Renesas Synergy™ S124

Sensor Panel Board User Guide

R12AN0074EU0100
Rev.1.00
Nov 15, 2017

Introduction

This User guide describes about the Renesas Sensor Panel Board. In this Sensor Panel solution, Renesas Synergy™ S124 Microcontroller Group and Renesas RL78/G1D Bluetooth Low Energy (hereafter called BLE) are the highlighted Components. Using this Sensor Panel Board, developers can easily start to evaluate on Renesas Lighting solution, using RL78/G1D Bluetooth® wireless connectivity and Renesas Synergy™ S124 device including Temperature sensor, Light sensor and necessary user interface.

Target Device

R7FS124773A01CFM

Contents

1. Overview

The Sensor Panel Board uses the Renesas Synergy™ S124, 32-MHz Arm® Cortex®-M0+ microcontroller with 256 KB of code flash, 24 KB of SRAM, and 4 KB of data flash. It has two push button switches, one reset button, and three LEDs for user interface; Bluetooth® RY7011 module and onboard micro-B USB for communication; and one PMOD™ connector for expansion. For interacting with surrounding environment, it also includes Temperature Sensor, Light sensor, passive infrared (PIR) sensor, Reed Switch (Tilt Switch) with two LED indicators, Hall Effect Switch, and two open drain outputs. There are a 5 volt center positive DC power connector (cylindrical male diameter 5.5mm) and the same micro-B USB connector from external power and has internal power supply provided by Li-ion Battery (Type: NCR18650BF or equivalent) with battery charger including 3.3 volt regulated output to provide onboard power. For development, the board has two Programming/Debugging contactors: standard 9-pin JTAG contactor for S124 device and 14-pin (2x7, 0.1 inch) connector for RY7011 module. Two 4-screw terminals are included for two general purpose switch inputs and two open drain output as well.

Figure 1 shows top and bottom view of the Sensor Panel Board.

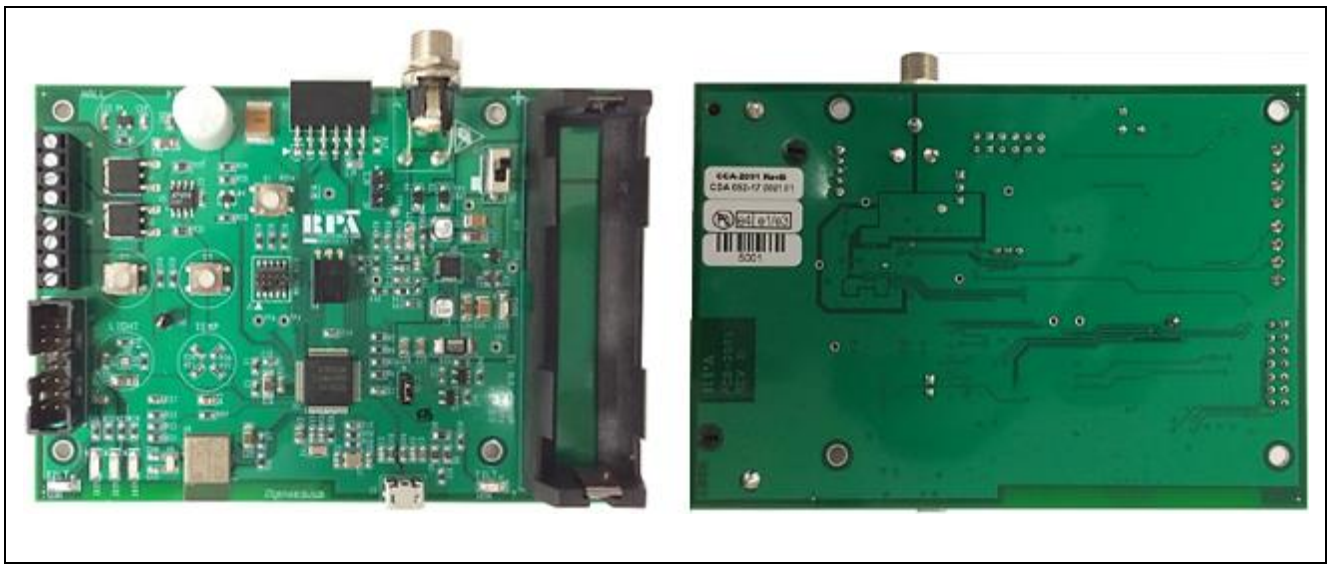


Figure 1 Sensor Panel Board

1.1 Specification Outline

The specification of Sensor Panel Board is described as below Table 1.

Table 1 Sensor Panel Board Specification

Item	Content
Dimension	3.25 inch x 4.725 inch
Mounting Hole Dimension	2.650 inch x 3.375 inch, Φ ⅛ inch
Operation Power Supply Voltage	5.0 V
Maximum Power Supply Current	100 mA
Operating Ambient Temperature/Humidity	0°C to +60°C, 10% to 80% RH (non condensing)

2. Sensor Panel System

Figure 2 shows the Sensor Panel System Block diagram. Typically the Sensor Panel board has five sections: Renesas Synergy™ S124 microcontroller (MCU), Bluetooth®, user input/output, Sensors, and regulated power supply with battery. Renesas Synergy™ S124 device is populated along with RL78/G1D BLE module (RY7011). Thus the acquisition of data from sensors are processed by S124 device and then transmitted through the Bluetooth® module RY7011. To connect with external device like thermostat, it has two digital inputs and two open drain outputs for controlling the device. In addition, there is one 12-pin PMOD™ connector so that you can utilize on adding more sensor like Accelerometer or LCD display. You can also monitors the environment parameter using board sensors like temperature, light, PIR, reed switch and Hall Effect switch. The Sensor Panel board is suitable to evaluate and develop various sensor applications with S124 device. Using slide switch (S5), the Sensor Panel board can be powered up with Li-ion battery or external power source.

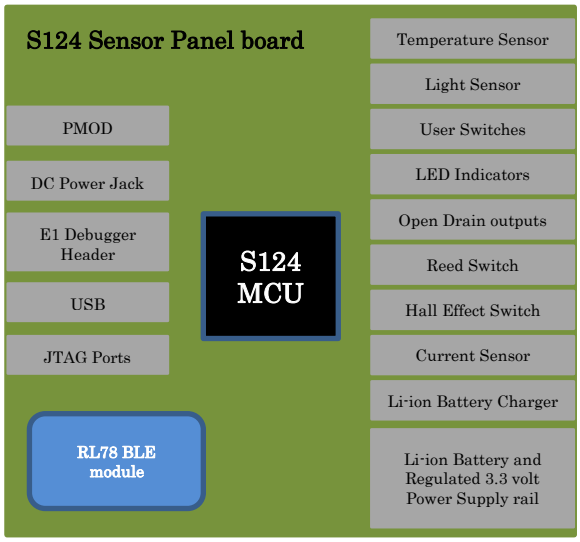


Figure 2 Renesas Synergy™ S124 Sensor Board System Block diagram

2.1 Renesas Synergy™ S124 device

This Sensor Panel board uses JTAG programming/debugging interface for S124 device. The JTAG signals can be used through JTAG connector (J1). Use the SEGGER J-Link for programming to the board and debugging for development. See detail in schematics sheet 2 of 6.

Table 2 JTAG

JTAG Description	Renesas Synergy™ S124 Microcontroller	
	Function Name	Pin
Test Mode Select	TMS/SWDIO	P108 (P1_8)
Test Clock	TCK/SWCLK	P300 (P3_0)
Test Data Out	TDO	P109 (P1_9)
Test Data In	TDI	P110 (P1_10)
Reset	RESET#	RESET#

To enable JTAG debug with S124 target on the Sensor Panel board, use with jumper JP1 for boot mode as below.

- Insert shunt jumper at JP1 SCI boot mode (serial programming mode).
- Remove shunt jumper at JP1 Normal boot mode.

2.2 RL78/G1D module (RY7011)

This RY7011 is a Bluetooth Low Energy module incorporated with the RL78/G1D device, 32-MHz crystal resonator for the RF section, and PCB antenna. This module has been certified on Japan's Radio Law, FCC certification, IC regulation, CE mark requirements, and the Bluetooth v4.1 specification. Thus it is suitable to use on Sensor Panel board yet low power consumption as below:

- RF transmission: 4.3 mA (TYP.)
- RF reception: 3.5 mA (TYP.)
- RF sleep (POWER_DOWN mode): 0.3 µA (TYP.)

