User's Manual

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RX130 Group

Renesas Starter Kit User's Manual

RENESAS 32-Bit MCU
RX Family / RX100 Series

Renesas Electronics
www.renesas.com

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CAUTION

This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to avoid build-up of static electricity while working with this equipment. All test and measurement tool including the workbench must be grounded. The user/operator must be grounded using the wrist strap. The connectors and/or device pins should not be touched with bare hands.

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	鉛 Lead (Pb)	水銀 Mercury (Hg)	カドミウム Cadmium (Cd)	六価クロム Hexavalent Chromium (Cr(VI))	ポリ臭化ビフェニル Polybrominated biphenyls (PBB)	ポリ臭化ジフェニルエーテル Polybrominated diphenyl ethers (PBDE)
筐体 Case	O	O	O	O	O	O
ボード Board	X	O	O	O	O	O
ケーブル Cable	X	O	O	O	O	O
ソケット Socket	X	O	O	O	O	O
ＡＣアダプタ AC-Adapter	X	O	O	O	O	O

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外壳 Case	O	O	O	O	O	O
电路板 Board	X	O	O	O	O	O
连接线 Cable	X	O	O	O	O	O
插座 Socket	X	O	O	O	O	O
AC 适配器 AC-Adapter	X	O	O	O	O	O

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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 RSKRX130. 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.	RSKRX130 User's Manual	R20UT3444EG
Tutorial Manual	Provides a guide to setting up RSK environment, running sample code and debugging programs.	RSKRX130 Tutorial Manual	CS+: R20UT3445EG e^2 studio: R20UT3448EG
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	RSKRX130 Quick Start Guide	CS+: R20UT3446EG e^2 studio: R20UT3449EG
Code Generator Tutorial Manual	Provides a guide to code generation and importing into the IDE (Integrated Development Environment).	RSKRX130 Code Generator Tutorial Manual	CS+: R20UT3447EG e^2 studio: R20UT3450EG
Schematics	Full detail circuit schematics of the RSK.	RSKRX130 Schematics	R20UT3443EG
Hardware Manual	Provides technical details of the RX130 microcontroller.	RX130 Group Hardware Manual	R01UH0560EJ

2. List of Abbreviations and Acronyms

Abbreviation	Full Form
ADC	Analog-to-Digital Converter
BC	Battery Charging
bps	Bits per second
CAN	Controller Area Network
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
DAC	Digital-to-Analog Converter
DIP	Dual In-line Package
DMA	Direct Memory Access
DMAC	Direct Memory Access Controller
DNF	Do Not Fit
E1/E2 Lite	Renesas On-chip Debugging Emulator
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
GPT	General PWM Timer
I^2C (IIC)	Philips™ Inter-Integrated Circuit Connection Bus
IRQ	Interrupt Request
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LIN	Local Interconnect Network
MCU	Micro-controller Unit
MTU	Multi-Function Timer Pulse Unit
n/a (NA)	Not applicable
n/c (NC)	Not connected
NMI	Non-maskable Interrupt
OTG	On The Go™
PC	Personal Computer
PDC	Parallel Data Capture Unit
PLL	Phase Locked Loop
Pmod™	This is a Digilent Pmod™ Compatible connector. Pmod™ is registered to Digilent Inc. Digilent-Pmod_Interface_Specification
POE	Port Output Enable
PWM	Pulse Width Modulation
RAM	Random Access Memory
ROM	Read Only Memory
RSK	Renesas Starter Kit
RTC	Realtime Clock
SAU	Serial Array Unit
SCI	Serial Communications Interface
SFR	Special Function Registers
SPI	Serial Peripheral Interface
SSI	Serial Sound Interface
TAU	Timer Array Unit
TFT	Thin Film Transistor
TPU	Timer Pulse Unit
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
WDT	Watchdog timer

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.

1.3 Board specification

Board specification was shown in **Table 1-1** below.

Item	Specification
Microcontroller	Part No : R5F51305ADFN
	Package : 80-pin LFQFP
	On-Chip Memory : ROM 128KB, RAM 16KB
On-Board Memory	I^2C EEPROM : 2Kbit
Input Clock	RX130 Main : 8MHz
	RX130 Sub : 32.768kHz
	RL78/G1C Main: 12MHz
Power Supply	DC Power Jack : 5 V Input
	Power Supply IC : 5V Input, 3.3V/1.86V Output
Debug Interface	E1 14-pin box header
Push Switch	Reset Switch x 1
	User Switch x 3
Potentiometer (for ADC)	Single-turn, 10kΩ
LED	Power indicator: green x 1
	User : green x 1, orange x 1, red x 2
LIN	Connector *1 : 2.54mm pitch, 3-pin x 1
	LIN Driver x 1
Touch Interface	Slider x1, key x2
USB to Serial Converter Interface	Connector : USB-MiniB
	Driver : RL78/G1C Microcontroller (Part No R5F10JBCANA)
Pmod™	PMOD1 : Angle type, 12-pin Connector
	PMOD2 : Straight type, 12-pin Connector
Application Board Interface *2	2.54mm pitch, 26-pin x 2 (JA1, JA2), 24-pin x 2 (JA5, JA6)

Table 1-1: Board Specification

*1: LIN connector is not fitted on this product.
*2: The Application Board Interface connectors are not fitted on this product.

2. Power Supply

2.1 Requirements

This RSK is supplied with an E1/E2 Lite 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. This board has an optional centre positive supply connector using a 2.0mm barrel power jack.

Details of the external power supply requirements for the RSK, and configuration are shown in **Table 2-1** , **Table 2-2** below. The default RSK power configuration is shown in **bold, blue text.**

Connector	Supply voltage
PWR	Input 5VDC

Table 2-1: PWR Connector Requirements

J6 Setting	R168 Setting	Supply Source	Board_5V VBAT	Board_3V3	Board_VCC UC_VCC
Pin1-2 shorted	**Don't care**	**E1(3V3) / E2 Lite(3V3) / CON_3V3**	**0V** *1	**3.3V**	**3.3V**
	DNF	**PWR Connector / CON_5V / Unregulated_VCC**	**5V**	**3.3V**	**3.3V**
	Fit	PWR Connector / CON_5V / Unregulated_VCC	5V *1	1.86V	1.86V *2,*3
Pin2-3 shorted	Don't care	PWR Connector / CON_5V / Unregulated_VCC / E1(5V)	5V	3.3V or 1.86V	5V *2
All Open	Don't care	DO NOT USE	DO NOT USE	DO NOT USE	DO NOT USE

Table 2-2: Main Power Supply Requirements

*1 : Can not use LIN interface.
*2 : Can not use Pmod™.
*3 : Can not use LED.

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' build of the example tutorial software pre-programmed into the Renesas microcontroller. Please consult the 'Renesas Starter Kit Code Generator Tutorial Manual' for further information of this example.

