

RL78/G21

Fast Prototyping Board

User's Manual

16-Bit Single-Chip Microcontrollers
RL78 Family

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1. Precaution against Electrostatic Discharge (ESD)

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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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This Fast Prototyping Board is only intended for use in a laboratory environment under ambient temperature and humidity conditions. A safe separation distance should be used between this and any sensitive equipment. Its use outside the laboratory, classroom, study area, or similar such area invalidates conformity with the protection requirements of the Electromagnetic Compatibility Directive and could lead to prosecution.

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 fulfil the regulatory standards for an end product.

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List of Abbreviations and Acronyms

Abbreviation	Full Form
BOM	Bill of Materials
COM	Communication Port
DNF	Do Not Fit
FPB	Fast Prototyping Board
GPIO	General Purpose Input Output
I ² C	Inter-Integrated Circuit
IDE	Integrated Development Environment
INT	Interrupt Request
LED	Light Emitting Diode
MCU	Micro-controller Unit
MISO	SPI Master In Slave Out
MOSI	SPI Master Out Slave In
n/a (NA)	Not applicable
n/c (NC)	Not connected
PC	Personal Computer
PWM	Pulse Width Modulation
RAM	Random Access Memory
RXD	Serial Receive Data
SCK	SPI Serial Clock
SCL	I ² C Serial Clock line
SDA	I ² C Serial Data line
SMD	Surface Mount Device
SPI	Serial Peripheral Interface
TXD	Serial Transmit Data
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

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1. Overview

This document describes the RL78/G21 Fast Prototyping Board (FPB-RL78G21) (hereinafter referred to as “this board”).

1.1 Purpose

This board is an evaluation tool for a Renesas MCU. This document describes the hardware specifications, ways of setting switches, and the basic setup procedure.

1.2 Board Specification

The features of this board are as follows.

- Programming of the Renesas MCU
- Debugging of user code
- User circuits for switches and LEDs
- Pmod connector* x 2
- Arduino connector*
- Grove connector (not mounted)
- Debug connector for an E2 emulator or E2 emulator Lite (not mounted)

Note: We do not guarantee connection to all modules for these interfaces. For details on the connector specifications, refer to 5.3 Ecosystem.

Table 1-1 shows the detailed board specifications.

Table 1-1 Board Specification Table

Item	Specification
Evaluation MCU (RL78/G21)	Part No.: R7F103GLJ3ZFB
	Package: 64-pin LQFP
	On-chip memory: 256-KB Code Flash, 8-KB RAM, 4-KB Data Flash
Board size	56.0 mm x 74.9 mm
MCU power-supply voltage	VDD: 1.6 V to 5.5 V (EVDD is the same voltage as VDD.)
Power-supply circuit*2	USB connector: VBUS (5 V) or 3.3 V
	External power supply: 1.6 V to 5.5 V
	E2 emulator: 1.8 V to 5.0 V
	E2 emulator Lite: 3.3 V
Main clock*1	X1: Crystal oscillator (surface-mount technology (SMT)) for the main system clock X2: Crystal oscillator or ceramic resonator (lead type) for the main system clock
Push switches	Reset switch x 1
	User switch x 1
LEDs	Power indicator: green x 1
	User: green x 2
Pmod connectors	Right-angle type, 12 pins (6 x 2 columns) x 2
Arduino connectors	Connectors: 6 pins x 1, 8 pins x 2, 10 pins x 1 The interfaces are compatible with the Arduino UNO R3 board.
Grove connector*1	Interface for Grove modules I ² C x 1
MCU header*1	Header: 32 pins (16 x 2 columns) x 2
USB connector	Connector: USB Type-C
USB-to-serial converter	Used as the interface with the RL78 COM port debug tool. FT232RNQ from FTDI x 1
USB-to-serial converter reset switch	DIP switch x 1 (switch is off by default)
Current measurement header*1	Header: 2 pins x 2
Power-supply selection header*2	Header: 3 pins x 1
Emulator connector*1	14-pin connector for connecting an E2 emulator or E2 emulator Lite

Notes: 1. This part is not mounted.

2. The intended source of power for the evaluation MCU on the board as shipped is VBUS (5 V). Setting a jumper is required if power is to be supplied from other sources. For details, refer to 5.1 Power.

1.3 Preparation

- Watch the video on “Getting Started with Fast Prototyping Board for RL78 Family”.
[renesas.com/gs-fpb-rl78](https://www.renesas.com/gs-fpb-rl78)
- Install the integrated development environment (IDE) and required software on the host PC.
<https://www.renesas.com/development-tools>
- Prepare a USB 2.0 Type-C cable (2 m or shorter is recommended) for data transfer.
- Refer to the following Web page and prepare the E2 emulator if required.
<https://www.renesas.com/e2>
- Refer to the following Web page and prepare the E2 emulator Lite if required.
<https://www.renesas.com/e2lite>

1.3.1 Installing the e² studio IDE

For details on the procedure for installation, watch the video on “e² studio Quick Start Guide (1/3) - Installation for RX and RL78”.

<https://www.renesas.com/software-tool/rl78-software-tool-course>

Download the installer for the latest version of e² studio from the following Web page.

<https://www.renesas.com/software-tool/e-studio>

1.3.2 Installing the CS+ IDE

For details on the procedure for installation, watch the video on “CS+ Quick Start Guide (1/4): Installation”.

<https://www.renesas.com/software-tool/rl78-software-tool-course>

Download the installer for the latest version of CS+ for CC from the following Web page.

<https://www.renesas.com/software-tool/cs>

1.4 Board Layout

Figure 1-1 and Figure 1-2 show the board layout on the top and bottom sides.

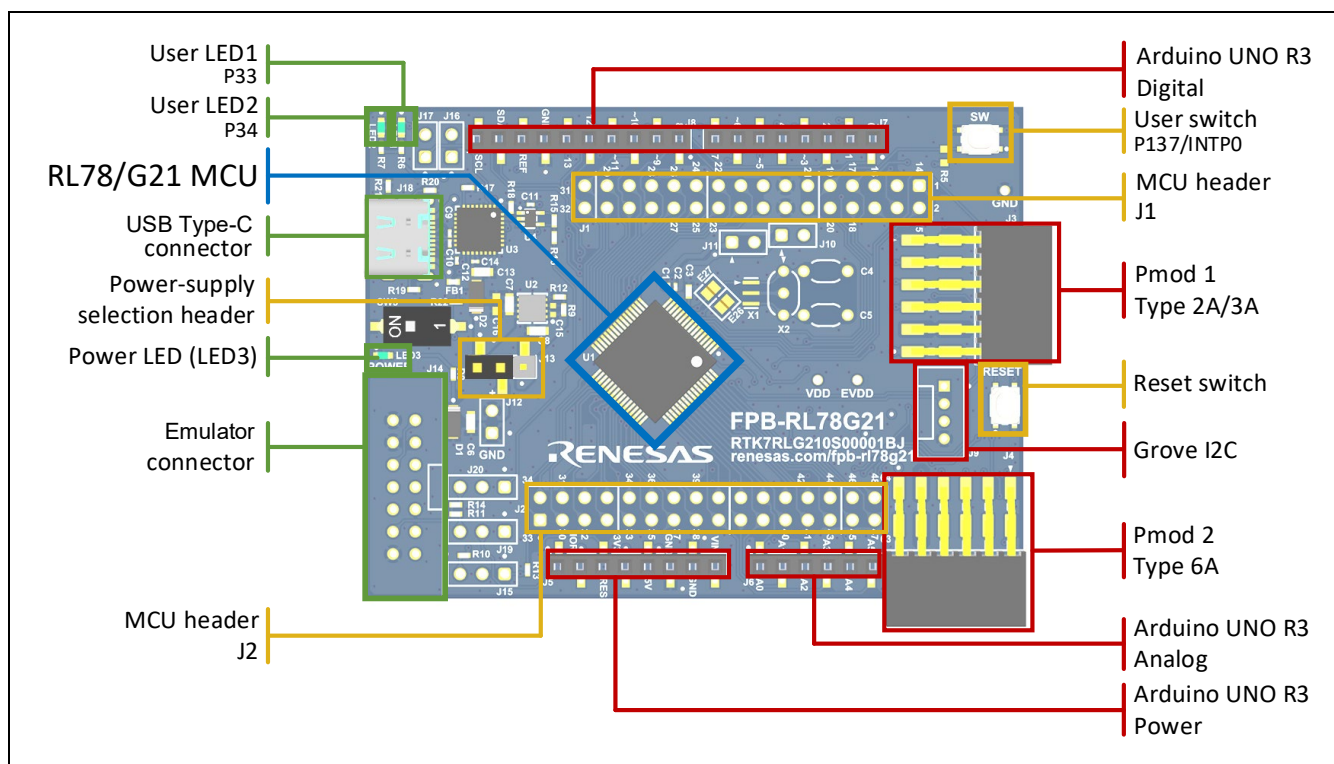


Figure 1-1 Board Layout (Top Side)

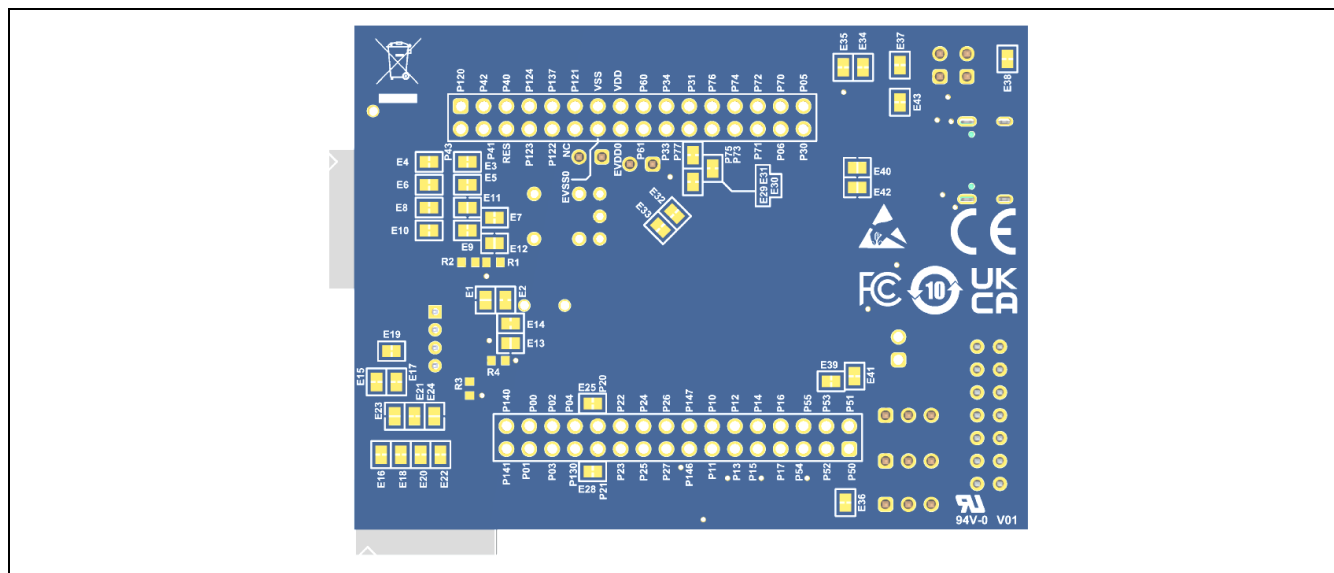


Figure 1-2 Board Layout (Bottom Side)

2. Box Contents

The following components are included in the box:

- FPB-RL78G21 board
- FPB-RL78G21 Quick Start Guide (English)

3. Ordering Information

- FPB-RL78G21 v1 orderable part number: RTK7RLG210S00001BJ

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

4. Hardware Architecture

This board is designed with the same architecture as other boards in the FPB series. In addition to the MCU, it consists of a USB-to-serial converter, pin headers providing access to all MCU pins, a power regulator, multiple LEDs and switches, and ecosystem I/O connectors (Pmod and Arduino).

4.1 Block Diagram

Figure 4-1 shows the block diagram of this board. Gray shading of blocks indicates parts that are not mounted on the board.

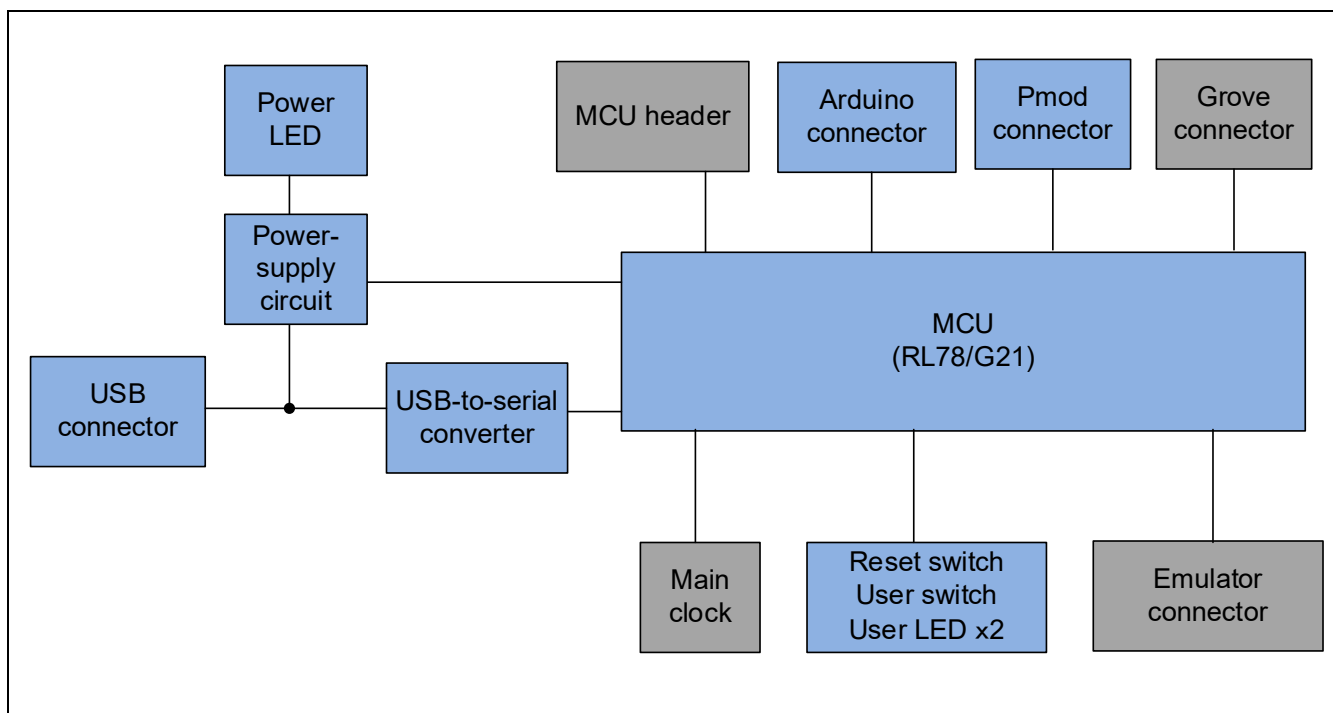


Figure 4-1 Block Diagram

4.2 Parts Layout

Figure 4-2 and Figure 4-3 show the parts layout of this board.