3. Building Sample Project

3.1 Renesas Synergy™ S124 Firmware

This Sensor Panel board populates with Renesas Synergy™ S124 microcontroller to evaluate with onboard sensors. Thus, Sensor Panel board can be used as development platform. When using this Sensor Panel board, PMOD™ module can be added for extended feature through UART or CSI peripheral. For debugging and programming to S124 device, you can use JTAG connector (J1) with SEGGER J-Link debugger. For using S124 programmer/debugger tool and detail project development, refer Renesas website.
(Note: SEGGER J-Link download link: https://www.segger.com/downloads/jlink)

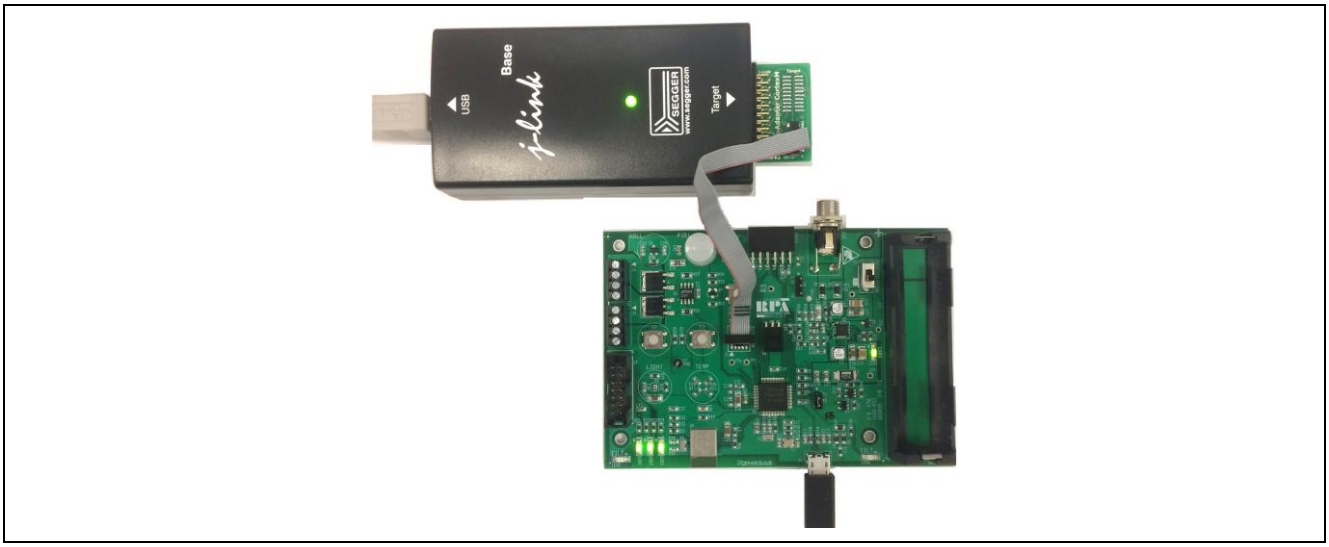


Figure 3 Renesas Synergy™ S124 Hardware Programming/Debugging setting

In order to build and debug the Renesas Synergy™ S124 firmware, you need e^2 studio version 5.3 or later and Renesas Synergy™ Software Package (SSP) 1.20. To begin debugging, import the project (**s1_Sensor_board_01**) from the following folder.

\..\ Renesas_Sensor_Panel_Demo\ Synergy_project\S124.

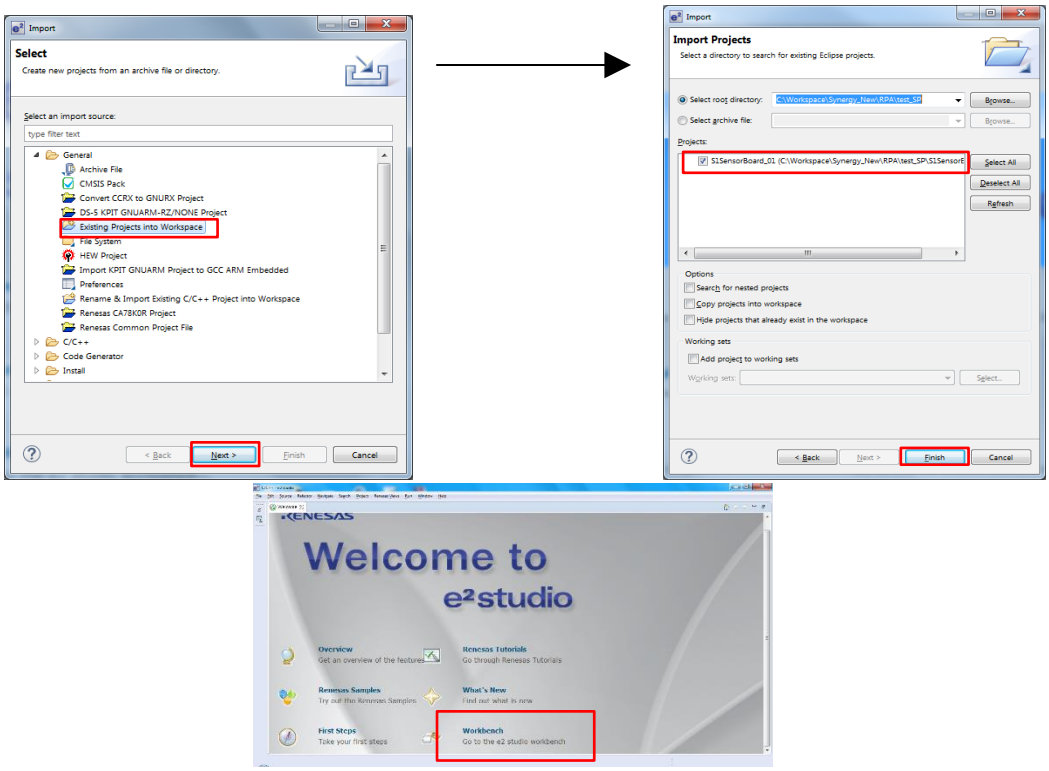


Figure 4 e² studio Workspace environment Import Projects

3.1.1 Importing the Renesas Synergy™ Project in e² studio Workspace

To import the project into e² studio workspace, following the below step 1 to 5.

1. First, launch the e² studio workspace.
2. Select **Import** from the File pulldown menu.
3. Select **Existing Projects into Workspace** from General, and click **Next**.
4. Browse the projects folder, select the files, and click **Finish**.
5. Clicking **Workbench** in the Welcome screen opens the Workspace (see Figure 5) and selects **Build All** (to build all the projects) from Project pulldown menu.

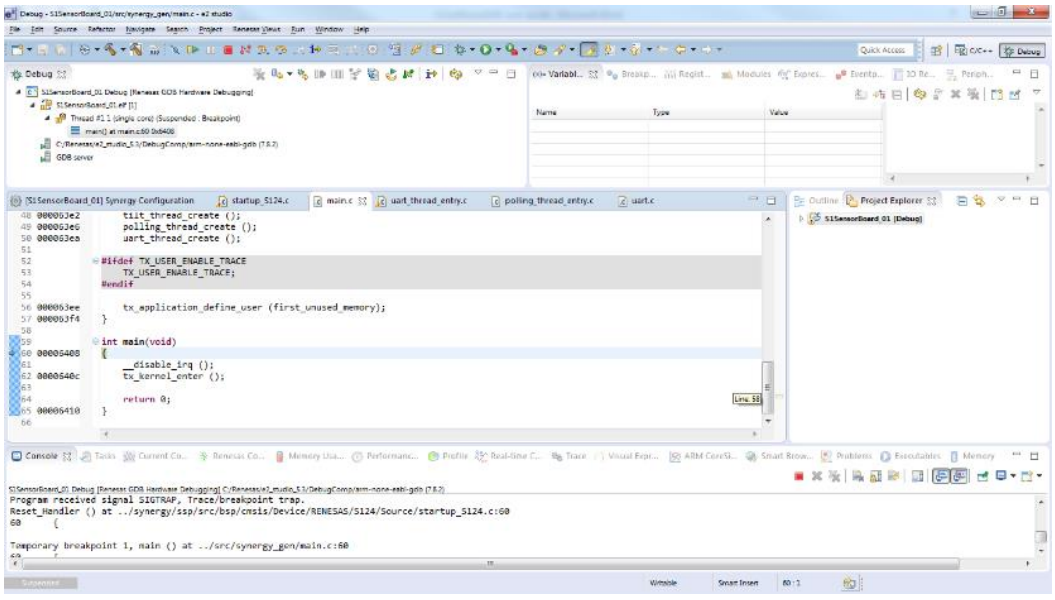


Figure 5 e² studio Workspace environment

3.1.2 Debugging the Renesas Synergy™ Project in e² studio Workspace

1. To enable JTAG debug function on the S124 Sensor Panel board, do the following (see Figure 3).
   The S124 Sensor Panel board uses JTAG as its programming/debugging interface. Insert shunt jumper at the JP1 location (ON position) on Sensor Panel Board.
   A. Attach the J-Link connector (J1) to the SEGGER J-Link debugger unit.
   B. Supply power to the Sensor Panel Board using provided battery or +5 VDC Power via USB micro-B (J2).
   Figure 3 shows the debug setting with SEGGER J-Link debugger.

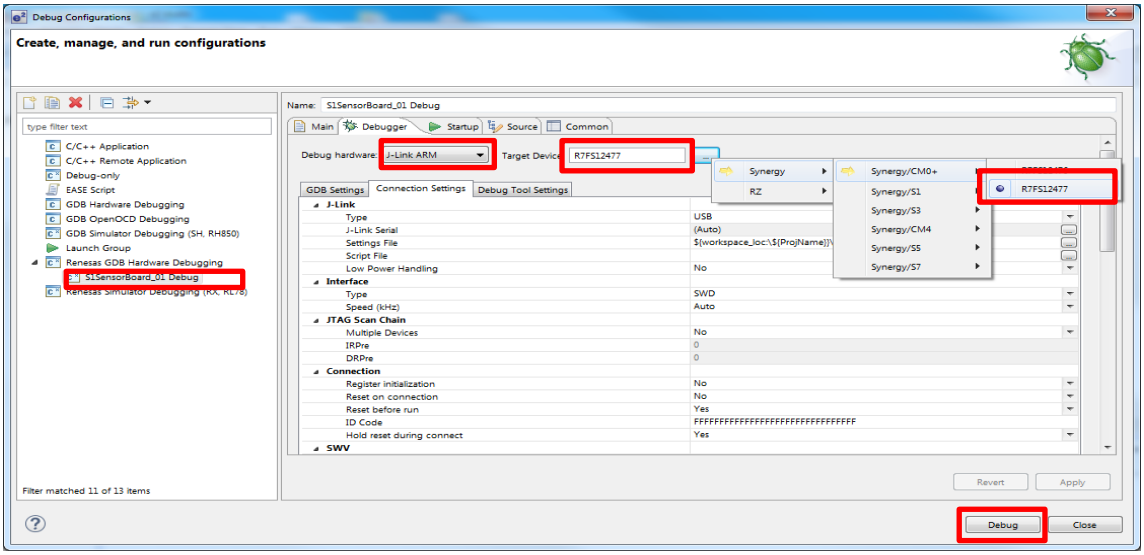


Figure 6 e² studio workspace debugging setup

2. Set the Debug configuration by selecting a project to debug.
3. Figure 6 shows the Debug Configuration window.
4. Select Debug Configuration from the Run pulldown menu.
5. Right-click Renesas GDB hardware Debugging.
6. Select New from the options menu to create a new debug launch.
7. Select the **Debugger** tab (see Figure 6).
8. Select Arm's **J-Link** for debug hardware and **R7FS12477** for Target Device.
9. Click **Debug** to start debugging.
   Figure 7 shows the **Debug** window. Click **Resume** (F8) to run the program in Debug mode.

