

# GCPX3 Evaluation Kit J70D1

R30AN0276EJ0200

Rev.2.00

Apr 5, 2018

## RTK0EE0003D01002BJ Schematics and BOM

### Introduction

This document describes the schematics and the bill of materials of GCPX3 Evaluation Kit J70D1.

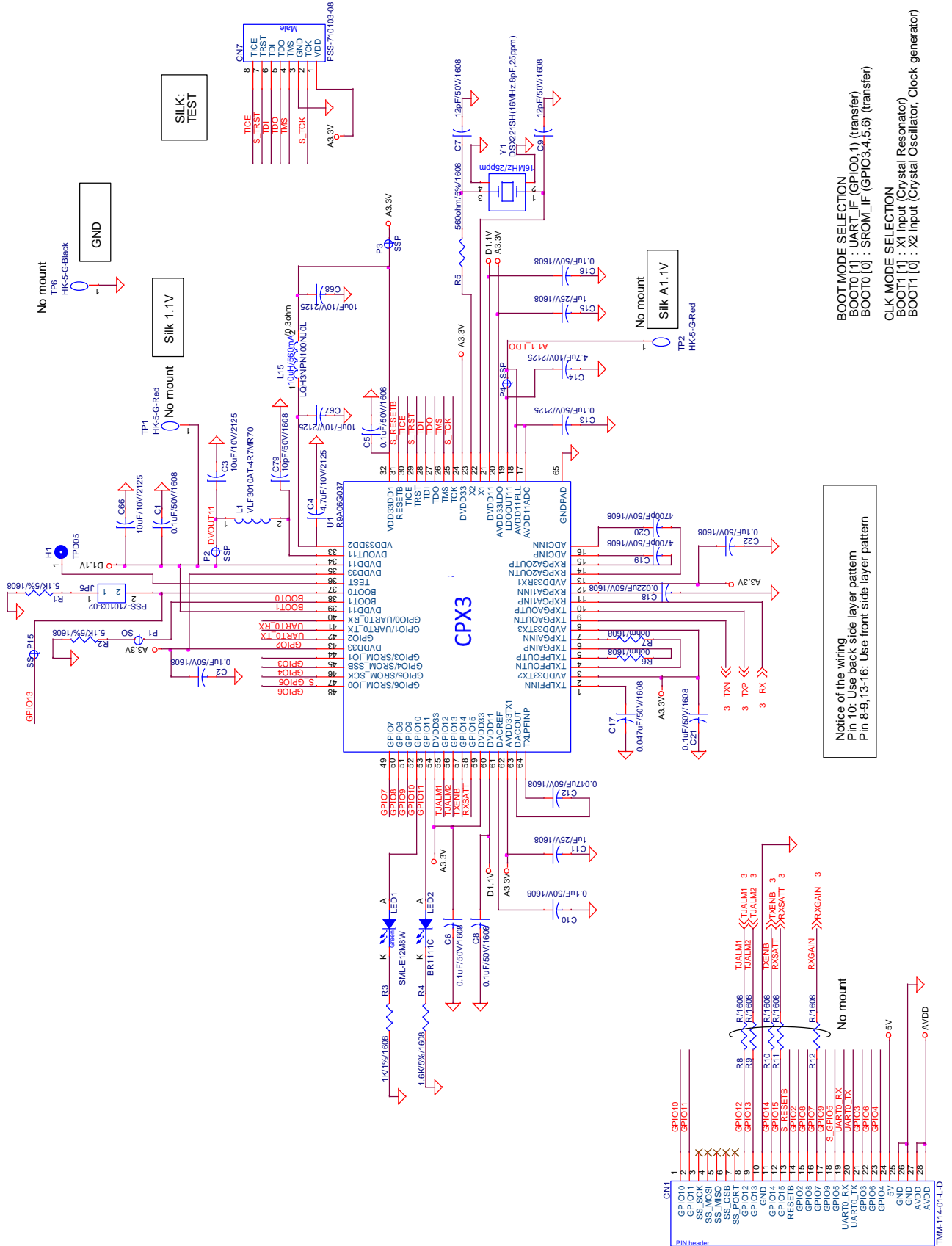
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# 1. Schematics

