

# BCPX3 Evaluation Kit J80D2

R30AN0314EJ0100

Rev.1.00

Oct 1, 2017

## RTK0EE0007D02001BJ Schematics and BOM

### Introduction

This document describes the schematics and the bill of materials of BCPX3 Evaluation Kit J80D1.

### Contents

<b>1. Schematics</b> .....	<b>2</b>
<b>1.1 PLC board</b> .....	<b>2</b>
<b>1.1.1 PLC modem LSI (R9A06G037:CPX3)</b> .....	<b>2</b>
<b>1.1.2 PLC output stage and AFE (ISL15110) circuit</b> .....	<b>3</b>
<b>1.1.3 MCU peripheral circuit</b> .....	<b>4</b>
<b>1.1.4 Power supply circuit</b> .....	<b>5</b>
<b>1.2 RL78 MCU BOARD</b> .....	<b>6</b>
<b>1.3 POWER FILTER BOARD</b> .....	<b>7</b>
<b>2. Bill of materials</b> .....	<b>8</b>
<b>2.1 PLC board</b> .....	<b>8</b>
<b>2.2 RL78 MCU BOARD</b> .....	<b>10</b>
<b>2.3 POWER FILTER BOARD</b> .....	<b>11</b>

# 1. Schematics

## 1.1 PLC board

### 1.1.1 PLC modem LSI (R9A06G037:CPX3)

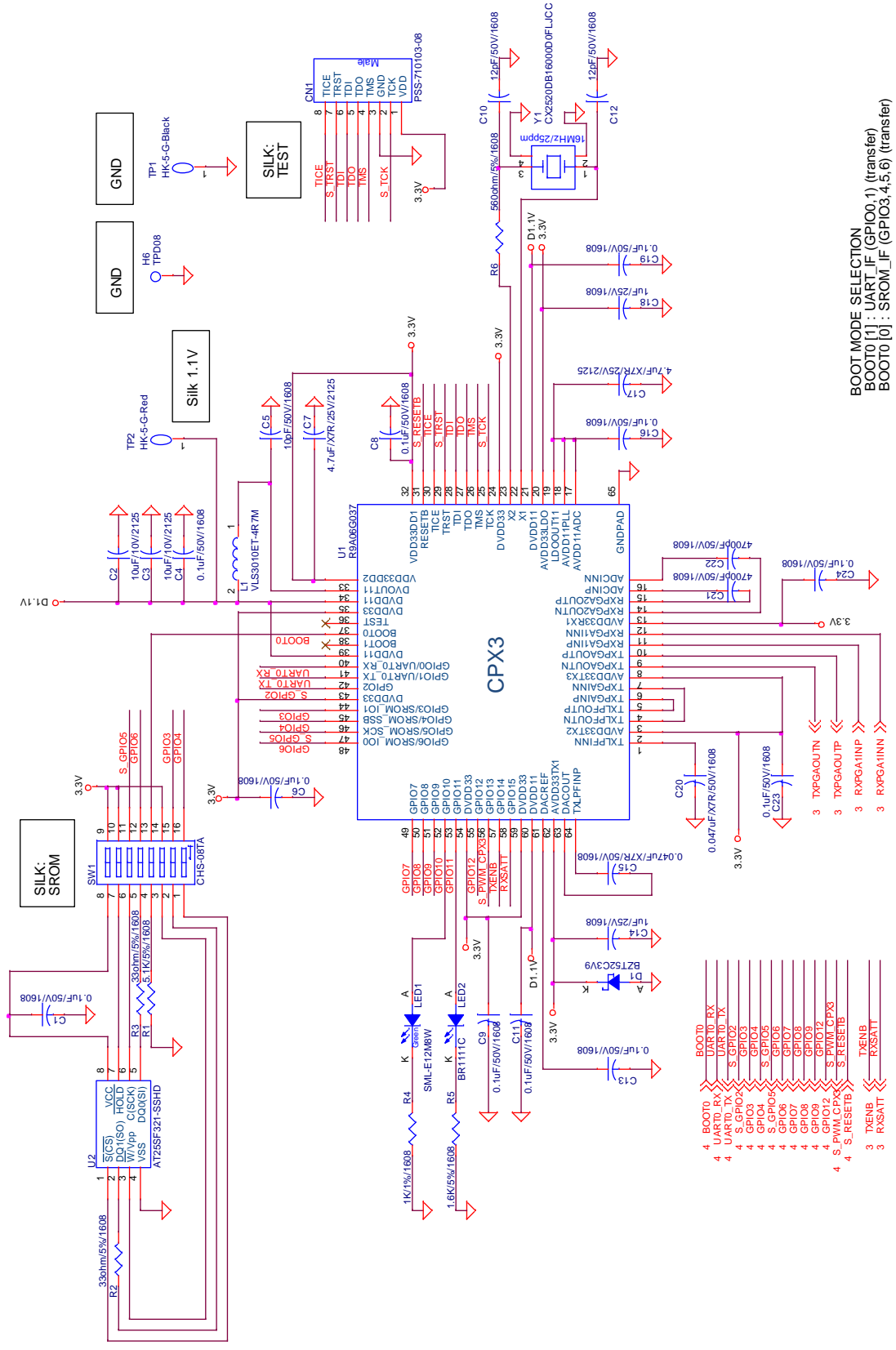


Figure 1-1 PLC board (1/4)