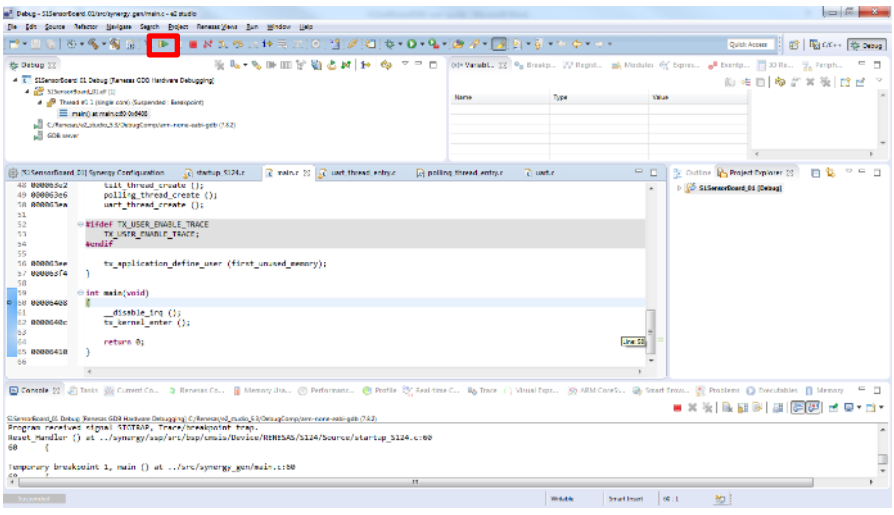


Figure 7 e² studio workspace in debugging mode for Renesas Synergy™ S124

3.2 Renesas RL78/G1D Firmware

This Sensor Panel board populates with Renesas Bluetooth® module, RY7011 that includes RL78/G1D device to evaluate for Bluetooth® communication. Thus, Sensor Panel board is suitable for developing a wireless communication platform.

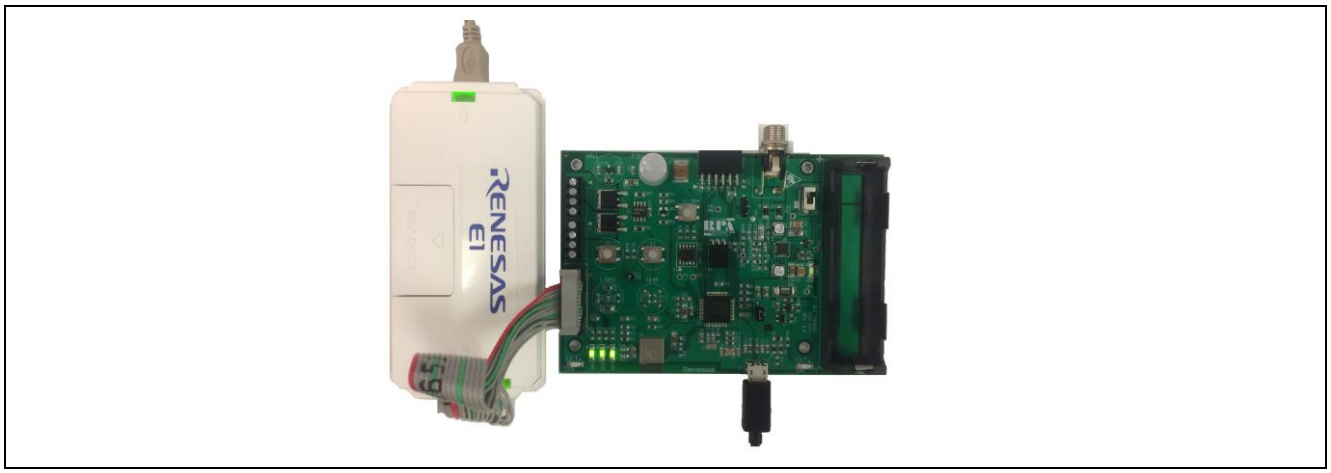


Figure 8 RL78/G1D device Hardware Programming/Debugging setting

To build the RL78/G1D beacon firmware, you need e^2 studio version 5.3 or later and the CCRL compiler v1.00.

3.2.1 Importing the RL78/G1D Project in e^2 studio Workspace

1. To begin debugging, import the project (R5F11AGJ_Beacon) from the following folder and follow the procedure in section 3.1.1.
   \..\Renesas_Sensor_Panel_Demo\ RL_project\uart_beacon
   Figure 9 shows the project in the e^2 studio for Renesas Beacon firmware project.

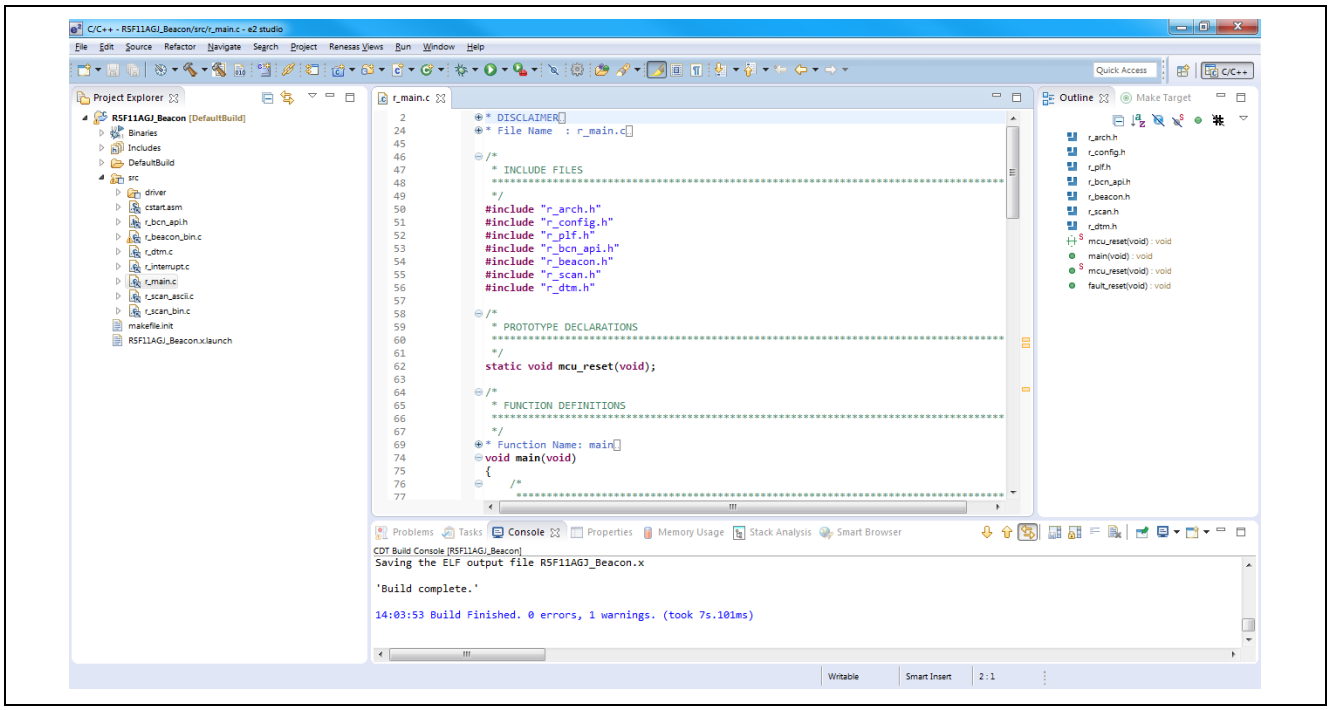


Figure 9 e^2 studio with RL78 / G1D firmware project

2. Select Rebuild All from the Project pulldown menu to build the project.
   The binary image output (R5F11AGJ_Beacon.hex) is placed in the following folder.
   \..\Renesas_Sensor_Panel_Demo\RL_project\uart_beacon\Project_Source\application\project\e2_cc\BLE_Software\R5F11AGJ_Beacon

3.2.2 Debugging the RL78/G1D Project in e² studio Workspace

1. To enable debug function on Sensor Panel board for the RL78/G1D device, do the following (see Figure 10). The Sensor Panel board uses E1 as its programming/debugging interface.
   A. Attach the 14-pin connector (J9) to the E1 debugger unit.
   B. Supply power to the Sensor Panel Board using provided battery or +5 VDC Power via USB micro-B (J2). Figure 9 shows the debug setting with SEGGER J-Link debugger.

