



# RX23T Group

## Renesas Starter Kit User's Manual

RENESAS MCU RX Family / RX200 Series

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corporation without notice. Please review the latest information published by Renesas Electronics Corporation through various means, including the Renesas Electronics Corporation website (http://www.renesas.com).

Renesas Electronics www.renesas.com

Rev. 1.00 Aug 2015

#### Notice

- 1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
- 2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
- 3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
- 4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
- 5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anticrime systems; and safety equipment etc.

Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.

- 6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
- 7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
- 8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
- 9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
- 10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
- 11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
- 12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.



## CAUTION

With reference to Directive 2014/30/EU Article 2, clause 2 (e) this is a custom built evaluation kit destined for professionals to be used solely at research and development facilities for such purposes. This equipment can cause radio frequency noise when used. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

## 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.

EEDT-ST-004-10

## For customers in the European Union only



The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the European Union only. This equipment (including all accessories) is not intended for household use. After use the equipment cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner. Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at http://www.renesas.eu/weee

## ● 有毒有害物質又は元素の含有表

Table of Toxic and Hazardous Substance and Elements

				有毒有	害物質又は元素		
Part Name	Toxic and Hazardous Substance and Elements						
	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)	
童体							
Case	0	0	0	0	0	0	
ボード Board	x	о	0	0	0	0	
ケーブル Cable	x	0	0	0	0	0	
ソケット Socket	x	0	0	0	0	0	
ACアダプタ AC-Adapter	x	0	0	0	0	0	
column, which for this part is b X: 少なくとも当該 求を上回ること If certain toxic indicates that t for this part i	indicates pelow the 部材のあ を表し? and haz his toxic is above マーク pplied to	s that this t e limit requi うる均質材料 ます。 ardous sub and hazar the limit re 中央の数字 c EIPs sold se period.	oxic and hazard rement in SJ/T 中における当計 ostance or elem dous substance quirement in S には環境保護使用 in People's Re The years for th	dous substance 11363-2006. 该有毒有害な物質 eent is contained or element cor J/T11363-2006. 用期限の年数です epublic of China is product is app	or element contained in a 重の含有量が SJ/T11363 in this part, then "X" for itained in at least one of このマークは、中華人民 た。なお、本製品の年数 , and the number in the blicable when the product	ark "O" for the corresponding all of the homogeneous materials -2006 基準に規定する限度量の要 the corresponding column, which the homogeneous materials used 共和国で販売される電子情報製品 は、通常に使用された場合の年数 center indicates the years of the is used normally. いものがございますのでご了承下	
environment-fri 注)この表には電子 tice) All of the atta	- 情報製品 iched iter	ms relating	to 'Electronic Ir		ucts' are listed in this table items because it depends		

製品或いは梱包箱に表記された銘板ラベル等から製造年をご確認頂けます。

Please confirm the produced year from nameplate label etc on product body or outer box.

