

# BCPX3 Evaluation Kit J80D1

R30AN0313EJ0100

Rev.1.00

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## RTK0EE0007D01001BJ Schematics and BOM

### Introduction

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

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1.1.2 PLC output stage and AFE (ISL15110) circuit

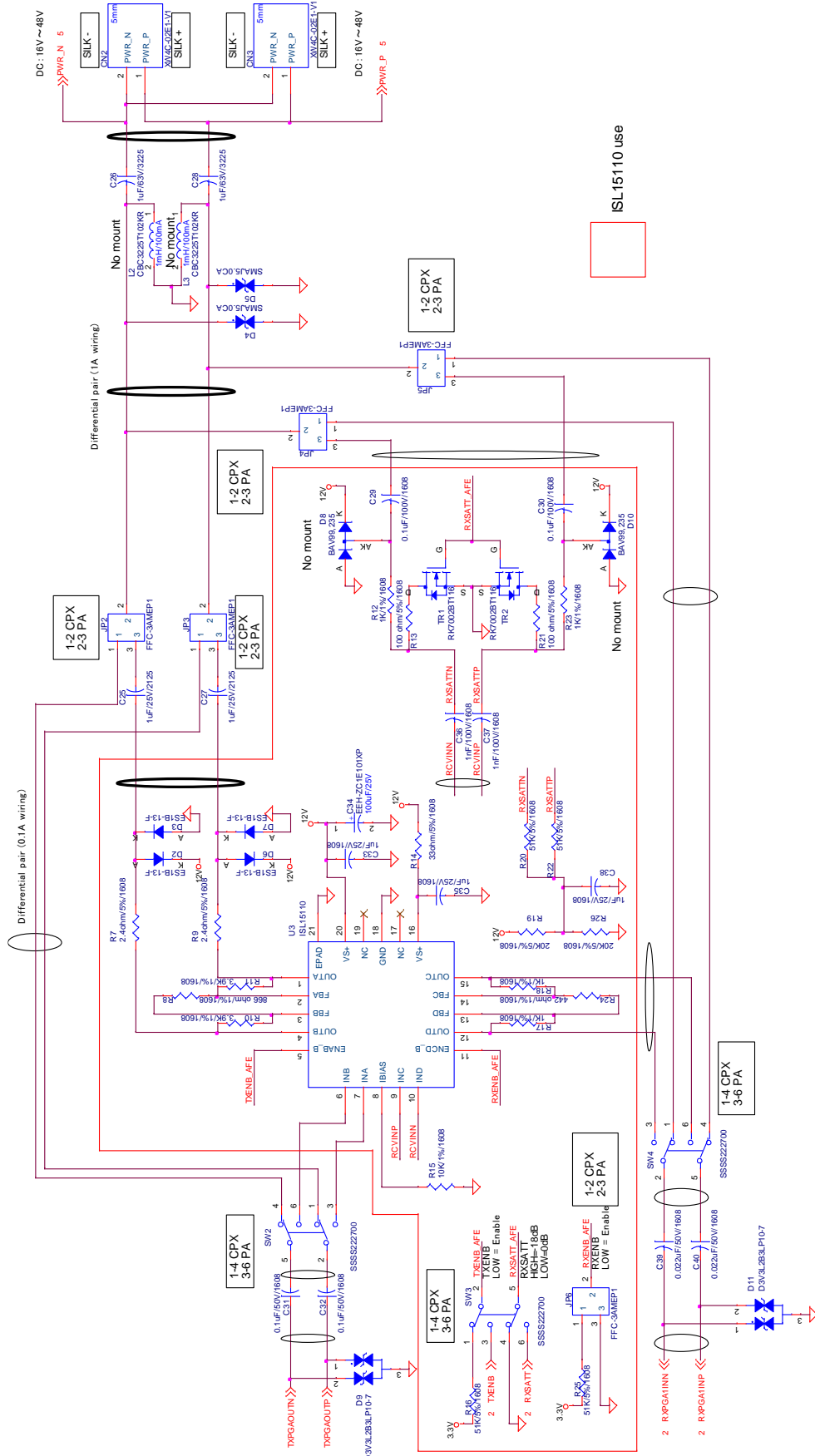


Figure 1-2 PLC board (2/4)

