User's Manual

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R8C/LA8A Group

Renesas Starter Kit User's Manual

RENESAS MCU
R8C Family / R8C/Lx Series

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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 be 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 R8C/LA8A 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 R8C/LA8A User's Manual	R20UT0284EG0100
Tutorial	Provides a guide to setting up RSK environment, running sample code and debugging programs.	RSK R8C/LA8A Tutorial Manual	R20UT0285EG0100
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	RSK R8C/LA8A Quick Start Guide	R20UT0286EG0100
Schematics	Full detail circuit schematics of the RSK.	RSK R8C/LA8A Schematics	R20UT0287EG0100
Hardware Manual	Provides technical details of the R8C/LA8A microcontroller.	R8C/LA8A Group Hardware Manual	REJ09B0556

2. List of Abbreviations and Acronyms

Abbreviation	Full Form
ADC	Analogue-to-Digital Converter
CPU	Central Processing Unit
E8a	On-chip Debugger
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
HEW	High-performance Embedded Workshop
IRQ	Interrupt Request
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Micro-controller Unit
PC	Program Counter
RSK	Renesas Starter Kit
SFR	Special Function Register
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 E8a debugger. The debugger is able to power the RSK board with up to 300mA. 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 5V and 3.3V 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	R30 Setting	R31 Setting
PWR1	Regulated, 5V DC	Fitted	Removed
	Regulated, 3.3V DC	Removed	Fitted

Table 2-1: Main Power Supply Requirements

The RSK board is neither under nor over voltage protected. Use a centre positive regulated supply for this board.

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.

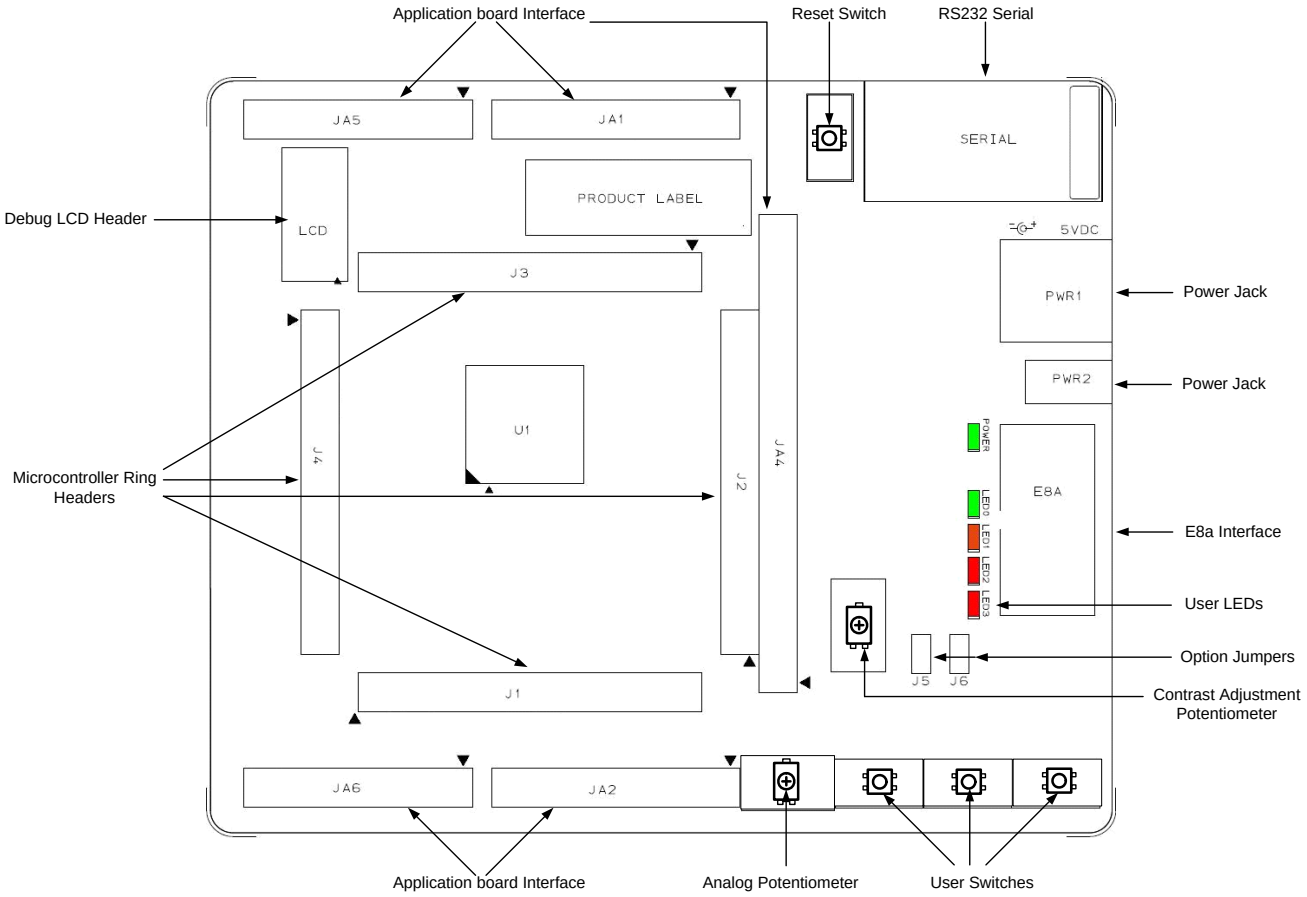

Figure 3-1: Board Layout

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.

