User's Manual

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RX630 Group

Renesas Starter Kit User's Manual

RENESAS MCU
RX Family / RX600 Series

Renesas Electronics
www.renesas.com

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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 RX630 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.	RSKRX630 User Manual	R20UT0292EG
Tutorial Manual	Provides a guide to setting up RSK environment, running sample code and debugging programs.	RSKRX630 Tutorial Manual	R20UT0293EG
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	RSKRX630 Quick Start Guide	R20UT0294EG
USB Function Manual	Provides sample instructions to configure the RSK and Host PC for running the USB function sample code.	RSKRX630 USB Function Manual	R20UT0296EG
Schematics	Full detail circuit schematics of the RSK.	RSKRX630 Schematics	R20UT0291EG
Hardware Manual	Provides technical details of the RX630 microcontroller.	RX630 Group Hardware Manual	R01UH0040EJ

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
IIC	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
NMI	Non Maskable Interrupt
PC	Program Counter
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
UART	Universal Asynchronous Receiver/Transmitter

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.

Details of the external power supply requirements for the RSK, and connections are shown in **Table 2-1** below.

Connector	Supply Voltages
PWR	Regulated, 5V DC

Table 2-1: Main Power Supply Requirements

In order for the debug LCD to operate, the following jumper settings must be made for the different power supply options:

Jumper	RSK Powered By E1 Debugger	RSK Powered by External 5V Supply
J6	Jumper across pins 1 and 2.	Jumper across pins 2 and 3.
J7	Jumper across pins 1 and 2.	Jumper across pins 2 and 3.

Table 2-2: LCD Power Supply Options

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

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.

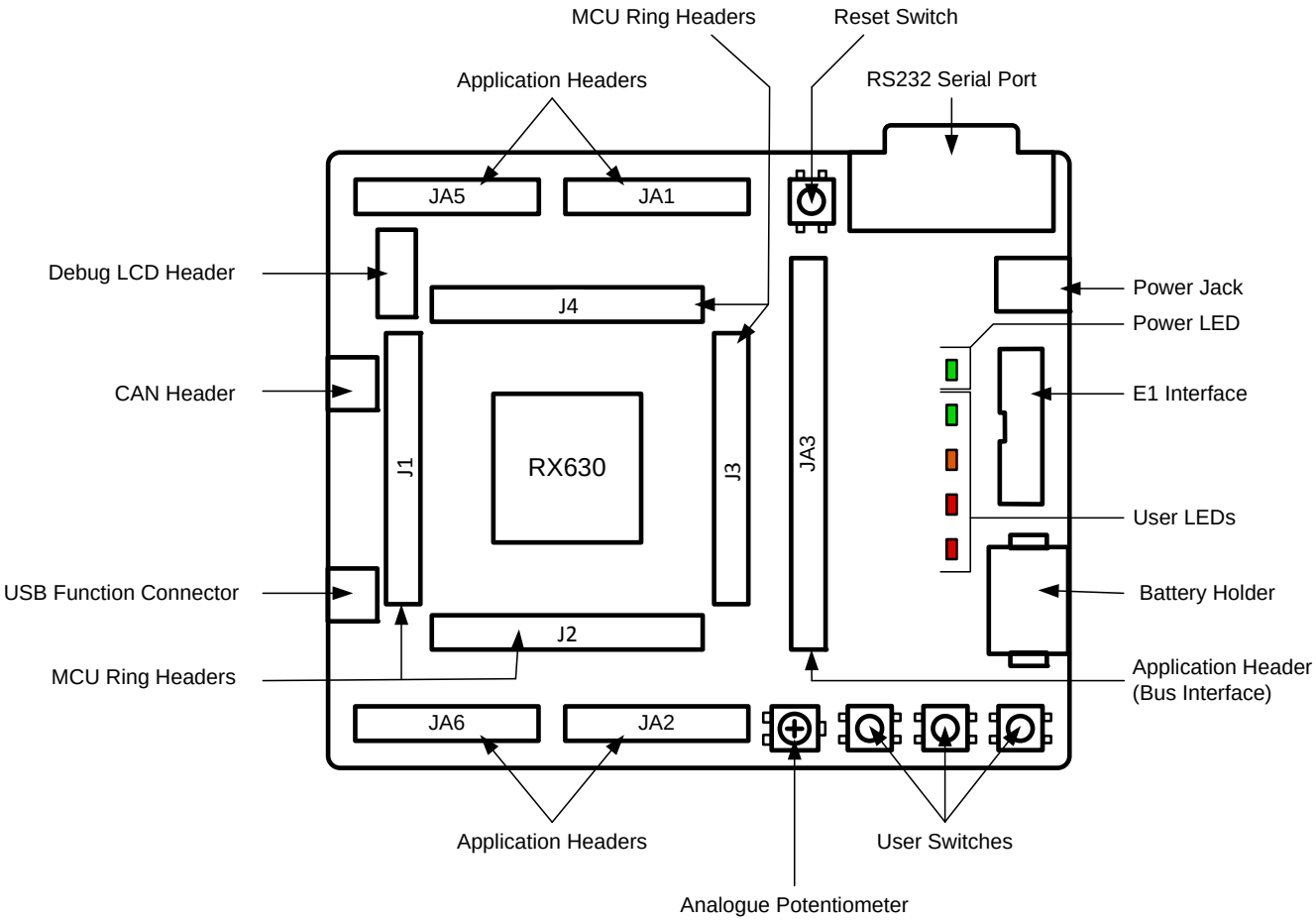

Figure 3-1: Board Layout

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.

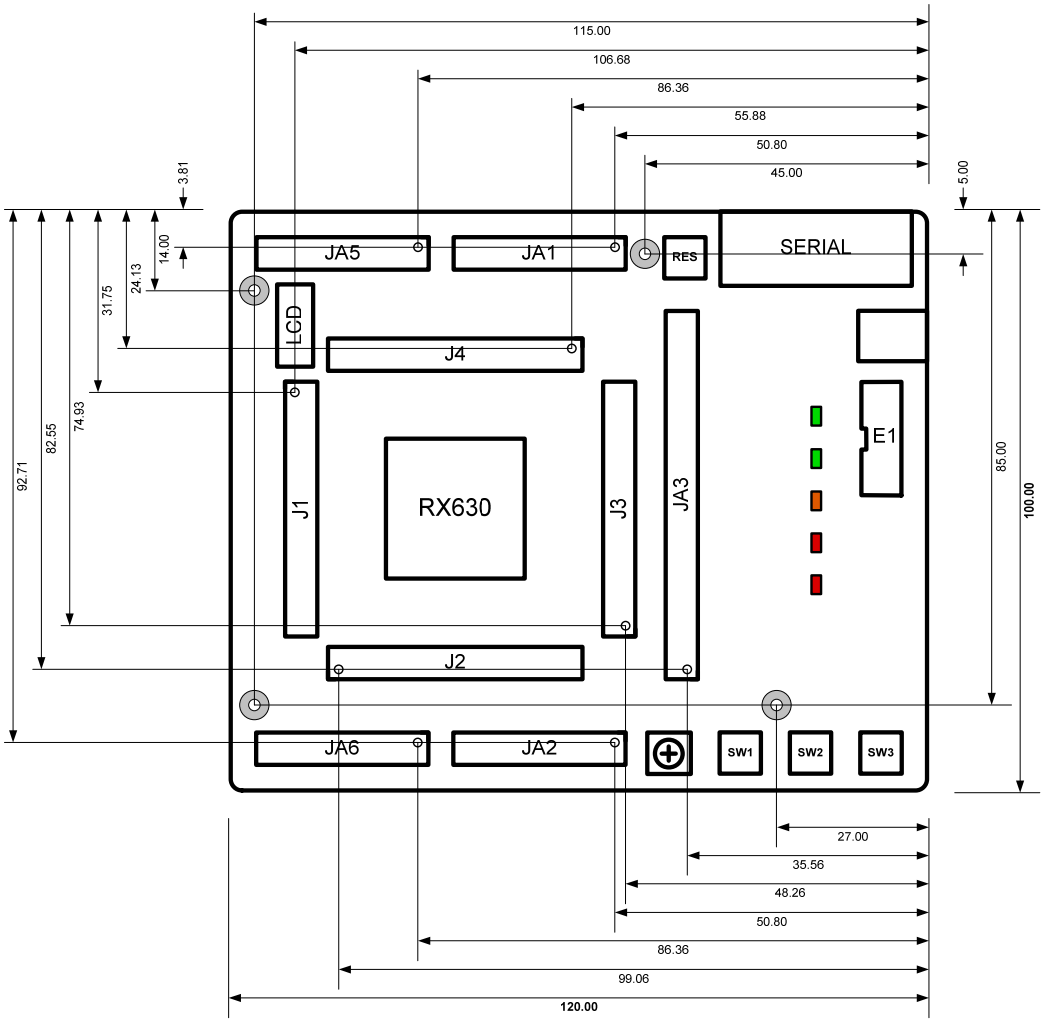

Figure 3-2: Board Dimensions

3.3 Component Placement

Figure 3-3 below shows placement of individual components on the top-side PCB. Component types and values can be looked up using the board schematics.