## 1.1 PLC board

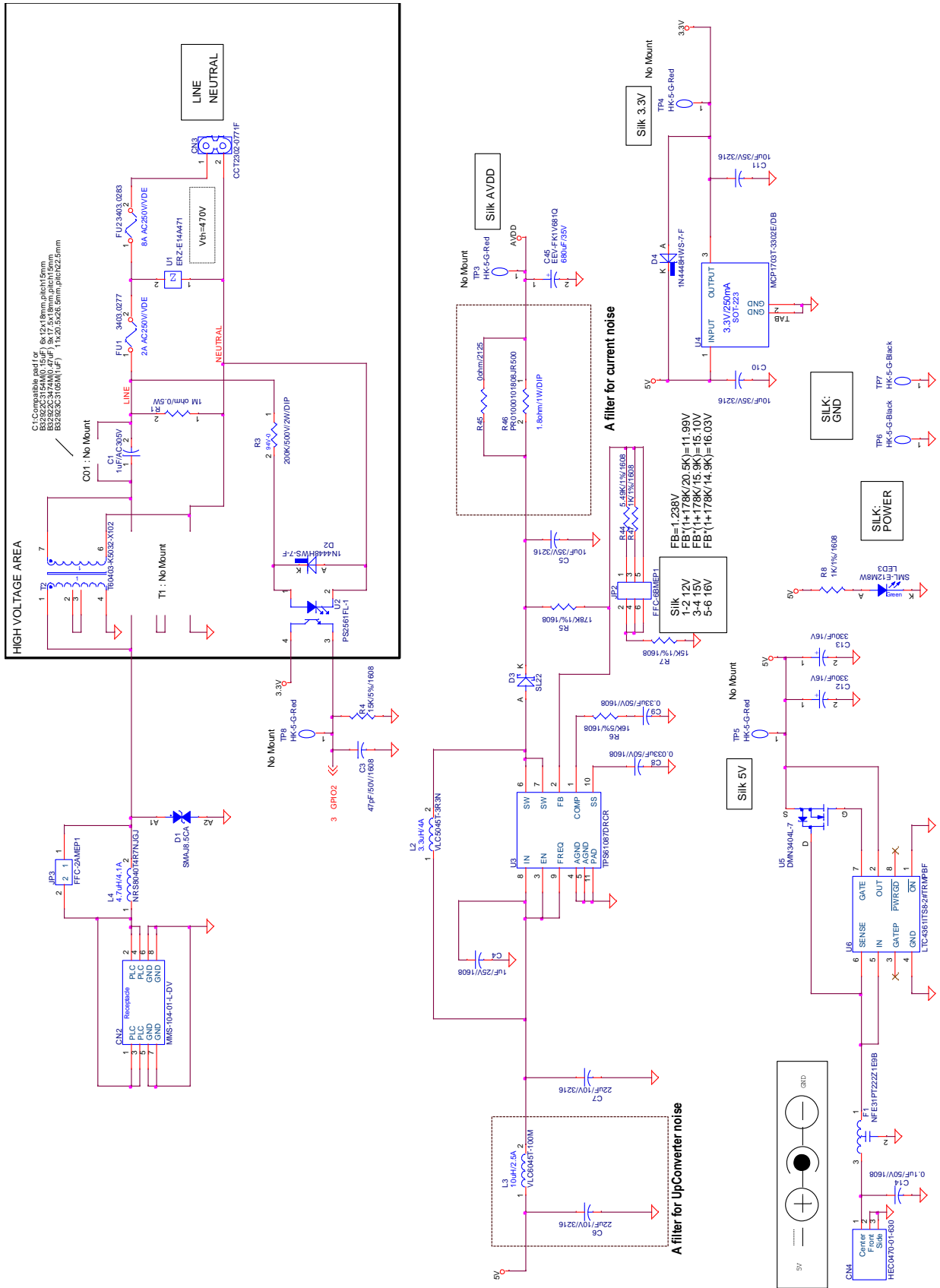
### 1.1.1 PLC modem LSI (R9A06G037:CPX3)