1.1.3 MCU peripheral circuit

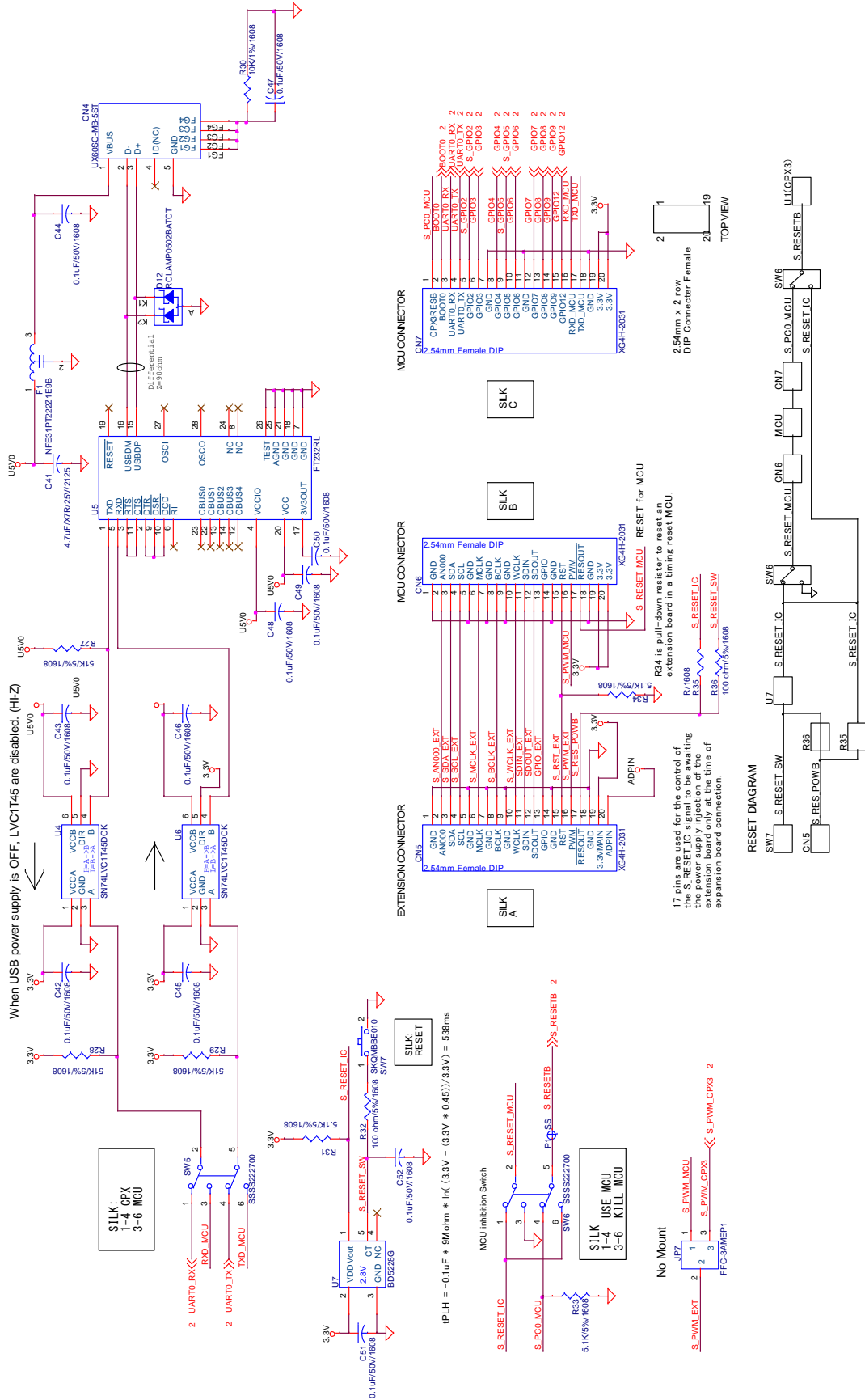


Figure 1-3 PLC board (3/4)

