FEBL63Q2537TB48_RB-02

RB-D63Q2537TB48
User's Manual

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Preface

This manual describes about the ML63Q2537TB48 Reference Board (RB-D63Q2537TB48).

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1. Overview

1.1 Overview of RB-D63Q2537TB48

RB-D63Q2537TB48 is designed to allow customers to test the operation of ML63Q2537 by installing the necessary parts according to their purpose.
By connecting an ARM debugger to RB-D63Q2537TB48, software development, debugging, and writing to FlashROM can be performed.
By connecting RB-D63Q2537TB48 to a PC via FTDI's USB to SPI (FT232H), AI can be monitored. RB-D63Q2537TB48 recommends the use of MM-FT232HC equipped with FT232H (hereinafter: MM-FT232HC*(1), Sunhayato Corp.), and has a through hole that can connect MM-FT232HC.
When using RB-D63Q2537TB48, please understand and take note of the following contents.
*(1) Please search for products at https://www.sunhayato.co.jp

1.1.1 Features

- Equipped with ML63Q2537 48-pin TQFP
- Equipped with a connector for connecting to an emulator
- High expandability with LSI pins arranged in through-holes for peripheral boards
- Equipped with low-speed crystal oscillator (32.768kHz)
- Equipped with high-speed crystal oscillator (40MHz)
- Equipped with LED (P50, P51, P52)
- Equipped with RST SW (RESET_N)
- Foot pattern for mounting components for successive approximation type AD converter (P32, P33, P34, P35)

1.1.2 Hardware Specifications

The hardware specifications of RB-D63Q2537TB48 are shown in Table 1.

Table 1 Hardware Specifications

Equipped LSI	・U1: ML63Q2537 48 pins TQFP
Equipped parts	・C1-C5, C10: VDDL, VDD, VREF capacitor
	・XT1, C6, C7, R7, R8: High-speed crystal oscillator (40MHz), capacitors and resistors
	・XT2, C8, C9, R9: Low-speed crystal oscillator (32.768kHz), capacitors and resistors
	・R3: RESET_N pin pull-up resistor
	・J4: VREF pin-VDD connection jumper chip
	・P50-P52: LED
	・R4-R6: LED Resistor
	・J1-J3: LED connection jumper chip
	・RST: swich
	・CNE1: ARM debugger connector (10-pin connector)
	・R1, R2: ARM Debugger Interface Pull-up Resistor
Component mounting pad	・CN1-CN2: User board connector pad (34 pins, 2.54 mm pitch, φ0.9 mm)
	・CN3: USB-SPI(7pins，2.54 mm pitch，φ0.9 mm)
	・CNE2: SWD (6pins，2.54 mm pitch，φ0.9 mm)
	・BRMPN: BRMPN(2pins，2.54 mm pitch，φ0.9 mm)
	・J5: VREF pin-CN1 connection jumper chip
	・C10-C13: Successive approximation type AD converter capacitor
Power Pad	・VDD, VSS ：φ0.9 ㎜
Operating voltage	・VDD: +2.3V～+5.5V
External dimensions	・55.88 mm x 93.98 mm

For the specific connections of each mounted component, please refer to the circuit diagram.

1.2 External view

The external appearance of the RB-D63Q2537TB48 is shown in Fig. 1.

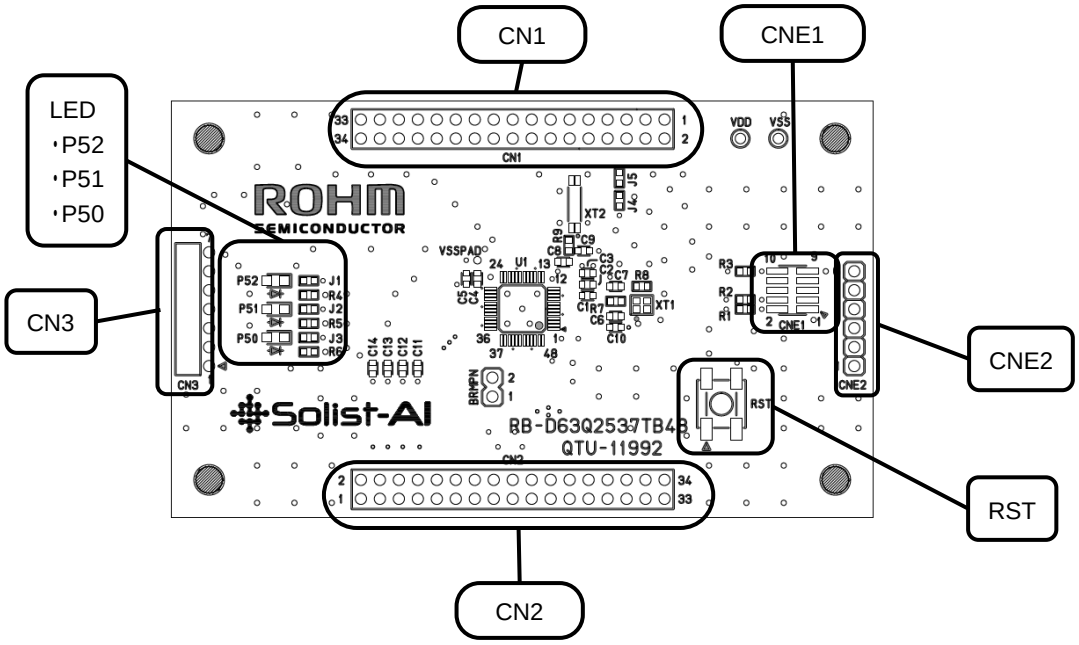


Fig. 1. External view of RB-D63Q2537TB48

2. Features

2.1 Power supply circuit

Power is supplied from the VDD check pin or from the MM-FT232HC connected to the SPI connection through-hole (CN3). VDD is used as the power supply within the board.
The MM-FT232HC have 3.3V output and 5V output, and when connected to the SPI connection through-hole (CN3), the set voltage can be supplied to VDD.