3. Board Layout

3.1 Component Layout

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

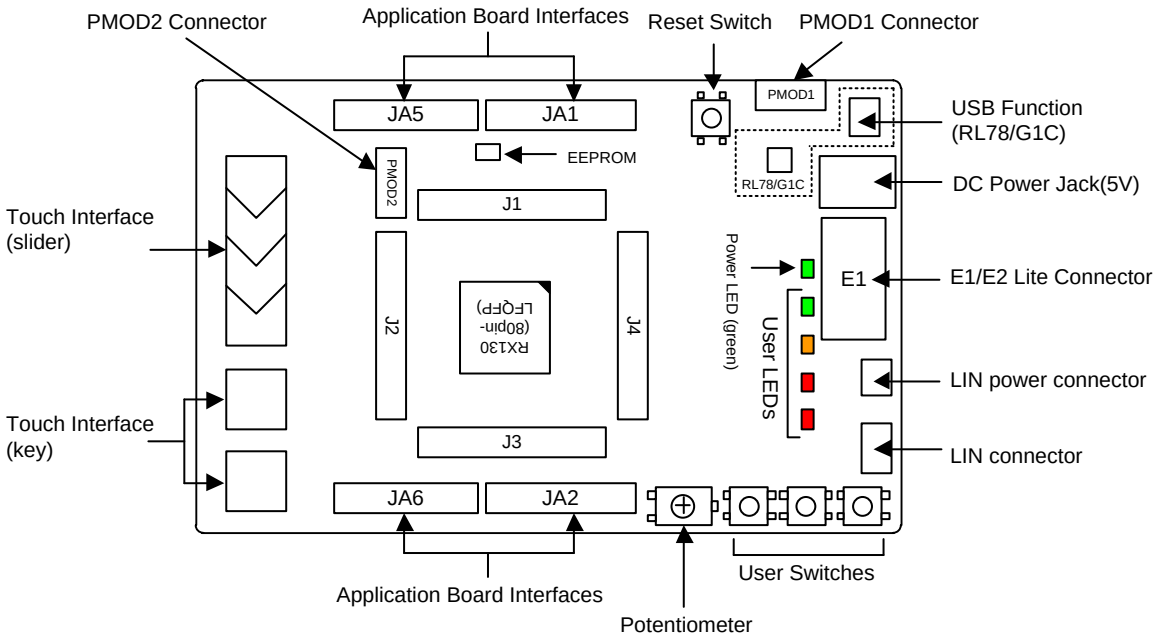

Figure 3-1: Board Layout

3.2 Board Dimensions

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

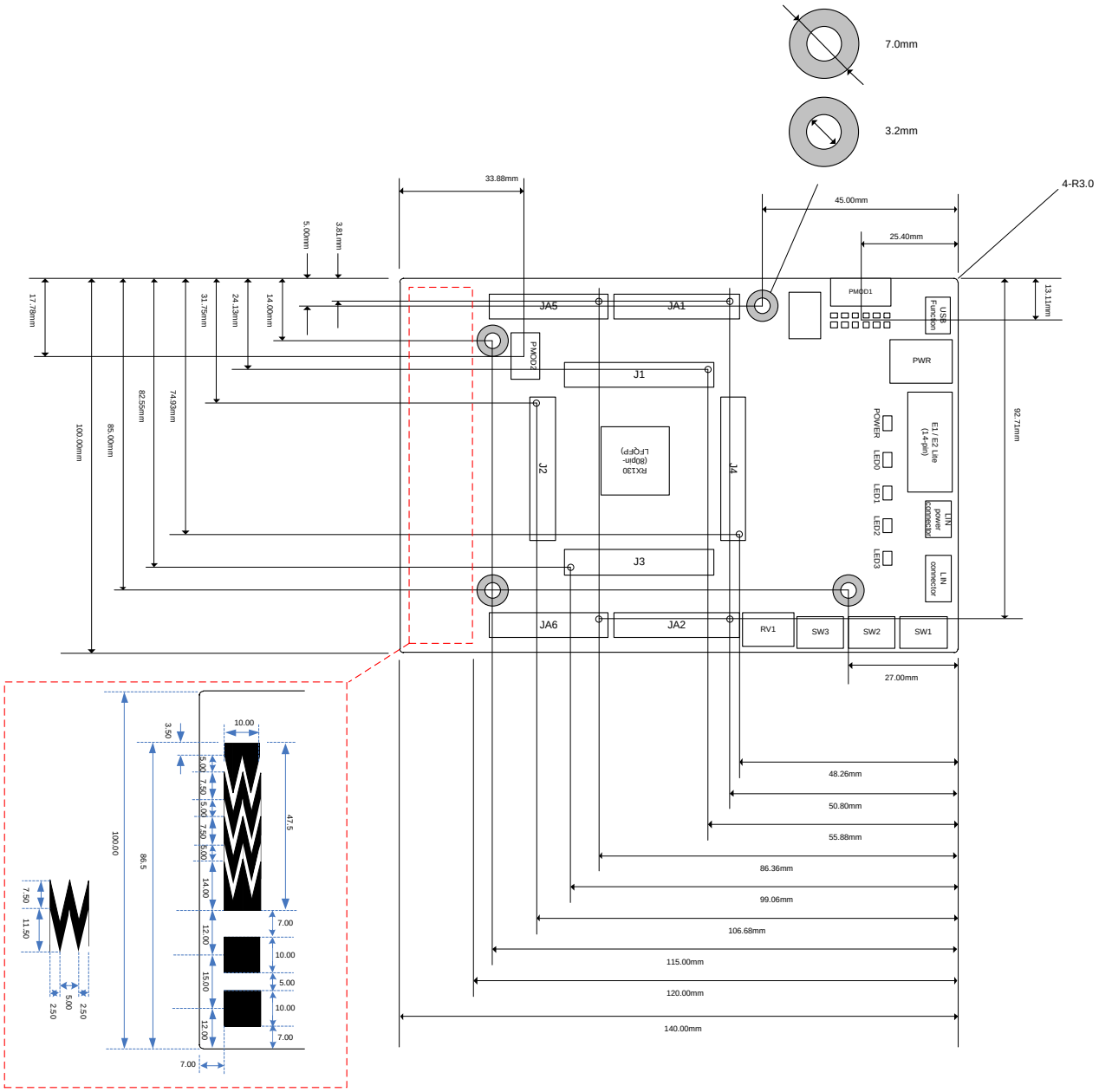

Figure 3-2: Board Dimensions

3.3 Component Placement

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

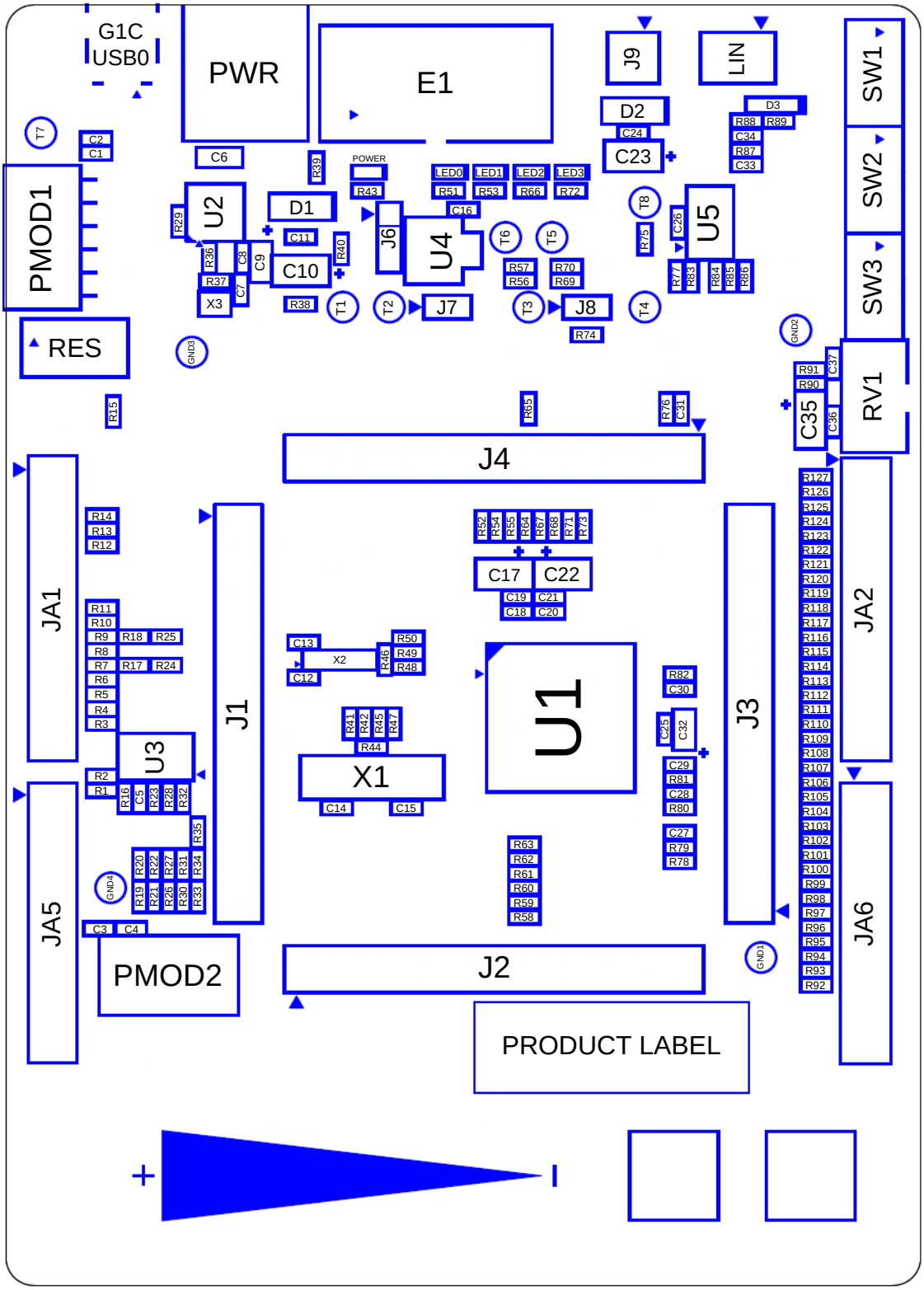

