User's Manual

32

RX62N Group

Renesas Starter Kit+ User's Manual

RENESAS MCU
RX Family / RX600 Series

Renesas Electronics
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Precautions

The following precautions should be observed when operating any RSK product:

This Renesas Starter Kit 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. However, 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 10m of the product when in use.
- The user is advised to take ESD precautions when handling the equipment.

The Renesas Starter Kit does not represent an ideal reference design for an end product and does not fulfil the regulatory standards for an end product.

How to Use This Manual

1. Purpose and Target Readers

This manual is designed to provide the user with an understanding of the RSK hardware functionality, and electrical characteristics. It is intended for users designing sample code on the RSK platform, using the many different incorporated peripheral devices.

The manual comprises of an overview of the capabilities of the RSK product, but does not intend to be a guide to embedded programming or hardware design. Further details regarding setting up the RSK and development environment can found in the tutorial manual.

Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the RX62N Group. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.

Document Type	Description	Document Title	Document No.
User's Manual	Describes the technical details of the RSK hardware.	RSK+RX62N User's Manual	REJ10J2198
Software Manual	Describes the functionality of the sample code, and its interaction with the Renesas Peripheral Driver Library (RPDL)	RSK+RX62N Software Manual	REJ10J2201
Tutorial	Provides a guide to setting up RSK environment, running sample code and debugging programs.	RSK+RX62N Tutorial Manual	REJ10J2199
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	RSK+RX62N Quick Start Guide	REJ10J2200
Schematics	Full detail circuit schematics of the RSK.	RSK+RX62N Schematics	RJJ99J0073
Hardware Manual	Provides technical details of the RX62N microcontroller.	RSK+RX62N Hardware Manual	R01UH0033EJ

2. List of Abbreviations and Acronyms

Abbreviation	Full Form
ADC	Analogue-to-Digital Converter
bps	bits per second
CAN	Controller-Area Network
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
DIP	Dual In-line Package
DMA	Direct Memory Access
DMAC	Direct Memory Access Controller
E1	On-chip Debugger
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
HEW	High-performance Embedded Workshop
I^2C	Phillips™ Inter-Integrated Circuit Connection Bus
IRQ	Interrupt Request
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Micro-controller Unit
MTU	Multifunction Timer Unit
OTG	On The Go™
PC	Program Counter
PLL	Phase Locked Loop
PWM	Pulse Width Modulation
RSK+	Renesas Starter Kit+
RSPI	Renesas Serial Peripheral Interface
SDRAM	Synchronous Dynamic Random Access Memory
SFR	Special Function Register
SPI	Serial Peripheral Interface
SRAM	Static Random Access Memory
TFT	Thin Film Transistor
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

Table of Contents

1. Overview

1.1 Purpose

This RSK is an evaluation tool for Renesas microcontrollers. This manual describes the technical details of the RSK hardware. The Quick Start Guide and Tutorial Manual provide details of the software installation and debugging environment.

1.2 Features

This RSK provides an evaluation of the following features:

- Renesas microcontroller programming
- User code debugging
- User circuitry such as switches, LEDs and a potentiometer
- Sample application
- Sample peripheral device initialisation code

The RSK board contains all the circuitry required for microcontroller operation.

2. Power Supply

2.1 Requirements

This RSK+ is supplied with an E1 debugger. The debugger is able to power the RSK+ board with up to 200mA. When the RSK is connected to another system then that system should supply power to the RSK+. All RSK and RSK+ boards have an optional centre positive supply connector using a 2.0mm barrel power jack.

This RSK+ supports a wide range of voltage inputs, and requires specific configuration for different inputs. Details of the external power supply connections are shown in **Table 2-1** below.

Connector	Supply Voltages	J10 Setting	J11 Setting
PWR1	Regulated, 5V DC	Shorted	Shorted
	Unregulated, 7 to 15V DC	Open	Open

Table 2-1: Main Power Supply Requirements

The main power supply connected to PWR1 should supply a minimum of 5W to ensure full functionality.

This RSK+ features an independent USB power supply, which allows a user to power the USB host/OTG modules from a second external power supply. Connections for the external USB power supply are detailed in **Table 2-2** below.

Connector	Supply Voltages
PWR2	Regulated, 3.3V DC
PWR3	Regulated, 5V DC

Table 2-2: USB Power Supply Requirements

The USB power supplies connected to PWR2 and PWR3 should both supply a minimum of 600mA to ensure full USB host functionality. Note: The OTG module is limited to supply a maximum of 200mA when operating as host.

The RSK+ can also be powered directly from the USB VBUS, when a suitable host device is connected to the USB0 connector and the RSK+ is correctly configured (refer to §6). This will limit the current consumption of the RSK+ to 500mA (USB maximum), therefore full functionality can not be achieved whilst being powered from the USB VBUS.

2.2 Power-Up Behaviour

When the RSK+ is purchased, the RSK+ board has the ‘Release’ or stand-alone code from the example tutorial code pre-programmed into the Renesas microcontroller. On powering up the board the user LEDs will start to flash. After 200 flashes or after pressing any switch, the LEDs will flash at a rate controlled by the potentiometer.

3. Board Layout

3.1 Component Layout

Figure 3-1 below shows the top component layout of the board.

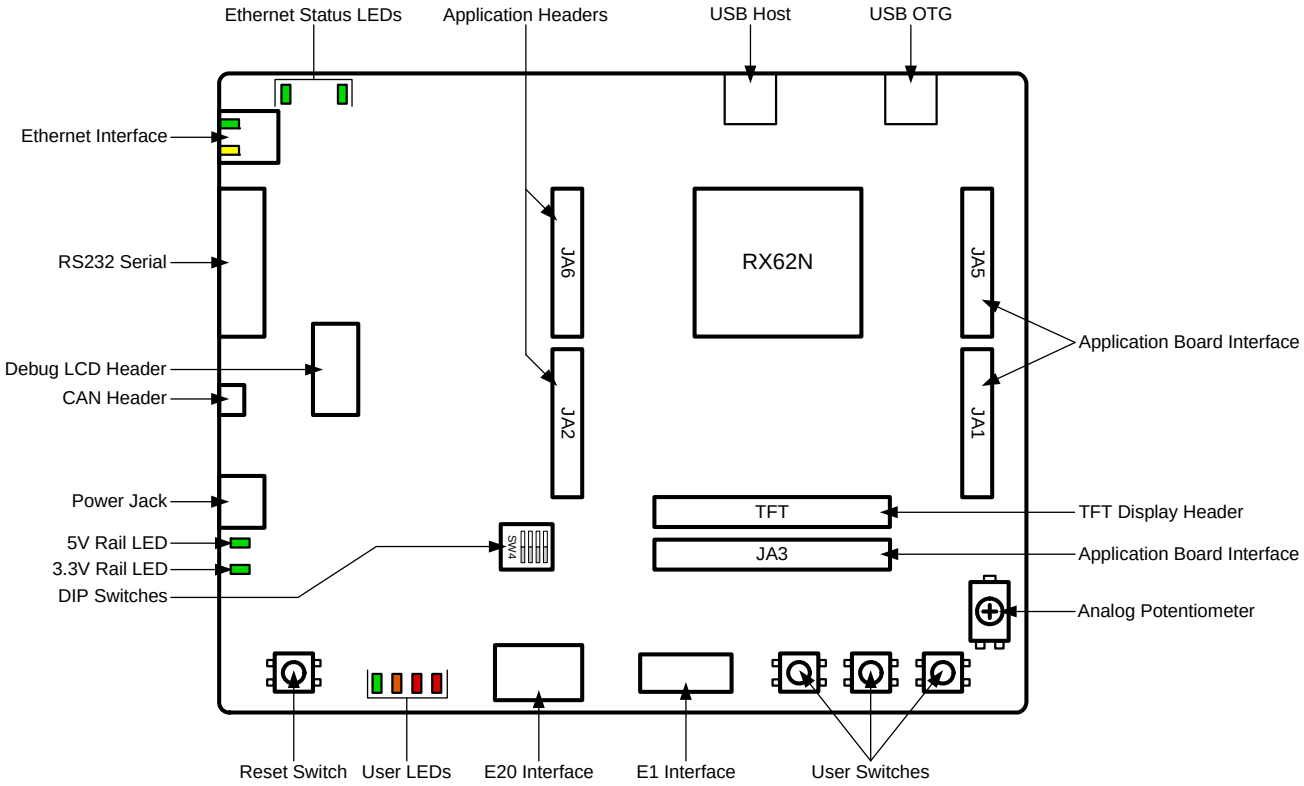

Figure 3-1: Board Layout

3.2 Board Dimensions

Figure 3-2 below gives the board dimensions and connector positions. All the through-hole connectors are on a common 0.1 inch grid for easy interfacing.

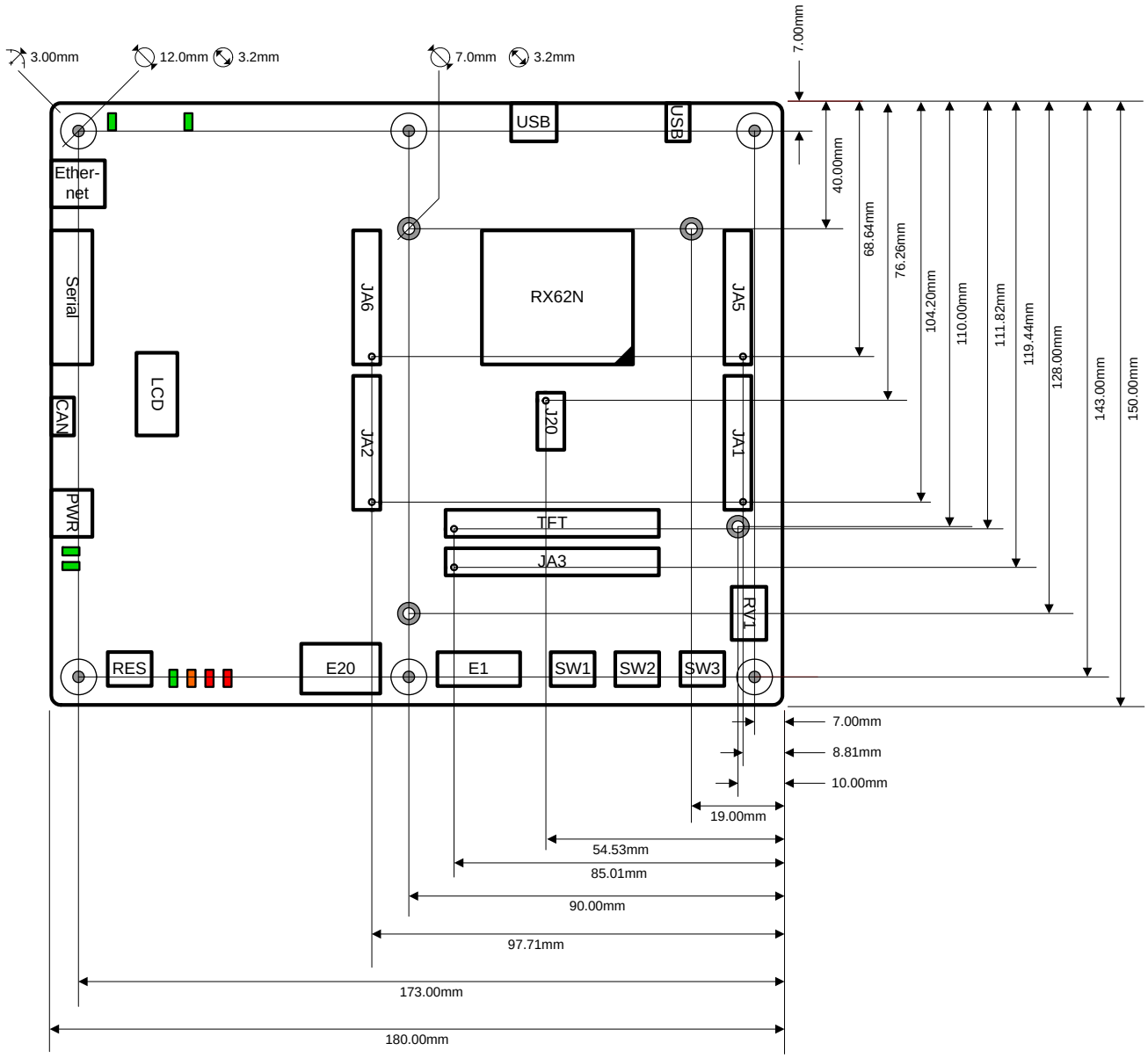

Figure 3-2: Board Dimensions

3.3 Component Placement

Figure 3-3 below shows placement of individual components on the top-side PCB – bottom-side component placement can be seen in **Figure 3-4**, overleaf. Component types and values can be looked up using the board schematics.