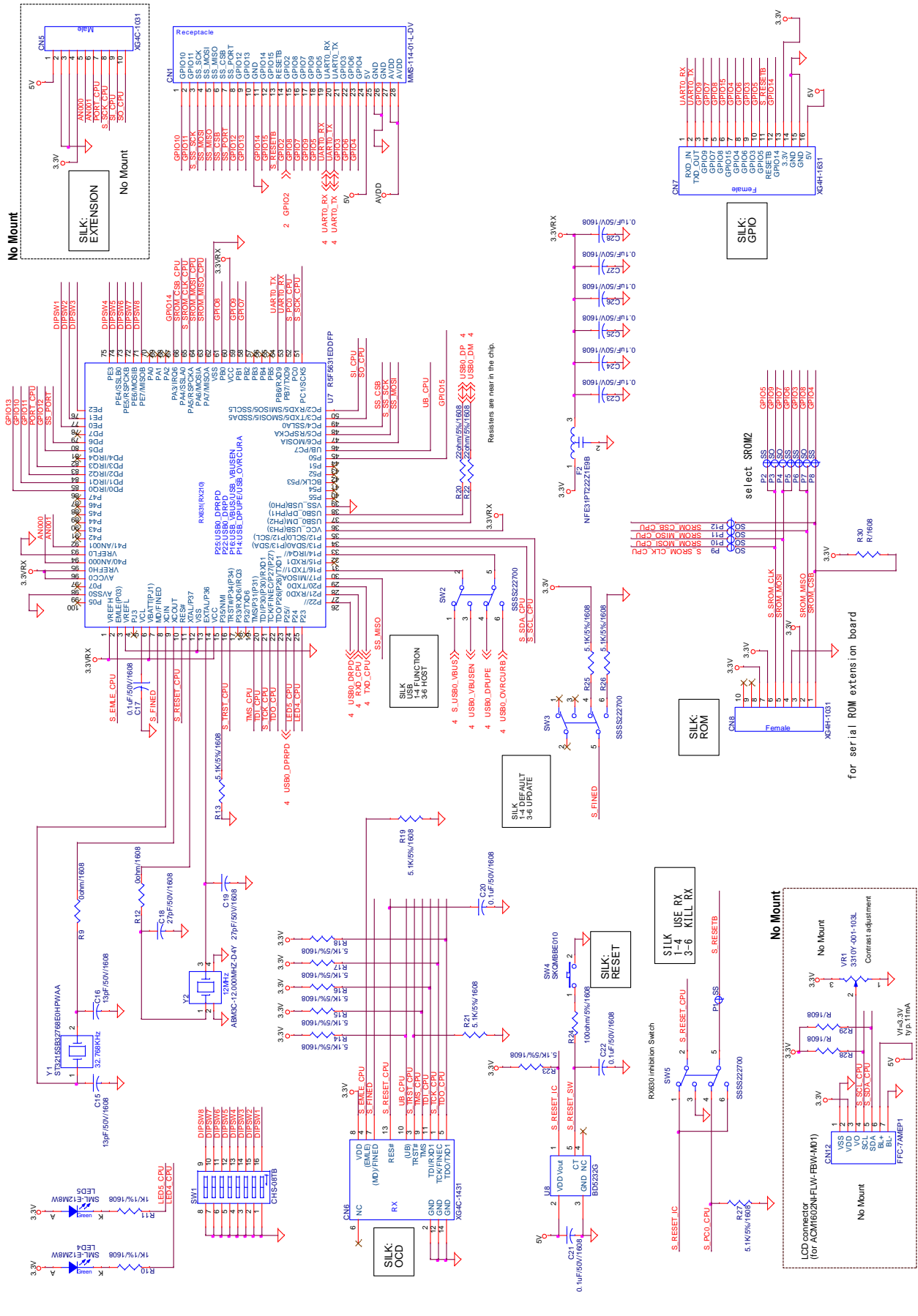


1.2 BASE board

1.2.1 AC coupling circuit and Power supply circuit



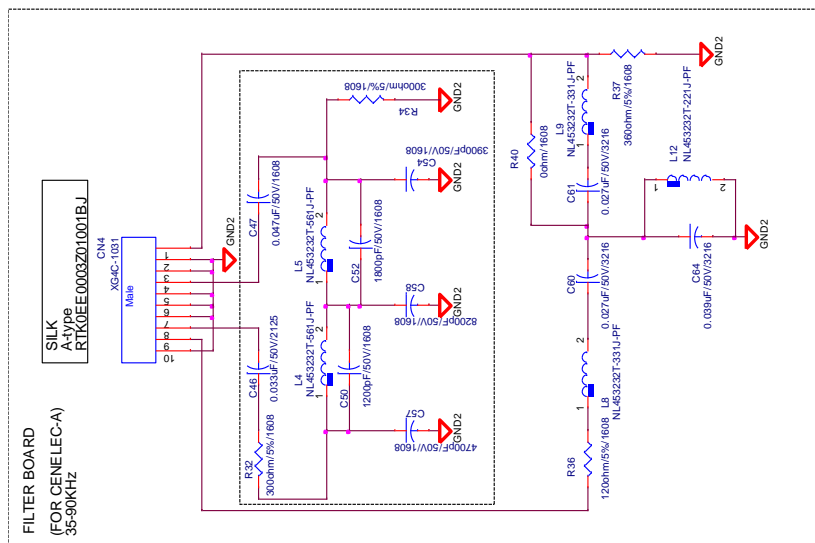
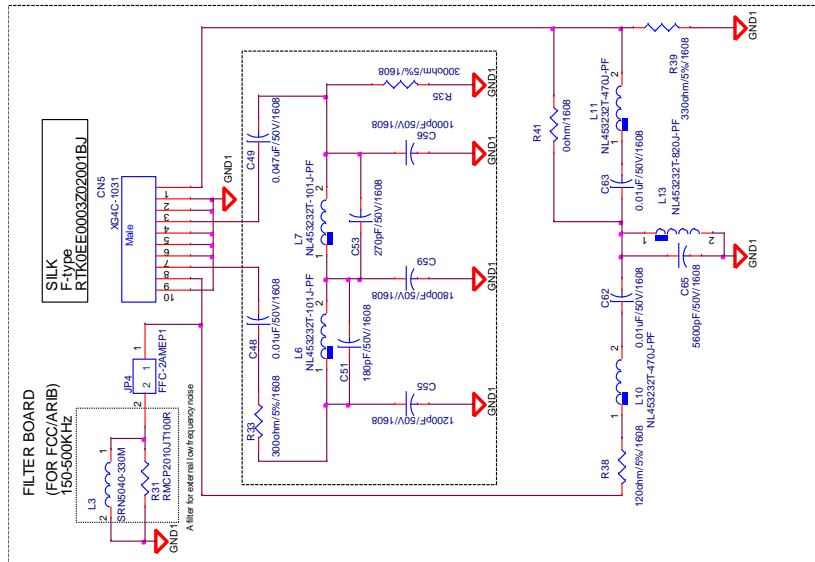
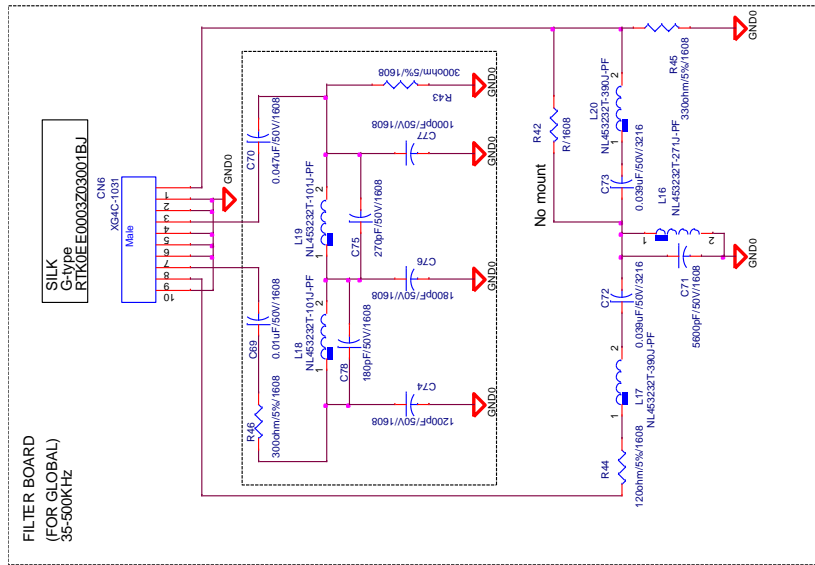
1.2.2 MCU (RX631)