**Ex) 2007**年の場合 Produced 2007

## ● 有毒有害物质或元素 有情况表

#### Table of Toxic and Hazardous Substance and Elements

Part Name         Toxic and Hazardous Substance and Elements           日         東         第         次价格         多溴氏菜         多溴二苯醛           日         東         第         第         次价格         Polybrominated         Polybrominated diphenyl ethers           小売         Case         O         O         O         O         O         O           内売         O         O         O         O         O         O         O         O           内売         Case         O         O         O         O         O         O         O           国路板         X         O         O         O         O         O         O         O           経线         X         O         O         O         O         O         O         O           Socket         X         O         O         O         O         O         O         O           Case         X         O         O         O         O         O         O         O         O           Socket         X         O         O         O         O         O         O         O         O           Stackapter <th>部件名称</th> <th colspan="7">有毒有害物质或元素</th>	部件名称	有毒有害物质或元素						
しead         Mercury (Hg)         Cadmium (Cd)         Hexavalent Chromium (Cr(VI))         Polybrominated biphenyls (PBB)         Polybrominated diphenyl ethers (PBDE)           外売 Case         0         0         0         0         0         0         0           地路板 Board         X         0         0         0         0         0         0           地路板 Board         X         0         0         0         0         0         0           建築线 Cable         X         0         0         0         0         0         0           描座 Socket         X         0         0         0         0         0         0           Cable         X         0         0         0         0         0         0           AC-Adapter         X         0         0         0         0         0         0           C: 表示该有毒有書物质在该部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。 If certain toxic and hazardous substance or element contained in this part, then mark "0" for the corresponding column which indicates that this toxic and hazardous substance or element contained in this part, then "X" for the corresponding column, whindicates that this toxic and hazardous substance or element contained in this part, then "X" for the corresponding column, whindicates that this toxic and hazardous substance or element contained in this part, then	Part Name	Toxic and Hazardous Substance and Elements						
(Pb)         (Hg)         (Cd)         Chromium (Cr(VII))         biphenyls (PBB)         ethers (PBDE)           外売 Case         0         0         0         0         0         0         0         0           电路板 Board         X         0         0         0         0         0         0         0           电路板 Board         X         0         0         0         0         0         0           直接线 Cable         X         0         0         0         0         0         0           描座 Socket         X         0         0         0         0         0         0           AC-Adapter         X         0         0         0         0         0         0           O:         素示该有毒有害物质在这部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。         If certain toxic and hazardous substances or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.         X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量翅出 SJ/T11363-2006 标准规定的限量要求。         X           X:         表示该有專有書書物质至少在该部件的某一均质材料中的 量翅出 SJ/T11363-2006.         该标识过适用于在中华人民共和国境内销售的电子信息产品。本产           Y         If certain toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.		铅	汞	镉	六价铬	多溴联苯	多溴二苯醚	
小市       (Cr(VI))       (PBB)       (PBDE)         外売       0       0       0       0       0         Case       0       0       0       0       0       0         电路板       0       0       0       0       0       0         直路板       0       0       0       0       0       0         直接线       0       0       0       0       0       0         「雪接线       0       0       0       0       0       0         「雪擦板       ×       0       0       0       0       0         「雪擦板       ×       0       0       0       0       0         AC-Adapter       X       0       0       0       0       0       0         C: 表示该有毒有書物质在该部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。       If certain toxic and hazardous substance or element so not exist in this part, then mark "0" for the corresponding column which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.       X: 表示该有毒有者書物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求、         X:       表示该有毒有書書物质至少在该部件的其一均质材料中的 量超出 SJ/T11363-2006.       该法示谈 for the corresponding column, wh indicates that this toxic and hazardous subst		Lead	Mercury	Cadmium	Hexavalent	Polybrominated	Polybrominated diphenyl	
外売 Case       O       O       O       O       O       O       O         EB路板 Board       X       O       O       O       O       O       O         連路板 Board       X       O       O       O       O       O       O         連接线 Cable       X       O       O       O       O       O       O         播座 Socket       X       O       O       O       O       O       O         AC 适配器 AC-Adapter       X       O       O       O       O       O       O         Cettain toxic and hazardous substances or elements do not exist in this part, then mark "O" for the corresponding column which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.       X       表示该有毒有害物质至少在该部件的某一均质材料中的量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element contained in this part, then "X" for the corresponding column, whindicates that this toxic and hazardous substance or element contained in all of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.       该标识适用于在中华人民共和国境内销售的电子信息产品。本产 ①         If petRe组组装到整机中, 通常情况下能使用的车限。图形中间的数字表示电子信息产品的环保使用期限。       This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product i		(Pb)	(Hg)	(Cd)		biphenyls	ethers	
Case000000电路板 BoardX00000连接线 CableX00000插座 SocketX00000AC 适配器 AC-AdapterX00000CableX000000AC 法配器 AC-AdapterX000000C 表示该有毒有害物质在支部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。 If certain toxic and hazardous substances or elements do not exist in this part, then mark "O" for the corresponding column which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.X:X:X:X:表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.X:X:A:X:表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element contained in all east one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.X:X:Y:##					(Cr(VI))	(PBB)	(PBDE)	
Case       O       I       O       O       O       O       O         电路板       A       O       O       O       O       O       O       O         连接线       A       O       O       O       O       O       O       O         插座       X       O       O       O       O       O       O       O         AC Janes       X       O       O       O       O       O       O       O         AC Janes       X       O       O       O       O       O       O       O         AC Janes       X       O       O       O       O       O       O       O         AC Janes       X       O       O       O       O       O       O       O         AC Janes       X       O       O       O       O       O       O       O         Casing af af at wight Fridy Explority       X       O	外壳		•					
Board         X         O <td>Case</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	Case	0	0	0	0	0	0	
Board       X       V <td>电路板</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	电路板							
Cable         X         0         0         0         0         0         0         0         0           插座         X         0 </td <td>Board</td> <td>Х</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	Board	Х	0	0	0	0	0	
Cable         A         P         P         O <td>连接线</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	连接线							
Socket         X         O </td <td>Cable</td> <td>Х</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	Cable	Х	0	0	0	0	0	
Socket         A         C         O         O         O         O         O           AC 适配器         AC-Adapter         X         O         D         D	插座							
AC-AdapterXOOOOO: 表示该有毒有害物质在该部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。 If certain toxic and hazardous substances or elements do not exist in this part, then mark "O" for the corresponding colum which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for th part is below the limit requirement in SJ/T11363-2006.X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, wh indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.Windicates that this toxic and hazardous substance or element contained in the center indicates the years of environment-friendly use period. The years for thi	Socket	Х	0	0	0	0	0	
AC-Adapter       A       0       0       0       0       0         O: 表示该有毒有害物质在该部件所有均质材料中的 量均在 SJ/T11363-2006 标准规定的限量要求以下。       If certain toxic and hazardous substances or elements do not exist in this part, then mark "O" for the corresponding column which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006.         X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。         If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, whindicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the limit requirement in SJ/T11363-2006.         If part is above the l	AC 适配器							
If certain toxic and hazardous substances or elements do not exist in this part, then mark "O" for the corresponding column which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006. X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, while indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产	AC-Adapter	х	0	0	0	0	0	
which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006. X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, whe indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产 新年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally.	O: 表示该有毒有害	物质在该	家部件所有均	匀质材料中的 量	均在 SJ/T11363	-2006标准规定的限量要定	求以下。	
which indicates that this toxic and hazardous substance or element contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006. X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。 If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, whe indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产 新年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally.	If certain toxic a	and haza	ardous sub:	stances or elem	ents do not exis	t in this part, then mark "	O" for the corresponding column,	
<ul> <li>X: 表示该有毒有害物质至少在该部件的某一均质材料中的 量超出 SJ/T11363-2006 标准规定的限量要求。</li> <li>If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, whi indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产的目标限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。</li> <li>This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally.</li> <li>专提示)该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。</li> </ul>								
If certain toxic and hazardous substance or element is contained in this part, then "X" for the corresponding column, whi indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产 ① 1年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally.	part is below th	e limit re	equirement	in SJ/T11363-2	006.			
indicates that this toxic and hazardous substance or element contained in at least one of the homogeneous materials used this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产 到年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally. 寺提示)该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。	X: 表示该有毒有害物	物质至少	在该部件的	的某一均质材料中	中的 量超出 SJ/T	11363-2006 标准规定的	限量要求。	
this part is above the limit requirement in SJ/T11363-2006. 该标识适用于在中华人民共和国境内销售的电子信息产品。本产 到年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally. 寺提示)该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。	If certain toxic	and haz	ardous sub	stance or elem	ent is contained	in this part, then "X" for	the corresponding column, which	
① I年限是组装到整机中,通常情况下能使用的年限。图形中间的数字表示电子信息产品的环保使用期限。 This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally. 持提示)该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。	indicates that this to	oxic and	hazardous	s substance or	element contain	ed in at least one of the	homogeneous materials used for	
This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally. 侍 提示) 该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。	this part is above th	e limit re	quirement	in SJ/T11363-2	006. 该标识道	适用于在中华人民共和国均	竟内销售的电子信息产品。 本产品	
This mark is applied to EIPs sold in People's Republic of China, and the number in the center indicates the years of environment-friendly use period. The years for this product is applicable when the product is used normally. 侍 提示) 该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。		東田 市	· 名兴库/口	下始体田的年阳	因形由问的粉	今主二中之后自立口的环	(2) 本田期四	
environment-friendly use period. The years for this product is applicable when the product is used normally. 持 提示)该表中包括在电子情报产品系列产品所有的附件。产品不同时,包装内的附件会有所不同。								
lotice) All of the attached items relating to 'Electronic Information Products' are listed in this table.	寺 提示 ) 该表中包括	在电子情	报产品系列	列产品所有的附价	牛。产品不同时,	, 包装内的附件会有所不同	<b>司。</b>	
	lotice) All of the atta	ached ite	ems relating	g to 'Electronic I	Information Prod	lucts' are listed in this tab	le.	
Please understand that there is not always bundled all of the items because it is depends on a product.	Please ur	nderstan	d that there	e is not always b	oundled all of the	e items because it is depe	ends on a product.	

## ● 识 生产日期的方法 About Confirmation method of produced year

请通过产品或产品外包装箱上的序列号识生产日期。

Please confirm the produced year from nameplate label etc on product body or outer box.

如) 生产日期为 2007 年 Produced 2007

## Disclaimer

By using this Renesas Starter Kit (RSK), the user accepts the following terms:

The RSK is not guaranteed to be error free, and the entire risk as to the results and performance of the RSK is assumed by the User. The RSK is provided by Renesas on an "as is" basis without warranty of any kind whether express or implied, including but not limited to the implied warranties of satisfactory quality, fitness for a particular purpose, title and non-infringement of intellectual property rights with regard to the RSK. Renesas expressly disclaims all such warranties. Renesas or its affiliates shall in no event be liable for any loss of profit, loss of data, loss of contract, loss of business, damage to reputation or goodwill, any economic loss, any reprogramming or recall costs (whether the foregoing losses are direct or indirect) nor shall Renesas or its affiliates be liable for any other direct or indirect special, incidental or consequential damages arising out of or in relation to the use of this RSK, even if Renesas or its affiliates have been advised of the possibility of such damages.

