signal**	**Closed**	**Open**
S3	Reset Switch	Red	RES#		
S2	User Switch	Blue	P32 (IRQ2)	E16	
S1	User Switch	Blue	PD0 (IRQ0) *1	E17	

*1: The signal is shared with Arduino.

The User Switches S1 and S2 may be isolated from the RX MCU, so the associated ports can be used for other purposes. To separate S1 from PD0, copper jumper E17 must be open. To separate S2 from P32, copper jumper E16 must be open.

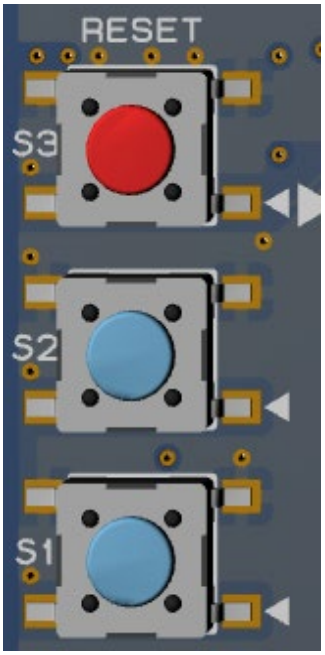


Figure 30. Reset and User Switches

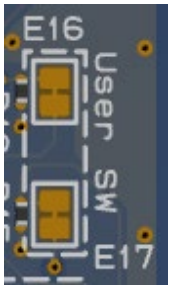


Figure 31. User switches Copper jumpers (bottom side)

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6. Special Feature Access Area

The Special Feature Access area provides features specific to the RX MCU group such as CAN FD and Touch interface.



Figure 32. Special Feature Access Area

6.1 CAN FD (Controller Area Network with Flexible Data Rate)

A CAN FD transceiver IC is provided on the EK-RX261 v1. The RX MCU incorporates CAN FD module. Refer to the RX260 Group, RX261 Group User's Manual: Hardware for details of the CAN FD module.

Table 24. CAN FD Connection

CAN FD transceiver IC		**EK-RX261 v1**
Pin	**Description**	**Signal**
U8-1	TXD	P54 (CTX0)
U8-2	GND	GND
U8-3	VCC	5.0 V
U8-4	RXD	P55 (CRX0)
U8-5	VIO	Board_VCC
U8-6	CANL	CAN-L
U8-7	CANH	CAN-H
U8-8	STB	GND

The differential signals of CAN-H and CAN-L are connected to CAN FD interface connector J21 (3-pin male header).

Table 25. CAN FD Interface Connector Connection

CAN FD Interface Connector	**EK-RX261 v1**
Pin	**Signal**
J21-1	CAN-H
J21-2	GND
J21-3	CAN-L

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6.2 Touch Interface

The RX MCU incorporates Capacitive Touch Sensing Unit (CTSU2SL), and the CTSU is connected to 2 touch buttons on the EK-RX261 v1.

Table 26. Touch Interface

EK-RX261 v1		RX MCU	Configuration	
Signal	**Function**	**Port**	**Closed**	**Open**
TS1	Electrostatic capacitance measurement pin (Touch Button 1)	P31	-	-
TS3	Electrostatic capacitance measurement pin (Touch Button 2)	P27	-	-
TSCAP	LPF (Low-pass filter) connection pin	PC4	-	E14



Figure 33. Touch Buttons

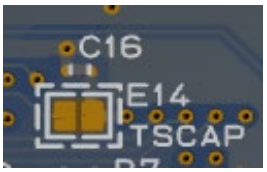


Figure 34. Touch Interface Copper Jumpers (bottom side)

Note: Two touch buttons are implemented on MCU Native Pin Access area, however, the Touch Interface is described in section 6 “Special Feature Access Area” because the Touch Interface is functionally categorized into Special Feature Access.

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7. MCU Native Pin Access Area