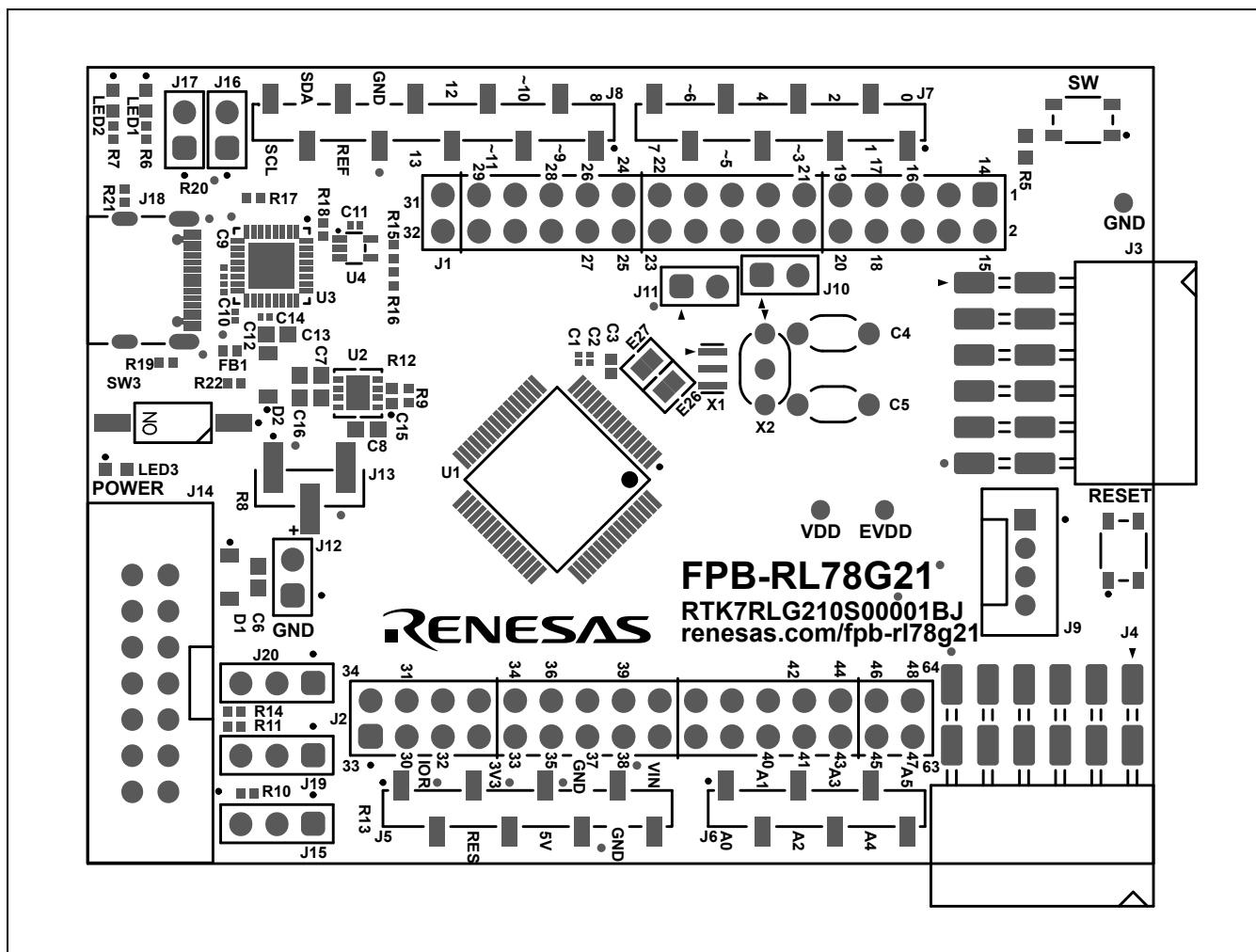


Figure 4-2 Parts Layout (Top Side)

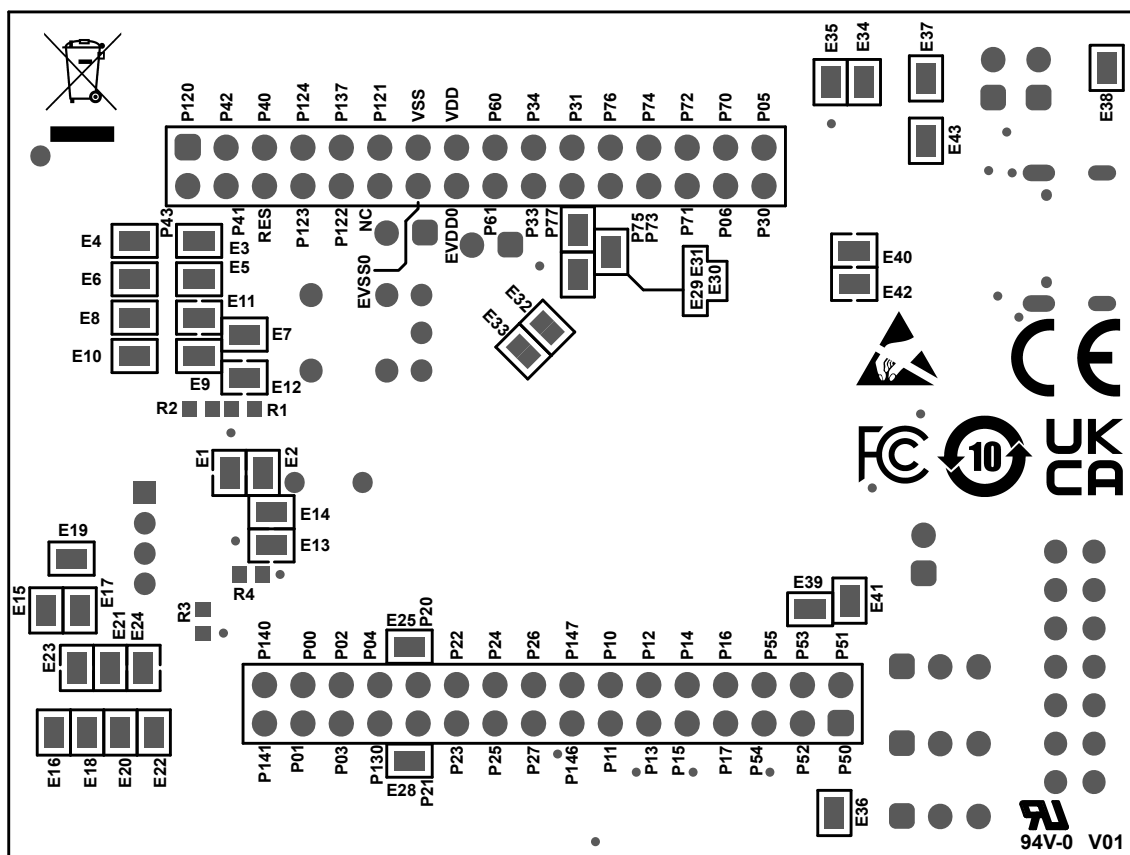


Figure 4-3 Parts Layout (Bottom Side)

Figure 4-4 shows the dimensional drawing of this board.

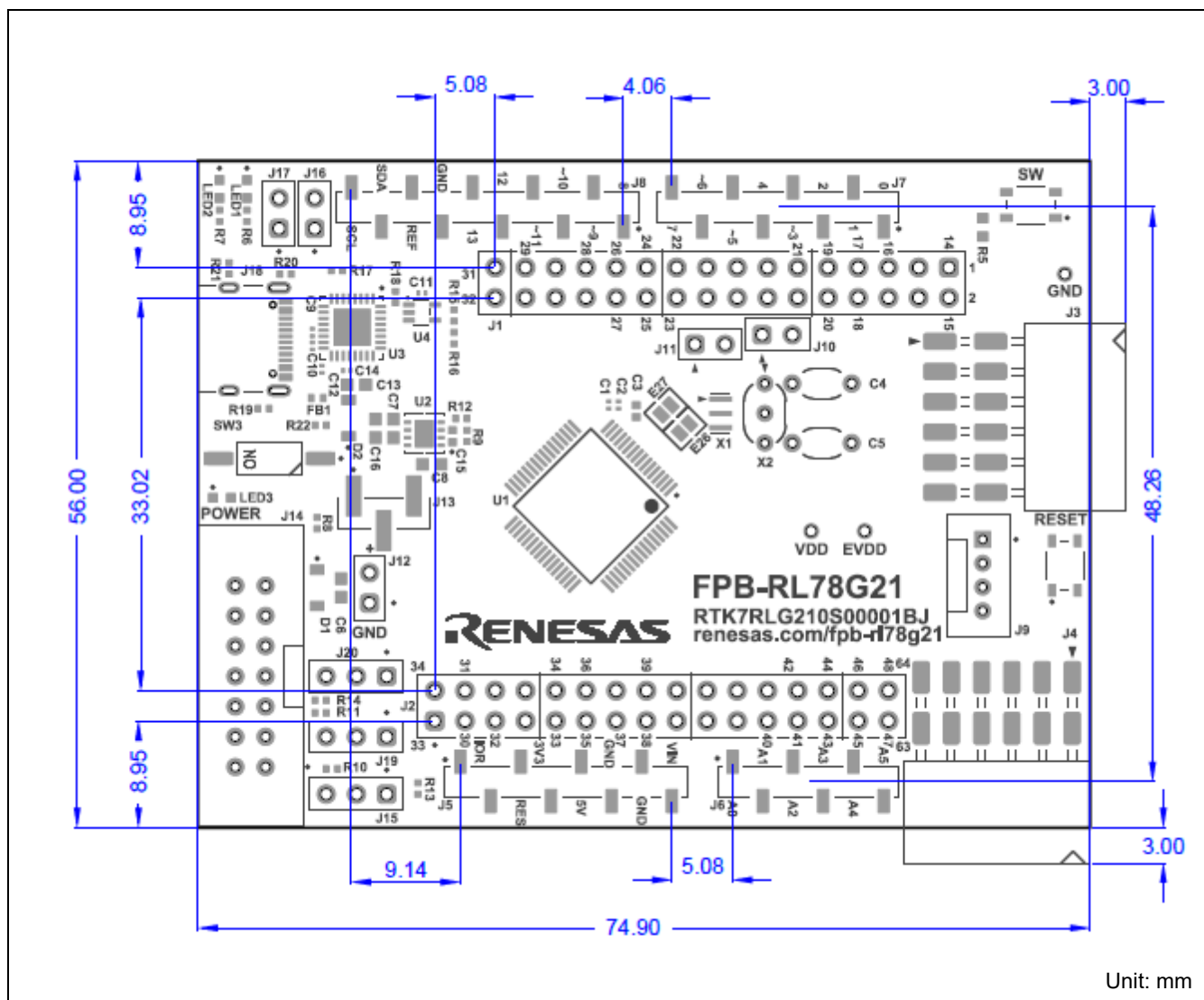


Figure 4-4 Board Dimensions

4.3 Jumper Settings

Three types of jumpers are provided on this board.

1. Copper jumpers
2. Traditional pin header jumpers
3. DIP switches

The following sections describe each type and their default configuration.

4.3.1 Copper Jumpers

Copper jumpers are of two types, designated **Jumper Trace Cut (closed)** and **Jumper Solder Bridge (open)**.

A **Jumper Trace Cut (closed)** is provided with a narrow copper trace connecting its pads. The silk screen overlay printing around a Jumper Trace Cut (closed) is a solid box. 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 Jumper Trace Cut (closed) is turned into a Jumper Solder Bridge (open) for any later changes.

A **Jumper Solder Bridge (open)** 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 SMD zero-ohm resistor, inch size 0805, 0603, or 0402, may be placed across the two pads and soldered in place. A zero-ohm resistor shorts the pads together.

For any copper jumper, the connection is considered **closed** if there is an electrical connection between the pads (default for Jumper Trace Cut (closed)). The connection is considered **open** if there is no electrical connection between the pads (default for Jumper Solder Bridge (open)).

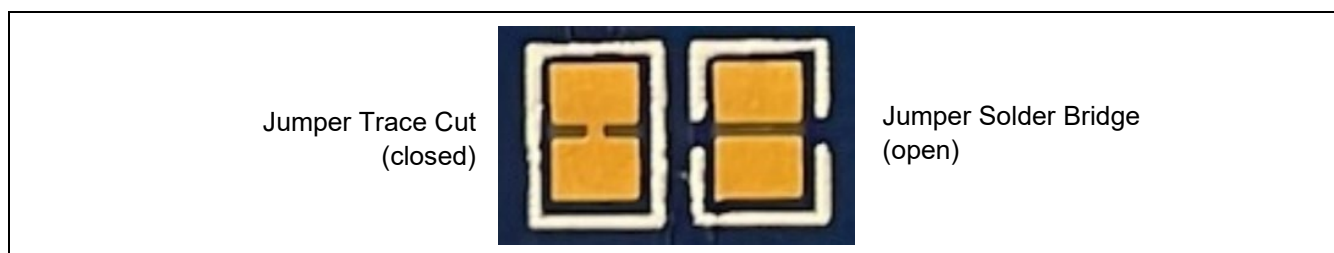


Figure 4-5 Copper Jumpers

4.3.2 Traditional Pin Header Jumpers

These jumpers are traditional small pitch jumpers that require an external shunt to close them. The traditional pin header jumpers on this board are 0.1" (2.54 mm) pitch headers and use compatible 2.54 mm shunt jumpers.

4.3.3 Default Jumper and DIP Switch Configuration

The following table describes the default settings for each jumper on this board. This includes copper jumpers (reference designator Ex), traditional pin header jumpers (reference designator Jx) and DIP switch (reference designator SWx).

The circuit group for each jumper and switch is the reference found in the board schematic (available in the Design Package). Refer to Figure 4-2 and Figure 4-3 for the locations of each jumper on this board. The “Function” column in the table describes the function of the “Closed” state. Functional details for many of the listed jumpers may be found in sections associated with each functional area of the board.