## Precautions

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

This Renesas Starter Kit is only intended for use in a laboratory environment under ambient temperature and humidity conditions. A safe separation distance should be used between this and any sensitive equipment. Its use outside the laboratory, classroom, study area or similar such area invalidates conformity with the protection requirements of the Electromagnetic Compatibility Directive and could lead to prosecution.

The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures;

- ensure attached cables do not lie across the equipment
- reorient the receiving antenna
- increase the distance between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that which the receiver is connected
- power down the equipment when not in use
- consult the dealer or an experienced radio/TV technician for help NOTE: It is recommended that wherever
  possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken;

- The user is advised that mobile phones should not be used within 10m of the product when in use.
- The user is advised to take ESD precautions when handling the equipment.

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

## How to Use This Manual

## 1. Purpose and Target Readers

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

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

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

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

The following documents apply to the RSKRX23T. 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.	RSKRX23T User's Manual	R20UT3318EG
Tutorial Manual	Provides a guide to setting up RSK environment, running sample code and debugging programs.	RSKRX23T Tutorial Manual	CS+: R20UT3319EG e <sup>2</sup> studio: R20UT3322EG
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	RSKRX23T Quick Start Guide	CS+: R20UT3320EG e <sup>2</sup> studio: R20UT3323EG
Code Generator Tutorial Manual	Provides a guide to code generation and importing into the IDE (Integrated Development Environment).	RSKRX23T Code Generator Tutorial Manual	CS+: R20UT3321EG e <sup>2</sup> studio: R20UT3224EG
Schematics	Full detail circuit schematics of the RSK.	RSKRX23T Schematics	R20UT3317EG
Hardware Manual	Provides technical details of the RX23T microcontroller.	RX23T Group Hardware Manual	R01UH0520EJ

## 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	Renesas On-chip Debugging Emulator
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
GPT	General PWM Timer
I <sup>2</sup> C (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 <sup>™</sup> Compatible connector. Pmod <sup>™</sup> is registered to <u>Digilent Inc.</u> 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
	existered trademarks are the property of their respective owners

All trademarks and registered trademarks are the property of their respective owners.

## **Table of Contents**

1. O	Dverview	10
1.1	Purpose	
1.2	Features	
1.3	Board specification	10
2 P	ower Supply	11
2.1	Requirements	
2.1	Power-Up Behaviour	
2.2		
	oard Layout	
3.1	Component Layout	
3.2	Board Dimensions	
3.3	Component Placement	14
4. C	connectivity	
4.1	Internal RSK Connections	
4.2	Debugger Connections	
5 14	lser Circuitry	18
5. 0. 5.1	Reset Circuit	
5.1 5.2	Clock Circuit	
5.2 5.3	Switches	
5.4	LEDs	
5.5	Potentiometer	
5.6	Pmod <sup>™</sup>	
5.7	USB Serial Port	
5.8	I <sup>2</sup> C Bus (Inter-IC Bus)	
	configuration	າາ
6.1 6.2	Modifying the RSK MCU Operating Modes	
6.2 6.3		
6.4	Power Supply Configuration	
6.5	Analog Power & ADC & Comparator Configuration	
6.6	E1 Debugger Configuration	
6.7	General I/O & LED Configuration	
6.8	I <sup>2</sup> C & EEPROM Configuration	
6.9	IRQ & Switch Configuration	
6.10	MTU & POE Configuration	
6.11	PMOD1 Interface Configuration	
6.12		
6.13		
<b>7 Ц</b>	leaders	20
7. חי 7.1	Application Headers	
7.1 7.2	Microcontroller Pin Headers	
	code Development	
8.1	Overview	
8.2	Compiler Restrictions	
8.3	Mode Support	
8.4	Debugging Support	
8.5	Address Space	35
9. Ad	dditional Information	

## RENESAS

## RSKRX23T

**RENESAS STARTER KIT** 

## 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			
	Part No : R5F523T5ADFM			
Microcontroller	Package : 64-pin LFQFP			
	On-Chip Memory : ROM 128KB, RAM 12KB			
On-Board Memory	I2C EEPROM : 2Kbit			
Input Clock	RX23T Main : 20MHz			
Input Clock	RL78/G1C Main: 12MHz			
Power Supply*1	DC Power Jack : 5 V Input			
	Power Supply IC : 5V Input, 3.3V Output			
Debug Interface	E1 14-pin box header			
Push Switch	Reset Switch x 1			
T dan Switch	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			
USB to Serial Converter Interface	Connector : USB-MiniB			
COD to Senal Converter Interface	Driver : RL78/G1C Microcontroller (Part No R5F10JBCANA)			
Pmod™	PMOD1 : Angle type, 12-pin Connector			
	PMOD2* <sup>2</sup> : 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

<sup>1</sup>: Board can also supply 5V into RX23T microcontroller without LDO regulator.

<sup>\*2</sup>: The Application Board Interface connectors are not fitted on this product.



## 2. Power Supply

## 2.1 Requirements

This RSK is supplied with an E1 debugger. The debugger is able to power the RSK board with up to 200mA. When the RSK is connected to another system then that system should supply power to the RSK. 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 2-2** 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(DNF)	R139 Setting	Supply Source	Board_VCC UC_VCC	Unavailable Feature
Pin1-2 shorted	DNF	PWR/Unregulated_VCC/CON_5V	3V3	None
Finit-2 Shorted	DINF	E1(3V3)/CON_3V3	3V3	None
Allenen	Fit	PWR/Unregulated_VCC/CON_5V	3V3	None
All open		E1(3V3)/CON3V3	3V3	None
Pin2-3 shorted	PWR/Unregulated_VCC/CON_5V		5V	Pmod
	DNF	E1(5V)	5V	Pmod

**Table 2-2: Main Power Supply Requirements** 

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 preprogrammed 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

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



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

Figure 4-1: Internal RSK Block Diagram



## 4.2 Debugger Connections

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



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 RX23T 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 RX23T Group Hardware Manual for details regarding the clock signal requirements, and the RSKRX23T 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	RX23T Main oscillator.	Fitted	20MHz	Encapsulated, SMT
X2	RL78/G1C Main oscillator	Fitted	12MHz	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 schematics.

Switch	Function	MCU		
Switch	Function	Signal (Port)	Pin	
RES	When pressed, the microcontroller is reset	RES#	6	
SW1	Connects to an IRQ input for user controls	IRQ5 (PD6)	13	
SW2	Connects to an IRQ input for user controls.	IRQ2 (P00)	2	
SW3	Connects to an IRQ input for user controls. <sup>*1</sup>	IRQ1 (P94)	29	
3003	Connects to an ADTRG input.	ADTRG0# (PA4)	64	

#### Table 5-2: Switch Connections

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



## 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	PA3	27	
LED1	Orange	User operated LED	P71	38	
LED2	Red	User operated LED	P72	37	
LED3	Red	User operated LED	P73	36	

## 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 56). 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 RX23T Group Hardware Manual for further details.