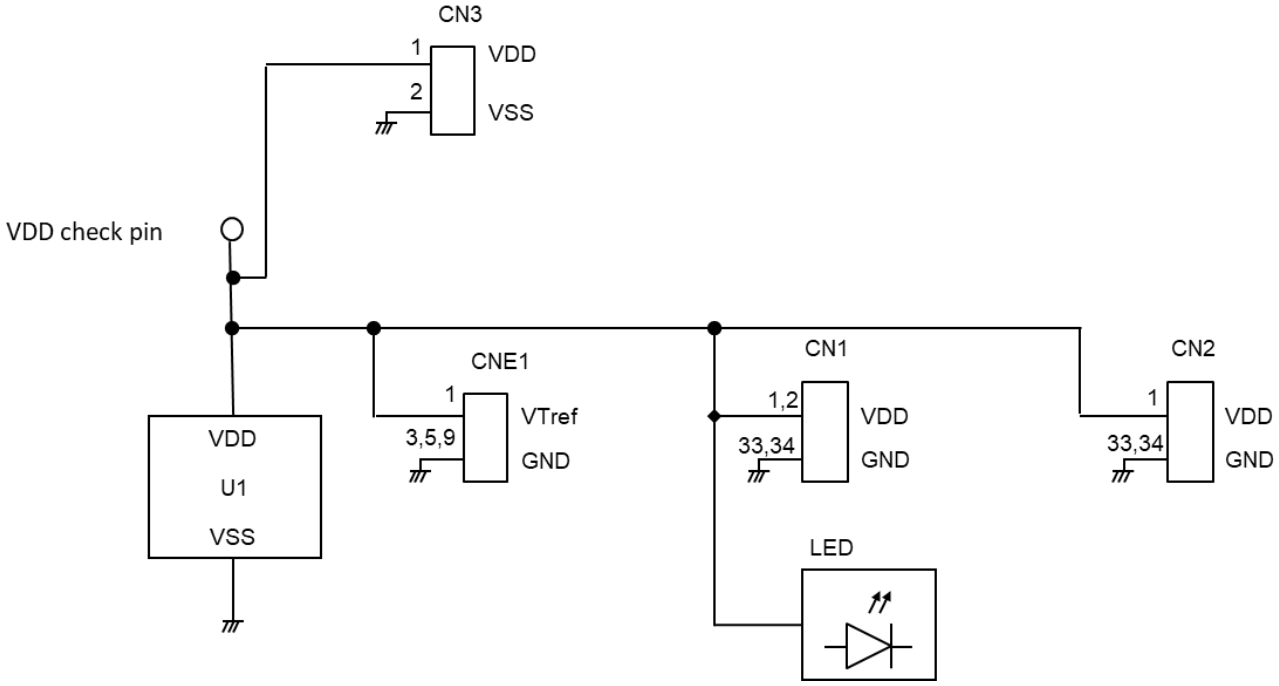


Fig. 2 Power supply circuit

When applying a voltage between 2.3V and 5.5V from the VDD check pin
How to use:
1. Connect an external power supply to the VDD check pin and apply voltage.

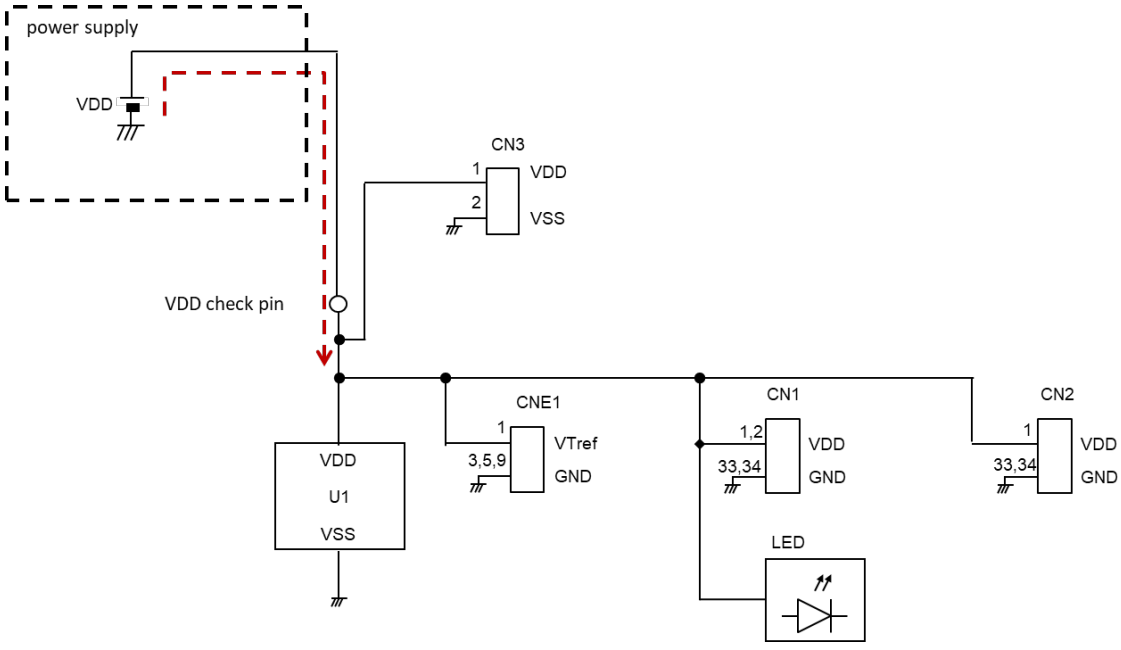


Fig. 3. Applying voltage to the VDD check pin

When applying 5V from MM-FT232HC
How to use:
1. Connect MM-FT232HC to the SPI connection through-hole of RB-D63Q2537TB48.
2. Set jumper pin JP1 on MM-FT232HC to the 5V side.
3. Connect MM-FT232HC and PC with a USB cable.

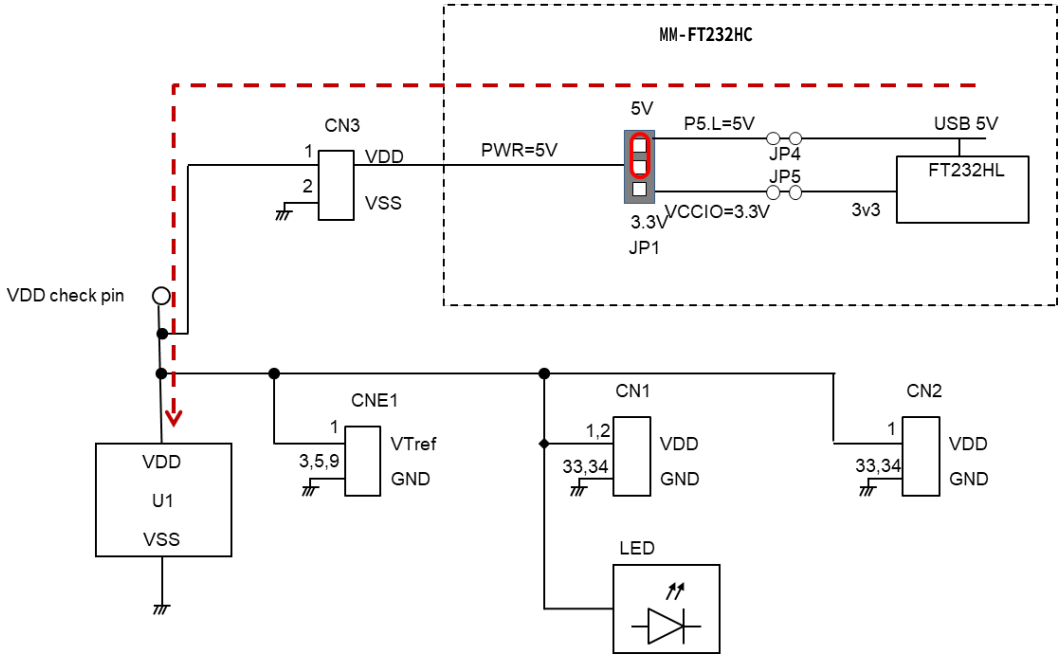


Fig. 4 Applying 5V from MM-FT232HC

When applying 3.3V from MM-FT232HC
How to use:
1. Connect MM-FT232HC to the SPI connection through-hole of RB-D63Q2537TB48.
2. Set jumper pin JP1 of MM-FT232HC to the 3.3V side.
3. Connect MM-FT232HC and PC with a USB cable. Connect to PC and supply voltage from MM-FT232HC.