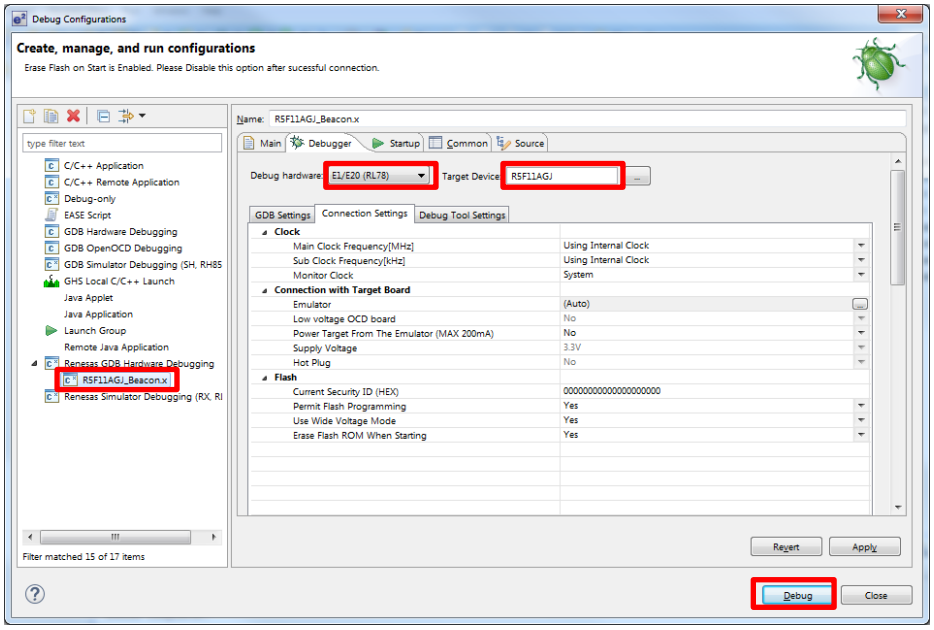


Figure 10 e² studio workspace in debugging mode for RL78/G1D

2. Set the Debug configuration by selecting a project to debug. Figure 10 shows the Debug Configuration window.
3. Select Debug Configuration from the Run pulldown menu.
4. Right-click Renesas GDB hardware Debugging.
5. Select New from the options menu to create a new debug launch.
6. Select the **Debugger** tab (see Figure 6).
7. Select **E1/E20(RL78)** for debug hardware and **R5F11AGJ** for Target Device.
8. Click **Debug** to start debugging.

Figure 11 shows the **Debug** window. Click **Resume** (F8) to run the program in Debug mode.

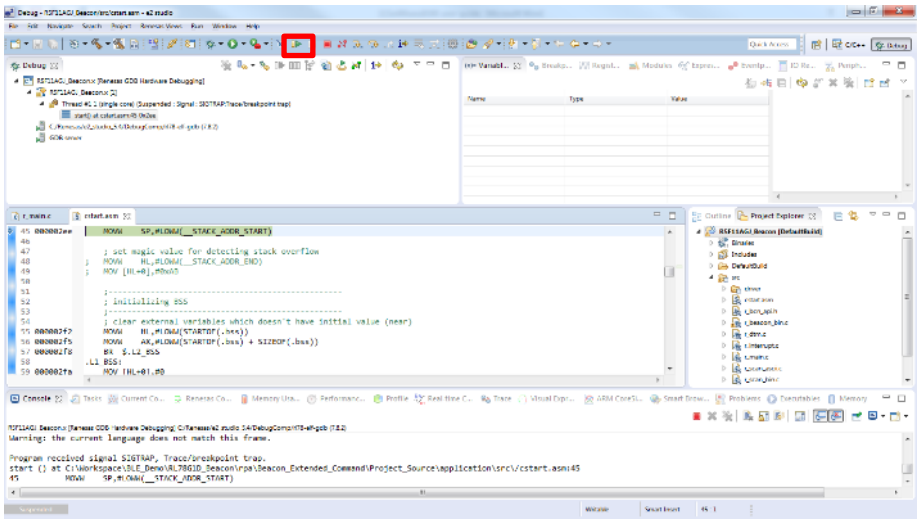


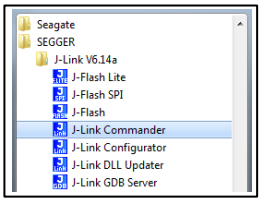
Figure 11 e² studio workspace in debugging mode for RL78/G1D

4. Programming to Sensor Panel

4.1 Renesas Synergy™ S124 device

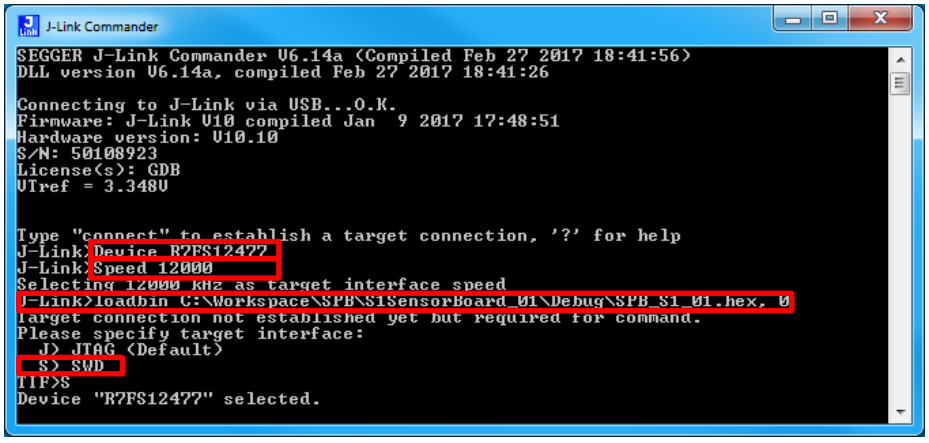
Step 1. Attach the J-Link connector (J1) to the SEGGER J-Link debugger unit and attach PC USB connector via micro USB cable for power supply. See Figure 3.
Note: Set up the Sensor Panel board with remove the shunt jumper at JP1 location.

Step 2. Open J-Link Commander from Start menu in All Programs, SEGGER folder.



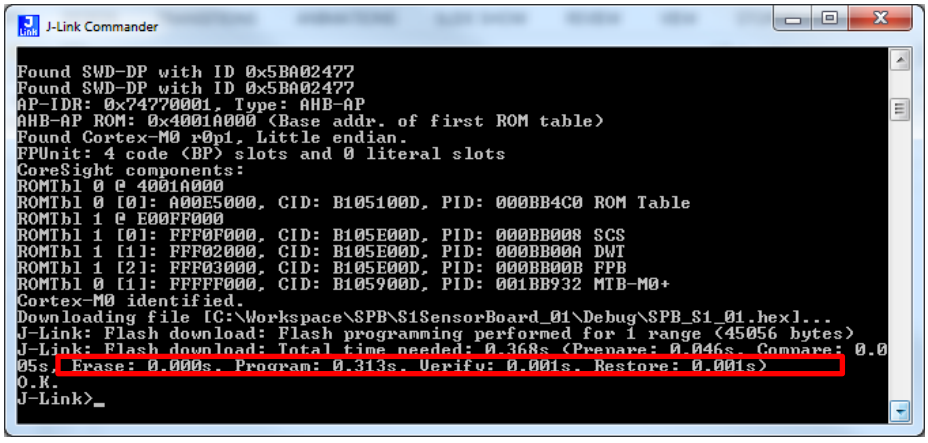
Step 3. Enter the below commands to program target device.

1. Device R7FS12477
2. Speed 12000
3. loadbin C:\...\ROM_File\file_name.hex, 0
4. S



Step 4. Note: This Healthcare Meters Kit includes following Hex files for respective modules

a. The S7G2 Starter Kit (scanner) : Security_Panel_S7.hex
b. The S124 Sensor Panel (beacon): Security_Panel_S124.hex



Step 5. After programming, disconnect the board from the PC to evaluate.

4.2 RL78/G1D module (RY7011)

To program the RL78/G1D Bluetooth®, you use the E1 programmer and perform the following steps:

Step 1. Connect the Renesas E1 programmer/Debugger to connector J9 on the Sensor Panel board. See Figure 8 for connection.

Step 2. To program RL78/G1D Beacon project output (R5F11AGJ_Beacon_SPB.hex), launch the Renesas Flash Programmer (RFP). See Figure 12 for applicable screens.

Step 3. Create a new project. Select the RL78 device and set the power supply to 3.3 Volts. Click OK.

Step 4. Select the Operation tab to load the program file (R5F11AGJ_Beacon_SPB.hex).

Step 5. Click Start to begin to program.

For details on RFP usage, refer to R20UT3841E.