Table 4-1 Default Jumper Settings

Reference Designator	Circuit Group	Default	Function
J13 1-2	Power	Closed (Short-circuit)	MCU operating voltage selection (VDD: 5.0 V)
J13 2-3	Power	Open	MCU operating voltage selection (VDD: 3.3 V)
J12 (DNF)	Power	—	External power supply
J10 (DNF)	MCU (Power)	—	MCU current measurement (VDD)
J11 (DNF)	MCU (Power)	—	MCU current measurement (EVDD)
E1	Pmod 1	Open	Connect J3-Pin6 and J3-Pin12 to 5.0 V.
E2	Pmod 1	Closed	Connect J3-Pin6 and J3-Pin12 to EVDD.
E3	Pmod 1	Closed	Connect J3-Pin1 to P77/INTP11.
E4	Pmod 1	Closed	Connect J3-Pin7 to P141/INTP7.
E5	Pmod 1	Closed	Connect J3-Pin2 to P02/SO10/TxD1.
E6	Pmod 1	Closed	Connect J3-Pin8 to P124.
E7	Pmod 1	Closed	Connect J3-Pin3 to P03/SI10/RxD1.
E8	Pmod 1	Closed	Connect J3-Pin9 to P123.
E9	Pmod 1	Closed	Connect J3-Pin4 to P04/SCK10.
E10	Pmod 1	Closed	Connect J3-Pin10 to P43.
E11	Pmod 1	Open	Connect J3-Pin3 to P04/SCL10.
E12	Pmod 1	Open	Connect J3-Pin4 to P03/SDA10.
E13	Pmod 2	Open	Connect J4-Pin6 and J4-Pin12 to 5.0 V.
E14	Pmod 2	Closed	Connect J4-Pin6 and J4-Pin12 to EVDD.
E15	Pmod 2	Closed	Connect J4-Pin1 to P31/INTP4.
E16	Pmod 2	Closed	Connect J4-Pin7 to P76/INTP10.
E17	Pmod 2	Closed	Connect J4-Pin2 to P15.
E18	Pmod 2	Closed	Connect J4-Pin8 to P53.
E19	Pmod 2	Closed	Connect J4-Pin3 to P14/SI20/(SCLA0)/RxD2.
E20	Pmod 2	Closed	Connect J4-Pin9 to P54.
E21	Pmod 2	Closed	Connect J4-Pin4 to P13/(SDAA0).
E22	Pmod 2	Closed	Connect J4-Pin10 to P52.
E23	Pmod 2	Open	Connect J4-Pin2 to P13/SO20/TxD2.
E24	Pmod 2	Open	Connect J4-Pin4 to P15/SCK20.
E25	MCU (Power)	Closed	Connect P20/AVREFP to VDD.
E28	MCU (Power)	Closed	Connect P21/AVREFM to GND.
E29	MCU (Power)	Closed	Connect VDD (MCU Pin15) to VDD.
E30	MCU (Power)	Closed	Connect EVDD to VDD.
E31	MCU (Power)	Closed	Connect EVDD0 (MCU Pin16) to EVDD.

Reference Designator	Circuit Group	Default	Function
E26	MCU (Clock)	Open	Connect P122/X2 to crystal oscillator (DNF).
E27	MCU (Clock)	Open	Connect P121/X1 to crystal oscillator (DNF).
E32	MCU (Clock)	Closed	Connect P121/X1 to J1-Pin11.
E33	MCU (Clock)	Closed	Connect P122/X2 to J1-Pin10.
E34	LED	Closed	Connect P33 to LED1.
E35	LED	Closed	Connect P34 to LED2.
E36	Emulator	Closed	Use COM port debugging (Emulator cannot be used).
E39	Emulator	Closed	Use COM port debugging (Emulator cannot be used).
E41	Emulator	Closed	Use COM port debugging (Emulator cannot be used).
E37	USB-UART	Closed	Connect P11/TOOLRxD to U3-Pin30 (TXD).
E38	USB-UART	Closed	Connect P12/TOOLTxD to U3-Pin2 (RXD).
E43	USB-UART	Closed	Connect U3-Pin1 (VCCIO) to EVDD.
SW3	USB-UART	Open (OFF)	Reset the USB-to-serial converter (U3). It is set to the reset-off state by default.

5. Hardware Details

5.1 Power

5.1.1 Power Supplies and Usage Conditions

Different power supplies can be selected. Table 5-1 shows the relationship between power-supply sources and usage conditions. Figure 5-1 shows the block diagram of the power-supply circuit.

Table 5-1 Power-Supply Sources and Usage Conditions

Power-Supply Source	Usage Condition				
	Power supplied to the evaluation MCU	Use of Arduino shields* ¹	Use of Pmod or Grove modules* ¹	Use of an emulator and IDE	Jumper setting* ²
USB* ⁴ (default)	5 V or 3.3 V	Possible	Possible	Possible* ³	Not required • J13: 1-2 short-circuit: 5 V (default) Required • J13: 2-3 short-circuit: 3.3 V
External power supply	1.6 V to 5.5 V	Possible	Possible	Possible* ³	Required • J13: open-circuit
Emulator	E2 Lite: 3.3 V E2: 1.8 V to 5.0 V	Not possible	Possible	Possible	Required • J13: open-circuit

- Notes: 1. Connecting this board to an Arduino shield, a Pmod module, or a Grove module shall be conducted at the user's own responsibility and should only proceed after confirming the specifications of the power supply and interfaces. When an Arduino shield requires the supply of 5-V or 3.3-V power, connect the host PC to this board via the USB cable.
2. Requirements for modifications after shipment are stated in this column.
3. Use the IDE in a state where power is being supplied from a source other than the emulator. The power-supply voltage must be at least 1.8 V.
4. If power is supplied to this board from a source other than USB, cut Jumper Trace Cut E43 (see Figure 5-7).

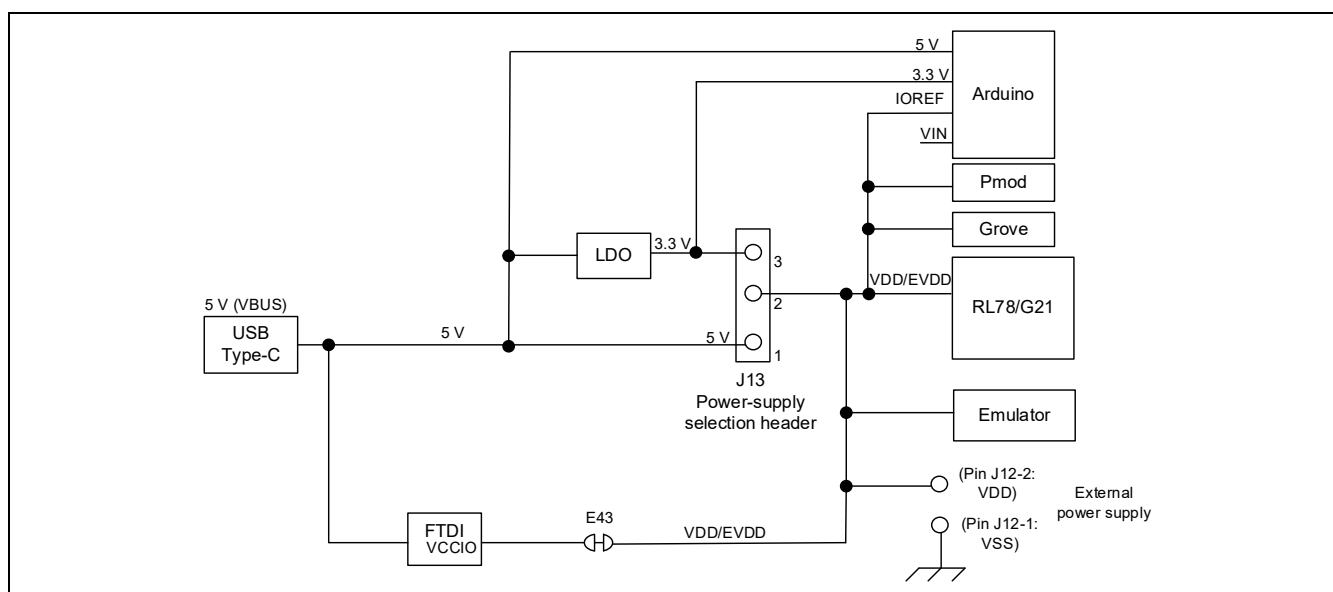


Figure 5-1 Block Diagram of the Power-Supply Circuit

5.1.2 USB Connector

The connector shape is USB 2.0 Type-C. It serves as a power-supply input and an interface for communications with the RL78 COM port debug tool (through USB-to-serial conversion). Connect the USB connector to the host PC by a USB cable. If the power supply on the host side is on, the power is supplied to this board at the same time as connection of the cable.

Note: The package does not include a USB cable. Do not connect a USB cable while the emulator is supplying power.

5.1.3 Power-Supply Selection Header

The operating power (VDD) of the evaluation MCU can be changed to 3.3 V or 5 V or to supply from the emulator or external power with the use of a header (J13). Only change the jumper setting of J13 while power is not being supplied.

- 1-2 of J13 being short-circuit selects a 5-V power supply. This is the default setting as shipped (Figure 5-2).
- 2-3 of J13 being short-circuit selects a 3.3-V power supply (Figure 5-3).
- J13 being open-circuit selects supply from the emulator or external power (Figure 5-4).

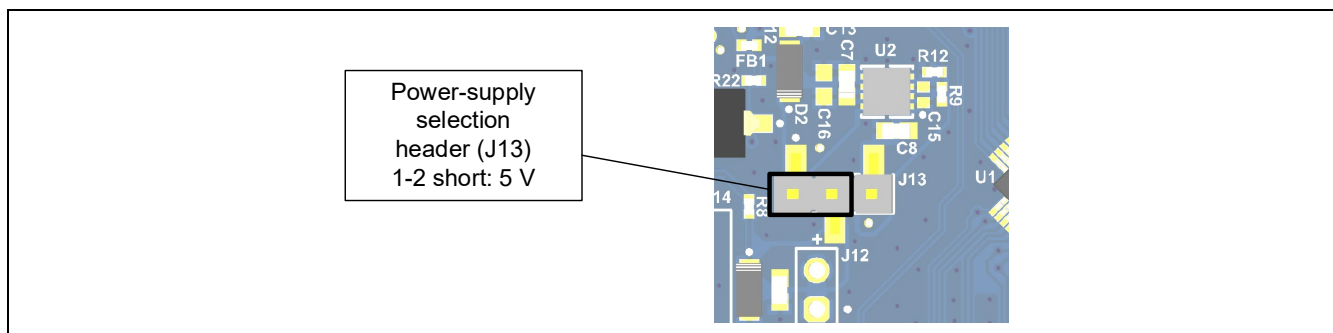


Figure 5-2 Setting of the Header to Select a 5-V Power Supply

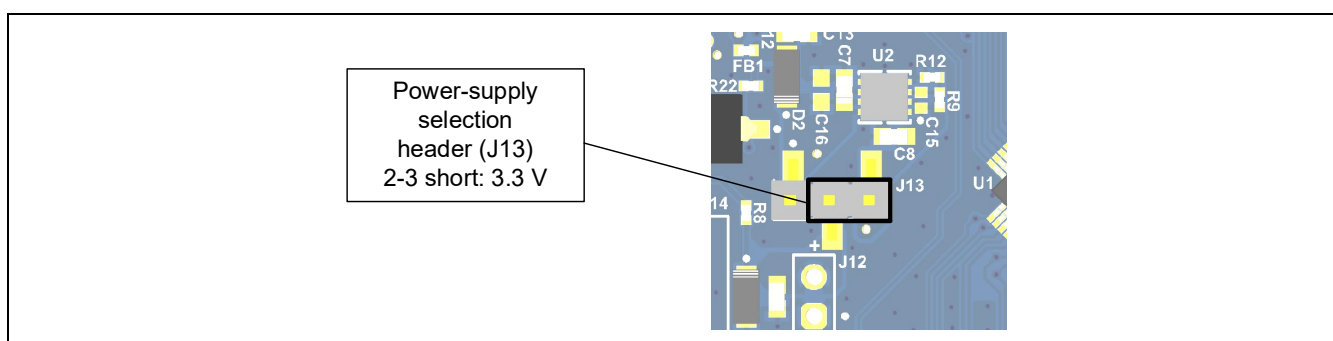


Figure 5-3 Setting of the Header to Select a 3.3-V Power Supply

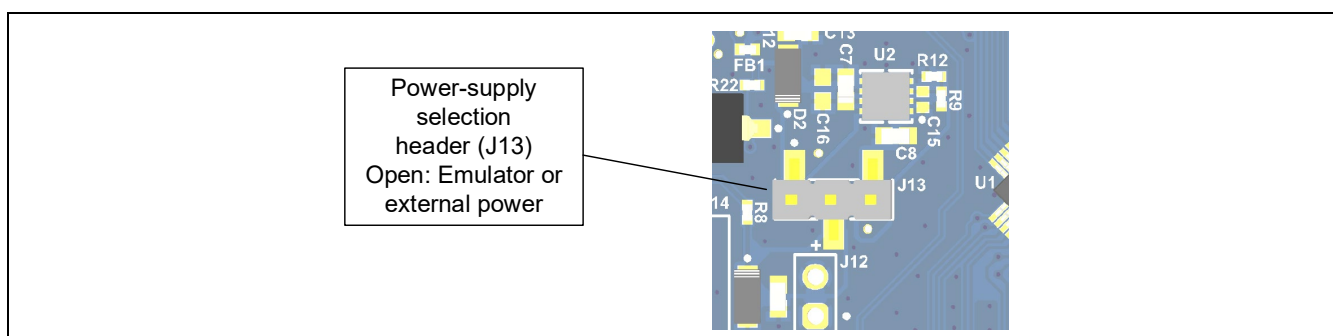


Figure 5-4 Setting of the Header to Select Supply from the Emulator or External Power

5.1.4 External Power Supply

When the evaluation MCU is to have a desired power-supply voltage, or when more current is required, use an external power supply. The usable voltages depend on the evaluation MCU.

Destinations for the connection of an external power supply:

- VDD: Pin J12-2 or pin J1-15 on the MCU header
- GND: Pin J12-1 or pin J1-13, 14 on the MCU header

Figure 5-5 shows the positions of the external power supply.

When an external power supply is used, confirm that the I/O voltages for Arduino shields or Grove modules are correct.

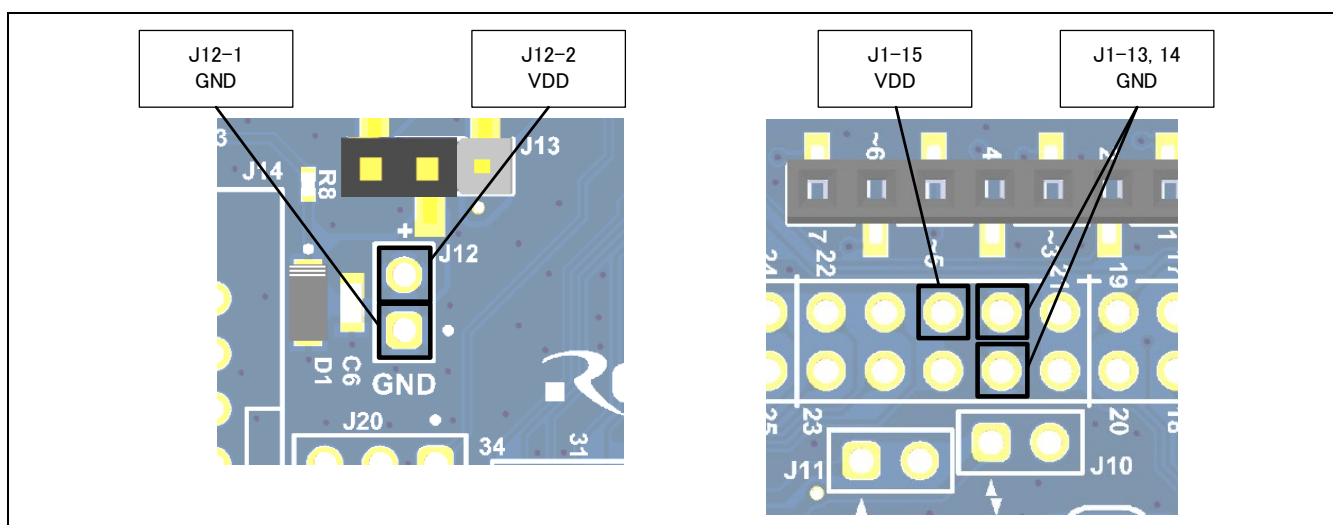


Figure 5-5 Positions of the Destinations for Connection of an External Power Supply

5.1.5 Separate Pattern for VDD and EVDD

When VDD and EVDD are to be used with different potentials, cut Jumper Trace Cut E30. Figure 5-6 shows the position of the Jumper Trace Cut.