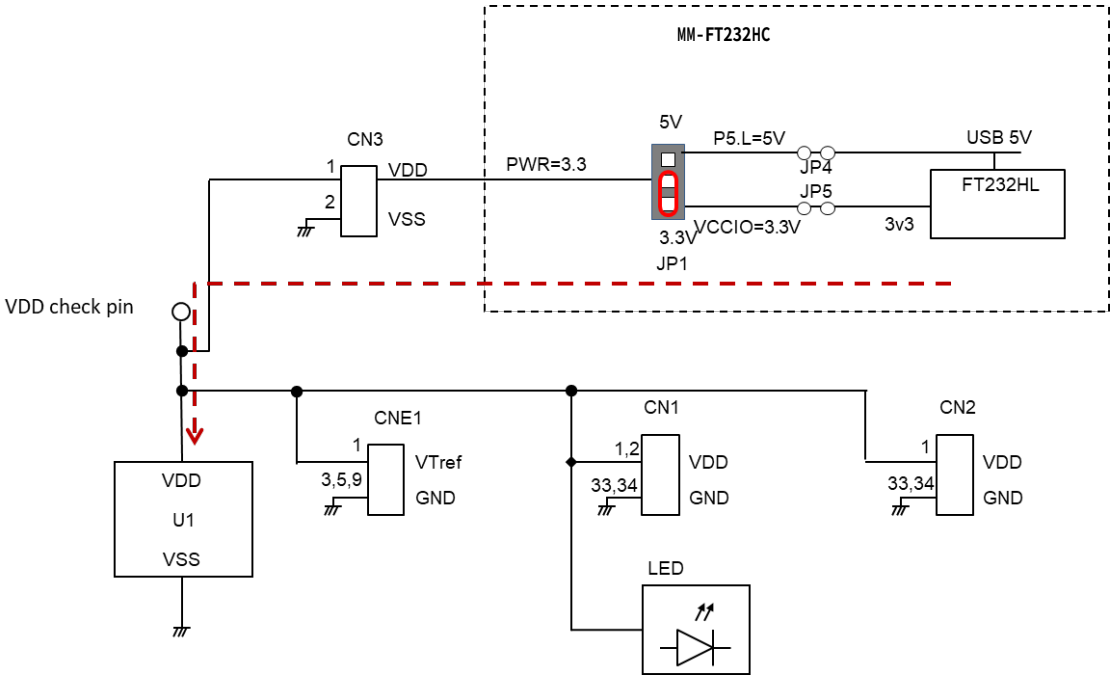


Fig. 5 Applying 3.3V from MM-FT232HC

2.2 SPI connection through hole (CN3)

A 7-pin L-shaped header pin connector (e.g. A2-7PA-2.54DS(71) Hirose Electric Co., Ltd.) can be connected to the CN3 SPI connection through hole. Connect the MM-FT232HC to the 7-pin L-shaped header pin connector.

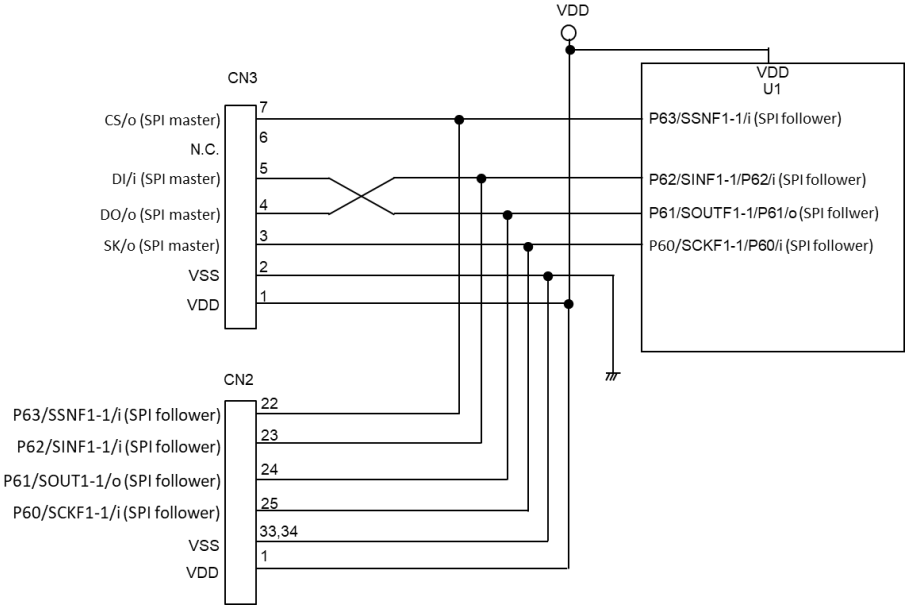


Fig. 6 SPI connection through hole (CN3)

Noted
If you connect an MM-FT232HC to CN3, you cannot use the same pin on CN2.

If you are using MM-FT232HC, you will need a 7-pin L-shaped header pin connector (e.g. A2-7PA-2.54DS(71) Hirose Electric Co., Ltd.) and a connector socket (e.g. FSR-41085-07 Hirosugi Keiki) to connect. If you are not using these, please connect using a jumper or similar.

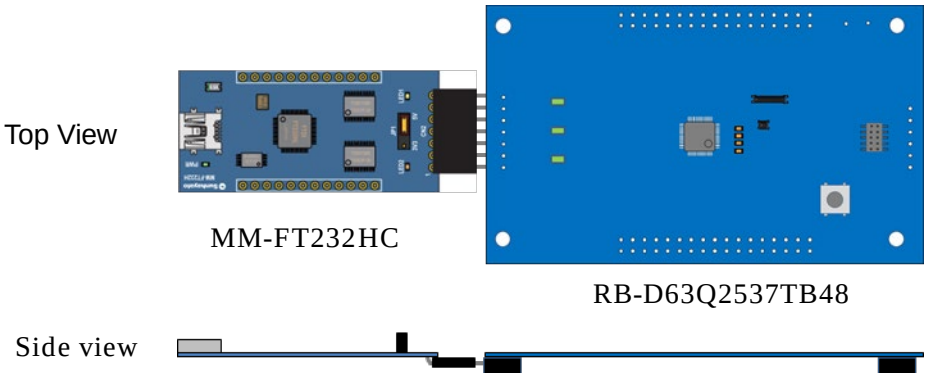


Fig. 7. Example of connection between SPI connection through hole (CN3) and MM-FT232HC

2.3 ARM Debugger Connector (CNE1)

The ARM debugger connector is connected to the SWC, SWD, and RESET_N pin and can be used to connect an ARM debugger.