1.1.4 Power supply circuit

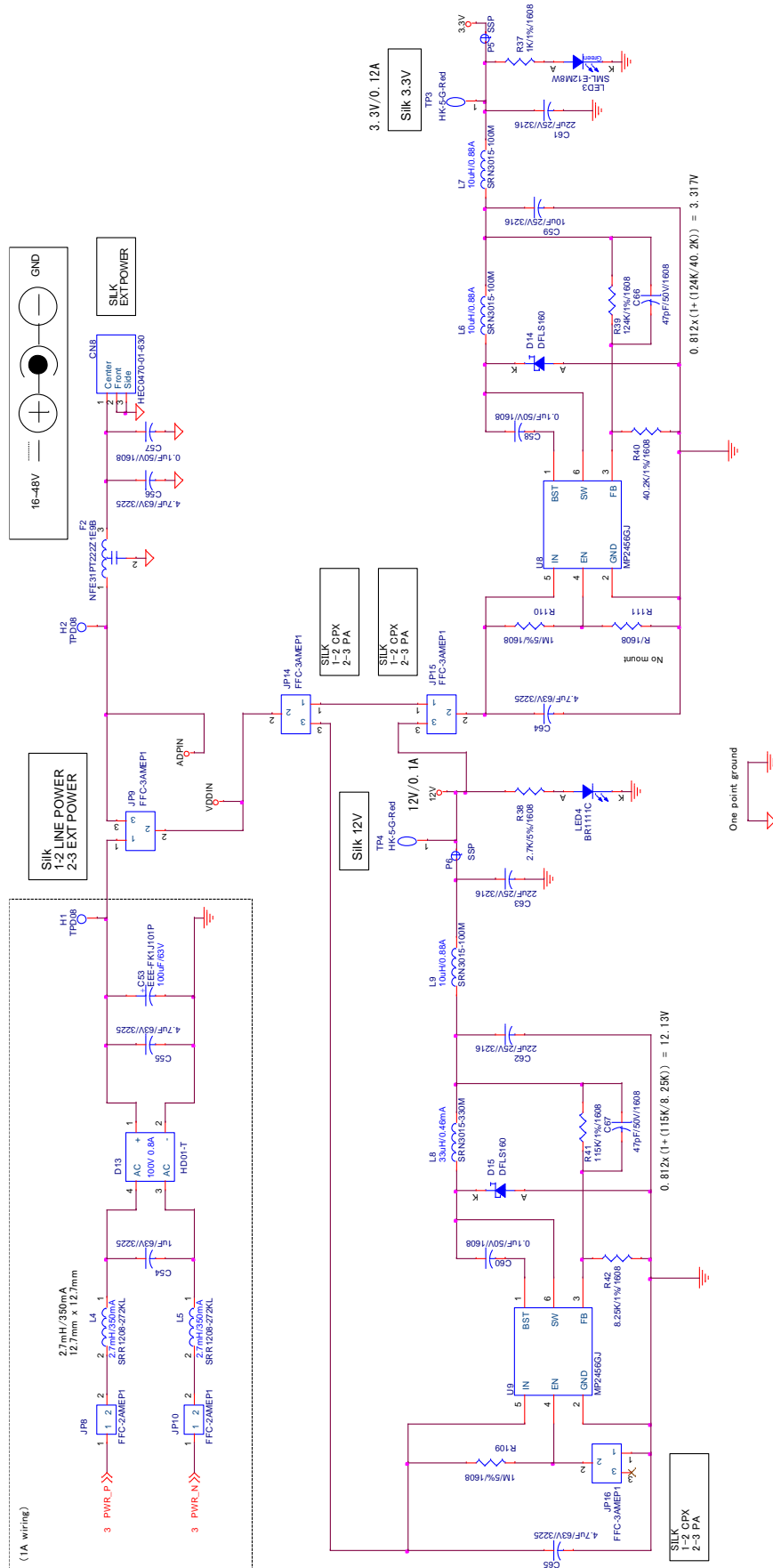


Figure 1-4 PLC board (4/4)