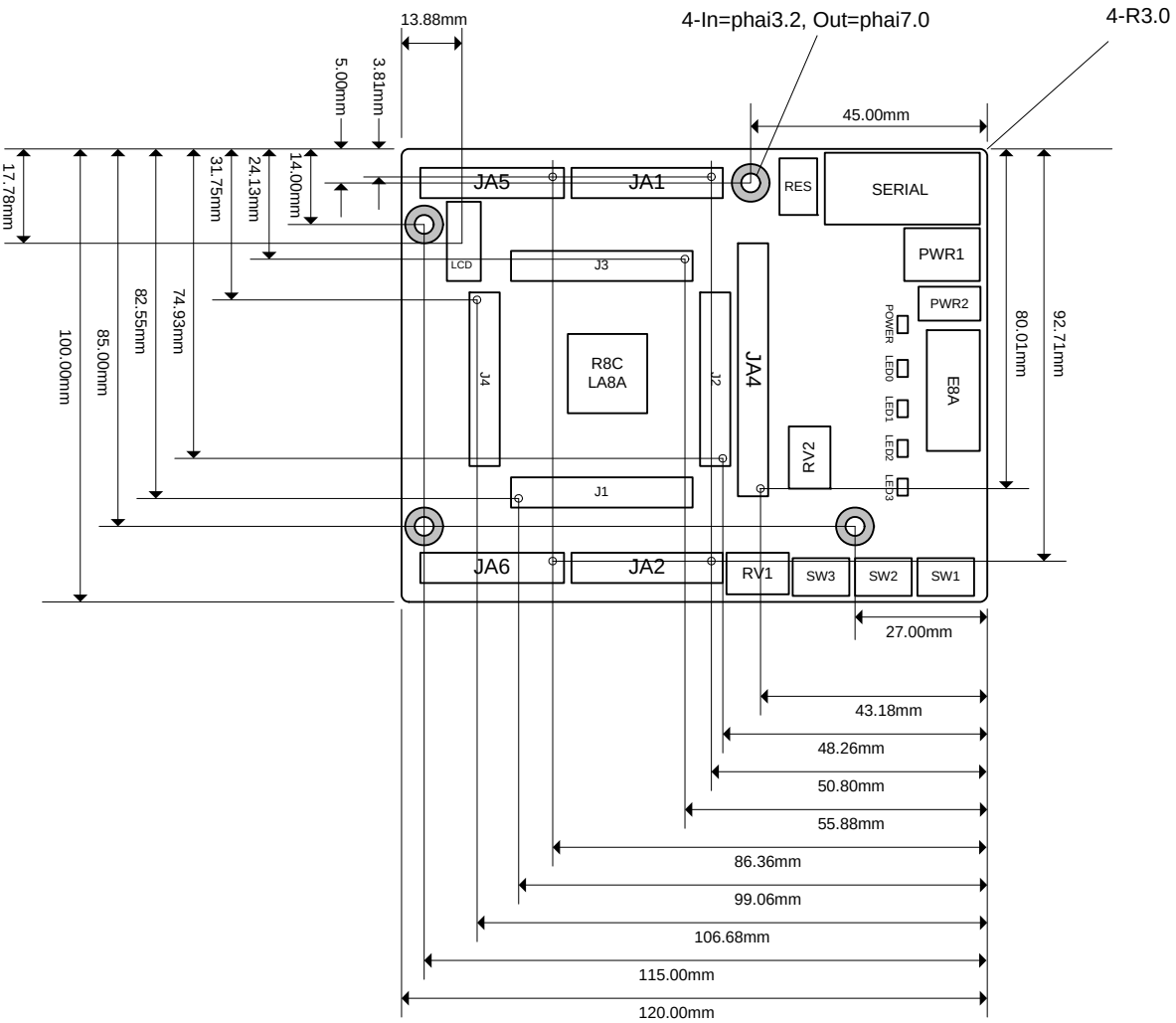

Figure 3-2: Board Dimensions

3.3 Component Placement

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

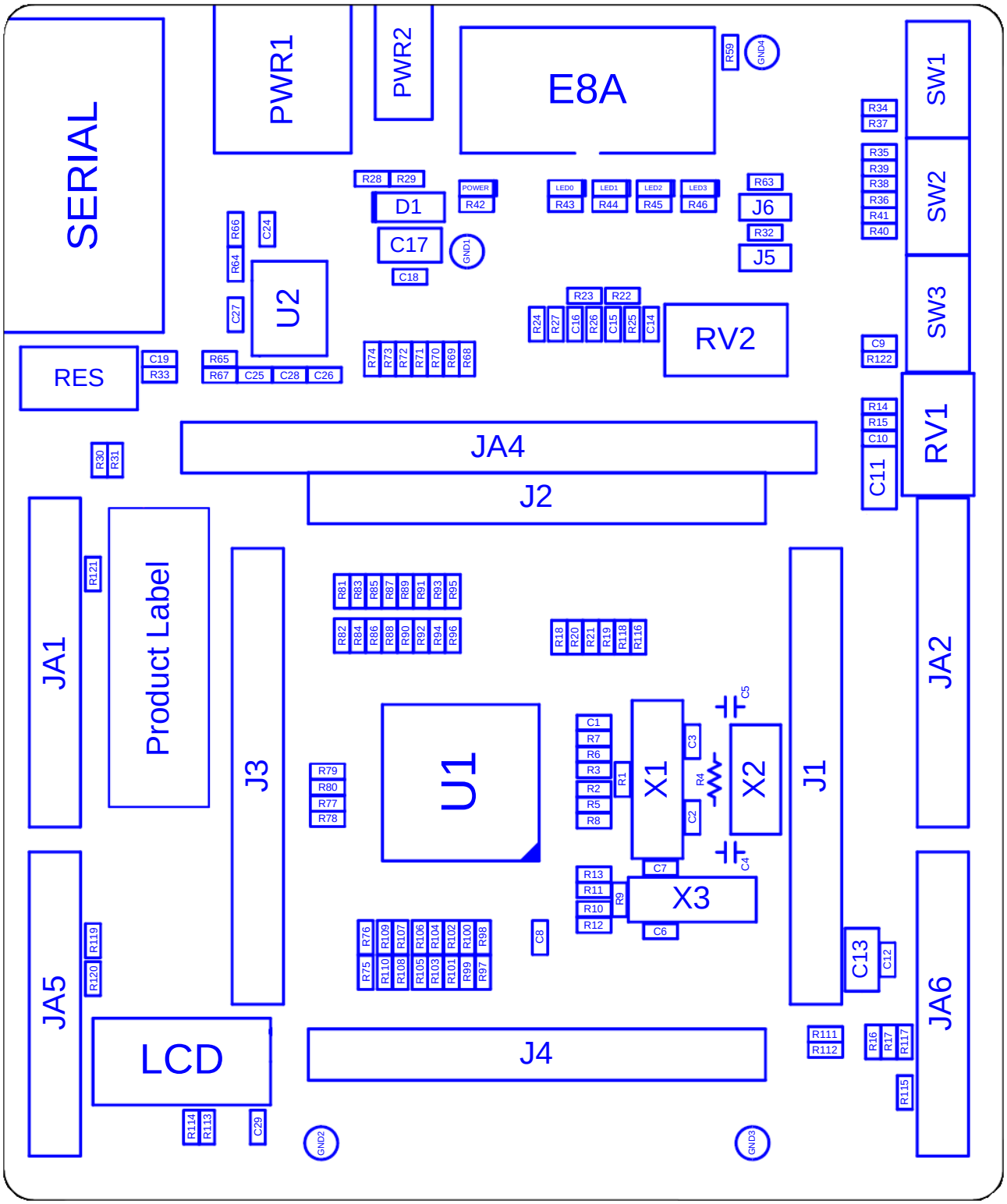

Figure 3-3: Top-Side Component Placement

4. Connectivity