Destination for the connection of an external power supply of EVDD to the source with a different potential:

- EVDD side: test pin EVDD or Pin J1-16 on the MCU header

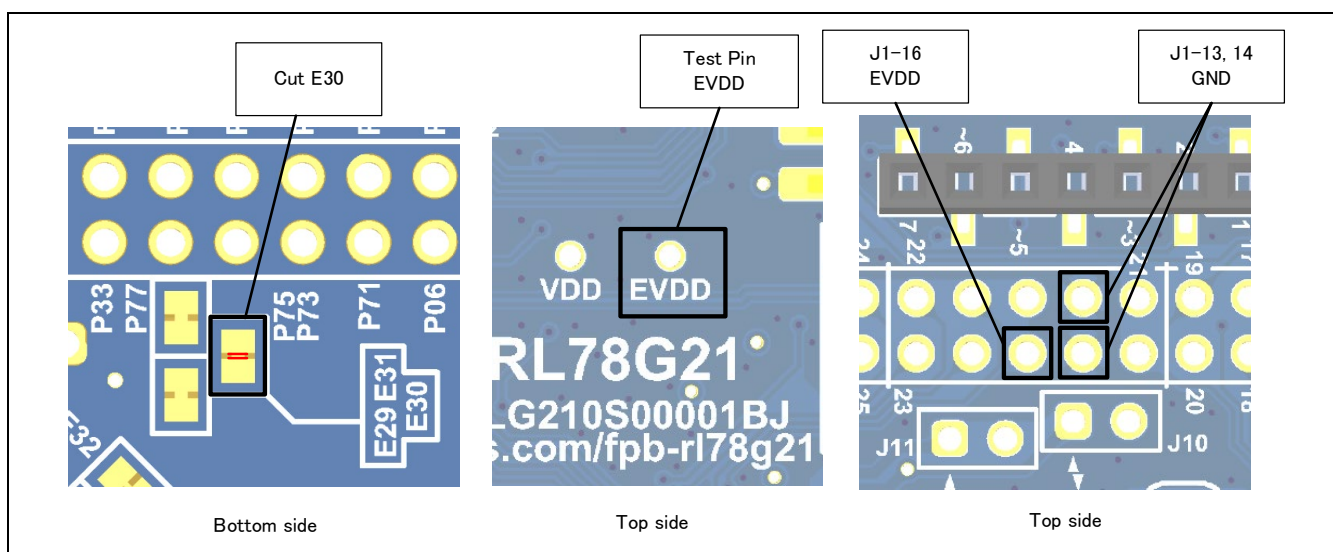


Figure 5-6 Positions of Jumper Trace Cut E30 and Test Pin for EVDD

5.1.6 I/O Power Supply for the USB-to-Serial Converter

If you intend to use this board without connecting a USB connector, cut Jumper Trace Cut E43. Figure 5-7 shows the position of the Jumper Trace Cut.

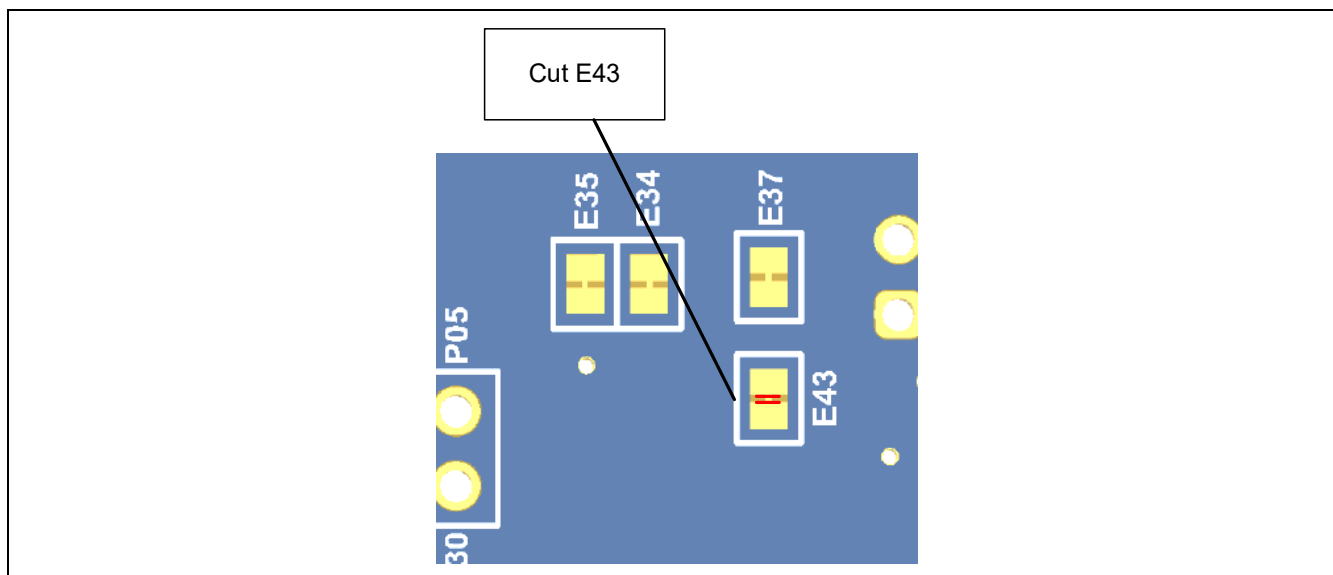


Figure 5-7 Position of Jumper Trace Cut E43 (Bottom Side)

5.1.7 Power-up Behavior

When power is supplied, the green power LED (LED3) will light up.

When power is initially supplied, the pre-programmed Quick Start Example Project (QSEP) will also run, and begin to make the two green user LEDs, LED1 and LED2, blink.

LED1 and LED2 respectively blink at 1 Hz and 0.5 Hz. When the user presses switch SW, the frequencies of blinking by LED1 and LED2 respectively change to 10 Hz and 5 Hz. From that point, the frequencies alternate each time SW is pressed.

5.2 Debug

5.2.1 USB-to-Serial Converter

A USB-to-serial converter (FT232RNQ) from FTDI is mounted on the board and is usable with the standard driver of Windows 10/11. For other operating systems, install the driver by downloading from the following Web site of FTDI.

<https://ftdichip.com/drivers/vcp-drivers/>

The USB-to-serial converter reset switch (SW3) is off; the port is recognized as a COM port when the host PC is connected to this board via a USB cable.

As the interface with the RL78 COM port debug tool, the USB-to-serial converter enables debugging and programming of the evaluation MCU. Refer to 5.2.3 Developing Code. Note that the P40, P11, and P12 pins of the evaluation MCU are respectively occupied as the TOOL0, TOOLRxD, and TOOLTxD functions.

For the method of COM port debugging, refer to the application note, RL78 Debugging Functions Using the Serial Port (R20AN0632).

Note: When the RL78 COM port debug tool is in use, use of the P125/RESET pin as the P125 port pin is prohibited. Do not make the option byte setting for using P125. If P125 is mistakenly set, COM port debugging and writing will become unavailable. If you are unable to use COM port debugging or writing, please recover by erasing the program using an E2 emulator or E2 emulator Lite connection, or by using the 'RL78/G21 COM Port Connection Recovery Application for Fast Prototyping Board' (R01AN8235).

When the USB-to-serial converter is not used as the interface with the RL78 COM port debug tool, using the RxD0 and TxD0 functions of the P11 and P12 pins enables UART communications between the host PC and the evaluation MCU. The user needs to prepare the terminal software, such as Tera Term.

5.2.2 USB-to-Serial Converter Reset Switch

The USB-to-serial converter is placed in the forced reset state by turning on its reset switch (SW3). If the evaluation MCU alone is to operate without the use of the RL78 COM port debug tool, place the USB-to-serial converter in the reset state. This allows the use of P11 and P12 for any MCU function, including port functions, via the MCU header while a reset is being applied to the USB-to-serial converter. Note that this switch is only active when power is supplied via the USB. Figure 5-8 shows the position of the USB-to-serial converter reset switch.

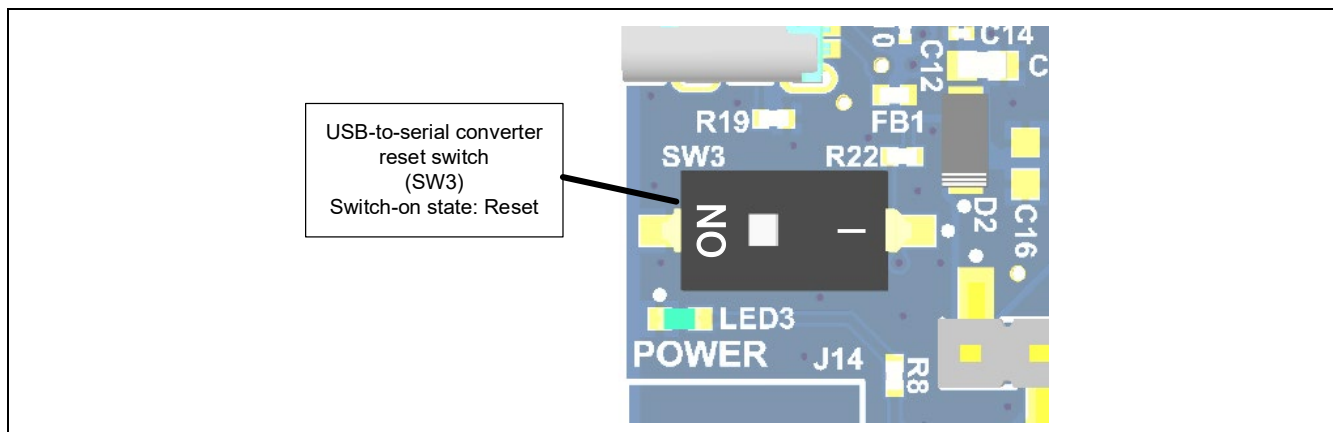


Figure 5-8 Position of the USB-to-Serial Converter Reset Switch

When power is to be supplied other than through the USB cable, the evaluation MCU alone is to operate, and P11 and P12 are to be used other than as COM ports, cut Jumper Trace Cuts E37 and E38 that would otherwise connect the USB-to-serial converter.

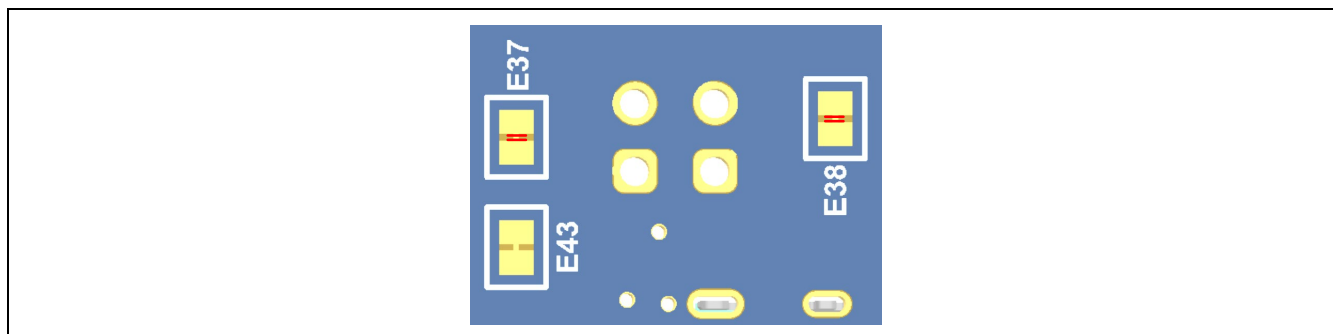


Figure 5-9 Positions for Disconnecting the Host PC from the USB-to-Serial Converter (Bottom Side)

To restore availability of the COM ports after having cut E37 and E38, short-circuit J16 and J17 (the components are not mounted).

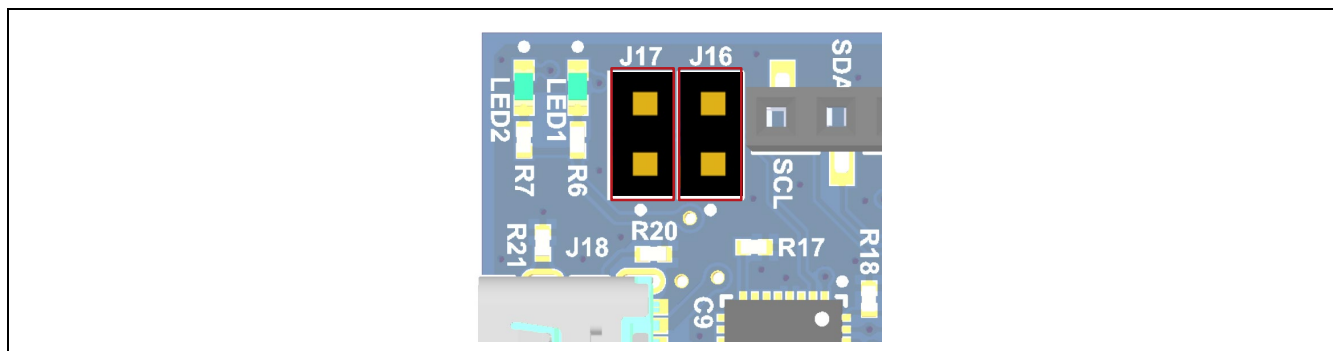


Figure 5-10 When the COM Port is to be Used after Having Cut E37 and E38

5.2.3 Developing Code

Use e² studio or CS+, both of which support the evaluation MCU (RL78/G21).

For the usage of the E2 emulator and E2 emulator Lite, refer to the help system or user's manual of e² studio or CS+.

5.2.3.1 Using COM Port Debugging with e² studio

Figure 5-11 shows the settings of e² studio when it is to be connected to this board.

- [Debug hardware]: Select [COM port (RL78)].
- [Target Device]: Select [R7F103GLJ].
- [Connection with Target Board]:
 - [COM Port]: Select the COM port number for assignment to this board from the pull-down list.
 - [Reset control pin]: Select [DTR].

