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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

Renesas Starter Kit for M16C6C

User's Manual

RENESAS SINGLE-CHIP MICROCOMPUTER M16C FAMILY

Renesas Electronics
www.renesas.com

Rev.1.00 2009.01

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Precautions

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 is 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.

Table of Contents

Chapter 1. Preface

Cautions

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Glossary

CPU	Central Processing Unit	HEW	High-performance Embedded Workshop
LED	Light Emitting Diode	RSK	Renesas Starter Kit
PC	Personal Computer	E8A	E8A on-chip debugger module
ESD	Electrostatic Discharge	EMC	Electromagnetic compatibility
LCD	Liquid Crystal Display	MCU	Microcontroller Unit
ADC	Analog to Digital Converter	USB	Universal Serial Bus
UART	Universal Asynchronous Receiver/Transmitter	ROM	Read Only Memory
RAM	Random Access Memory	CD	Compact Disc

Chapter 2. 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.

Features include:

- Renesas Microcontroller Programming.
- User Code Debugging.
- User Circuitry such as Switches, LEDs and potentiometer.
- User or Example Application.
- Sample peripheral device initialisation code.

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

Chapter 3. Power Supply

3.1. Requirements

This RSK operates from a 5V power supply.

A diode provides reverse polarity protection only if a current limiting power supply is used.

All RSK boards are supplied with an E8A debugger. This product 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 boards have an optional centre positive supply connector using a 2.0mm barrel power jack.

Warning

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

3.2. 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 a switch the LEDs will flash at a rate controlled by the potentiometer.

Chapter 4. Board Layout

4.1. Component Layout

The following diagram shows top layer component layout of the board.

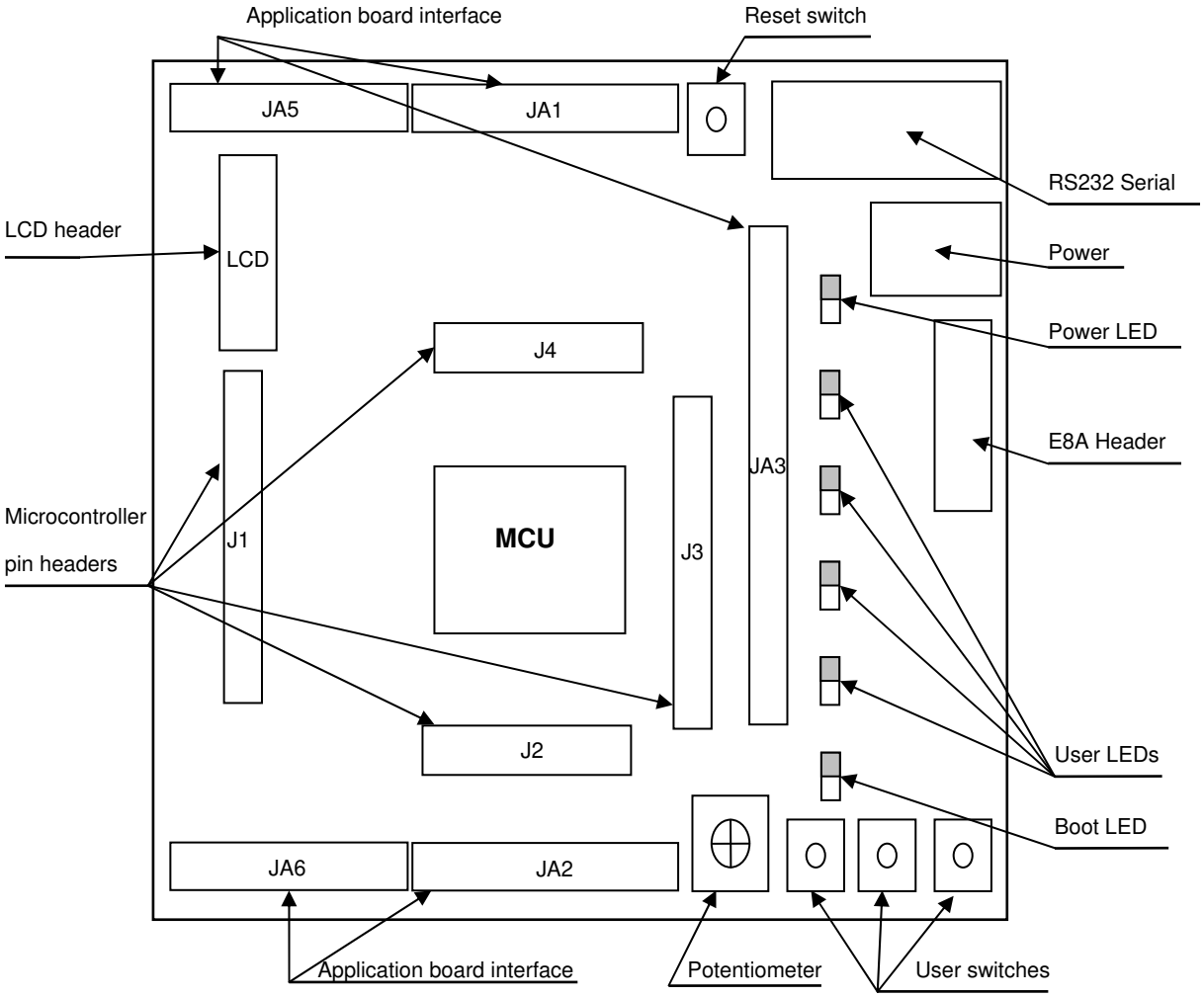

Figure 4-1: Board Layout

4.2. Board Dimensions

The following diagram gives the board dimensions and connector positions. All through hole connectors are on a common 0.1” grid for easy interfacing.