4.1 Internal RSK Connections

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

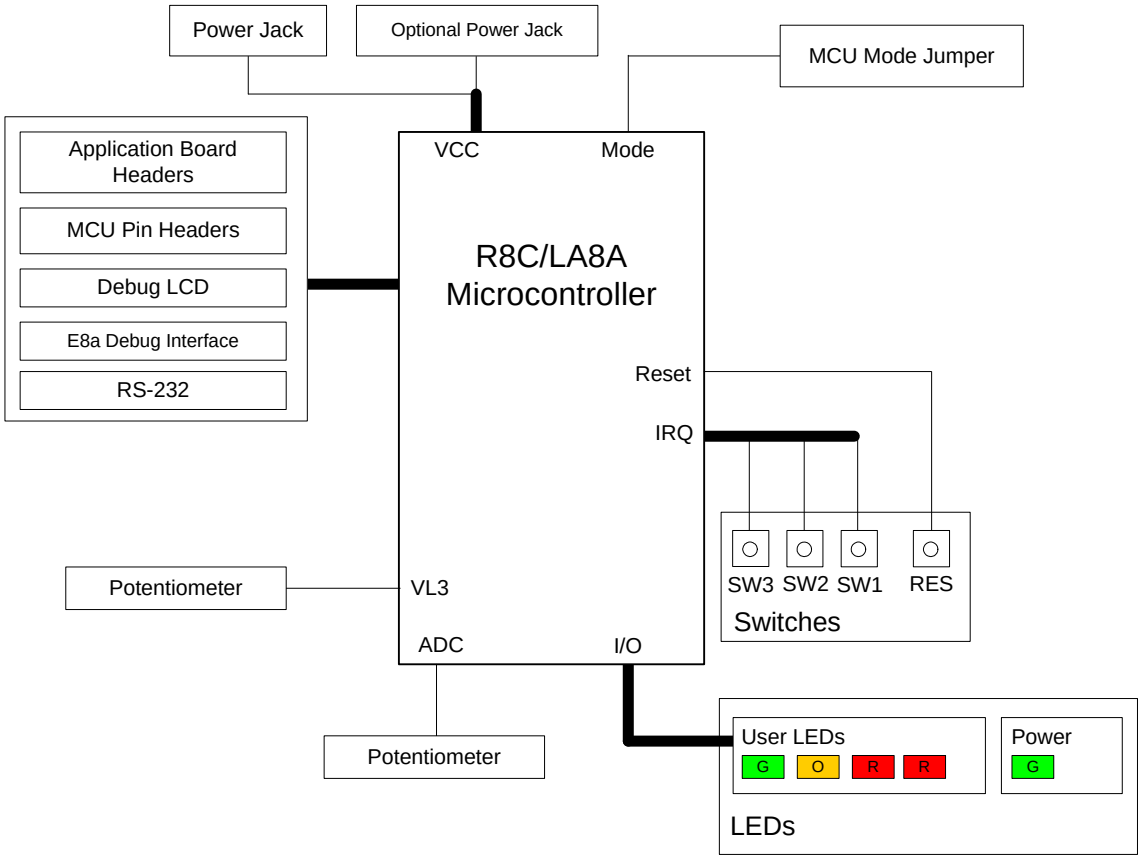

Figure 4-1: Internal RSK Block Diagram

4.2 Debugger Connections

The diagram below shows the connections between the RSK, E8a debugger and the host PC.