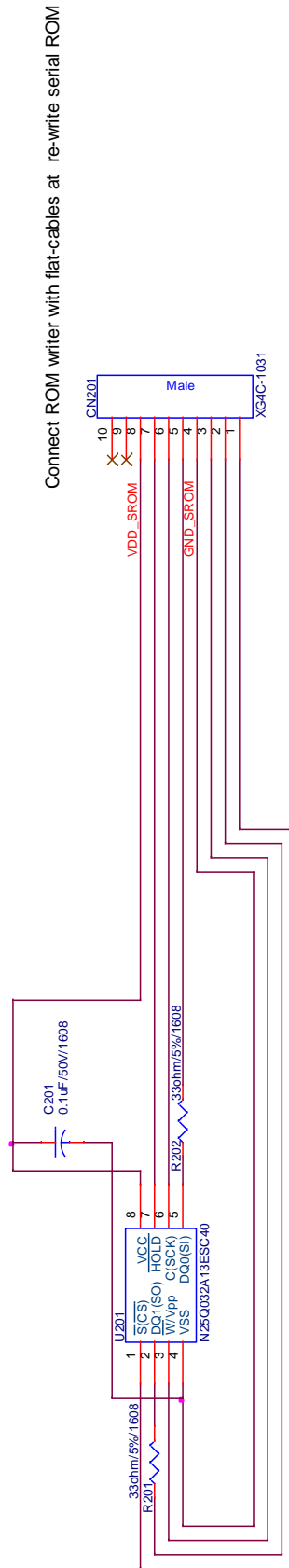
### 1.3 FILTER board

#### 1.3.1 A-type / F-type / G-type



1.4 S-ROM board

Serial ROM 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         | TMM-114-01-L-D      | SAMTEC       |  |
| 1        | CN2  | CONNECTOR         | TMM-104-01-L-D      | SAMTEC       |  |
| 1        | CN3  | CONNECTOR         | XG4H-1031           | OMRON        |  |
| 1        | CN7  | CONNECTOR         | PSS-710103-08       | HIROSUGI     |  |
| 13       | C1,C2,C5,C6,C8,C10,C16,C21,C22,C32,C44,C45,C13 | CERAMIC CAPACITOR | CC0603KRX7R9BB104   | Yageo        | 0.1uF/50V/1608/X7R 10%   |
| 7        | C3,C38,C42,C43,C66,C67,C68                     | CERAMIC CAPACITOR | LMK212B7106KG-TD    | Taiyo Yuden  | 10uF/10V/2125/X7R 10%  |
| 2        | C19,C20  | CERAMIC CAPACITOR | CGA3E2C0G1H472J     | TDK          | 4700pF/50V/1608/C0G 5% 30ppm   |
| 2        | C7,C9  | CERAMIC CAPACITOR | C1608C0G1H120J      | TDK          | 12pF/50V/1608/C0G 5%   |
| 9        | C11,C15,C25,C28,C33,C34,C35,C36,C40            | CERAMIC CAPACITOR | TMK107B7105KA-T     | Taiyo Yuden  | 1uF/25V/1608/X7R 10%   |
| 2        | C12,C17  | CERAMIC CAPACITOR | CC0603KRX7R9BB473   | Yageo        | 0.047uF/50V/1608/X7R 10%   |
| 2        | C14,C4   | CERAMIC CAPACITOR | C2012X7R1A475K      | TDK          | 4.7uF/10V/2125/X7R 10%   |
| 4        | C18,C24,C27,C31                                | CERAMIC CAPACITOR | C1608X7R1H223K      | TDK          | 0.022uF/50V/1608/X7R 10%   |
| 1        | C26  | CERAMIC CAPACITOR | GRM32ER71H106KA12L  | TDK          | 10uF/50V/3225/X7R 10%  |
| 1        | C30  | CERAMIC CAPACITOR | C1608C0G1H122J      | TDK          | 1200pF/50V/1608/C0G 5% 30ppm   |
| 1        | C37  | ALUM CAP          | EEH-ZC1E101XP       | Panasonic    |  |
| 1        | C39  | CERAMIC CAPACITOR | C1608C0G1H101J080AA | TDK          | 100pF/50V/1608 C0G 5%  |
| 1        | C41  | CERAMIC CAPACITOR | LMK316AB7226ML-TR   | Taiyo Yuden  | 22uF/10V/3216/X7R 20%  |
| 1        | C79  | CERAMIC CAPACITOR | GRM1885C1H100JA01D  | MURATA       | 10pF/50V/1608/C0G 5%   |
| 2        | C124,C127                                      | CERAMIC CAPACITOR | C1608C0G1E103J080AA | TDK          | 0.01uF/50V/1608/C0G 5% 30ppm   |
| 2        | D3,D1  | DIODE             | ES3AB-13-F          | Diodes Inc   |  |
| 1        | D2   | DIODE             | KDZTR16B            | ROHM         |  |
| 3        | JP5,JP6,JP7                                    | CONNECTOR         | PSS-710103-02       | HIROSUGI     |  |
| 1        | LED1   | LED               | SML-E12M8W          | Rohm         |  |
| 1        | LED2   | LED               | BR1111C             | STANLEY      |  |
| 1        | L1   | INDUCTOR          | VLF3010AT-4R7MR70   | TDK          | alternative :<br>VLS3015ET-4R7M(TDK)<br>VLS3012HBX-4R7M(TDK)<br>NR3010T4R7M(Taiyo Yuden)<br>NR3012T4R7M(Taiyo Yuden) |
| 1        | L2   | INDUCTOR          | NR3010T4R7M         | Taiyo Yuden  | alternative :<br>NR3012T4R7M(Taiyo Yuden)<br>VLS3015ET-4R7M(TDK)<br>VLS3012HBX-4R7M(TDK)                             |
| 1        | L15  | INDUCTOR          | LQH3NPN100NJ0L      | Murata       | alternative :<br>LQH3NPN100MJRL(Murata)<br>VLS3012CX-100M-1(TDK)   |