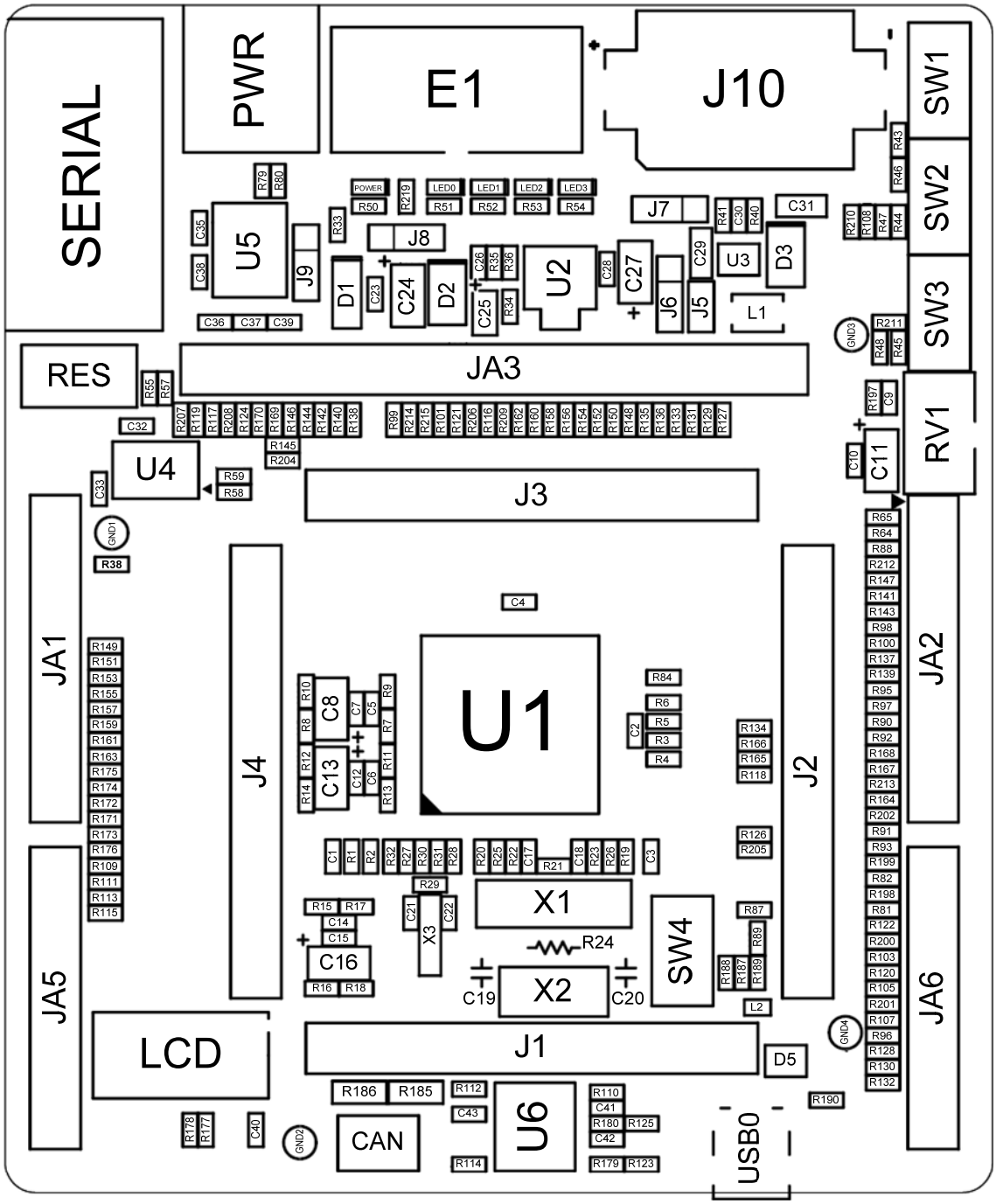

Figure 3-3: Top-Side Component Placement

Figure 3-4 below shows placement of individual components on the bottom-side PCB. Component types and values can be looked up using the board schematics.