Figure 3-3 Top-Side Component Placement

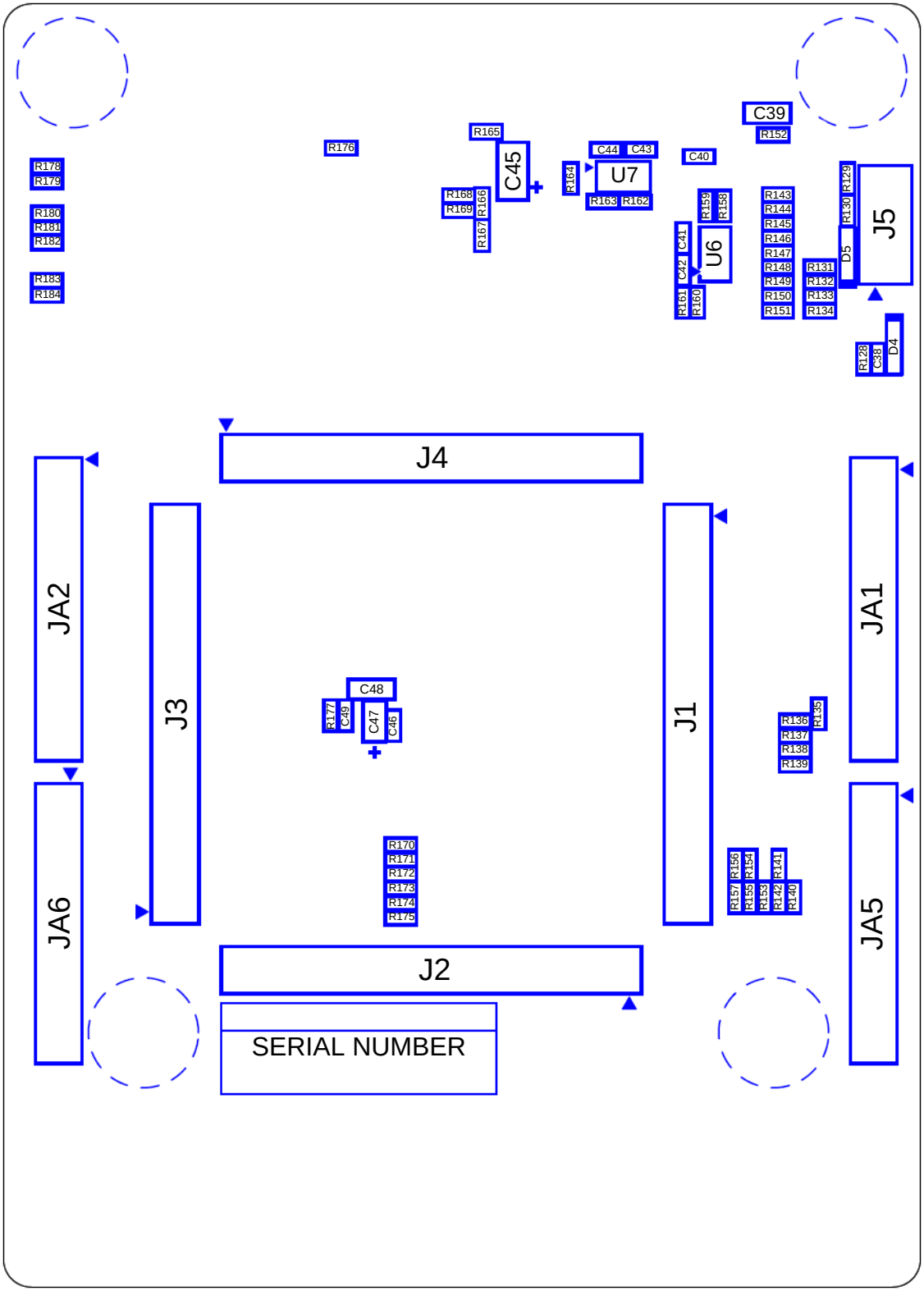

Figure 3-4 Bottom-Side Component Placement

4. Connectivity

4.1 Internal RSK Connections

Figure 4-1 below shows the RSK board components and their connectivity to the MCU.

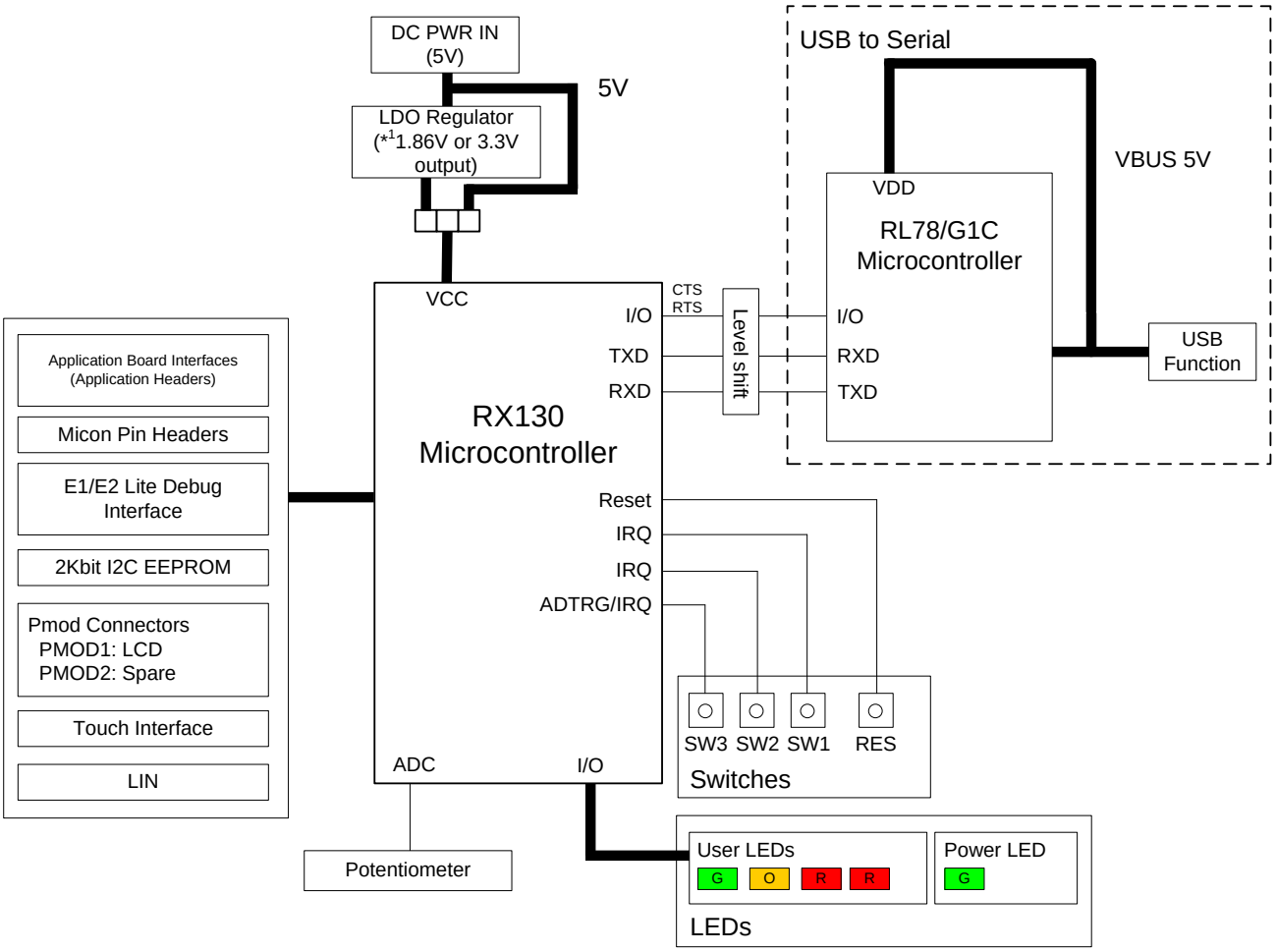

Figure 4-1: Internal RSK Block Diagram

*1 Default setting is 3.3V output - refer to §2.1 or §6.3 for the required modifications.