Table 2.2 PLC board (2/2)

| Quantity | Reference   | KIND     | Parts Name                | Manufacturer | Memo                                       |
|----------|-------------|----------|---------------------------|--------------|--|
| 2        | R2,R1       | RESISTOR | 5.1K/5%/1608              |              |  |
| 1        | R3          | RESISTOR | 1K/1%/1608                |              |  |
| 1        | R4          | RESISTOR | 1.6K/5%/1608              |              |  |
| 1        | R5          | RESISTOR | 560ohm/5%/1608            |              |  |
| 2        | R6,R7       | RESISTOR | 0ohm/1608                 |              |  |
| 2        | R19,R14     | RESISTOR | 681ohm/1%/1608            |              |  |
| 2        | R15,R23     | RESISTOR | 6.81K/1%/1608             |              |  |
| 1        | R16         | RESISTOR | 3522ZR                    | TE AMP       |  |
| 3        | R17,R21,R25 | RESISTOR | 390ohm/5%/1608            |              |  |
| 1        | R20         | RESISTOR | 51ohm/5%/1608             |              |  |
| 1        | R24         | RESISTOR | 3K/5%/1608                |              |  |
| 1        | R26         | RESISTOR | 33ohm/5%/1608             |              |  |
| 1        | R27         | RESISTOR | 150K/1%/1608              |              |  |
| 1        | R28         | RESISTOR | 56.2K/1%/1608             |              |  |
| 1        | R29         | RESISTOR | 100K/1%/1608              |              |  |
| 1        | R30         | RESISTOR | 31.6K/1%/1608             |              |  |
| 1        | R22         | RESISTOR | 10K/5%/1608               |              |  |
| 1        | U1          | IC       | R9A06G037GNP#AA0          | Renesas      |  |
| 1        | U2          | IC       | NJM45001                  | NJRC         |  |
| 1        | U3          | IC       | RAA230215GSB#HA0          | Renesas      |  |
| 1        | Y1          | CRYSTAL  | DSX221SH(16MHz,8pF,25ppm) | KDS          | alternative : KCD,<br>CX2520DB16000D0FLJCC |

## 2.2 BASE board

Table 2.3 BASE board (1/2)