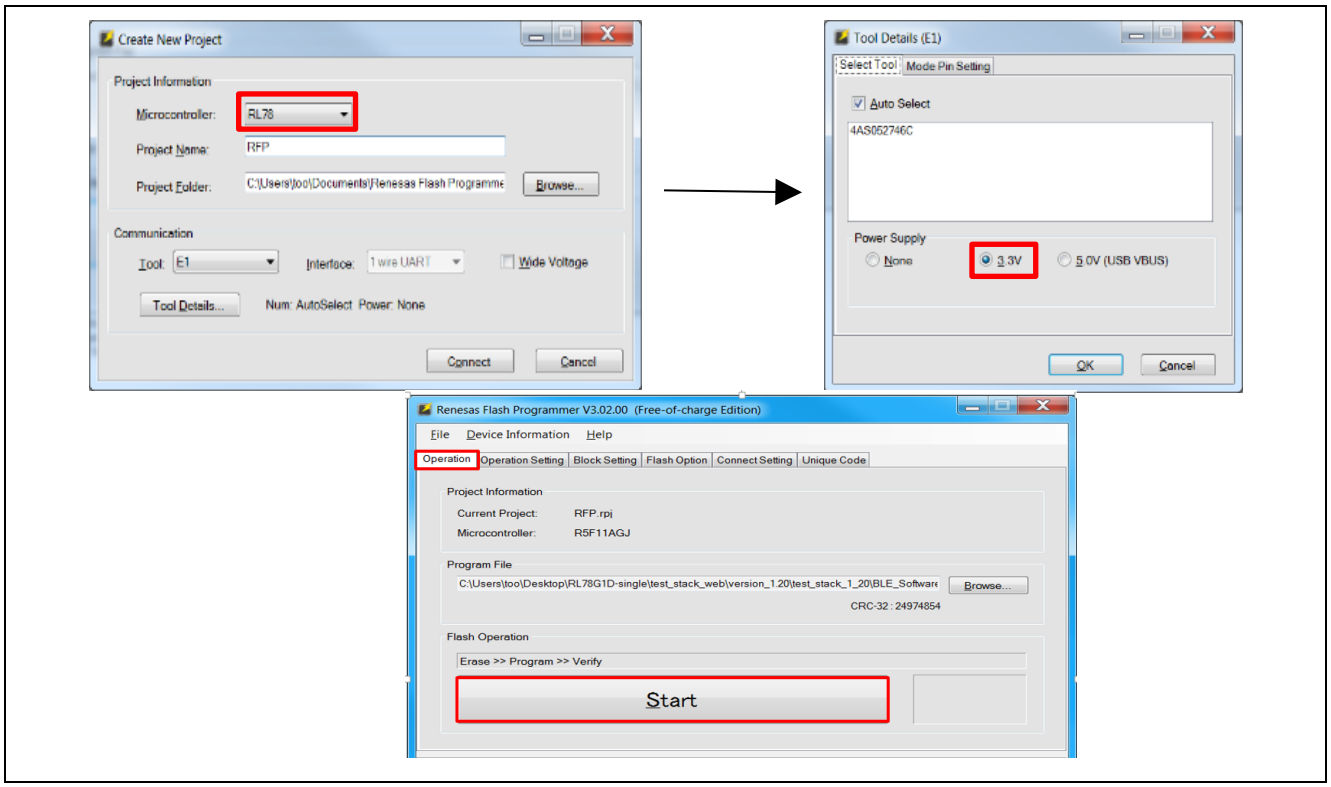


Figure 12 Renesas Flash Programmer

5. Circuit Diagram

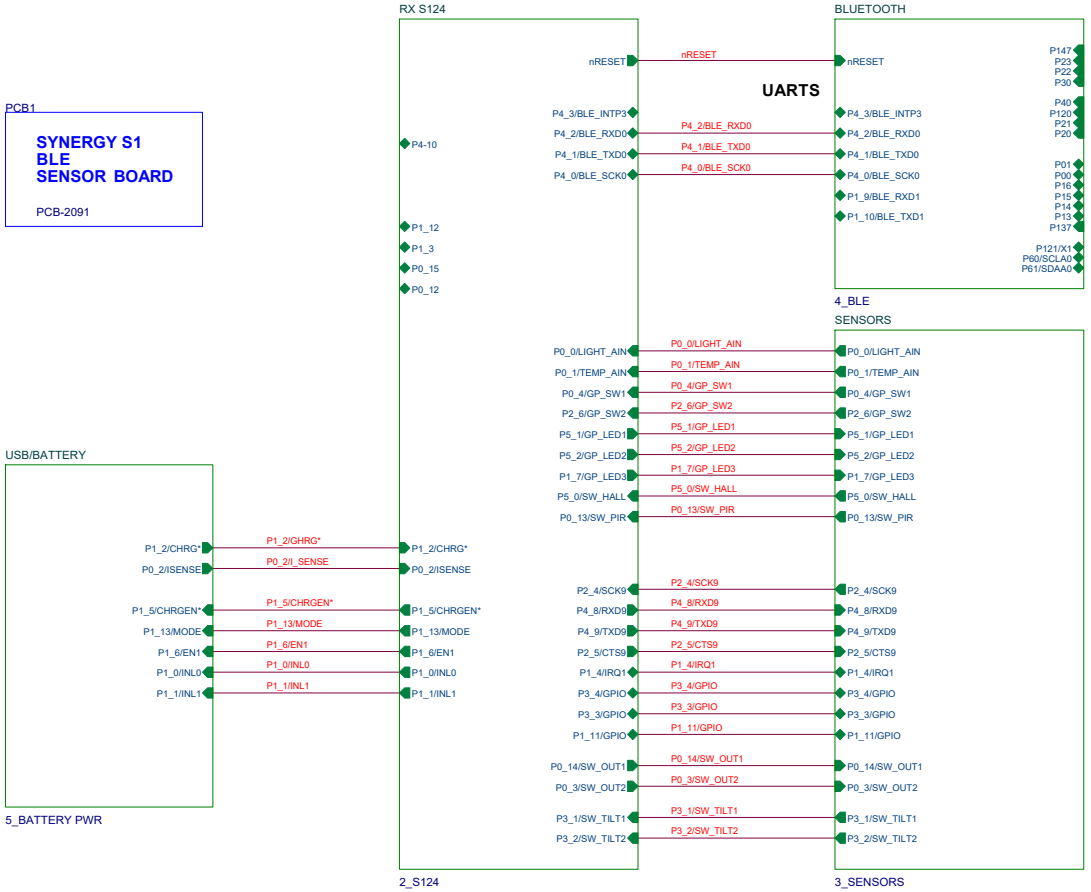
This section shows the Sensor Panel board schematics in total 6 sheets and RL78/G1D Module (RM-110-RFB-2) schematics in total one sheet.

NOTES:

1. ALL RESISTORS ARE %5 UNLESS OTHERWISE NOTED.

2. NETS WITHOUT SHEET TO SHEET REFERENCE ARE CONNECTED ON PAGE.

REVISIONS		(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)		
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-
-		-	-	-



TOP LEVEL BLOCK

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LINEAR DIM INCH

X +/-0.1
X.X +/-0.04
X.XX +/-0.010
X.XXX

ANGLES +/-1.0 DEG

INTERPRET DRAWING PER ANSI Y14.100

THIRD ANGLE PROJECTION

CONTRACT:	<CONTRACT>	
ENGR:	D.THOMAS	1/3/17
DRAWN:	M.RADLEY	1/3/17
CHECK:	NAME	yyyy/mm/dd

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
Phone:(607)771-0393 Fax:(607)771-0658
www.rpaelectronics.com

SCHEMATIC DIAGRAM

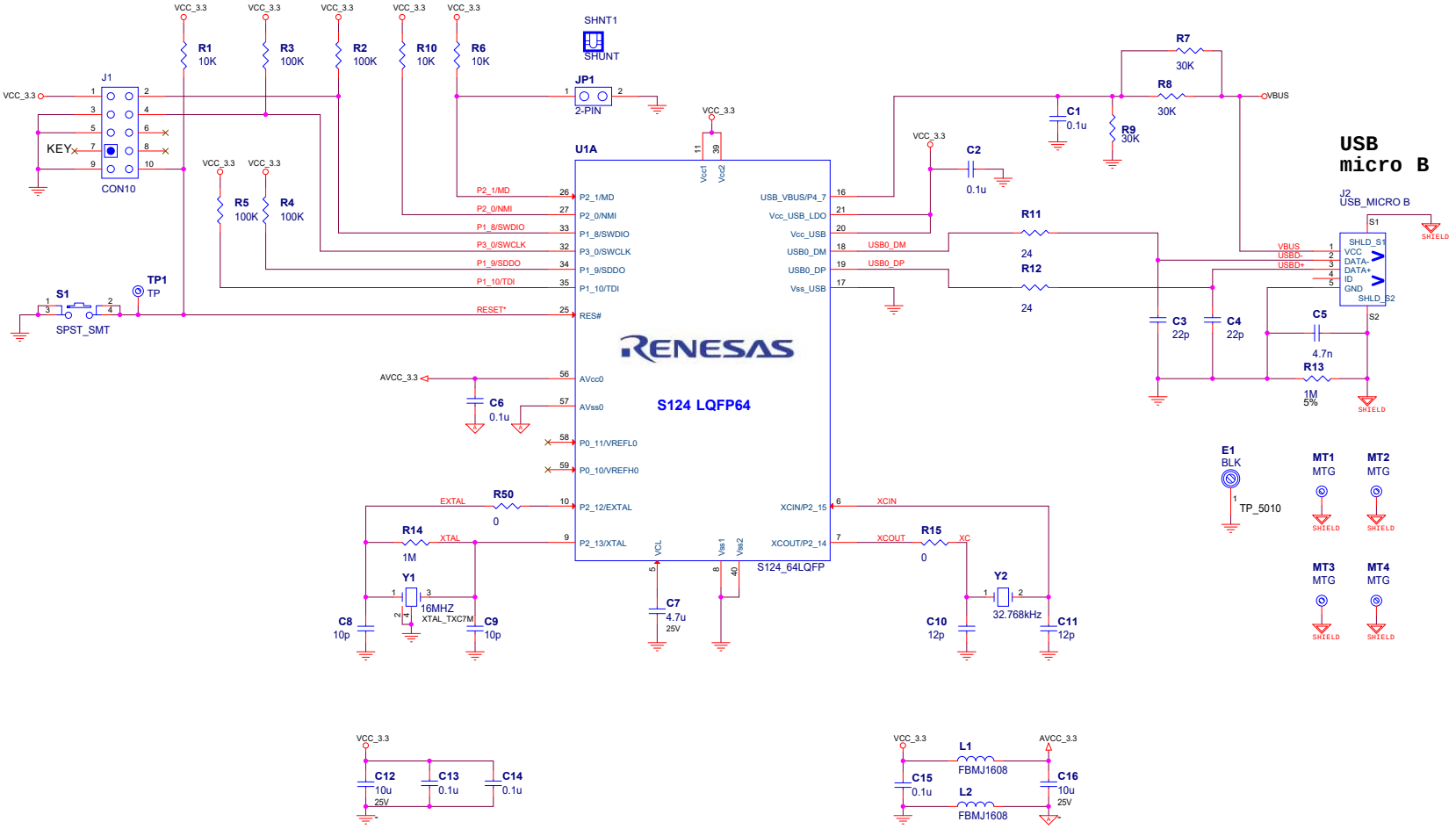
SYNERGY S1 BLE SENSOR BOARD

SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0

SCALE NONE

SHEET 1 OF 6

REVISIONS		(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)		
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-