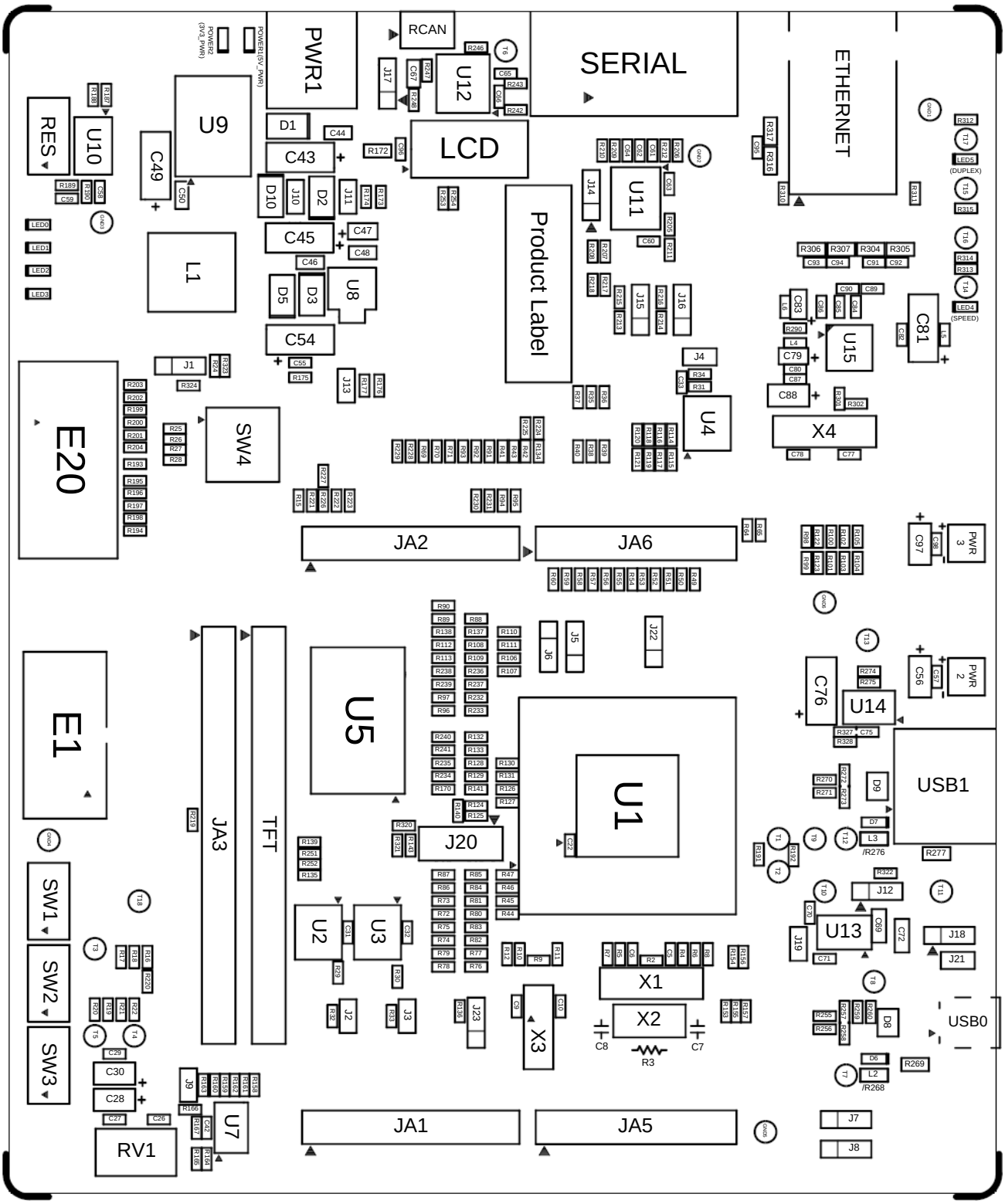

Figure 3-3: Top-Side Component Placement

Figure 3-4 below shows the component placement on the bottom-side of the RSK+ board.

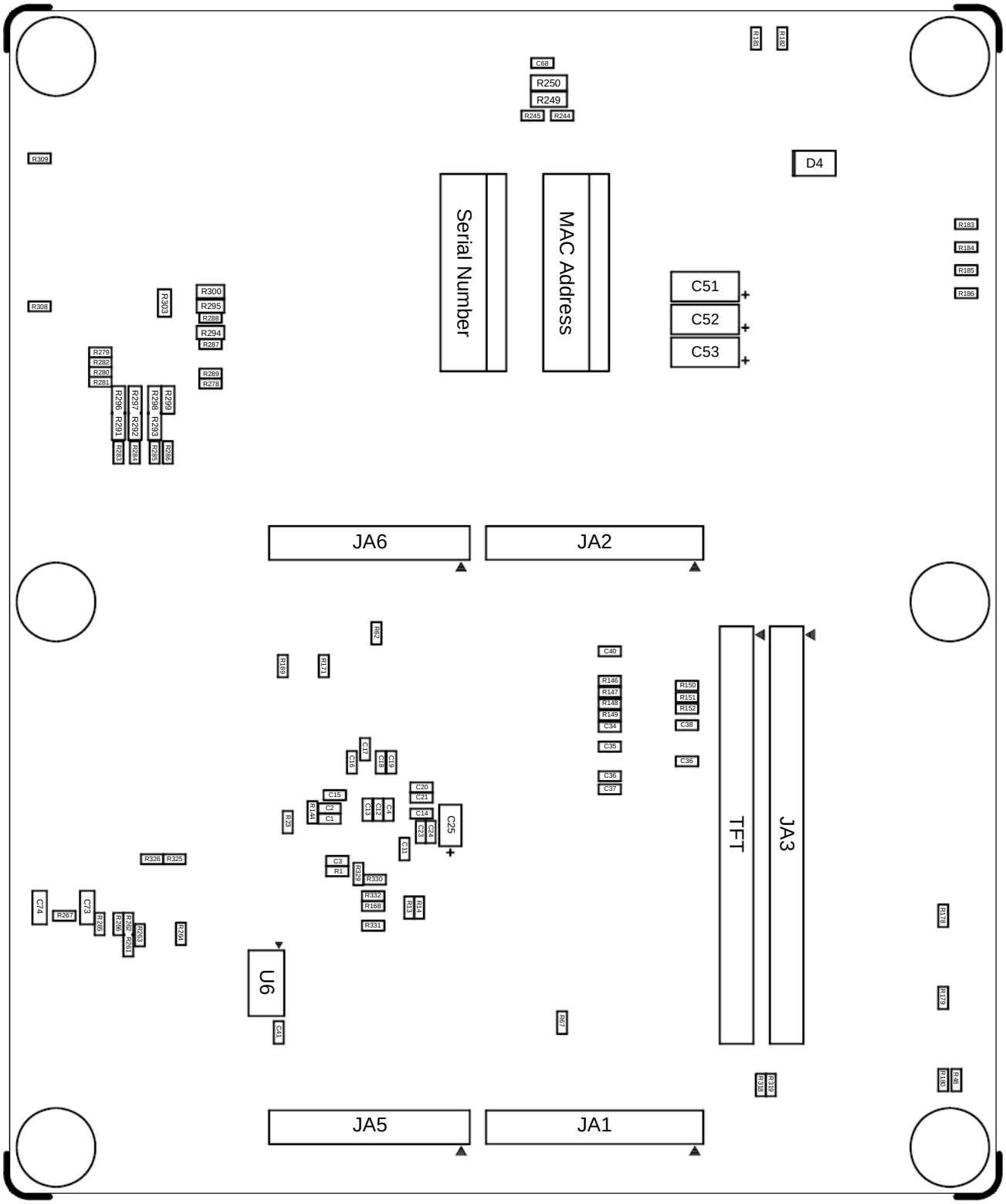

Figure 3-4: Bottom-Side Component Placement

4. Connectivity

4.1 Internal RSK Connections

The diagram below shows the RSK+ board components and their connectivity to the MCU.

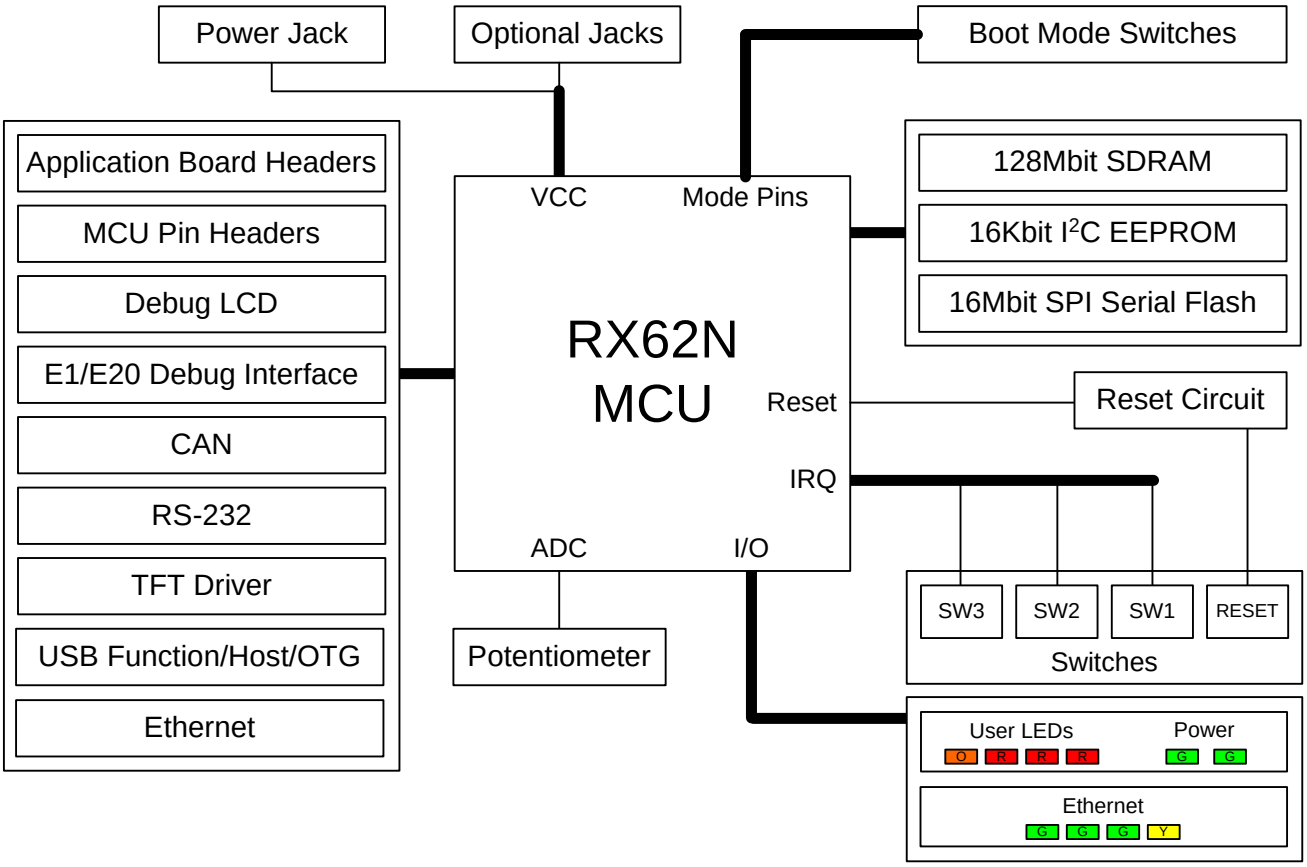

Figure 4-1: Internal RSK+ Block Diagram

4.2 Debugger Connections

The diagram below shows the connections between the RSK+, E1 debugger and the host PC.

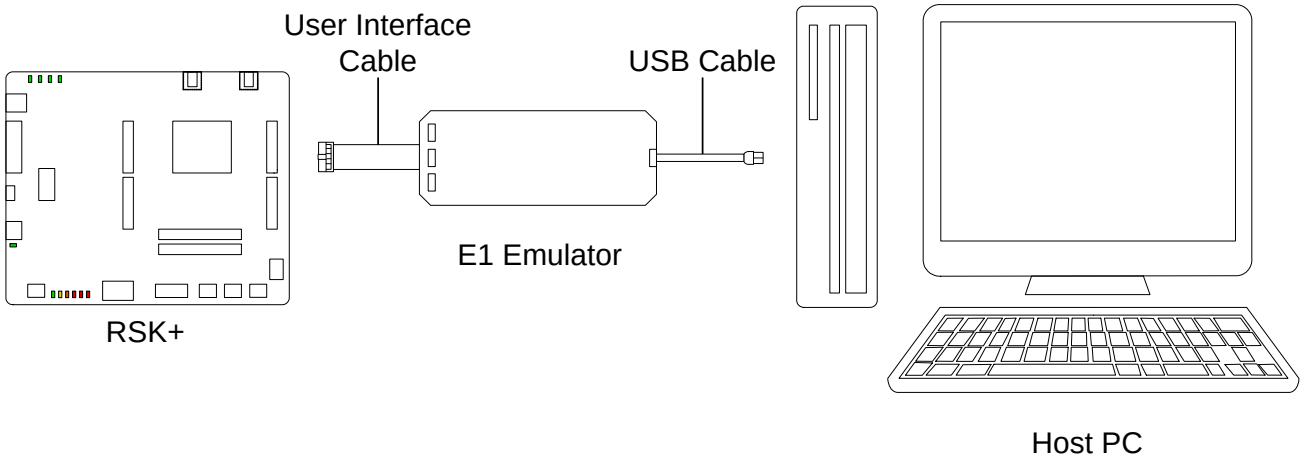

Figure 4-2: Debugger Connection Diagram

5. User Circuitry

5.1 Reset Circuit

A reset control circuit is fitted to the RSK to generate the required reset signal, and is triggered from the RES switch. Refer to the RX62N hardware manual for details regarding the reset signal timing requirements, and the RSK+RX62N board schematics for information regarding the reset circuitry in use on the RSK.

5.2 Clock Circuit

A clock circuit is fitted to the RSK to generate the required clock signal to drive the MCU, and associated peripherals. Refer to the RX62N hardware manual for details regarding the clock signal requirements, and the RSK+RX62N board schematics for information regarding the clock circuitry in use on the RSK. Details of the oscillators fitted to the RSK are listed in **Table 5-1** below.

Crystal	Function	Default Placement	Frequency	Device Package
X1	Main MCU oscillator.	Fitted	12MHz	HC49/4U
X2	Internal RSK Testing Only	Unfitted	n/a	n/a
X3	Real time Clock	Fitted	32.768kHz	Encapsulated, SMT
X4	Ethernet Clock	Fitted	25MHz	HC49/4U

Table 5-1: Oscillators

5.3 Switches

There are four switches located on the RSK+ board. The function of each switch and its connection is shown in **Table 5-2**. For further information regarding switch connectivity, refer to the RSK+RX62N board schematics.

Switch	Function	MCU Connection
RES	When pressed, the microcontroller is reset.	RES#, Pin H4
SW1	Connects to an IRQ input for user controls.	IRQ8-A, Pin C1
SW2	Connects to an IRQ input for user controls.	IRQ9-A, Pin D2
SW3/ADTRG	Connects to an IRQ input for user controls. The switch is also connected to an ATRG input, and is used to trigger AD conversions.	IRQ15-A/ADTRG0#, Pin C4

Table 5-2: Switch Connections

5.4 LEDs

There are ten LEDs on the RSK board. The function of each LED, its colour, and its connections are shown in **Table 5-3**.