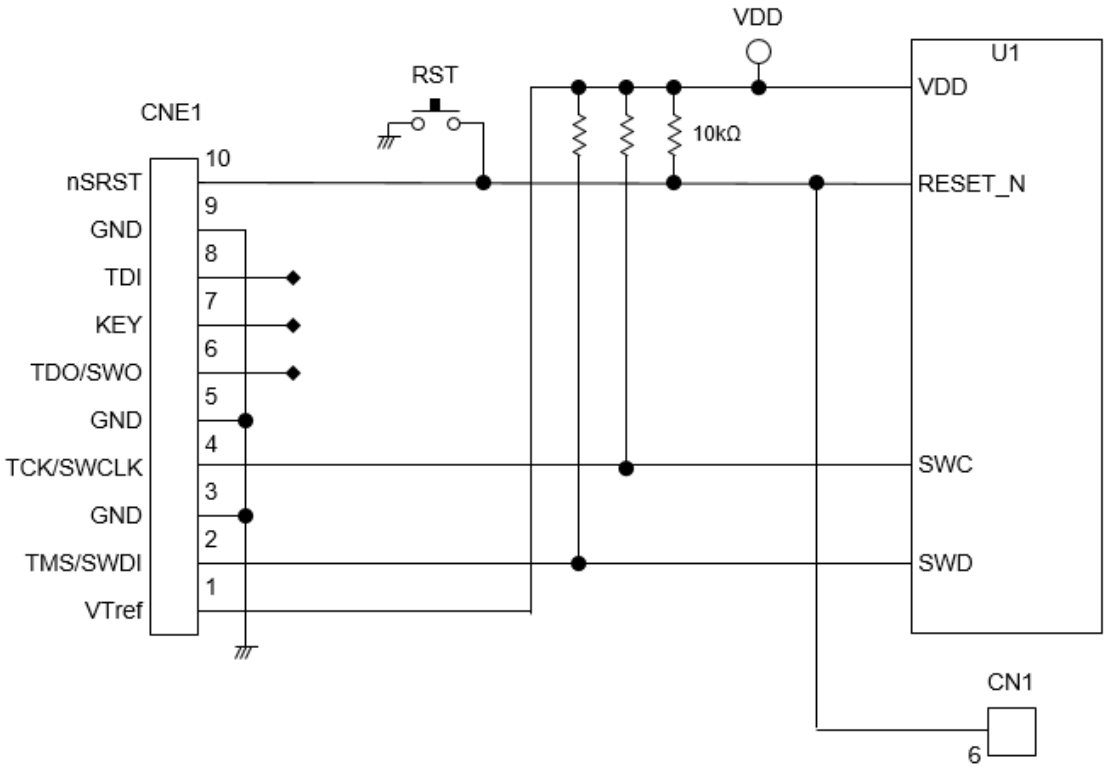


Fig. 8 ARM debugger connector (CNE1)

Noted
Be careful when connecting the ARM debugger to the CNE1 connector, and do not make a mistake in the direction of the connection (1-pin direction).

2.4 SWD (CNE2)

SWD is connected to the SWC, SWD, and RESET_N pins. SWD can be evaluated.

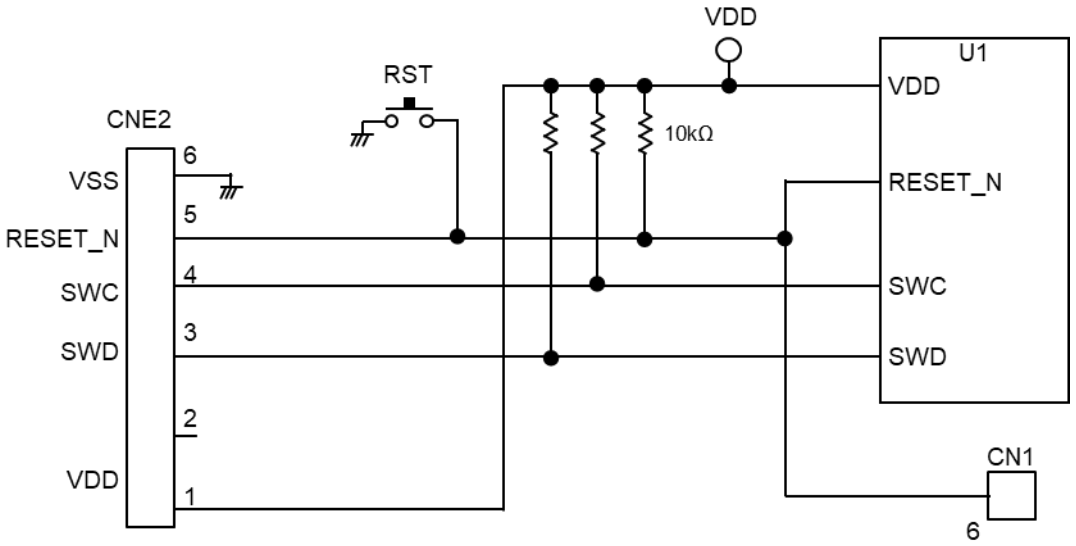


Fig.9 SWD (CNE2)

2.5 RESET

RESET_N pin are connected to RST switches, CNE1, CNE2, and CN1. The RESET_N pin is pulled up to VDD at R3.

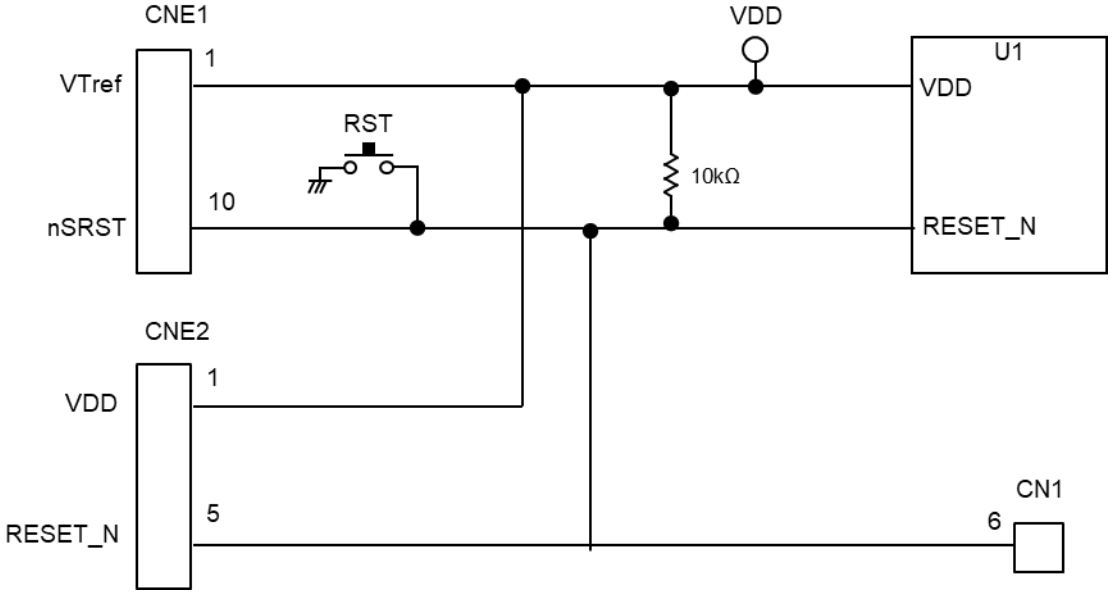


Fig. 10 Configuration of RESET_N pin

2.6 LED (P50, P51, P52)

The P50-P52 pins are capable of directly driving LEDs. The P50-P52 pins are connected to the LEDs via jumper chips (J1-J3). If you are not using the LEDs, remove the jumper chips on J1-J3.