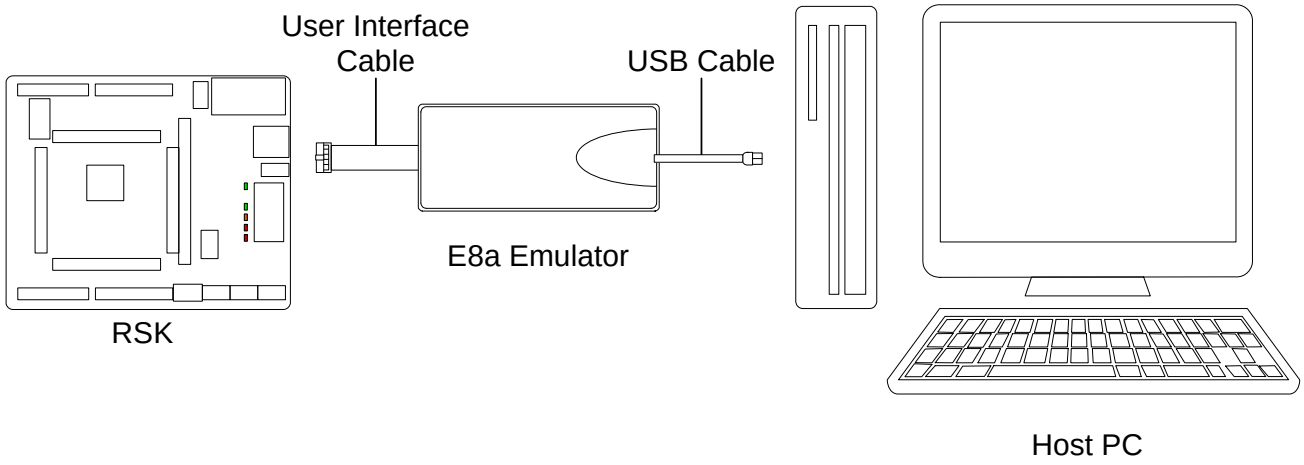

Figure 4-2: Debugger Connection Diagram

5. User Circuitry

5.1 Reset Circuit

The RESET pin is connected to Board_VCC via a pull-up resistor R33. When the VCC pin voltage level rises, the power-on reset function is enabled and the pins, CPU, and SFRs are reset. Refer to the R8C/LA8A hardware manual for details regarding the reset signal timing requirements, and the RSK R8C/LA8A board schematics for information regarding the reset circuitry in use on the RSK.

5.2 Clock Circuit

Crystal oscillators are fitted to the RSK to generate the required clock signal to drive the MCU, and associated peripherals. Refer to the R8C/LA8A hardware manual for details regarding the clock signal requirements, and the RSK R8C/LA8A 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	20MHz	HC49/4U
X2	Internal RSK Testing Only	Unfitted	n/a	n/a
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 RSK R8C/LA8A board schematics.

Switch	Function	MCU Connection
RES	When pressed, the microcontroller is reset.	RESETn, Pin 9
SW1	Connects to an IRQ input for user controls.	INT1n, Pin 20 (Port 8, bit 0)
SW2	Connects to an INT input for user controls. The switch is also used as wake up signal when connected to MCU pin WKUP0n (Pin 4) via option jumper resistor R39.	INT2n, Pin 3 (Port 8, bit 7)
SW3	Connects to an INT input for user controls. The switch is also connected to an ADTRGn input (Pin 66) via option link resistor R41 and R76, and is used to trigger AD conversions.	INT3n, Pin 19 (Port 8, bit 1)

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
PWR	Green	Indicates the status of the Board_VCC power rail.	No connection
LED0	Green	User operated LED.	P6_1, Pin 74
LED1	Orange	User operated LED.	P6_2, Pin 73
LED2	Red	User operated LED.	P6_3, Pin 72
LED3	Red	User operated LED.	P6_4, Pin 71

Table 5-3: LED Connections

5.5 Potentiometer

A single-turn potentiometer is connected as a potential divider to analogue input AN8, (Port 6 bit 5, Pin 70). The potentiometer can be used to create a voltage between VREF and ground (by default, VREF is connected to the Board_VCC 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, LCD.

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 module supplied with the RSK board only supports 5V operation.

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	P6_7, Pin 68
5	R/W (Pulled to ground)	-	6	DLCDE (pulled to ground)	P6_6, Pin 69
7	No Connection	-	8	No Connection	-
9	No Connection	-	10	No Connection	-
11	SEG20_DLCDD4	P2_4, Pin 47	12	SEG21_DLCDD5	P2_5, Pin 46
13	SEG22_DLCDD6	P2_6, Pin 45	14	SEG23_DLCDD7	P2_7, Pin 44

Table 5-4: LCD Header Connections

5.7 RS232 Serial Port

Serial port UART0 is connected to the standard RS232 header fitted to the RSK. Alternatively, serial port UART2 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
TxD0	UART0 Transmit Signal.	P8_5, Pin 15	Pin 2
RxD0	UART0 Receive Signal.	P8_6, Pin 14	Pin 3
TxD2	UART2 Transmit Signal.	P7_2, Pin 80	Pin 2*
RxD2	UART2 Receive Signal.	P7_1, Pin 1	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.

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.

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 and jumpers.

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 R8C/LA8A hardware manual and RSK R8C/LA8A board schematics for further information.

6.2 MCU Configuration

Table 6-1 below details the different configurations and functions of the MCU operating mode jumpers.

Reference	Position One	Position Two	Related Ref.
J6	Pins 1 and 2 shorted. Connects MODE pin to ground. MCU operates in Standard Serial I/O Mode (Boot mode).	**All pins open. MODE pin is pulled up by resistor R63. MCU operates in single chip mode.**	--

Table 6-1: MCU Operating Mode Jumpers

6.3 RS232 Serial Port Configuration

Table 6-2 below details the function of the option links associated with the serial port configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R66	Places the RS-232 Transceiver in a power-down mode.	**Places the RS-232 Transceiver in a power-up mode.**	-
R67	Disables the RS-232 Transceiver.	**Enables the RS-232 Transceiver**	-
R69	Connects the RS232 serial port (Tx) to the application board interface (JA6-5).	**Disconnects the RS232 serial port (Tx) from application board interface (JA6-5).**	R71, R73
R70	Connects the RS232 serial port (Rx) to the application board interface (JA6-6)	**Disconnects the RS232 serial port (Rx) from application board interface (JA6-6)**	R72, R74