### 1.2 RX651 MCU BOARD

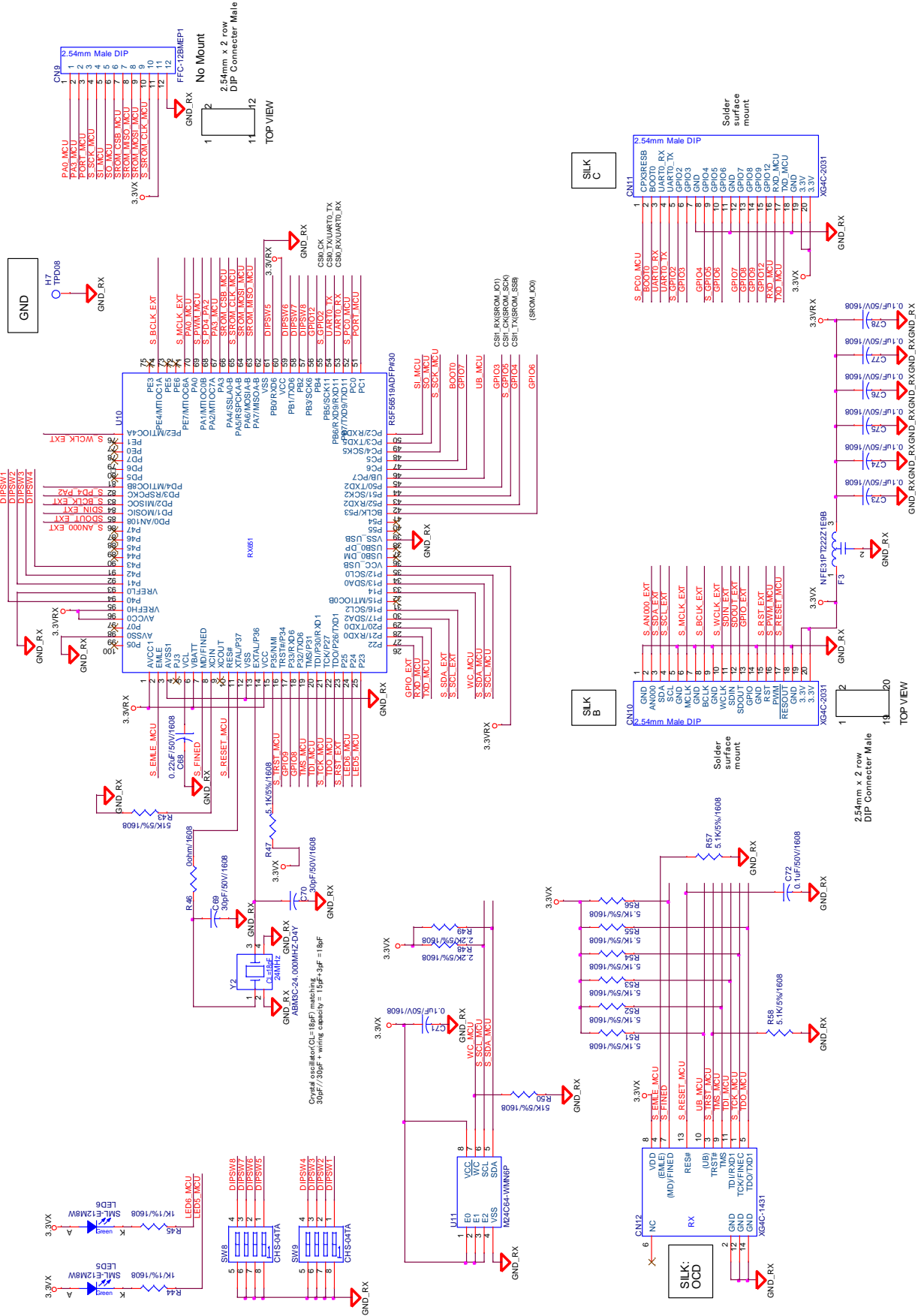


Figure 1-5 RX651 MCU board