LED	Colour	Function	MCU Connection
3V3_PWR	Green	Indicates the status of the 3.3V power rail.	No connection
5V_PWR	Green	Indicates the status of the 5V power rail.	No connection
LED0	Green	User operated LED.	P02, Pin B1
LED1	Orange	User operated LED.	P03, Pin C2
LED2	Red	User operated LED.	P05, Pin C3
LED3	Red	User operated LED.	P34, Pin J4
LED4	Green	Ethernet speed status LED.	No connection
LED5	Green	Ethernet duplex status LED.	No connection
Built into Ethernet con.	Green	Ethernet link status LED.	No connection
Built into Ethernet con.	Yellow	Ethernet activity status LED.	No connection

Table 5-3: LED Connections

5.5 Potentiometer

A single-turn potentiometer is connected as a potential divider to analogue input AN0, C5. The potentiometer can be used to create a voltage between AVCC and ground (by default, AVCC is connected to the board 5V supply).

The potentiometer is fitted to offer an easy method of supplying a variable analogue input to the microcontroller. It does not necessarily reflect the accuracy of the controller's ADC. Refer to the device hardware manual for further details.

5.6 Debug LCD Module

A debug LCD module is supplied with the RSK, and should be connected to the LCD header, LCD1.

Care should be taken when installing the LCD module to ensure pins are not bent or damaged. The LCD module is vulnerable to electrostatic discharge (ESD); therefore appropriate ESD protection should be used.

The debug LCD module uses a 4-bit interface to reduce pin allocation. No contrast control is provided, as this is set by a resistor supplied on the display module. Connection information for the debug LCD is provided in **Table 5-4**, overleaf. Connection information for the debug LCD module is provided in **Table 5-4** below.

Debug LCD Header					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	Ground	-	2	Board_5V	-
3	No Connection	-	4	DLCDRS	P84, Pin R9
5	R/W (Pulled to ground)	-	6	DLCDE (pulled to ground)	P85, Pin P9
7	No Connection	-	8	No Connection	-
9	No Connection	-	10	No Connection	-
11	DLCDD4	P94, Pin C8	12	DLCDD5	P95, Pin D8
13	DLCDD6	P96, Pin B8	14	DLCDD7	P97, Pin B9

Table 5-4: LCD Header Connections

5.7 RS232 Serial Port

Serial port SCI2-A is connected to the standard RS232 header fitted to the RSK. Alternatively, serial port SCI1-B or SCI6-A can be connected to the RS232 transceiver by making changes to the configurations to the jumpers and option links (refer to §6). Connections between the RS232 header and the microcontroller are listed in the **Table 5-5**.

SCI Signal	Function	MCU Connection	RS232 Connection
TxD2-A	SCI2-A Transmit Signal.	P13, Pin P5	Pin 2
RxD2-A	SCI2-A Receive Signal.	P12, Pin R3	Pin 3
TxD1-B	SCI1-B Transmit Signal.	PF0, Pin K3	Pin 8*
RxD1-B	SCI1-B Receive Signal.	PF2, Pin L1	Pin 7*
TxD6-A	SCI6-A Transmit Signal.	P00, Pin C1	Pin 2*
RxD6-A	SCI6-A Receive Signal.	P01, Pin D2	Pin 3*

Table 5-5: Serial Port Connections

* This connection is a not available in the default RSK+ configuration - refer to §6 for the required modifications.

5.8 Controller-Area Network (CAN)

A CAN transceiver IC is fitted to the RSK+, and is connected to the CAN MCU peripheral. For further details regarding the CAN protocol and supported modes of operation, please refer to the RX62N hardware manual.

The connections for the CAN microcontroller signals are listed in **Table 5-7** below.

CAN Signal	Function	MCU Connection
CTX0	CAN Data Transmission.	P32, Pin J2
CRX0	CAN Data Reception.	P33, Pin K1
CANEN	CAN Transceiver Device Enable Control.	P42, Pin A3
CANERRn	CAN Error and Power Status.	P43, Pin D5
CANSTBn	CAN Standby Mode Control.	P41, Pin D4

Table 5-6: CAN Connections

5.9 Ethernet

When running any Ethernet software, a unique MAC address should be used. A unique Renesas allocated MAC address is attached to the RSK+RX62N PCB as a sticker, and should be always be used with this device ensured to ensure full compatibility when using other Renesas hardware on a common Ethernet connection.

An Ethernet controller IC is fitted to the RSK, and is connected to the Ethernet MCU peripheral. The RX62N MCU supports full duplex 10Mb/s and 100Mb/s transmission and reception. The Ethernet status LEDs (LED6 – 9) are detailed in §5.4. The connections for the Ethernet controller are listed in **Table 5-7** below.

Ethernet Signal	Function	MCU Connection
MDIO	Management data serial I/O	P71, Pin K13
MDC	Management serial clock	P72, Pin K14
TX_CLK	Transmit clock	PC4, Pin P12
TX_EN	Transmit enable.	P80, Pin R13
TX_ER	Transmit error.	PC3, Pin N11
TXD0	Transmit data bit 0.	P81, Pin M11
TXD1	Transmit data bit 1.	P82, Pin P11
TXD2	Transmit data bit 2.	PC5, Pin N10
TXD3	Transmit data bit 3.	PC6, Pin M10
RX_DV	Receive data valid.	PC2, Pin N12
RX_ER	Receive data error.	P77, Pin R14
RXD0	Receive data bit 0.	P75, Pin R15
RXD1	Receive data bit 1.	P74, Pin N13
RXD2	Receive data bit 2.	PC1, Pin P14
RXD3	Receive data bit 3.	PC0, Pin M12
COL	Collision detect.	PC7, Pin R12
CRS	Carrier sense	P83, Pin R11

Table 5-7: Ethernet Connections

5.10 Universal Serial Bus (USB)

This RSK+ device is fitted with a USB host socket (type B) and an OTG (On The Go™) socket (type AB). USB module USB0 is connected to the OTG socket, and can operate as either a host or function device. Module USB1 is connected to a dedicated host port. The connections for the USB0 module are shown in **Table 5-8** below.

USB Signal	Function	MCU Connection
USB0_DP	Positive differential data signal.	USB0_DP, Pin R5*
USB0_DM	Negative differential data signal.	USB0_DM, Pin R7*
USB0_VBUS	Cable monitor pin.	P16, Pin P3
USB0_EXICEN	OTG low-power control signal.	P21, Pin R1
USB0_VBUSEN-A	VBUS power supply enable	P24, Pin P1
USB0_OVRCURA	Over-current detection signal A.	P14, Pin P4
USB0_OVRCURB	Over-current detection signal B.	P16, Pin P3
USB0_ID	USB ID pin.	P20, Pin N3
USB_DPUPE-A	Positive differential data pull-up control signal.	P23, Pin N2
USB_DPUPE-B	Positive differential data pull-up control signal.	P15, Pin N5
USB0_DPRPD	Differential data pull-down control signal.	P25, Pin M2
USB0_DRPD	Differential data pull-down control signal.	P22, Pin M3

Table 5-8: USB0 Module Connections

The connections for the USB1 module are shown in **Figure 5-9** below.

USB Signal	Function	MCU Connection
USB1_DP	Positive differential data signal.	USB1_DP, Pin R8
USB1_DM	Negative differential data signal.	USB1_DM, Pin R7
USB1_VBUSEN-B	VBUS power supply enable	P17, Pin N4
USB1_OVRCURA	Over-current detection signal A.	P15, Pin N5

Table 5-9: USB1 Module Connections

5.11 Generic LCD Header

This RSK+ device is fitted with a generic TFT LCD header, that allows connection to compatible Renesas LCD application boards.

The pin connections of this header are listed in **Table 5-10** below.

Generic LCD Header					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	5V	-	2	5v	-
3	3V3	-	4	3V3	-
5	No Connection	-	6	No Connection	-
7	B1	PD0, Pin A7	8	B2	PD1, Pin B7
9	B3	PD2, Pin A8	10	B4	PD3, Pin A9
11	B5	PD4, Pin A10	12	G0	PD5, Pin C10
13	G1	PD6, Pin B10	14	G2	PD7, Pin A12
15	G3	PE0, Pin C12	16	G4	PE1, Pin A15
17	G5	PE2, Pin B14	18	R1	PE3, Pin C13
19	R2	PE4, Pin D13	20	R3	PE5, Pin C14
21	R4	PE6, Pin C15	22	R5	PE7, Pin D14
23	EDACK	P54, Pin M7	24	HSYNC	P32, Pin J2
25	DOTCLK	P56, Pin P7	26	LCDDEN	P34, Pin J4
27	VSYNC	P24, Pin P1	28	EDREQ	P55, Pin M6
29	SSCK	P27, Pin L2	30	SSI	P30, Pin L4
31	SSO	P26, Pin N1	32	SCS	P50, Pin P10
33	RESET	RES#, Pin H4	34	GND	-
35	BACKLIGHT	P93, Pin D7	36	SD_DOTCLK	-
37	GND	-	38	GND	-
39	GND	-	40	GND	-
41	X_DRIVE	P84, Pin P9	42	Y_DRIVE	P85, Pin R9
43	X_INPUT1	P44, Pin B4	44	Y_INPUT1	P45, Pin A4
45	X_INPUT2	P46, Pin A5	46	Y_INPUT2	P47, Pin B5
47	No Connection	-	48	No Connection	-
49	No Connection	-	50	No Connection	-

Table 5-10: Generic LCD Header Connections

5.12 External Bus

The RX62N features an external data bus, which is connected to various devices on the RSK+ board. Details of the devices connected to the external data bus are listed in **Table 5-11** below. Further details of the devices connected to the external bus can be found in the board schematics.

Chip Select	Device Name	Device Description	Address Space
CS0*	JA3	Application Header	FF000000h to FFFFFFFFh (16Mbytes)
SDCS	U5	128MBit SDRAM	08000000h to 0FFFFFFFh (128Mbytes)
CS1 to CS2	-	Unused	06000000h to 07FFFFFFh (16Mbytes)
CS3	JA3	Application Header	05000000h to 05FFFFFFh (16Mbytes)
CS4 to CS7	-	Unused	01000000h to 04FFFFFFh (4 x 16Mbytes)

Table 5-11: External Bus Address Space

5.13 Renesas Serial Peripheral Interface (RSPI)

The RX62N features two Renesas Serial Peripheral Interface modules (Renesas SPI or RSPI). **Table 5-12** below details the connected devices, and their connections to the MCU.

RSPI Channel	Slave Select	Device Name	Device Description
1	SSLB0	U6	Serial Flash, 16Mbits
1	SSLB1	TFT	Generic LCD Header

Table 5-12: SPI Connections

5.14 I^2C Bus (Inter-IC Bus)

The RX62N features two I^2C (Inter-IC Bus) interface modules. I^2C module 0 is connected to a 16Kbit EEPROM (Electronically-Erasable Programmable Read Only Memory). Specific details of the EEPROM device and the connections can be found in the board schematics.

This device is configured to respond to the address 0x3. The first bit of the device address can be configured by modifying option links – refer to §6 for further details.

6. Configuration

6.1 Modifying the RSK

This section lists the option links that are used to modify the way RSK+ operates in order to access different configurations. Configurations are made by modifying link resistors or headers with movable jumpers or by configuration DIP switches

A link resistor is a 0Ω surface mount resistor, which is used to short or isolate parts of a circuit. Option links are listed in the following sections, detailing their function when fitted or removed. Bold, blue text indicates the default configuration that the RSK+ is supplied with. Refer to the component placement diagram (§3) to locate the option links, jumpers and DIP switches.

When removing soldered components, always ensure that the RSK is not exposed to a soldering iron for intervals greater than 5 seconds. This is to avoid damage to nearby components mounted on the RSK.

When modifying a link resistor, always check the related option links to ensure there is no possible signal contention or short circuits. Because many of the MCU's pins are multiplexed, some of the peripherals must be used exclusively. Refer to the RX62N hardware manual and RSK+RX62N board schematics for further information.

6.2 MCU Configuration

Table 6-1 below details the option links associated with configuring the MCU operating modes and emulator support.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R190	**Connects RESn (MCU, pin H4) to the reset IC U10, pin 6.**	Connects RESn (MCU, pin H4) to the reset IC U10, pin 6.	-
R324	Connects EMLE (MCU, pin D1) to GROUND (via R24), bypassing J1.	**Disconnects EMLE (MCU, pin D1) from GROUND via R24. (Still connectable via J1),**	J1

Table 6-1: MCU Option Links

Table 6-2 below details the function of the jumpers associated with configuring the MCU operating modes, and emulator support.

Reference	Pin 1	Pin 2	Operating Mode	Related Ref.
SW4	**OFF**	**OFF**	Single chip mode	**-**
	ON	OFF	Boot mode	**-**
	OFF	ON	USB boot mode	**-**
	ON	ON	DO NOT SET	**-**
Reference	**Pin 3**	**Pin 4**	**Operating Mode**	**Related Ref.**
SW4	OFF	X	Big endian	-
	ON	X	Little endian	-
	X	**OFF**	USB boot mode bus-powered*	J12, J21
	X	ON	USB boot mode self-powered*	J12, J21

Table 6-2: MCU Setting DIP Switches

x – Mode selection is irrespective of this pin changing (i.e. "Don't care").
* To configure the device to power from the USB VBUS, see the USB configuration section (§6.7).

Table 6-3 below details the different configurations and functions of the MCU operating mode jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J1*	Pins 1 and 2 shorted. Connects EMLE to Board_VCC (bypassed to GROUND via R324).	Pins 2 and 3 shorted. Connects EMLE to GROUND (bypassed by R324).	All pins open. EMLE is left to float – DO NOT SET.	R324

Table 6-3: MCU Operating Mode Jumpers

*By default, this jumper is not fitted to the RSK+. R324 is fitted by default, therefore EMLE is connected to GROUND.