Table 6-2: Serial Port Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R71	**Connects the TxD pin of serial port UART0 to the D-type Serial SKT via the RS232 transceiver**	Disconnects the TxD pin of serial port UART0 from the D-type Serial SKT	R69, R73
R72	**Connects the RxD pin of serial port UART0 to the D-type Serial SKT via the RS232 transceiver**	Disconnects the RxD pin of serial port UART0 from the D-type Serial SKT	R70, R74
R73	Connects the TxD pin of serial port UART2 to the D-type Serial SKT via the RS232 transceiver	**Disconnects the TxD pin of serial port UART2 from the D-type Serial SKT**	R69, R71
R74	Connects the RxD pin of serial port UART2 to the D-type Serial SKT via the RS232 transceiver	**Disconnects the RxD pin of serial port UART2 from the D-type Serial SKT**	R70, R72

Table 6-2: Serial Port Option Links (Continuation)

6.4 Power Source Configuration

Table 6-3 below details the function of the option links associated with power source configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R28	**Connects the voltage source from PWR1 to Board_VCC**	Disconnects the Board_VCC from PWR1 connector	R29
R29	Connects the voltage source from PWR2 to Board_VCC	**Disconnects the Board_VCC from PWR2 connector**	R28
R115	Connects the net Unregulated_VCC (JA6-23) to Board_VCC. (R30 and R31 Must be removed if supplying unregulated VCC)	**Disconnects Unregulated_VCC from Board_VCC**	R30, R31
R30	**Connects the net CON_5V (JA1-1) to Board_VCC. External 5V supply can be connected at CON_5V.** **(R28, R29, R115 and R31 Must be removed if supplying 5V from CON_5V)**	Disconnects CON_5V from Board_VCC	R115, R31
R31	Connects the net CON_3V3 (JA1-3) to Board_VCC. External 3.3V supply can be connected at CON_3V3. (R28, R29, R115 and R30 Must be removed if supplying 3.3V from CON_3V3)	**Disconnects CON_3V3 from Board_VCC**	R115, R30
R32	**Supply power to the Microcontroller VCC pin**	Disconnects power supply to the microcontroller VCC pins. Supply current to the MCU can be measured across ‘J5’	J5

Table 6-3: Power Source Option Links

6.5 Analogue Section Configuration

Table 6-4 below details the function of the option links associated with analogue voltage source configuration.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R122	**Connects on-board potentiometer ADPOT to the analog input pin AN8 of the MCU (Port pin p6_5)**	Disconnects the ADPOT from analog input AN8	-
R14	**Connects Board_VCC to the potentiometer RV1 and MCU pin VREF**	Disconnects Board_VCC from potentiometer RV1 and MCU pin VREF	R15
R15	Connects MCU pin VREF to CON_VREF (JA1-7)	**Disconnects CON_VREF from potentiometer RV1 and MCU pin VREF**	R14

Table 6-4: Analogue Section Option Links

6.6 Clock Configuration

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

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R1	Parallel resistor for oscillator 'X1'	**Not fitted**	-
R2	**On board clock X1 connected to the MCU as main clock**	External clock source can be connected to the MCU	R3, R5, R6, R7, R8
R3	**On board clock X1 connected to the MCU as main clock**	External clock source can be connected to the MCU	R2, R5, R6, R7, R8
R4	Parallel resistor for oscillator 'X2'	**Not fitted**	-
R5	On board clock X2 can be connected to the MCU as main clock	**X2 is disconnected from MCU main clock input pins**	R2, R3, R6, R7, R8
R6	On board clock X2 can be connected to the MCU as main clock	**X2 is disconnected from MCU main clock input pins**	R2, R3, R5, R7, R8
R7	Connects MCU clock input pin XIN to J1 header (at J1-12)	**MCU pin XIN is disconnected from J1 header**	R2, R3, R5, R6, R8
R8	Connects MCU clock output pin XOUT to J1 (at J1-10) and JA2 (at JA2-2) headers	**MCU pin XOUT is disconnected from J1 and JA2 headers**	R2, R3, R5, R6, R7
R9	Parallel resistor for on-board sub clock X3	**Not fitted**	-
R10	**On board clock X3 connected to the MCU as sub clock**	X3 is disconnected from XCIN	R11, R12, R13
R11	**On board clock X3 connected to the MCU as sub clock**	X3 is disconnected from XCOUT	R10, R12, R13
R12	Connects MCU clock input pin XCIN to J1 header (at J1-7)	**MCU pin XCIN is disconnected from J1 header**	R10, R11, R13
R13	Connects MCU clock input pin XCOUT to J1 header (at J1-8)	**MCU pin XCOUT is disconnected from J1 header**	R10, R11, R12

Table 6-5: Clock Option Links

6.7 Application Board Interface Configuration

Table 6-6 below details the functions of option links associated with application board interface.