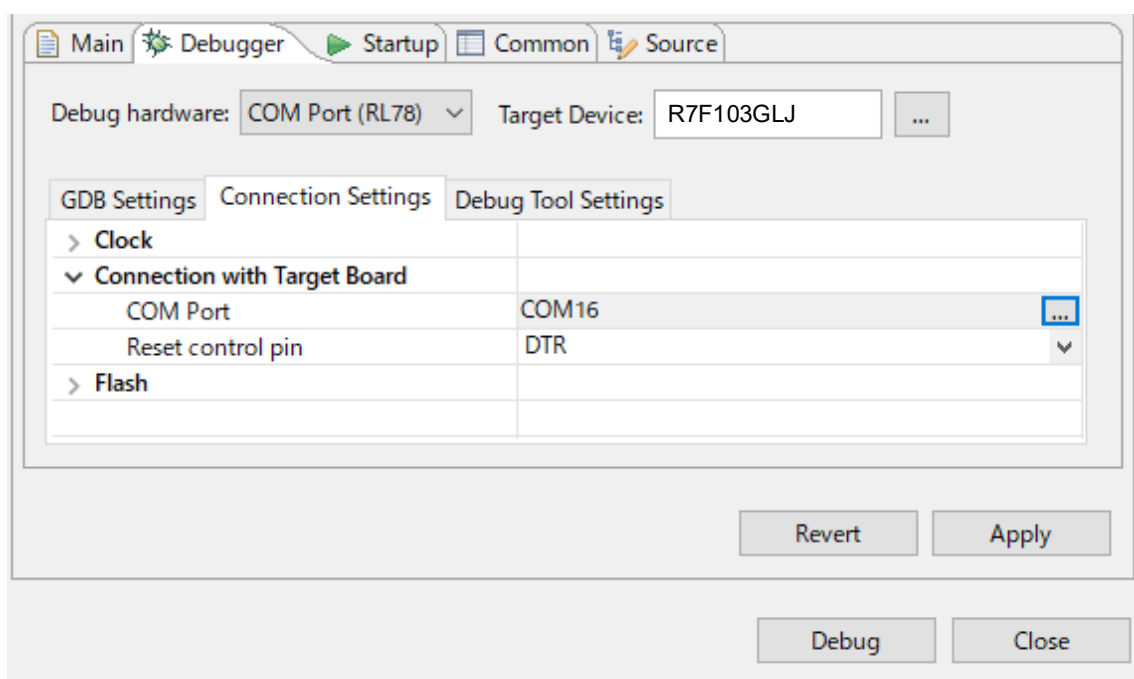


Figure 5-11 Settings of e² studio

5.2.3.2 Using COM Port Debugging with CS+

Figure 5-12 and Figure 5-13 show the settings of CS+ when it is to be connected to this board.

- [Using Debug Tool]:
Select [RL78 COM Port] from [Using Debug Tool] in the [Debug] menu.

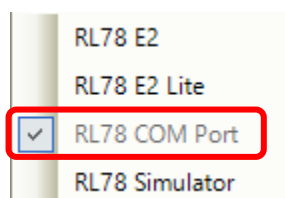


Figure 5-12 Panel for Selecting the Debug Tool

- [Connection with Target Board]:
[Communication port]: Select the COM port number for assignment to this board from the pull-down list.
[Reset control pin]: Select [DTR].

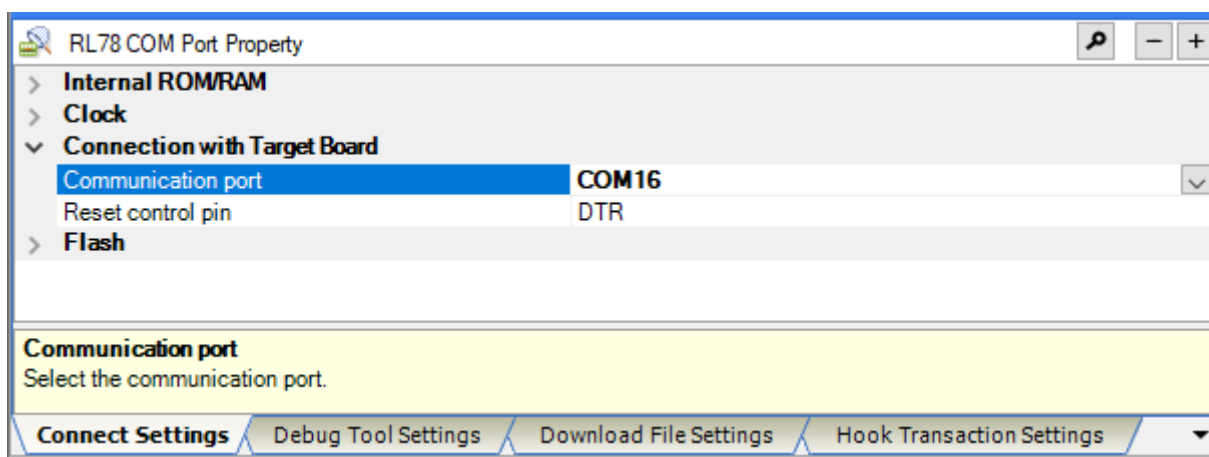


Figure 5-13 [Connect Settings] Tabbed Page of CS+

For details and points for caution, refer to the following application note for the RL78 COM port debug tool.

- RL78 Debugging Functions Using the Serial Port (R20AN0632)

5.2.4 Emulator Connector

This 14-pin connector (J14) is used to connect this board to an on-chip debugging E2 emulator or E2 emulator Lite, from Renesas Electronics, incorporating programming facilities (the connector is not mounted). The emulator is used for programming or debugging the evaluation MCU.

To connect the emulator, change the circuit as follows.

- J14: 14-pin connector must be mounted
- J15, J19, and J20: pins 2-3 are short-circuited (Mount these 3-pin connectors as needed)
- Jumper Trace Cut E36: cut
- Jumper Trace Cut E39: cut
- Jumper Trace Cut E41: cut

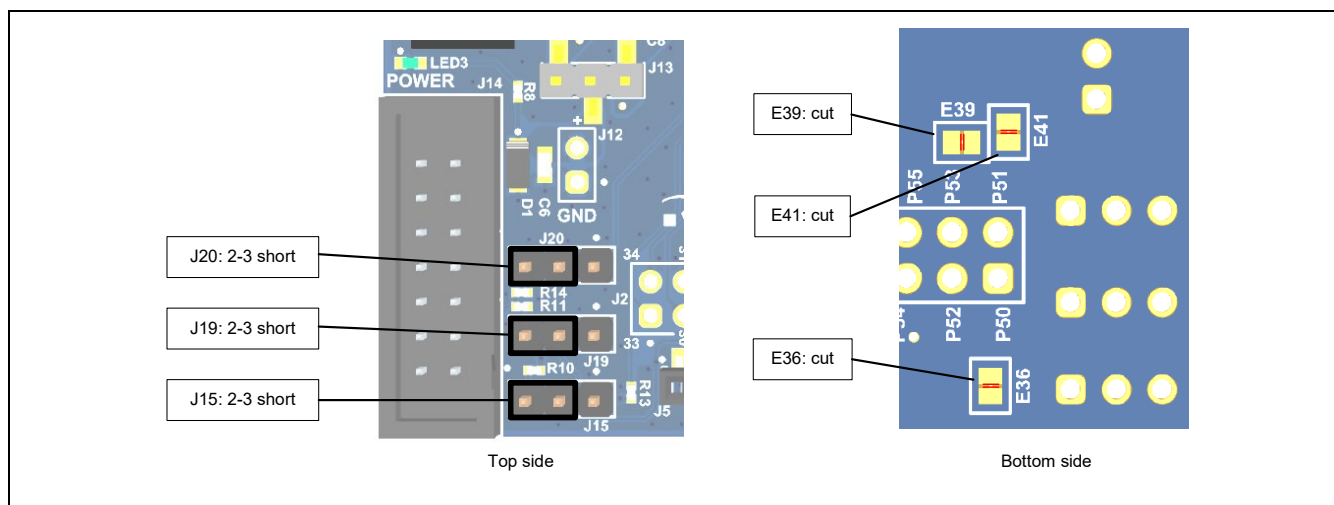


Figure 5-14 Settings for Use with the Emulator Connector

For the usage of the emulator, refer to the E1/E20/E2 Emulator, E2 emulator Lite Additional Document for User's Manual (Notes on Connection of RL78) (R20UT1994).

After the changes to the circuit have been made to connect the emulator as described in the previous page, if you want to restore the settings to those for COM port debugging with the use of the USB-to-serial converter, make the following change of setting as follows.

- J15, J19, and J20: pins 1-2 are short-circuited

For the patterns that were cut on the previous page, there is no need to short-circuit them with solder.

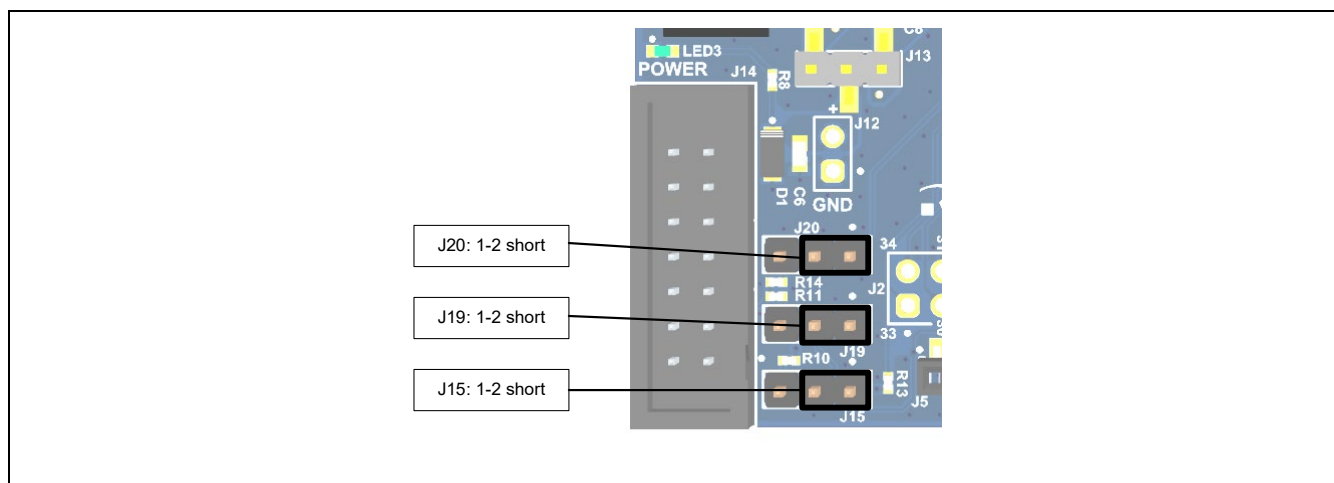


Figure 5-15 Settings for Use with COM Port Debugging (Top Side)

5.3 Ecosystem

5.3.1 Arduino Connectors

The specification of the Arduino connectors is on the assumption that Arduino shields are to be connectable. However, we do not guarantee connection to all types of Arduino shield. Confirm the specifications of this board against any Arduino shield you intend to use.

Figure 5-16 and Table 5-2 show the pin assignments of the Arduino connectors.

Using the functions enclosed by () in the figure and table requires changing the settings of the peripheral I/O redirection register (PIORx) from the default settings. For details, refer to the RL78/G21 User's Manual: Hardware.

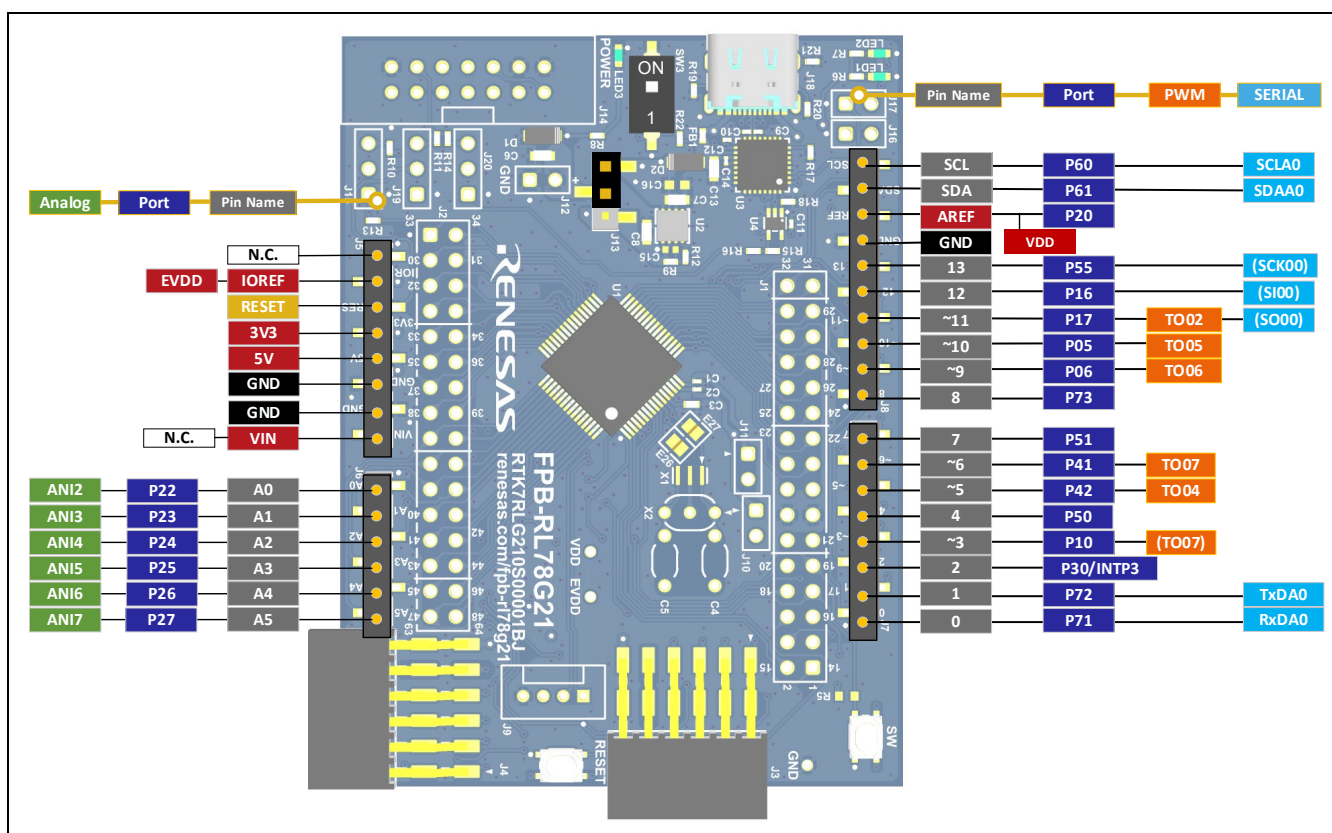


Figure 5-16 Pin Assignments of the Arduino Connectors

Table 5-2 Pin Assignments of the Arduino Connectors

Part No. in the Circuit Schematics	Name of Arduino Signal	RL78/G21						
		Pin	Power Supply	Port	Analog	PWM	Serial	Others
J5-1	n/c	-	-	-	-	-	-	-
J5-2	IOREF	16	EVDD	-	-	-	-	-
J5-3	RESET	6	-	-	-	-	-	RESET
J5-4	3V3	-	-	-	-	-	-	-
J5-5	5V	-	-	-	-	-	-	-
J5-6	GND	13/14	VSS/ EVSS	-	-	-	-	-
J5-7	GND	13/14	VSS/ EVSS	-	-	-	-	-
J5-8	VIN	-	-	-	-	-	-	-

J6-1	A0	54	-	P22	ANI2	-	-	-
J6-2	A1	53	-	P23	ANI3	-	-	-
J6-3	A2	52	-	P24	ANI4	-	-	-
J6-4	A3	51	-	P25	ANI5	-	-	-
J6-5	A4	50	-	P26	ANI6	-	-	-
J6-6	A5	49	-	P27	ANI7	-	-	-

J8-10	SCL	17	-	P60*2	-	-	SCLA0	-
J8-9	SDA	18	-	P61*2	-	-	SDAA0	-
J8-8	AREF*1	56	-	P20*1	AVREFP*1	-	-	-
J8-7	GND	13/14	VSS/ EVSS		-	-	-	-
J8-6	SCK/13	38	-	P55	-	-	(SCK00)	-
J8-5	MISO/12	40	-	P16	-	-	(SI00)	-
J8-4	MOSI/~11	39	-	P17	-	TO02	(SO00)	-
J8-3	~10	31	-	P05	-	TO05	-	-
J8-2	~9	30	-	P06	-	TO06	-	-
J8-1	8	26	-	P73	-	-	-	-

J7-8	7	34		P51	-	-	-	-
J7-7	~6	4		P41	-	TO07	-	-
J7-6	~5	3		P42	-	TO04	-	-
J7-5	4	33		P50	-	-	-	-
J7-4	~3	46		P10	-	(TO07)	-	-
J7-3	2	32		P30	-	-	-	INTP3
J7-2	TX/1	27		P72	-	-	TxDA0	-
J7-1	RX/0	28		P71	-	-	RxDA0	-

Notes: 1. P20 is connected to VDD by default. When P20 is disconnected from VDD, cut Jumper Trace Cut E25.