1.1.2 PLC output stage and AFE (ISL15110) circuit

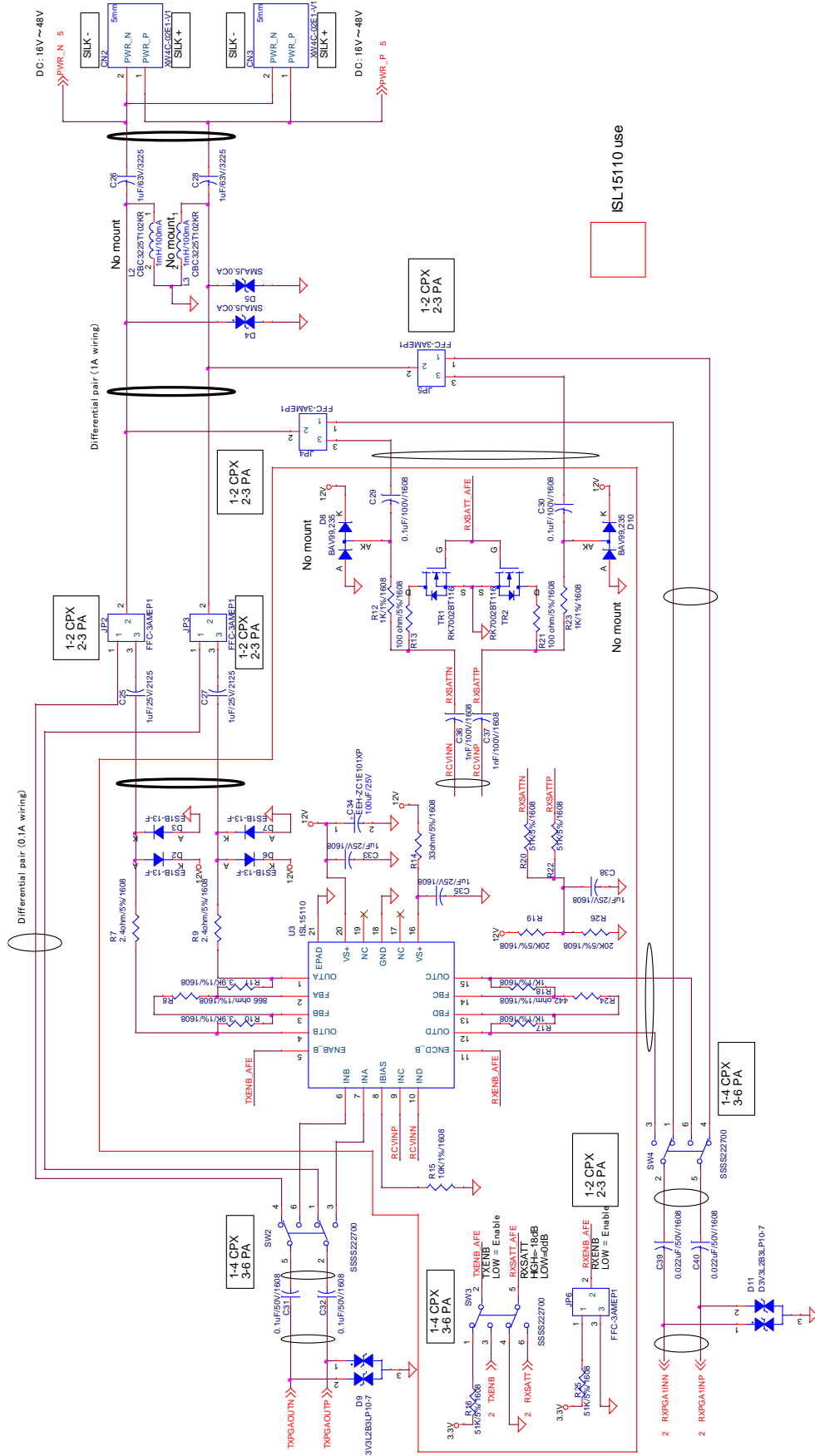


Figure 1-2 PLC board (2/4)