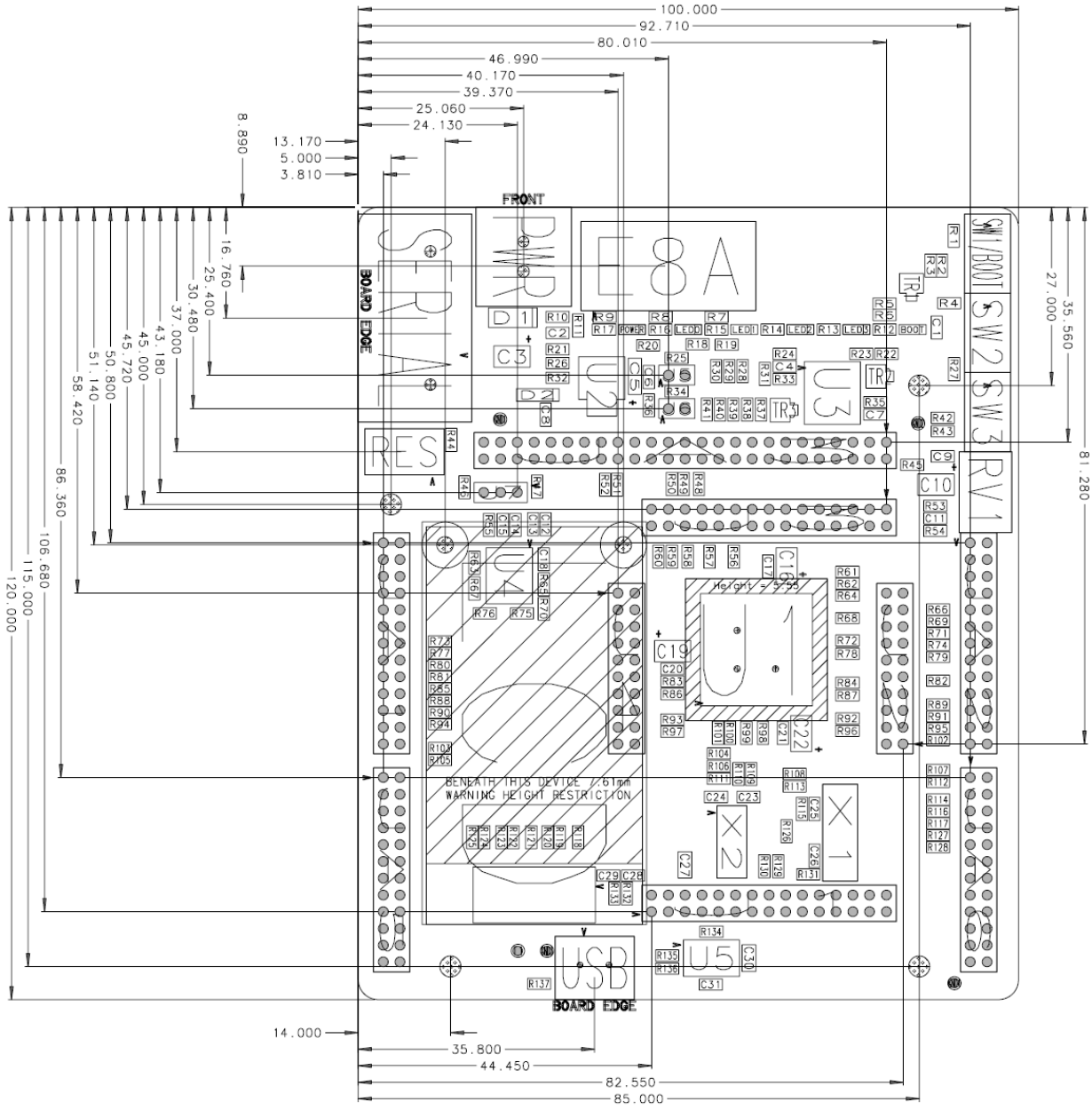

Figure 4-2: Board Dimensions

Chapter 5. Block Diagram

Figure 5-1 shows the CPU board components and their connectivity.

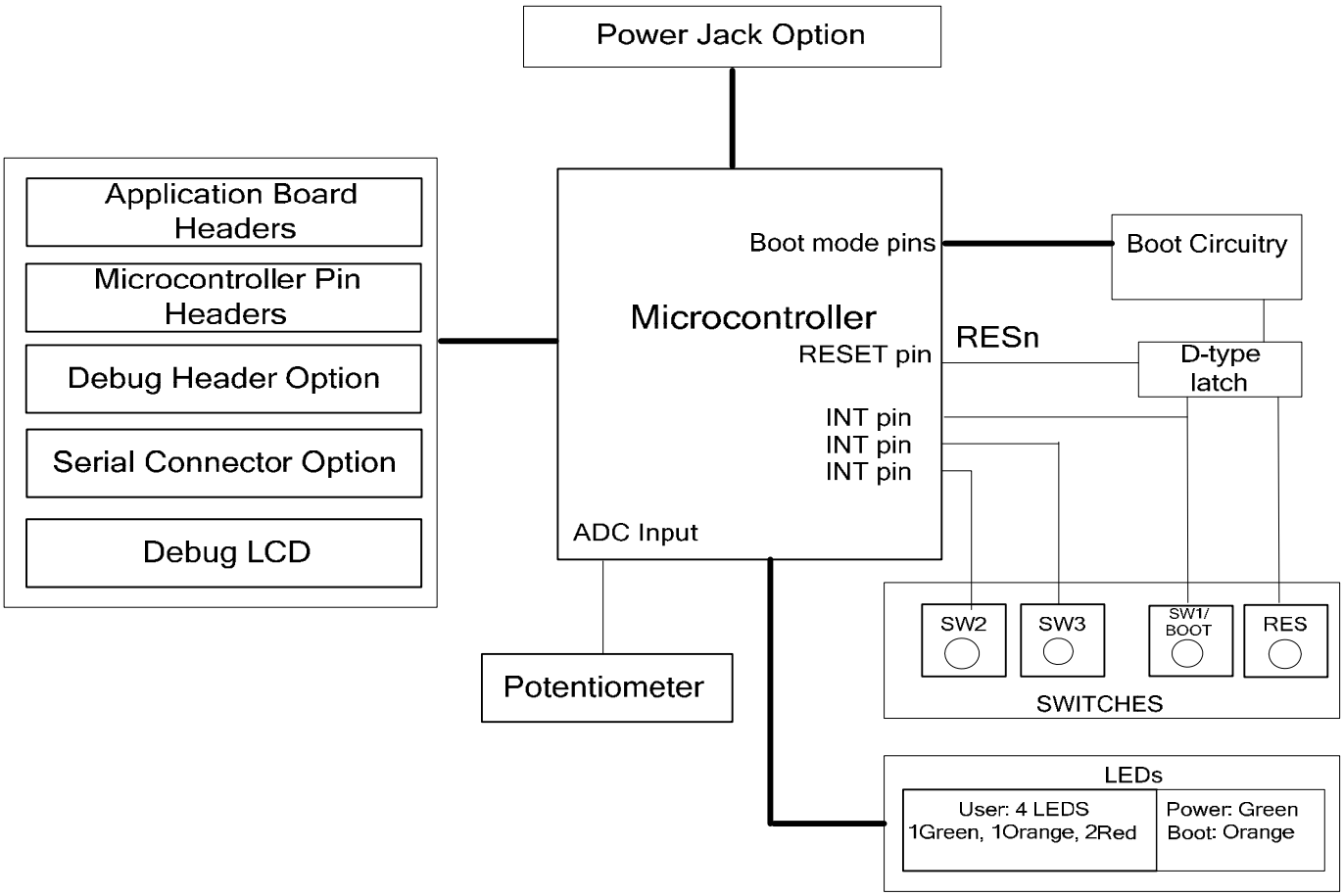

Figure 5-1: Block Diagram

Figure 5-2 shows the connections to the RSK.