### 1.3 AUDIO BOARD

#### 1.3.1 AUDIO BOARD (1/2)

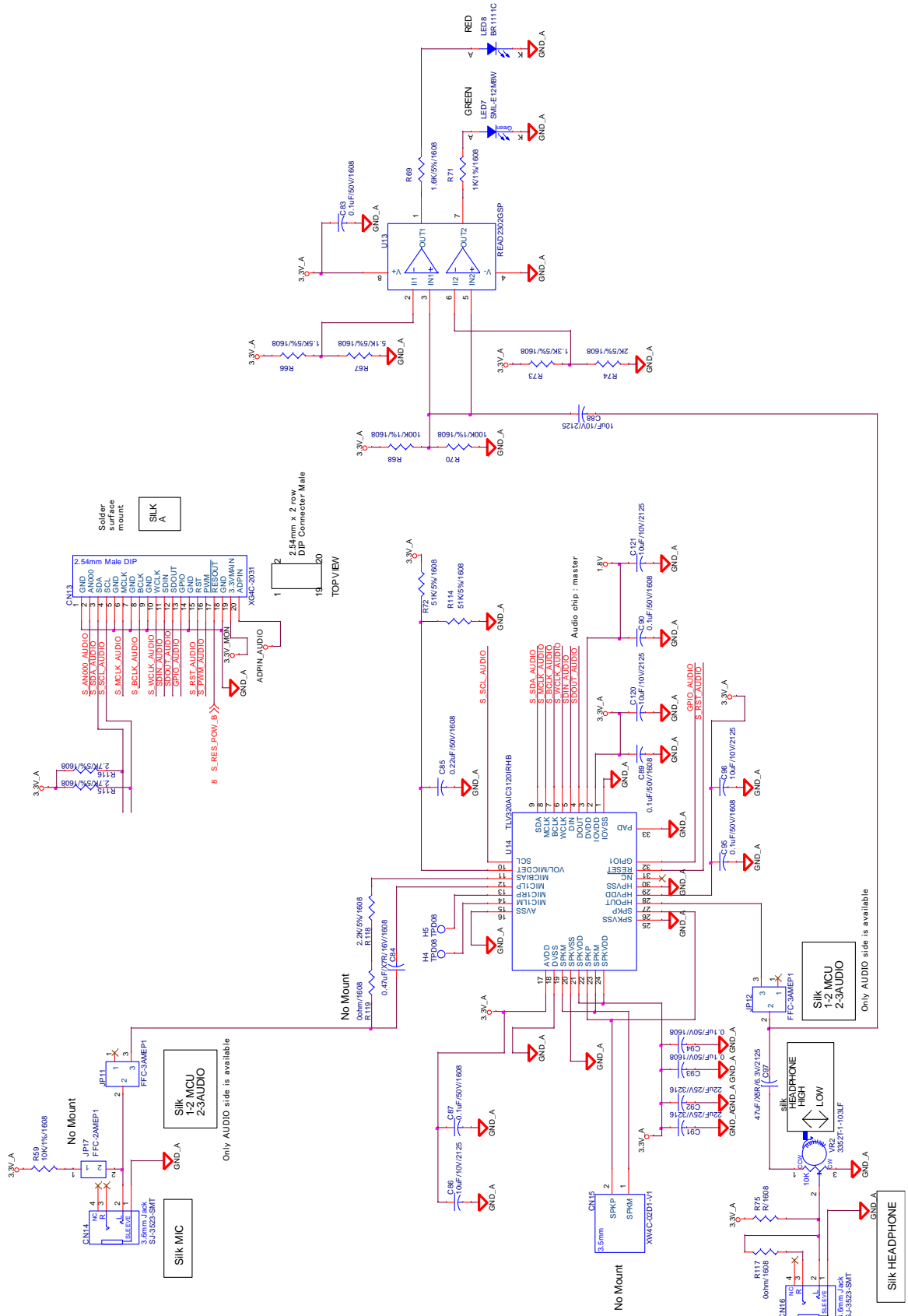


Figure 1-6 RX651 MCU board