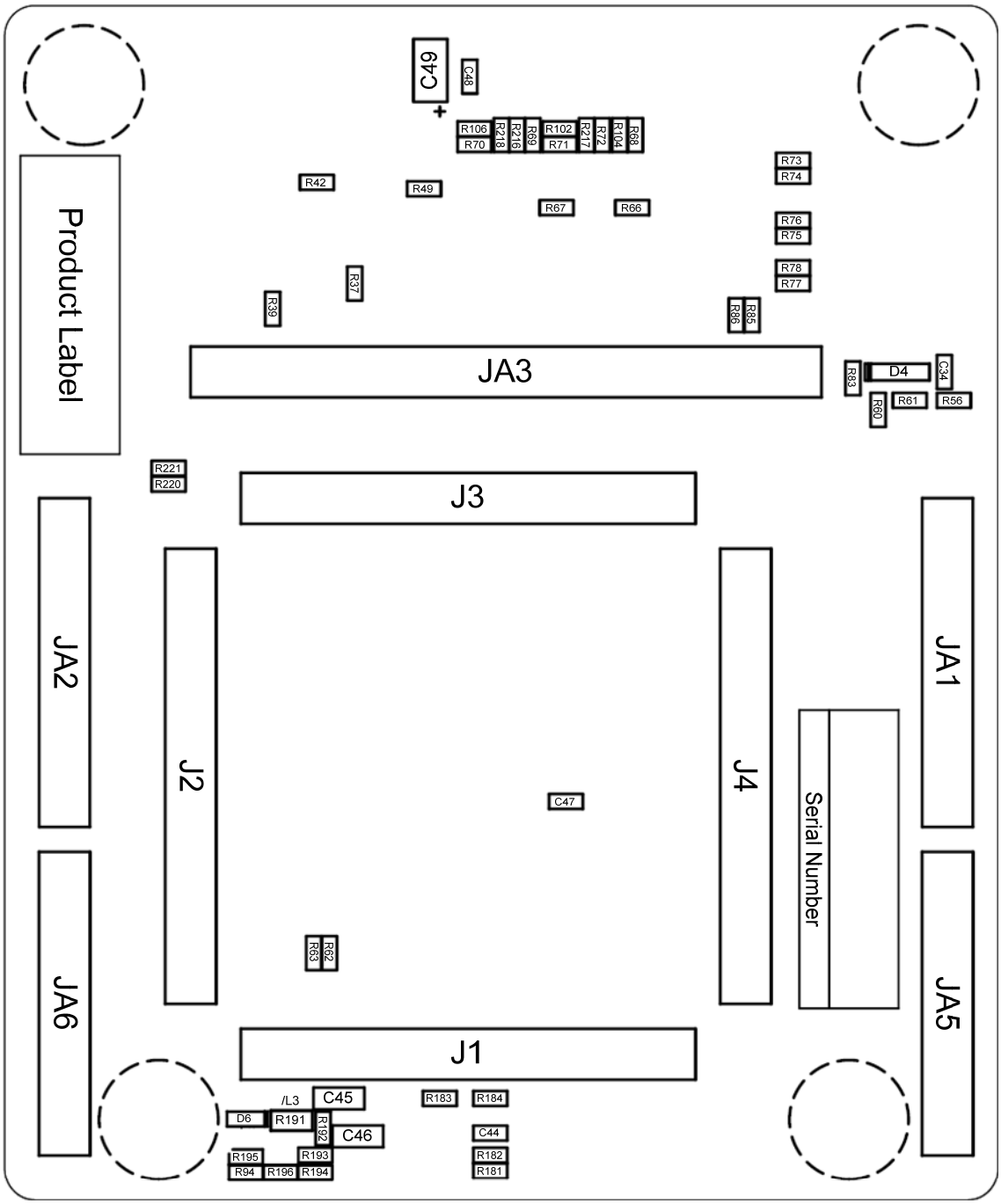

Figure 3-4: Bottom-Side Component Placement

4. Connectivity

4.1 Internal RSK Connections

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

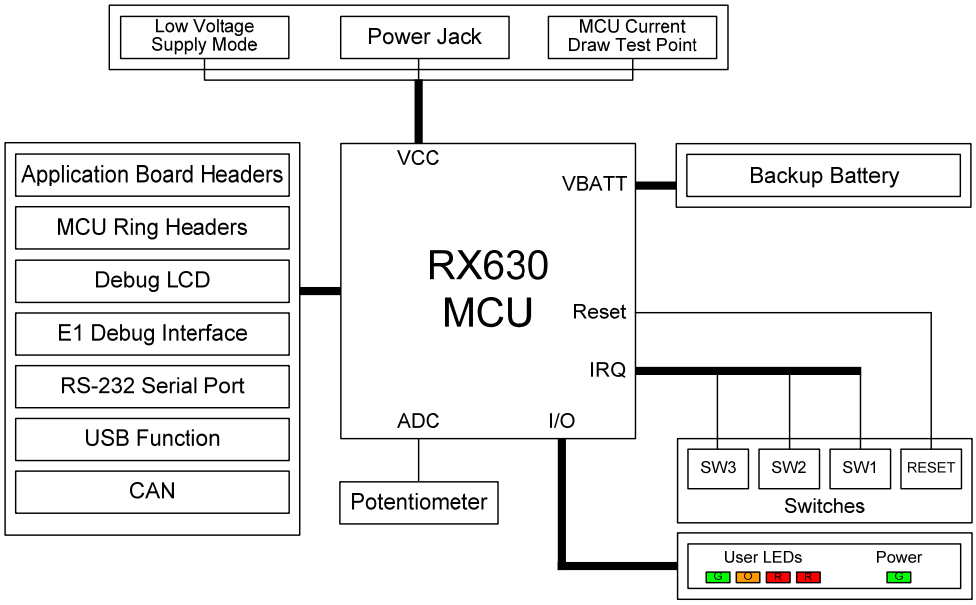

Figure 4-1: Internal RSK Block Diagram

4.2 Debugger Connections

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

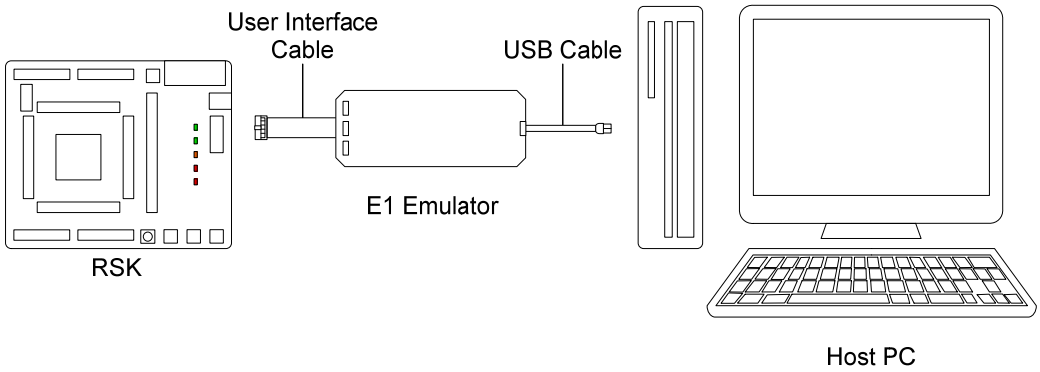

Figure 4-2: Debugger Connection Diagram

5. User Circuitry

5.1 Reset Circuit

A reset control circuit is not fitted to the RSK, as the MCU is capable of voltage and power-on detection. Resets are handled internally, and reset switch is connected directly to RESn on the MCU (pin 10).

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 RX630 hardware manual for details regarding the clock signal requirements, and the RSKRX630 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 crystal.	Fitted	12MHz	HC49, SMT
X2	External crystal	Not fitted	NA	NA
X3	Real time Clock	Fitted	32.768kHz	Encapsulated, SMT

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 RSKRX630 board schematics.

Switch	Function	MCU Connection
RES	When pressed, the microcontroller is reset.	RESn, Pin 10
SW1	Connects to an IRQ input for user controls.	IRQ2, Pin 18
SW2	Connects to an IRQ input for user controls.	IRQ12, Pin 90
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 and ADTRG0n, Pin 98

Table 5-2: Switch Connections

5.4 LEDs

There are five 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
POWER	Green	Indicates the power status	No connection
LED0	Green	User operated LED.	PC5, Pin 47
LED1	Orange	User operated LED.	P24, Pin 24
LED2	Red	User operated LED.	PC2, Pin 50
LED3	Red	User operated LED.	P17, Pin 29

Table 5-3: LED Connections

5.5 Potentiometer

A single-turn potentiometer is connected as a potential divider to analogue input AN000, pin 95. The potentiometer can be used to create a voltage between AVCC0 and ground (by default, AVCC0 is connected to the board power supply Board_VCC).

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.

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 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	PJ3, pin 4
5	R/W (pulled to ground)	-	6	DLCDE (pulled to ground)	P33, pin 17
7	No Connection	-	8	No Connection	-
9	No Connection	-	10	No Connection	-
11	D12_DLCD4	PE4, pin 74	12	D13_DLCD5	PE5, pin 73
13	D14_DLCD6	PE6, pin 72	14	D15_DLCD7	PE7, pin 71

Table 5-4: LCD Header Connections

5.7 RS232 Serial Port

Connections between the RS232 header and the microcontroller are listed in **Table 5-5** below.

SCI Signal	Function	MCU Connection	RS232 Connection
TXD0	SCI0 Transmit Signal.	P20, pin 28	Pin 13
RXD0	SCI0 Receive Signal.	P21, pin 27	Pin 15
TXD1	SCI1 Transmit Signal.	P26, pin 22	Pin 13*
RXD1	SCI1 Receive Signal.	P30, pin 20	Pin 15*
TXD2	SCI2 Transmit Signal	P50, pin 44	Pin 12*
RXD2	SCI2 Receive Signal	P52, pin 42	Pin 10*
RS232TX	External SCI Transmit Signal.	n/a	Pin 13*
RS232RX	External SCI Receive Signal.	n/a	Pin 15*

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 USB

Connections between the USB connector and the microcontroller are listed in **Table 5-6** below.

USB Signal	Function	MCU Connection	USB Connection
USB0DP	USB Data+	37	3
USB0DM	USB Data-	36	2
USB0DUPE	USB Data+ Pull Up	P14, pin 32	3 (via pull up)
USB0VBUS	USB VBUS	P16, pin 30	1

Table 5-6: USB Connections

5.9 CAN

Connections between the CAN IC (U6) and the microcontroller are listed in **Table 5-7** below.

CAN Signal	Function	MCU Connection	CAN IC (U6) Connection
CTX1	CAN Transmit	P54, pin 40	1
CRX1	CAN Receive	P55, pin 39	4
CANEN	CAN Device Enable	P45, pin 89	6
CANERRn	CAN Error	P46, pin 88	8
CANSTBn	CAN Standby	P47, pin 87	14

Table 5-7: CAN Connections

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 some of the MCU's pins are multiplexed, some of the peripherals must be used exclusively. Refer to the RX630 hardware manual and RSKRX630 board schematics for further information.

6.2 MCU Operating Modes

Table 6-1 below details the function of the jumpers associated with the MCU operating modes.

Reference	Position One	Position Two	Position Three	Position Four	Related Ref.
SW4	Pin 1 and Pin 2 set to OFF. DO NOT SET.	**Pin 1 set to OFF and Pin 2 set to X (don't care). Single Chip Mode is selected.**	Pin 1 set to ON and Pin 2 set to OFF. User Boot Mode/USB Boot Mode is selected.	Pin 1 and Pin 2 set to 'ON'. Boot Mode (SCI) is selected.	-

Table 6-1: MCU Operating Mode Configuration

Table 6-2 below details the function of the links associated with the USB boot mode power configuration.

Reference	Position One	Position Two	Position Three	Related Ref.
R65	**Fitted. USB boot mode is self powered.**	Removed. USB boot mode is bus powered.	-	-

Table 6-2: USB Boot Mode Configuration

Table 6-3 below details the function of the jumpers associated with the emulator..

Reference	Position One	Position Two	Position Three	Related Ref.
J8	Pin 1 and pin 2 shorted, E1 debugs with Hot plug-in.	**Pin 2 and pin 3 shorted, E1 debugs normally.**	All open. DO NOT SET.	-

Table 6-3: Emulator Configuration

6.3 E1 Debugger Interface

Table 6-4 below details the function of the option links associated with the E1 debugger interface configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R216	**Connects TMS (MCU, pin 19) to E1 connector (pin 9).**	Disconnects TMS (MCU, pin 19) from E1 connector (pin 9).	-
R217	**Connects TRSTn (MCU, pin 16) to E1 connector (pin 3).**	Disconnects TRSTn (MCU, pin 16) from E1 connector (pin 3).	-
R218	**Connects IRQ14 (MCU, pin 45) to E1 connector (pin 10).**	Disconnects IRQ14 (MCU, pin 45) from E1 connector (pin 10).	-
R219	**Connects EMLE (MCU, pin 2) to E1 connector (pin 4).**	Disconnects EMLE (MCU, pin 2) from E1 connector (pin 4)	-

Table 6-4: E1 Debugger Interface Option Links

6.4 CAN Configuration

Table 6-5 below details the function of the option links associated with the CAN transceiver.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R179	**Connects CTX1 (MCU, pin 40) to TXD (U6, pin 1).**	Disconnects CTX1 (MCU, pin 40) from TXD (U6, pin 1).	R123
R180	**Connects CRX1 (MCU, pin 39) from RXD (U6, pin 4).**	Disconnects CRX1 (MCU, pin 39) from RXD (U6, pin 4).	R125
R184	**Connects WAKE (U6, pin 9) to GROUND.**	Disconnects WAKE (U6, pin 9) from GROUND.	-