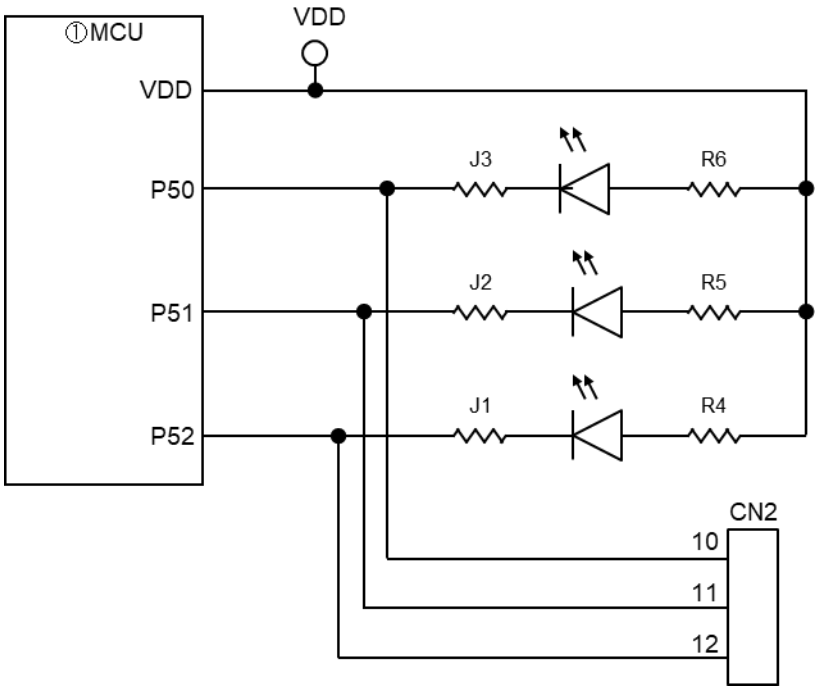


Fig. 11 Circuit diagram of around LED

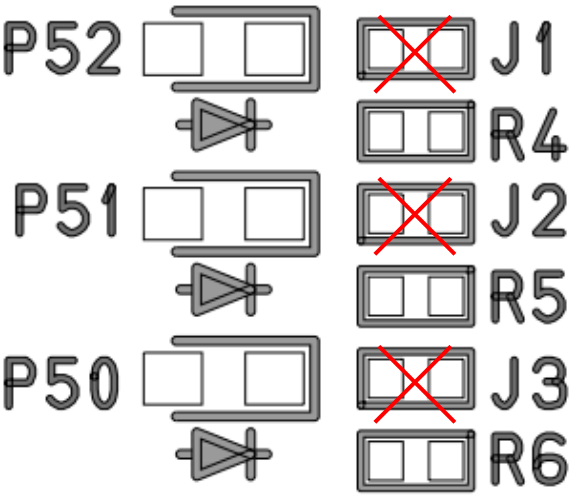


Fig. 12 Processing diagram of around LED when LED is not used

2.7 High-speed quartz crystal

The HXT0 and HXT1 pins are connected to the quartz crystal.

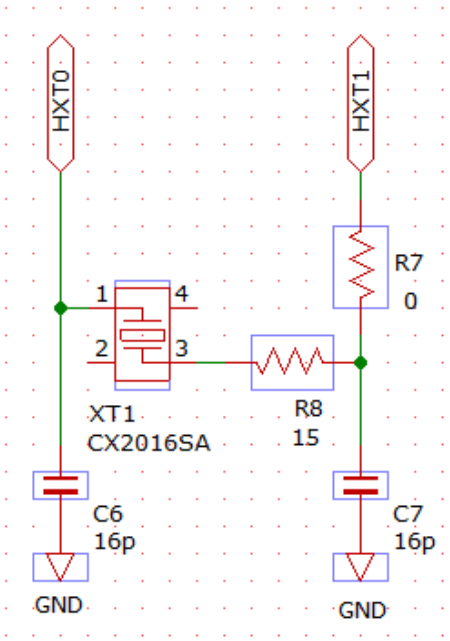


Fig. 13 High-speed crystal oscillator circuit

2.8 Low-speed quartz crystal

The XT0 and XT1 pins are connected to the crystal.

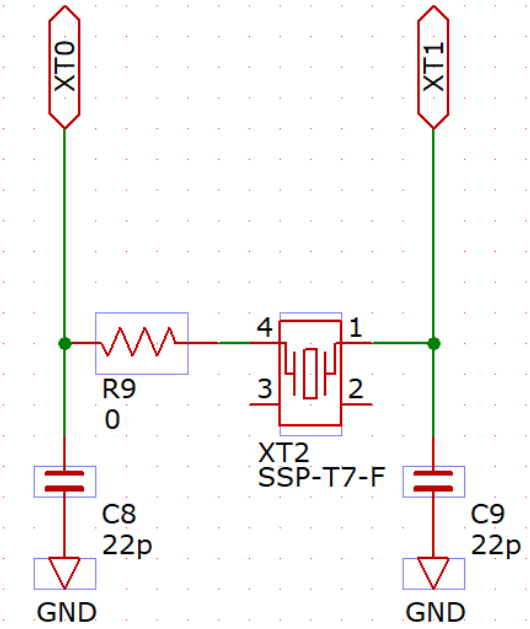


Fig. 14 Low-speed crystal oscillator circuit

2.9 VREF，VREFN，AIN0-3 (P32-35)

The VREF pin is connected to VDD via a jumper chip. When inputting a voltage from the user board connection connector pad to the VREF pin, remove the jumper chip of J4 and install the jumper chip of J5. VREFN is fixed to VSS. The P32-P35 pins can be used as the AIN0-AIN3 function of successive approximation AD converters to mount bypass capacitors on the C14-C11. Note that the bypass capacitor of the C14-11 is not implemented.