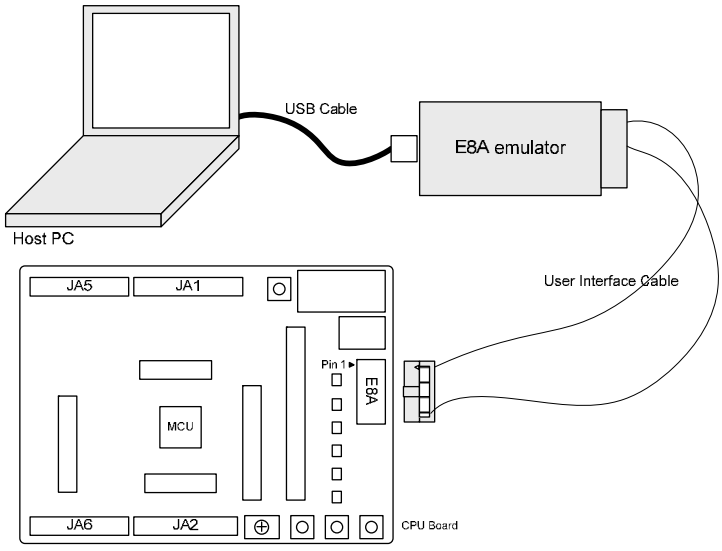

Figure 5-2: RSK Connections

Chapter 6. User Circuitry

6.1. Switches

There are four switches located on the CPU board. The function of each switch and its connection are shown in Table 6-1.

Switch	Function	Microcontroller
RES	When pressed, the RSK microcontroller is reset.	RESn, Pin 10
SW1/BOOT*	Connects to an IRQ input for user controls. The switch is also used in conjunction with the RES switch to place the device in BOOT mode when not using the E8A debugger.	INT0n, Pin 18 (Port 8, pin 2)
SW2*	Connects to an IRQ line for user controls.	INT1n, Pin 17 (Port 8, pin 3)
SW3*	Connects to the IRQ input line. Option link allows connection to ADC trigger input. For more details on option links, please refer to Sec 6.6.	INT2n, Pin 16 (Port 8, pin 4)

Table 6-1: Switch Functions

*Refer to schematic for detailed connectivity information.

6.2. LEDs

There are six LEDs on the RSK board. The green 'POWER' LED lights when the board is powered. The orange BOOT LED indicates the device is in BOOT mode when lit. The four user LEDs are connected to an IO port and will light when their corresponding port pin is set low.

Table 6-2, below, shows the LED pin references and their corresponding microcontroller port pin connections.

LED Reference (As shown on silkscreen)	Colour	Microcontroller Port Pin	Microcontroller Pin Number
LED0	Green	Port 4_0	52
LED1	Orange	Port 4_1	51
LED2	Red	Port 4_2	50
LED3	Red	Port 4_3	49

Table 6-2: LED Port

6.3. Potentiometer

A single turn potentiometer is connected to channel AN0 (Port 10_0) of the microcontroller. This may be used to vary the input analog voltage value to this pin between AVCC and Ground.

6.4. Serial port

The microcontroller programming serial port (UART1) is connected to the E8A connector. This serial port can optionally be connected to the RS232 transceiver by moving option resistors and fitting the D connector. The connections to be moved are listed in Table 6-3

Description	Function	Microcontroller Port Pin	Fit for RS232	Remove for RS232
UART0	Default serial port (TX)	Port 6_3	R128	R127, R76
UART0	Default serial port (RX)	Port 6_2	R114	R116, R75
UART1	Spare Serial Port (TX)	Port 6_7	R76	R127, R128
UART1	Spare Serial Port (RX)	Port 6_6	R75	R114, R116

Table 6-3: Serial Port settings

The UART0 port is also available on J2 and JA2. The UART1 port is available on J1.

The board is designed to accept a straight-through RS-232 male-to-female cable.

6.5. Debug LCD Module

A debug LCD module is supplied to be connected to the connector LCD. This should be fitted so that the debug LCD module lies over J4. Care should be taken to ensure the pins are inserted correctly into LCD. The debug LCD module uses a 4 bit interface to reduce the pin allocation. No contrast control is provided; this is set by a resistor on the supplied display module. The module supplied with the RSK only supports 5V operation.

Table 6-4 shows the pin allocation and signal names used on this connector.

LCD					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	Ground	-	2	5V	-
3	No Connection	-	4	DLCDRS (Port 2_0)	70
5	R/W (Wired to write only using 10K pull down)	-	6	DLCDE (Port 2_1) (+ 100k pull down to ground)	69
7	No Connection	-	8	No connection	-
9	No Connection	-	10	No connection	-
11	DLCD4 (Port 2_4)	66	12	DLCD5 (Port 2_5)	65
13	DLCD6 (Port 2_6)	64	14	DLCD7 (Port 2_7)	63

Table 6-4: Debug LCD Module Connections

6.6.USB Module

The USB module can be used for USB device modes at full speed. Table 6-5: USB connections contain details of the signal descriptions and pin connections.

LCD					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	VbusDTCT	15	2	SOUT3	3
3	USD+	4	4	USD-	5

Table 6-5: USB Module Connections

6.7.Option Links

Table 6-6 below describes the function of the option links contained on this RSK board and associated with Serial Port Configuration. The default configuration is indicated by BOLD text.