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R75	**Connects MCU port pin P0_1 (pin 66) to SEG1 at JA4-12**	Disconnects MCU port pin P0_1 (pin 66) from SEG1	R76
R76	Connects MCU port pin P0_1 (pin 66) to ADTRGn at JA1-8	**Disconnects MCU port pin p0_1 (pin 66) from ADTRGn**	R75
R77	**Connects MCU port pin P1_3 (pin 56) to SEG11 at JA4-22**	Disconnects MCU port pin P1_3 (pin 56) from SEG11	R78
R78	Connects MCU port pin P1_3 (pin 56) to KI7n at JA5-10	**Disconnects MCU port pin P1_3 (pin 56) from KI7n**	R77
R79	**Connects MCU port pin P1_4 (pin 55) to SEG12 at JA4-23**	Disconnects MCU port pin P1_4 (pin 55) from SEG12	R80
R80	Connects MCU port pin P1_4 (pin 55) to INT4n at JA5-9	**Disconnects MCU port pin P1_4 (pin 55) from INT4n**	R79
R81	**Connects MCU port pin P3_0 (pin 43) to SEG24 at JA4-35**	Disconnects MCU port pin P3_0 (pin 43) from SEG24	R82
R82	Connects MCU port pin P3_0 (pin 43) to IO0 at JA1-15	**Disconnects MCU port pin P3_0 (pin 43) from IO0**	R81
R83	**Connects MCU port pin P3_1 (pin 42) to SEG25 at JA4-36**	Disconnects MCU port pin P3_1 (pin 42) from SEG25	R84
R84	Connects MCU port pin P3_1 (pin 42) to IO1 at JA1-16	**Disconnects MCU port pin P3_1 (pin 42) from IO1**	R83
R85	**Connects MCU port pin P3_2 (pin 41) to SEG26 at JA4-37**	Disconnects MCU port pin P3_2 (pin 41) from SEG26	R86
R86	Connects MCU port pin P3_2 (pin 41) to IO2 at JA1-17	**Disconnects MCU port pin P3_2 (pin 41) from IO2**	R85
R87	**Connects MCU port pin P3_3 (pin 40) to SEG27 at JA4-38**	Disconnects MCU port pin P3_3 (pin 40) from SEG27	R88
R88	Connects MCU port pin P3_3 (pin 40) to IO3 at JA1-18	**Disconnects MCU port pin P3_3 (pin 40) from IO3**	R87
R89	**Connects MCU port pin P3_4 (pin 39) to SEG28 at JA4-39**	Disconnects MCU port pin P3_4 (pin 39) from SEG28	R90
R90	Connects MCU port pin P3_4 (pin 39) to IO4 at JA1-19	**Disconnects MCU port pin P3_4 (pin 39) from IO4**	R89
R91	**Connects MCU port pin P3_5 (pin 38) to SEG29 at JA4-40**	Disconnects MCU port pin P3_5 (pin 38) from SEG29	R92
R92	Connects MCU port pin P3_5 (pin 38) to IO5 at JA1-20	**Disconnects MCU port pin P3_5 (pin 38) from IO5**	R91
R93	**Connects MCU port pin P3_6 (pin 37) to SEG30 at JA4-41**	Disconnects MCU port pin P3_6 (pin 37) from SEG30	R94
R94	Connects MCU port pin P3_6 (pin 37) to IO6 at JA1-21	**Disconnects MCU port pin P3_6 (pin 37) from IO6**	R93
R95	**Connects MCU port pin P3_7 (pin 36) to SEG31 at JA4-42**	Disconnects MCU port pin P3_7 (pin 36) from SEG31	R96
R96	Connects MCU port pin P3_7 (pin 36) to IO7 at JA1-22	**Disconnects MCU port pin P3_7 (pin 36) from IO7**	R95

Table 6-6: Application Board Interface Option Links (Continued Overleaf)

Reference	Link Fitted Configuration	Link Removed Configuration	Related Ref.
R97	Connects MCU port pin P6_0 (pin 75) to AN3 at JA1-12	**Disconnects MCU port pin P6_0 (pin 75) from AN3**	R98
R98	**Connects MCU port pin P6_0 (pin 75) to TRJ2IO at JA2-22**	Disconnects MCU port pin P6_0 (pin 75) from TRJ2IO	R97
R99	Connects MCU port pin P6_1 (pin 74) to AN4 at JA5-1	**Disconnects MCU port pin P6_1 (pin 74) from AN4**	R100
R100	**Connects MCU port pin P6_1 (pin 74) to LED0**	Disconnects MCU port pin P6_1 (pin 74) from LED0	R99
R101	Connects MCU port pin P6_2 (pin 73) to AN5 at JA5-2	**Disconnects MCU port pin P6_2 (pin 73) from AN5**	R102
R102	**Connects MCU port pin P6_2 (pin 73) to LED1**	Disconnects MCU port pin P6_2 (pin 73) from LED1	R101
R103	Connects MCU port pin P6_3 (pin 72) to AN6 at JA5-3	**Disconnects MCU port pin P6_3 (pin 72) from AN6**	R104
R104	**Connects MCU port pin P6_3 (pin 72) to LED2**	Disconnects MCU port pin P6_3 (pin 72) from LED2	R103
R105	Connects MCU port pin P6_4 (pin 71) to AN7 at JA5-4	**Disconnects MCU port pin P6_4 (pin 71) from AN7**	R106
R106	**Connects MCU port pin P6_4 (pin 71) to LED3**	Disconnects MCU port pin P6_4 (pin 71) from LED3	R105
R107	Connects MCU port pin P6_6 (pin 69) to TRCIOC at JA2-21	**Disconnects MCU port pin P6_6 (pin 69) from TRCIOC**	R108
R108	**Connects MCU port pin P6_6 (pin 69) to DLCDE**	Disconnects MCU port pin P6_6 (pin 69) from DLCDE	R107
R109	Connects MCU port pin P6_7 (pin 68) to TRCIOB at JA2-19	**Disconnects MCU port pin P6_7 (pin 68) from TRCIOB**	R110
R110	**Connects MCU port pin P6_7 (pin 68) to DLCDRS**	Disconnects MCU port pin P6_7 (pin 68) from DLCDRS	R109
R111	**Connects MCU port pin P7_0 (pin 2) to CLK2 at JA2-10**	Disconnects MCU port pin P7_0 (pin 2) from CLK2	R112
R112	Connects MCU port pin P7_0 (pin 2) to TRJ2O at JA2-20	**Disconnects MCU port pin P7_0 (pin 2) from TRJ2O**	R111

Table 6-6: Application Board Interface Option Links (Continuation)

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	66*
9	AD0	78	10	AD1	77
11	AD2	76	12	AD3	75*
13	DAC0	-	14	DAC1	-
15	IO_0	43*	16	IO_1	42*
17	IO_2	41*	18	IO_3	40*
19	IO_4	39*	20	IO_5	38*
21	IO_6	37*	22	IO_7	36*
23	IRQ3/IRQAEC/M2_HSIN0	19	24	IIC_EX	-
25	IIC_SDA	17	26	IIC_SCL	18