1.1.3 MCU peripheral circuit

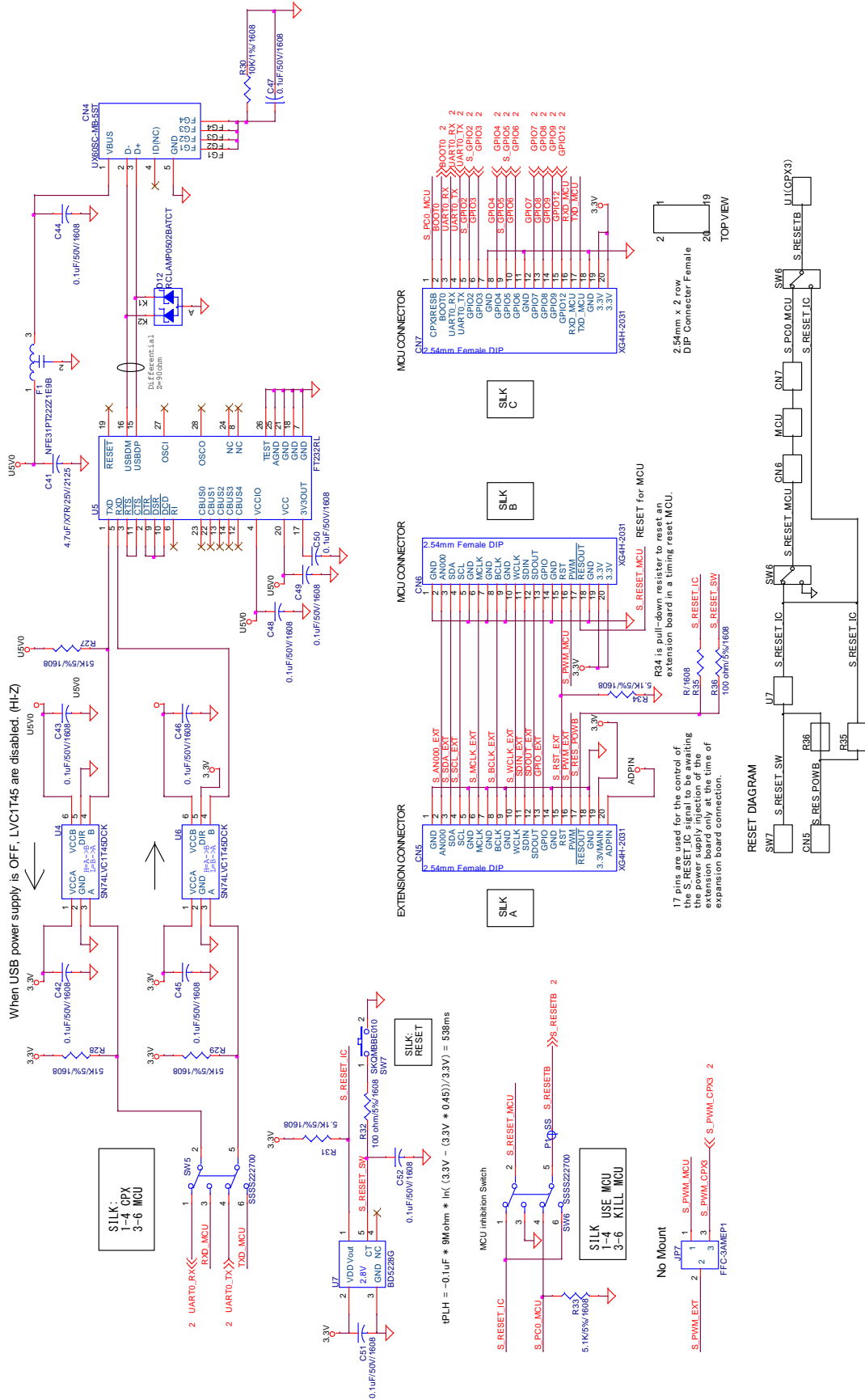


Figure 1-3 PLC board (3/4)