Serial port option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R46	Serial Port Configuration	Connects Channel 2 (RX pin) of the RS232 transceiver to the 9-pin D-type serial port connector	Disconnects Channel 2 (RX pin) of the RS232 transceiver from the 9-pin D-type serial port connector	R47, R55, R67
R47	Serial Port Configuration	Connects Channel 2 (TX pin) of the RS232 transceiver to the 9-pin D-type serial port connector	Disconnects Channel 2 (TX pin) of the RS232 transceiver from the 9-pin D-type serial port connector	R46, R55, R67
R55	Serial Port configuration	Connects Channel 2 (TX pin) of the RS232 transceiver to the TX pin of the UART2 port of the microcontroller	Disconnects Channel 2 (TX pin) of the RS232 transceiver from the TX pin of the UART2 port of the microcontroller	R46, R47, R67
R67	Serial Port configuration	Connects Channel 2 (RX pin) of the RS232 transceiver to the RX pin of the UART2 port of the microcontroller	Disconnects Channel 2 (RX pin) of the RS232 transceiver from the RX pin of the UART2 port of the microcontroller	R46, R47, R55
R70	Serial Port configuration	Disables the RS232 Serial Transceiver	Enables the RS232 Serial Transceiver	-
R128	Serial Port Configuration	Connects Channel 1 (TX pin) of the RS232 transceiver to the UART0 port of the microcontroller	Disconnects Channel 1 (TX pin) of the RS232 transceiver from the UART0 port of the microcontroller	R114, R75
R114	Serial Port Configuration	Connects Channel 1 (RX pin) of the RS232 transceiver to the UART0 port of the microcontroller	Disconnects Channel 1 (RX pin) of the RS232 transceiver from the UART0 port of the microcontroller	R128, R76
R127	Serial Port Configuration	Connects Channel 1 (TX In pin) of RS232 transceiver to JA6-5 (RS232TX)	Disconnects channel 1 (TX In pin) of RS232 transceiver from JA6-5 (RS232TX)	R116, R76
R116	Serial Port Configuration	Connects Channel 1 (RX pin) of the RS232 transceiver to JA6-6 (RS232RX)	Disconnects Channel 1 (RX pin) of the RS232 transceiver from JA6-6 (RS232RX)	R127, R75
R75	Serial Port Configuration	Connects Channel 1 (RX pin) of the RS232 transceiver to the UART1 port of the microcontroller	Disconnects Channel 1 (RX pin) of the RS232 transceiver from the UART1 port of the microcontroller	R114, R116
R76	Serial Port Configuration	Connects Channel 1 (TX pin) of the RS232 transceiver to the UART1 port of the microcontroller	Disconnects Channel 1 (TX pin) of the RS232 transceiver from the UART1 port of the microcontroller	R127, R128

Table 6-6: Serial port configuration links

Table 6-7 below describes the function of the option links associated with application board interface. The default configuration is indicated by BOLD text.

Application board interface option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R93	Application board interface	Connects the microcontroller port pin p10_0 to AN0 (JA1-9) of application board interface.	Disconnects the microcontroller port pin p10_0 from AN0 (JA1-9) of application board interface.	R97
R97	Application board interface	Connects the microcontroller port pin p10_0 to ADPOT.	Disconnects the microcontroller port pin p10_0 from ADPOT.	R93
R49	Application board interface	Connects the microcontroller port pin p5_0 to WRn (JA3-26) of application board interface.	Disconnects the microcontroller port pin p5_0 from WRn (JA3-26) of application board interface.	R50
R50	Application board interface	Connects the microcontroller port pin p5_0 to WRLn (JA3-48) of application board interface.	Disconnects the microcontroller port pin p5_0 from WRLn (JA3-48) of application board interface.	R49
R51	Application board interface	Connects the microcontroller port pin p1_5 to D13 (JA3-34) of application board interface.	Disconnects the microcontroller port pin p1_5 from D13 (JA3-34) of application board interface.	R52
R52	Application board interface	Connects the microcontroller port pin p1_5 to INT3n (JA1-23) of application board interface.	Disconnects the microcontroller port pin p1_5 from INT3n (JA1-23) of application board interface.	R51
R66	Application board interface	Connects the microcontroller port pin p8_0 to Up (JA2-13) of application board interface.	Disconnects the microcontroller port pin p8_0 from Up (JA2-13) of application board interface.	R69
R69	Application board interface	Connects the microcontroller port pin p8_0 to TA4OUT (JA2-20) of application board interface.	Disconnects the microcontroller port pin p8_0 from TA4OUT (JA2-20) of application board interface.	R66
R89	Application board interface	Connects the microcontroller port pin p8_1 to TA4IN (JA2-22) of application board interface.	Disconnects the microcontroller port pin p8_1 from TA4IN (JA2-22) of application board interface.	R91
R91	Application board interface	Connects the microcontroller port pin p8_1 to Un (JA2-14) of application board interface.	Disconnects the microcontroller port pin p8_1 from Un (JA2-14) of application board interface.	R89
R71	Application board interface	Connects the microcontroller port pin p7_4 to Wp (JA2-17) of application board interface.	Disconnects the microcontroller port pin p7_4 from Wp (JA2-17) of application	R74

Application board interface option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
			board interface.	
R74	Application board interface	Connects the microcontroller port pin p7_4 to TA2OUT (JA2-19) of application board interface.	Disconnects the microcontroller port pin p7_4 from TA2OUT (JA2-19) of application board interface.	R71
R95	Application board interface	Connects the microcontroller port pin p7_5 to Wn (JA2-18) of application board interface.	Disconnects the microcontroller port pin p7_5 from Wn (JA2-18) of application board interface.	R102
R102	Application board interface	Connects the microcontroller port pin p7_5 to TA2IN (JA2-21) of application board interface.	Disconnects the microcontroller port pin p7_5 from TA2IN (JA2-21) of application board interface.	R95
R59	Application board interface	Connects the microcontroller port pin p5_3 to TRISTn (JA2-24) of application board interface.	Disconnects the microcontroller port pin p5_3 from TRISTn (JA2-24) of application board interface.	R60
R60	Application board interface	Connects the microcontroller port pin p5_3 to BCLK (JA3-44) of application board interface.	Disconnects the microcontroller port pin p5_3 from BCLK (JA3-44) of application board interface.	R59
R73	Application board interface	Connects the microcontroller port pin p3_0 to IO0 (JA1-15) of application board interface.	Disconnects the microcontroller port pin p3_0 from IO0 (JA1-15) of application board interface.	-
R77	Application board interface	Connects the microcontroller port pin p3_1 to IO1 (JA1-16) of application board interface.	Disconnects the microcontroller port pin p3_1 from IO1 (JA1-16) of application board interface.	-
R80	Application board interface	Connects the microcontroller port pin p3_2 to IO2 (JA1-17) of application board interface.	Disconnects the microcontroller port pin p3_2 from IO2 (JA1-17) of application board interface.	-
R81	Application board interface	Connects the microcontroller port pin p3_3 to IO3 (JA1-18) of application board interface.	Disconnects the microcontroller port pin p3_3 from IO3 (JA1-18) of application board interface.	-
R85	Application board interface	Connects the microcontroller port pin p3_4 to IO4 (JA1-19) of application	Disconnects the microcontroller port pin p3_4	-