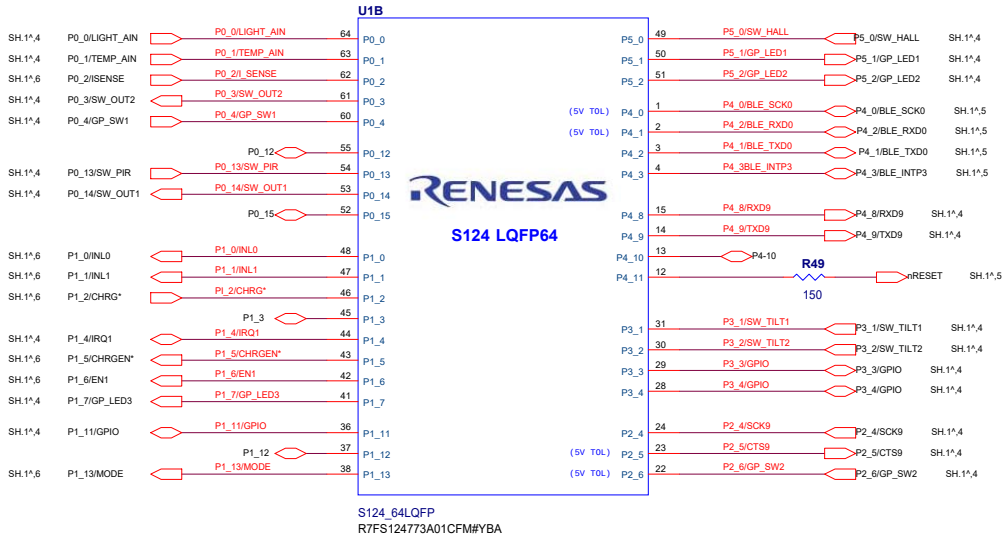
RX111 CONFIG

SCHEMATIC DIAGRAM

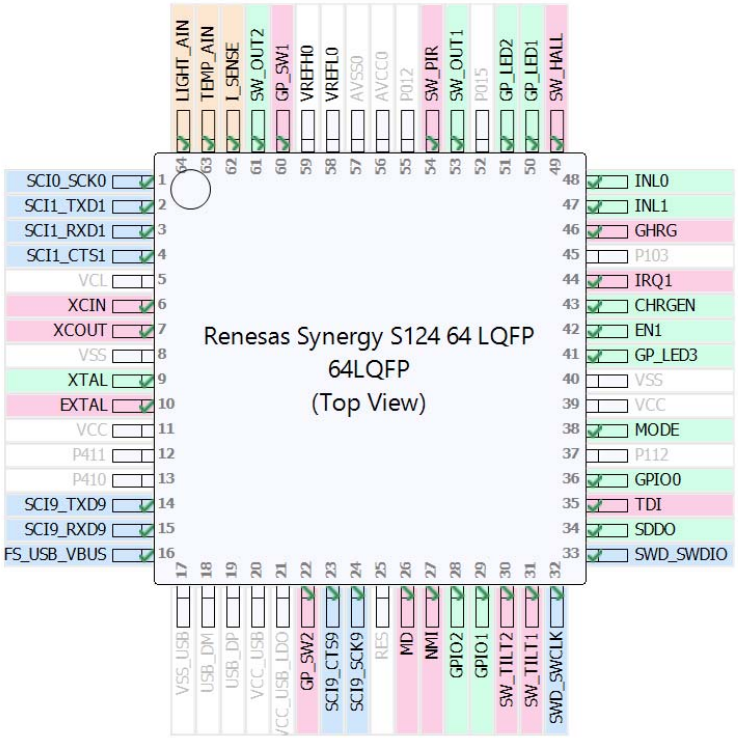
SYNERGY S1 BLE SENSOR BOARD

SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0
SCALE NONE	DATE 1/3/17	SHEET 2 OF 6	

REVISIONS		(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)		
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-
-		-	-	-



S124_64LQFP
R7FS124773A01CFM#YBA



PORT 0		
PORT	FUNCTION	SIGNAL
P0_0	AN000	P0_0/LIGHT_AIN
P0_1	AN001	P0_1/TEMP_AIN
P0_2	INPUT	P0_2/I_SENSE
P0_3	OUTPUT	P0_3/SW_OUT2
P0_4	INPUT	P0_4/GP_SW1
P0_10	-	-
P0_11	-	-
P0_12	-	-
P0_13	INPUT	P0_13/SW_PIR
P0_14	OUTPUT	P0_14/SW_OUT1
P0_15	-	

PORT 1		
PORT	FUNCTION	SIGNAL
P1_0	OUTPUT	P1_0/INL0
P1_1	OUTPUT	P1_1/INL1
P1_2	INPUT	PI_2/GHRG*
P1_3	-	-
P1_4	IRQ1	P1_4/IRQ1
P1_5	OUTPUT	P1_5/CHRGEN*
P1_6	OUTPUT	P1_6/EN1
P1_7	OUTPUT	P1_7/GP_LED3
P1_11	OUTPUT	P1_11/GPIO
P1_12	-	-
P1_13	OUTPUT	P1_13/MODE

PORT 2		
PORT	FUNCTION	SIGNAL
P2_4	SCK9	P2_4/SCK9
* P2_5	CTS9	P2_5/CTS9
* P2_6	INPUT	P2_6/GP_SW2

PORT 3		
PORT	FUNCTION	SIGNAL
P3_1	INPUT	P3_1/SW_TILT1
P3_2	INPUT	P3_2/SW_TILT2
P3_3	OUTPUT	P3_3/GPIO
P3_4	OUTPUT	P3_4/GPIO

PORT 4		
PORT	FUNCTION	SIGNAL
P4_0	SCK1_B	P4_0/BLE_SCK0
P4_1	TXD1_B	P4_2/BLE_RXD0
P4_2	RXD1_B	P4_1/BLE_TXD0
P4_3	-	-
P4_8	RXD9	P4_8/RXD9
P4_9	TXD9	P4_9/TXD9
P4_10		
P4_11		

PORT 5		
PORT	FUNCTION	SIGNAL
P5_0	INPUT	P5_0/SW_HALL
P5_1	OUTPUT	P5_1/GP_LED1
P5_2	OUTPUT	P5_2/GP_LED2

Mode:
Analog mode
Input mode
Output mode
Peripheral Mode

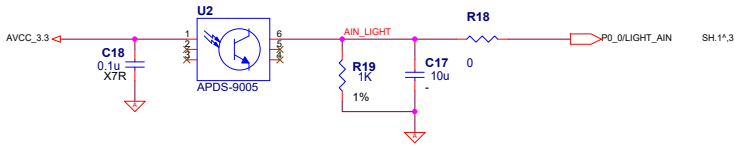
CORE INTERFACE

SCHEMATIC DIAGRAM
SYNERGY S1 BLE SENSOR BOARD

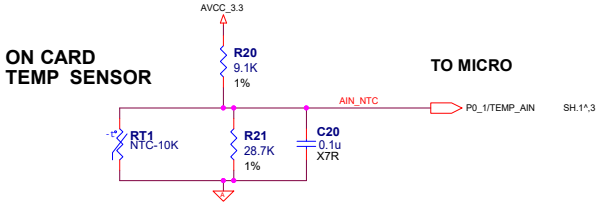
SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0
SCALE NONE	DATE 1/3/17	SHEET 3 OF 6	

REVISIONS	(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)			
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-