Table 6-5: CAN Option Links

6.5 USB Configuration

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

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R190	**Connects FRAME (USB0 connector, pin 6) to GROUND.**	Disconnects FRAME (USB0 connector, pin 6) from GROUND.	-
R191	**Bypasses the inductive filter L3.**	Does not bypass the inductive filter L3.	R196, R195
R195	**Connects USB0VBUS (MCU, pin 30) to BOARD_VCC.**	Disconnects USB0VBUS (MCU, pin 30) from BOARD_VCC.	R196, R94, R191
R196	Connects USB0VBUS (MCU, pin 30) to VBUS (USB0 connector, pin 1).	**Disconnects USB0VBUS (MCU, pin 30) from VBUS (USB0 connector, pin 1).**	R191, R94

Table 6-6: USB Option Links

6.6 ADC Configuration

Table 6-7 below details the function of the option links associated with the Analogue-to-Digital circuit.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R7	**Connects the MCU (VREFH0, pin 96) to UC_VCC.**	Disconnects the MCU (VREFH0, pin 97) from UC_VCC.	R8
R8	Connects the MCU (VREFH0, pin 96) to CON_VREFH0.	**Disconnects the MCU (VREFH0, pin 96) from CON_VREFH0.**	R7
R9	**Connects the MCU (VREFL0, pin 94) to GROUND.**	Disconnects the MCU (VREFL0, pin 94) from GROUND.	R10
R10	Connects the MCU (VREFL0, pin 94) to CON_VREFL0.	**Disconnects the MCU (VREFL0, pin 94) from CON_VREFL0.**	R9
R11	**Connects the MCU (AVCC0, pin 97) to UC_VCC.**	Disconnects the MCU (AVCC0, pin 97) from UC_VCC.	R12
R12	Connects the MCU (AVCC0, pin 97) to CON_AVCC0.	**Disconnects the MCU (AVCC0, pin 97) from CON_AVCC0.**	R11
R13	**Connects the MCU (AVSS0, pin 99) to GROUND.**	Disconnects the MCU (AVSS0, pin 99) from GROUND.	R14
R14	Connects the MCU (AVSS0, pin 99) to CON_AVSS.	**Disconnects the MCU (AVSS0, pin 99) from CON_AVSS.**	R13
R15	**Connects the MCU (VREFH, pin 1) to UC_VCC.**	Disconnects the MCU (VREFH0, pin 1) from UC_VCC.	R16
R16	Connects the MCU (VREFH0, pin 1) to CON_VREFH.	**Disconnects the MCU (VREFH, pin 1) from CON_VREFH.**	R15
R17	**Connects the MCU (VREFL, pin 3) to GROUND.**	Disconnects the MCU (VREFL, pin 3) from GROUND.	R18
R18	Connects the MCU (VREFL, pin 3) to CON_VREFL.	**Disconnects the MCU (VREFL, pin 3) from CON_VREFL.**	R17
R220	**Connects the potentiometer (RV1) to Board_VCC.**	Disconnects the potentiometer (RV1) from Board_VCC.	R221
R221	Connects the potentiometer (RV1) to CON_AVCC0.	**Disconnects the potentiometer (RV1) from CON_AVCC0.**	R220

Table 6-7: ADC Option Links

6.7 RS232 Serial Port Configuration

Table 6-8 below details the function of the option links associated with serial port configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R73	Connects T2OUT (U5, pin 8) to serial connector (pin 8).	**Disconnects T2OUT (U5, pin 8) from serial connector (pin 8).**	J9
R74	Connects R2IN (U5, pin 9) to serial connector (pin 7).	**Disconnects R2IN (U5, pin 9) from serial connector (pin 7).**	J9
R76	Connects SHDNn (U5, pin 20) to GROUND.	**Disconnects SHDNn (U5, pin 20) from GROUND.**	-
R78	Connects ENn (U5, pin 1) to Board_VCC.	**Disconnects ENn (U5, pin 1) from Board_VCC.**	-
R81	Connects RS232TX (JA6, pin 5) to T1IN (U5, pin 13).	**Disconnects RS232TX (JA6, pin 5) from T1IN (U5, pin 13).**	R198, R200
R82	Connects RS232RX (JA6, pin 6) to R1OUT (U5, pin 15).	**Disconnects RS232RX (JA6, pin 6) from R1OUT (U5, pin 15).**	R198, R201
R85	Connects TXD2 (MCU, pin 44) to T2IN (U5, pin 12).	**Disconnects TXD2 (MCU, pin 44) from T2IN (U5, pin 12).**	R116, R117, R118
R86	Connects RXD2 (MCU, pin 42) to R2OUT (U5, pin 10).	**Disconnects RXD2 (MCU, pin 42) from R2OUT (U5, pin 10).**	R121, R122
R198	**Connects TXD0 (MCU, pin 28) to T1IN (U5, pin 13).**	Disconnects TXD0 (MCU, pin 28) from T1IN (U5, pin 13).	R81, R200
R199	**Connects RXD0 (MCU, pin 27) to R1OUT (U5, pin 15).**	Disconnects RXD0 (MCU, pin 27) from R1OUT (U5, pin 15).	R82, R201
R200	Connects TXD1 (MCU, pin 22) to T1IN (U5, pin 13).	**Disconnects TXD1 (MCU, pin 22) from T1IN (U5, pin 13).**	R81, R198, R102, R103
R201	Connects RXD1 (MCU, pin 20) to R1OUT (U5, pin 15).	**Disconnects RXD1 (MCU, pin 20) from R1OUT (U5, pin 15).**	R199, R82, R106, R107

Table 6-8: RS232 Serial Port Option Links

6.8 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.
R127	**Connects A4_MTIC5U (MCU, pin 66) to A4 (JA3, pin 5).**	Disconnects A4_MTIC5U (MCU, pin 66) from A4 (JA3, pin 5).	R128
R128	Connects A4_MTIC5U (MCU, pin 66) to MTIC5U (JA6, pin 14).	**Disconnects A4_MTIC5U (MCU, pin 66) from MTIC5U (JA6, pin 14).**	R127
R129	**Connects A6_MTIC5V (MCU, pin 64) to A6 (JA3, pin 7).**	Disconnects A6_MTIC5V (MCU, pin 64) from A6 (JA3, pin 7).	R130
R130	Connects A6_MTIC5V (MCU, pin 64) to MTIC5V (JA6, pin 15).	**Disconnects A6_MTIC5V (MCU, pin 64) from MTIC5V (JA6, pin 15).**	R129
R131	**Connects A8_MTIC5W (MCU, pin 61) to A8 (JA3, pin 9).**	Disconnects A8_MTIC5W (MCU, pin 61) from A8 (JA3, pin 9).	R132
R132	Connects A8_MTIC5W (MCU, pin 61) to MTIC5W (JA6, pin 16).	**Disconnects A8_MTIC5W (MCU, pin 61) from MTIC5W (JA6, pin 16).**	R131
R133	**Connects A11_MTIOC0A (MCU, pin 57) to A11 (JA3, pin 12).**	Disconnects A11_MTIOC0A (MCU, pin 57) from A11 (JA3, pin 12).	R134
R134	Connects A11_MTIOC0A (MCU, pin 57) to MTIOC0A which is connected to JA2_PIN7 (JA2, pin 7) via R166.	**Disconnects A11_MTIOC0A (MCU, pin 57) from MTIOC0A which is connected to JA2_PIN7 (JA2, pin 7) via R166.**	R133, R165, R166
R135	**Connects A13_MTIOC1B (MCU, pin 55) to A13 (JA3, pin 14).**	Disconnects A13_MTIOC1B (MCU, pin 55) from A13 (JA3, pin 14).	R136
R136	Connects A13_MTIOC1B (MCU, pin 55) to MTIOC1B; which is connected to JA2_PIN23 (JA2, pin 23) via R168.	**Disconnects A13_MTIOC1B (MCU, pin 55) from MTIOC1B which is connected to JA2_PIN23 (JA2, pin 23) via R168.**	R135, R167, R168
R137	**Connects A18_MTIOC4B (MCU, pin 50) to MTIOC4B (JA2, pin 17).**	Disconnects A18_MTIOC4B (MCU, pin 50) from MTIOC4B (JA2, pin 17).	R138
R138	Connects A18_MTIOC4B (MCU, pin 50) to A18 (JA3, pin 39).	**Disconnects A18_MTIOC4B (MCU, pin 50) from A18 (JA3, pin 39).**	R137
R139	**Connects A19_MTIOC4D (MCU, pin 49) to MTIOC4D (JA2, pin 18).**	Disconnects A19_MTIOC4D (MCU, pin 49) from MTIOC4D (JA2, pin 18).	R140
R140	Connects A19_MTIOC4D (MCU, pin 49) to A19 (JA3, pin 40).	**Disconnects A19_MTIOC4D (MCU, pin 49) from A19 (JA2, pin 40).**	R139
R141	**Connects A20_MTIOC3D (MCU, pin 48) to MTIOC3D (JA2, pin 14).**	Disconnects A20_MTIOC3D (MCU, pin 48) from MTIOC3D (JA2, pin 14).	R142
R142	Connects A20_MTIOC3D (MCU, pin 48) to A20 (JA3, pin 41).	**Disconnects A20_MTIOC3D (MCU, pin 48) from A20 (JA3, pin 41).**	R141