| Quantity | Reference   | KIND              | Parts Name             | Manufacturer | Memo   |
|----------|---|-------------------|------------------------|--------------|--|
| 1        | CN1   | CONNECTOR         | MMS-114-01-L-DV        | SAMTEC       |  |
| 1        | CN2   | CONNECTOR         | MMS-104-01-L-DV        | SAMTEC       |  |
| 1        | CN3   | CONNECTOR         | CCT2302-0771F          | CMK          | alternative:AC-M11PB73C(ECHO ELECTRIC)   |
| 1        | CN4   | CONNECTOR         | HEC0470-01-630         | HOSHIDEN     |  |
| 1        | CN6   | CONNECTOR         | XG4C-1431              | OMRON        |  |
| 1        | CN7   | CONNECTOR         | XG4H-1631              | OMRON        |  |
| 1        | CN8   | CONNECTOR         | XG4H-1031              | OMRON        |  |
| 2        | CN11,CN9  | CONNECTOR         | UX60SC-MB-5ST          | HIROSE       |  |
| 1        | CN10  | CONNECTOR         | UBA-4R-D14T-4D(LF)(SN) | JST          | alternative:UE27AC54100(A mphenol)   |
| 1        | C1  | FILM CAPACITOR    | B32923C3105M           | EPCOS        |  |
| 1        | C3  | CERAMIC CAPACITOR | C1608C0G1H470J         | TDK          | 47pF/50V/1608/C0G 5%   |
| 2        | C42,C4  | CERAMIC CAPACITOR | TMK107B7105KA-T        | Taiyo Yuden  | 1uF/25V/1608/X7R 10%   |
| 3        | C5,C10,C11  | CERAMIC CAPACITOR | GMK316AB7106KL-TR      | Taiyo Yuden  | 10uF/35V/3216/X7R 10%  |
| 2        | C6,C7   | CERAMIC CAPACITOR | LMK316AB7226ML-TR      | Taiyo Yuden  | 22uF/10V/3216/X7R 10%  |
| 1        | C8  | CERAMIC CAPACITOR | CC0603KRX7R9BB333      | Yageo        | 0.033uF/50V/1608/X7R 10%   |
| 1        | C9  | CERAMIC CAPACITOR | C1608X7R1H334K080AC    | TDK          | 0.33uF/50V/1608/X7R 10%  |
| 3        | C12,C13,C39   | ELECTROLYTIC CAP  | EEU-FM1C331            | Panasonic    |  |
| 23       | C14,C17,C20,C21,C22,C23,C24,C25,C26,C27,C28,C30,C31,C32,C33,C34,C35,C36,C37,C38,C40,C43,C44 | CERAMIC CAPACITOR | CC0603KRX7R9BB104      | Yageo        | 0.1uF/50V/1608/X7R 10%   |
| 2        | C16,C15   | CERAMIC CAPACITOR | GRM1885C1H130JA01D     | MURATA       | 13pF/50V/1608 5%   |
| 2        | C19,C18   | CERAMIC CAPACITOR | C1608C0G1H270J         | TDK          | 27pF/50V/1608 5%   |
| 1        | C29   | CERAMIC CAPACITOR | C2012X7R1A475K         | TDK          | 4.7uF/10V/1215/X7R 10%   |
| 1        | C41   | ELECTROLYTIC CAP  | UPJ1A121MED            | Nichicon     |  |
| 1        | C45   | ELECTROLYTIC CAP  | EEV-FK1V681Q           | Panasonic    |  |
| 1        | D1  | DIODE             | SMAJ8.5CA              | Bourns Inc.  |  |
| 2        | D2,D4   | DIODE             | 1N4448HWS-7-F          | Diodes Inc   |  |
| 1        | D3  | DIODE             | SL22                   | Vishay       |  |
| 2        | D11,D10   | DIODE             | RCLAMP0502BATCT        | Semtech      |  |
| 1        | FU1   | FUSE              | 3403.0277              | Schurter Inc |  |
| 1        | FU2   | FUSE              | 3403.0283              | Schurter Inc |  |
| 3        | F1,F2,F3  | FILTER            | NFE31PT222Z1E9B        | Murata       |  |
| 2        | JP1,JP2   | CONNECTOR         | FFC-6BMEP1             | HONDA        |  |
| 1        | JP3   | CONNECTOR         | FFC-2AMEP1             | HONDA        |  |
| 3        | LED3,LED4,LED5  | LED               | SML-E12M8W             | Rohm         |  |
| 1        | L2  | INDUCTOR          | VLC5045T-3R3N          | TDK          | alternative :<br>VLS5045EX-3R3N(TDK)<br>74404054033(WE)<br>NR5040T3R3N(Taiyo Yuden)            |
| 1        | L3  | INDUCTOR          | VLC6045T-100M          | TDK          | alternative :<br>VLS6045EX-100M(TDK)<br>CDRH60D43RNP-100MC(Sumida)<br>NR6045T100M(Taiyo Yuden) |
| 1        | L4  | INDUCTOR          | NRS8040T4R7NJGJ        | Taiyo Yuden  |  |

Table 2.4 BASE board (2/2)