4.2 Debugger Connections

Figure 4-2 below shows the connections between the RSK, E1/E2 Lite debugger and the host PC.

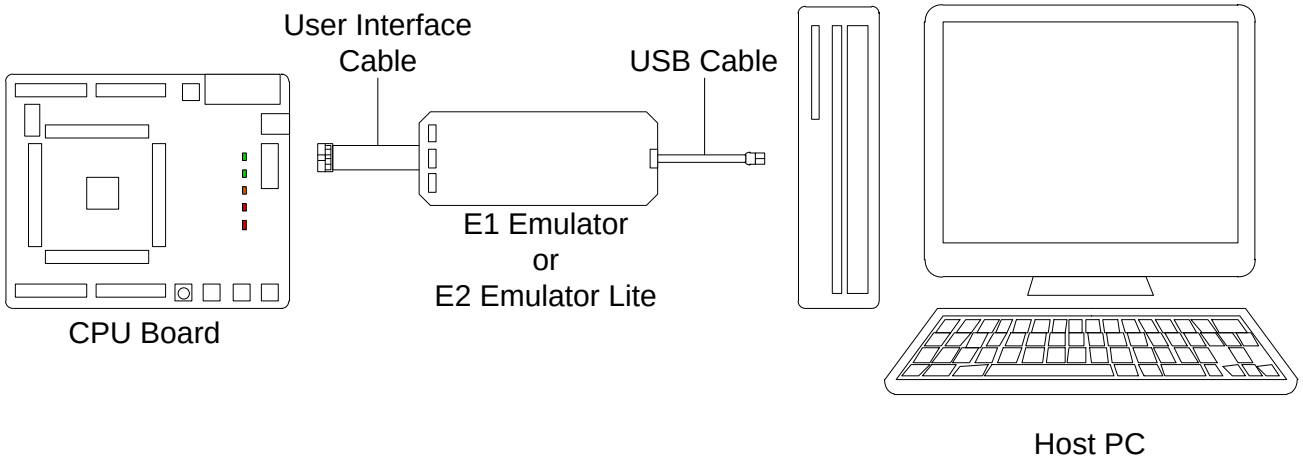

Figure 4-2: Debugger Connection Diagram

5. User Circuitry

5.1 Reset Circuit

A reset control circuit is fitted to the RSK to generate a reset signal from the RES switch. Refer to the RX130 hardware manual for details regarding the reset signal timing requirements, and the RSK schematics for information regarding the reset circuitry in use on the board.

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 RX130 Group Hardware Manual for details regarding the clock signal requirements, and the RSKRX130 board schematics for information regarding the clock circuitry in use on the RSK. Details of the oscillators fitted to the board are listed in **Table 5-1** below.

Crystal	Function	Default Placement	Frequency	Device Package
X1	RX130 Main oscillator	Fitted	8MHz	Encapsulated, SMT
X2	RX130 Sub oscillator	Fitted	32.768kHz *1	Encapsulated, SMT
X3	RL78/G1C Main oscillator	Fitted	12MHz	Encapsulated, SMT

Table 5-1: Oscillators

*1: The Sub clock oscillator drive circuit is low power to achieve excellent standby power consumption. The Crystal and associated capacitors must have a capacitance equal or less than 6pF to ensure this oscillator is accurate. The oscillator will function at higher loads, but operation to specification is not guaranteed.

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 schematics.

Switch	Function	MCU	
		Signal (Port)	Pin
RES	When pressed, the microcontroller is reset.	RES#	9
SW1	Connects to an IRQ input for user controls.	IRQ1 (P31)	17
SW2	Connects to an IRQ input for user controls.	IRQ2 (P32)	16
SW3	Connects to an IRQ input for user controls. The switch is also connected to an ADTRG input, and is used to trigger AD conversions.	ADTRG0n_IRQ6 (P16)	24

Table 5-2: Switch Connections

5.4 LEDs

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

LED	Colour	Function	MCU	
			Port	Pin
POWER	Green	Indicates the status of the Board_VCC power rail	-	-
LED0	Green	User operated LED	P21	21
LED1	Orange	User operated LED	P04	3
LED2	Red	User operated LED	P06	1
LED3	Red	User operated LED	P07	78

Table 5-3: LED Connections

5.5 Potentiometer

A single-turn potentiometer is connected as a potential divider to analog input AN000 (Port P40, Pin 75). The potentiometer can be used to create a voltage between Board_VCC and ground.
Refer to the maker site for specification of the potentiometer (PIHER with part number N6 series).

The potentiometer offers an easy method of supplying a variable analog input to the microcontroller. It does not necessarily reflect the accuracy of the controller's ADC. Refer to the RX130 Group Hardware Manual for further details.

5.6 Pmod™

The RSK board are equipped with connectors for Digilent Pmod™ interface. Please connect the PMOD1 connector that is compatible with Debug 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 Digilent Pmod™ Compatible headers uses an SPI interface. **Figure 5-1** below shows Digilent Pmod™ Compatible Header Pin Numbering. Connection information for the Digilent Pmod™ Compatible header is provided in **Table 5-4 and Table 5-5** below.

Please note that the connector numbering adheres to the Digilent Pmod™ standard and is different from all other connectors on the RSK designs. Details can be found in the Digilent Pmod™ Interface Specification Revision: November 20, 2011.

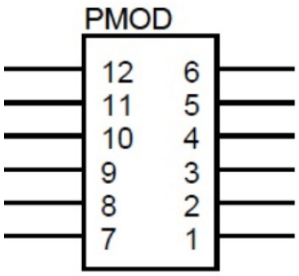

Figure 5-1: Digilent Pmod™ Compatible Header Pin Numbering

Digilent Pmod™ Compatible Header (PMOD1) Connections							
Pin	Circuit Net Name	MCU		Pin	Circuit Net Name	MCU	
		Port	Pin			Port	Pin
1	PMOD1_PIN1	PB4/PB2	44/46	7	IRQ0	PD0	66
2	TXD6	PB1	47	8	IRQ7	P17	23
3	RXD6	PB0	49	9	PC2	PC2	40
4	SCK6	PB3	45	10	PC3	PC3	39
5	GROUND	-	-	11	GROUND	-	-
6	Board_3V3	-	-	12	Board_3V3	-	-

Table 5-4: Pmod™1 Header Connections

Digilent Pmod™ Compatible Header (PMOD2) Connections							
Pin	Circuit Net Name	MCU		Pin	Circuit Net Name	MCU	
		Port	Pin			Port	Pin
1	PMOD2_PIN1	PA5/PA6	52/51	7	IRQ4	P34	15
2	P-TXD5	PA4	53	8	IRQ5	P15	25
3	P-RXD5	PA2	55	9	PE3	PE3	60
4	P-SCK5	PA1	56	10	PE4	PE4	59
5	GROUND	-	-	11	GROUND	-	-
6	Board_3V3	-	-	12	Board_3V3	-	-

Table 5-5: Pmod™2 Header Connections

5.7 USB Serial Port

A USB serial port is implemented in a Renesas low power microcontroller (RL78/G1C) and is connected to the RX130 Serial Communications Interface (SCI) module. Multiple options are provided to allow the selection of the connected SCI1 port. Connections between the USB to Serial converter and the microcontroller are listed in **Table 5-6** below.

Signal Name	Function	MCU	
		Port	Pin
TXD1	SCI1 Transmit Signal	P26	20
RXD1	SCI1 Receive Signal	P30	18
TXD5 *1	SCI5 Transmit Signal	PA4	53
RXD5 *1	SCI5 Receive Signal	PA2	55
TXD12 *1	SCI12 Transmit Signal	PE1	62
RXD12 *1	SCI12 Receive Signal	PE2	61
RS232TX *1	External SCI Transmit Signal	-	-
RS232RX *1	External SCI Receive Signal	-	-
RL78G1CCTS	Clear To Send	P15	34
RL78G1CRTS	Request to Send	PE3	60

Table 5-6: Serial Port Connections

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

When the RSK board is first connected to a PC running Windows™ with the USB/Serial connection, the PC will look for a driver. This driver is installed during the installation process, so the PC should be able to find it. The PC will report that it is installing for a driver and then report that a driver has been installed successfully, as shown in **Figure 5-2**. The exact messages may vary depending upon operating system.