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

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R143	**Connects A21_MTIOC3B (MCU, pin 47) to A21 (JA3, pin 42).**	Disconnects A21_MTIOC3B (MCU, pin 47) from A21 (JA3, pin 42).	R144
R144	Connects A21_MTIOC3B (MCU, pin 47) to MTIOC3B (JA2, pin 13).	**Disconnects A21_MTIOC3B (MCU, pin 47) from MTIOC3B (JA2, pin 13).**	R143
R145	**Connects A22_CS1n_MTIOC3C (MCU, pin 46) to CS1n which is connected to JA3_PIN45 (JA3, pin 45).**	Disconnects A22_CS1n_MTIOC3C (MCU, pin 46) from CS1n which is connected to JA3_PIN45 (JA3, pin 45).	R146, R147, R169, R170
R146	Connects A22_CS1n_MTIOC3C (MCU, pin 46) to A22 (JA3, pin 43).	**Disconnects A22_CS1n_MTIOC3C (MCU, pin 46) from A22 (JA3, pin 43).**	R145, R147
R147	Connects A22_CS1n_MTIOC3C (MCU, pin 46) to MTIOC3C (JA2, pin 11).	**Disconnects A22_CS1n_MTIOC3C (MCU, pin 46) from MTIOC3C (JA2, pin 11).**	R146, R145
R148	**Connects D0_IO0 (MCU, pin 86) to D0 (JA3, pin 17).**	Disconnects D0_IO0 (MCU, pin 86) from D0 (JA3, pin 17).	R149
R149	Connects D0_IO0 (MCU, pin 86) to IO0 (JA1, pin 15).	**Disconnects D0_IO0 (MCU, pin 86) from IO0 (JA1, pin 15).**	R148
R150	**Connects D1_IO1 (MCU, pin 85) to D1 (JA3, pin 18).**	Disconnects D1_IO1 (MCU, pin 85) from D1 (JA3 pin 18).	R151
R151	Connects D1_IO1 (MCU, pin 85) to IO1 (JA1, pin 16).	**Disconnects D1_IO1 (MCU, pin 85) from IO1 (JA1, pin 16).**	R150
R152	**Connects D2_IO2 (MCU, pin 84) to D2 (JA3, pin 19).**	Disconnects D2_IO2 (MCU, pin 84) from D2 (JA3, pin 19).	R153
R153	Connects D2_IO2 (MCU, pin 84) to IO2 (JA1, pin 17).	**Disconnects D2_IO2 (MCU, pin 84) from IO2 (JA1, pin 17).**	R152
R154	**Connects D3_IO3 (MCU, pin 83) to D3 (JA3, pin 20).**	Disconnects D3_IO3 (MCU, pin 83) from D3 (JA3, pin 20).	R155
R155	Connects D3_IO3 (MCU, pin 83) to IO3 (JA1, pin 18).	**Disconnects D3_IO3 (MCU, pin 83) from IO3 (JA1, pin 18).**	R154
R156	**Connects D4_IO4 (MCU, pin 82) to D4 (JA3, pin 21).**	Disconnects D4_IO4 (MCU, pin 82) from D4 (JA3, pin 21).	R157
R157	Connects D4_IO4 (MCU, pin 82) to IO4 (JA1, pin 19).	**Disconnects D4_IO4 (MCU, pin 82) from IO4 (JA1, pin 19).**	R156
R158	**Connects D5_IO5 (MCU, pin 81) to D5 (JA3, pin 22).**	Disconnects D5_IO5 (MCU, pin 81) from D5 (JA3, pin 22).	R159
R159	Connects D5_IO5 (MCU, pin 81) to IO5 (JA1, pin 20).	**Disconnects D5_IO5 (MCU, pin 81) from IO5 (J20, pin 20).**	R158
R160	**Connects D6_IO6 (MCU, pin 80) to D6 (JA3, pin 23).**	Disconnects D6_IO6 (MCU, pin 80) from D6 (JA3, pin 23).	R161
R161	Connects D6_IO6 (MCU, pin 80) to IO6 (JA1, pin 21).	**Disconnects D6_IO6 (MCU, pin 80) from IO6 (JA1, pin 21).**	R160
R162	**Connects D7_IO7_POE0n (MCU, pin 79) to D7 (JA3, pin 24).**	Disconnects D7_IO7_POE0n (MCU, pin 79) from D7 (JA3, pin 24).	R163, R164

Table 6-10: External Bus Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R163	Connects D7_IO7_POE0n (MCU, pin 79) to IO7 (JA1, pin 22).	**Disconnects D7_IO7_POE0n (MCU, pin 79) from IO7 (JA1, pin 22).**	R162, R164
R164	Connects D7_IO7_POE0n (MCU, pin 79) to POE0n (JA2, pin 24).	**Disconnects D7_IO7_POE0n (MCU, pin 79) from POE0n (JA2, pin 24).**	R162, R163

Table 6-11: External Bus Option Links

6.9 IRQ & General I/O Pin Configuration

Table 6-12 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.
R1	Connects VBATT (MCU, pin 6) to UC_VCC (J1, pin 14).	Disconnects VBATT (MCU, pin 6) from UC_VCC (J1, pin 14).	R2
R2	**Connects VBATT (MCU, pin 6) to VBATT (J1, pin 6).**	Disconnects VBATT (MCU, pin 6) from VBATT (J1, pin 6).	R1
R3	**Connects VCC_USB (MCU, pin 35) to UC_VCC (J1, pin 14).**	Disconnects VCC_USB (MCU, pin 35) from UC_VCC (J1, pin 14).	R4
R4	Connects VCC_USB (MCU, pin 35) to CON_VCCUSB (J2, pin 10).	**Disconnects VCC_USB (MCU, pin 35) from CON_VCCUSB (J2, pin 10).**	R3
R5	**Connects VSS_USB (MCU, pin 38) to GROUND.**	Disconnects VSS_USB (MCU, pin 38) from GROUND.	R6
R6	Connects VSS_USB (MCU, pin 38) to CON_VSSUSB (j2, pin 13).	**Disconnects VSS_USB (MCU, pin 38) from CON_VSSUSB (j2, pin 13).**	R5
R49	**Connects LED0, LED1, LED2 and LED3 to Board_VCC.**	Disconnects LED0, LED1, LED2 and LED3 from Board_VCC	-
R87	**Connects SDA0_IRQ3_MTIOC0B (MCU, pin 33) to SDA0 (JA1_SDA0) (JA1, pin 25).**	Disconnects **SDA0_IRQ3_MTIOC0B (MCU, pin 33) from SDA0 (JA1_SDA0) (JA1, pin 25).**	R88
R88	Connects SDA0_IRQ3_MTIOC0B (MCU, pin 33) to IRQ3_MTIOC0B (JA2, pin 9).	**Disconnects SDA0_IRQ3_MTIOC0B (MCU, pin 33) from IRQ3_MTIOC0B (JA1_SDA0) (JA2, pin 9).**	R87
R89	**Connects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) to USB0DPUPE (USB0DP (MCU, pin 37)) and USB0 connector (pin 3).**	Disconnects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) from USB0DPUPE (USB0DP (MCU, pin 37)) and USB0 connector (pin 3).	R90, R91
R90	Connects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) to TRIGa (JA2, pin 21).	**Disconnects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) from TRIGa (JA2, pin 21).**	R89, R91
R91	Connects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) to MTCLKA (JA2, pin 25).	**Disconnects USB0DPUPE_TRIGa _MTCLKA (MCU, pin 32) from MTCLKA (JA2, pin 25).**	R89, R90
R92	**Connects TRIGb_MTCLKB (MCU, pin 31) to TRIGb (JA2, pin 22).**	Disconnects TRIGb_MTCLKB (MCU, pin 31) from TRIGb (JA2, pin 22).	R93
R93	Connects TRIGb_MTCLKB (MCU, pin 31) to MTCLKB (JA2, pin 26).	**Disconnects TRIGb_MTCLKB (MCU, pin 31) from MTCLKB (JA2, pin 26).**	R92