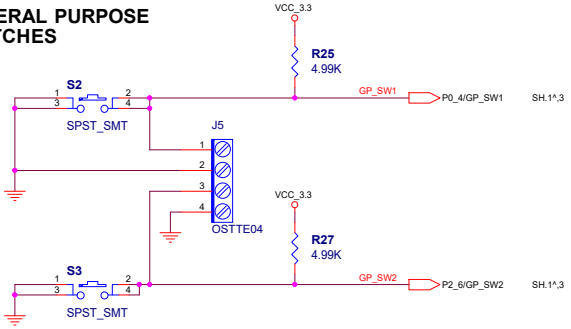
ON CARD LIGHT SENSOR



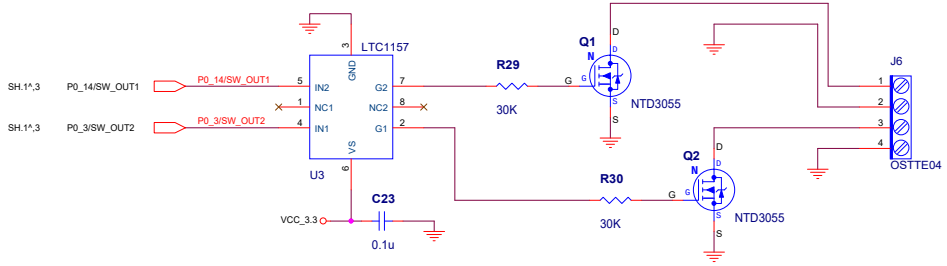
ON CARD TEMP SENSOR



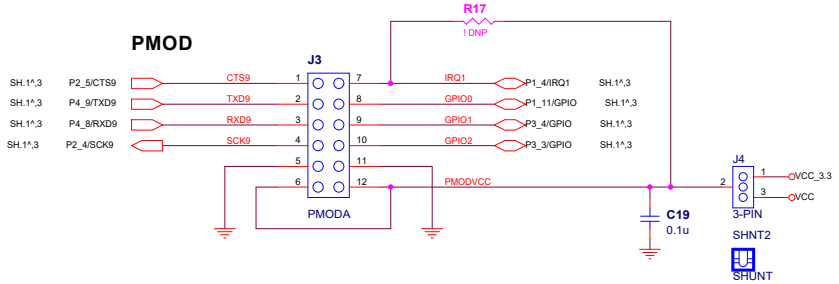
GENERAL PURPOSE SWITCHES



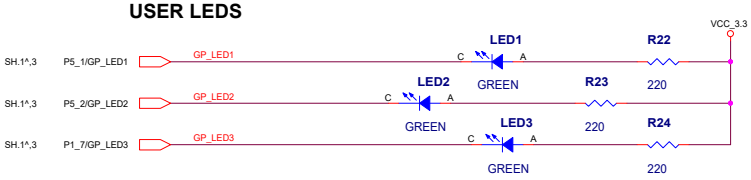
LOW SIDE SWITCHES



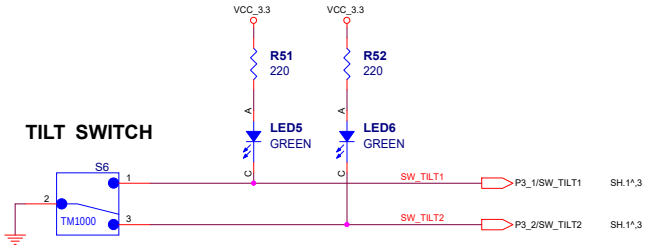
PMOD



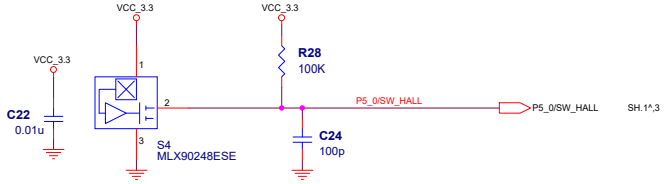
USER LEDS



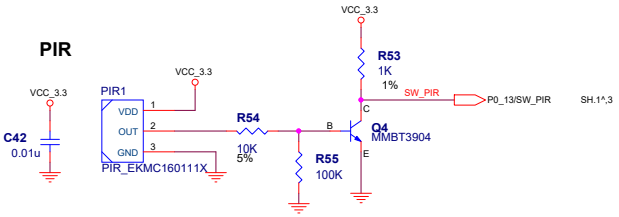
TILT SWITCH



HALL EFFECT SWITCH



PIR



SENSORS

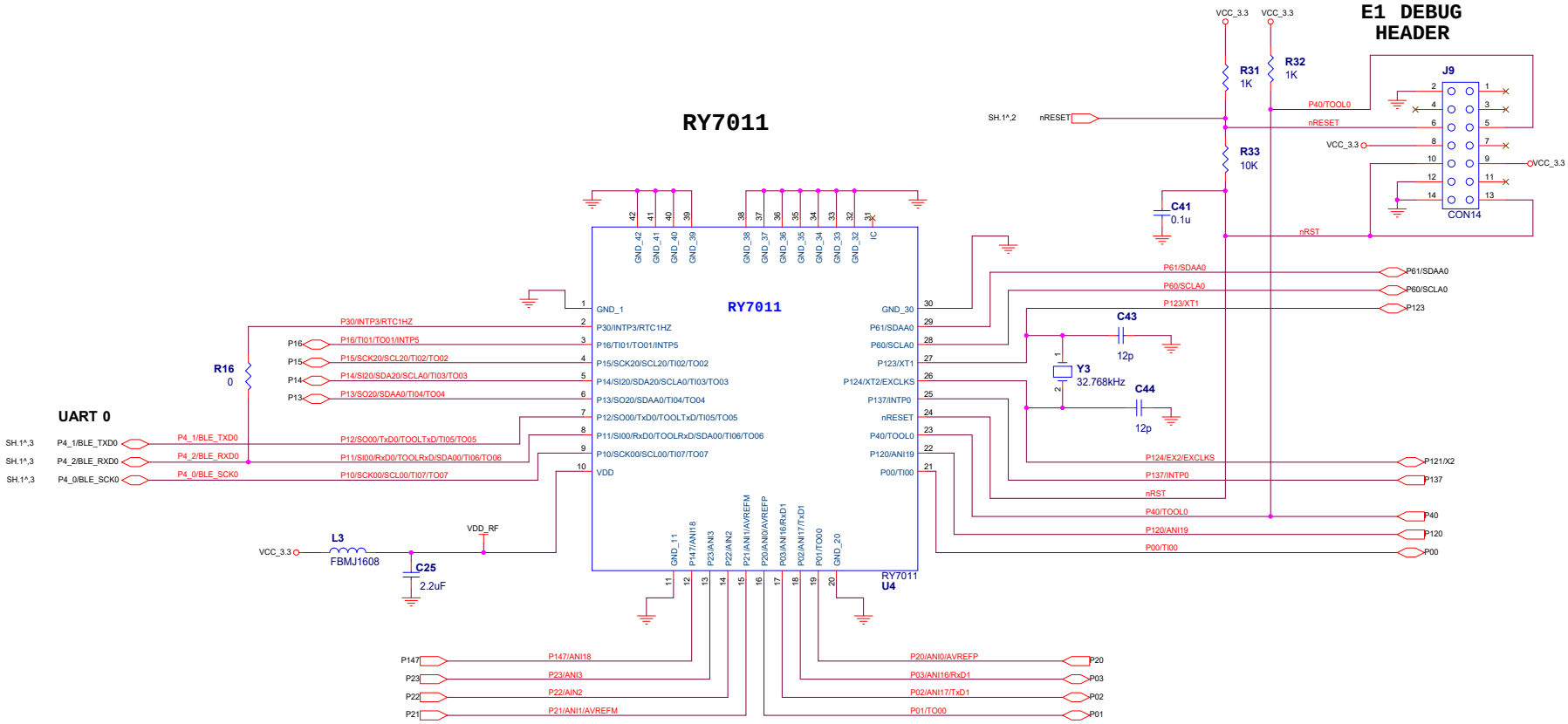
SCHEMATIC DIAGRAM

SYNERGY S1 BLE SENSOR BOARD

SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0

SCALE	DATE	SHEET
NONE	1/3/17	4 OF 6

REVISIONS	(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)			
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-
-		-	-	-



RENESAS BLUETOOTH MODULE

SCHEMATIC DIAGRAM

SYNERGY S1 BLE SENSOR BOARD

SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0

SCALE	NONE	DATE	1/3/17	SHEET	5	OF	6

REVISIONS	(MAINTAIN ALL SHEETS AT SAME REVISION LEVEL)			
REV	EO NO	DESCRIPTION	DATE	APPROVED
B0		RELEASE	1/3/17	-
-		-	-	-

EXT +5V SUPPLY

J10 — 2.1mm_PWR_JACK (PIN 1, SHUNT 2, SLEEVE 3)

D1 — PMEG6010, DIODE_SOD123F

USB

D2 — PMEG6010, DIODE_SOD123F

VBUS

VCC

R34 10K 5%

C27 10u 25V

U5 — LTC3566

Pin	Name
21	VBUS
3	NTC
15	PROG
2	CLPROG
1	LDO3V3
23	CHRGEN
8	MODE
24	EN1
14	ILIM1
13	ILIM0
6, 12, 25	GND_6, GND_12, GND_PAD
22	SW
20	VOUT
18	GATE
19	BAT
17	GND_17
9	VIN1
16	CHRG
7	SWAB1
11	SWCD1
10	VOUT1
4	FB1
5	VC1

RT2 NTC-10K

TP8 TP

TP9 TP

R35 2.15K 1%

R36 3.0K 5%

C29 0.1u X7R

R38 0 — LDO3V3

TP7 TP

C31 1u X7R

R39 10K 5%

VCC_3.3

SH.1^,3 P1_5/CHRGEN* — CHRGEN*

SH.1^,3 P1_13/MODE — MODE

SH.1^,3 P1_6/EN1 — EN1

SH.1^,3 P1_0/INL0 — INL0

SH.1^,3 P1_1/INL1 — INL1

L4 3.3uH COIL_LPS4018

L5 2.2uH COIL_LPS4018

Q3 SI2333CDS

S5 CKN9565 (OFF / ON)

J11 3039

VOUT

vbat+.3

TP2 TP

TP3 TP

C28 22u 25V

C30 2.2uF X7R

R37 1K 1%

LED4 GREEN

CHRG* — P1_2/CHRG* — SH.1^,3

TP4 TP

VIN_3.3

3.3V@1A

R40 24 5%

R41 121K 1%

C32 33p X7R

R42 324K 1%

TP5 TP

C33 22u 25V

C34 330p NPO

R43 15K 1%

R44 105K 1%

C35 10p X7R

INPUT CURRENT LIMIT SETTINGS

ILIM1	ILIM0	CURRENT LIMIT
0	0	100mA (1X)
0	1	1A (10X)
1	0	SUSPEND (500uA)
1	1	500mA (5X)