6.3 ADC Configuration

Table 6-4 below details the function of the option links associated with the Analogue-to-Digital circuit.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R16	**Connects VREFL (MCU, pin B3) to GROUND.**	Disconnects VREFL (MCU, pin B3) from GROUND.	R17, R18, R220
R17	**Connects UC_VCC to VREFH (MCU, pin B2).**	Disconnects UC_VCC from VREFH (MCU, pin B2).	R16, R18, R220
R18	Connects CON_VREFH to VREFH (MCU, pin B2)	**Disconnects CON_VREFH from VREFH (MCU, pin B2)**	R16, R17, R220
R19	**Connects AVSS (MCU, pin A1) to GROUND.**	Disconnects AVSS (MCU, pin A1) from GROUND.	R20
R20	Connects AVSS (MCU, pin A1) to CON_AVSS.	**Disconnects AVSS (MCU, pin A1) from CON_AVSS.**	R19, R220
R21	**Connects AVCC (MCU, pin A2) to UC_VCC.**	Disconnects AVCC (MCU, pin A2) from UC_VCC.	R22
R22	Connects AVCC (MCU, pin A2) to CON_AVCC.	**Disconnects AVCC (MCU, pin A2) from CON_AVCC.**	R21
R72	**Connects AN0_ADPOT (MCU, pin C5) to the potentiometer, RV1.**	Disconnects AN0_ADPOT (MCU, pin C5) from the potentiometer, RV1.	R73
R73	Connects AN0_ADPOT (MCU, pin C5) to header JA1, pin 9.	**Disconnects AN0_ADPOT (MCU, pin C5) from header JA1, pin 9.**	R72
R74	**Connects AN1_CANSTBn (MCU, pin D4) to CAN transceiver (U12, pin 14).**	Disconnects AN1_CANSTBn (MCU, pin D4) from CAN transceiver (U12, pin 14).	R75
R75	Connects AN1_CANSTBn (MCU, pin D4) to header JA1, pin 10.	**Disconnects AN1_CANSTBn (MCU, pin D4) from header JA1, pin 10.**	R74
R76	**Connects AN2_CANEN (MCU, pin A3) to the CAN transceiver (U12, pin 6).**	Disconnects AN2_CANEN (MCU, pin A3) from the CAN transceiver (U12, pin 6).	R77
R77	Connects AN2_CANEN (MCU, pin A3) to header JA1, pin 11.	**Disconnects AN2_CANEN (MCU, pin A3) from header JA1, pin 11.**	R76
R78	**Connects AN3_CANERRn (MCU, pin D5) to the CAN transceiver (U12, pin 8).**	Disconnects AN3_CANERRn (MCU, pin D5) from the CAN transceiver (U12, pin 8).	R79
R79	Connects AN3_CANERRn (MCU, pin D5) to the header JA1, pin 12.	**Disconnects AN3_CANERRn (MCU, pin D5) from the header JA1, pin 12.**	R78

Table 6-4: ADC Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R80	**Connects AN4_XINPUT1 (MCU, pin B4) to header TFT, pin 43.**	Disconnects AN4_XINPUT1 (MCU, pin B4) from header TFT, pin 43.	R81
R81	Connects AN4_XINPUT1 (MCU, pin B4) to header JA5, pin 1.	**Disconnects AN4_XINPUT1 (MCU, pin B4) from header JA5, pin 1.**	R80
R82	**Connects AN5_YINPUT1 (MCU, pin A4) to header TFT, pin 44).**	Disconnects AN5_YINPUT1 (MCU, pin A4) from header TFT, pin 44.	R83
R83	Connects AN5_YINPUT1 (MCU, pin A4) to header JA5, pin 2.	**Disconnects AN5_YINPUT1 (MCU, pin A4) from header JA5, pin 2.**	R82
R84	**Connects AN6_XINPUT2 (MCU, pin A5) to header TFT, pin 45.**	Disconnects AN6_XINPUT2 (MCU, pin A5) from header TFT, pin 45.	R85
R85	Connects AN6_XINPUT2 (MCU, pin A5) to header JA5, pin 3.	**Disconnects AN6_XINPUT2 (MCU, pin A5) from header JA5, pin 3.**	R84
R86	**Connects AN7_YINPUT2 (MCU, pin B5) to header TFT, pin 46.**	Disconnects AN7_YINPUT2 (MCU, pin B5) from header TFT, pin 46.	R87
R87	Connects AN7_YINPUT2 (MCU, pin B5) to header JA5, pin 4.	**Disconnects AN7_YINPUT2 (MCU, pin B5) from header JA5, pin 4.**	R86
R220	Connects VREFL (MCU, pin B3) to CON_AVSS.	**Disconnects VREFL (MCU, pin B3) from CON_AVSS.**	R16, R17, R18, R20

Table 6-3: ADC Option Links (Continuation)

6.4 RS232 Serial Port Configuration

Table 6-5 below details the function of the option links associated with serial port configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R36	Connects TxD6-A_IRQ8-A (MCU, pin C1) to the RS232 transceiver (U11, pin 12) via R217.	**Disconnects TxD6-A_IRQ8-A (MCU, pin C1) from the RS232 transceiver (U11, pin 12) via R217.**	R35, R217
R39	Connects RxD6-A_IRQ9-A (MCU, pin D2) to the RS232 transceiver (U11, pin 10) via R218.	**Disconnects RxD6-A_IRQ9-A (MCU, pin D2) from the RS232 transceiver (U11, pin 10) via R218.**	R38, R218
R209	Connects T2OUT (U11, pin 8) to the serial socket, pin 8.	**Disconnects T2OUT (U11, pin 8) from the serial socket, pin 8.**	R217
R210	Connects R2IN (U11, pin 9) to the serial socket, pin 7.	**Connects R2IN (U11, pin 9) to the serial socket, pin 7.**	R218
R213	Connects T1IN (U11, pin 13) to the header JA6, pin 5.	**Disconnects T1IN (U11, pin 13) from the header JA6, pin 5.**	J15, R215
R214	Connects R1OUT (U11, pin 15) to the header JA6, pin 6.	**Disconnects R1OUT (U11, pin 15) from the header JA6, pin 6.**	J16, R216
R215	Connects TxD2-A (MCU, pin P5) to the RS232 transceiver U11, pin 13 (bypassing J15).	**Disconnects TxD2-A (MCU, pin P5) from the RS232 transceiver U11, pin 13 (still connectable via J15).**	J15, R213
R216	Connects RxD2-A (MCU, pin P5) to the RS232 transceiver U11, pin 15 (bypassing J16).	**Disconnects RxD2-A (MCU, pin P5) from the RS232 transceiver U11, pin 15 (still connectable via J16).**	J16, R214

Table 6-5: RS232 Serial Port Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R217	Connects TxD6-A (MCU, pin C1) to the RS232 transceiver (U11, pin 12) via R36.	**Disconnects TxD6-A (MCU, pin C1) from the RS232 transceiver (U11, pin 12) via R36.**	R36, R209
R218	Connects RxD6-A (MCU, pin D2) to the RS232 transceiver (U11, pin 12) via R39.	**Disconnects RxD6-A (MCU, pin D2) from the RS232 transceiver (U11, pin 12) via R39.**	R39, R210
R221	**Connects TDO_TxD1-B (MCU, pin K3) to the header JA2, pin 6.**	Disconnects TDO_TxD1-B (MCU, pin K3) from the header JA2, pin 6.	-
R222	**Connects TDI_RxD1-B (MCU, pin L1) to the header JA2, pin 8.**	Disconnects TDI_RxD1-B (MCU, pin L1) from the header JA2, pin 8.	-
R223	**Connects TCK_SCK1-B (MCU, pin M1) to the header JA2, pin 10.**	Disconnects TCK_SCK1-B (MCU, pin M1) from the header JA2, pin 10.	-

Table 6-5: RS232 Serial Port Option Links (Continuation)

Table 6-6 below details the different configurations and functions of the RS232 serial jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J5	Pins 1 and 2 shorted. Connects SCL0 _RxD2-A to the IIC EEPROM U7, pin 6.	Pins 2 and 3 shorted. Connects SCL0 _RXD2-A to the RS232 transceiver via J16.	All pins open. Disconnects both lines.	J16
J6	Pins 1 and 2 shorted. Connects SDA0 _TxD2-A to the IIC EEPROM U7, pin 5.	Pins 2 and 3 shorted. Connects SDA0 _TxD2-A to the RS232 transceiver via J15.	All pins open. Disconnects both lines.	J15
J15	Pins 1 and 2 shorted. Connects TDO _TxD1-B to the RS232 transceiver (U11, pin 13).	**Pins 2 and 3 shorted. Connects TxD2-A to the RS232 transceiver (U11, pin 13).**	All pins open. Disconnects both lines to the RS232 transceiver (U11, pin 13).	R215
J16	Pins 1 and 2 shorted. Connects TDI _RxD1-B to the RS232 transceiver (U11, pin 15).	**Pins 2 and 3 shorted. Connects RxD2-A to the RS232 transceiver (U11, pin 15).**	All pins open. Disconnects both lines to the RS232 transceiver (U11, pin 15).	R216

Table 6-6: RS232 Serial Port Jumpers

6.5 CAN Configuration

Table 6-7 below details the function of the option links associated with CAN configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R74	**Connects AN1_CANSTBn (MCU, pin D4) to CAN transceiver (U12, pin 14).**	Disconnects AN1_CANSTBn (MCU, pin D4) from CAN transceiver (U12, pin 14).	R75
R75	Connects AN1_CANSTBn (MCU, pin D4) to header JA1, pin 10.	**Disconnects AN1_CANSTBn (MCU, pin D4) from header JA1, pin 10.**	R74
R76	**Connects AN2_CANEN (MCU, pin A3) to the CAN transceiver (U12, pin 6).**	Disconnects AN2_CANEN (MCU, pin A3) from the CAN transceiver (U12, pin 6).	R77
R77	Connects AN2_CANEN (MCU, pin A3) to header JA1, pin 11.	**Disconnects AN2_CANEN (MCU, pin A3) from header JA1, pin 11.**	R76
R78	**Connects AN3_CANERRn (MCU, pin D5) to the CAN transceiver (U12, pin 8).**	Disconnects AN3_CANERRn (MCU, pin D5) from the CAN transceiver (U12, pin 8).	R79
R79	Connects AN3_CANERRn (MCU, pin D5) to the header JA1, pin 12.	**Disconnects AN3_CANERRn (MCU, pin D5) from the header JA1, pin 12.**	R78
R242	**Connects CTX0 (MCU, pin J2) to the CAN transceiver U12, pin 1 (via J23).**	Disconnects CTX0 (MCU, pin J2) from the CAN transceiver U12, pin 1 (via J23).	J23
R243	**Connects CTR0 (MCU, pin K1) to the CAN transceiver U12, pin 4.**	Disconnects CTR0 (MCU, pin K1) from the CAN transceiver U12, pin 4.	-
R247	**Connects WAKE (U12, pin 9) to ground.**	Disconnects WAKE (U12, pin 9) from ground.	-
R248	**Connects VBAT (U12, pin 10) to Board_5V (bypassing J17).**	Disconnects VBAT (U12, pin 10) from Board_5V (still connectable via J17).	J17

Table 6-7: CAN Option Links

Table 6-8 below details the different configurations and functions of the CAN jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J17*	Pins 1 and 2 shorted. Connects VBAT (U12, pin 10) to Board_5V (bypassed by R248).	Pins 2 and 3 shorted. Connects VBAT (U12, pin 10) to Unregulated_VCC.	All pins open. Disconnects both lines.	R248
J23	**Pins 1 and 2 shorted. Connects CT0X _IRQ2-A_MTIOC0C to the CAN transceiver (U12, pin 1) via R242.**	Pins 2 and 3 shorted. Connects CT0X _IRQ2-A_MTIOC0C to header TFT, pin 24.	All pins open. Disconnects both lines.	R67, R242

Table 6-8: CAN Jumpers

*By default, this jumper is not fitted to the RSK+. Therefore the default configuration is all pins open.

6.6 External Bus Configuration

Table 6-9 below details the function of option links related to configuring the MCU's external bus.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R32	Connects OEn pin (U2, pin 19) to GROUND, bypassing J2.	**Disconnects OEn pin (U2, pin 19) from GROUND (still connectable via J2).**	J2
R33	Connects OEn pin (U3, pin 19) to GROUND, bypassing J3.	**Disconnects OEn pin (U3, pin 19) from GROUND (still connectable via J3).**	J3
R34	Connects OEn pin (U4, pin 19) to GROUND, bypassing J4.	**Disconnects OEn pin (U4, pin 19) from GROUND (still connectable via J4).**	J4
R88	**Connects WRn_WR0n_SSLB1-A (MCU, pin P10) to header JA3, pin 26 (via R232).**	Disconnects WRn_WR0n _SSLB1-A (MCU, pin P10) from header JA3, pin 26 (via R232).	R89, R90, R232
R89	Connects WRn_WR0n_SSLB1-A (MCU, pin 10) to header JA3, pin 48 (via R238).	**Disconnects WRn_WR0n _SSLB1-A (MCU, pin 10) from header JA3, pin 48 (via R238).**	R88, R90, R238
R90	**Connects WRn_WR0n_SSLB1-A (MCU, pin 10) to header TFT, pin 32 (via R251).**	Disconnects WRn_WR0n _SSLB1-A (MCU, pin 10) from header TFT, pin 32 (via R251).	R88, R89, R251
R91	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to the Ethernet transceiver U15, pin 10.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from the Ethernet transceiver U15, pin 10.**	R92, R93
R92	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to header JA2, pin 17.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from header JA2, pin 17.**	R91, R93
R93	**Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to headers JA6, pin 2; and TFT , pin 23.**	Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from headers JA6, pin 2; and TFT , pin 23.	R91, R93
R94	**Connects EDREQ0-C _MTIOC4D-B (MCU, pin M6) to header JA2, pin 18.**	Disconnects EDREQ0-C _MTIOC4D-B (MCU, pin M6) from header JA2, pin 18.	R95
R95	Connects EDREQ0-C _MTIOC4D-B (MCU, pin M6) to headers JA6, pin 1; and TFT, pin 28.	**Disconnects EDREQ0-C _MTIOC4D-B (MCU, pin M6) from headers JA6, pin 1; and TFT, pin 28.**	R94
R96	**Connects SDCSn (MCU, pin A13) to the SDRAM module U5, pin 19 (chip select signal).**	Disconnects SDCSn (MCU, pin A13) from the SDRAM module U5, pin 19 (chip select signal).	R97
R97	Connects SDCSn (MCU, pin A13) to header JA3, pin 28.	**Disconnects SDCSn (MCU, pin A13) from header JA3, pin 28.**	R96
R106	**Connects A0_MTIOC6A (MCU, pin F14) to the external address bus.**	Disconnects A0_MTIOC6A (MCU, pin F14) from the external address bus.	R107
R107	Connects A0_MTIOC6A (MCU, pin F14) to header JA1, pin 23 (via R225).	**Disconnects A0_MTIOC6A (MCU, pin F14) from header JA1, pin 23 (via R225).**	R106, R225
R108	**Connects A1_MTIOC6B (MCU, pin G15) to the external address bus.**	Disconnects A1_MTIOC6B (MCU, pin G15) from the external address bus.	R109