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	9	2	EXTAL	12*
3	NMI	-	4	Vss1	11
5	WDT_OVF	-	6	SCIaTX	80*
7	IRQ0/WKUP/M1_HSIN0	4	8	SCIaRX	1*
9	IRQ1/M1_HSIN1	20	10	SCIaCK	2*
11	M1_UD	-	12	CTS2RTS2	79
13	M1_UP	-	14	M1_UN	-
15	M1_VP	-	16	M1_VN	-
17	M1_WP	-	18	M1_WN	-
19	TimerOut0	68*	20	TimerOut1	2*
21	TimerIn0	69*	22	TimerIn1	75*
23	IRQ2/M1_EncZ/M1_HSIN2	3	24	M1_POE	-
25	M1_TRCCLK	-	26	M1_TRDCLK	-

Table 7-2: Application Header JA2 Connections

Table 7-3 below lists the connections of the application header, JA4.

Application Header JA4					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	V1	-	2	V2	
3	V3	22	4	V4	
5	Vss	-	6	Vss	-
7	COM1	24	8	COM2	25
9	COM3	26	10	COM4	27
11	SEG1	67	12	SEG2	66*
13	SEG3	65	14	SEG4	64
15	SEG5	63	16	SEG6	62
17	SEG7	61	18	SEG8	60
19	SEG9	59	20	SEG10	58
21	SEG11	57	22	SEG12	56*
23	SEG13	55*	24	SEG14	54
25	SEG15	53	26	SEG16	52
27	SEG17	51	28	SEG18	50
29	SEG19	49	30	SEG20	48
31	SEG21	47	32	SEG22	46
33	SEG23	45	34	SEG24	44
35	SEG25	43*	36	SEG26	42*
37	SEG27	41*	38	SEG28	40*
39	SEG29	39*	40	SEG30	38*
41	SEG31	37*	42	SEG32	36*
43	SEG33	35	44	SEG34	34
45	SEG35	33	46	SEG36	32
47	SEG37	31	48	SEG38	30
49	SEG39	29	50	SEG40	28

Table 7-3: Application Header JA4 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	74*	2	AD5	73*
3	AD6	72*	4	AD7	71*
5	CAN1TX	-	6	CAN1RX	-
7	CAN2TX	-	8	CAN2RX	-
9	IRQ4/M2_EncZ/M2_HSIN1	55*	10	IRQ5/M2_HSIN2	56*
11	M2_UD	-	12	M2_Uin	-
13	M2_Vin	-	14	M2_Win	-
15	M2_Toggle	-	16	M2_POE	-
17	M2_TRCCLK	-	18	M2_TRDCLK	-
19	M2_UP	-	20	M2_UN	-
21	M2_VP	-	22	M2_VN	-
23	M2_WP	-	24	M2_WN	-

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	-	2	DACK	-
3	TEND	-	4	STBYn	-
5	RS232TX	-	6	RS232RX	-
7	SCIbRX	14	8	SCIbTX	15
9	SCIcTX	-	10	SCIbCK	16
11	SCIcCK	-	12	SCIcRX	-
13	M1_Toggle	-	14	M1_Uin	-
15	M1_Vin	-	16	M1_Win	-
17	Reserved	-	18	Reserved	-
19	Reserved	-	20	Reserved	-
21	Reserved	-	22	Reserved	-
23	Unregulated_VCC	-	24	GROUND	11

Table 7-5: Application Header JA6 Connections

Pins marked with '*' are connected via option links.

7.2 Microcontroller Ring Headers

Microcontroller ring 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, J1.

Pin Header J1					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	RXD2	1	2	CLK2_TRJ2O	2
3	INT2n	3	4	WKUP0n	4
5	VREF	5	6	MODE	6
7	CON_XCIN	7	8	CON_XCOUT	8
9	RESETn	9	10	CON_XOUT	10
11	GROUND	11	12	CON_XIN	12
13	UC_VCC	13	14	RXD0	14
15	TXD0	15	16	CLK0	16
17	PIN17	17	18	PIN18	18
19	INT3n	19	20	INT1n	20
21	-	-	22	-	-
23	-	-	24	-	-
25	-	-	26	-	-
27	-	-	28	-	-
29	-	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	-	-	36	-	-

Table 7-6: Pin Header J1 Connections

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

Pin Header J2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	PIN21	21	2	PIN22	22
3	PIN23	23	4	COM0	24
5	COM1	25	6	COM2	26
7	COM3	27	8	SEG39	28
9	SEG38	29	10	SEG37	30
11	SEG36	31	12	SEG35	32
13	SEG34	33	14	SEG33	34
15	SEG32	35	16	SEG31_IO7	36
17	SEG30_IO6	37	18	SEG29_IO5	38

Table 7-7: Pin Header J2 Connections (Continued Overleaf)

Pin Header J2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
19	SEG28_IO4	39	20	SEG27_IO3	40
21	-	-	22	-	-
23	-	-	24	-	-
25	-	-	26	-	-
27	-	-	28	-	-
29	-	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	-	-	36	-	-

Table 7-7: Pin Header J2 Connections (Continuation)

Table 7-8 below lists the connections of the pin header, J3.

Pin Header J3					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	SEG26_IO2	41	2	SEG25_IO1	42
3	SEG24_IO0	43	4	SEG23_DLCDD7	44
5	SEG22_DLCDD6	45	6	SEG21_DLCDD5	46
7	SEG20_DLCDD4	47	8	SEG19	48
9	SEG18	49	10	SEG17	50
11	SEG16	51	12	SEG15	52
13	SEG14	53	14	SEG13	54
15	SEG12_INT4n	55	16	SEG11_KI7n	56
17	SEG10	57	18	SEG9	58
19	SEG8	59	20	SEG7	60
21	-	-	22	-	-
23	-	-	24	-	-
25	-	-	26	-	-
27	-	-	28	-	-
29	-	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	-	-	36	-	-

Table 7-8: Pin Header J3 Connections

Table 7-9 below lists the connections of the pin header, J4.