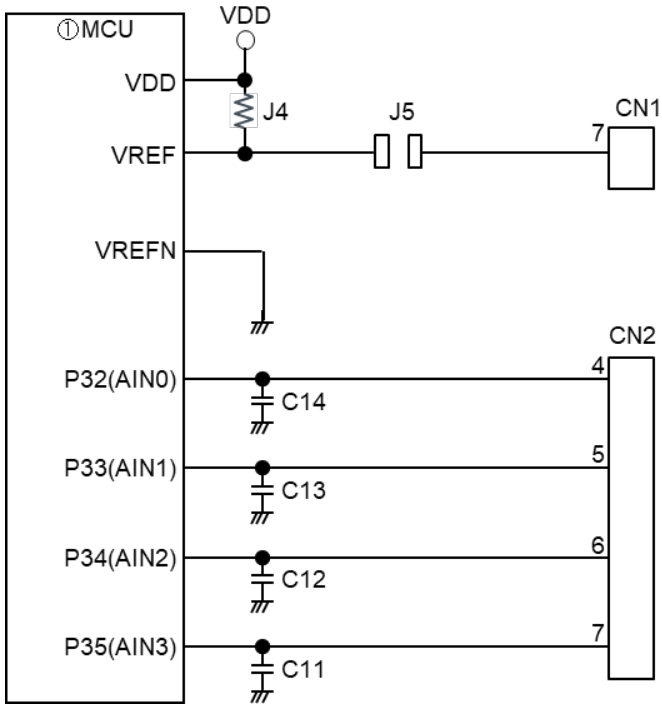


Fig15 VREF，AIN0-3 (P32-35)

2.10 BRMPN

Normally, H is input to the BRMPN pin with a built-in pull-up, but L is input to the BRMPN pin when 1-2 are connected with jumper wiring.

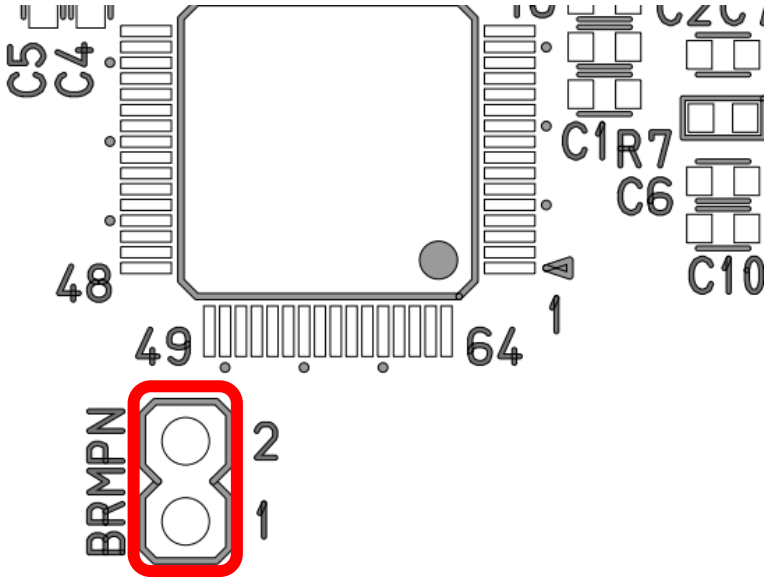


Fig16 BRMPN

3. User Interface

3.1 CN1, CN2

The pinouts of CN1 and CN2 of RB-D63Q2537TB48 are shown.

Table 2 Connection destinations of CN1 and CN2 of RB-D63Q2537TB48

CN1 Pin No.	Connected to			CN2 Pin No.	Connected to		
	device	Pin No.	Pin Name		device	Pin No.	Pin Name
1	ML63Q2537	10, 25	VDD	1	ML63Q2537	10, 25	VDD
2	ML63Q2537	10, 25	VDD	2	-	-	-
3	-	-	-	3	-	-	-
4	-	-	-	4	ML63Q2537	26	P32
5	-	-	-	5	ML63Q2537	27	P33
6	ML63Q2537	3	RESET_N	6	ML63Q2537	28	P34
7	J5	-	VREF	7	ML63Q2537	29	P35
8	-	-	-	8	ML63Q2537	30	P36
9	-	-	-	9	ML63Q2537	31	P37
10	-	-	-	10	ML63Q2537	32	P50
11	-	-	-	11	ML63Q2537	33	P51
12	-	-	-	12	ML63Q2537	34	P52
13	-	-	-	13	-	-	-
14	-	-	-	14	-	-	-
15	-	-	-	15	ML63Q2537	35	P55
16	-	-	-	16	ML63Q2537	36	P56
17	-	-	-	17	ML63Q2537	37	P57
18	-	-	-	18	-	-	
19	ML63Q2537	13	P40	19	-	-	-
20	ML63Q2537	14	P41	20	ML63Q2537	39	P65
21	ML63Q2537	15	P42	21	ML63Q2537	40	P64
22	ML63Q2537	16	P43	22	ML63Q2537	41	SSNF1-1 /P63
23	ML63Q2537	17	P44	23	ML63Q2537	42	SINF1-1 /P62
24	ML63Q2537	18	P45	24	ML63Q2537	43	SOUTF1-1 /P61
25	ML63Q2537	19	P46	25	ML63Q2537	44	SCKF1-1 /P60
26	ML63Q2537	20	P47	26	-	-	-
27	ML63Q2537	21	P80	27	-	-	-
28	ML63Q2537	22	P81	28	-	-	-
29	ML63Q2537	23	P82	29	ML63Q2537	45	P74
30	ML63Q2537	24	P83	30	ML63Q2537	46	P73
31	-	-	-	31	ML63Q2537	47	P20
32	-	-	-	32	ML63Q2537	48	P21
33	ML63Q2537	9	VSS	33	ML63Q2537	9	VSS
34	ML63Q2537	9	VSS	34	ML63Q2537	9	VSS

- :disconnected

3.2 CN3

The pin arrangement of CN3 of RB-D63Q2537TB48 is shown below.

Table 3 RB-D63Q2537TB48 CN3 connection destination

CNE1		Connected to		
Pin No.	Pin Name	device	Pin No.	ML63Q2537 pin name
1	VDD	ML63Q2537	10,25	VDD
2	VSS	ML63Q2537	9	VSS
3	SK/(output)	ML63Q2537	44	SCKF1-1 /P60 /(input)
4	DO/(output)	ML63Q2537	42	SINF1-1 /P62 /(input)
5	DI/(input)	ML63Q2537	43	SOUTF1-1 /P61 /(output)
6	N.C.	-	-	N.C.
7	CS/(output)	ML63Q2537	41	SSNF1-1 /P63 /(input)

- ：disconnected

3.3 CNE1

The pin arrangement of CNE1 of RB-D63Q2537TB48 is shown below.

Table 4 RB-D63Q2537TB48 CNE1 connection destination

CNE1		Connected to		
Pin No.	Pin Name	device	Pin No.	ML63Q2537 pin name
1	VTref	ML63Q2537	10,25	VDD
2	SWD	ML63Q2537	1	SWD
3	GND	ML63Q2537	9	VSS
4	SWC	ML63Q2537	2	SWC
5	GND	ML63Q2537	9	VSS
6	SWO	-	-	-
7	KEY	-	-	-
8	TDI	-	-	-
9	GND	ML63Q2537	9	VSS
10	nSRST	ML63Q2537	3	RESET_N

- ：disconnected

3.4 CNE2

The pin arrangement of CNE2 of RB-D63Q2537TB48 is shown below.