## 5.6 **Pmod**<sup>™</sup>

The RSK board are equipped with connectors for Digilent Pmod<sup>™</sup> 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<sup>™</sup> Compatible headers uses an SPI interface. **Figure 5-1** below shows Digilent Pmod<sup>™</sup> Compatible Header Pin Numbering. Connection information for the Digilent Pmod<sup>™</sup> Compatible header is provided in **Table 5-4 and Table 5-5** below.

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



Figure 5-1: Digilent Pmod<sup>™</sup> Compatible Header Pin Numbering

Digilent Pmod™ Compatible Header (PMOD1) Connections							
Signal Nama	MC	MCU		Signal Name	MCU		
Signal Name	Port	Pin		Signal Name	Port	Pin	
PMOD1_PIN1	PA2/P02	28/1	7	IRQ0	P93	30	
P-TXD5	PB5	19	8	IRQ4	P01	4	
P-RXD5	PB6	18	9	P91	P91	32	
P-SCK5	PB7	17	10	P92	P92	31	
GROUND	-	-	11	GROUND	-	-	
Board_3V3	-	-	12	Board_3V3	-	-	
	Signal Name PMOD1_PIN1 P-TXD5 P-RXD5 P-SCK5 GROUND	Signal NameMCPMOD1_PIN1PA2/P02P-TXD5PB5P-RXD5PB6P-SCK5PB7GROUND-	Signal Name         MCU           Port         Pin           PMOD1_PIN1         PA2/P02         28/1           P-TXD5         PB5         19           P-RXD5         PB6         18           P-SCK5         PB7         17           GROUND         -         -	MCU         Pin           Signal Name         MCU         Pin           PMOD1_PIN1         PA2/P02         28/1         7           P-TXD5         PB5         19         8           P-RXD5         PB6         18         9           P-SCK5         PB7         17         10           GROUND         -         -         11	MCU         Pin         Signal Name           Port         Pin         Pin         Signal Name           PMOD1_PIN1         PA2/P02         28/1         7         IRQ0           P-TXD5         PB5         19         8         IRQ4           P-RXD5         PB6         18         9         P91           P-SCK5         PB7         17         10         P92           GROUND         -         -         11         GROUND	MCU         Pin         Signal Name         MC           Port         Pin         Pin         Signal Name         Port           PMOD1_PIN1         PA2/P02         28/1         7         IRQ0         P93           P-TXD5         PB5         19         8         IRQ4         P01           P-RXD5         PB6         18         9         P91         P91           P-SCK5         PB7         17         10         P92         P92           GROUND         -         -         11         GROUND         -	

Table 5-4: Pmod<sup>™</sup>1 Header Connections

	Digilent Pmod™ Compatible Header (PMOD2) Connections												
Pin	Signal Nama	MCU		Pin	Signal Name	MCU							
Pin	Signal Name	Port	Pin		Signal Name	Port	Pin						
1	PD7	PD7	12	7	P-IRQ2	P00	2						
2	P-TXD5	PB5	19	8	P-IRQ3	PB4	21						
3	P-RXD5	PB6	18	9	P30	P30	45						
4	P-SCK5	PB7	17	10	P31	P31	43						
5	GROUND	-	-	11	GROUND	-	-						
6	Board_3V3	-	-	12	Board_3V3	-	-						

Table 5-5: Pmod<sup>™</sup>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 RX23T 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		
Signal Name	Function	Port	Pin	
TXD1	SCI1 Transmit Signal	PD3	16	
RXD1	SCI1 Receive Signal	PD5	14	
TXD5* <sup>1</sup>	SCI5 Transmit Signal	PB5	19	
RXD5 <sup>*1</sup>	SCI5 Receive Signal	PB6	18	
RS232TX * <sup>1</sup>	External SCI Transmit Signal	-	-	
RS232RX *1	External SCI Receive Signal	-	-	
RL78G1CCTS	Clear To Send	PB4	21	
RL78G1CRTS	Request to Send	PD7	12	

**Table 5-6: Serial Port Connections** 

\*<sup>1</sup>: 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.



## 5.8 I<sup>2</sup>C Bus (Inter-IC Bus)

The RX23T features one  $I^2C$  (Inter-IC Bus) interface modules. RIIC0 is connected to a 2Kbit EEPROM. Specific details of the EEPROM device and the connections can be found in the board schematics.



## 6. Configuration

## 6.1 Modifying the RSK

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

A link resistor is a  $0\Omega$  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, jumpers and DIP switches.

When removing soldered components, always ensure that the RSK is not exposed to a soldering iron for intervals greater than 5 seconds. This is to avoid damage to nearby components mounted on the 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 RX23T Group Hardware Manual and RSKRX23T 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	Link Fitted Configuration	Link Removed Configuration	Related Ref.
J8	Boot Mode (SCI)	Single Chip Mode	-

Table 6-1: MCU Option Links

## 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.

Jumper Position	Explanation	Related Ref.
Shorted Pin1-2	Connect Power rail via regulator.	R139*1
Shorted Pin2-3	Direct connect Power rail.	R139*1
All open	In case of fitted R139*1, same as "Jumper J6 shorted Pin1-2".	R139*1
Shorted	Connect Power rail.	R140
Open	Enable current probe for MCU current consumption.	R140
	Shorted Pin1-2 Shorted Pin2-3 All open Shorted	Shorted Pin1-2         Connect Power rail via regulator.           Shorted Pin2-3         Direct connect Power rail.           All open         In case of fitted R139*1, same as "Jumper J6 shorted Pin1-2".           Shorted         Connect Power rail.

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

\*<sup>1</sup>: By default, jumper J6 is not fitted to the RSK. R139 is fitted by default and becomes the same setting as 'Connect Power rail via regulator'.

\*<sup>2</sup>: By default, jumper J7 is not fitted to the RSK. R140 is fitted by default and becomes the same setting as 'Connect Power rail.