1.1.4 Power supply circuit

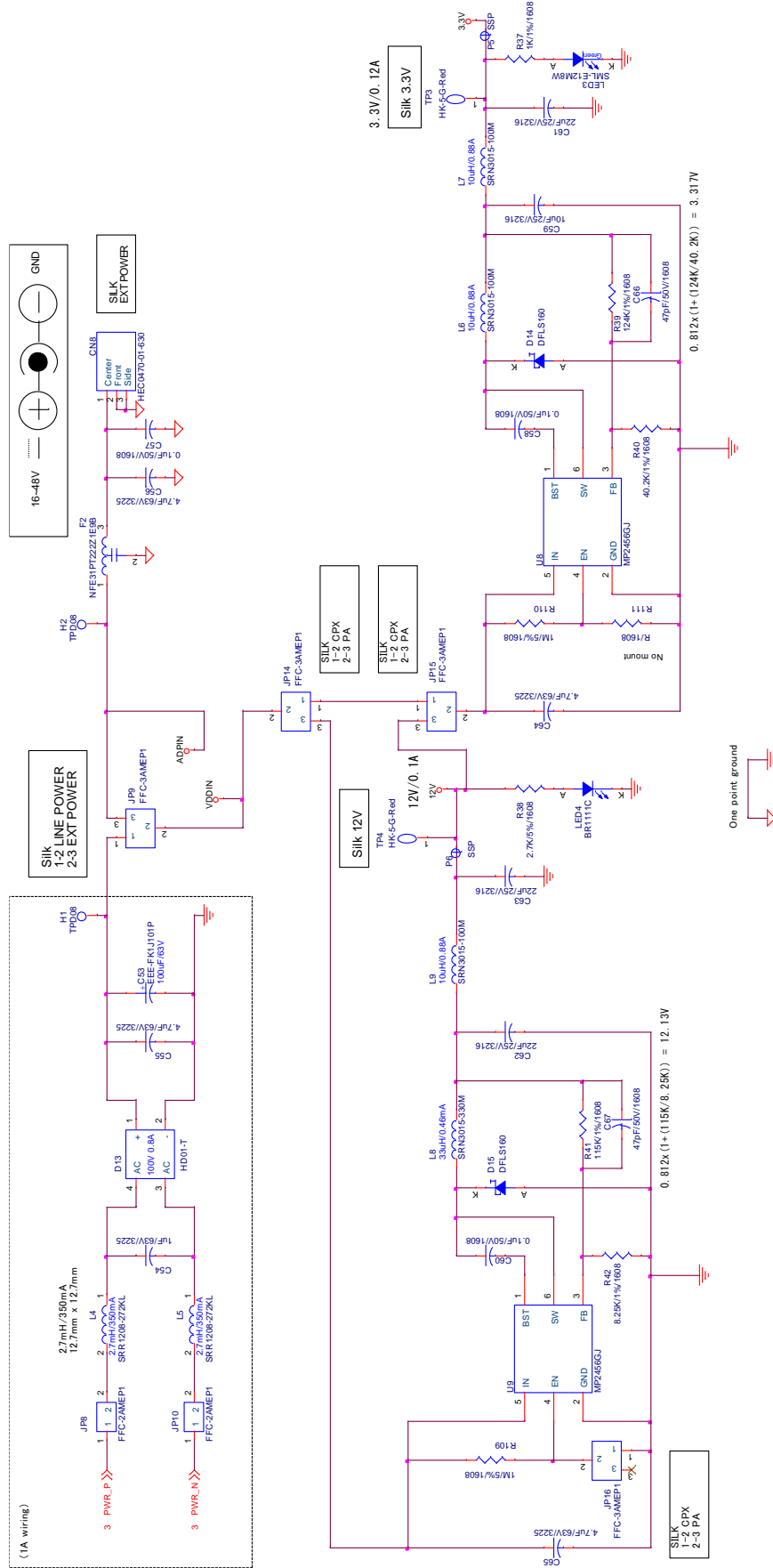


Figure 1-4 PLC board (4/4)