Table 5. RB-D63Q2537TB48 CNE2 connection destination

CNE1		Connected to		
Pin No.	Pin Name	device	Pin No.	ML63Q2537 pin name
1	VDD	ML63Q2537	10,25	VDD
2	-	-	-	-
3	SWD	ML63Q2537	1	SWD
4	SWC	ML63Q2537	2	SWC
5	RESET_N	ML63Q2537	3	RESET_N
6	VSS	ML63Q2537	9	VSS

- ：disconnected

4. Precautions for Use

(1) The RB-D63Q2537TB48 is an incomplete product and is a board for experts to use only in research and development facilities for research and development purposes. This board is not intended to be used in mass-produced products or as part of mass-produced products.

(2) The contents of this manual are subject to change without notice due to product and technical improvements. Please confirm that the information is update before using the product.

(3) When using the RB-D63Q2537TB48, please refer to the ML63Q2500 User's Manual and the manual of the ARM debugger you are using thoroughly and understand the contents before using the product.

(4) Please check the electrical characteristics, etc. on the mass-produced product and on your mass-produced board for final confirmation.

(5) We do not provide support for the RB-D63Q2537TB48. We will replace the product only if it is defective upon initial purchase.

(6) The RB-D63Q2537TB48 has a pattern on the back, so if it is used on a conductive material, it may short circuit and cause malfunction. Please use it on an insulating material, and if necessary, attach a protective sheet or attach feet to prevent the rear pattern from coming into contact with other objects.

5. Board specifications, parts list, circuit diagram

The following pages show the board specifications, parts list, and circuit diagram for the RB-D63Q2537TB48.

5.1 Board specifications

- Name: RB-D63Q2537TB48
- Size: 55.88mm x 93.98mm
- Weight: 20g

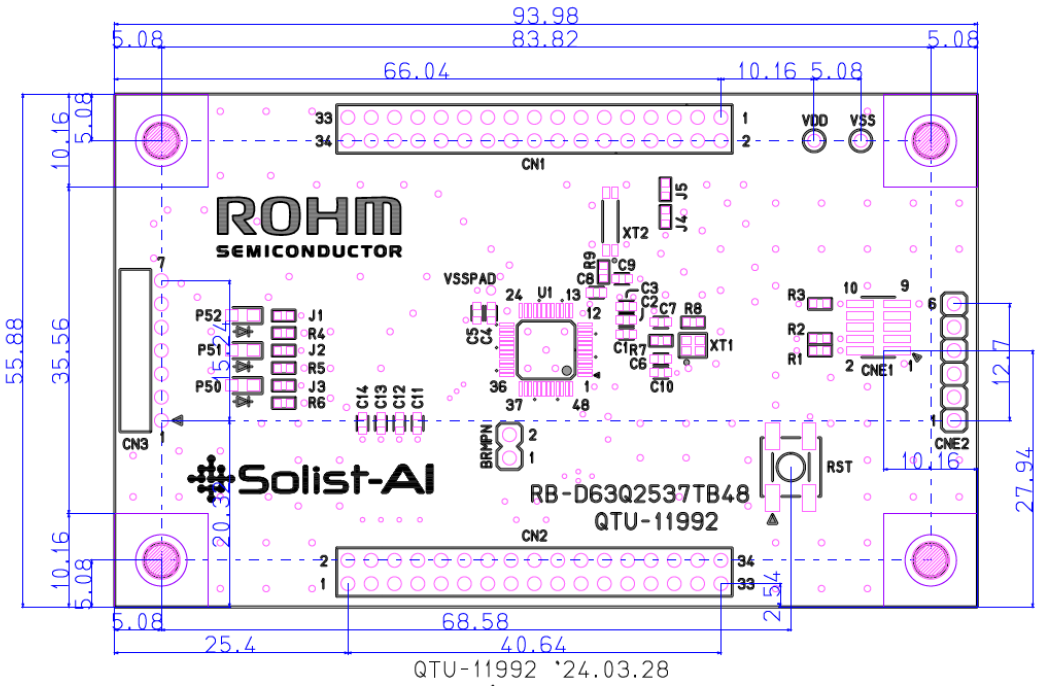


Fig.17 RB-D63Q2537TB48 Board Dimensions (Top View)

5.2 Bill of Materials

Table.6 RB-D63Q2537TB48 Bill of Materials

	Parts Number	Symbol	Contents	Package Type	Vendor
1	QTU-11992	RB-D63Q 2537TB48	PCB	-	Rohm Co., Ltd.
2	C1608X7R1E105K080AB	C1	Ceramic Capacitor 1.0μF/25V X7R	1608	TDK Corporation
3	C1608X7R1H104K080AA	C2	Ceramic Capacitor 0.1μF/50V X7R	1608	TDK Corporation
4	C1608X7R1E105K080AB	C3	Ceramic Capacitor 1.0μF/25V X7R	1608	TDK Corporation
5	C1608X7R1H104K080AA	C4	Ceramic Capacitor 0.1μF/50V X7R	1608	TDK Corporation
6	C1608X7R1E105K080AB	C5	Ceramic Capacitor 1.0μF/25V X7R	1608	TDK Corporation
7	GRM1885C1H220JA01	C6	Ceramic Capacitor 16pF/50V C0G	1608	Murata Manufacturing Co., Ltd.
8	GRM1885C1H220JA01	C7	Ceramic Capacitor 16pF/50V C0G	1608	Murata Manufacturing Co., Ltd.
9	GRM1885C1H220JA01	C8	Ceramic Capacitor 22pF/50V C0G	1608	Murata Manufacturing Co., Ltd.
10	GRM1885C1H220JA01	C9	Ceramic Capacitor 22pF/50V C0G	1608	Murata Manufacturing Co., Ltd.
11	C1608X7R1E105K080AB	C10	Ceramic Capacitor 1.0μF/25V X7R	1608	TDK Corporation
12	-	C11	Unmounted	1608	-
13	-	C12	Unmounted	1608	-
14	-	C13	Unmounted	1608	-
15	-	C14	Unmounted	1608	-
16	A1-34PA-2.54DSA(71)	CN1	Unmounted	34PIN DIP	Hirose Electric Co., Ltd.
17	A1-34PA-2.54DSA(71)	CN2	Unmounted	34PIN DIP	Hirose Electric Co., Ltd.
18	A2-7PA-2.54DS(71)	CN3	Unmounted	7PIN DIP	Hirose Electric Co., Ltd.
19	FTSH-105-01-L-DV-K	CNE1	10pin Header	10PIN SMD	Samtec Inc.
20	A2-6PA-2.54DSA(71)	CNE2	Unmounted	6PIN DIP	Hirose Electric Co., Ltd.
21	MCR03EZPJ103	R1	Resistor 10kΩ ±5%	1608	Rohm Co., Ltd.
22	MCR03EZPJ103	R2	Resistor 10kΩ ±5%	1608	Rohm Co., Ltd.
23	MCR03EZPJ103	R3	Resistor 10kΩ ±5%	1608	Rohm Co., Ltd.
24	MCR03EZPJ681	R4	Resistor 680Ω ±5%	1608	Rohm Co., Ltd.
25	MCR03EZPJ681	R5	Resistor 680Ω ±5%	1608	Rohm Co., Ltd.
26	MCR03EZPJ681	R6	Resistor 680Ω ±5%	1608	Rohm Co., Ltd.
27	MCR03ERTJ000	R7	Resistor 0Ω	1608	Rohm Co., Ltd.
28	MCR03ERTJ150	R8	Resistor 15Ω ±5%	1608	Rohm Co., Ltd.
29	MCR03ERTJ000	R9	Resistor 0Ω	1608	Rohm Co., Ltd.
30	MCR03ERTJ000	J1	Resistor 0Ω	1608	Rohm Co., Ltd.
31	MCR03ERTJ000	J2	Resistor 0Ω	1608	Rohm Co., Ltd.
32	MCR03ERTJ000	J3	Resistor 0Ω	1608	Rohm Co., Ltd.
33	MCR03ERTJ000	J4	Resistor 0Ω	1608	Rohm Co., Ltd.
34	MCR03ERTJ000	J5	Unmounted	1608	Rohm Co., Ltd.
35	SKHUALE010	RST	Tactile Switche	4PIN	ALPS ALPINE CO., LTD.
36	A2-2PA-2.54DSA(71)	BRMPN	Unmounted	2PIN DIP	Hirose Electric Co., Ltd.