Reference	Explanation	Fit	DNF	Related Ref.
PWR	Connect 5V power rail to PWR.	R38	-	U3
PWR	Disconnect PWR from 5V power rail.	-	R38	-
Unregulated_VCC	Connect 5V power rail to Unregulated_VCC.	R52	-	U3
Unregulated_VCC	Disconnect Unregulated_VCC from 5V power rail.	-	R52	-
	Connect 5V power rail to CON_5V.	R39	-	U3
CON_5V	Disconnect CON_5V from 5V power rail.	-	R39	-
Board_5V	Connect 5V power rail to Board_5V.	-	-	IIC pull-up(R8),U3,U4
CON_3V3	Connect 3.3V power rail to CON_3V3.	R48	-	-
CON_3V3	Disconnect CON_3V3 from 3.3V power rail.	-	R48	-
Board_3V3	Connect 3.3V power rail to Board_3V3.	-	-	IIC pull-up(R4),PMOD,U4
Board_VCC	Connect 3.3V power rail to Board_VCC.	-	-	U1
UC VCC	Connect power rail to UC_VCC.	R140	-	U1
	Disconnect UC_VCC from power rail.	-	R140	-

 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,	Connect crystal (X1) to RX23T.	R59, R61	R62, R58	U1(EXTAL, XTAL)
CON_EXTAL	Connect CON_EXTAL to RX23T.	R62	R59, R61	U1(EXTAL),JA2.2

Table 6-4: Clock Option Links

## 6.5 Analog Power & ADC & Comparator Configuration

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

	MCU		MCL	Peripheral Sel	ection	Destin	Destination Selection			
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF		
MTIOC3A_CVREF0	61	P11	MTIOC3A	R44	R45	JA6.13	-	-		
WINCCSA_CVREFU	01	PII	CVREF0	R45	R44	JA6.18	-	-		
AN000	56	P40				RV1	R134	-		
ANUUU	50	P40	-	-	-	JA1.9	-	-		
	64	PA4				SW3	R103	R102		
ADTRG0n	04	PA4	-	-	-	JA1.8	-	-		
	57		UC_VCC	R132	R129, R133	-	-	-		
AVCC0		-	CON_AVCC0	R133	<b>R129</b> , R132	JA1.5	-	-		
			Board_VCC	R129, R128	R132, <b>R133</b>	-	-	-		
AV/CC0	60		GROUND	R136	R135	-	-	-		
AVSS0	60	-	CON_AVSS0	R135	R136	JA1.6	R41	R42		
	FO		UC_VCC	R46	R47	-	-	-		
VREFH0	58	-	CON_VREFH0	R47	R46	JA1.7	-	-		
	59		GROUND	R51	R50	-	-	-		
VREFL0	59	-	CON_VREFL0	R50	R51	JA1.6	R42	R41		

### Table 6-5: Analog Power ADC & Comparator Option Links



## 6.6 E1 Debugger Configuration

Table 6-6 below details the function of the option links associated with E1 Debugger conf	iguration.
---	------------

	M	CU	MC	CU Peripheral S	Selection	Destination Selection				
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF		
						JA2.6	-	-		
TXD1	16	PD3	-	-	-	-	-	E1.5	R130	R19
						U6.3	R19	R16,R20,R130		
						JA2.8	-	-		
RXD1	14 PD5	PD5	-	-	-	E1.11	R137	R36		
						U5.3	R36	R27,R37,R137		

Table 6-6: E1 Debugger Option Links

## 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.

	MC	CU	MCUI	Peripheral Sele	ection	Destina	tion Selection	on
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
P02	1	P02	-	-	-	PMOD1.1	R87	R88
	48	P22	100	R11	R28	JA1.15	-	-
IO0_MTIC5W	48	PZZ	MTIC5W	R28	R11	JA6.16	-	-
IO1_MTIC5V	47	P23	I01	R12	R29	JA1.16	-	-
	47	F ZJ	MTIC5V	R29	R12	JA6.15	-	-
IO2_MTIC5U	46	P24	102	R13	R30	JA1.17	-	-
102_1111030	40	1 24	MTIC5U	R30	R13	JA6.14	-	-
P30_MTIOC0B	45	P30	P30	R14	R31	PMOD2.9	-	-
	45	F 30	MTIOC0B	R31	R14	JA2.9	R98	R97
			P31	R15	R32	PMOD2.10	-	-
P31_MTIOC0A	43	P31	MTIOC0A	R32	R15	JA2.19	R95	R100
			WITIOCUA	NJ2	K15	JA2.7	R100	R99
MTIOC3B	38	P71			_	LED1	-	-
WITIOC3D	30	F/I	-	-	-	JA2.13	-	-
MTIOC4A	37	P72	-		_	LED2	-	-
WITIOC4A	57	F / Z	-	-	-	JA2.15	-	-
MTIOC4B	36	P73	-	_	_	LED3	-	-
WITIOC4D	30	F73	-	-	-	JA2.17	-	-
			103	R56	R55	JA1.18	-	-
IO3_MTIOC0C_IRQ1	29	P94	MTIOC0C_IRQ1	R55	R56	SW3	R102	R103
			WITIOCUC_IKUT	K00	K30	JA2.23	R93	R94
			104	R54	R63,R64	JA1.19	-	-
IO4_MTIOC2B_CTS5RTS5	28	PA2	MTIOC2B	R64	R54, <mark>R63</mark>	JA2.22	-	-
			CTS5RTS5	R63	R54, <mark>R64</mark>	PMOD1.1	R88	R87
			-	-	-	LED0	-	-
IO5_MTIOC2A	27	PA3	105	R65	R68	JA1.20	-	-
			MTIOC2A	R68	R65	JA2.20	-	-
IO6_MTIOC0D	26	PB0	IO6	R70	R67	JA1.21	-	-
	20	PDU	MTIOCOD	R67	R70	JA2.21	-	-
PD7_RL78G1CRTS	12	PD7	PD7	R77	R78	PMOD2.1	-	-
	IZ		RL78G1CRTS	R78	R77	U6.2	-	-

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

## 6.8 I<sup>2</sup>C & EEPROM Configuration

Table 6-8 below details the function of the option links associated with I<sup>2</sup>C & EEPROM configuration.

Signal name	Μ	CU	MCU Peripheral Selection			Destination Selection		
Signal name /Reference	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
SCL	25	PB1				U4.6	-	-
JUL	20	PDI	-	-	-	JA1.26	-	-
SDA	24	PB2				U4.5	-	-
SDA	24		-	-	-	JA1.25	-	-
Board_5V (Pull-up)	-	-	-	R8	R4	SDA, SCL, U4	-	-
Board_3V3 (Pull-up)	-	-	-	R4	R8	SDA, SCL, U4	-	-
Write Protect ON	-	-	-	-	R3	U4.7	-	-
Write Protect OFF	-	-	-	R3	-	U4.7	-	-

Table 6-8: I<sup>2</sup>C & EEPROM Option Links

## 6.9 IRQ & Switch Configuration

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

	1	//CU	MCU P	eripheral Selection	n	Destina	tion Selec	tion:
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
			-	-	-	SW2	R104	-
A-IRQ2_P-IRQ2	2	P00	A-IRQ2	R74	R75	JA2.7	R99	R100
			P-IRQ2	R75	R74	PMOD2.7	-	-
IO3_MTIOC0C_IRQ1			103	R56	R55	JA1.18	-	-
	29	P94	MTIOC0C_IRQ1	DEE	DF/	SW3	R102	R103
				R55	R56	JA2.23	R93	R94
ADTRON	14	DAA				SW3	R103	R102
ADTRG0n	64	PA4	-	-	-	JA1.8	-	-
			RL78G1CCTS	R71	R72,R73	U5.2	-	-
RL78G1CCTS_A-IRQ3_P-IRQ3	21	PB4	A-IRQ3	R72	R71, <b>R73</b>	JA2.9	R97	R98
			P-IRQ3	R73	R71, <b>R72</b>	PMOD2.8	-	-
			CTS1RTS1	R91	R90	JA2.12	-	-
CTS1RTS1_IRQ5	13	PD6	IDOF	DOO	D01	JA1.23	-	-
			IRQ5	R90	R91	SW1	R105	-