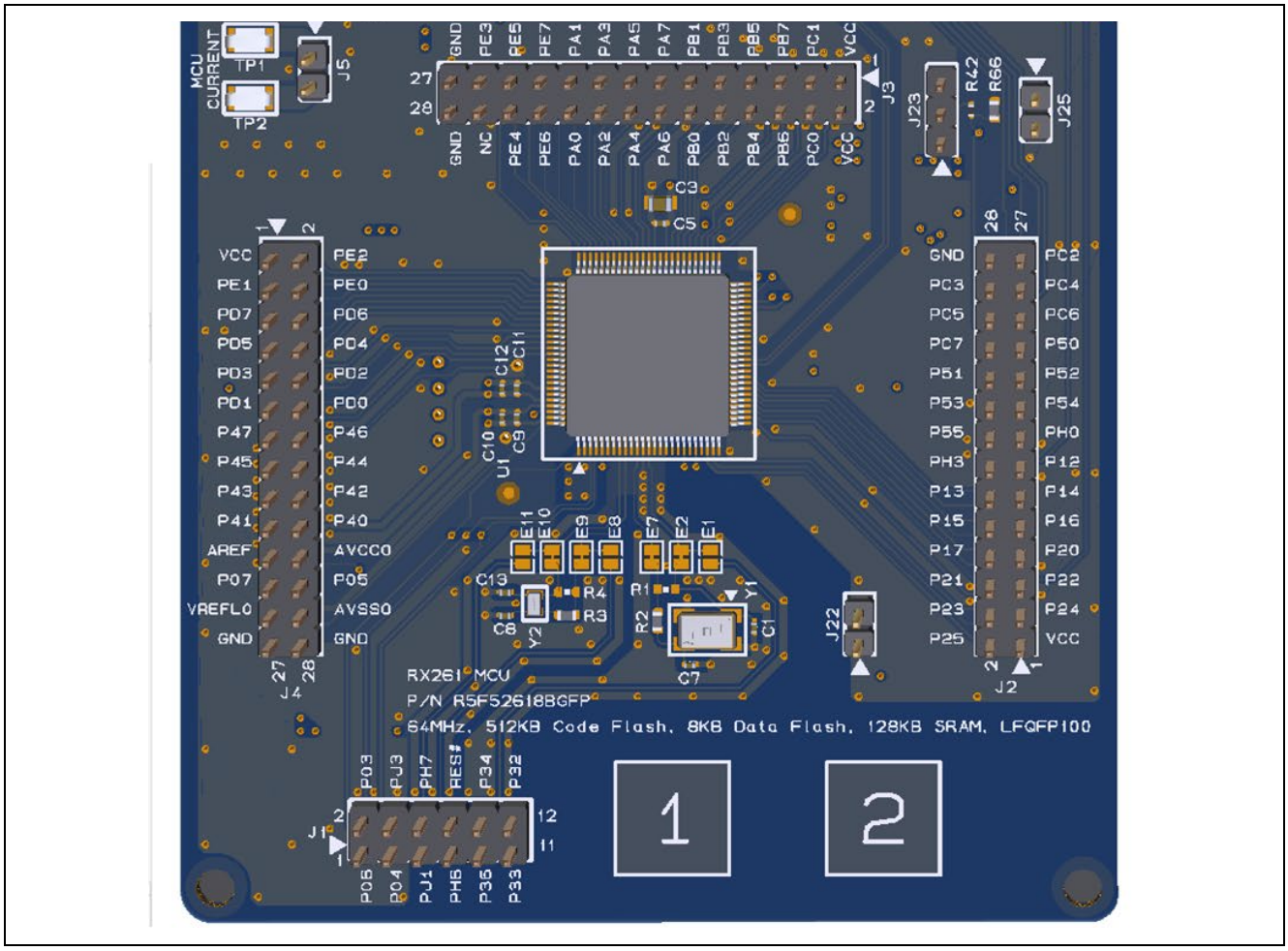


Figure 35. Native Pin Access Area

7.1 Breakout Pin Headers

The EK-RX261 v1 pin headers, J1, J2, J3 and J4, provide access to RX MCU signals. Each header pin is labeled with the power or port connected to that pin. Refer to the RX260 Group, RX261 Group User's Manual: Hardware for details of each port function, and the EK-RX261 v1 schematic for pin header port assignments.

The placement of the breakout pin headers allows for a standard 2.54 mm (0.100") center breadboard to be placed on all four pin headers. This can be used for prototyping and testing of custom circuitry for use with the RX MCU.

7.2 MCU Current Measurement

Included in the Native Pin Access area are current measurement test points to measure the RX MCU current.

The EK-RX261 v1 provides 2 test points (TP1 and TP2) for current measurement of the main Board_VCC MCU power. Set an ammeter between TP1 and TP2 without shunt jumpers at J5, and then measure the main Board_VCC MCU power current.