Application board interface option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
		board interface.	from IO4 (JA1-19) of application board interface.	
R88	Application board interface	Connects the microcontroller port pin p3_5 to IO5 (JA1-20) of application board interface.	Disconnects the microcontroller port pin p3_5 from IO5 (JA1-20) of application board interface.	-
R94	Application board interface	Connects the microcontroller port pin p3_6 to IO6 (JA1-21) of application board interface.	Disconnects the microcontroller port pin p3_6 from IO6 (JA1-21) of application board interface.	-
R90	Application board interface	Connects the microcontroller port pin p3_7 to IO7 (JA1-22) of application board interface.	Disconnects the microcontroller port pin p3_7 from IO7 (JA1-22) of application board interface.	-
R105	Application board interface	Connects the microcontroller port pin p7_0 to IICSDA (JA1-25) of application board interface.	Disconnects the microcontroller port pin p7_0 from IICSDA (JA1-25) of application board interface.	R103
R103	Application board interface	Connects the microcontroller port pin p7_1 to IICSCL (JA1-26) of application board interface.	Disconnects the microcontroller port pin p7_1 from IICSCL (JA1-26) of application board interface.	R105
R107	Application board interface	Connects the microcontroller port pin p7_2 to Vp (JA2-15) of application board interface.	Disconnects the microcontroller port pin p7_2 from Vp (JA2-15) of application board interface.	R112
R112	Application board interface	Connects the microcontroller port pin p7_2 to CLK2 (JA6-10) of application board interface.	Disconnects the microcontroller port pin p7_2 from CLK2 (JA6-10) of application board interface.	R107
R130	Application board interface	Connects the microcontroller port pin p8_5 to NMIn (JA2-3) of application board interface.	Disconnects the microcontroller port pin p8_5 from NMIn (JA2-3) of application board interface.	-

Table 6-7: Application board interface configuration links

Table 6-8 below describes the function of the option links associated with E8A debugger. The default configuration is indicated by BOLD text.

E8A debugger option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R19	E8A	**E8A_A enabled.**	E8A_A disabled.	-
R8	E8A	**E8A Tx enabled.**	E8A Tx disabled.	-
R7	E8A	**E8A Rx enabled.**	E8A Rx disabled.	-
R11	E8A	**E8A_SCLK enabled.**	E8A_SCLK disabled.	-
R9	E8A	**E8A_CNVSS enabled.**	E8A_CNVSS disabled.	-
R20	E8A	E8A_B enabled.	**E8A_B disabled.**	-
R18	E8A	**E8A_BUSY enabled.**	E8A_BUSY disabled.	-

Table 6-8: E8A debugger configuration links

Table 6-9 below describes the function of the option links associated with power source. The default configuration is indicated by **BOLD** text.

Power option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R26	Power source	CON_5V source signal will be powered from PWR connector via R10.	CON_5V source signal will not be powered from PWR connector.	R10, R32
R32	Power source	CON_5V source signal will be powered from external source.	CON_5V source signal will not be powered from external source.	R10, R26
R10	Power source	Enables power to board from PWR connector.	Disables power to board from PWR connector.	R26, R32
R21	Power source	5V supply to on-board 3.3v regulator is enabled.	Disconnects PWR connector from on board 3.3v voltage regulator.	-
R36	Power source	Connects on board 3.3v output of voltage regulator to Board_VCC1 via R41 and Board_VCC2 via R30.	Disconnects on board 3.3v output of voltage regulator from Board_VCC1 and Board_VCC2.	R30, R41
R30	Power source	Connects on board 3.3v output of the voltage regulator to Board_VCC2.	Disconnects on board 3.3v output of the voltage regulator from Board_VCC2.	R36
R41	Power source	Connects on board 3.3v output of the voltage regulator to Board_VCC1.	Disconnects on board 3.3v output of the voltage regulator from Board_VCC1.	R36
R38	Power source	Connects E8A_VCC to Board_VCC1.	Disconnects E8A_VCC from Board_VCC1.	-
R40	Power source	Connects 5V supply to Board_VCC1	Disconnects Board_VCC1 from PWR connector	R10
R39	Power source	Connects CON_3V3 to Board_VCC1	Disconnects CON_3V3 from Board_VCC1.	-
R28	Power source	Connects CON_3V3 to Board_VCC2	Disconnects CON_3V3 from Board_VCC2.	-
R29	Power source	Connects 5V supply to Board_VCC2	Disconnects Board_VCC2 from PWR connector	R10
R34	MCU power supply	Supply to MCU.	CPU current can be measured across R34	-
R45	Ground	Connects Analog & Digital grounds together.	Separates Analog & Digital grounds.	-

Table 6-9: Power configuration links

Table 6-10 below describes the function of the option links associated with clock configuration. The default configuration is indicated by BOLD text.

Clock option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R115	Clock Oscillator	Parallel resistor for crystal X1	Not fitted	-
R108	Clock Oscillator	On-board clock source is used.	External clock source can be used.	R131, R113,R126
R131	Clock Oscillator	On-board clock source is used.	External clock source can be used.	R108, R113, R126
R113	Clock Oscillator	External clock source is used.	On-board clock source can be used.	R108, R131, R126
R126	Clock Oscillator	External clock source is used.	On-board clock source can be used.	R108, R113, R131
R111	Clock Oscillator	Parallel resistor for crystal X2	Not fitted	-
R106	Clock Oscillator	On-board clock source is used.	External clock source can be used	R109, R104, R110
R110	Clock Oscillator	On-board clock source is used	External clock source can be used	R106, R109, R104
R109	Clock Oscillator	External clock source can be used	On-board clock source is used	R104, R106, R110
R104	Clock Oscillator	External clock source can be used	On-board clock source is used	R106, R110, R109

Table 6-10: Clock configuration links

Table 6-11 below describes the function of the option links associated with reference voltage source. The default configuration is indicated by BOLD text.

Voltage reference option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R86	Voltage Reference Source	VREF is set to Board_VCC1.	VREF is not set to Board_VCC1.	R83
R83	Voltage Reference Source	VREF to be supplied from external source (JA1- 7).	VREF is not supplied from external source (JA1- 7).	R86

Table 6-11: Voltage reference configuration links

Table 6-12 below describes the function of the option links associated with analog power supply. The default configuration is indicated by BOLD text.

Analog power supply option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R54	Analog Voltage Source	AVCC to be supplied from external source (JA1-5).	AVCC is not supplied from external source (JA1-5).	R53
R53	Analog Voltage Source	AVCC is set to Board_VCC1.	AVCC is not set to Board_VCC1.	R54

Table 6-12: Analog power supply configuration links

Table 6-13 below describes the function of the option links associated with switches configuration. The default configuration is indicated by BOLD text.