1.2 RL78 MCU BOARD

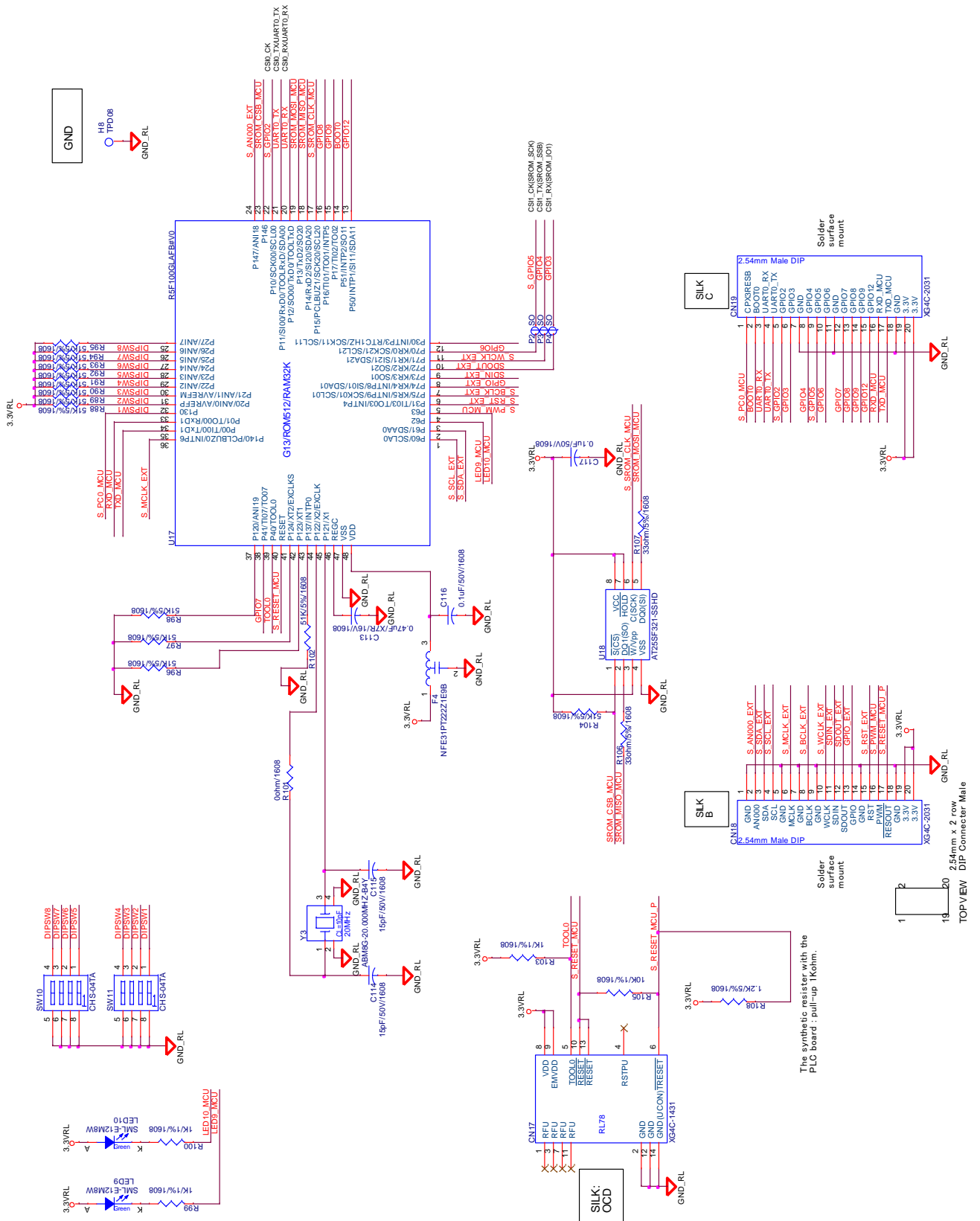


Figure 1-5 RL78 MCU board

1.3 POWER FILTER BOARD