## Table 6-9: IRQ & Switch Option Links



## 6.10 MTU & POE Configuration

	MCU		MCU P	eripheral Selec	Destination Selection			
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
MTIOC3A_CVREF0	61	P11	MTIOC3A	R44	R45	JA6.13	-	-
WITOCSA_CVKLIU	01	FII	CVREF0	R45	R44	JA6.18	-	-
IO0_MTIC5W	48	P22	100	R11	R28	JA1.15	-	-
	40	FZZ	MTIC5W	R28	R11	JA6.16	-	-
IO1_MTIC5V	47	P23	101	R12	R29	JA1.16	-	-
	77	125	MTIC5V	R29	R12	JA6.15	-	-
IO2_MTIC5U	46	P24	102	R13	R30	JA1.17	-	-
102_1011030	40	127	MTIC5U	R30	R13	JA6.14	-	-
P30_MTIOCOB	45	P30	P30	R14	R31	PMOD2.9	-	-
	43	1.50	MTIOC0B	R31	R14	JA2.9	R98	R97
			P31	R15	R32	PMOD2.10	-	-
P31_MTIOC0A	43	P31	MTIOC0A	R32	R15	JA2.19	R95	R100
					_	JA2.7	R100	R99
MTCLKB_MTIOC3C	41	P32	MTCLKB	R33	R34	JA2.26	-	-
MICERB_MINOC3C			MTIOC3C	R34	R33	JA2.11	-	-
POE0n	39	P70	-	-	-	JA2.24	R35	-
MTIOC3B	38	P71	-	-		LED1	-	-
WITIOC3B			-		-	JA2.13	-	-
MTIOC4A	37	P72	-			LED2	-	-
WITIOC4A			-	-	-	JA2.15	-	-
MTIOC4B	36	P73		-	-	LED3	-	-
WITIOC4D	30		-			JA2.17	-	-
			103	R56	R55	JA1.18	-	-
IO3_MTIOC0C_IRQ1	29	P94	MTIOC0C_IRQ1	R55	R56	SW3	R102	R103
			WITIOCUC_IKQ1	ROO	ROO	JA2.23	R93	R94
			104	R54	R63,R64	JA1.19	-	-
IO4_MTIOC2B_CTS5RTS5	28	PA2	MTIOC2B	R64	R54, <b>R63</b>	JA2.22	-	-
			CTS5RTS5	R63	R54, <b>R64</b>	PMOD1.1	R88	R87
			-	-	-	LED0	-	-
IO5_MTIOC2A	27	PA3	105	R65	R68	JA1.20	-	-
			MTIOC2A	R68	R65	JA2.20	-	-
MTIOC1A	63	PA5	-	-	-	JA2.23	R94	R93
	27		106	R70	R67	JA1.21	-	-
IO6_MTIOC0D	26	PB0	MTIOCOD	R67	R70	JA2.21	-	-

Table 6-10 below details the function of the option links associated with MTU & POE configuration.

Table 6-10: MTU & POE Option Links

#### **PMOD1 Interface Configuration** 6.11

	M	CU	MCU Peripheral Selection			Destina	Destination Selection		
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF	
P02	1	P02	-	-	-	PMOD1.1	R87	R88	
			<b>IO</b> 4	R54	R63,R64	JA1.19	-	-	
IO4_MTIOC2B_CTS5RTS5	28	PA2	MTIOC2B	R64	R54, <mark>R63</mark>	JA2.22	-	-	
			CTS5RTS5	R63	R54, <mark>R64</mark>	PMOD1.1	R88	R87	
		PB5	A-TXD5	R81	R82	JA6.8	-	-	
	19					U6.3	R20	R16,R19	
A-TXD5_P-TXD5	19		P-TXD5	R82	R81	PMOD1.2	-	-	
						PMOD2.2	-	-	
				Dor	D04	JA6.7	-	-	
	18	PB6	A-RXD5	R85	R84	U5.3	R37	<b>R27</b> ,R36	
A-RXD5_P-RXD5	10	PD0		R84	DOF	PMOD1.3	-	-	
			P-RXD5	R84	R85	PMOD2.3	-	-	
			A-SCK5	R80, <b>R83</b>	R86	JA6.10	-	-	
A-SCK5_P-SCK5	17	PB7	P-SCK5	R83,R86	R80	PMOD1.4	-	-	
—			P-30K0	K03,K80	ROU	PMOD2.4	-	-	

Table 6-11 below details the function of the option links associated with PMOD1 Interface configuration.

Table 6-11: PMOD1 Interface Option Links

#### 6.12 **PMOD2 Interface Configuration**

Table 6-12 below details the function of the option links associated with PMOD2 Interface configuration.

	M	CU	MCU Pe	MCU Peripheral Selection			Destination Selection		
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF	
			-	-	-	SW2	R104	-	
A-IRQ2_P-IRQ2	2	P00	A-IRQ2	R74	R75	JA2.7	R99	R100	
			P-IRQ2	R75	R74	PMOD2.7	-	-	
	45	D20	P30	R14	R31	PMOD2.9	-	-	
P30_MTIOC0B	45	P30	MTIOC0B	R31	R14	JA2.9	R98	R97	
			P31	R15	R32	PMOD2.10	-	-	
P31_MTIOC0A	43	P31	MTIOCOA	D22	D1F	JA2.19	R95	R100	
			MTIOC0A	R32	R15	JA2.7	R100	R99	
	21	PB4	RL78G1CCTS	R71	R72,R73	U5.2	-	-	
RL78G1CCTS_A-IRQ3_P-IRQ3			A-IRQ3	R72	R71, <b>R73</b>	JA2.9	R97	R98	
			P-IRQ3	R73	R71, <b>R72</b>	PMOD2.8	-	-	
	19			R81	D00	JA6.8	-	-	
		DDC	A-TXD5		R82	U6.3	R20	<b>R16</b> ,R19	
A-TXD5_P-TXD5		PB5	P-TXD5	R82	D01	PMOD1.2	-	-	
					R81	PMOD2.2	-	-	
				2.05	D0.4	JA6.7	-	-	
	18		A-RXD5	R85	R84	U5.3	R37	<b>R27</b> ,R36	
A-RXD5_P-RXD5	18	PB6	P-RXD5	R84	R85	PMOD1.3	-	-	
			P-KAD5	K84	Roo	PMOD2.3	-	-	
			A-SCK5	R80, <mark>R83</mark>	R86	JA6.10	-	-	
A-SCK5_P-SCK5	17	PB7	P-SCK5	R83,R86	R80	PMOD1.4	-	-	
			F-30N0	100,100	KOU	PMOD2.4	-	-	
	12	PD7	PD7	R77	R78	PMOD2.1	-	-	
PD7_RL78G1CRTS	12	PD/	RL78G1CRTS	R78	R77	U6.2	-	-	

Table 6-12: PMOD2 Interface Option Links



## 6.13 Serial & USB to Serial Configuration

Table 6-13 below details the function of the option links associated with Serial & USB to Serial configuration.