Table 6-12: IRQ & General I/O Option Links (continued overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R94	**Connects USB0VBUS_TMR0 (MCU, pin 30) to USB0VBUS, which connects to Board_VCC.**	Disconnects USB0VBUS_TMR0 (MCU, pin 30) from USB0VBUS.	R95
R95	Connects USB0VBUS_TMR0 (MCU, pin 30) to TMR0 (JA2, pin 19).	**Disconnects USB0VBUS_TMR0 (MCU, pin 30) from TMR0 (JA2, pin 19).**	R94
R96	**Connects TMR1_MTIOC3A (MCU, pin 29) to MTIOC3A (JA6, pin 13).**	Disconnects TMR1_MTIOC3A (MCU, pin 29) from MTIOC3A (JA6, pin 13).	R97
R97	Connects TMR1_MTIOC3A (MCU, pin 29) to TMR1 (JA2, pin 20).	**Disconnects TMR1_MTIOC3A (MCU, pin 29) from TMR1 (JA2, pin 20).**	R96
R98	**Connects CS4n_MTIOC4A (MCU, pin 24) to MTIOC4A (JA2, pin 15).**	Disconnects CS4n_MTIOC4A (MCU, pin 24) from MTIOC4A (JA2, pin 15).	R99
R99	Connects CS4n_MTIOC4A (MCU, pin 24) to CS4n (JA3, pin 27).	**Disconnects CS4n_MTIOC4A (MCU, pin 24) from CS4n (JA3, pin 27).**	R98
R100	**Connects CS5n_MTIOC4C (MCU, pin 23) to MTIOC4C (JA2, pin 16).**	Disconnects CS5n_MTIOC4C (MCU, pin 23) from MTIOC4C (JA2, pin 16).	R101
R101	Connects CS5n_MTIOC4C (MCU, pin 23) to CS5n (JA3, pin 28).	**Disconnects CS5n_MTIOC4C (MCU, pin 23) from CS5n (JA3, pin 28).**	R100
R102	**Connects TDO_TXD1 (MCU, pin 22) to TDO (E1, pin 5).**	Disconnects TDO_TXD1 (MCU, pin 22) from TDO (E1, pin 5).	R103
R103	Connects TDO_TXD1 (MCU, pin 22) to TXD1 (JA6, pin 9).	**Disconnects TDO_TXD1 (MCU, pin 22) from TXD1 (JA6, pin 9).**	R102
R104	**Connects TCK_FINEC_SCK1 (MCU, pin 21) to TCK_FINEC (E1, pin 1).**	Disconnects TCK_FINEC_SCK1 (MCU, pin 21) from TCK_FINEC (E1, pin 1).	R105
R105	Connects TCK_FINEC_SCK1 (MCU, pin 21) to SCK1 (JA6, pin 11).	**Disconnects TCK_FINEC_SCK1 (MCU, pin 21) from SCK1 (JA6, pin 11).**	R104
R106	**Connects TDI_RXD1 (MCU, pin 20) to TDI (E1, pin 11).**	Disconnects TDI_RXD1 (MCU, pin 20) from TDI (E1, pin 11).	R107
R107	Connects TDI_RXD1 (MCU, pin 20) to RXD1 (JA6, pin 12).	**Disconnects TDI_RXD1 (MCU, pin 20) from TDI (JA6, pin 12).**	R106
R108	**Connects AN004_IRQ12 (MCU, pin 90) to IRQ12 (JA1, pin 23).**	Disconnects AN004_IRQ12 (MCU, pin 90) from IRQ12 (JA1, pin 23).	R109
R109	Connects AN004_IRQ12 (MCU, pin 90) to AN004 (JA5 pin 1).	**Disconnects AN004_IRQ12 (MCU, pin 90) from AN004 (JA5, pin 1).**	R108

Table 6-13: IRQ & General I/O Option Links (continued overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R110	**Connects AN005_CANEN (MCU, pin 89) to CANEN (U6, pin 6).**	Disconnects AN005_CANEN (MCU, pin 89) from CANEN (U6, pin 6).	R111
R111	Connects AN005_CANEN (MCU, pin 89) to AN005 (JA5, pin 2).	**Disconnects AN005_CANEN (MCU, pin 89) from AN005 (JA5, pin 2).**	R110
R112	**Connects AN006_CANERRn (MCU, pin 88) to CANERRn (U6, pin 8).**	Disconnects AN006_CANERRn (MCU, pin 88) from CANERRn (U6, pin 8).	R113
R113	Connects AN006_CANERRn (MCU, pin 88) to AN006 (JA5, pin 3).	**Disconnects AN006_CANERRn (MCU, pin 88) from AN006 JA5, pin 3).**	R112
R114	**Connects AN007_CANSTBn (MCU, pin 87) to CANSTBn (U6, pin 14).**	Disconnects AN007_CANSTBn (MCU, pin 87) from CANSTBn (U6, pin 14).	R115
R115	Connects AN007_CANSTBn (MCU, pin 87) to AN007 (JA5, pin 4).	**Disconnects AN007_CANSTBn (MCU, pin 87) from AN007 (JA5, pin 4).**	R114
R116	**Connects WR0n_WRn_TXD2 (MCU, pin 44) to WRn (JA3, pin 26).**	Connects WR0n_WRn_TXD2 (MCU, pin 44) from WRn (JA3, pin 26).	R117, R118
R117	Connects WR0n_WRn_TXD2 (MCU, pin 44) to WR0n (JA3, pin 48).	**Connects WR0n_WRn_TXD2 (MCU, pin 44) from WR0n (JA3, pin 48).**	R116, R118
R118	Connects WR0n_WRn_TXD2 (MCU, pin 44) to TXD2 (JA6, pin 8).	**Connects WR0n_WRn_TXD2 (MCU, pin 44) from TXD2 (JA6, pin 8).**	R116, R117
R119	**Connects WR1n_SCK2 (MCU, pin 43) to WR1n (JA3, pin 47).**	Connects WR1n_SCK2 (MCU, pin 43) from WR1n (JA3, pin 47).	R120
R120	Connects WR1n_SCK2 (MCU, pin 43) to SCK2 (JA6, pin 10).	**Connects WR1n_SCK2 (MCU, pin 43) from SCK2 (JA6, pin 10).**	R119
R121	**Connects RDn_RXD2 (MCU, pin 42) to RDn (JA3, pin 25).**	Disconnects RDn_RXD2 (MCU, pin 42) from RDn (JA3, pin 25).	R122
R122	Connects RDn_RXD2 (MCU, pin 42) to RXD2 (JA6, pin 7).	**Disconnects RDn_RXD2 (MCU, pin 42) from RXD2 (JA6, pin 7).**	R121
R123	**Connects ALE_CTX1 (MCU, pin 40) to CTX1 (U6, pin 1).**	Disconnects ALE_CTX1 (MCU, pin 40) from CTX1 (U6, pin 1).	R124
R124	Connects ALE_CTX1 (MCU, pin 40) to ALE (JA3, pin 46).	**Disconnects ALE_CTX1 (MCU, pin 40) from ALE (JA3, pin 46).**	R123
R125	**Connects WAITn_CRX1 (MCU, pin 39) to CRX1 (U6, pin 4).**	Disconnects WAITn_CRX1 (MCU, pin 39) from CRX1 (U6, pin 4).	R126
R126	Connects WAITn_CRX1 (MCU, pin 39) to WAITn, connected to JA3_PIN45 (JA3, pin 45) via R170.	**Disconnects WAITn_CRX1 (MCU, pin 39) to WAITn, connected from JA3_PIN45 (JA3, pin 45) via R170.**	R125

Table 6-14: IRQ & General I/O Option Links (continued overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R165	**Connects IRQ14 (MCU, pin 45) to JA2_PIN7 (JA2, pin 7).**	Disconnects IRQ14 (MCU, pin 45) from JA2_PIN7 (JA2, pin 7).	R166
R166	Connects MTIOC0A to JA2_PIN7 (JA2, pin 7).	**Disconnects MTIOC0A from JA2_PIN7 (JA2, pin 7).**	R165
R167	**Connects IRQ2_MTIOC0C to JA2_PIN23 (JA2, pin 23).**	Disconnects IRQ2_MTIOC0C from JA2_PIN23 (JA2, pin 23).	R168
R168	Connects MTIOC1B to JA2_PIN23 (JA2, pin 23).	**Disconnects MTIOC1B from JA2_PIN23 (Ja2, pin 23).**	R167
R169	**Connects CS1n to JA3_PIN45 (JA3, pin 45).**	Disconnects CS1n from JA3_PIN45 (JA3, pin 45).	R170
R170	Connects WAITn to JA3_PIN45 (JA3, pin 45).	**Disconnects WAITn from JA3_PIN45 (JA3, pin 45).**	R169
R175	**Connects IIC bus pull-ups to Board_VCC.**	Disconnects IIC pull-ups from Board_VCC.	R176
R176	Connects IIC bus pull-ups to Board_5V.	**Disconnects IIC bus pull-ups from Board_5V.**	R175

Table 6-15: IRQ & General I/O Option Links

6.10 User Switch Configuration

Table 6-16 below details the function of the option links associated with user switches.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R46	**Connects the switch SW1 to IRQ2_MTIOC0C (MCU, pin 18).**	Disconnects the switch SW1 from IRQ2_MTIC0C (MCU, pin 18).	-
R47	**Connects the switch SW2 to AN004_IRQ12 (MCU, pin 90).**	Disconnects the switch SW2 from AN004_IRQ12 (MCU, pin 90).	-
R48	**Connects the switch SW3 to ADTRG0n (MCU, pin 98).**	Disconnects the switch SW3 from ADTRG0n (MCU, pin 98).	-
R55	Connects the switch RES to the input pin (CD) of the reset IC (U4, pin 5)*.	**Disconnects the switch RES from CD (U4, pin 5).**	R56, R60, R61
R56	**Connects the switch RES to RESn (MCU, pin 10).**	Disconnects the switch RES from RESn (MCU, pin 10).	R55, R60, R61
R60	Connects the output pin (OUT) of the reset IC (U4, pin 6) to RESn (MCU, pin 10)*.	**Disconnects OUT (U4, pin 6) from RESn (MCU, pin 10).**	R55, R56, R61
R61	**Connects the switch RES to RESn (MCU, pin 10) via R56.**	Disconnects the switch RES from RESn (MCU, pin 10).	R55, R56, R60

Table 6-16: User Switch Option Links

* By default, the reset IC, U4, is not fitted as the RX630 has an internal power-on-reset circuit.