1.3.2 AUDIO BOARD (2/2)

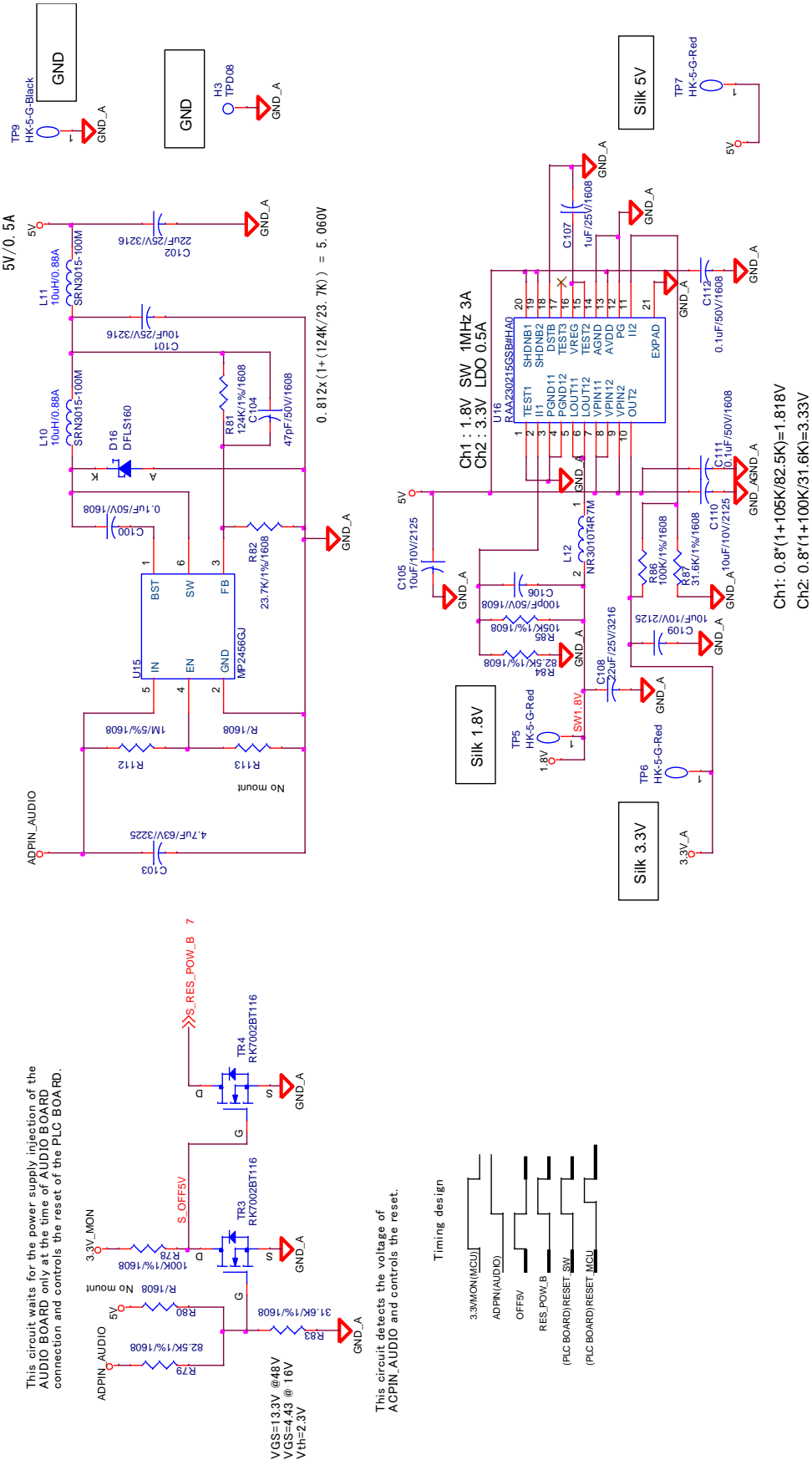


Figure 1-7 AUDIO board (2/2)