	M	CU	MCU Peripheral Selection			Destination Selection		
Signal name	Pin	Port	Signal	Fit	DNF	Interface /Function	Fit	DNF
			A-TXD5	R81	R82	JA6.8	-	-
A-TXD5_P-TXD5	19	PB5	A-TAD3	ROI	ROZ	U6.3	R20	<b>R16</b> ,R19
A-TAD3_P-TAD3	19	PD0	P-TXD5	R82	R81	PMOD1.2	-	-
			P-TAD0	ROZ	ROI	PMOD2.2	-	-
				DOF	D04	JA6.7	-	-
A-RXD5 P-RXD5	18	PB6	A-RXD5	R85	R84	U5.3	R37	<b>R27</b> ,R36
A-RADO_P-RADO	10		P-RXD5	R84	R85	PMOD1.3	-	-
						PMOD2.3	-	-
		PD3		-	-	JA2.6	-	-
TXD1	16					E1.5	R130	R19
						U6.3	R19	R16,R20,R130
						JA2.8	-	-
RXD1	14	PD5	-	-	-	E1.11	R137	R36
						U5.3	R36	R27,R37,R137
DCJJJTV						JA6.5	-	-
RS232TX	-	-	-	-	-	U6.3	R16	R19, <mark>R20</mark>
DCJJJDV			-			JA6.6	-	-
RS232RX	-	-		-	-	U5.3	R27	R36, <b>R37</b>

Table 6-13: Serial & USB to Serial Option Links



#### 7. Headers

## 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.

		Application	Header J	A1		
Pin	Header Name	MCU Pin	Pin	Header Name	MCU Pin	
	Circuit Net Name	WICO FIII	F 111	Circuit Net Name		
4	5V		2	0V		
1	CON_5V		2	GROUND	-	
3	3V3		4	0V		
3	CON_3V3		4	GROUND	-	
<i>r</i>	AVCC	57	0	AVSS	00/50	
5	CON_AVCC0	57	6	CON_AVSS0/CON_VREFL0	60/59	
-	AVREF	50	_	ADTRG		
7	CON_VREFH0	- 58	8	ADTRG0n	64	
	ADC0		10	ADC1		
9	AN000	- 56		AN001	55	
	ADC2	- 54 12	10	ADC3	=	
11	AN002		12	AN003	53	
10	DAC0		14	DAC1		
13	NC	- NC		NC	NC	
4.5	IO_0	10	10	IO_1		
15	IO0	- 48	16	IO1	47	
	IO_2	10	10	IO_3		
17	102	- 46	18	103	- 29	
	IO_4			IO_5		
19	IO4	_ 28	20	IO5	27	
04	IO_6			IO_7		
21	IO6	26	22	107	23	
	IRQ3/IRQAEC/M2_HSIN0	10		IIC_EX		
23	IRQ5	13	24	NC	NC	
05	IIC_SDA			IIC_SCL	0.5	
25	JA1_SDA (SDA)	_ 24	26	JA1_SCL (SCL)	25	

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

Table 7-1: Application Header JA1 Connections



		Application	Header J	A2		
Pin	Header Name	MOLLDin	Pin	Header Name		
FIII	Circuit Net Name	MCU Pin	Pin	Circuit Net Name	MCU Pin	
	RESET	<u>_</u>		EXTAL	0	
1	RESn	6	2	CON_EXTAL	9	
0	NMI	44		Vss1		
3	NMIn	- 11	4	GROUND		
~	WDT_OVF	NO		SCIaTX	40	
5	NC	NC	6	TXD1	- 16	
7	IRQ/WKUP/M_HSIN	2/43	0	SCIaRX	14	
1	A-IRQ2/NC/MTIOC0A	- 2/43	8	RXD1		
0	IRQ1/M1_HSIN1	04/45	10	SCIaCK	45	
9	A-IRQ3/MTIOC0B	21/45	10	SCK1	15	
	M1_UD		12	CTSRTS	40	
11	MTIOC3C	- 41		CTS1RTS1	- 13	
40	M1_UP	- 38		M1_UN	35	
13	MTIOC3B		14	MTIOC3D	35	
4 5	M1_VP	07	10	M1_VN	34	
15	MTIOC4A	- 37	16	MTIOC4C	34	
47	M1_WP		10	M1_WN		
17	MTIOC4B	- 36	18	MTIOC4D	- 33	
10	TimerOut	40	20	TimerOut	07	
19	MTIOC0A	43	20	MTIOC2A	27	
04	TimerIn	20	22	TimerIn	20	
21	MTIOC0D	- 26	22	MTIOC2B	28	
	IRQ2/M1_EncZ/M1_HSIN2			M1_POE		
23	MTIOC0C_IRQ1/MTIOC1A /MTIOC0C_IRQ1	29/63/29	24	POE0n	39	
05	M1_TRxCLK	40	00	M1_TRDCLK	44	
25	MTCLKA	40	26	MTCLKB	41	

Table 7-2: Application Header JA2 Connections



		Application	Header J	A5		
<b>D</b>	Header Name	MOULDin		Header Name	MOULDIN	
Pin	Circuit Net Name	MCU Pin	Pin	Circuit Net Name	MCU Pin	
4	ADC4	50	2	ADC5	54	
1	AN004	- 52	2	AN005		
2	ADC6	50	4	ADC7	49	
3	AN006	- 50	4	AN007	- 49	
5	CAN1TX	- NC	6	CAN1RX	NC	
Э	NC		6	NC		
7	CAN2TX	NC	0	CAN2RX	NC	
7	NC		8	NC		
9	IRQ4/M2_EncZ/M2_HSIN1	NC/NC/NC	10	IRQ5/M2_HSIN2	NC/NC	
9	NC/NC/NC			NC/NC		
11	M2_UD	NC	12	M2_Uin	NC	
11	NC	- NC		NC		
13	M2_Vin	NC	14	M2_Win	NC	
15	NC			NC		
15	M2_Toggle		16	M2_POE	NC	
15	NC	- NC	10	NC		
17	M2_TRCCLK	- NC	18	M2_TRDCLK	- NC	
17	NC		10	NC		
19	M2_UP	NC	20	M2_UN	NC	
19	NC		20	NC		
21	M2_VP	NC	22	M2_VN	NC	
21	NC		22	NC		
23	M2_WP	- NC	24	M2_WN	NC	
23	NC		24	NC		