| Quantity | Reference   | KIND           | Parts Name           | Manufacturer        | Memo |
|----------|---|----------------|----------------------|---------------------|------|
| 1        | R1  | RESISTOR       | SPRM12B105J          | Akabane Dengu       |      |
| 1        | R3  | RESISTOR       | FMP200JR-52-200K     | Yageo               |      |
| 3        | R4,R38,R39  | RESISTOR       | 15K/5%/1608          |                     |      |
| 1        | R5  | RESISTOR       | 178K/1%/1608         |                     |      |
| 1        | R6  | RESISTOR       | 16K/5%/1608          |                     |      |
| 1        | R7  | RESISTOR       | 15K/1%/1608          |                     |      |
| 4        | R8,R10,R11,R47                                      | RESISTOR       | 1K/1%/1608           |                     |      |
| 2        | R9,R12  | RESISTOR       | 0ohm/1608            |                     |      |
| 13       | R13,R14,R15,R16,R17,R18,R19,R21,R23,R25,R26,R27,R36 | RESISTOR       | 5.1K/5%/1608         |                     |      |
| 2        | R20,R22   | RESISTOR       | 22ohm/5%/1608        |                     |      |
| 1        | R24   | RESISTOR       | 100ohm/5%/1608       |                     |      |
| 2        | R34,R31   | RESISTOR       | 51K/5%/1608          |                     |      |
| 3        | R35,R40,R43   | RESISTOR       | 10K/5%/1608          |                     |      |
| 1        | R37   | RESISTOR       | 100K/5%/1608         |                     |      |
| 1        | R41   | RESISTOR       | 20K/5%/1608          |                     |      |
| 1        | R42   | RESISTOR       | 1.5K/5%/1608         |                     |      |
| 1        | R44   | RESISTOR       | 5.49K/1%/1608        |                     |      |
| 1        | R45   | RESISTOR       | 0ohm/2125            |                     |      |
| 1        | R46   | RESISTOR       | PR01000101808JR500   | Vishay              |      |
| 1        | SW1   | Switch         | CHS-08TB             | COPAL               |      |
| 3        | SW2,SW3,SW5   | SWITCH         | SSSS222700           | ALPS                |      |
| 1        | SW4   | SWITCH         | SKQMBBE010           | ALPS                |      |
| 2        | TP6,TP7   | TEST PIN       | HK-5-G-Black         | MAC8                |      |
| 1        | T2  | TRANS          | T60403-K5032-X102    | VAC Magnetic        |      |
| 1        | U1  | Surge Absorber | ERZ-E14A471          | panasonic           |      |
| 1        | U2  | PHOTOCOUPLER   | PS2561FL-1           | CEL                 |      |
| 1        | U3  | IC             | TPS61087DRCR         |                     |      |
| 1        | U4  | REGULATOR      | MCP1703T-3302E/DB    | Microchip           |      |
| 1        | U5  | Transistor     | DMN3404L-7           | Diodes Incorporated |      |
| 1        | U6  | IC             | LTC4361ITS8-2#TRMPBF | Linear Technology   |      |
| 1        | U7  | IC             | R5F5631EDDFP#V0      | Renesas             |      |
| 1        | U8  | IC             | BD5232G              | Rohm                |      |
| 2        | U11,U9  | IC             | SN74LVC1T45DCK       | TI                  |      |
| 1        | U10   | IC             | FT232RL              | FTDI                |      |
| 1        | U12   | IC             | MIC2025-1YMM         | Micrel              |      |
| 1        | Y1  | CRYSTAL        | ST3215SB32768E0HPWAA | Kyocera             |      |
| 1        | Y2  | CRYSTAL        | ABM3C-12.000MHZ-D4Y  | Abracon             |      |

## 2.3 FILTER board

**Table 2.5 Filter board (A-type)**

| Quantity | Reference | KIND              | Parts Name           | Manufacturer | Memo                             |
|----------|-----------|-------------------|----------------------|--------------|----------------------------------|
| 1        | CN4       | CONNECTOR         | XG4C-1031            | OMRON        |                                  |
| 2        | L4,L5     | INDUCTOR          | NL453232T-561J-PF    | TDK          |                                  |
| 2        | L8,L9     | INDUCTOR          | NL453232T-331J-PF    | TDK          |                                  |
| 1        | L12       | INDUCTOR          | NL453232T-221J-PF    | TDK          |                                  |
| 1        | C46       | CERAMIC CAPACITOR | CGA4J2C0G1H333J125AA | TDK          | 0.033uF/50V/2125/C0G 5%<br>30ppm |
| 1        | C47       | CERAMIC CAPACITOR | CC0603KRX7R9BB473    | Yageo        | 0.047uF/50V/1608/X7R 10%         |
| 1        | C50       | CERAMIC CAPACITOR | C1608C0G1H122J       | TDK          | 1200pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C52       | CERAMIC CAPACITOR | CGA3E2C0G1H182J      | TDK          | 1800pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C54       | CERAMIC CAPACITOR | CGA3E2C0G1H392J      | TDK          | 3900pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C57       | CERAMIC CAPACITOR | CGA3E2C0G1H472J      | TDK          | 4700pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C58       | CERAMIC CAPACITOR | CGA3E2C0G1H822J      | TDK          | 8200pF/50V/1608/C0G 5%<br>30ppm  |
| 2        | C60,C61   | CERAMIC CAPACITOR | GRM3195C1H273JA01D   | MURATA       | 0.027uF/50V/3216/C0G 5%<br>30ppm |
| 1        | C64       | CERAMIC CAPACITOR | GRM3195C1H393JA01D   | MURATA       | 0.039uF/50V/3216/C0G 5%<br>30ppm |
| 2        | R32,R34   | RESISTOR          | 300ohm/5%/1608       |              |                                  |
| 1        | R36       | RESISTOR          | 120ohm/5%/1608       |              |                                  |
| 1        | R37       | RESISTOR          | 360ohm/5%/1608       |              |                                  |
| 1        | R40       | RESISTOR          | 0ohm/1608            |              |                                  |