	Parts Number	Symbol	Contents	Package Type	Vendor
37	SML-H12P8T	P50	LED Green	2012	Rohm Co., Ltd.
38	SML-H12P8T	P51	LED Green	2012	Rohm Co., Ltd.
39	SML-H12P8T	P52	LED Green	2012	Rohm Co., Ltd.
40	ML63Q2537-xxxTB	U1	32-bit Microcontroller	TQFP48	Rohm Co., Ltd.
41	Check Pin	VDD	Unmounted	TH Φ0.9	-
42	Check Pin	VSS	Unmounted	TH Φ0.9	-
43	CX2016SA40000D0GSS 40MHz	XT1	X'tal 40MHz	4PIN SMD	KYOCERA Corporation
44	SSP-T7-F 32.768kHz 12.5pF	XT2	X'tal 32.768kHz 12.5pF	4PIN SMD	Seiko Instruments Inc.

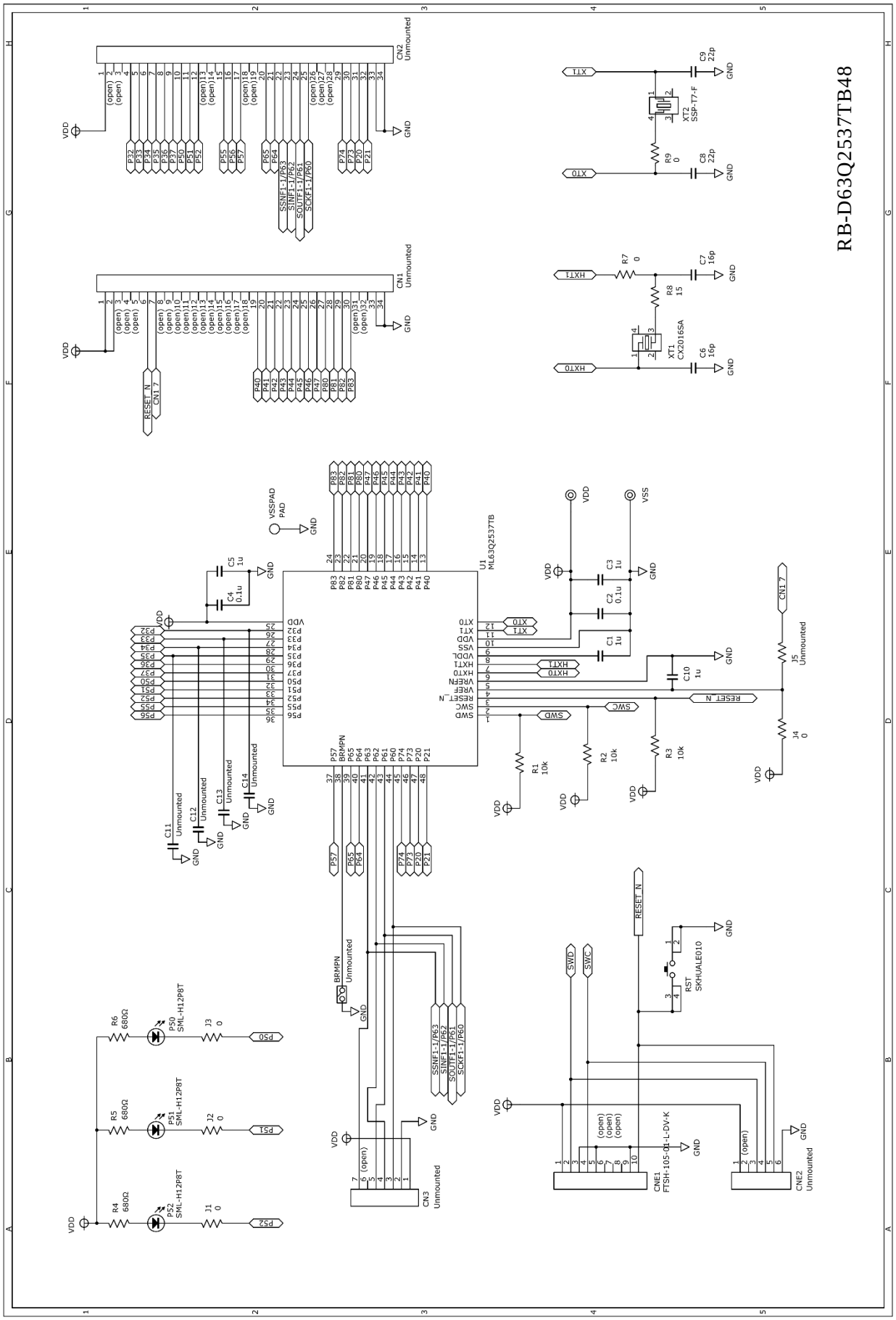
Noted

· The diameter of the through holes of CN1, CN2, CN3, and CNE2 is 0.9 mm. When mounting a connector, use a connector with a pin diameter of less than 0.9 mm, such as 0.5 mm.

· Parts may be replaced with parts with equivalent performance.

5.3 Circuit diagram

The circuit diagram for RB-D63Q2537TB48 is shown on the next page.


RB-D63Q2537TB48
U1
ML63Q2537TB
CN1
Unmounted
CN2
Unmounted
CN3
Unmounted
CNE1
FTSH-105-01-L-DV-K
CNE2
Unmounted
XT1
CX2016SA
XT2
SSP-T7-F
J1
J2
J3
J4
J5
P50
SML-H12P8T
P51
SML-H12P8T
P52
SML-H12P8T
RST
SKHUALE010
BRMPN
VSSPAD
PAD
RESET_N
SWD
SWC
SSNF1-1/P63
SINF1-1/P62
SOUTF1-1/P61
SCKF1-1/P60

6. Revision History

No.	Issue data	Page		Change details
		Change before	Change after	
FEBL63Q2537TB48_RB-01	2024.9.13	―	―	First edition issued
FEBL63Q2537TB48_RB-02	2025.12.19	P.1, P.3 to P.5	P.1, P.3 to P.5	Deleted due to discontinuation of MM-FT232H sales.

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