2. P60 and P61 are N-ch open drain outputs. Pull-up resistors need to be provided by the connected module.

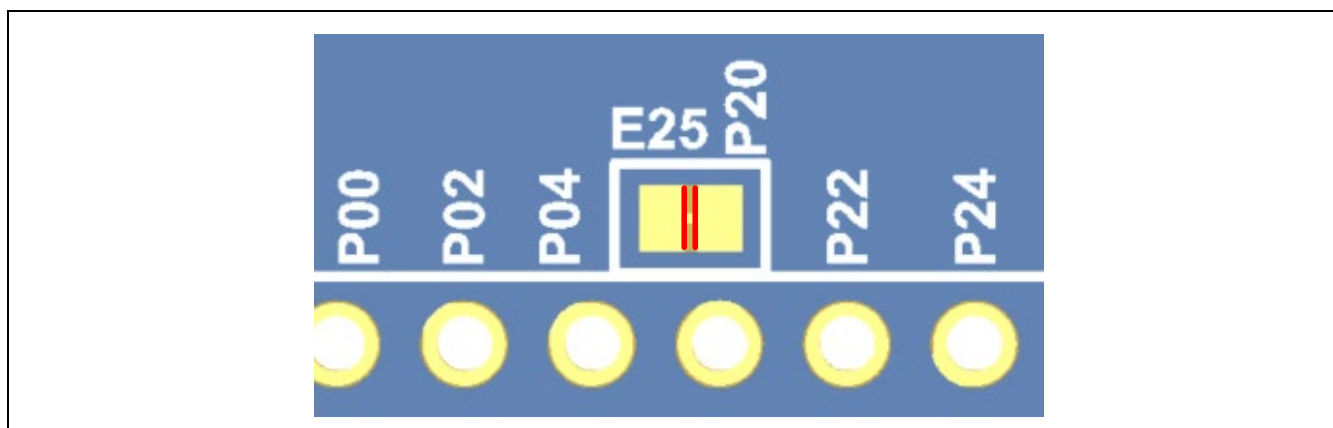


Figure 5-17 Assignment of E25 (Bottom Side)

5.3.2 Pmod Connectors

The specification of the Pmod™ connectors is on the assumption that Pmod modules are to be connectable.

Pmod 1 (J3) is assumed to be connected to the Pmod Interface Type 2A or 3A (option: Type 6A) module.

Pmod 2 (J4) is assumed to be connected to the Pmod Interface Type 6A (option: Type 2A or 3A) module.

For details on the Pmod module from Renesas, refer to the Web site at:

<https://www.renesas.com/quickconnect>.

Note: We do not guarantee connection to all types of Pmod module. Confirm the specifications of this board against any Pmod module you intend to use.

Figure 5-18, Table 5-3 and Table 5-4 show the pin assignments of the Pmod connectors.

Using the optional functions enclosed by [] in these figures and tables requires modification of the copper jumpers. For details, refer to Table 5-3, Table 5-4, Figure 5-19, Figure 5-20 and section 4.3.1 Copper Jumpers.

Using the functions enclosed by () in these figures and tables requires changing the settings of the peripheral I/O redirection register (PIORx) from the default settings. For details, refer to the RL78/G21 User's Manual: Hardware.

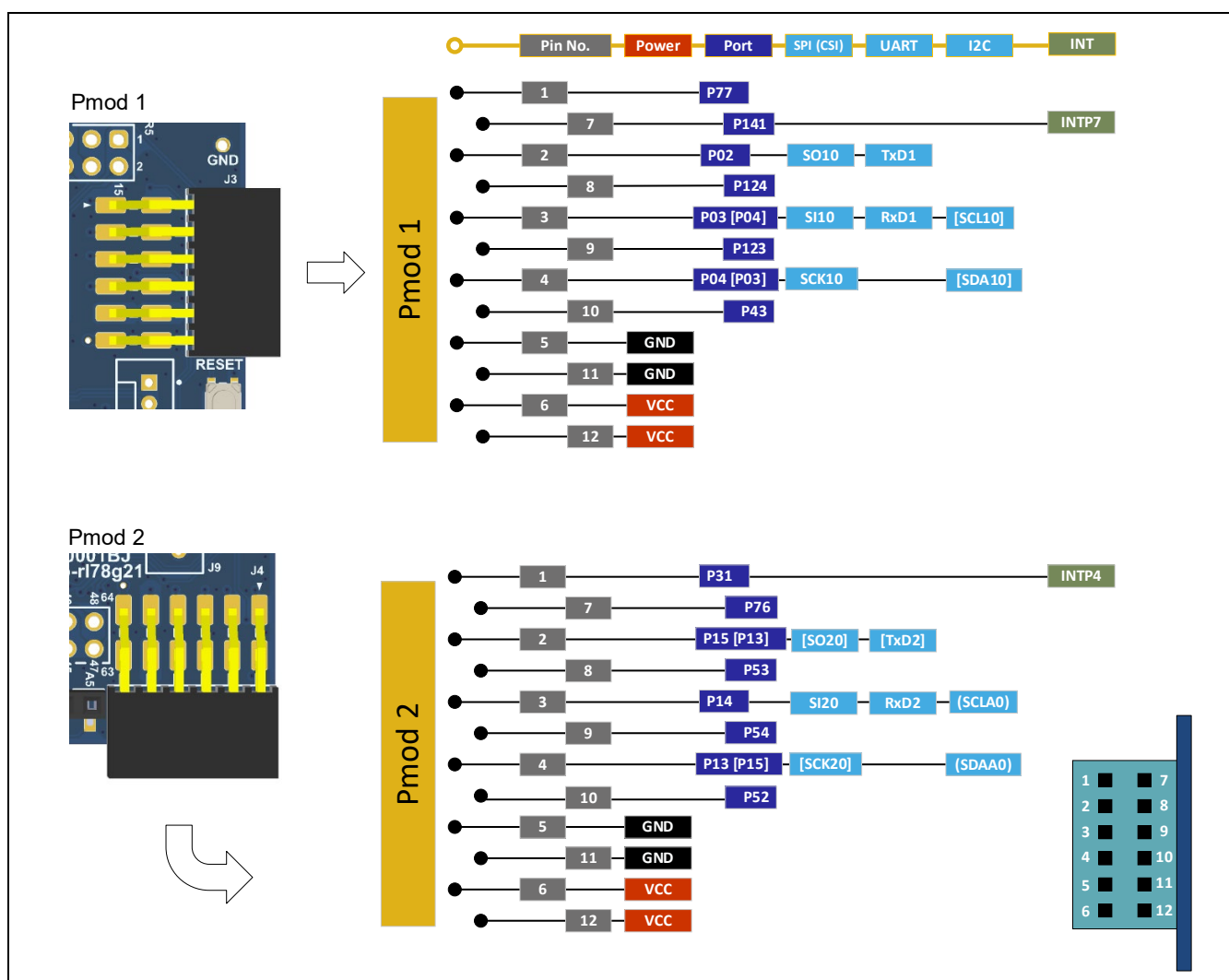


Figure 5-18 Pin Assignments of the Pmod Connectors

Table 5-3 Pin Assignments of Pmod 1 (J3)

Pmod 1			RL78/G21	Copper Jumper	
Pin	Default Type 2A/3A	Option Type 6A	Signal/Bus	Closed	Open
J3-1	CS/CTS	INT	P77/INTP11	E3	-
J3-2	MOSI/TXD	RESET	P02/SO10/TxD1	E5	-
J3-3	MISO/RXD	-	P03/SI10/RxD1	E7	E11
	-	[SCL] *1	[P04/SCL10]	E11	E7
J3-4	SCK/RTS	-	P04/SCK10	E9	E12
	-	[SDA] *1	[P03/SDA10]	E12	E9
J3-5	GND		GND	-	-
J3-6	VCC		EVDD	E2	E1
			[5.0V]	E1	E2
J3-7	INT/GPIO	GPIO	P141/INTP7	E4	-
J3-8	RESET/GPIO	GPIO	P124	E6	-
J3-9	CS2/GPIO	GPIO	P123	E8	-
J3-10	CS3/GPIO	GPIO	P43	E10	-
J3-11	GND		GND	-	-
J3-12	VCC		EVDD	E2	E1
			[5.0V]	E1	E2

*1 When using I²C, resistors R1 and R2 can be mounted to pull up the I²C signals (P03 and P04) to VCC.

Table 5-4 Pin Assignments of Pmod 2 (J4)

Pmod 2			RL78/G21	Copper Jumper	
Pin	Option Type 2A/3A	Default Type 6A	Signal/Bus	Closed	Open
J4-1	CS/CTS	INT	P31/INTP4	E15	
J4-2	-	RESET	P15	E17	E23
	[MOSI/TXD]		[P13/SO20/TxD2]	E23	E17
J4-3	MISO/RXD	SCL *1	P14/(SCLA0)/SI20/RxD2	E19	-
J4-4	-	SDA *1	P13/(SDAA0)	E21	E24
	[SCK/RTS]	-	[P15/SCK20]	E24	E21
J4-5	GND		GND	-	-
J4-6	VCC		EVDD	E14	E13
			[5.0V]	E13	E14
J4-7	INT/GPIO	GPIO	P76/INTP10	E16	-
J4-8	RESET/GPIO	GPIO	P53	E18	-
J4-9	CS2/GPIO	GPIO	P54	E20	-
J4-10	CS3/GPIO	GPIO	P52	E22	-
J4-11	GND		GND	-	-
J4-12	VCC		EVDD	E14	E13
			[5.0V]	E13	E14

*1 When using I²C, resistors R3 and R4 can be mounted to pull up the I²C signals (P14 and P13) to VCC.

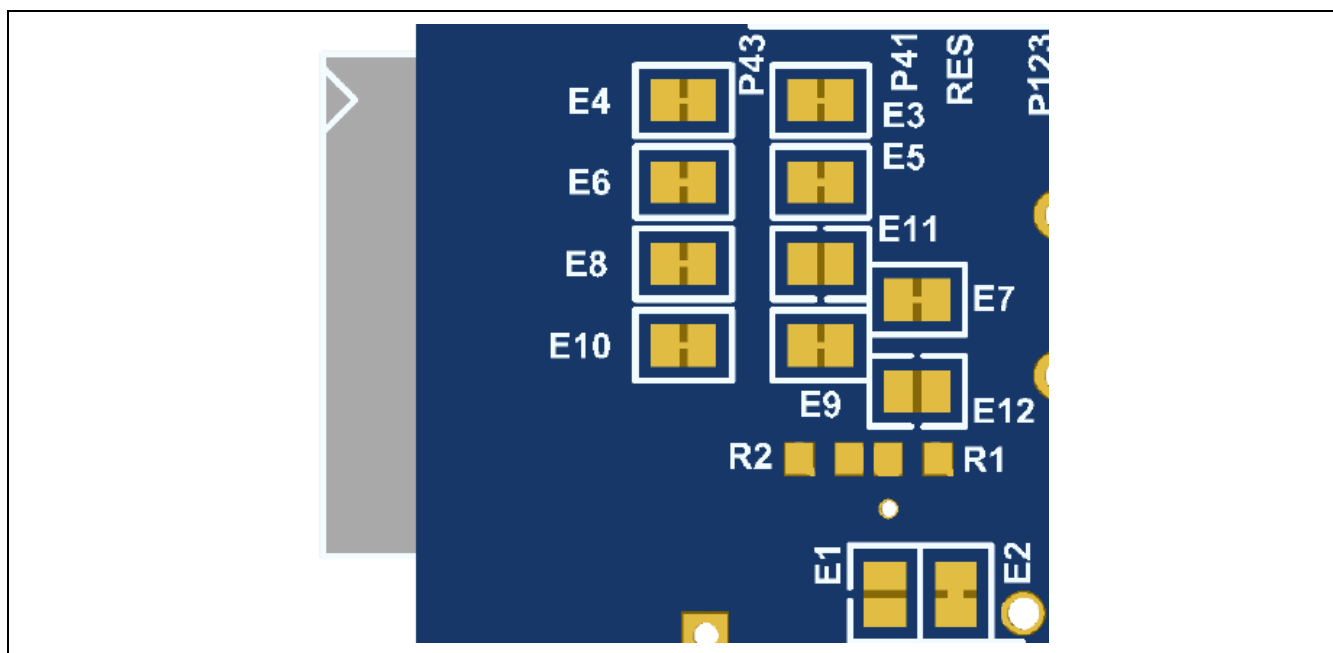


Figure 5-19 Assignments of Jumper Trace Cuts and Jumper Solder Bridges for Pmod 1 (Bottom Side)