CURRENT SENSE

U6 — LT6106

R45 100 1%

R46 0.05 1W 1% RSENSE

R47 1K

R48 4.99K 5% <TYPE>

U7 — MCP6401U

C36 0.1u

I_SENSE — P0_2/ISENSE — SH.1^,3

LOAD — VCC_3.3

TP6 TP

C37 0.1u

C38 4.7u 25V Y5V

C39 4.7u 25V Y5V

C40 4.7u 25V Y5V

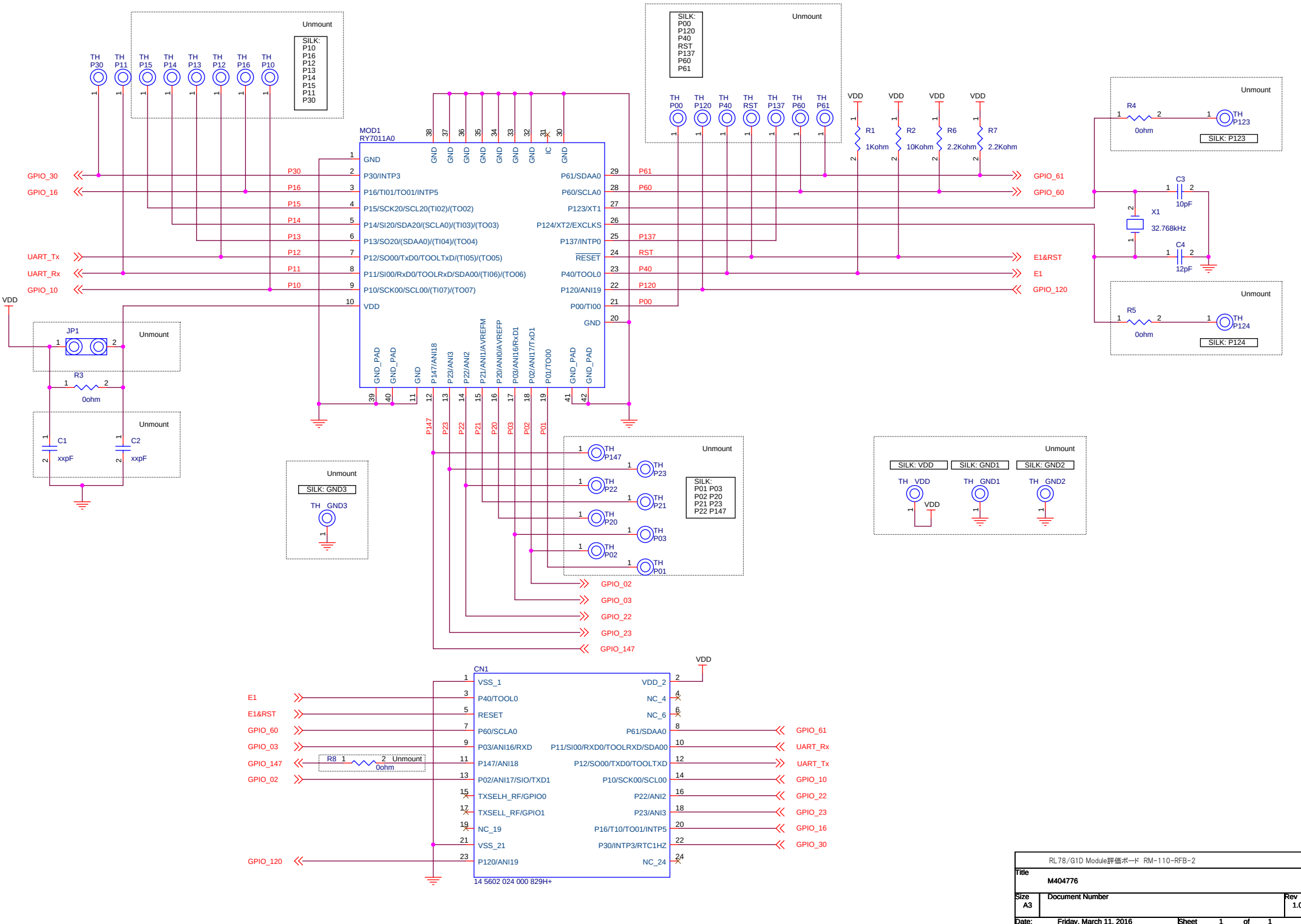
3.3V PWR

SCHEMATIC DIAGRAM

SYNERGY S1 BLE SENSOR BOARD

SIZE	CAGE CODE	DWG NO	REV
C	5D7K6	SCH-2091	B0

SCALE	DATE	SHEET
NONE	1/3/17	6 OF 6


Unmount
SILK: P10 P16 P12 P13 P14 P15 P11 P30
TH P30
TH P11
TH P15
TH P14
TH P13
TH P12
TH P16
TH P10
SILK: P00 P120 P40 RST P137 P60 P61
TH P00
TH P120
TH P40
TH RST
TH P137
TH P60
TH P61
MOD1
RY7011A0
GND
P30/INTP3
P16/TI01/TO01/INTP5
P15/SCK20/SCL20(TI02)/(TO02)
P14/SI20/SDA20/(SCLA0)/(TI03)/(TO03)
P13/SO20/(SDAA0)/(TI04)/(TO04)
P12/SO00/TxD0/TOOLTxD/(TI05)/(TO05)
P11/SI00/RxD0/TOOLRxD/SDA00/(TI06)/(TO06)
P10/SCK00/SCL00/(TI07)/(TO07)
VDD
P61/SDAA0
P60/SCLA0
P123/XT1
P124/XT2/EXCLKS
P137/INTP0
RESET
P40/TOOL0
P120/ANI19
P00/TI00
GND
GND_PAD
P147/ANI18
P23/ANI3
P22/ANI2
P21/ANI1/AVREFM
P20/ANI0/AVREFP
P03/ANI16/RxD1
P02/ANI17/TxD1
P01/TO00
GPIO_30
GPIO_16
UART_Tx
UART_Rx
GPIO_10
GPIO_61
GPIO_60
E1&RST
E1
GPIO_120
VDD
JP1
R3
0ohm
C1
C2
xxpF
R1
1Kohm
R2
10Kohm
R6
2.2Kohm
R7
2.2Kohm
R4
R5
0ohm
TH P123
TH P124
SILK: P123
SILK: P124
C3
C4
10pF
12pF
X1
32.768kHz
SILK: P01 P03 P02 P20 P21 P23 P22 P147
TH P147
TH P23
TH P22
TH P21
TH P20
TH P03
TH P02
TH P01
GPIO_02
GPIO_03
GPIO_22
GPIO_23
GPIO_147
SILK: GND3
TH GND3
SILK: VDD
SILK: GND1
SILK: GND2
TH VDD
TH GND1
TH GND2
CN1
VSS_1
P40/TOOL0
RESET
P60/SCLA0
P03/ANI16/RXD
P147/ANI18
P02/ANI17/SIO/TXD1
TXSELH_RF/GPIO0
TXSELL_RF/GPIO1
NC_19
VSS_21
P120/ANI19
VDD_2
NC_4
NC_6
P61/SDAA0
P11/SI00/RXD0/TOOLRXD/SDA00
P12/SO00/TXD0/TOOLTXD
P10/SCK00/SCL00
P22/ANI2
P23/ANI3
P16/T10/TO01/INTP5
P30/INTP3/RTC1HZ
NC_24
R8 0ohm
14 5602 024 000 829H+
RL78/G1D Module評価ボード RM-110-RFB-2
Title
M404776
Size A3
Document Number
Rev 1.0
Date: Friday, March 11, 2016
Sheet 1 of 1

Website and Support

Renesas Electronics Website
http://www.renesas.com/

Inquiries
http://www.renesas.com/contact/

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Nov 15, 2017	–	Initial Release

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

   Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment when power is supplied.

   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

   Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

   — The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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 or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other disputes involving 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, including but not limited to, the product data, drawing, chart, program, algorithm, application examples.
3. 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 shall not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics products.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended 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 (traffic lights); large-scale communication equipment; key financial terminal systems; safety control 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 (space and undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability 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. When using the Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat radiation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions or failure or accident 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 Renesas Electronics 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 ensure to implement safety measures to guard them against the possibility of bodily injury, injury or damage caused by fire, and social damage in the event of failure or malfunction of Renesas Electronics products, 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 by your own responsibility as warranty for your products/system. Because the evaluation of microcomputer software alone is very difficult and not practical, 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 investigate applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive carefully and sufficiently and use Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall 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 shall not use Renesas Electronics products or technologies for (1) any purpose relating to the development, design, manufacture, use, stockpiling, etc., of weapons of mass destruction, such as nuclear weapons, chemical weapons, or biological weapons, or missiles (including unmanned aerial vehicles (UAVs)) for delivering such weapons, (2) any purpose relating to the development, design, manufacture, or use of conventional weapons, or (3) any other purpose of disturbing international peace and security, and you shall not sell, export, lease, transfer, or release Renesas Electronics products or technologies to any third party whether directly or indirectly with knowledge or reason to know that the third party or any other party will engage in the activities described above. When exporting, selling, transferring, etc., Renesas Electronics products or technologies, you shall comply with any applicable export control laws and regulations promulgated and administered by the governments of the countries asserting jurisdiction over the parties or transactions.
10. Please acknowledge and agree that you shall bear all the losses and damages which are incurred from the misuse or violation of the terms and conditions described in this document, including this notice, and hold Renesas Electronics harmless, if such misuse or violation results from your resale or making Renesas Electronics products available any third party.
11. This document shall not be reprinted, 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.

(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.

(Rev.3.0-1 November 2016)

RENESAS

SALES OFFICES Renesas Electronics Corporation http://www.renesas.com

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

Renesas Electronics America Inc.
2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL II Stage, Indiranagar, Bangalore, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

Colophon 6.0