Table 6-9: External Bus Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R109	Connects A1_MTIOC6B (MCU, pin G15) to header JA5, pin 9 (via R241).	**Disconnects A1_MTIOC6B (MCU, pin G15) from header JA5, pin 9 (via R241).**	R108, R241
R110	**Connects A2_MTIOC6C (MCU, pin H13) to the external address bus.**	Disconnects A2_MTIOC6C (MCU, pin H13) from the external address bus.	R111
R111	Connects A2_MTIOC6C (MCU, pin H13) to header JA5, pin 10.	**Disconnects A2_MTIOC6C (MCU, pin H13) from header JA5, pin 10.**	R110
R112	**Connects A4_MTIOC7A (MCU, pin H14) to the external address bus.**	Disconnects A4_MTIOC7A (MCU, pin H14) from the external address bus.	R113
R113	Connects A4_MTIOC7A (MCU, pin H14) to header JA5, pin 9 (via R240).	**Disconnects A4_MTIOC7A (MCU, pin H14) from header JA5, pin 9 (via R240).**	R112, R240
R124	**Connects D0_POE7n (MCU, pin A7) to external data bus.**	Disconnects D0_POE7n (MCU, pin A7) from external data bus.	R125
R125	Connects D0_POE7n (MCU, pin A7) to header JA5, pin 16.	**Disconnects D0_POE7n (MCU, pin A7) from header JA5, pin 16.**	R124
R126	**Connects D4_POE3n (MCU, pin A10) to the external data bus.**	Disconnects D4_POE3n (MCU, pin A10) from the external data bus.	R127
R127	Connects D4_POE3n (MCU, pin A10) to header JA2, pin 24.	**Disconnects D4_POE3n (MCU, pin A10) from header JA2, pin 24.**	R126
R128	**Connects D5_MTIC5W-B (MCU, pin C10) to the external data bus.**	Disconnects D5_MTIC5W-B (MCU, pin C10) from the external data bus.	R129
R129	Connects D5_MTIC5W-B (MCU, pin C10) to header JA6, pin 16.	**Disconnects D5_MTIC5W-B (MCU, pin C10) from header JA6, pin 16.**	R128
R130	**Connects D6_MTIC5V-B (MCU, pin B10) to the external data bus.**	Disconnects D6_MTIC5V-B (MCU, pin B10) from the external data bus.	R131
R131	Connects D6_MTIC5V-B (MCU, pin B10) to header JA6, pin 15.	**Disconnects D6_MTIC5V-B (MCU, pin B10) from header JA6, pin 15.**	R130
R132	**Connects D7_MTIC5U-B (MCU, pin A12) to the external data bus.**	Disconnects D7_MTIC5U-B (MCU, pin A12) from the external data bus.	R133
R133	Connects D7_MTIC5U-B (MCU, pin A12) to header JA6, pin 14.	**Disconnects D7_MTIC5U-B (MCU, pin A12) from header JA6, pin 14.**	R132
R143	**Connects BCLK (MCU, pin R10) to the header J20, pin 10.**	Disconnects BCLK (MCU, pin R10) from the header J20, pin 10.	R321
R234	**Connects CS0n-a (MCU, pin B11) to header JA3, pin 45.**	Disconnects CS0n-a (MCU, pin B11) from header JA3, pin 45.	R235
R235	Connects WAITn-A (MCU, pin N6) to header JA3, pin 45.	**Disconnects WAITn-A (MCU, pin N6) from header JA3, pin 45.**	R234
R236	**Connects WR1n (MCU, pin M8) to header JA3, pin 47.**	Disconnects WR1n (MCU, pin M8) from header JA3, pin 47.	R237
R237	Connects DQM1 (MCU, pin E15) to header JA3, pin 47.	**Disconnects DQM1 (MCU, pin E15) from header JA3, pin 47.**	R236
R238	**Connects WR0n (MCU, pin P10) to header TFT, pin 32 (via R89).**	Disconnects WR0n (MCU, pin P10) from header TFT, pin 32 (via R89).	R89, R239
R239	Connects DQM1 (MCU, pin E15) to header JA3, pin 48.	**Disconnects DQM1 (MCU, pin E15) from header JA3, pin 48.**	R238

Table 6-9: External Bus Option Links (Continuation)

Table 6-10 below details the different configurations and functions of the external bus jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J2*	Pins 1 and 2 shorted. Connects OEn (U2, pin 19) to GROUND (bypassed by R32).	All pins open. Disconnects OEn (U2, pin 19) from GROUND (still connectable via R32).	-	R32
J3*	Pins 1 and 2 shorted. Connects OEn (U3, pin 19) to GROUND (bypassed by R33).	All pins open. Disconnects OEn (U3, pin 19) from GROUND (still connectable via R33).	-	R33
J4*	Pins 1 and 2 shorted. Connects OEn (U4, pin 19) to GROUND (bypassed by R34).	All pins open. Disconnects OEn (U4, pin 19) from GROUND (still connectable via R34).	-	R34

Table 6-10: External Bus Jumpers

*By default, this jumper is not fitted to the RSK+. Therefore the default configuration is all pins open.

6.7 USB Configuration

Table 6-11 below details the function of option links related to configuring the USB ports.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R49	**Connects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) to USB IC U14, pin 2.**	Disconnects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) from USB IC U14, pin 2.	R50, R51
R50	Connects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) to header TFT, pin 32.	**Connects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) to header TFT, pin 32.**	R49, R51, R252
R51	Connects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).	**Connects USB1OVRCURA_P15_MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).**	R49, R50, R229
R52	**Connects USB1BUSEN-B_MTIOC0B (MCU, pin N4) to USB IC U14, pin 1.**	Disconnects USB1BUSEN-B_MTIOC0B (MCU, pin N4) from USB IC U14, pin 1.	R53
R53	Connects USB1BUSEN-B_MTIOC0B (MCU, pin N4) to header JA6, pin 13.	**Disconnects USB1BUSEN-B_MTIOC0B (MCU, pin N4) from header JA6, pin 13.**	R52
R54	**Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to USB IC U13, pin 3.**	Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to USB IC U13, pin 3.	R55, R56
R55	Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to header JA2, pin 22.	**Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) from header JA2, pin 22.**	R54, R55
R56	Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to header JA2, pin 23 (via R231).	**Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) from header JA2, pin 23 (via R231).**	R55, R56, R231

Table 6-11: USB Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R57	**Connects USB0EXICEN _TMCI0-B (MCU, pin R1) to USB IC U13, pin 11.**	Disconnects USB0EXICEN _TMCI0-B (MCU, pin R1) to USB IC U13, pin 11.	R58
R58	Connects USB0EXICEN _TMCI0-B (MCU, pin R1) to JA2, pin 21.	**Disconnects USB0EXICEN _TMCI0-B (MCU, pin R1) from JA2, pin 21.**	R57
R59	**Connects USB0DRPD_TMO0 (MCU, pin M3) to USB0_D-.**	Disconnects USB0DRPD _TMO0 (MCU, pin M3) from USB0_D-.	R60
R60	Connects USB0DRPD_TMO0 (MCU, pin M3) to header JA2, pin 19.	**Disconnects USB0DRPD _TMO0 (MCU, pin M3) from header JA2, pin 19.**	R59
R62	Connects USB0VBUSEN-A _MTIOC4A-A_MTCLKA-A (MCU, pin P1) to header JA2, pin 25.	**Disconnects USB0VBUSEN -A_MTIOC4A-A_MTCLKA-A (MCU, pin P1) from header JA2, pin 25.**	J22
R64	**Connects USB0DPRPD _MTCLKB-A (MCU, pin M3) to USBD0_D-.**	Disconnects USB0DPRPD _MTCLKB-A (MCU, pin M3) from USBD0_D-.	R65
R65	Connects USB0DPRPD _MTCLKB-A (MCU, pin M3) to header JA2, pin 26.	**Disconnects USB0DPRPD _MTCLKB-A (MCU, pin M3) from header JA2, pin 26.**	R64
R144	**Connects VSS_USB (MCU, pin R6) to GROUND.**	Disconnects VSS_USB (MCU, pin R6) from GROUND.	R191, R192
R191	**Connects VCC_USB (MCU, pin P6) to UC_VCC.**	Disconnects VCC_USB (MCU, pin P6) from UC_VCC	R144, R192
R192	Connects VCC_USB (MCU, pin P6) to CON_VCCUSB.	**Disconnects VCC_USB (MCU, pin P6) from CON_VCCUSB.**	R144, R191
R261	**Connects VCC (U13, pin 2) to Board_VCC.**	Disconnects VCC (U13, pin 2) to Board_VCC.	-
R268	Bypasses the inductor L2 on the VBUS line from USB0.	**Leaves the inductor L2 on the VBUS line from USB0.**	L2
R269	**Connects GND (USB0 Connector, pin 5) to GROUND.**	Disconnects GND (USB0 Connector, pin 5) from GROUND.	-
R276	**Bypasses the inductor L3 on the VBUS line from USB1.**	Leaves the inductor L3 on the VBUS line from USB1.	L3
R277	**Connects GND (USB1 Connector, pin 4) to GROUND.**	Disconnects GND (USB1 Connector, pin 4) from GROUND.	-
R274	**Connects FLG (U14, pin 2) to Board_VCC.**	Disconnects FLG (U14, pin 2) from Board_VCC.	-
R322	**Connects USB0VBUS (MCU, pin P3) to the VBUS line from USB0, via J18 (bypasses J12).**	Disconnects USB0VBUS (MCU, pin P3) from the VBUS line from USB0, via J18 (still connectable via J12).	J12
R325	Connects 3V3USB to CON_3V3USB.	**Disconnects 3V3USB from CON_3V3USB.**	R326, R327, R328
R326	**Connects 3V3USB to Board_VCC.**	Disconnects 3V3USB from Board_VCC.	R325, R327, R328
R327	Connects 5VUSB to CON_5VUSB.	**Disconnects 5VUSB from CON_5VUSB.**	R325, R326, R327
R328	**Connects 5VUSB to Board_5V.**	Disconnects 5VUSB from Board_5V.	R325, R326, R327

Table 6-11: USB Option Links (Continuation)

Table 6-12 below details the different configurations and functions of the USB jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J7	**Pins 1 and 2 shorted. Connects USB0OVRCURA _USB0DPUPE-B to USB0_D+.**	Pins 2 and 3 shorted. Connects USB0OVRCURA_USB0DPUPE-B to USB IC U13, pin 5.	All pins open. Disconnects both lines.	-
J8	**Pins 1 and 2 shorted. Connects USB0VBUS_USB0 OVRCURB to the USB0 VBUS (via J12).**	Pins 2 and 3 shorted. Connects USB0VBUS _USB0OVRCURB to USB IC U13, pin 6.	All pins open. Disconnects both lines.	J12
J12*	Pins 1 and 2 shorted. Connects USB0VBUS to Board VCC.	Pins 2 and 3 shorted. Connects USB0VBUS to VBUS from USB0 via J18 (can be bypassed by R322)	All pins open. Disconnects both lines.	J18, R322
J18	Pins 1 and 2 shorted. Connects VBUS (Connector USB0, pin 1) to USB IC U13, pin 1. [OTG Mode]	**Pins 2 and 3 shorted. Connects VBUS (Connector USB0, pin 1) to USB0VBUS (MCU, pin P3) via J8 & J12. [FUNC Mode]**	All pins open. Disconnects both lines.	J8, J12
J19*	Pins 1 and 2 shorted. Connects SHDNn (U13, pin 11) to GROUND.	All pins open. Disconnects SHDNn (U13, pin 11) from GROUND.	-	-
J21*	Pins 1 and 2 shorted. Connects VBUS (connector USB0, pin 1) to the main power supply.	All pins open. Disconnects VBUS (connector USB0, pin 1) from the main power supply.	-	J12
J22	**Pins 1 and 2 shorted. Connects USB0VBUS EN-A_MTIOC4A-A _MTCLKA-A to USB IC U13, pin 4.**	Pins 2 and 3 shorted. Connects USB0VBUS EN-A_MTIOC4A-A _MTCLKA-A to header TFT, pin 27.	All pins open. Disconnects both lines.	R62

Table 6-12: USB Jumpers (Continued Overleaf)

*By default, this jumper is not fitted to the RSK+. Therefore the default configuration is all pins open.