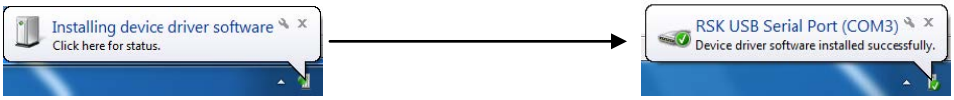

Figure 5-2: USB-Serial Windows™ Installation message

5.8 Local-Interconnect Network (LIN)

A LIN transceiver IC is fitted to the RSK, and connected to the Extended serial mode MCU peripheral. For further details regarding the supported modes of operation, please refer to the RX130 Group Hardware Manual.

Connections between the LIN connector and the microcontroller are listed in **Table 5-7** below.

Signal Name	Function	MCU	
		Port	Pin
LINTXD	LIN Transmit Signal	PE1	62
LINRXD	LIN Receive Signal	PE2	61
LINNSLP	LIN Transceiver Device Sleep Control	PC5	37

Table 5-7: LIN Connections

5.9 I²C Bus (Inter-IC Bus)

The RX130 features one I²C (Inter-IC Bus) interface modules. RIIC is connected to a 2Kbit EEPROM. Specific details of the EEPROM device and the connections can be found in the board schematics.

5.10 Touch Interface

The RSK Board is fitted with a Touch Interface (slider) and two Touch Interfaces (key). **Table 5-8** below details the connected devices, and their connections to the MCU.

Touch Interface Signal	Function	MCU	
		Port	Pin
TS7	Electrostatic capacitive measurement pin(touch slider)	PH3	29
TS8	Electrostatic capacitive measurement pin(touch slider)	PH2	30
TS9	Electrostatic capacitive measurement pin(touch slider)	PH1	31
TS10	Electrostatic capacitive measurement pin(touch slider)	PH0	32
TS11	Electrostatic capacitive measurement pin(touch key)	P55	33
TS12	Electrostatic capacitive measurement pin(touch key)	P54	34
TSCAP	LPF(Low-pass filter) connection pin	PC4	38

Table 5-8: Touch Interface 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.

A link resistor is a 0Ω surface mount resistor, which is used to connect 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 board.

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 RX130 Group Hardware Manual and RSKRX130 schematics for further information.

6.2 MCU Operating Modes

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

Reference	Configuration	Explanation	Related Ref.
J7 *1	All open	Single Chip Mode	-
	Shorted Pin1-2	Boot Mode (SCI)	-

Table 6-1: MCU Option Links

*1: By default, jumper J7 is not fitted to the RSK. Therefore, it becomes the same setting as 'J7 All open'.

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.3 Power Supply Configuration

Table 6-2 and Table 6-3 below details the function of the option links associated with power supply configuration.

Reference	Configuration	Explanation	Related Ref.
J8 *1	Shorted Pin1-2	Connects Board_VCC to UC_VCC.	R74
	All open	Enables current probe for MCU current consumption.	R74
R168	Fit	Enables 1.86V regulator output.	U4
	DNF	Enables 3.3V regulator output.	U4
J6	Shorted Pin1-2	Connects regulator output to Board_VCC.	U4
	Shorted Pin2-3	Disconnects regulator output from Board_VCC.	U4
	All open	DO NOT USE	U4

Table 6-2: Power Supply Option Links (1)

*1: By default, jumper J8 is not fitted to the RSK. R74 is fitted by default and becomes the same setting as 'J8 Shorted Pin1-2'.

Reference	Explanation	Fit	DNF	Related Ref.
PWR	Connects 5V power rail to Board_5V.	R39	-	U4, J6
	Disconnects 5V power rail from Board_5V.	-	R39	-
Unregulated_VCC	Connects Unregulated_VCC to Board_5V.	R40	-	U4, JA6.23
	Disconnects Unregulated_VCC from Board_5V.	-	R40	-
CON_5V	Connects CON_5V to Board_5V.	R38	-	U4, JA1.1
	Disconnects CON_5V from Board_5V.	-	R38	-
CON_3V3	Connects CON_3V3 to Board_3V3.	R15	-	J6, JA1.3
	Disconnects CON_3V3 from Board_3V3.	-	R15	-
Board_VCC	Connects Board_VCC to UC_VCC.	R74/J8.1-2	-	U1(VCC, AVCC0, VREFH0)
	Disconnects Board_VCC from UC_VCC. Enables current probe for MCU current consumption.	J8.Open	R74	U1(VCC, AVCC0, VREFH0)
Borad_5V	Connects Board_5V to VBAT.	R75	-	U5
	Disconnects Board_5V from VBAT.	-	R75	U5, J9

Table 6-3: Power Supply Option Links (2)

6.4 Clock Configuration

Table 6-4 below details the function of the option links associated with clock configuration.

Reference	Explanation	Fit	DNF	Related Ref.
XTAL, EXTAL, CON_EXTAL	Connects 8MHz crystal (X1) to RX130.	R42, R45	R41, R47	U1(EXTAL, XTAL)
	Connects CON_EXTAL to RX130.	R47	R42, R45	U1(EXTAL), JA2.2
XCIN, XCOUT	Connects 32.768kHz crystal (X2) to RX130.	R49, R48	-	U1(XCIN, XCOUT)
	Disconnects 32.768kHz crystal (X2) from RX130.	-	R49, R48	U1(XCIN, XCOUT)

Table 6-4: Clock Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.5 Analog Power & ADC & DAC Configuration

Table 6-5 below details the function of the option links associated with Analog Power & ADC & DAC configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
DA0	2	P03	DA0	-	-	JA1.13	-	-
DA1	80	P05	DA1	-	-	JA1.14	-	-
ADTRG0n_IRQ6	24	P16	ADTRG0n_IRQ6	-	-	SW3	R184	-
						JA1.8	-	-
AN000	75	P40	AN000	-	-	RV1	R65	-
						JA1.9	-	-
AN001	73	P41	AN001	-	-	JA1.10	-	-
AN002	72	P42	AN002	-	-	JA1.11	-	-
AN003	71	P43	AN003	-	-	JA1.12	-	-
AN004	70	P44	AN004	-	-	JA5.1	-	-
AN005	69	P45	AN005	-	-	JA5.2	-	-
AN006	68	P46	AN006	-	-	JA5.3	-	-
AN007	67	P47	AN007	-	-	JA5.4	-	-
VREFH0	76	PJ6	UC_VCC	R67	R68	-	-	-
			CON_VREFH0	R68	R67	JA1.7	-	-
VREFL0	74	PJ7	GROUND	R73	R71	-	-	-
			CON_VREFL0	R71	R73	JA1.6	R14	R13
AVCC0	77	-	UC_VCC	R64	R55, R90	-	-	-
			CON_AVCC0	R55	R64, R90	JA1.5	-	-
			Board_VCC	R90, R91	R55, R64	-	-	-
AVSS0	79	-	GROUND	R52	R54	-	-	-
			CON_AVSS0	R54	R52	JA1.6	R13	R14

Table 6-5: Analog Power & ADC & DAC Option Links

6.6 E1 / E2 Lite Debugger Configuration

Table 6-6 below details the function of the option links associated with E1 / E2 Lite Debugger configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
A-TXD1_E-TXD1	20	P26	E-TXD1	R57	R125	E1.5	-	-
			A-TXD1	R125	R57	U7.3	R126	R104, R101, R98
						JA2.6	-	-
A-RXD1_E-RXD1	18	P30	E-RXD1	R70	R122	E1.11	-	-
			A-RXD1	R122	R70	U6.3	R123	R105, R103, R96
						JA2.8	-	-

Table 6-6: E1 / E2 Lite Debugger Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.7 General I/O & LED Configuration

Table 6-7 below details the function of the option links associated with the General I/O & LED configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
IO0_MTIOC4A	57	PA0	IO0	R10	R116	JA1.15	-	-
			MTIOC4A	R116	R10	JA2.15	-	-
IO1_MTIOC0D	54	PA3	IO1	R11	R113	JA1.16	-	-
			MTIOC0D	R113	R11	JA2.21	-	-
IO2_TXD6	47	PB1	IO2	R8	R149	JA1.17	-	-
			TXD6	R149	R8	PMOD1.2	-	-
IO3_CTS6RTS6	46	PB2	IO3	R9	R18	JA1.18	-	-
			CTS6RTS6	R18	R9	PMOD1.1	R25	R24
IO4_SCK6	45	PB3	IO4	R81, R6	R5	JA1.19	-	-
			SCK6	R81, R5	R6	PMOD1.4	-	-
IO5_PB4	44	PB4	IO5	R7	R17	JA1.20	-	-
			PB4	R17	R7	PMOD1.1	R24	R25
IO6_POE1n	43	PB5	IO6	R4, R80	R109	JA1.21	-	-
			POE1n	R109, R80	R4	JA2.24	-	-
IO7	35	PC7	IO7	-	-	JA1.22	-	-
LED0	21	P21	LED0	-	-	LED0	R176	-
LED1	3	P04	LED1	-	-	LED1	R176	-
LED2	1	P06	LED2	-	-	LED2	R176	-
LED3	78	P07	LED3	-	-	LED3	R176	-

Table 6-7: General I/O & LED Option Links

6.8 I²C & EEPROM Configuration

Table 6-8 below details the function of the option links associated with I²C & EEPROM configuration.