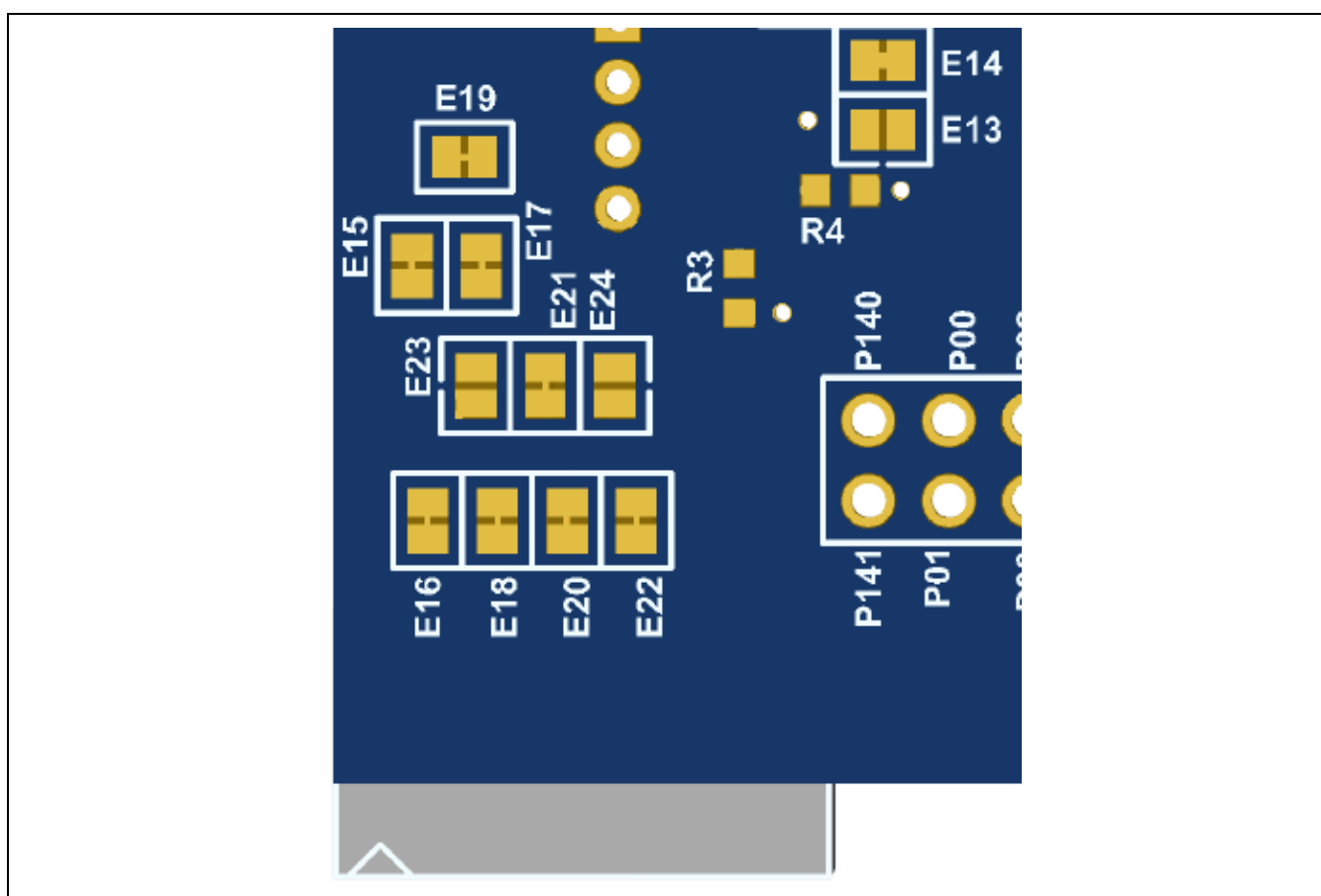


Figure 5-20 Assignments of Jumper Trace Cuts and Jumper Solder Bridges for Pmod 2 (Bottom Side)

5.3.3 Grove Connector

The specification of the Grove connector (J9) is on the assumption that Grove modules are to be connectable through I²C. If a connector is mounted, however, connection to all Grove modules (through I²C) is not guaranteed. Use this connector after having confirmed the specifications of this board and Grove modules (through I²C) you intend to use. Also, prepare I²C pull-up resistors on the connected-module side.

Figure 5-21 and Table 5-5 show the pin assignments of the Grove connector (the connector is not mounted).

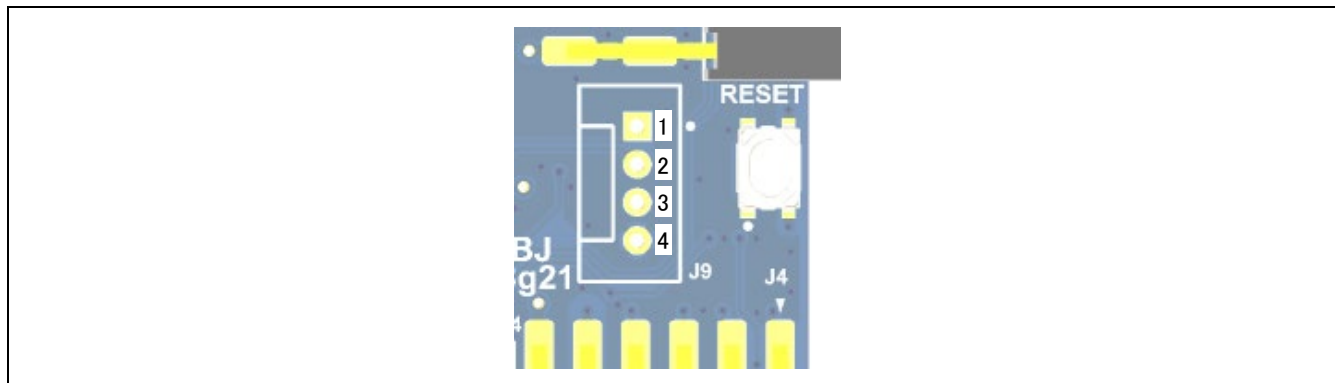


Figure 5-21 Pin Assignments of the Grove Connector

Table 5-5 Pin Assignments of the Grove Connector

Part No. in the Circuit Schematics	RL78/G21			
	Pin	Power Supply	Port	I ² C
J9-1	24	-	P75	SCL01
J9-2	25	-	P74	SDA01
J9-3	-	EVDD	-	-
J9-4	-	GND	-	-

5.4 LEDs

Three LEDs are provided on this board.

Behavior of the LEDs is described in the following table. User LEDs turn on by setting the port output to low level.

Note: The LED may not be illuminated when the power supply voltage is 2.2 V or lower.

Table 5-6 LED Connections

LED			FPB-RL78G21
Designator	Color	Function	Signal
LED1	Green	User LED	P33
LED2	Green	User LED	P34
LED3	Green	Power LED	VDD

5.5 Switches

Two small push-button switches are mounted on this board. Pressing the reset switch (SW2: RESET) generates a reset signal to reset the evaluation MCU. The signal connected to the user switch (SW1: SW) is at the low level while the user switch is being pressed. To use the user switch as an input, enable the internal pull-up function of P137. When an external pull-up resistor is to be used, do not enable the internal pull-up function of P137 but mount R5 (10 kΩ, EIA0603).

Table 5-7 Switch Connections

Switch		FPB-RL78G21
Designator	Function	Signal
RESET (SW2)	Reset Switch	RES#
SW (SW1)	User Switch	P137 (INTP0)

5.6 MCU Headers

The MCU headers are provided as through hole J1 and J2 for 32 (16 x 2) pins. The pin headers have a pitch of 2.54 mm and the evaluation MCU is connected to the through hole for the headers.

Table 5-8 and Table 5-9 show the pin assignments of the MCU headers.

Using the functions enclosed by [] in these tables requires modification of the copper jumpers.

Using the functions enclosed by () in these tables requires changing the settings of the peripheral I/O redirection register (PIORx) from the default settings. For details, refer to the RL78/G21 User's Manual: Hardware.

Table 5-8 Pin Assignments of the MCU Headers (J1)

J1 Evaluation MCU				Other Assignments					
Pin No.	Pin No.	Pin Name	Port Name	Power, Clock, Debug, LED, SW	Pmod1	Pmod2	Grove	Arduino	Arduino I/O ^{*1}
1	1	P120/ANI19	P120	-	-	-	-	-	14
2	2	P43	P43	-	10	-	-	-	15
3	3	P42/TI04/TO04	P42	-	-	-	-	~5: TO04	-
4	4	P41/TI07/TO07	P41	-	-	-	-	~6: TO07	-
5	5	P40/TOOL0	P40	TOOL0	-	-	-	-	16
6 ^{*2}	6	P125/RESET/(INTP9)	P125 ^{*2}	RESET	-	-	-	RESET	-
7	7	P124/(RxD A0)	P124	-	8	-	-	-	17
8	8	P123/(TxDA0)	P123	-	9	-	-	-	18
9	9	P137/INTP0	P137	SW	-	-	-	-	19
10	10	P122/X2/EXCLK/(INTP6)/(RxD2)	P122	[Main clock]	-	-	-	-	20
11	11	P121/X1/(INTP8)/(TxDA2)	P121	[Main clock]	-	-	-	-	21
12	-	-	-	-	-	-	-	-	-
13	13	VSS	-	GND	-	-	-	-	-
14	14	EVSS0	-	GND	-	-	-	-	-
15	15	VDD	-	VDD	-	-	-	-	-
16	16	EVDD0	-	EVDD	-	-	-	-	-
17	17	P60/SCLA0	P60	-	-	-	-	SCL: SCLA0	-
18	18	P61/SDAA0	P61	-	-	-	-	SDA: SDAA0	-
19	19	P34/(RxD A0)	P34	LED2	-	-	-	-	22
20	20	P33/(TxDA0)	P33	LED1	-	-	-	-	23
21	21	P31/TI03/TO03/INTP4	P31	-	-	1: INTP4	-	-	24
22	22	P77/KR7/INTP11/(TxDA2)	P77	-	1: INTP11	-	-	-	25
23	23	P76/KR6/INTP10/(RxD2)	P76	-	-	7: INTP10	-	-	26
24	24	P75/KR5/INTP9/SCK01/SCL01	P75	-	-	-	1: SCL01	-	27
25	25	P74/KR4/INTP8/SI01/SDA01	P74	-	-	-	2: SDA01	-	28
26	26	P73/KR3/SO01	P73	-	-	-	-	8	-
27	27	P72/KR2/SO21/TxDA0	P72	-	-	-	-	1: TxDA0	-
28	28	P71/KR1/SI21/SDA21/RxDA0	P71	-	-	-	-	0: RxDA0	-
29	29	P70/KR0/SCK21/SCL21	P70	-	-	-	-	-	29
30	30	P06/TI06/TO06/CLKA0	P06	-	-	-	-	~9: TO06	-
31	31	P05/TI05/TO05	P05	-	-	-	-	~10: TO05	-
32	32	P30/INTP3/SCK11/SCL11	P30	-	-	-	-	2	-

Notes: 1. The names of Arduino signals correspond to the pin numbers for the Arduino IDE. The Arduino IDE will be supported in the future.

2. When the RL78 COM port debug tool is in use, use of the P125/RESET pin as P125 is prohibited. If P125 is mistakenly set, refer to 5.2.1 USB-to-Serial Converter.

Table 5-9 Pin Assignments of the MCU Headers (J2)

J2	Evaluation MCU			Other Assignments					
Pin No.	Pin No.	Pin Name	Port Name	Power, Clock, Debug, LED, SW	Pmod1	Pmod2	Grove	Arduino	Arduino I/O ^{*1}
1	33	P50/INTP1/SI11/SDA11/(RxD2)	P50	-	-	-	-	4	-
2	34	P51/INTP2/SO11/(TxD2)	P51	-	-	-	-	7	-
3	35	P52/(INTP10)	P52	-	-	10	-	-	30
4	36	P53/(INTP11)	P53	-	-	8	-	-	31
5	37	P54	P54	-	-	9	-	-	32
6	38	P55/(SCK00)	P55	-	-	-	-	13: (SCK00)	-
7	39	P17/TI02/TO02/(SO00)/(TxD0)	P17	-	-	-	-	~11: TO02/(SO00)	-
8	40	P16/TI01/TO01/INTP5/(SI00)/(RxD0)	P16	-	-	-	-	12: (SI00)	-
9	41	P15/SCK20/SCL20/(TI02)/(TO02)	P15	-	-	2: [4: SCK20]	-	-	33
10	42	P14/RxD2/SI20/SDA20/(SCLA0)/(TI03)/(TO03)	P14	-	-	3: (SCLA0)/SI20/RxD2	-	-	34
11	43	P13/TxD2/SO20/(SDAA0)/(TI04)/(TO04)	P13	-	-	4: (SDAA0) [2: SO20/TxD2]	-	-	35
12	44	P12/SO00/TxD0/TOOLTxD/(INTP5)/(TI05)/(TO05)	P12	TOOLTxD	-	-	-	-	36
13	45	P11/SI00/RxD0/TOOLRxD/SDA00/(TI06)/(TO06)	P11	TOOLRxD	-	-	-	-	37
14	46	P10/SCK00/SCL00/(TI07)/(TO07)	P10	-	-	-	-	~3: (TO07)	-
15	47	P146	P146	-	-	-	-	-	38
16	48	P147/ANI18	P147	-	-	-	-	-	39
17	49	P27/ANI7	P27	-	-	-	-	A5: ANI7	-
18	50	P26/ANI6	P26	-	-	-	-	A4: ANI6	-
19	51	P25/ANI5	P25	-	-	-	-	A3: ANI5	-
20	52	P24/ANI4	P24	-	-	-	-	A2: ANI4	-
21	53	P23/ANI3	P23	-	-	-	-	A1: ANI3	-
22	54	P22/ANI2	P22	-	-	-	-	A0: ANI2	-
23 ^{*2}	55	P21/ANI1/AVREFM	[P21]	GND	-	-	-	-	40
24 ^{*3}	56	P20/ANI0/AVREFP	[P20]	VDD	-	-	-	AREF: [AVREFP]	-
25	57	P130	P130	-	-	-	-	-	41
26	58	P04/SCK10/SCL10	P04	-	4: SCK10 [3: SCL10]	-	-	-	42
27	59	P03/ANI16/SI10/RxD1/SDA10	P03	-	3: SI10/RxD1 [4: SDA10]	-	-	-	43
28	60	P02/ANI17/SO10/TxD1	P02	-	2: SO10/TxD1	-	-	-	44
29	61	P01/TO00/(RxD1)/(RxDA0)	P01	-	-	-	-	-	45
30	62	P00/TI00/(TxD1)/(TxDA0)	P00	-	-	-	-	-	46
31	63	P141/INTP7	P141	-	7: INTP7	-	-	-	47
32	64	P140/INTP6	P140	-	-	-	-	-	48

Notes: 1. The names of Arduino signals correspond to the pin numbers for the Arduino IDE. The Arduino IDE will be supported in the future.