6.11 Power Supply Configuration

Table 6-17 below details the function of the option links associated with power supply configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R33	**Connects PWR connector (pin 3) to the input pin of U2 (IN) and VSEL2 (J7, pin 3).**	Disconnects PWR connector (pin 3) from the input pin of U2 (IN) and VSEL2 (J7, pin 3).	-
R34	**Connects VBUS (USB0 connector, pin 1) to the input pin of U2 (IN) and VSEL2 (J7, pin 3) via D2.**	Disconnects VBUS (USB0 connector, pin 1) to the input pin of U2 (IN) and VSEL2 (J7, pin 3) via D2.	-
R35	**Connects CON_5V (JA1, pin 1) to PWR connector (pin 3).**	Disconnects CON_5V (JA1, pin 1) from PWR connector (pin 3).	R33
R36	Connects Unregulated_VCC (JA6, pin 23) to PWR connector (pin 3).	**Disconnects Unregulated_VCC (JA6, pin 23) from PWR connector (pin 3).**	R33
R37	Connects VSEL1 (J6, pin 2) to Vin (U3, pin 5).	**Disconnects VSEL1 (J6, pin 2) from Vin (U3, pin 5).**	-
R38	**Connects CON_3V3 (JA1, pin 3) to VSEL1 (J6, pin 2).**	**Disconnects CON_3V3 (JA1, pin 3) from VSEL1 (J6, pin 2).**	-
R39	**Connects J5 pins 1 and 2, bypassing current measurement jumper J5.**	**Disconnects J5 pins 1 and 2.**	J5
R42	Connects VSEL2 (J7) pins 1 and 2. Board_5V is supplied from U3.	**Disconnects VSEL2 (J7) pins 1 and 2. Board_5V is not supplied from U3.**	J7

Table 6-17: Power Supply Option Links

Table 6-18 below details the function of the jumpers associated with power supply configuration.

Reference	Position One	Position Two	Position Three	Related Ref.
J5*	Pins 1 and 2 shorted. Connects Board_VCC to UC_VCC.	Disconnects UC_VCC from Board_VCC. Connect an ammeter across pins for power measurement.	n/a	R39
J6	**Pins 1 and 2 shorted.** **Connects Board_VCC to the input pin (Vin) of voltage regulator U3.**	Pins 2 and 3 shorted. Voltage regulator U2 supplies the 3.3V Board_VCC.	All pins open. DO NOT SET.	R37
J7	**Pins 1 and 2 shorted.** **Connects the 5V output of U3 to Board_5V.**	Pins 2 and 3 shorted. Board_5V is supplied directly from PWR connector.	All pins open. DO NOT SET.	R42
J10	Fit CR2032 3V battery to supply power to VBATT (MCU, pin 6). Note: battery is not supplied with the RSKRX630.	**Remove CR2032 3V battery stops power supply to VBATT (MCU, pin 6).**	n/a	-

Table 6-18 Power Supply Jumpers

* J5 header is unfitted by default.

6.12 Clock Configuration

Table 6-19 below details the function of the option links associated with clock configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R19	Connects EXTAL (MCU, pin 13) to CON_EXTAL (J1, pin 13).	**Disconnects EXTAL (MCU, pin 13) from CON_EXTAL (J1, pin 13).**	R22
R20	Connects XTAL (MCU, pin 11) to CON_XTAL (J1, pin 11).	**Disconnects XTAL (MCU, pin 11) from CON_XTAL (J1, pin 11).**	R23
R22	**Connects XTAL (MCU, pin 11) to X1 (pin 1).**	DISCONNECTS XTAL (MCU, pin 11) from X1 (pin 1).	-
R23	**Connects EXTAL (MCU, pin 13) to X1 (pin 2).**	Disconnects EXTAL (MCU, pin 13) from X1 (pin 2).	-
R25	Connects XTAL (MCU, pin 11) to X2 (pin 1).	**Disconnects XTAL (MCU, pin 11) from X2 (pin 1).**	-
R26	Connects EXTAL (MCU, pin 13) to X2 (pin 2).	**Disconnects EXTAL (MCU, pin 13) from X2 (pin 2).**	-
R27	Connects XCIN (MCU, pin 8) to CON_XCIN (J1, pin 8).	**Disconnects XCIN (MCU, pin 8) from CON_XCIN (J1, pin 8).**	R30
R28	Connects XCOUT (MCU, pin 9) to CON_XCOUT (J1, pin 9).	**Disconnects XCOUT (MCU, pin 9) from CON_XCOUT (J1, pin 9).**	R31
R30	**Connects XCIN (MCU, pin 8) to X3 (pin 1).**	Disconnects XCIN (MCU, pin 8) from X3 (pin 1).	-
R31	**Connects XCOUT (MCU, pin 9) to X3 (pin 4).**	Disconnects XCOUT (MCU, pin 9) from X3 (pin 4).	-
R32	Connects XCIN (MCU, pin 8) to GROUND.	**Disconnects XCIN (MCU, pin 8) from GROUND.**	-

Table 6-19: Clock Option Links

7. Headers

7.1 Microcontroller Ring Headers

This RSK is fitted with MCU ring headers, which are used to access all the MCU's pins.

Table 7-1 below lists the connections of the ring header, J1.

Ring Header J1					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	CON_VREFH	1*	2	EMLE	2
3	CON_VREFL	3*	4	DLCDRS	4
5	NC	nc	6	VBATT	6
7	MD_FINED	7	8	CON_XCIN	8
9	CON_XCOUT	9	10	RESn	10
11	CON_XTAL	11	12	GROUND	-
13	CON_EXTAL	13	14	UC_VCC	-
15	NMIn	15	16	TRSTn	16
17	DLCDE	17	18	IRQ2_MTIOC0C	18
19	TMS	19	20	TDI_RXD1	20
21	TCK_FINEC_SCK1	21	22	TDO_TXD1	22
23	CS5n_MTIOC4C	23	24	CS4n_MTIOC4A	24
25	CTS0RTS0	25	26	NC	nc
27	NC	nc	28	NC	nc
29	NC	nc	30	NC	nc
31	NC	nc	32	NC	nc
33	NC	nc	34	NC	nc
35	NC	nc	36	NC	nc

Table 7-1: Ring Header J1 Connections

* Connection made through option link**.**

Table 7-2 below lists the connections of the ring header, J2.

Ring Header J2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	SCK0	26	2	RXD0	27
3	TXD0	28	4	TMR1_MTIOC3A	29
5	USB0VBUS_TMR0	30	6	TRIGb_MTCLKB	31
7	USB0DPUPE_TRIGa_MTCLKA	32	8	SDA0_IRQ3_MTIOC0B	33
9	SCL0	34	10	CON_VCCUSB	35
11	NC	36	12	NC	NC
13	CON_VSSUSB	38*	14	WAITn_CRX1	39
15	ALE_CTX1	40	16	BCLK	41
17	RDn_RXD2	42	18	WR1n_SCK2	43
19	WR0n_WRn_TXD2	44	20	IRQ14	45
21	A22_CS1n_MTIOC3C	46	22	A21_MTIOC3B	47
23	A20_MTIOC3D	48	24	A19_MTIOC4D	49
25	A18_MTIOC4B	50	26	NC	nc
27	NC	nc	28	NC	nc
29	NC	nc	30	NC	nc
31	NC	nc	32	NC	nc
33	NC	nc	34	NC	nc
35	NC	nc	36	NC	nc

Table 7-2: Ring Header J2 Connections

* Connection made through option link**.**

Table 7-3 below lists the connections of the ring header, J3.

Ring Header J3					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	A17	51	2	A16	52
3	A15	53	4	A14	54
5	A13_MTIOC1B	55	6	A12	56
7	A11_MTIOC0A	57	8	A10	58
9	A9	59	10	UC_VCC	-
11	A8_MTIC5W	61	12	GROUND	-
13	A7	63	14	A6_MTIC5V	64
15	A5	65	16	A4_MTIC5U	66
17	A3	67	18	A2	68
19	A1	69	20	A0	70
21	D15_DLCDD7	71	22	D14_DLCDD6	72
23	D13_DLCDD5	73	24	D12_DLCDD4	74
25	D11	75	26	NC	nc
27	NC	nc	28	NC	nc
29	NC	nc	30	NC	nc
31	NC	nc	32	NC	nc
33	NC	nc	34	NC	nc
35	NC	nc	36	NC	nc

Table 7-3: Ring Header J3 Connections

* Connection made through option link**.**

Table 7-4 below lists the connections of the ring header, J4.