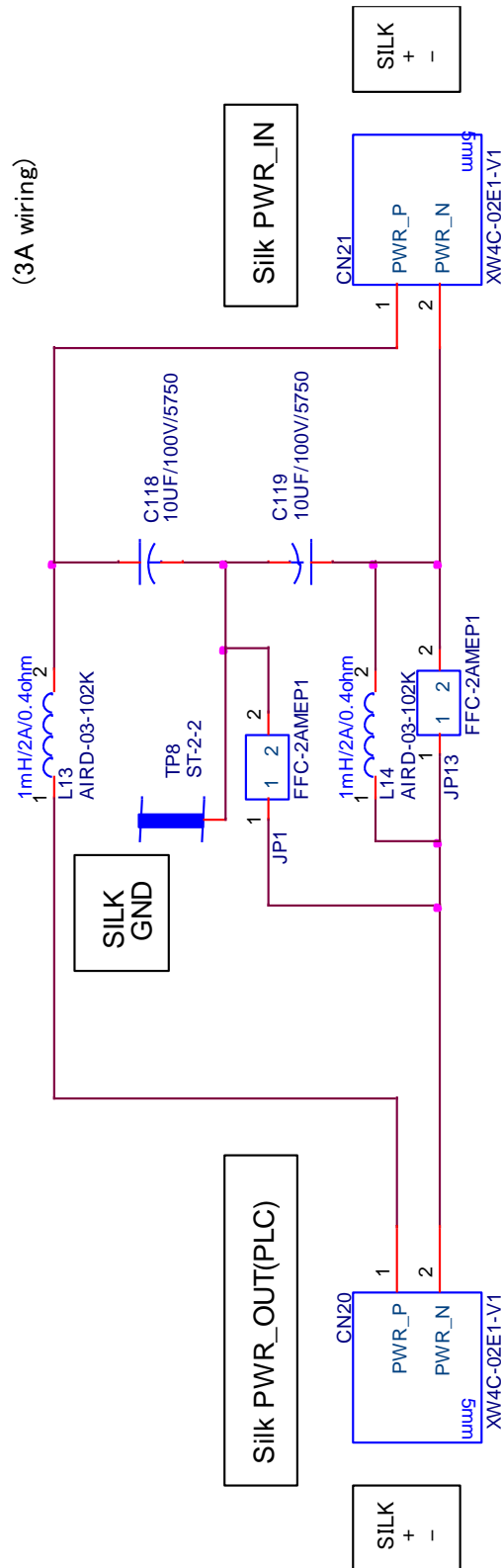


Figure 1-6 Power Filter board

## 2. Bill of materials

### 2.1 PLC board

Table 2.1 PLC board (1/2)