Switches option link settings				
Reference	Function	Fitted	Alternative (Removed)	Related To
R42	Switch	Connects INT2n (MCU port pin p8_4) to SW3	Disconnects INT2n (MCU port pin p8_4) from SW3.	R43
R43	Switch	Connects ADTRGn (MCU port pin p9_7) to SW3	Disconnects ADTRGn (MCU port pin p9_7) from SW3	R42

Table 6-13: Switches configuration links

6.8. Oscillator Sources

A crystal oscillator is fitted on the RSK and used to supply the main clock input to the Renesas microcontroller. Table 6-14 details the oscillators that are fitted and alternative footprints provided on this RSK:

Component		
Crystal (X1)	Fitted	6 MHz (HC49/4H package)
Crystal (X2)	Fitted	32.768KHz (HC49/4H package)

Table 6-14: Oscillators / Resonators

6.9. Reset Circuit

The CPU Board includes a simple latch circuit that links the mode selection and reset circuit. This provides an easy method for swapping the device between Boot Mode and User mode. This circuit is not required on customer's boards as it is intended for providing easy evaluation of the operating modes of the device on the RSK. Please refer to the hardware manual for more information on the requirements of the reset circuit.

The Reset circuit operates by latching the state of the boot switch on pressing the reset button. This control is subsequently used to modify the mode pin states as required.

The mode pins should change state only while the reset signal is active to avoid possible device damage.

The reset is held in the active state for a fixed period by a pair of resistors and a capacitor. Please check the reset requirements carefully to ensure the reset circuit on the user's board meets all the reset timing requirements.

Chapter 7. Modes

The RSK supports Boot mode and Single chip mode.

Details of programming the FLASH memory is described in the M16C6C Group Hardware Manual.

7.1. Boot mode

The Boot mode settings for this RSK are shown in Table 7-1.

CNVSS	P5.0	P5.5	LSI State after Reset End
1	1	0	Boot Mode

Table 7-1: Boot Mode pin settings

The software supplied with this RSK only supports Boot mode using an E8A and HEW. However, hardware exists to enter Boot mode manually, do not connect the E8A in this case. Press and hold the SW1/BOOT. The mode pins above are held in their boot states while reset is pressed and released. Release the Boot switch. The BOOT LED will be illuminated to indicate that the microcontroller is in Boot mode.

When neither the E8A is connected nor the board is placed in Boot mode (with CNVSS and P5.5 being pulled low during reset) as above, the P5.5 pin is pulled high by a 10k resistor, the P.5.0 pin is pulled high by a 4k7 resistor and the CNVSS is pulled low by a 4k7 resistor.

When an E8A is used these three pins are controlled by the E8A.

7.2. Single-Chip mode

As CNVSS is being pulled down by a 4k7 resistor, this RSK will always boot in Single-Chip mode when the E8A is not connected and the Boot switch is not depressed. Refer to M16C6C Group Hardware Manual for details of Single-Chip mode

CNVSS	P5.0	P5.5	LSI State after Reset End
0	1	1	Single-Chip Mode

Table 7-2: Single-Chip Mode pin settings

Chapter 8. Programming Methods

The board is intended for use with HEW and the supplied E8A debugger. Refer to M16C6C Group Hardware Manual for details of programming the microcontroller without using these tools.

Chapter 9. Headers

9.1. Microcontroller Headers

Table 9-1 to Table 9-4 show the microcontroller pin headers and their corresponding microcontroller connections. The header pins connect directly to the microcontroller pin unless otherwise stated.

J1					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	DA1	1	2	DA0	2
3	NC	-	4	NC	-
5	NC	-	6	BYTE	6
7	CNVSS	7	8	CON_XCIN	8
9	CON_XCOUT	9	10	RESn	10
11	CON_XOUT	11	12	GROUND	12
13	CON_XIN	13	14	UC_VCC1	14
15	NMIn	15	16	INT2n	16
17	INT1n	17	18	INT0n	18
19	TA4IN_Un	19	20	TA4OUT_Up	20
21	P77	21	22	P76	22
23	TA2IN_Wn	23	24	TA2OUT_Wp	24
25	Vn	25	26	CLK2_Vp	26
27	IICSCL_RxD2	27	28	IICSDA_TxD2	28
29	PTTX	29	30	PTRX	30

Table 9-1: J1

J2					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	PTCK	31	2	BUSY	32
3	TxD0	33	4	RxD0	34
5	CLK0	35	6	CTSRTS	36
7	RDYn	37	8	ALE	38
9	EPM	39	10	UD	40
11	TRISTn_BCLK	41	12	RDn	42
13	WRHn	43	14	WRLn_WRn	44
15	CS3n	45	16	CS2n	46
17	CS1n	47	18	CS0n	48
19	A19_LED3	49	20	A18_LED2	50

Table 9-2: J2

J3					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	A17_LED1	51	2	A16_LED0	52
3	A15_IO7	53	4	A14_IO6	54
5	A13_IO5	55	6	A12_IO4	56
7	A11_IO3	57	8	A10_IO2	58
9	A9_IO1	59	10	UC_VCC2	60
11	A8_IO0	61	12	GROUND	62
13	A7_DLCD7	63	14	A6_DLCD6	64
15	A5_DLCD5	65	16	A4_DLCD4	66
17	A3	67	18	A2	68
19	A1_DLCDE	69	20	A0_DLCDRS	70
21	D15	71	22	D14	72
23	D13_INT3n	73	24	D12	74
25	D11	75	26	D10	76
27	D9	77	28	D8	78
29	D7	79	30	D6	80

Table 9-3: J3

J4					
Pin	Circuit Net Name	Device Pin	Pin	Circuit Net Name	Device Pin
1	D5	81	2	D4	82
3	D3	83	4	D2	84
5	D1	85	6	D0	86
7	AN7	87	8	AN6	88
9	AN5	89	10	AN4	90
11	AN3	91	12	AN2	92
13	AN1	93	14	AVss	94
15	ADPOT_AN0	95	16	CON_VREF	-
17	CON_AVCC	-	18	ADTRGn	98
19	P96	99	20	P95	100

Table 9-4: J4

9.2. Application Headers

Table 9-5 to Table 9-9 below show the standard application header connections.