6.8 Ethernet Configuration

Table 6-13 below details the function of option links related to configuring the MCU's Ethernet peripheral.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R91	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to the Ethernet transceiver U15, pin 10.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from the Ethernet transceiver U15, pin 10.**	R92, R93
R92	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to header JA2, pin 17.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from header JA2, pin 17.**	R91, R93
R93	**Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to headers JA6, pin 2; and TFT , pin 23.**	Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from headers JA6, pin 2; and TFT , pin 23.	R91, R93
R114	**Connects ETRXDV_MTCLKE-A (MCU, pin N12) to the Ethernet transceiver U15, pin 19 (via line buffer U4).**	Disconnects ETRXDV _MTCLKE-A (MCU, pin N12) from the Ethernet transceiver U15, pin 19.	R115
R115	Connects ETRXDV_MTCLKE-A (MCU, pin N12) to header JA5, pin 17 (via line buffer U4).	**Disconnects ETRXDV _MTCLKE-A (MCU, pin N12) to header JA5, pin 17.**	R114
R116	**Connects ETTXER_MTCLKF-A (MCU, pin N11) to the Ethernet transceiver U15, pin 1 (via line buffer U4).**	Disconnects ETTXER _MTCLKF-A (MCU, pin N11) from the Ethernet transceiver U15, pin 1.	R117
R117	Connects ETTXER_MTCLKF-A (MCU, pin N11) to header JA5, pin 18 (via line buffer U4).	**Disconnects ETTXER _MTCLKF-A (MCU, pin N11) from header JA5, pin 18.**	R116
R118	**Connects ETTXD2_MTIC11W-A (MCU, pin N10) to the Ethernet transceiver U15, pin 26 (via line buffer U4).**	Disconnects ETTXD2 _MTIC11W-A (MCU, pin N10) from the Ethernet transceiver U15, pin 26.	R119
R119	Connects ETTXD2_MTIC11W-A (MCU, pin N10) to JA5, pin 14 (via line buffer U4).	**Connects ETTXD2_MTIC11W-A (MCU, pin N10) to JA5, pin 14.**	R118
R120	**Connects ETTXD3_MTIC11V-A (MCU, pin M10) to the Ethernet transceiver U15, pin 27 (via line buffer U4).**	Disconnects ETTXD3 _MTIC11V-A (MCU, pin M10) to the Ethernet transceiver U15, pin 27.	R121
R121	Connects ETTXD3_MTIC11V-A (MCU, pin M10) to header JA5, pin 13 (via line buffer U4).	**Disconnects ETTXD3 _MTIC11V-A (MCU, pin M10) to header JA5, pin 13.**	R120
R122	**Connects ETCOL_MTIC11U-A (MCU, pin R12) to the Ethernet transceiver U15, pin 36.**	Disconnects ETCOL _MTIC11U-A (MCU, pin R12) from the Ethernet transceiver U15, pin 36.	R123
R123	Connects ETCOL_MTIC11U-A (MCU, pin R12) to header JA5, pin 12.	**Disconnects ETCOL _MTIC11U-A (MCU, pin R12) from header JA5, pin 12.**	R122
R301	**Connects XTAL2 (U15, pin 13) to the crystal X4.**	Disconnects XTAL2 (U15, pin 13) from the crystal X4.	X4
R312	Connects SPEED100/PHYAD0 (U15, pin 9) to ground.	**Disconnects SPEED100 /PHYAD0 (U15, pin 9) from ground.**	-

Table 6-13: Ethernet Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R313	Connects LINK/PHYAD1 (U15, pin 10) to ground.	**Disconnects LINK/PHYAD1 (U15, pin 10) from ground.**	-
R314	Connects ACTIVITY/PHYAD2 (U15, pin 11) to ground.	**Disconnects ACTIVITY /PHYAD2 (U15, pin 11) from ground.**	-
R315	Connects FDUPLEX/PHYAD3 (MCU, pin 12) to ground.	**Disconnects FDUPLEX /PHYAD3 (MCU, pin 12) FROM ground.**	-
R317	**Connects CAP (connector ETHERNET, pin 10) to GROUND.**	Disconnects CAP (connector ETHERNET, pin 10) from GROUND.	-

Table 6-13: Ethernet Option Links (Continuation)

6.9 Multi-Function Timer Pulse Unit (MTU) Configuration

Table 6-14 to **Table 6-17** on the following pages detail the function of option links related to configuring the MCU's MTU pins.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R33	Connects OEn pin (U3, pin 19) to GROUND, bypassing J3.	**Disconnects OEn pin (U3, pin 19) from GROUND (still connectable via J3).**	J3
R34	Connects OEn pin (U4, pin 19) to GROUND, bypassing J4.	**Disconnects OEn pin (U4, pin 19) from GROUND (still connectable via J4).**	J4
R49	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to USB IC U14, pin 2.**	Disconnects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) from USB IC U14, pin 2.	R50, R51
R50	Connects USB1OVRCURA_P15 _MTIOC0B (MCU, pin N5) to header TFT, pin 32.	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to header TFT, pin 32.**	R49, R51, R252
R51	Connects USB1OVRCURA_P15 _MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).**	R49, R50, R229
R52	**Connects USB1BUSEN-B _MTIOC0B (MCU, pin N4) to USB IC U14, pin 1.**	Disconnects USB1BUSEN-B _MTIOC0B (MCU, pin N4) from USB IC U14, pin 1.	R53
R53	Connects USB1BUSEN-B _MTIOC0B (MCU, pin N4) to header JA6, pin 13.	**Disconnects USB1BUSEN-B _MTIOC0B (MCU, pin N4) from header JA6, pin 13.**	R52
R54	**Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to USB IC U13, pin 3.**	Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to USB IC U13, pin 3.	R55, R56
R55	Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to header JA2, pin 22.	**Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) from header JA2, pin 22.**	R54, R55
R56	Connects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) to header JA2, pin 23 (via R231).	**Disconnects USB0ID_TMRIO-B_MTIOC1A (MCU, pin N3) from header JA2, pin 23 (via R231).**	R55, R56, R231
R62	Connects USB0VBUSEN-A _MTIOC4A-A_MTCLKA-A (MCU, pin P1) to header JA2, pin 25.	**Disconnects USB0VBUSEN -A_MTIOC4A-A_MTCLKA-A (MCU, pin P1) from header JA2, pin 25.**	J22
R64	**Connects USB0DPRPD _MTCLKB-A (MCU, pin M3) to USBD0_D-.**	Disconnects USB0DPRPD _MTCLKB-A (MCU, pin M3) from USBD0_D-.	R65
R65	Connects USB0DPRPD _MTCLKB-A (MCU, pin M3) to header JA2, pin 26.	**Disconnects USB0DPRPD _MTCLKB-A (MCU, pin M3) from header JA2, pin 26.**	R64
R69	**Connects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) to LED3 and header TFT, pin 26.**	Disconnects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) from LED3 and header TFT, pin 26.	R70. R71
R70	Connects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) to header JA2, pin 20.	**Disconnects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) from header JA2, pin 20.**	R69, R71

Table 6-14: MTU Option Links – Part 1

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R71	Connects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) to header JA2, pin 7 (via R227).	**Disconnects LED3_PO12 _LCDDEN_MTIOC0A (MCU, pin J4) from header JA2, pin 7 (via R227).**	R69, R70, R227
R91	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to the Ethernet transceiver U15, pin 10.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from the Ethernet transceiver U15, pin 10.**	R92, R93
R93	**Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to headers JA6, pin 2; and TFT , pin 23.**	Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from headers JA6, pin 2; and TFT , pin 23.	R91, R93
R98	**Connects ETTXEN_MTIOC3B-B (MCU, pin R13) to the Ethernet transceiver U15, pin 6.**	Disconnects ETTXEN _MTIOC3B-B (MCU, pin R13) from the Ethernet transceiver U15, pin 6.	R99
R99	Connects ETTXEN_MTIOC3B-B (MCU, pin R13) to header JA2, pin 13.	**Disconnects ETTXEN _MTIOC3B-B (MCU, pin R13) from header JA2, pin 13.**	R98
R100	**Connects ETTXD0_MTIOC3D-B (MCU, pin M11) to the Ethernet transceiver U15, pin 23.**	Disconnects ETTXD0 _MTIOC3D-B (MCU, pin M11) from the Ethernet transceiver U15, pin 23.	R101
R101	Connects ETTXD0_MTIOC3D-B (MCU, pin M11) to header JA2, pin 14.	**Disconnects ETTXD0 _MTIOC3D-B (MCU, pin M11) from header JA2, pin 14.**	R100
R102	**Connects ETTXD1_MTIOC4A-B (MCU, pin P11) to the Ethernet transceiver U15, pin 24.**	Connects ETTXD1_MTIOC4A-B (MCU, pin P11) to the Ethernet transceiver U15, pin 24.	R103
R103	Connects ETTXD1_MTIOC4A-B (MCU, pin P11) to header JA2, pin 15.	**Connects ETTXD1 _MTIOC4A-B (MCU, pin P11) to header JA2, pin 15.**	R102
R104	**Connects ETCRS_MTIOC4C-B (MCU, pin R11) to the Ethernet transceiver U15, pin 3.**	Disconnects ETCRS _MTIOC4C-B (MCU, pin R11) from the Ethernet transceiver U15, pin 3.	R105
R105	Connects ETCRS_MTIOC4C-B (MCU, pin R11) to header JA2, pin 16.	**Disconnects ETCRS _MTIOC4C-B (MCU, pin R11) from header JA2, pin 16.**	R104
R106	**Connects A0_MTIOC6A (MCU, pin F14) to the external address bus.**	Disconnects A0_MTIOC6A (MCU, pin F14) from the external address bus.	R107
R107	Connects A0_MTIOC6A (MCU, pin F14) to header JA1, pin 23 (via R225).	**Disconnects A0_MTIOC6A (MCU, pin F14) from header JA1, pin 23 (via R225).**	R106, R225
R108	**Connects A1_MTIOC6B (MCU, pin G15) to the external address bus.**	Disconnects A1_MTIOC6B (MCU, pin G15) from the external address bus.	R109
R109	Connects A1_MTIOC6B (MCU, pin G15) to header JA5, pin 9 (via R241).	**Disconnects A1_MTIOC6B (MCU, pin G15) from header JA5, pin 9 (via R241).**	R108, R241
R110	**Connects A2_MTIOC6C (MCU, pin H13) to the external address bus.**	Disconnects A2_MTIOC6C (MCU, pin H13) from the external address bus.	R111
R111	Connects A2_MTIOC6C (MCU, pin H13) to header JA5, pin 10.	**Disconnects A2_MTIOC6C (MCU, pin H13) from header JA5, pin 10.**	R110
R112	**Connects A4_MTIOC7A (MCU, pin H14) to the external address bus.**	Disconnects A4_MTIOC7A (MCU, pin H14) from the external address bus.	R113

Table 6-15: MTU Option Links – Part 2

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R113	Connects A4_MTIOC7A (MCU, pin H14) to header JA5, pin 9 (via R240).	**Disconnects A4_MTIOC7A (MCU, pin H14) from header JA5, pin 9 (via R240).**	R112, R240
R114	**Connects ETRXDV_MTCLKE-A (MCU, pin N12) to the Ethernet transceiver U15, pin 19 (via line buffer U4).**	Disconnects ETRXDV _MTCLKE-A (MCU, pin N12) from the Ethernet transceiver U15, pin 19.	R115
R115	Connects ETRXDV_MTCLKE-A (MCU, pin N12) to header JA5, pin 17 (via line buffer U4).	**Disconnects ETRXDV _MTCLKE-A (MCU, pin N12) to header JA5, pin 17.**	R114
R92	Connects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) to header JA2, pin 17.	**Disconnects EDACK0-C _ETLINKSTA_MTIOC4B-B (MCU, pin M7) from header JA2, pin 17.**	R91, R93
R116	**Connects ETTXER_MTCLKF-A (MCU, pin N11) to the Ethernet transceiver U15, pin 1 (via line buffer U4).**	Disconnects ETTXER _MTCLKF-A (MCU, pin N11) from the Ethernet transceiver U15, pin 1.	R117
R117	Connects ETTXER_MTCLKF-A (MCU, pin N11) to header JA5, pin 18 (via line buffer U4).	**Disconnects ETTXER _MTCLKF-A (MCU, pin N11) from header JA5, pin 18.**	R116
R118	**Connects ETTXD2_MTIC11W-A (MCU, pin N10) to the Ethernet transceiver U15, pin 26 (via line buffer U4).**	Disconnects ETTXD2 _MTIC11W-A (MCU, pin N10) from the Ethernet transceiver U15, pin 26.	R119
R119	Connects ETTXD2_MTIC11W-A (MCU, pin N10) to JA5, pin 14 (via line buffer U4).	**Connects ETTXD2_MTIC11W-A (MCU, pin N10) to JA5, pin 14.**	R118
R120	**Connects ETTXD3_MTIC11V-A (MCU, pin M10) to the Ethernet transceiver U15, pin 27 (via line buffer U4).**	Disconnects ETTXD3 _MTIC11V-A (MCU, pin M10) to the Ethernet transceiver U15, pin 27.	R121
R121	Connects ETTXD3_MTIC11V-A (MCU, pin M10) to header JA5, pin 13 (via line buffer U4).	**Disconnects ETTXD3 _MTIC11V-A (MCU, pin M10) to header JA5, pin 13.**	R120
R122	**Connects ETCOL_MTIC11U-A (MCU, pin R12) to the Ethernet transceiver U15, pin 36.**	Disconnects ETCOL _MTIC11U-A (MCU, pin R12) from the Ethernet transceiver U15, pin 36.	R123
R123	Connects ETCOL_MTIC11U-A (MCU, pin R12) to header JA5, pin 12.	**Disconnects ETCOL _MTIC11U-A (MCU, pin R12) from header JA5, pin 12.**	R122
R128	**Connects D5_MTIC5W-B (MCU, pin C10) to the external data bus.**	Disconnects D5_MTIC5W-B (MCU, pin C10) from the external data bus.	R129
R129	Connects D5_MTIC5W-B (MCU, pin C10) to header JA6, pin 16.	**Disconnects D5_MTIC5W-B (MCU, pin C10) from header JA6, pin 16.**	R128
R130	**Connects D6_MTIC5V-B (MCU, pin B10) to the external data bus.**	Disconnects D6_MTIC5V-B (MCU, pin B10) from the external data bus.	R131
R131	Connects D6_MTIC5V-B (MCU, pin B10) to header JA6, pin 15.	**Disconnects D6_MTIC5V-B (MCU, pin B10) from header JA6, pin 15.**	R130
R132	**Connects D7_MTIC5U-B (MCU, pin A12) to the external data bus.**	Disconnects D7_MTIC5U-B (MCU, pin A12) from the external data bus.	R133
R133	Connects D7_MTIC5U-B (MCU, pin A12) to header JA6, pin 14.	**Disconnects D7_MTIC5U-B (MCU, pin A12) from header JA6, pin 14.**	R132
R224	**Connects IRQ10-A (MCU, pin B1) to header JA1, pin 23 (via R42).**	Disconnects IRQ10-A (MCU, pin B1) from header JA1, pin 23 (via R42).	R42, R225

Table 6-16: MTU Option Links – Part 3

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R225	Connects MTIOC6A (MCU, pin F14) to header JA1, pin 23 (via R107).	**Disconnects MTIOC6A (MCU, pin F14) from header JA1, pin 23 (via R107).**	R107, R224
R226	**Connects IRQ8-A (MCU, pin C1) to header JA2, pin 7 (via R35).**	Disconnects IRQ8-A (MCU, pin C1) from header JA2, pin 7 (via R35).	R35, R227
R227	Connects MTIOC0A (MCU, pin J4) to header JA2, pin 7 (via R71).	**Disconnects MTIOC0A (MCU, pin J4) from header JA2, pin 7 (via R71).**	R71, R226
R228	**Connects IRQ9-A (MCU, pin D2) to header JA2, pin 9 (via R38).**	Disconnects IRQ9-A (MCU, pin D2) from header JA2, pin 9 (via R38).	R38, R229
R229	Connects MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R51).	**Disconnects MTIOC0B (MCU, pin N5) from header JA2, pin 9 (via R51).**	R51, R228
R230	**Connects IRQ2-A (MCU, pin J2) to header JA2, pin 23 (via R67).**	Disconnects IRQ2-A (MCU, pin J2) to header JA2, pin 23 (via R67).	R67, R231
R231	Connects MTIOC1A (MCU, pin N3) to header JA2, pin 23 (via R56).	**Disconnects MTIOC1A (MCU, pin N3) from header JA2, pin 23 (via R56).**	R56, R230
R240	Connects MTIOC7A (MCU, pin H14) to header JA5, pin 9 (via R113).	**Disconnects MTIOC7A (MCU, pin H14) from header JA5, pin 9 (via R113).**	R113, R241
R241	**Connects MTIOC6B (MCU, pin G15) to header JA5, pin 9 (via R109).**	Disconnects MTIOC6B (MCU, pin G15) from header JA5, pin 9 (via R109).	R109, R240

Table 6-17: MTU Option Links – Part 4

Table 6-18 below details the different configurations and functions of the MTU jumpers.