Signal name /Reference	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
SCL	28	P12	SCL	-	-	U3.6	-	-
						JA1.26	-	-
SDA_MTIOC0B_IRQ3	27	P13	SDA	R135	R121	U3.5	-	-
						JA1.25	-	-
			MTIOC0B_IRQ3	R121	R135	JA2.9	-	-
Board_5V (Pull-up)	-	-	-	-	-	SDA, SCL, U3	R23	R16
Board_3V3 (Pull-up)	-	-	-	-	-	SDA, SCL, U3	R16	R23
Write Protect enable	-	-	-	-	-	U3.7	R1	-
Write Protect disable	-	-	-	-	-	U3.7	-	R1
Device Address = 0xA6	-	-	-	-	-	U3.1	R28	R32
Device Address = 0xA4	-	-	-	-	-	U3.1	R32	R28

Table 6-8: I²C & EEPROM Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.9 IRQ & Switch Configuration

Table 6-9 below details the function of the option links associated with the IRQ & Switches configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
IRQ7	23	P17	IRQ7	-	-	PMOD1.8	-	-
ADTRG0n_IRQ6	24	P16	ADTRG0n_IRQ6	-	-	SW3	R184	-
						JA1.6	-	-
MTCLKB_IRQ5	25	P15	MTCLKB	R106	R154	JA2.26	-	-
			IRQ5	R154	R106	PMOD2.8	-	-
MTIOC0A_IRQ4_RL78G1CCTS	15	P34	MTIOC0A_IRQ4	R124	R156, R160	JA2.7	-	-
			RL78G1CCTS	R160	R124, R156	U6.2	-	-
			IRQ4	R156	R124, R160	PMOD2.7	-	-
SDA_MTIOC0B_IRQ3	27	P13	SDA	R135	R121	U3.5	-	-
						JA1.25	-	-
			MTIOC0B_IRQ3	R121	R135	JA2.9	-	-
MTIOC0C_IRQ2	16	P32	MTIOC0C_IRQ2	-	-	SW2	R181	-
						JA2.23	R110	R111
IRQ1	17	P31	IRQ1	-	-	SW1	R179	-
						JA1.23	-	-
IRQ0	66	PD0	IRQ0	-	-	PMOD1.7	-	-
NMI	14	P35	NMI	-	-	JA2.3	-	-

Table 6-9: IRQ & Switch Option Links

6.10 LIN Configuration

Table 6-10 below details the function of the option links associated with the LIN configuration.

Signal name /Reference	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
LINTXD_A-TXD12	62	PE1	A-TXD12	R99	R85	JA6.9	-	-
						U7.3	R98	R104, R126, R101
			LINTXD	R85	R99	U5.4	-	-
LINRXD_A-RXD12	61	PE2	A-RXD12	R95	R83	JA6.12	-	-
						U6.3	R96	R105, R123, R103
			LINRXD	R83	R95	U5.1	-	-
LINNSLP	37	PC5	LINNSLP	-	-	U5.2	-	-
LIN Operating Mode	-	-	-	-	-	Master mode	R87, R88	-
						Slave mode	-	R87, R88

Table 6-10: LIN Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.11 MTU & POE Configuration

Table 6-11 below details the function of the option links associated with MTU & POE configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
MTIOC0A_IRQ4_RL78G1CCTS	15	P34	MTIOC0A_IRQ4	R124	R156, R160	JA2.7	-	-
			RL78G1CCTS	R160	R124, R156	U6.2	-	-
			IRQ4	R156	R124, R160	PMOD2.7	-	-
SDA_MTIOC0B_IRQ3	27	P13	SDA	R135	R121	U3.5	-	-
						JA1.25	-	-
			MTIOC0B_IRQ3	R121	R135	JA2.9	-	-
MTIOC0C_IRQ2	16	P32	MTIOC0C_IRQ2	-	-	SW2	R181	-
						JA2.23	R110	R111
IO1_MTIOC0D	54	PA3	IO1	R11	R113	JA1.16	-	-
			MTIOC0D	R113	R11	JA2.21	-	-
MTIOC1A	22	P20	MTIOC1A	-	-	JA2.22	R112	R111
						JA2.23	R111	R110, R112
MTIOC3A	5	PJ1	MTIOC3A	-	-	JA6.13	-	-
MTIOC3B	41	PB7	MTIOC3B	-	-	JA2.13	R118	R115
						JA2.19	R115	R118
MTIOC3C	36	PC6	MTIOC3C	-	-	JA2.11	-	-
MTIOC3D	42	PB6	MTIOC3D	-	-	JA2.14	R117	R114
						JA2.20	R114	R117
IO0_MTIOC4A	57	PA0	IO0	R10	R116	JA1.15	-	-
			MTIOC4A	R116	R10	JA2.15	-	-
MTIOC4B	65	PD1	MTIOC4B	-	-	JA2.17	-	-
MTIOC4C	58	PE5	MTIOC4C	-	-	JA2.16	-	-
MTIOC4D	64	PD2	MTIOC4D	-	-	JA2.18	-	-
MTIC5U_A-TXD5_P-TXD5	53	PA4	MITC5U	R94	R100, R27	JA6.14	-	-
			A-TXD5	R100	R94, R27	JA6.8	-	-
						U7.3	R101	R104, R126, R98
			P-TXD5	R27	R100, R94	PMOD2.2	-	-
MTIC5V_CTS5RTS5	51	PA6	MTIC5V	R93	R35	JA6.15	-	-
			CTS5RTS5	R35	R93	PMOD2.1	R34	R31
RXD6_MTIC5W	49	PB0	MTIC5W	R92	R146	JA6.16	-	-
			RXD6	R146	R92	PMOD1.3	-	-
IO6_POE1n	43	PB5	IO6	R4, R80	R109	JA1.21	-	-
			POE1n	R109, R80	R4	JA2.24	-	-
MTCLKA_CTS1RTS1	26	P14	MTCLKA	R107	R119	JA2.25	-	-
			CTS1RTS1	R119	R107	JA2.12	-	-
MTCLKB_IRQ5	25	P15	MTCLKB	R106	R154	JA2.26	-	-
			IRQ5	R154	R106	PMOD2.8	-	-

Table 6-11: MTU & POE Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.12 PMOD1 Interface Configuration

Table 6-12 below details the function of the option links associated with PMOD1 Interface configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
IO3_CTS6RTS6	46	PB2	IO3	R9	R18	JA1.18	-	-
			CTS6RTS6	R18	R9	PMOD1.1	R25	R24
IO2_TXD6	47	PB1	IO2	R8	R149	JA1.17	-	-
			TXD6	R149	R8	PMOD1.2	-	-
RXD6_MTIC5W	49	PB0	MTIC5W	R92	R146	JA6.16	-	-
			RXD6	R146	R92	PMOD1.3	-	-
IO4_SCK6	45	PB3	IO4	R81, R6	R5	JA1.19	-	-
			SCK6	R81, R5	R6	PMOD1.4	-	-
IRQ0	66	PD0	IRQ0	-	-	PMOD1.7	-	-
IRQ7	23	P17	IRQ7	-	-	PMOD1.8	-	-
PC2	40	PC2	PC2	-	-	PMOD1.9	-	-
PC3	39	PC3	PC3	-	-	PMOD1.10	-	-
IO5_PB4	44	PB4	IO5	R7	R17	JA1.20	-	-
			PB4	R17	R7	PMOD1.1	R24	R25