1.4 POWER FILTER BOARD

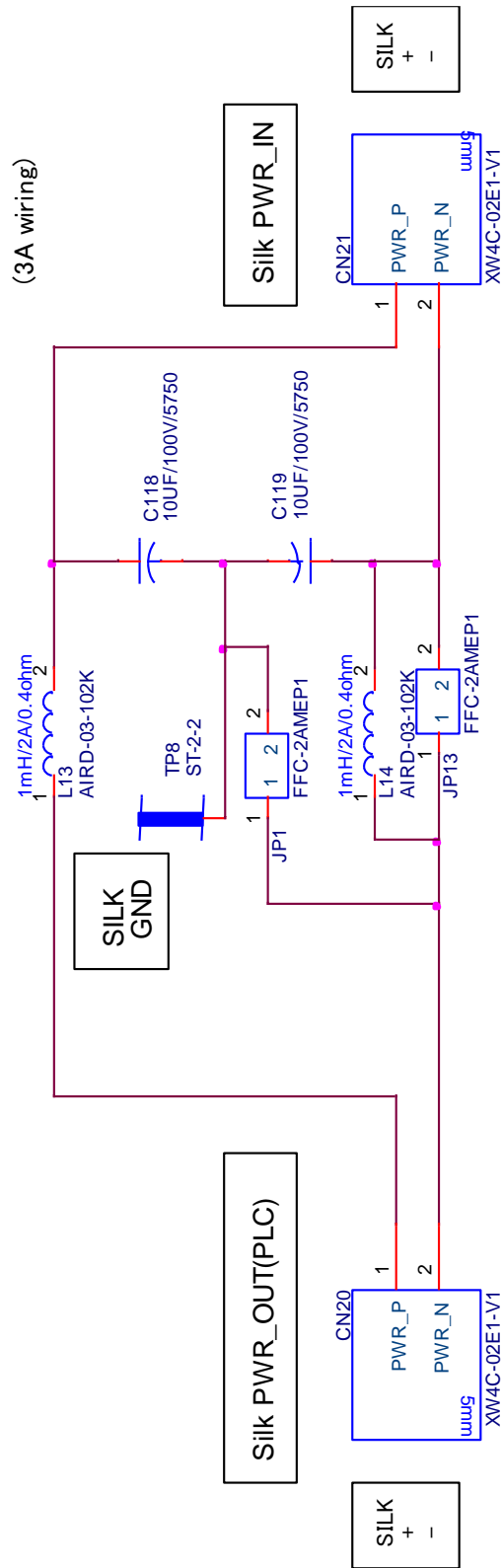


Figure 1-8 Power Filter board

## 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	Kyosera(KCD)	alternative: DSX221SH(16MHz,CL:8pF, Frequency tolerance:±10ppm, Frequency characteristics over temperature:±15ppm) / KDS

**2.2 RX651 MCU BOARD****Table 2.3 RX651 MCU BOARD**

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
2	CN10,CN11	CONNECTOR	XG4C-2031	HONDA	
1	CN12	CONNECTOR	XG4C-1431	OMRON	
1	C68	CERAMIC CAPACITOR	GRM188R61H224KAC4D	Murata	alternative: 0.22uF/50V/1608 X5R/B
2	C69,C70	CERAMIC CAPACITOR	GRM1882C1H300JA01D	Murata	alternative: 30pF/50V/1608/CH
8	C71,C72,C73,C74,C75, C76,C77,C78	CERAMIC CAPACITOR	GRM188B31H104KA92D	Murata	alternative: 0.1uF/50V/1608 X5R/B
1	F3	FILTER	NFE31PT222Z1E9	Murata	
2	LED5,LED6	LED	SML-E12M8W	Rohm	
2	R43,R50	RESISTOR	RK73B1JTDD513J	KOA	alternative: 51K/5%/1608
2	R44,R45	RESISTOR	RK73H1JTDD1001F		alternative: 1K/1%/1608
1	R46	RESISTOR	RK73Z1JTDD	KOA	alternative: 0ohm/1608
2	R48,R49	RESISTOR	RK73B1JTDD222J	KOA	alternative: 2.2K/5%/1608
9	R47,R51,R52,R53,R54, R55,R56,R57,R58	RESISTOR	RK73B1JTDD512J	KOA	alternative: 5.1K/5%/1608
2	SW8,SW9	Switch	CHS-04TA	COPAL	
1	U10	IC	R5F56519ADFP#30	Renesas	
1	U11	IC	M24C64-WMN6TP	STMicro	
1	Y2	CRYSTAL	ABM3C-24.000MHZ-D4Y	Abracon	

## 2.3 AUDIO BOARD

Table 2.4 AUDIO BOARD (1/2)