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
1	CN1	CONNECTOR	PSS-710103-08	HIROSUGI	
2	CN2,CN3	CONNECTOR	SPT2,5/2-V-5.0	Phoenix Contact	alternative: XW4C-02E1-V1(OMRON)
1	CN4	CONNECTOR	UX60SC-MB-5ST	HIROSE	
3	CN5,CN6,CN7	CONNECTOR	XG4H-2031	HONDA	
1	CN8	CONNECTOR	HEC0470-01-630	HOSHIDEN	
27	C1,C4,C6,C8,C9,C11,C13,C16,C19,C23,C24,C31,C32,C42,C43,C44,C45,C46,C47,C48,C49,C50,C51,C52,C57,C58,C60	CERAMIC CAPACITOR	GRM188B31H104KA92D	Murata	alternative: 0.1uF/50V/1608 X5R/B
2	C2,C3	CERAMIC CAPACITOR	GRM21BR61A106KE19L	Murata	alternative: 10uF/10V/2125 X5R/B
1	C5	CERAMIC CAPACITOR	GRM1882C1H100JA01D	Murata	alternative: 10pF/50V/1608 CH
3	C7,C17,C41	CERAMIC CAPACITOR	GRM21BR71E475KA73L	Murata	alternative: 4.7uF/25V/2125/X7R
2	C10,C12	CERAMIC CAPACITOR	GRM1882C1H120JA01D	Murata	alternative: 12pF/50V/1608/CH
5	C14,C18,C33,C35,C38	CERAMIC CAPACITOR	GRM188B31E105KA75D	Murata	alternative: 1uF/25V/1608 X5R/B
2	C15,C20	CERAMIC CAPACITOR	CC0603KRX7R9BB473	Yageo	alternative: 0.047uF/50V/1608/X7R
2	C21,C22	CERAMIC CAPACITOR	GRM1882C1H472JA01D	Murata	alternative: 4700pF/50V/1608/CH
2	C25,C27	CERAMIC CAPACITOR	GRM21BR71E105KA99L	Murata	alternative: 1uF/25V/2125/X7R
3	C26,C28,C54	CERAMIC CAPACITOR	HMK325B7105KN-T	Taiyo Yuden	alternative: 1uF/X7R/63V/3225
2	C29,C30	CERAMIC CAPACITOR	HMK107B7104MAHT	Taiyo Yuden	alternative: 0.1uF/X7R/100V/1608
1	C34	ALUM CAP	EEH-ZC1E101XP	Panasonic	
2	C36,C37	CERAMIC CAPACITOR	C1608X7R2A102K080AA	TDK	alternative: 1000pF/X7R/100V/1608
1	C53	ALUM CAP	EEE-FK1J101P	Panasonic	
4	C55,C56,C64,C65	CERAMIC CAPACITOR	HMK325BJ475KM-PE	Taiyo Yuden	alternative: 4.7uF/X5R,B/63V/3225
1	C59	CERAMIC CAPACITOR	C3216X5R1E106K160AB	TDK	alternative: 10uF/25V/3216 X5R/B
3	C61,C62,C63	CERAMIC CAPACITOR	GRM31CR61E226KE15L	Murata	alternative: 22uF/25V/3216 X5R/B
2	C66,C67	CERAMIC CAPACITOR	GRM1882C1H470JA01D	Murata	alternative: 47pF/50V/1608/CH
1	D1	DIODE	BZT52C3V9	Diodes Inc	
4	D2,D3,D6,D7	DIODE	ES1B-13-F	Diodes Inc	
2	D4,D5	DIODE	SMAJ5.0CA-TR	STMicroelectronics	
2	D9,D11	DIODE	D3V3L2B3LP10-7	Diodes Inc	
1	D12	DIODE	RCLAMP0502BATCT	Semtech	
1	D13	BRIDGE DIODE	HD01-T	Diodes Inc	
2	D14,D15	DIODE	DFLS160-7	Diodes Inc	
2	F1,F2	FILTER	NFE31PT222Z1E9	Murata	
2	JP8,JP10	CONNECTOR	FFC-2AMEP1	HONDA	
9	JP2,JP3,JP4,JP5,JP6,JP9,JP14,JP15,JP16	CONNECTOR	FFC-3AMEP1	HONDA	
2	LED1,LED3	LED	SML-E12M8W	Rohm	
2	LED2,LED4	LED	BR1111C	STANLEY	
1	L1	INDUCTOR	VLS3010ET-4R7M	TDK	alternative: VLS3010ET-4R7M-CA
2	L4,L5	INDUCTOR	SRR1208-272KL	Bourns Inc	
3	L6,L7,L9	INDUCTOR	SRN3015-100M	Bourns	



Table 2.2 PLC board (2/2)