JA1							
Pin	Generic Header Name	CPU board Signal Name	Device Pin	Pin	Generic Header Name	CPU board Signal Name	Device Pin
1	5V	CON_5V	-	2	0V	GROUND	-
3	3V3	CON_3V3	-	4	0V	GROUND	-
5	AVCC	CON_AVCC	-	6	AVss	AVSS	94
7	AVref	CON_VREF	-	8	ADTRG	ADTRGn	98
9	AD0	AN0	95	10	AD1	AN1	93
11	AD2	AN2	92	12	AD3	AN3	91
13	DAC0	DA0	2	14	DAC1	DA1	1
15	IO_0	IO0	61	16	IO_1	IO1	59
17	IO_2	IO2	58	18	IO_3	IO3	57
19	IO_4	IO4	56	20	IO_5	IO5	55
21	IO_6	IO6	54	22	IO_7	IO7	53
23	IRQ3	INT3n	73	24	IIC_EX	NC	-
25	IIC_SDA	IICSDA	28	26	IIC_SCL	IICSCL	27

Table 9-5: JA1 Standard Generic Header

JA2							
Pin	Generic Header Name	CPU board Signal Name	Device Pin	Pin	Generic Header Name	CPU board Signal Name	Device Pin
1	RESn	RESn	10	2	EXTAL	CON_XIN	-
3	NMIn	NMIn	15	4	Vss1	GROUND	-
5	WDT_OVF	NC	-	6	SCIaTX	TxD0	33
7	IRQ0	INT0n	18	8	SCIaRX	RxD0	34
9	IRQ1	INT1n	17	10	SCIaCK	CLK0	35
11	UD	UD	40	12	CTSRTS	CTSRTS	36
13	Up	Up	20	14	Un	Un	19
15	Vp	Vp	26	16	Vn	Vn	25
17	Wp	Wp	24	18	Wn	Wn	23
19	TMR0	TA2OUT	24	20	TMR1	TA4OUT	20
21	TRIGa	TA2IN	23	22	TRIGb	TA4IN	19
23	IRQ2	INT2n	16	24	TRISTn	TRISTn	41
25	-	NC	-	26	-	NC	-

Table 9-6: JA2 Standard Generic Header

JA5							
Pin	Generic Header Name	CPU board Signal Name	Device Pin	Pin	Generic Header Name	CPU board Signal Name	Device Pin
1	AD4	AN4	90	2	AD5	AN5	89
3	AD6	AN6	88	4	AD7	AN7	87
5	CAN1TX	NC	-	6	CAN1RX	NC	-
7	CAN2TX	NC	-	8	CAN2RX	NC	-
9	Reserved	NC	-	10	Reserved	NC	-
11	Reserved	NC	-	12	Reserved	NC	-
13	Reserved	NC	-	14	Reserved	NC	-
15	Reserved	NC	-	16	Reserved	NC	-
17	Reserved	NC	-	18	Reserved	NC	-
19	Reserved	NC	-	20	Reserved	NC	-
21	Reserved	NC	-	22	Reserved	NC	-
23	Reserved	NC	-	24	Reserved	NC	-

Table 9-7: JA5 Standard Generic Header

JA6							
Pin	Generic Header Name	CPU board Signal Name	Device Pin	Pin	Generic Header Name	CPU board Signal Name	Device Pin
1	DREQ	NC	-	2	DACK	NC	-
3	TEND	NC	-	4	STBYn	NC	
5	RS232TX	RS232TX	-	6	RS232RX	RS232RX	-
7	SCIbRX	IICSCL_RxD2	27	8	SCIbTX	IICSDA_TxD2	28
9	SCIcTX	NC	-	10	SCIbCK	CLK2	26
11	SCIcCK	NC	-	12	SCIcRX	NC	-
13	Reserved	NC	-	14	Reserved	NC	-
15	Reserved	NC	-	16	Reserved	NC	-
17	Reserved	NC	-	18	Reserved	NC	-
19	Reserved	NC	-	20	Reserved	NC	-
21	Reserved	NC	-	22	Reserved	NC	-
23	Reserved	NC	-	24	Reserved	NC	-

Table 9-8: JA6 Standard Generic Header

JA3							
Pin	Generic Header Name	CPU board Signal Name	Device Pin	Pin	Generic Header Name	CPU board Signal Name	Device Pin
1	A0	A0_DLCDRS	70	2	A1	A1_DLCDE	69
3	A2	A2	68	4	A3	A3	67
5	A4	A4_DLCD4	66	6	A5	A5_DLCD5	65
7	A6	A6_DLCD6	64	8	A7	A7_DLCD7	63
9	A8	A8_IO0	61	10	A9	A9_IO1	59
11	A10	A10_ IO2	58	12	A11	A11_ IO3	57
13	A12	A12_ IO4	56	14	A13	A13_ IO5	55
15	A14	A14_ IO6	54	16	A15	A15_ IO7	53
17	D0	D0	86	18	D1	D1	85
19	D2	D2	84	20	D3	D3	83
21	D4	D4	82	22	D5	D5	81
23	D6	D6	80	24	D7	D7	79
25	RDn	RDn	42	26	WRn	WRn	44
27	CSan	CS0n	48	28	CSbn	CS1n	47
29	D8	D8	78	30	D9	D9	77
31	D10	D10	76	32	D11	D11	75
33	D12	D12	74	34	D13	D13	73
35	D14	D14	72	36	D15	D15	71
37	A16	A16_LED0	52	38	A17	A17_LED1	51
39	A18	A18_LED2	50	40	A19	A19_LED3	49
41	A20	NC	-	42	A21	NC	-
43	A22	NC	-	44	BCLK	BCLK	41
45	CScn	CS2n	46	46	AHn	ALE	38
47	HWRn	WRHn	43	48	LWRn	WRLn	44
49	NC	NC	-	50	NC	NC	-

Table 9-9: JA3 Standard Generic Header

Chapter 10. Code Development

10.1. Overview

Note: For all code debugging using Renesas software tools, the RSK board must be connected to a PC USB port via an E8A. An E8A emulator is supplied with the RSK product.

Due to the continuous process of improvements undertaken by Renesas the user is recommended to review the information provided on the Renesas website at www.renesas.com to check for the latest updates to the Compiler and Debugger manuals.

10.2.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.

Warning: 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.

10.3. Mode Support

HEW connects to the Microcontroller and programs via the E8A. Mode support is handled transparently to the user.

10.4. Breakpoint Support

HEW supports breakpoints on the user code, both in RAM and ROM.

Double clicking in the breakpoint column in the code sets the breakpoint. Breakpoints will remain unless they are double clicked to remove them.