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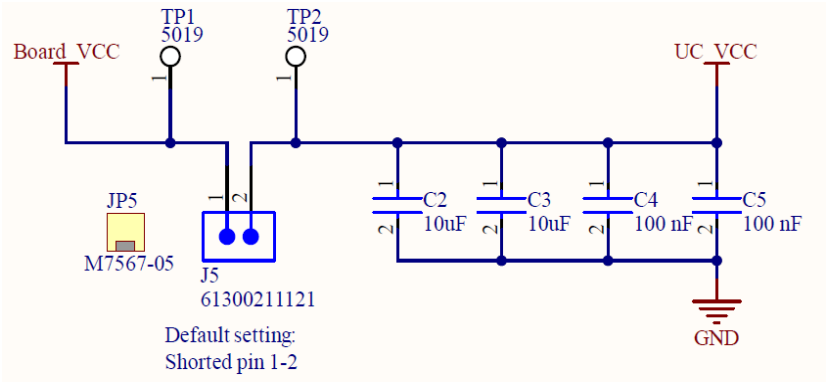


Figure 36. RX MCU Current Measurement Circuit

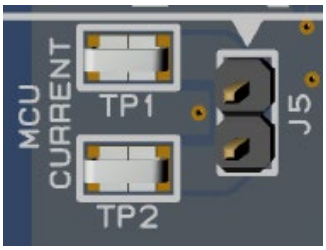


Figure 37. Pin Header Jumper J5

7.3 MCU Operating Mode

MCU operating mode is configured by pin header jumpers (J22, J23, J24 and J25).

Table 27. MCU Operating Mode Configuration

J22	J23	J24	J25	Description
Open	Jumper on pins 2-3	Open	Open	Debug on-board mode
Open	Jumper on pins 1-2 or Jumper on pins 2-3	Closed	Open	Standalone Operation mode or Debug in mode
Open	Jumper on pins 1-2	Closed	Closed	USB Boot mode (Bus powered)
Closed	Jumper on pins 1-2	Closed	Closed	USB Boot mode (Self powered)
Open	Jumper on pins 2-3	Closed	Closed	SCI Boot mode

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8. Recommended Components

Table 28 lists recommended part numbers for the components that can be fitted as required.

Table 28. Recommended Components

Designator(s)	Description	Manufacturer	Part Number
R1 *1	Feedback resistor of crystal oscillator Y1	-	The resistance must be adjusted by users.
R4 *1	Feedback resistor of crystal oscillator Y2	-	The resistance must be adjusted by users.
J11, J12	Seeed Grove® Connector	Seeed Studio	110990037
J13	SparkFun® Qwiic® Connector	JST	SM04B-SRSS-TB(LF)(SN)

*1: Pads of chip resistance (size 0603) are provided on the EK-RX261 v1.

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9. Certifications

The EK-RX261 v1 meets the following certifications/standards. See page 4 of this user's manual for the disclaimer and precautions.

9.1 EMC/EMI Standards

- FCC Notice (Class A)

  This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

  NOTE- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/television technician for help.

- Innovation, Science and Economic Development Canada ICES-003 Compliance:
  CAN ICES-3 (A)/NMB-3(A)

- CE Class A (EMC)

  This product is herewith confirmed to comply with the requirements set out in the Council Directives on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility Directive 2014/30/EU.

  Warning – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures to correct this interference.

- UKCA Class A (EMC)

  This product is in conformity with the following relevant UK Statutory Instrument(s) (and its amendments): 2016 No. 1091 Electromagnetic Compatibility Regulations 2016.

  Warning – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be requried to take adequate measures to correct this interference.

- Taiwan: Chinese National Standard 13438, C6357 compliance, Class A limits
- Australia/New Zealand AS/NZS CISPR 32:2015, Class A

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9.2 Material Selection, Waste, Recycling and Disposal Standards

- EU RoHS
- China SJ/T 113642014, 10-year environmental protection use period.
- WEEE Directive (2012/19/EU) & The Waste Electrical and Electronic Equipment Regulations 2013



The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the UK and European Union.

This equipment (including all accessories) is not intended for household use. After use the equipment cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner.

Renesas Electronics Europe GmbH can take back end of life equipment. Register for this service at;
https://www.renesas.com/eu/en/support/regional-customer-support/weee

9.3 Safety Standards

- UL 94V-0

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10. Design and Manufacturing Information

The design and manufacturing information for the EK-RX261 v1 is available in the “EK-RX261 v1 Design Package” available on renesas.com/rx/ek-rx261.