2. P21 is connected to GND by default. When P21 is to be disconnected from GND, cut Jumper Trace Cut E28.

3. P20 is connected to VDD by default. When P20 is to be disconnected from VDD, cut Jumper Trace Cut E25.

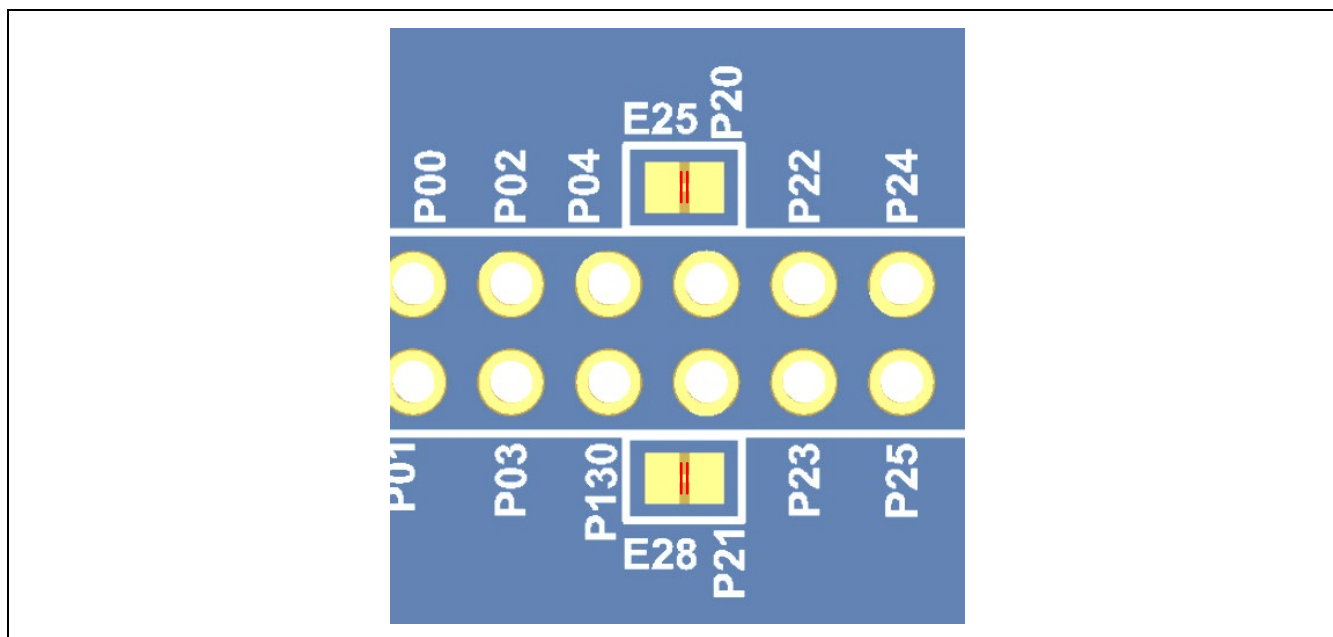


Figure 5-22 Assignments of E25 and E28 (Bottom Side)

5.7 Current Measurement Header

This header (J10) is used to measure the current drawn by the evaluation MCU (J10 header is not mounted). Connecting an ammeter to this board enables measurement of the current being drawn by the evaluation MCU. Take care to cut Jumper Trace Cut E29 if this header is to be used. Figure 5-23 shows the positions of the current measurement header and Jumper Trace Cut.

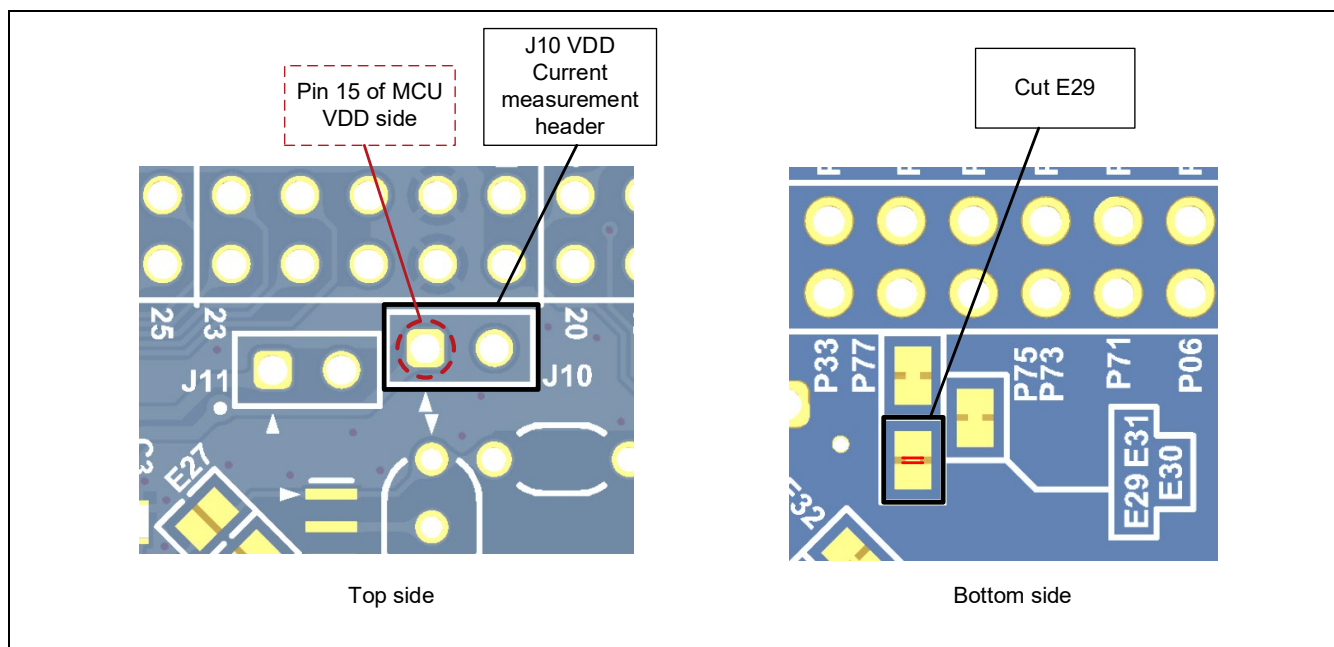


Figure 5-23 Positions of the Current Measurement Header (J10) and Jumper Trace Cut E29

Insert an ammeter between the sockets of the current measurement header (J10) to measure the current. To minimize current drawn outside the evaluation MCU, turn off the LEDs. Additionally, to ignore the current drawn by the USB-to-serial converter (FTDI: FT232RLN), cut Jumper Trace Cut E43 (see Figure 5-7). Note that cutting this jumper will prevent USB communication.

When the current is to be measured with EVDD turned off and the MCU in a low-power state, cut Jumper Trace Cut E30 (see Figure 5-6) to separate VDD from EVDD.

Figure 5-24 is a block diagram of the power-supply lines related to the measurement of current drawn. For a block diagram of the power-supply circuit as a whole, refer to Figure 5-1.

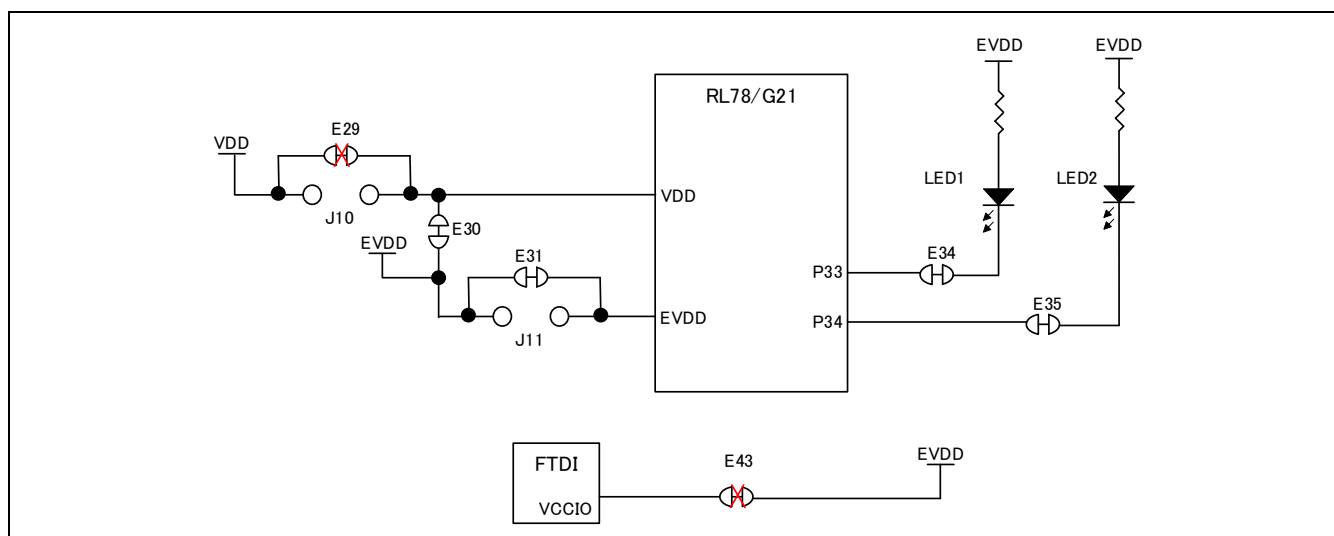


Figure 5-24 Block Diagram of the Headers Related to Current Measurement

5.8 Clock

Clock circuits are provided to handle the clock sources for the evaluation MCU. For details on the specifications of the evaluation MCU, refer to the RL78/G21 User's Manual: Hardware. For details on the clock circuit of this board, refer to the circuit schematics. Table 5-10 shows the details of the clocks on this board.

Table 5-10 Details of Clocks

Clock	Function and Usage	State as Shipped	Frequency	Package for the Oscillator
X1*	Crystal oscillator for the main system clock (e.g. CSTNE20M0V5 from Murata Manufacturing Co., Ltd.)	Not mounted	n/a	SMT
X2*	Crystal oscillator or ceramic resonator for the main system clock	Not mounted	n/a	Lead type

Note: Use the main system clock by cutting Jumper Trace Cuts E32 and E33 and short-circuiting Jumper Solder Bridges E26 and E27.

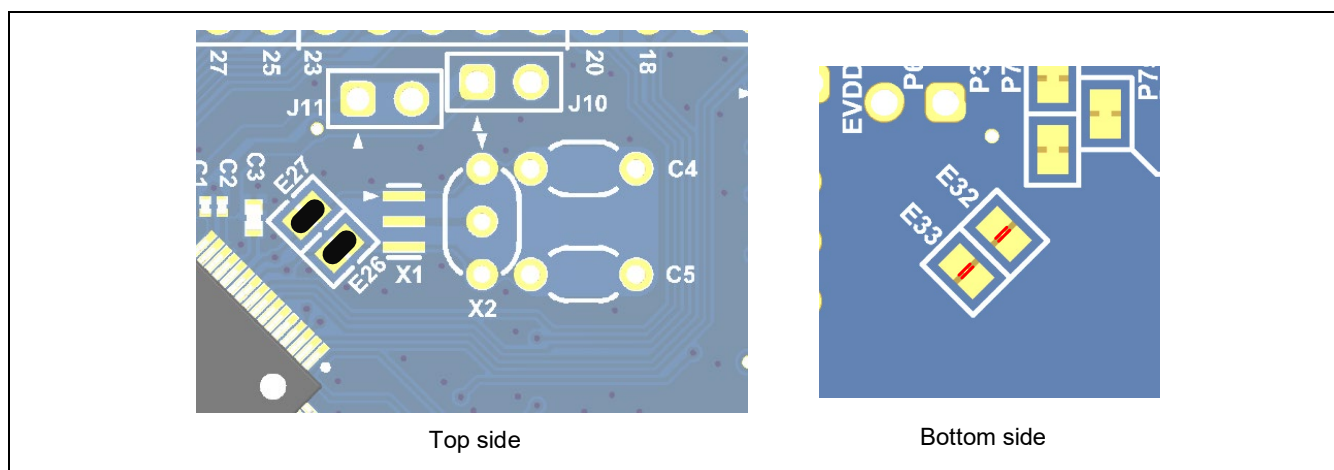


Figure 5-25 Assignments of E26, E27, E32, and E33

6. Handling Precautions

6.1 Power to be Supplied

When power is to be supplied to this board through the USB, note that the total current of VDD, EVDD, 5 V, and 3.3 V should not exceed 500 mA. When using power from an emulator, note that the total current should not exceed 200 mA.

6.2 Remodeling the Board

Any modification of the board (including cutting the Jumper Trace Cut and short-circuiting the Jumper Solder Bridge) shall be conducted at the user's own responsibility.

6.3 Note on Using P12/TxD0

Do not write a user program to the evaluation MCU that starts UART transmission output on the P12/TxD0 line before the host PC recognizes the USB-to-serial converter as a COM port, such as immediately after power-on or release from reset of the USB-to-serial converter. The operation of the USB-to-serial converter may become unstable, and connection to the Renesas Flash Programmer or terminal software may become impossible.

In such cases, turn on the power (connect the USB cable) while pressing the reset switch, wait about 3 seconds until the host PC recognizes the USB-to-serial converter as a COM port, and release the reset switch. Otherwise, reset the USB-to-serial converter (by turning SW3 on and then back off) while pressing the reset switch, wait about 3 seconds until the host PC recognizes the USB-to-serial converter as the COM port, and release the reset switch.

Finally, erase the user program by using the Renesas Flash Programmer.

6.4 Note on Using P137/INTP0

P137/INTP0 is connected to the user switch (SW1: SW). To use the user switch as an input, enable the internal pull-up function of P137. When using an external pull-up resistor, do not enable the internal pull-up function of P137 but mount R5 (10 kΩ).

7. Certifications

This board meets the following certifications/standards. See the beginning of this document for the disclaimer and precautions.

7.1 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 required to take adequate measures to correct this interference.

- Taiwan: CNS 15936, Class A limits 警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境
- Australia/New Zealand AS/NZS CISPR 32:2015, Class A

7.2 Material Selection, Waste, Recycling and Disposal Standards

- EU RoHS
- China SJ/T 11364-2014, 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>

7.3 Safety Standards

- UL 94V-0

8. Related Documents

Table 8-1 lists the related documents for this board and Table 8-2 describes the contents of the design package. All these documents are available on renesas.com/fpb-rl78g21.

Table 8-1 Related Documents

Document Type	Description	Document Title	Document No.
User's manual	This manual Provides a comprehensive overview of this board.	FPB-RL78G21 User's Manual	R20UT5750EJ
Quick Start Guide	Provides a concise board specification and power-up behavior.	FPB-RL78G21 Quick Start Guide	R20QS0098EJ
Basic Usage Guide	Provides procedures for evaluating this board using the pre-programmed demonstration software.	FPB-RL78G21 Basic Usage Guide	R20AN0859EJ
Design Package	The complete hardware design file, including schematics, PCB layouts, and manufacturing data for this board.	fpb-rl78g21-v1- Design Package	-

Table 8-2 FPB-RL78G21 v1 Design Package Contents

File Type	Content	File/Folder Name
File (PDF)	Schematics	r12tu0435ej0100-fpb-rl78g21-v1-schematics
File (PDF)	BOM	r12tu0436ej0100-fpb-rl78g21-v1-bom
File (PDF)	Mechanical Drawing	fpb-rl78g21-v1-mechdwg
File (PDF)	3D Drawing	fpb-rl78g21-v1-3d
Folder	Manufacturing Files	Manufacturing Files
Folder	Design Files	Design Files - Altium

9. Website and Support

Visit the following URLs to learn about the kit and the RL78 family of microcontrollers, download tools and documentation, and get support.

RL78/G21 Fast Prototyping Board resources	renesas.com/fpb-rl78g21
RL78 Product Information	renesas.com/rl78
RL78 Product Support Forum	community.renesas.com/mcu-mpu/rl78
RL78 Videos	renesas.com/software-tool/rl78-software-tool-course
Renesas Support	renesas.com/support

Revision History	RL78/G21 Fast Prototyping Board User's Manual
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		Page	Summary
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