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
7	CN13	CONNECTOR	XG4C-2031	HONDA	
1	CN13	CONNECTOR	XG4C-2031	HONDA	
2	CN16,CN14	CONNECTOR	SJ-3523-SMT	CUI	
10	C83,C87,C89,C90,C93, C94,C95,C100,C111,C1 12	CERAMIC CAPACITOR	GRM188B31H104KA92D	Murata	alternative: 0.1uF/50V/1608 X5R/B
1	C84	CERAMIC CAPACITOR	GRM188R71C474KA88D	Murata	alternative: 0.47uF/16V/1608/X7R
1	C85	CERAMIC CAPACITOR	GRM188R61H224KAC4D	Murata	alternative: 0.22uF/50V/1608 X5R/B
8	C86,C88,C96,C105,C10 9,C110,C120,C121	CERAMIC CAPACITOR	GRM21BR61A106KE19L	Murata	alternative: 10uF/10V/2125 X5R/B
4	C91,C92,C102,C108	CERAMIC CAPACITOR	GRM31CR61E226KE15L	Murata	alternative: 22uF/25V/3216 X5R/B
1	C97	CERAMIC CAPACITOR	GRM219R60J476ME44D	Murata	alternative: 47uF/6.3V/2125/X5R/B
1	C101	CERAMIC CAPACITOR	C3216X5R1E106K160AB	TDK	alternative: 10uF/25V/3216 X5R/B
1	C103	CERAMIC CAPACITOR	HMK325BJ475KM-PE	Taiyo Yuden	alternative: 4.7uF/X5R,B/63V/3225
1	C104	CERAMIC CAPACITOR	GRM1882C1H470JA01D	Murata	alternative: 47pF/50V/1608/CH
1	C106	CERAMIC CAPACITOR	GRM1882C1H101JA01D	Murata	alternative: 100pF/50V/1608/CH
1	C107	CERAMIC CAPACITOR	GRM188B31E105KA75D	Murata	alternative: 1uF/25V/1608 X5R/B
1	D16	DIODE	DFLS160-7	Diodes Inc	
2	JP11,JP12	CONNECTOR	FFC-3AMEP1	HONDA	
2	L10,L11	INDUCTOR	SRN3015-100M	Bourns	
1	L12	INDUCTOR	NR3010T4R7M	Taiyo Yuden	
1	LED7	LED	SML-E12M8W	Rohm	
1	LED8	LED	BR1111C	STANLEY	
1	R59	RESISTOR	RK73H1JTTD1002F	KOA	alternative: 10K/1%/1608
1	R66	RESISTOR	RK73B1JTTD152J	KOA	alternative: 1.5K/5%/1608
1	R67	RESISTOR	RK73B1JTTD512J	KOA	alternative: 5.1K/5%/1608
2	R68,R86	RESISTOR	RK73H1JTTD1003F	KOA	alternative: 100K/1%/1608
1	R69	RESISTOR	RK73B1JTTD162J	KOA	alternative: 1.6K/5%/1608
2	R70,R78	RESISTOR	RK73H1JTTD1003F	KOA	alternative: 100K/1%/1608
1	R71	RESISTOR	RK73H1JTTD1001F	KOA	alternative: 1K/1%/1608
2	R72,R114	RESISTOR	RK73B1JTTD513J	KOA	alternative: 51K/5%/1608
1	R73	RESISTOR	RK73B1JTTD132J	KOA	alternative: 1.3K/5%/1608
1	R74	RESISTOR	RK73B1JTTD202J	KOA	alternative: 2K/5%/1608
2	R79,R84	RESISTOR	RK73H1JTTD8252F	KOA	alternative: 82.5K/1%/1608
1	R81	RESISTOR	RK73H1JTTD1243F	KOA	alternative: 124K/1%/1608
1	R82	RESISTOR	RK73H1JTTD2372F	KOA	alternative: 23.7K/1%/1608
2	R83,R87	RESISTOR	RK73H1JTTD3162F	KOA	alternative: 31.6K/1%/1608
1	R85	RESISTOR	RK73H1JTTD1053F	KOA	alternative: 105K/1%/1608
1	R112	RESISTOR	RK73B1JTTD105J	KOA	alternative: 1M/5%/1608
2	R115,R116	RESISTOR	RK73B1JTTD272J	KOA	alternative: 2.7K/5%/1608
1	R117	RESISTOR	RK73Z1JTTD	KOA	alternative: 0ohm/1608
1	R118	RESISTOR	RK73B1JTTD222J	KOA	alternative: 2.2K/5%/1608
2	TR3,TR4	TRANSISTOR	RK7002BT116	Rohm	alternative: RK7002BMT116
1	U13	IC	READ2302GSP	RENESAS	

Table 2.5 AUDIO BOARD (2/2)

Quantity	Reference	KIND	Parts Name	Manufacturer	Memo
1	U14	IC	TLV320AIC3120IRHB	TI	
1	U15	IC	MP2456GJ	Monolithic Power	
1	U16	IC	RAA230215GSB#HA0	Renesas	
1	VR2	RESISTOR	3352T-1-103LF	Bourns	
3	TP5,TP6,TP7	TEST PIN	HK-5-G-Red	MAC8	
1	TP9	TEST PIN	HK-5-G-Black	MAC8	

## 2.4 POWER FILTER BOARD

Table 2.6 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	

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**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.

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