Table 6-12: PMOD1 Interface Option Links

6.13 PMOD2 Interface Configuration

Table 6-13 below details the function of the option links associated with PMOD2 Interface configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Fit	DNF	Interface /Function	Fit	DNF	Fit
MTIC5V_CTS5RTS5	51	PA6	MTIC5V	R93	R35	JA6.15	-	-
			CTS5RTS5	R35	R93	PMOD2.1	R34	R31
MTIC5U_A-TXD5_P-TXD5	53	PA4	MITC5U	R94	R100, R27	JA6.14	-	-
			A-TXD5	R100	R94, R27	JA6.8	-	-
						U7.3	R101	R104, R126, R98
			P-TXD5	R27	R100, R94	PMOD2.2	-	-
A-RXD5_P-RXD5	55	PA2	P-RXD5	R22	R102	PMOD2.3	-	-
			A-RXD5	R102	R22	JA6.7	-	-
						U6.3	R103	R105, R123, R96
A-SCK5_P-SCK5	56	PA1	P-SCK5	R82, R20	R97	PMOD2.4	-	-
			A-SCK5	R82, R97	R20	JA6.10	-	-
MTIOC0A_IRQ4_RL78G1CCTS	15	P34	MTIOC0A_IRQ4	R124	R156, R160	JA2.7	-	-
			RL78G1CCTS	R160	R124, R156	U6.2	-	-
			IRQ4	R156	R124, R160	PMOD2.7	-	-
MTCLKB_IRQ5	25	P15	MTCLKB	R106	R154	JA2.26	-	-
			IRQ5	R154	R106	PMOD2.8	-	-
PE3_RL78G1CRTS	60	PE3	PE3	R141	R162	PMOD2.9	-	-
			RL78G1CRTS	R162	R141	U7.2	-	-
PE4	59	PE4	PE4	-	-	PMOD2.10	-	-
PA5	52	PA5	PA5	-	-	PMOD2.1	R31	R34

Table 6-13: PMOD2 Interface Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.14 Serial & USB to Serial Configuration

Table 6-14 below details the function of the option links associated with Serial & USB to Serial configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
MTIOC0A_IRQ4_RL78G1CCTS	15	P34	MTIOC0A_IRQ4	R124	R156, R160	JA2.7	-	-
			RL78G1CCTS	R160	R124, R156	U6.2	-	-
			IRQ4	R156	R124, R160	PMOD2.7	-	-
PE3_RL78G1CRTS	60	PE3	PE3	R141	R162	PMOD2.9	-	-
			RL78G1CRTS	R162	R141	U7.2	-	-
A-TXD1_E-TXD1	20	P26	E-TXD1	R57	R125	E1.5	-	-
			A-TXD1	R125	R57	U7.3	R126	R104, R101, R98
						JA2.6	-	-
A-RXD1_E-RXD1	18	P30	E-RXD1	R70	R122	E1.11	-	-
			A-RXD1	R122	R70	U6.3	R123	R105, R103, R96
						JA2.8	-	-
A-SCK1	19	P27	A-SCK1	R177	-	JA2.10	-	-
MTCLKA_CTS1RTS1	26	P14	MTCLKA	R107	R119	JA2.25	-	-
			CTS1RTS1	R119	R107	JA2.12	-	-
MTIC5U_A-TXD5_P-TXD5	53	PA4	MITC5U	R94	R100, R27	JA6.14	-	-
			A-TXD5	R100	R94, R27	JA6.8	-	-
						U7.3	R101	R104, R126, R98
			P-TXD5	R27	R100, R94	PMOD2.2	-	-
A-RXD5_P-RXD5	55	PA2	P-RXD5	R22	R102	PMOD2.3	-	-
			A-RXD5	R102	R22	JA6.7	-	-
						U6.3	R103	R105, R123, R96
A-SCK5_P-SCK5	56	PA1	P-SCK5	R82, R20	R97	PMOD2.4	-	-
			A-SCK5	R82, R97	R20	JA6.10	-	-
MTIC5V_CTS5RTS5	51	PA6	MTIC5V	R93	R35	JA6.15	-	-
			CTS5RTS5	R35	R93	PMOD2.1	R34	R31
IO2_TXD6	47	PB1	IO2	R8	R149	JA1.17	-	-
			TXD6	R149	R8	PMOD1.2	-	-
RXD6_MTIC5W	49	PB0	MTIC5W	R92	R146	JA6.16	-	-
			RXD6	R146	R92	PMOD1.3	-	-
IO4_SCK6	45	PB3	IO4	R81, R6	R5	JA1.19	-	-
			SCK6	R81, R5	R6	PMOD1.4	-	-
IO3_CTS6RTS6	46	PB2	IO3	R9	R18	JA1.18	-	-
			CTS6RTS6	R18	R9	PMOD1.1	R25	R24
LINTXD_A-TXD12	62	PE1	A-TXD12	R99	R85	JA6.9	-	-
						U7.3	R98	R104, R126, R101
			LINTXD	R85	R99	U5.4	-	-
LINRXD_A-RXD12	61	PE2	A-RXD12	R95	R83	JA6.12	-	-
						U6.3	R96	R105, R123, R103
			LINRXD	R83	R95	U5.1	-	-
A-SCK12	63	PE3	A-SCK12	R76	R141	JA6.11	-	-
RS232TX(JA6.5)	-	-	-	-	-	U7.3	R104	R98, R101, R126
RS232RX(JA6.6)	-	-	-	-	-	U6.3	R105	R96, R103, R123

Table 6-14: Serial & USB to Serial Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

6.15 Touch Interface Configuration

Table 6-15 below details the function of the option links associated with Touch Interface configuration.

Signal name	MCU		MCU Peripheral Selection			Destination Selection		
	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
TSCAP	38	PC4	TSCAP	R79	R78	C27	-	-
TSCAP_CON			TSCAP_CON	R78	R79	-	-	-
TS7	29	PH3	TS7	R170	R63	touch slider	-	-
TS7_CON			TS7_CON	R63	R170	-	-	-
TS8	30	PH2	TS8	R171	R62	touch slider	-	-
TS8_CON			TS8_CON	R62	R171	-	-	-
TS9	31	PH1	TS9	R172	R61	touch slider	-	-
TS9_CON			TS9_CON	R61	R172	-	-	-
TS10	32	PH0	TS10	R173	R60	touch slider	-	-
TS10_CON			TS10_CON	R60	R173	-	-	-
TS11	33	P55	TS11	R174	R59	touch key	-	-
TS11_CON			TS11_CON	R59	R174	-	-	-
TS12	34	P54	TS12	R175	R58	touch key	-	-
TS12_CON			TS12_CON	R58	R175	-	-	-

Table 6-15: Touch Interface Option Links

Items shown in **bold** are the Fit / Do Not Fit (DNF) default configuration that the RSK is supplied with.

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	**Header Name** **Circuit Net Name**	**MCU Pin**	**Pin**	**Header Name** **Circuit Net Name**	**MCU Pin**
1	5V CON_5V	-	2	0V GROUND	-
3	3V3 CON_3V3	-	4	0V GROUND	-
5	AVCC CON_AVCC0	77	6	AVSS CON_AVSS0/ CON_VREFL0	79/74
7	AVREF CON_VREFH0	76	8	ADTRG ADTRG0n_IRQ6	24
9	ADC0 AN000	75	10	ADC1 AN001	73
11	ADC2 AN002	72	12	ADC3 AN003	71
13	DAC0 DA0	2	14	DAC1 DA1	80
15	IO_0 IO0	57	16	IO_1 IO1	54
17	IO_2 IO2	47	18	IO_3 IO3	46
19	IO_4 IO4	45	20	IO_5 IO5	44
21	IO_6 IO6	43	22	IO_7 IO7	35
23	IRQ3/IRQAEC/M2_HSIN0 IRQ1	17/NC/NC	24	IIC_EX NC	NC
25	IIC_SDA JA1_SDA (SDA)	27	26	IIC_SCL JA1_SCL (SCL)	28