Table 2.6 Filter board (F-type)

| Quantity | Reference   | KIND              | Parts Name           | Manufacturer | Memo                            |
|----------|-------------|-------------------|----------------------|--------------|---------------------------------|
| 1        | CN5         | CONNECTOR         | XG4C-1031            | OMRON        |                                 |
| 1        | JP4         | CONNECTOR         | FFC-2AMEP1           | HONDA        |                                 |
| 1        | L3          | INDUCTOR          | SRN5040-330M         | Bourns Inc.  |                                 |
| 2        | L6,L7       | INDUCTOR          | NL453232T-101J-PF    | TDK          |                                 |
| 2        | L10,L11     | INDUCTOR          | NL453232T-470J-PF    | TDK          |                                 |
| 1        | L13         | INDUCTOR          | NL453232T-820J-PF    | TDK          |                                 |
| 3        | C48,C62,C63 | CERAMIC CAPACITOR | C1608C0G1E103J080AA  | TDK          | 0.01uF/50V/1608/C0G 5%<br>30ppm |
| 1        | C49         | CERAMIC CAPACITOR | CC0603KRX7R9BB473    | Yageo        | 0.047uF/50V/1608/X7R 10%        |
| 1        | C51         | CERAMIC CAPACITOR | C1608C0G1H181J       | TDK          | 180pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C53         | CERAMIC CAPACITOR | C1608C0G1H271J       | TDK          | 270pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C55         | CERAMIC CAPACITOR | C1608C0G1H122J       | TDK          | 1200pF/50V/1608/C0G 5%<br>30ppm |
| 1        | C56         | CERAMIC CAPACITOR | C1608C0G1H102J       | TDK          | 1000pF/50V/1608/C0G 5%<br>30ppm |
| 1        | C59         | CERAMIC CAPACITOR | CGA3E2C0G1H182J      | TDK          | 1800pF/50V/1608/C0G 5%<br>30ppm |
| 1        | C65         | CERAMIC CAPACITOR | CGA3E2C0G1H562J080AA | TDK          | 5600pF/50V/1608/C0G 5%<br>30ppm |
| 1        | R31         | RESISTOR          | RMCP2010JT100R       | Stackpole    |                                 |
| 2        | R33,R35     | RESISTOR          | 300ohm/5%/1608       |              |                                 |
| 1        | R38         | RESISTOR          | 120ohm/5%/1608       |              |                                 |
| 1        | R39         | RESISTOR          | 330ohm/5%/1608       |              |                                 |
| 1        | R41         | RESISTOR          | 0ohm/1608            |              |                                 |

Table 2.7 Filter board (G-type)

| Quantity | Reference | KIND              | Parts Name           | Manufacturer | Memo                             |
|----------|-----------|-------------------|----------------------|--------------|----------------------------------|
| 1        | CN6       | CONNECTOR         | XG4C-1031            | OMRON        |                                  |
| 2        | L18,L19   | INDUCTOR          | NL453232T-101J-PF    | TDK          |                                  |
| 1        | L16       | INDUCTOR          | NL453232T-271J-PF    | TDK          |                                  |
| 2        | L17,L20   | INDUCTOR          | NL453232T-390J-PF    | TDK          |                                  |
| 1        | C69       | CERAMIC CAPACITOR | C1608C0G1E103J080AA  | TDK          | 0.01uF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C70       | CERAMIC CAPACITOR | CC0603KRX7R9BB473    | Yageo        | 0.047uF/50V/1608/X7R 10%         |
| 1        | C71       | CERAMIC CAPACITOR | CGA3E2C0G1H562J080AA | TDK          | 5600pF/50V/1608/C0G 5%<br>30ppm  |
| 2        | C72,C73   | CERAMIC CAPACITOR | GRM3195C1H393JA01D   | MURATA       | 0.039uF/50V/3216/C0G 5%<br>30ppm |
| 1        | C74       | CERAMIC CAPACITOR | C1608C0G1H122J       | TDK          | 1200pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C75       | CERAMIC CAPACITOR | C1608C0G1H271J       | TDK          | 270pF/50V/1608/C0G 5%<br>30ppm   |
| 1        | C76       | CERAMIC CAPACITOR | CGA3E2C0G1H182J      | TDK          | 1800pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C77       | CERAMIC CAPACITOR | C1608C0G1H102J       | TDK          | 1000pF/50V/1608/C0G 5%<br>30ppm  |
| 1        | C78       | CERAMIC CAPACITOR | C1608C0G1H181J       | TDK          | 180pF/50V/1608/C0G 5%<br>30ppm   |
| 2        | R43,R46   | RESISTOR          | 300ohm/5%/1608       |              |                                  |
| 1        | R44       | RESISTOR          | 120ohm/5%/1608       |              |                                  |
| 1        | R45       | RESISTOR          | 330ohm/5%/1608       |              |                                  |

## 2.4 S-ROM board

Table 2.8 S-ROM board

| Quantity | Reference | KIND              | Parts Name        | Manufacturer | Memo                                       |
|----------|-----------|-------------------|-------------------|--------------|--|
| 1        | CN201     | CONNECTOR         | XG4C-1031         | OMRON        |  |
| 1        | C201      | CERAMIC CAPACITOR | CC0603KRX7R9BB104 | Yageo        | 0.1uF/50V/1608/X7R 10%                     |
| 2        | R202,R201 | RESISTOR          | 33ohm/5%/1608     |              |  |
| 1        | U201      | IC                | N25Q032A13ESC40   | Micron       | alternative : AT25SF321-<br>SSHD-T(Adesto) |

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## Revision History

| Rev. | Date         | Description |   |
|------|--------------|-------------|---|
|      |              | Page        | Summary                                   |
| 1.00 | DEC 01, 2016 |             | First Edition issued                      |
| 2.00 | APL 05, 2018 | 9           | Addition of the alternative : L1, L2, L15 |
|      |              | 10          | Modification of the part number : U1, U3  |
|      |              | 11          | Addition of the alternative : L2, L3      |
|      |              | 15          | Addition of the alternative : U201        |

## 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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