Table 7-3: Application Header JA5 Connections



		Applicatior	Header .	JA6	
Pin	Header Name	MOLLE	<b>D</b> .	Header Name	MOUR
PIN	Circuit Net Name	MCU Pin	Pin	Circuit Net Name	MCU Pin
	DREQ	NO		DACK	NO
1	NC	— NC	2	NC	NC NC
3	TEND	NC	4	STBYn	NC
3	NC		4	NC	
5	RS232TX	NC	6	RS232RX	NC
5	RS232TX		6	RS232RX	
7	SCIbRX	10	0	SCIbTX	10
7	A-RXD5	- 18	8	A-TXD5	- 19
9	SCIcTX	NC	10	SCIbCK	47
9	NC	- NC		A-SCK5	17
	SCIcCK	- NC	12	SCIcRX	NC
11	NC			NC	
13	M1_Toggle	61	14	M1_Uin	46
13	MTIOC3A			MTIC5U	
15	M1_Vin	47	16	M1_Win	48
15	MTIC5V	- 4/	10	MTIC5W	40
17	Reserved	NC	18	Reserved	61
17	NC		10	CVREF0	01
19	Reserved	NC	20	Reserved	62
19	NC		20	CVREF1	02
21	Reserved	NC	22	Reserved	NC
21	NC		22	NC	
23	Unregulated_VCC		24	Vss	
23	Unregulated_VCC		24	GROUND	

<b>ble 7-4</b> below lists the connections of the application header, JA6.
--

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	P02	1	2	A-IRQ2_P-IRQ2	2			
3	NC	NC	4	IRQ4	4			
5	MD_FINED	5	6	RESn	6			
7	CON_XTAL	7	8	GROUND	-			
9	CON_EXTAL	9	10	UC_VCC	-			
11	NMIn	11	12	PD7_RL78G1CRTS	12			
13	CTS1RTS1_IRQ5	13	14	RXD1	14			
15	SCK1	15	16	TXD1	16			
17	NC	NC	18	NC	NC			
19	NC	NC	20	NC	NC			
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	A-SCK5_P-SCK5	17	2	A-RXD5_P-RXD5	18
3	A-TXD5_P-TXD5	19	4	UC_VCC	-
5	RL78G1CCTS_A-IRQ3_P-IRQ3	21	6	GROUND	-
7	107	23	8	SDA	24
9	SCL	25	10	IO6_MTIOC0D	26
11	IO5_MTIOC2A	27	12	IO4_MTIOC2B_CTS5RTS5	28
13	IO3_MTIOC0C_IRQ1	29	14	IRQ0	30
15	P92	31	16	P91	32
17	NC	NC	18	NC	NC
19	NC	NC	20	NC	NC
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



Microcontroller Pin Header J3					
Pin	Circuit Net Name	MCU Pin	Pin	Circuit Net Name	MCU Pin
1	MTIOC4D	33	2	MTIOC4C	34
3	MTIOC3D	35	4	MTIOC4B	36
5	MTIOC4A	37	6	MTIOC3B	38
7	POE0n	39	8	MTCLKA	40
9	MTCLKB_MTIOC3C	41	10	UC_VCC	-
11	P31_MTIOC0A	43	12	GROUND	-
13	P30_MTIOC0B	45	14	IO2_MTIC5U	46
15	IO1_MTIC5V	47	16	IO0_MTIC5W	48
17	NC	NC	18	NC	NC
19	NC	NC	20	NC	NC
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 below lists the connections of the microcontroller pin header, J3.

 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	AN007	49	2	AN006	50	
3	AN005	51	4	AN004	52	
5	AN003	53	6	AN002	54	
7	AN001	55	8	AN000	56	
9	CON_AVCC0	57	10	CON_VREFH0	58	
11	CON_VREFL0	59	12	CON_AVSS0	60	
13	MTIOC3A_CVREF0	61	14	CVREF1	62	
15	MTIOC1A	63	16	ADTRG0n	64	
17	NC	NC	18	NC	NC	
19	NC	NC	20	NC	NC	
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 debugger. An E1 debugger is supplied with this RSK product.

For further information regarding the debugging capabilities of the E1/E20 debuggers, refer to E1/E20 Emulator Additional Document for User's Manual (R20UT0399EJ).

## 8.2 Compiler Restrictions

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

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

## 8.3 Mode Support

The MCU supports Single Chip 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 RX23T 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 (as supplied with this RSK) supports break points, event points (including mid-execution insertion) and basic trace functionality. It is limited to a maximum of 8 on-chip event points, 256 software breaks and 256 branch/cycle trace. For further details, refer RX Family E1/E20 Emulator User's Manual (R20UT0398EJ).

## 8.5 Address Space

For the MCU address space details, refer to the 'Address Space' section of RX23T Group Hardware Manual.



## 9. Additional Information

## **Technical Support**

For information about the RX23T Group microcontrollers refer to the RX23T 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 8 of the "Quick Start Guide"

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

#### Trademarks

All brand or product names used in this manual are trademarks or registered trademarks of their respective companies or organisations.

#### Copyright

This document may be, wholly or partially, subject to change without notice. All rights reserved. Duplication of this document, either in whole or part is prohibited without the written permission of Renesas Electronics Europe Limited.

© 2015 Renesas Electronics Europe Limited. All rights reserved.

© 2015 Renesas Electronics Corporation. All rights reserved.

 $\ensuremath{\mathbb{C}}$  2015 Renesas System Design Co., Ltd. All rights reserved.



<b>REVISION HISTO</b>	TORY	RSKRX23T User's Manual			
Rev. Date		Description			

		Page	Summary
1.00	Aug 24, 2015		First Edition issued

Renesas Starter Kit Manual: User's Manual

Publication Date: Rev.1.00 Aug 24, 2015

Published by: Renesas Electronics Corporation



#### SALES OFFICES

Renesas Electronics Corporation

http://www.renesas.com

Refer to "http://www.renesas.com/" for the latest and detailed information.

 Renease Electronics America Inc.

 28011 Scott Boulevard Samia Cohra, CA 99050-2549, U.S.A.

 Tel: +1-408-588-6000, Fax: +1-408-588-6130

 Renease Electronics Canada Limited

 2521 Yonge Street, Suite Sa09 Richmond Hill, Ontario Canada L4C 9T3

 Tel: +1-905-237-2004

 Renease Electronics Europe Limited

 Dukes Meadow, Milboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K

 Tel: +44-1625-855100, Fax: +44-1628-56900

 Renease Electronics Europe MbH

 Arcadiastraser 10, 40472 Disseldorf, Germany

 Tel: +49-211-6503-0, Fax: +49-211-6503-1327

 Renease Electronics (China) Co., Ltd.

 Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China

 Tel: +86-10-2235-1155, Fax: +86-10-2235-7679

 Renease Electronics (China) Co., Ltd.

 Yoni 100, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333

 Tel: +86-21-226-0889, Fax: +86-212-20999

 Renease Electronics Hong Kong Limited

 Unit 101-1161, 16/F., Tower A, Central Towers, 2554 Jangao Road, Putuo District, Shanghai, P. R. China 200333

 Tel: +86-22-226-0889, Fax: +86-219-2099

 Renease Electronics Shing North Road, Taipei 10543, Taiwan

 Tel: +86-26-2175-9600, Fax: +886 2-8175-9670

 Renease Electronics Malaysia Stn.Bhd.

 <td

© 2015 Renesas Electronics Corporation. All rights reserved. Colophon 4.0

RX23T Group



R20UT3318EG0100