Table 7-1: Application Header JA1 Connections

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

Application Header JA2					
Pin	**Header Name** **Circuit Net Name**	**MCU Pin**	**Pin**	**Header Name** **Circuit Net Name**	**MCU Pin**
1	RESET RESn	9	2	EXTAL CON_EXTAL	12
3	NMI NMI	14	4	Vss1 GROUND	-
5	WDT_OVF NC	NC	6	SCIaTX A-TXD1	20
7	IRQ/WKUP/M_HSIN MTIOC0A_IRQ4	15/NC/15	8	SCIaRX A-RXD1	18
9	IRQ1/M1_HSIN1 MTIOC0B_IRQ3	27/27	10	SCIaCK A-SCK1	19
11	M1_UD MTIOC3C	36	12	CTSRTS CTS1RTS1	26
13	M1_UP MTIOC3B	41	14	M1_UN MTIOC3D	42
15	M1_VP MTIOC4A	57	16	M1_VN MTIOC4C	58
17	M1_WP MTIOC4B	65	18	M1_WN MTIOC4D	64
19	TimerOut MTIOC3B	41	20	TimerOut MTIOC3D	42
21	TimerIn MTIOC0D	54	22	TimerIn MTIOC1A	22
23	IRQ2/M1_EncZ/M1_HSIN2 MTIOC0C_IRQ2/MTIOC1A	16/22/16	24	M1_POE POE1n	43
25	M1_TRxCLK MTCLKA	26	26	M1_TRDCLK MTCLKB	25

Table 7-2: Application Header JA2 Connections

Table 7-3 below lists the connections of the application header, JA5.

Application Header JA5					
Pin	**Header Name** **Circuit Net Name**	**MCU Pin**	**Pin**	**Header Name** **Circuit Net Name**	**MCU Pin**
1	ADC4 AN004	70	2	ADC5 AN005	69
3	ADC6 AN006	68	4	ADC7 AN007	67
5	CAN1TX NC	NC	6	CAN1RX NC	NC
7	CAN2TX NC	NC	8	CAN2RX NC	NC
9	IRQ4/M2_EncZ/M2_HSIN1 NC	NC/NC/NC	10	IRQ5/M2_HSIN2 NC	NC/NC
11	M2_UD NC	NC	12	M2_Uin NC	NC
13	M2_Vin NC	NC	14	M2_Win NC	NC
15	M2_Toggle NC	NC	16	M2_POE NC	NC
17	M2_TRCCLK NC	NC	18	M2_TRDCLK NC	NC
19	M2_UP NC	NC	20	M2_UN NC	NC
21	M2_VP NC	NC	22	M2_VN NC	NC
23	M2_WP NC	NC	24	M2_WN NC	NC

Table 7-3: Application Header JA5 Connections

Table 7-4 below lists the connections of the application header, JA6.

Application Header JA6					
Pin	**Header Name** / **Circuit Net Name**	**MCU Pin**	**Pin**	**Header Name** / **Circuit Net Name**	**MCU Pin**
1	DREQ / NC	NC	2	DACK / NC	NC
3	TEND / NC	NC	4	STBYn / NC	NC
5	RS232TX / RS232TX	NC	6	RS232RX / RS232RX	NC
7	SCIbRX / A-RXD5	55	8	SCIbTX / A-TXD5	53
9	SCIcTX / A-TXD12	62	10	SCIbCK / A-SCK5	56
11	SCIcCK / A-SCK12	63	12	SCIcRX / A-RXD12	61
13	M1_Toggle / MTIOC3A	5	14	M1_Uin / MTIC5U	53
15	M1_Vin / MTIC5V	51	16	M1_Win / MTIC5W	49
17	Reserved / NC	NC	18	Reserved / NC	NC
19	Reserved / NC	NC	20	Reserved / NC	NC
21	Reserved / NC	NC	22	Reserved / NC	NC
23	Unregulated_VCC / Unregulated_VCC	-	24	Vss / GROUND	-

Table 7-4: Application Header JA6 Connections

7.2 Microcontroller Pin Headers

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

Table 7-5 below lists the connections of the microcontroller pin header, J1.

Microcontroller Pin Header J1					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	LED2	1	2	DA0	2
3	LED1	3	4	NC	NC
5	MTIOC3A	5	6	MD_FINED	6
7	NC	NC	8	NC	NC
9	RESn	9	10	CON_XTAL	10
11	GROUND	-	12	CON_EXTAL	12
13	UC_VCC	-	14	NMI	14
15	MTIOC0A_IRQ4_RL78G1CCTS	15	16	MTIOC0C_IRQ2	16
17	IRQ1	17	18	A-RXD1_E-RXD1	18
19	A-SCK1	19	20	A-TXD1_E-TXD1	20
21	NC	NC	22	NC	NC
23	NC	NC	24	NC	NC
25	NC	NC	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 7-5: Microcontroller Pin Header, J1

Table 7-6 below lists the connections of the microcontroller pin header, J2.

Microcontroller Pin Header J2					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	LED0	21	2	MTIOC1A	22
3	IRQ7	23	4	ADTRG0n_IRQ6	24
5	MTCLKB_IRQ5	25	6	MTCLKA_CTS1RTS1	26
7	SDA_MTIOC0B_IRQ3	27	8	SCL	28
9	TS7_CON	29	10	TS8_CON	30
11	TS9_CON	31	12	TS10_CON	32
13	TS11_CON	33	14	TS12_CON	34
15	IO7	35	16	MTIOC3C	36
17	LINNSLP	37	18	TSCAP_CON	38
19	PC3	39	20	PC2	40
21	NC	NC	22	NC	NC
23	NC	NC	24	NC	NC
25	NC	NC	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 7-6: Microcontroller Pin Header, J2

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

Microcontroller Pin Header J3					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	MTIOC3B	41	2	MTIOC3D	42
3	IO6_POE1n	43	4	IO5_PB4	44
5	IO4_SCK6	45	6	IO3_CTS6RTS6	46
7	IO2_TXD6	47	8	UC_VCC	-
9	RXD6_MTIC5W	49	10	GROUND	-
11	MTIC5V_CTS5RTS5	51	12	PA5	52
13	MTIC5U_A-TXD5_P-TXD5	53	14	IO1_MTIOC0D	54
15	A-RXD5_P-RXD5	55	16	A-SCK5_P-SCK5	56
17	IO0_MTIOC4A	57	18	MTIOC4C	58
19	PE4	59	20	PE3_RL78G1CRTS	60
21	NC	NC	22	NC	NC
23	NC	NC	24	NC	NC
25	NC	NC	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 7-7: Microcontroller Pin Header, J3

Table 7-8 below lists the connections of the microcontroller pin header, J4.

Microcontroller Pin Header J4					
Pin	**Circuit Net Name**	**MCU Pin**	**Pin**	**Circuit Net Name**	**MCU Pin**
1	LINRXD_A-RXD12	61	2	LINTXD_A-TXD12	62
3	A-SCK12	63	4	MTIOC4D	64
5	MTIOC4B	65	6	IRQ0	66
7	AN007	67	8	AN006	68
9	AN005	69	10	AN004	70
11	AN003	71	12	AN002	72
13	AN001	73	14	CON_VREFL0	74
15	AN000	75	16	CON_VREFH0	76
17	CON_AVCC0	77	18	LED3	78
19	CON_AVSS0	79	20	DA1	80
21	NC	NC	22	NC	NC
23	NC	NC	24	NC	NC
25	NC	NC	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 7-8: Microcontroller Pin Header, J4

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/E2 Lite debugger. An E1/E2 Lite debugger is supplied with this RSK product.

For further information regarding the debugging capabilities of the E1/E20/E2 Lite debuggers, refer to E1/E20 Emulator, E2 Emulator Lite 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 and Boot modes (SCI), which are configured on the RSK board. Details of the modifications required can be found in §6.2. All other MCU operating modes are configured within the MCU's registers, which are listed in the RX130 Group Hardware Manual.

Only 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 or E2 Emulator Lite (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) or E2 Emulator Lite User's Manual (R20UT3240EJ).

8.5 Address Space

For the MCU address space details, refer to the 'Address Space' section of RX130 Group Hardware Manual.

9. Additional Information

Technical Support
For information about the RX130 Group microcontrollers refer to the RX130 Group Hardware Manual.

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

Technical Contact Details

***Please refer to the contact details listed in section 9 of the* "Quick Start Guide"**

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

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