10.5. Memory Map

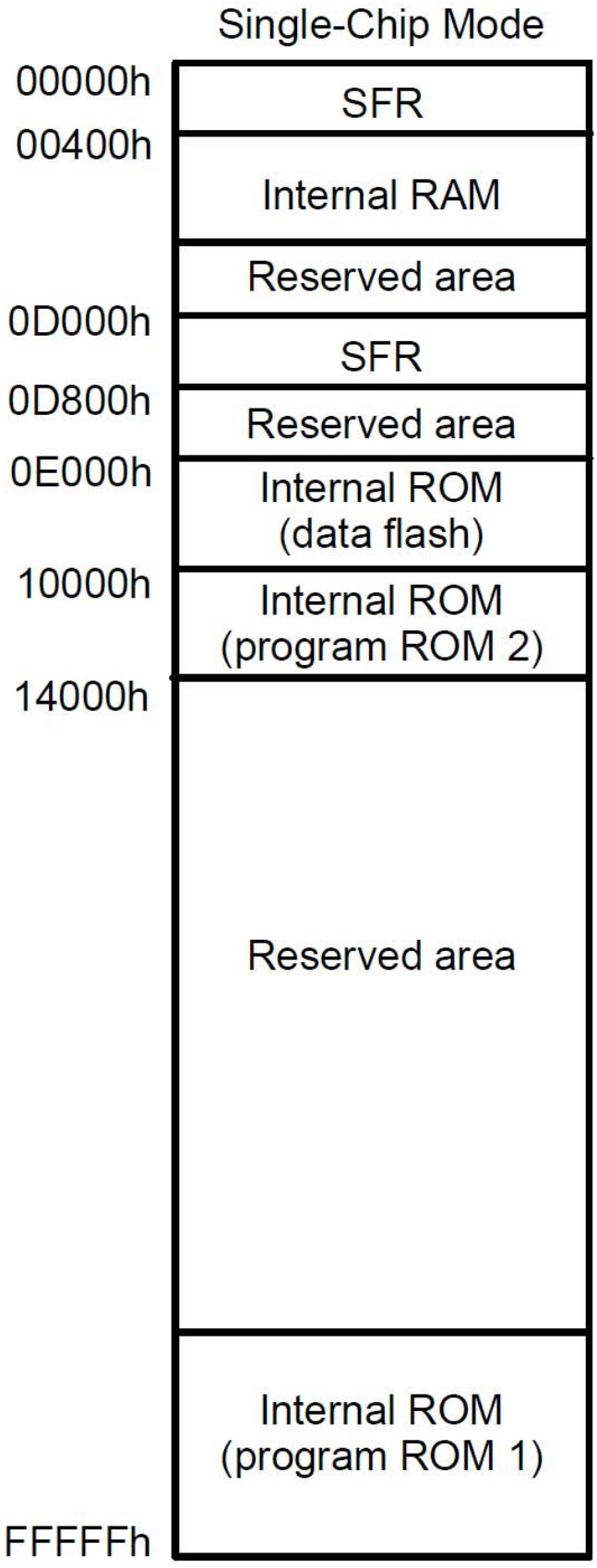

Figure 10-1: Memory Map

Chapter 11. Component Placement

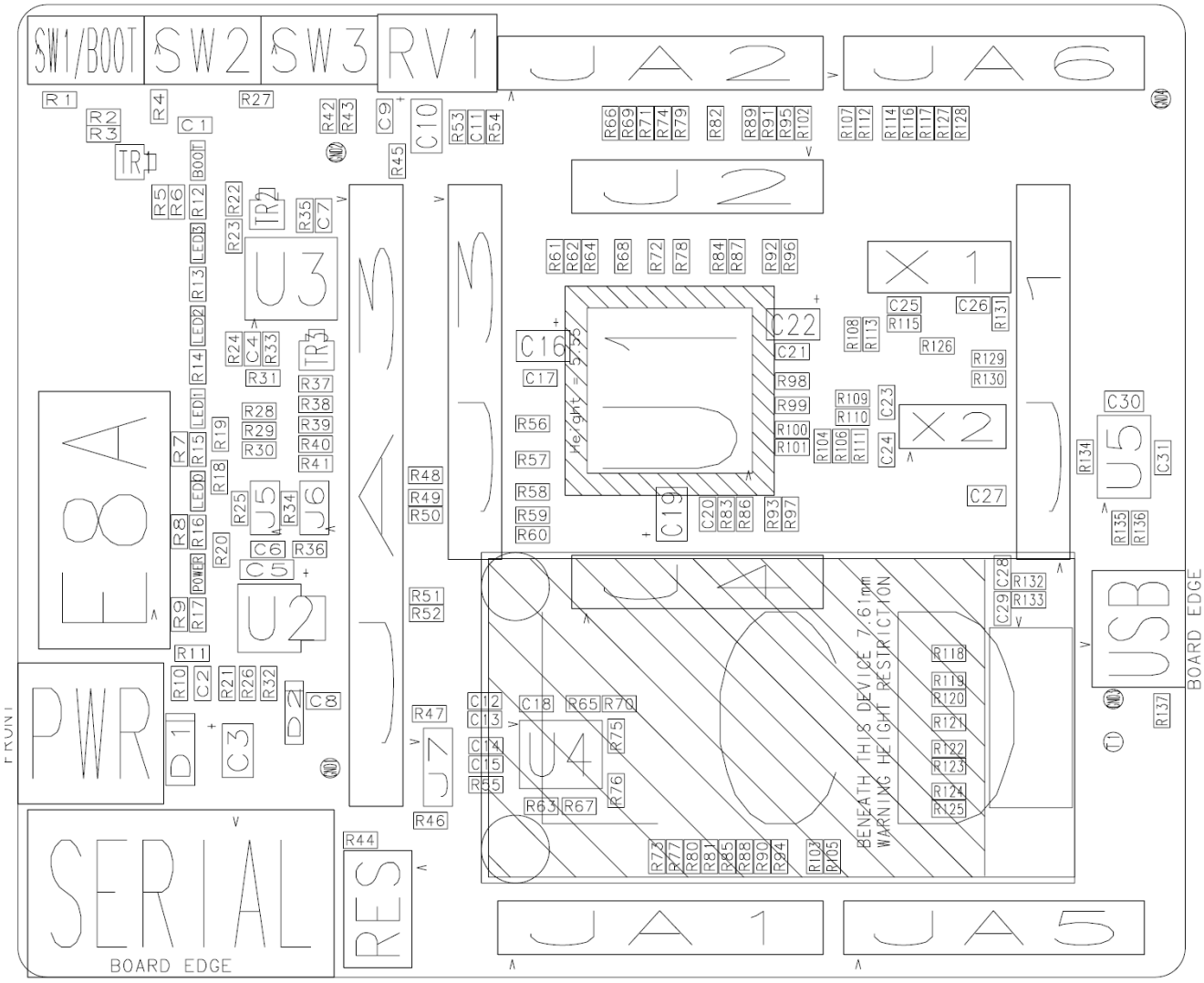

Figure 11-1: Component Placement

Chapter 12. Additional Information

For details on how to use High-performance Embedded Workshop (HEW), refer to the HEW manual available on the CD or installed in the Manual Navigator.

For information about the M16C6C series microcontrollers refer to the M16C6C Group hardware manual.

For information about the M16C6C assembly language, refer to the M16C Series Software Manual.

For information about the E8A Emulator, please refer to the *E8a Emulator User's Manual.*

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

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General information on Renesas Microcontrollers can be found on the Renesas website at: http://www.renesas.com/

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