Ring Header J4					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	D10	76	2	D9	77
3	D8	78	4	D7_IO7_POE0n	79
5	D6_IO6	80	6	D5_IO5	81
7	D4_IO4	82	8	D3_IO3	83
9	D2_IO2	84	10	D1_IO1	85
11	D0_IO0	86	12	AN007_CANSTBn	87
13	AN006_CANERRn	88	14	AN005_CANEN	89
15	AN004_IRQ12	90	16	AN003	91
17	AN002	92	18	AN001	93
19	CON_VREFL0	94*	20	AN000	95
21	CON_VREFH0	96*	22	CON_AVCC0	97*
23	ADTRG0n	98	24	CON_AVSS0	99*
25	DA1	100	26	NC	nc
27	NC	nc	28	NC	nc
29	NC	nc	30	NC	nc
31	NC	nc	32	NC	nc
33	NC	nc	34	NC	nc
35	NC	nc	36	NC	nc

Table 7-4: Ring Header J4 Connections

* Connection made through option link**.**

7.2 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 7-5 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	97*	6	AVSS	-
7	AVREF	96*	8	ADTRG	98
9	AD0	95	10	AD1	93
11	AD2	92	12	AD3	91
13	DA0	nc	14	DA1	100
15	IO_0	86	16	IO_1	85
17	IO_2	84	18	IO_3	83
19	IO_4	82	20	IO_5	81
21	IO_6	80	22	IO_7	79
23	IRQ3	90	24	IIC_EX	nc
25	IIC_SDA	33*	26	IIC_SCL	34*

Table 7-5: Application Header JA1 Connections

* Connection made through option link

Table 7-6 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	RESn	10	2	EXTAL	13*
3	NMI	15	4	Vss1	-
5	WDT_OVF	nc	6	SCIaTX	28
7	IRQ0	45/57*	8	SCIaRX	27
9	IRQ1	33*	10	SCIaCK	26
11	M1_UD	46*	12	CTSRTS	25
13	M1_UP	47*	14	M1_UN	48*
15	M1_VP	24*	16	M1_VN	23
17	M1_WP	50*	18	M1_WN	49
19	TMR0	30*	20	TMR1	29*
21	TRIGa	32*	22	TRIGb	31*
23	IRQ2	18*/55*/18*	24	M1_POE	79*
25	M1_TRCCLK	32*	26	M1_TRDCLK	31*

Table 7-6: Application Header JA2 Connections

* Connection made through option link

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

Bus Application Header JA3					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	A0	70	2	A1	69
3	A2	68	4	A3	67
5	A4	66	6	A5	65
7	A6	64	8	A7	63
9	A8	61	10	A9	59
11	A10	58	12	A11	57
13	A12	56	14	A13	55
15	A14	54	16	A15	53
17	D0	86*	18	D1	85*
19	D2	84*	20	D3	83*
21	D4	82*	22	D5	81*
23	D6	80*	24	D7	79*
25	RDn	42*	26	WR	44*
27	CSa	24	28	CSb	23*
29	D8	78	30	D9	77
31	D10	76	32	D11	75
33	D12	74	34	D13	73
35	D14	72	36	D15	71
37	A16	52	38	A17	51
39	A18	50*	40	A19	49*
41	A20	48*	42	A21	47*
43	A22	46*	44	SDCLK	41
45	CSc	46*/39*	46	ALE	40*
47	HWRn	43*	48	LWRn	44*
49	CAS	nc	50	RAS	nc

Table 7-7: Bus Application Header JA3 Connections

* Connection made through option link

Table 7-8 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	90	2	AD5	89
3	AD6	88	4	AD7	87
5	CAN1TX	40	6	CAN1RX	39
7	CAN2TX	nc	8	CAN2RX	nc
9	IRQ4	nc	10	IRQ5	nc
11	M2_UD	nc	12	M2_Uin	nc
13	M2_Vin	nc	14	M2_Win	nc
15	M2_Toggle	nc	16	M2_POE	nc
17	M2_TRCCLK	nc	18	M2_TRDCLK	nc
19	M2_Up	nc	20	M2_Un	nc
21	M2_Vp	nc	22	M2_Vn	nc
23	M2_W	nc	24	M2_Wn	nc

Table 7-8: Application Header JA5 Connections

Table 7-9 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	STBYn	NC
5	RS32TX	-	6	RS232RX	-
7	SCIbRX	42	8	SCIbTX	44
9	SCIcTX	22	10	SCIbCK	43
11	SCIcCK	21	12	SCIcRX	20
13	M1_Toggle	29	14	M1_Uin	66
15	M1_Vin	64	16	M1_Win	61
17	Reserved	nc	18	Reserved	nc
19	Reserved	nc	20	Reserved	nc
21	Reserved	nc	22	Reserved	nc
23	Unregulated_VCC	-	24	GROUND	-

Table 7-9: Application Header JA6 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 E1/E20 Emulator Additional Document for User's Manual (R20UT0399EJ).

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 RX630 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 (R20UT0398EJ).

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 RX630 group hardware manual.

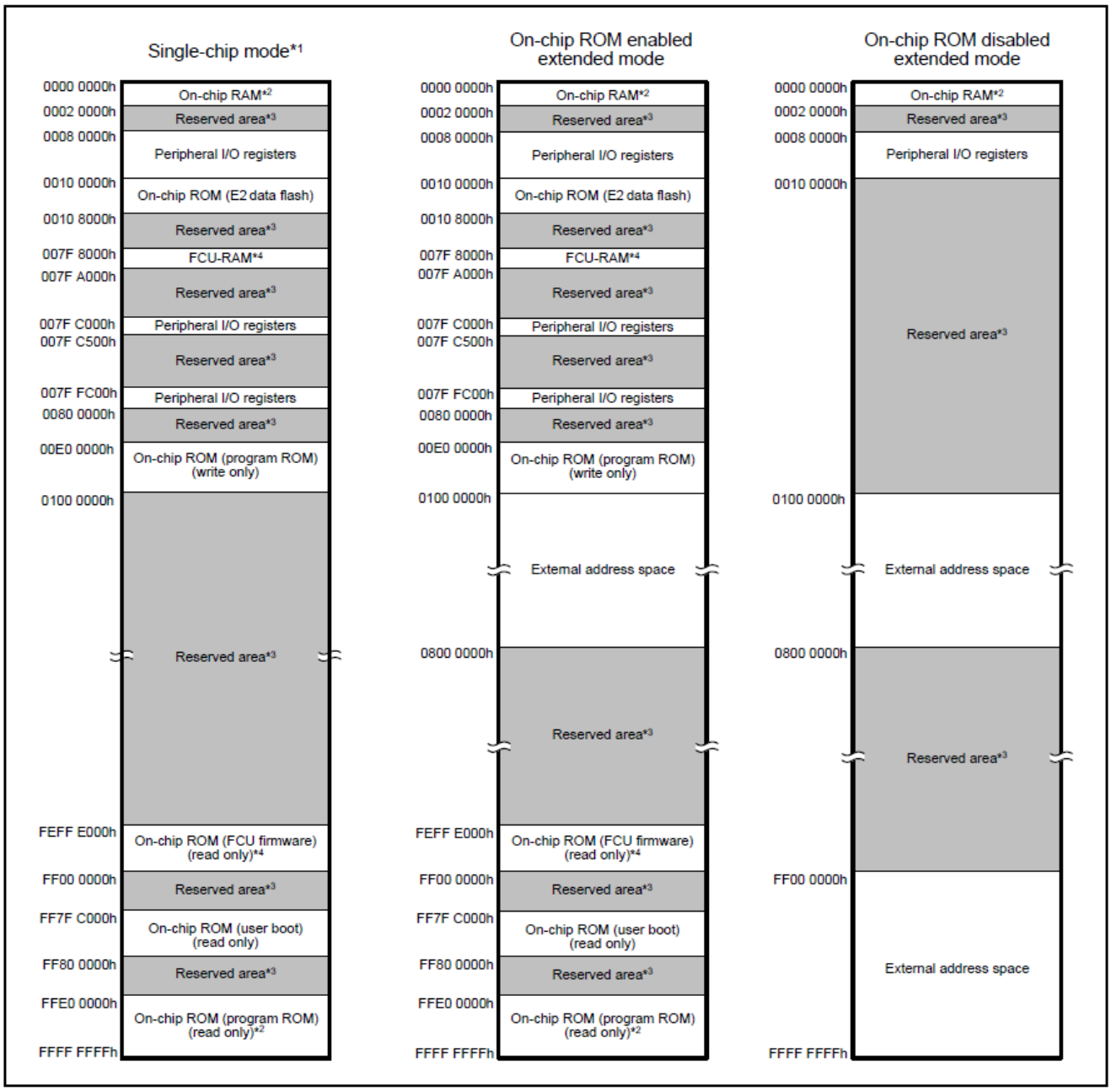

Figure 8-1: MCU Address Space Diagram

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 RX630 series microcontrollers refer to the RX630 Group hardware manual.

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

Online technical support and information is available at: http://www.renesas.com/rskrx630

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General information on Renesas Microcontrollers can be found on the Renesas website at:
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