Reference	Position One	Position Two	Position Three	Related Ref.
J3*	Pins 1 and 2 shorted. Connects OEn (U3, pin 19) to GROUND (bypassed by R33).	All pins open. Disconnects OEn (U3, pin 19) from GROUND (still connectable via R33).	-	R33
J4*	Pins 1 and 2 shorted. Connects OEn (U4, pin 19) to GROUND (bypassed by R34).	All pins open. Disconnects OEn (U4, pin 19) from GROUND (still connectable via R34).	-	R34
J22	**Pins 1 and 2 shorted. Connects USB0VBUS EN-A_MTIOC4A-A _MTCLKA-A to USB IC U13, pin 4.**	Pins 2 and 3 shorted. Connects USB0VBUS EN-A_MTIOC4A-A _MTCLKA-A to header TFT, pin 27.	All pins open. Disconnects both lines.	R62
J23	**Pins 1 and 2 shorted. Connects CT0X_IRQ2-A _MTIOC0C to the CAN transceiver (U12, pin 1) via R242.**	Pins 2 and 3 shorted. Connects CT0X _IRQ2-A_MTIOC0C to header TFT, pin 24.	All pins open. Disconnects both lines.	R67, R242

Table 6-18: MTU Jumpers

*By default, this jumper is not fitted to the RSK+. Therefore the default configuration is all pins open.

6.10 IRQ & General I/O Pin Configuration

Table 6-19 below details the function of the option links associated with IRQ and general I/O pin configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R32	Connects OEn pin (U2, pin 19) to GROUND, bypassing J2.	**Disconnects OEn pin (U2, pin 19) from GROUND (still connectable via J2).**	J2
R35	**Connects TxD6-A_IRQ8-A (MCU, pin C1) to switch SW1 (via R37).**	Disconnects TXD6-A_IRQ8-A (MCU, pin C1) from switch SW1 (via R37).	R36, R37, R226
R36	Connects TxD6-A_IRQ8-A (MCU, pin C1) to the RS232 transceiver (U11, pin 12) via R217.	**Disconnects TxD6-A_IRQ8-A (MCU, pin C1) from the RS232 transceiver (U11, pin 12) via R217.**	R35, R217
R37	**Connects IRQ8-A (MCU, pin C1) to the switch SW1 (via R35).**	Disconnects IRQ8-A (MCU, pin C1) from the switch SW1.	R35
R38	**Connects RxD6-A_IRQ9-A (MCU, pin D2) to switch SW2 (via R40).**	Disconnects RxD6-A_IRQ9-A (MCU, pin D2) from switch SW2 (via R40).	R39, R40
R39	Connects RxD6-A_IRQ9-A (MCU, pin D2) to the RS232 transceiver (U11, pin 10) via R218.	**Disconnects RxD6-A_IRQ9-A (MCU, pin D2) from the RS232 transceiver (U11, pin 10) via R218.**	R38, R218
R40	**Connects IRQ9-A (MCU, pin D2) to switch SW2 (via R38).**	Disconnects IRQ9-A (MCU, pin D2) from switch SW2 (via R38).	R38
R41	Connects LED0_SCK6-A _IRQ10-A (MCU, pin B1) to LED0.	Disconnects LED0_SCK6-A_IRQ10-A (MCU, pin B1) from LED0.	R42, R43
R42	Connects LED0_SCK6-A _IRQ10-A (MCU, pin B1) to header JA1, pin 23 (via R224).	**Disconnects LED0_SCK6-A _IRQ10-A (MCU, pin B1) from header JA1, pin 23 (via R224).**	R41, R43, R224
R43	Connects LED0_SCK6-A _IRQ10-A (MCU, pin B1) to header JA6, pin 11.	**Disconnects LED0_SCK6-A _IRQ10-A (MCU, pin B1) to header JA6, pin 11.**	R42, R43
R44	**Connects DA1_LED2 (MCU, pin C3) to LED2.**	Disconnects DA1_LED2 (MCU, pin C3) from LED2.	R45
R45	Connects DA1_LED2 (MCU, pin C3) to header JA1, pin 14.	**Disconnects DA1_LED2 (MCU, pin C3) from header JA1, pin 14.**	R44
R46	**Connects DA0_LED1 (MCU, pin C2) to LED1.**	Connects DA0_LED1 (MCU, pin C2) to LED1.	R47
R47	Connects DA0_LED1 (MCU, pin C2) to header JA1, pin 13.	**Connects DA0_LED1 (MCU, pin C2) to header JA1, pin 13.**	R46
R48	**Connects ADTRG0n_A (MCU, pin C4) to switch SW3.**	Disconnects ADTRG0n_A (MCU, pin C4) to switch SW3.	-
R49	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to USB IC U14, pin 2.**	Disconnects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) from USB IC U14, pin 2.	R50, R51
R50	Connects USB1OVRCURA_P15 _MTIOC0B (MCU, pin N5) to header TFT, pin 32.	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to header TFT, pin 32.**	R49, R51, R252
R51	Connects USB1OVRCURA_P15 _MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).	**Connects USB1OVRCURA _P15_MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R229).**	R49, R50, R229
R67	Connects CTX0_IRQ2-A _MTIOC0C (MCU, pin J2) to the header JA2, pin 23 (via R230).	**Disconnects CTX0_IRQ2-A _MTIOC0C (MCU, pin J2) from the header JA2, pin 23 (via R230).**	R230

Table 6-19: IRQ & General I/O Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R224	**Connects IRQ10-A (MCU, pin B1) to header JA1, pin 23 (via R42).**	Disconnects IRQ10-A (MCU, pin B1) from header JA1, pin 23 (via R42).	R42, R225
R225	Connects MTIOC6A (MCU, pin F14) to header JA1, pin 23 (via R107).	**Disconnects MTIOC6A (MCU, pin F14) from header JA1, pin 23 (via R107).**	R107, R224
R226	**Connects IRQ8-A (MCU, pin C1) to header JA2, pin 7 (via R35).**	Disconnects IRQ8-A (MCU, pin C1) from header JA2, pin 7 (via R35).	R35, R227
R227	Connects MTIOC0A (MCU, pin J4) to header JA2, pin 7 (via R71).	**Disconnects MTIOC0A (MCU, pin J4) from header JA2, pin 7 (via R71).**	R71, R226
R228	**Connects IRQ9-A (MCU, pin D2) to header JA2, pin 9 (via R38).**	Disconnects IRQ9-A (MCU, pin D2) from header JA2, pin 9 (via R38).	R38, R229
R229	Connects MTIOC0B (MCU, pin N5) to header JA2, pin 9 (via R51).	**Disconnects MTIOC0B (MCU, pin N5) from header JA2, pin 9 (via R51).**	R51, R228
R230	**Connects IRQ2-A (MCU, pin J2) to header JA2, pin 23 (via R67).**	Disconnects IRQ2-A (MCU, pin J2) to header JA2, pin 23 (via R67).	R67, R231
R231	Connects MTIOC1A (MCU, pin N3) to header JA2, pin 23 (via R56).	**Disconnects MTIOC1A (MCU, pin N3) from header JA2, pin 23 (via R56).**	R56, R230
R251	**Connects SSLB1-A (MCU, pin P10) to the header TFT, pin 32 (via R90).**	Disconnects SSLB1-A (MCU, pin P10) from the header TFT, pin 32 (via R90).	R252, R90
R252	Connects P15 (MCU, pin N5) to the header TFT, pin 32.	**Disconnects P15 (MCU, pin N5) from the header TFT, pin 32.**	R251, R50

Table 6-19: IRQ & General I/O Option Links (Continuation)

Table 6-20 below details the function of the jumpers associated with IRQ and general I/O pin configuration.

Reference	Position One	Position Two	Position Three	Related Ref.
J3*	Pins 1 and 2 shorted. Connects OEn (U3, pin 19) to GROUND (bypassed by R33).	All pins open. Disconnects OEn (U3, pin 19) from GROUND (still connectable via R33).	-	R33
J4*	Pins 1 and 2 shorted. Connects OEn (U4, pin 19) to GROUND (bypassed by R34).	All pins open. Disconnects OEn (U4, pin 19) from GROUND (still connectable via R34).	-	R34

Table 6-20: IRQ & General I/O Jumpers

*By default, this jumper is not fitted to the RSK+. Therefore the default configuration is all pins open.

6.11 Power Supply Configuration

Table 6-21 below details the function of the option links associated with power supply configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R172	**Connects Unregulated_VCC to the PWR1 connector, pin 3.**	Disconnects Unregulated _VCC from the PWR1 connector, pin 3.	-
R173	**Connects CON_5V to the main power supply.**	Disconnects CON_5V from the main power supply.	-
R174	**Connects Board_5V to the main 5V power supply.**	Disconnects Board_5V from the main 5V power supply.	-
R175	**Connects the 3.3V regulator to the main 3.3V connections.**	Disconnects the 3.3V regulator from the main 3.3V connections.	R176, R177
R176	**Connects CON_3V3 to the main 3.3V power supply (via R175).**	Disconnects CON_3V3 from the main 3.3V power supply (via R175).	R175
R177	**Connects UC_VCC to the main 3.3V power supply, bypassing J13 (via R175).**	Connects UC_VCC to the main 3.3V power supply, bypassing J13 (via R175).	R175
R325	Connects 3V3USB to CON_3V3USB.	**Disconnects 3V3USB from CON_3V3USB.**	R326, R327, R328
R326	**Connects 3V3USB to Board_VCC.**	Disconnects 3V3USB from Board_VCC.	R325, R327, R328
R327	Connects 5VUSB to CON_5VUSB.	**Disconnects 5VUSB from CON_5VUSB.**	R325, R326, R327
R328	**Connects 5VUSB to Board_5V.**	Disconnects 5VUSB from Board_5V.	R325, R326, R327

Table 6-21: Power Supply Option Links

Table 6-22 below details the function of the jumpers associated with power supply configuration.

Reference	Position One	Position Two	Position Three	Related Ref.
J10 & J11	Pins 1 and 2 shorted on both jumpers. Power supply regulated is bypassed, to allow a regulated 5V supply to be used.	**All pins open on both jumpers. Power supply is used, allowing an unregulated 7-15V supply to be used.**	All other combinations are unsupported, and may cause damage to the RSK+.	-
J12*	Pins 1 and 2 shorted. Connects USB0VBUS to Board VCC.	Pins 2 and 3 shorted. Connects USB0VBUS to VBUS from USB0 via J18 (can be bypassed by R322)	All pins open. Discon-nects both lines.	J18, J21, R322
J13*	Pins 1 and 2 shorted. Connects UC_VCC to the output of the 3.3V regulator, via R175 (bypassed by R177).	All pins open. Disconnects UC_VCC from the output of the 3.3V regulator (still connectable via R177).	-	R177
J21*	Pins 1 and 2 shorted. Connects VBUS (connector USB0, pin 1) to the main power supply.	All pins open. Disconnects VBUS (connector USB0, pin 1) from the main power supply.	-	J12

Table 6-22: Power Supply Jumpers (Continued Overleaf)

*By default, this jumper is not fitted to the RSK. The default position is therefore all pins open.