- Design package file name: ek-rx261-v1-designpackage.zip
- Design package contents

Table 29. EK-RX261 v1 Design Package Contents

File Type	Content	File / Folder Name
File (PDF)	Schematics	ek-rx261-v1-schematics
File (PDF)	Mechanical Drawing	ek-rx261-v1-mechdwg
File (PDF)	3D Drawing	ek-rx261-v1-3d
File (PDF)	BoM	ek-rx261-v1-bom
Folder	Manufacturing Files	Manufacturing Files
Folder	Design Files	Design Files-Altium

11. Website and Support

Visit the following URLs to learn about the kit and the RX family of microcontrollers, download tools and documentation, and get support.

EK-RX261 Resources	renesas.com/rx/ek-rx261
RX Kit Information	renesas.com/rx/kits
RX Product Information	renesas.com/rx
RX Product Support Forum	renesas.com/rx/forum
RX Videos	renesas.com/rx/videos
RX Kit Feedback and Feature Request	renesas.com/rx/kitfeedback
Renesas Support	renesas.com/support

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Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jul.31.24	—	Initial release

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● 有害物質の含有表
Table of Hazardous Substance

部品名称 Part Name	有害物質 Hazardous Substance					
	鉛 Lead (Pb)	水銀 Mercury (Hg)	カドミウム Cadmium (Cd)	六価クロム Hexavalent Chromium (Cr(VI))	ポリ臭化ビフェニル Polybrominated biphenyls (PBB)	ポリ臭化ジフェニルエーテル Polybrominated diphenyl ethers (PBDE)
筐体 Case	O	O	O	O	O	O
ボード Board	X	O	O	O	O	O
ケーブル Cable	X	O	O	O	O	O
ソケット Socket	X	O	O	O	O	O
ACアダプタ AC-Adapter	X	O	O	O	O	O

本表は SJ/T 11364 の規定により作成したものである。
This form is based on the provisions of the SJ/T 11364.

O: 当該部材の全ての均質材料中における該当有害な物質の含有量がいずれも GB/T 26572 基準に規定する限度量の要求以下であることを表します。
If certain hazardous substances do not exist in this part, then mark “O” for the corresponding column, which indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572

X: 少なくとも当該部材のある均質材料中における当該有害な物質の含有量が GB/T 26572 基準に規定する限度量の要求を上回ることを表します。
If certain hazardous substance is contained in this part, then “X” for the corresponding column, which indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.



このマークは、中華人民共和国で販売される電子情報製品に適用され、マーク中央の数字は環境保護使用期限の年数です。なお、本製品の年数は、通常に使用された場合の年数です。
This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of the environment-friendly use period. The years for this product is applicable when the product is used normally.

注） この表には電子情報製品全ての添付品を記載しており、製品によっては同梱されていないものがございますのでご了承下さい。

Notice) All of the attached items relating to 'Electronic Information Products' are listed in this table.
Please understand that there is not always bundled all of the items because it depends on the product.

● 製造年の確認方法に関して About Confirmation method of produced year

製品或いは梱包箱に表記された銘板ラベル等から製造年をご確認頂けます。
Please confirm the produced year from nameplate label etc on product body or outer box.

Ex) 2016 年の場合　　Produced 2016

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● 有害物质含有情况表
Table of Hazardous Substance

部件名称 Part Name	有害物质 Hazardous Substance					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
外壳 Case	O	O	O	O	O	O
电路板 Board	X	O	O	O	O	O
连接线 Cable	X	O	O	O	O	O
插座 Socket	X	O	O	O	O	O
AC 适配器 AC-Adapter	X	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制。

This form is based on the provisions of the SJ/T 11364.

O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下。

If certain hazardous substances do not exist in this part, then mark “O” for the corresponding column, which indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求。

If certain hazardous substance is contained in this part, then “X” for the corresponding column, which indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.

该标识适用于在中华人民共和国境内销售的电子信息产品。本产品的使用年限是组装到整机中，通常情况下能使用的年限。

图形中间的数字表示电子信息产品的环保使用期限。

This mark is applied to EIPs sold in People’s Republic of China, and the number in the center indicates the years of the environment-friendly use period. The years for this product is applicable when the product is used normally.

特别提示）该表中包括在电子情报产品系列产品所有的附件。产品不同时，包装内的附件会有所不同。

Notice) All of the attached items relating to 'Electronic Information Products' are listed in this table.
Please understand that there is not always bundled all of the items because it is depends on a product.

● 识别生产日期的方法 About Confirmation method of produced year

请通过产品或产品外包装箱上的序列号识别生产日期。

Please confirm the produced year from nameplate label etc on product body or outer box.

如）生产日期为2016 年　　Produced 2016

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EK-RX261 v1 – User's Manual

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