Pin Header J4					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	SEG6	61	2	SEG5	62
3	SEG4	63	4	SEG3	64
5	SEG2	65	6	SEG1_ADTRGn	66
7	SEG0	67	8	TRCIOB_DLCDRS	68
9	TRCIOC_DLCDE	69	10	ADPOT	70
11	AN7_LED3	71	12	AN6_LED2	72
13	AN5_LED1	73	14	AN4_LED0	74
15	AN3_TRJ2IO	75	16	AN2	76
17	AN1	77	18	AN0	78
19	CTS2RTS2	79	20	TXD2	80
21	-	-	22	-	-
23	-	-	24	-	-
25	-	-	26	-	-
27	-	-	28	-	-
29	-	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	-	-	36	-	-

Table 7-9: Pin Header J4 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 E8a debugger. An E8a debugger is supplied with this RSK product.

For further information regarding the debugging capabilities of the E8a debuggers, refer to the R8C Family E8a Emulator User's Manual (R0E00008AKCE00E).

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 64k 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 and Standard Serial I/O 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 R8C/LA8A 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 E8a emulator (as supplied with this RSK) supports break points, event points (including mid-execution insertion) and basic trace functionality. . For more details on breakpoints & E8a functions please refer to the '*E8A Emulator User's Manual'*.

8.5 Address Space

Figure 8-1 below details the address space of MCU R5F2LA88ANFP. For further details, refer to the R8C/LA8A group hardware manual.

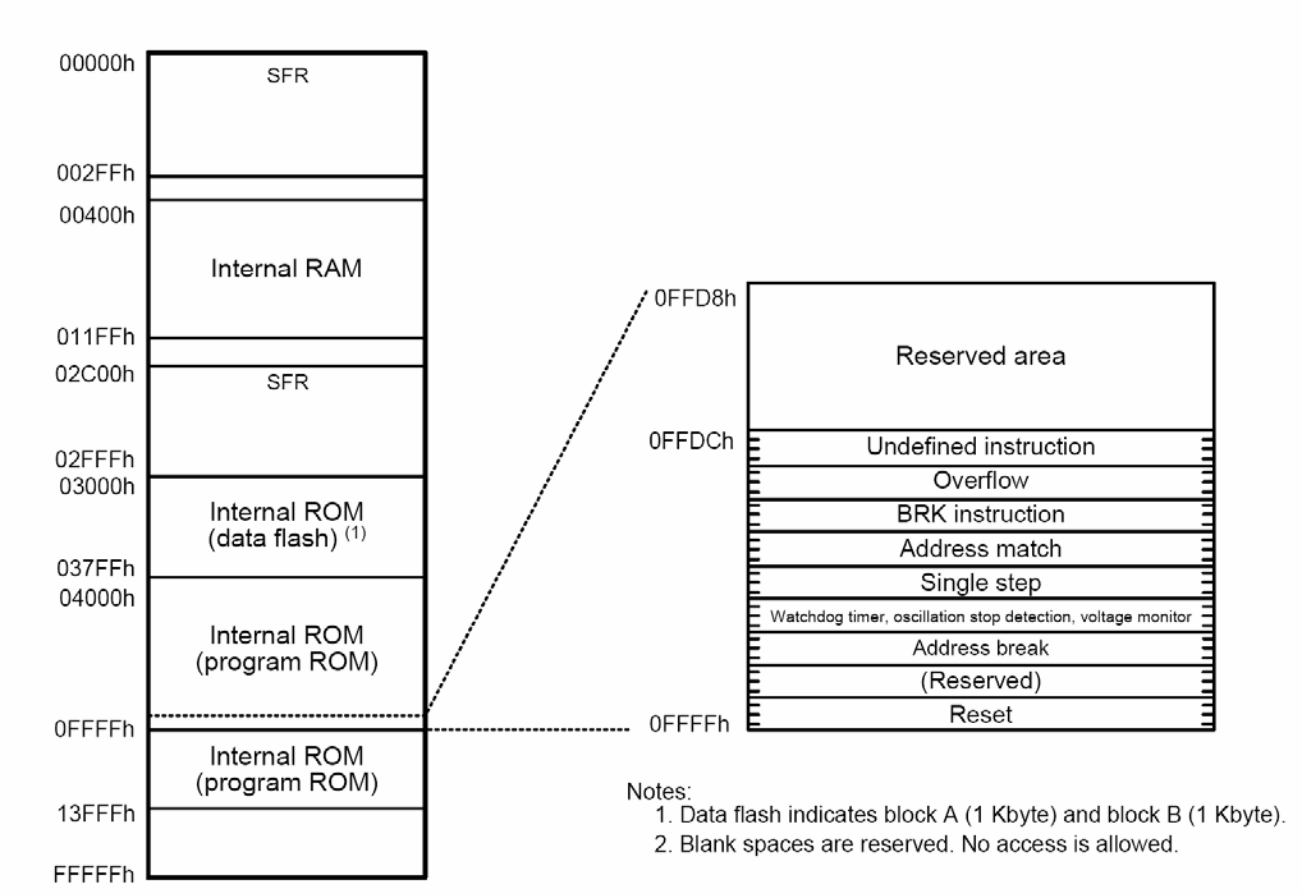

Figure 8-1: R5F2LA88ANFP Address Space Diagram

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 R8C/LA8A series microcontrollers refer to the R8C/LA8A Group hardware manual.

For information about the R8C/LA8A assembly language, refer to the R8C Family Software Programming Manual.

Online technical support and information is available at: http://www.renesas.com/rskr8cla8a

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