6.12 Clock Configuration

Table 6-23 below details the function of the option links associated with clock configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R4	**Connects EXTAL (MCU, pin J1) to the crystal X1.**	Disconnects EXTAL (MCU, pin J1) from the crystal X1.	R4, R6, R7, R8
R5	**Connects XTAL (MCU, pin H1) to the crystal X1.**	Disconnects XTAL (MCU, pin H1) from the crystal X1.	R5, R6, R7, R8
R6	Connects EXTAL (MCU, pin J1) to the crystal X2.	**Disconnects EXTAL (MCU, pin J1) from the crystal X2.**	R4, R5, R6, R8
R7	Connects XTAL (MCU, pin H1) to the crystal X2.	**Disconnects XTAL (MCU, pin H1) from the crystal X2.**	R4, R5, R7, R8
R8	Connects EXTAL (MCU, pin J1) to CON_EXTAL.	**Disconnects EXTAL (MCU, pin J1) from CON_EXTAL.**	R4, R5, R6, R7
R10	**Connects OSC2 (MCU, pin E1) to the crystal X3.**	Disconnects OSC2 (MCU, pin E1) from the crystal X3.	R11, R12
R11	**Connects OSC1 (MCU, pin F1) to the crystal X3.**	Disconnects OSC1 (MCU, pin F1) from the crystal X3.	R10, R12
R12	Connects OSC2 (MCU, pin E1) to ground.	**Disconnects OSC2 (MCU, pin E1) from ground.**	R10, R11
R301	**Connects XTAL2 (U15, pin 13) to the crystal X4.**	Disconnects XTAL2 (U15, pin 13) from the crystal X4.	X4

Table 6-23: Clock Option Links

6.13 External Memory Configuration

Table 6-24 below details the function of the option links associated with external memory configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R152	**Connects SDCLK (MCU, pin B15) to SDRAM module U5, pin 38.**	Disconnects SDCLK (MCU, pin B15) from SDRAM module U5, pin 38.	-
R156	Connects WP# (U6, pin 3) to ground, enabling write protection on the SPI flash IC.	**Disconnects WP# (U6, pin 3) from ground, disabling write protection on the SPI flash IC.**	-
R157	Connects HOLD# (U6, pin 7) to ground, enabling serial flash IC operation suspension.	**Disconnects HOLD# (U6, pin 7) from ground, disabling serial flash IC operation suspension.**	-
R161	**Connects SDA0 (MCU, pin P5) to the I^2C EEPROM (U7, pin 5).**	Disconnects SDA0 (MCU, pin P5) from the I^2C EEPROM (U7, pin 5).	-
R162	**Connects SCL0 (MCU, pin R3) to the I^2C EEPROM (U7, pin 6).**	Disconnects SCL0 (MCU, pin R3) from the I^2C EEPROM (U7, pin 6).	-
R163	Connects WP (U7, pin 7) to ground (bypassing J9), disabling write protection on the I^2C EEPROM IC.	**Disconnects WP (U7, pin 7) from ground (still connectable via J9), enabling write protection on the I^2C EEPROM IC.**	J9
R164	**Connects A0 (U7, pin 1) to Board_VCC or Board_5V, via R166 and R167 respectively.**	Disconnects A0 (U7, pin 1) from Board_VCC and Board_5V, via R166 and R167 respectively.	R165, R166, R167

Table 6-24: External Memory Configuration (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R165	Connects A0 (U7, pin 1) to GROUND.	**Disconnects A0 (U7, pin 1) from GROUND.**	R164
R166	**Powers the I^2C EEPROM IC (U7) from Board_VCC.**	Disconnects the I^2C EEPROM IC (U7) from Board_VCC.	R167
R167	Powers the I^2C EEPROM IC (U7) from Board_5V.	**Disconnects the I^2C EEPROM IC (U7) from Board_5V.**	R166

Table 6-24: External Memory Configuration (Continuation)

Table 6-25 below details the function of the jumpers associated with external memory configuration.

Reference	Position One	Position Two	Position Three	Related Ref.
J9	**Pins 1 and 2 shorted. Connects WP (U7, pin 7) to GROUND, disabling write protection on the I^2C EEPROM IC (bypassed by R163).**	All pins open. WP (U7, pin 7) is disconnected form GROUND, enabling write protection on the I^2C EEPROM IC (still connectable by R163).	-	R163

Table 6-25: External Memory Configuration

7. Headers

7.1 Application Headers

This RSK is fitted with application headers, which can be used to connect compatible Renesas application devices or as easy access to MCU pins.

Table 7-1 below lists the connections of the application header, JA1.

Application Header JA1					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	5V	-	2	0V	-
3	3V3	-	4	0V	-
5	AVCC	-	6	AVSS	-
7	AVREF	-	8	ADTRG	-
9	AD0	C5	10	AD1	D4
11	AD2	A3	12	AD3	D5
13	DAC0	C2	14	DAC1	C3
15	IO_0	C12	16	IO_1	A15
17	IO_2	B14	18	IO_3	C13
19	IO_4	D13	20	IO_5	C14
21	IO_6	C15	22	IO_7	D14
23	IRQ3/IRQAEC/M2_HSIN0	B1	24	IIC_EX	NC
25	IIC_SDA	-	26	IIC_SCL	-

Table 7-1: Application Header JA1 Connections

Table 7-2 below lists the connections of the application header, JA2.

Application Header JA2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	RESET	H4	2	EXTAL	-
3	NMI	H2	4	Vss1	-
5	WDT_OVF	F2	6	SCIaTX	K3
7	IRQ0/WKUP/M1_HSIN0	C1	8	SCIaRX	L1
9	IRQ1/M1_HSIN1	D2	10	SCIaCK	M1
11	M1_UD	P7	12	No Connection	NC
13	M1_Up	R13	14	M1_Un	M11
15	M1_Vp	P11	16	M1_Vn	R11
17	M1_Wp	M6	18	M1_Wn	M6
19	TimerOut	M3	20	TimerOut	M3
21	TimerIn	R1	22	TimerIn	R1
23	IRQ2/M1_EncZ/M1_HSIN2	J2	24	M1_POE	A10
25	M1_TRCCLK	P1	26	M1_TRDCLK	M2

Table 7-2: Application Header JA2 Connections

Table 7-3 below lists the connections of the BUS application header, JA3

Bus Application Header JA2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	A0	F14	A1	A1	G15
3	A2	H13	4	A3	H15
97	A4	H14	6	A5	J13
7	A6	J15	8	A7	J14
9	A8	K15	10	A9	K12
11	A10	M15	12	A11	L14
13	A12	L13	14	A13	N15
15	A14	M14	16	A15	P15
17	D0	A7	18	D1	B7
19	D2	A8	20	D3	A9
21	D4	A10	22	D5	C10
23	D6	C10	24	D7	A12
25	RDn	N8	26	WR/SDWE	P10
27	LED5_CS3n-B	N14	28	CSb	A13
29	D8	C12	30	D9	A15
31	D10	B14	32	D11	C13
33	D12	D13	34	D13	C14
35	D14	C15	36	D15	D14
37	A16	M12	38	A17	P14
39	A18	N12	40	A19	N11
41	A20	P12	42	A21	N10
43	A22	M10	44	SDCLK	B15
45	CSc/Wait	B11	46	ALE/SDCKE	D15
Q	HWRn/DQM1	M8	48	LWRn/DQM0	P10
49	CAS	A14	50	RAS	B12

Table 7-3: Bus Application Header JA3 Connections

Table 7-4 below lists the connections of the application header, JA5.

Application Header JA5					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	AD4	B4	2	AD5	A4
3	AD6	A5	4	AD7	B5
5	CAN1TX	J2	6	CAN1RX	K1
7	CAN2TX	NC	8	CAN2RX	NC
9	IRQ4/M2_EncZ/M2HSIN1	H14	10	IRQ5/M2_HSIN2	H13
11	M2_UD	K12	12	M2_Uin	R12
13	M2_Vin	M10	14	M2_Win	N10
15	M2_Toggle	K15	16	M2_POE	NC
17	M2_TRCCLK	N12	18	M2_TRDCLK	N11
19	M2_Up	M15	20	M2_Un	L14
21	M2_Vp	L13	22	M2_Vn	N15
23	M2_W	M14	24	M2_Wn	P15

Table 7-4: Application Header JA5 Connections

Table 7-5 below lists the connections of the application header, JA6.

Application Header JA6					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	DREQ	NC	2	DACK	NC
3	TEND	NC	4	GROUND	NC
5	RS32TX	-	6	RS232RX	-
7	SCIbRX	R3	8	SCIbTX	P5
9	SCIcTX	C1	10	SCIbCK	M5
11	SCIcCK	B1	12	SCIcRX	D2
13	M1_Toggle	NC	14	M1_Uin	NC
15	M1_Vin	NC	16	M1_Win	NC
17	Reserved	NC	18	Reserved	NC
19	Reserved	NC	20	Reserved	NC
21	Reserved	NC	22	Reserved	NC
23	Unregulated_VCC	NC	24	GROUND	NC

Table 7-5: Application Header JA6 Connections

7.2 Generic Headers

Generic headers, used to provide easy connections to various pins from devices fitted to the RSK+.

Table 7-6 below lists the connections of the pin header, J20.

Pin Header J20					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	CNVSS	E2	2	BSCANP	E3
3	P10	N7	4	P90	A6
5	P91	B6	6	P92	B6
7	PG0	A11	8	PG1	D10
9	GROUND	-	10	P53_BCLK	R10

Table 7-6: Pin Header J20 Connections

8. Code Development

8.1 Overview

For all code debugging using Renesas software tools, the RSK+ board must be connected to a PC via an E1/E20 debugger. An E1 debugger is supplied with this RSK+ product.

For further information regarding the debugging capabilities of the E1/E20 debuggers, refer to the RX Family E1/E20 Emulator User's Manual (REJ10J2089).

8.2 Compiler Restrictions

The compiler supplied with this RSK is fully functional for a period of 60 days from first use. After the first 60 days of use have expired, the compiler will default to a maximum of 128k code and data. To use the compiler with programs greater than this size you need to purchase the full tools from your distributor.

The protection software for the compiler will detect changes to the system clock. Changes to the system clock back in time may cause the trial period to expire prematurely.

8.3 Mode Support

The MCU supports Single Chip, Boot and USB Boot modes, which are configured on the RSK+ board. Details of the modifications required can be found in §6. All other MCU operating modes are configured within the MCU's registers, which are listed in the RX62N group hardware manual.

Only ever change the MCU operating mode whilst the RSK is in reset, or turned off; otherwise the MCU may become damaged as a result.

8.4 Debugging Support

The E1 emulator (as supplied with this RSK+) supports break points, event points (including mid-execution insertion) and basic trace functionality. It is limited to a maximum of 8 on-chip event points, 256 software breaks and 256 branch/cycle trace. For further details, refer RX Family E1/E20 Emulator User's Manual (REJ10J2089-0100).

8.5 Address Space

Figure 8-1 below details the address space of MCU in its different operating modes. For further details, refer to the RX62N group hardware manual.

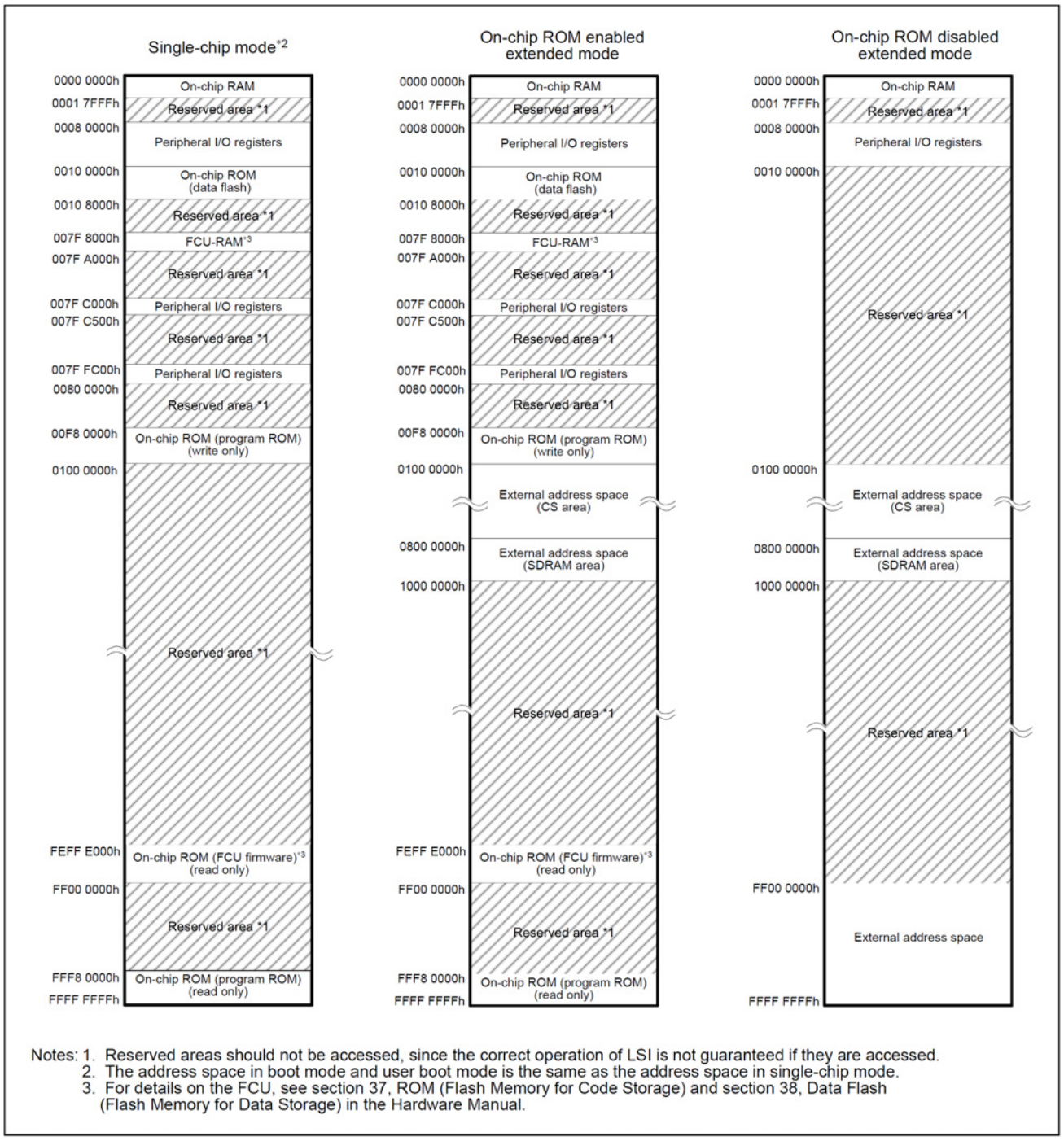

Figure 8-1: MCU Address Space Diagram

9. Additional Information

Technical Support
For details on how to use High-performance Embedded Workshop (HEW), refer to the HEW manual available on the CD or from the web site.

For information about the RX62N series microcontrollers refer to the RX62N Group hardware manual.

For information about the RX62N assembly language, refer to the RX600 Series Software Manual.

Online technical support and information is available at: http://www.renesas.com/rskrx62n

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