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
1	L8	INDUCTOR	SRN3015-330M	Bourns	
4	R1,R31,R33,R34	RESISTOR	RK73B1JTTD512J	KOA	alternative: 5.1K/5%/1608
3	R2,R3,R14	RESISTOR	RK73B1JTTD330J	KOA	alternative: 33ohm/5%/1608
6	R4,R12,R17,R18,R23,R37	RESISTOR	RK73H1JTTD1001F		alternative: 1K/1%/1608
1	R5	RESISTOR	RK73B1JTTD162J	KOA	alternative: 1.6K/5%/1608
1	R6	RESISTOR	RK73B1JTTD561J	KOA	alternative: 560ohm/5%/1608
2	R9,R7	RESISTOR	RK73B1JTTD2R4J	KOA	alternative: 2.4ohm/5%/1608
1	R8	RESISTOR	ERJ3EKF8660V	Panasonic	alternative: 866 ohm/1%/1608
2	R11,R10	RESISTOR	RK73B1JTTD392J	KOA	alternative: 3.9K/1%/1608
4	R13,R21,R32,R36	RESISTOR	RK73B1JTTD101J	KOA	alternative: 100 ohm/5%/1608
2	R15,R30	RESISTOR	RK73H1JTTD1002F	KOA	alternative: 10K/1%/1608
7	R16,R20,R22,R25,R27,R28,R29	RESISTOR	RK73B1JTTD513J	KOA	alternative: 51K/5%/1608
2	R19,R26	RESISTOR	RK73B1JTTD203J	KOA	alternative: 20K/5%/1608
1	R24	RESISTOR	RK73H1JTTD4420F	KOA	alternative: 442 ohm/1%/1608
1	R38	RESISTOR	RK73B1JTTD272J	KOA	alternative: 2.7K/5%/1608
1	R39	RESISTOR	RK73H1JTTD1243F	KOA	alternative: 124K/1%/1608
1	R40	RESISTOR	RK73H1JTTD4022F	KOA	alternative: 40.2K/1%/1608
1	R41	RESISTOR	RK73H1JTTD1153F	KOA	alternative: 115K/1%/1608
1	R42	RESISTOR	RK73H1JTTD8251F	KOA	alternative: 8.25K/1%/1608
2	R109,R110	RESISTOR	RK73B1JTTD105J	KOA	alternative: 1M/5%/1608
1	SW1	Switch	CHS-08TA	COPAL	
5	SW2,SW3,SW4,SW5,SW6	SWITCH	SSSS222700	ALPS	
1	SW7	SWITCH	SKQMBBE010	ALPS	
1	TP1	TEST PIN	HK-5-G-Black	MAC8	
3	TP2,TP3,TP4	TEST PIN	HK-5-G-Red	MAC8	
2	TR1,TR2	TRANSISTOR	RK7002BT116	Rohm	alternative: RK7002BMT116
1	U1	IC	R9A06G037	RENESAS	
1	U2	IC	AT25SF321-SSHD	Adesto	
1	U3	IC	ISL15110	Intersil	
2	U6,U4	IC	SN74LVC1T45DCK	TI	
1	U5	IC	FT232RL	FTDI	
1	U7	IC	BD5228G	Rohm	alternative: BD52E28G
2	U8,U9	IC	MP2456GJ	Monolithic Power	
1	Y1	CRYSTAL	CX2520DB16000D0FLJCC	Kyocera(KCD)	alternative: DSX221SH(16MHz,CL:8pF, Frequency tolerance:±10ppm, Frequency characteristics over temperature:±15ppm) / KDS

**2.2 RL78 MCU BOARD****Table 2.3 RL78 MCU BOARD**

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
1	CN17	CONNECTOR	XG4C-1431	OMRON	
2	CN18,CN19	CONNECTOR	XG4C-2031	HONDA	
1	C113	CERAMIC CAPACITOR	GRM188R71C474KA88D	Murata	alternative: 0.47uF/16V/1608/X7R
2	C114,C115	CERAMIC CAPACITOR	GRM1882C1H150JA01D	Murata	alternative: 15pF/50V/1608/CH
2	C116,C117	CERAMIC CAPACITOR	GRM188B31H104KA92D	Murata	alternative: 0.1uF/50V/1608 X5R/B
1	F4	FILTER	NFE31PT222Z1E9	Murata	
2	LED9,LED10	LED	SML-E12M8W	Rohm	
13	R88,R89,R90,R91,R92, R93,R94,R95,R96,R97, R98,R102,R104	RESISTOR	RK73B1JTTD513J	KOA	alternative: 51K/5%/1608
3	R99,R100,R103	RESISTOR	RK73H1JTTD1001F		alternative: 1K/1%/1608
1	R101	RESISTOR	RK73Z1JTTD	KOA	alternative: 0ohm/1608
1	R105	RESISTOR	RK73H1JTTD1002F	KOA	alternative: 10K/1%/1608
2	R106,R107	RESISTOR	RK73B1JTTD330J	KOA	alternative: 33ohm/5%/1608
1	R108	RESISTOR	RK73B1JTTD122J	KOA	alternative: 1.2K/5%/1608
2	SW10,SW11	Switch	CHS-04TA	COPAL	
1	U17	IC	R5F100GLAFB#V0	RENESAS	

## 2.3 POWER FILTER BOARD

**Table 2.4 POWER FILTER BOARD**

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
2	CN20,CN21	CONNECTOR	SPT2,5/2-V-5,0	Phoenix Contact	alternative: XW4C-02E1-V1(OMRON)
2	C118,C119	CERAMIC CAPACITOR	22201C106MAT2A	AVX	alternative: 10uF/63V/5750
2	L13,L14	INDUCTOR	AIRD-03-102K	Abracon	
2	JP1,JP13	CONNECTOR	FFC-2AMEP1	HONDA	
1	TP8	TEST PIN	ST-2-2	MAC8	

## Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Inquiries

<http://www.renesas.com/contact/>

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

**Revision History**

Rev.	Date	Description	
		Page	Summary
1.00	OCT 01, 2017		First Edition issued

## 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)



### 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