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ROHM Co., Ltd.  
April 1, 2024

# **RB-D62Q2712TB52**

## **User's Manual**

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Issue Date: July 10, 2023

Notes

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## Preface

This manual describes about the ML62Q2712 Reference Board : RB-D62Q2712TB52.

Refer to following documents when necessary.

- ML62Q2700 Group User's Manual  
Provides the detailed information about the microcontroller ML62Q2700 Group.
  
- EASE1000 V2 User's Manual  
Provides the information on how to use the On-chip emulator EASE1000 V2.

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## 1. Overview

### 1.1. Features

The RB-D62Q2712TB52 can be used for learning 'how to use' the ML62Q2712, on which the user needs to provide additional external components if necessary. By using the RB-D62Q2712TB52 together with the LAPIS Technology's on-chip emulator EASE1000 V2 and the provided software development environment, the user can develop software, debug and program the Flash. Also, by connecting an external power supply to RB-D62Q2712TB52, it can be used independently without connecting a EASE1000 V2.

Before using RB-D62Q2712TB52, be sure to understand and keep in mind the following information.

#### 1.1.1. Features

- The board is provided with ML62Q2712 52pin TQFP.
- Mounted with the linked connector to EASE1000 V2.
- Through-holes for connecting the pins of LSI to external peripheral boards.
- Power supply is selectable; supplied from the on-chip emulator EASE1000 V2 or CN1\_3pin/CN2\_2pin .
- Mounted with Crystal (32.768KHz)
- Mounted with LED (P20,P21,P22).
- Foot pattern with components for Successive Approximation Type A/D Converter is available (P23,P24,P25,P26).

#### 1.1.2. Hardware specifications

Table 1 shows the hardware specifications of RB-D62Q2712TB52.

**Table 1 Hardware specifications**

Mounted LSI	U1 : ML62Q2712 52pin TQFP
Other Mounted components	PWR: Jumper for selecting the power supply input (3pin pin-header and short pin)
	J1: Jumper for selecting TEST1_N pin (3pin pin-header and short pin)
	J2: Jumper for selecting P01/TEST0 pin (3pin pin-header and short pin)
	P20-P22: LEDs
	R1-R3: Resistors for LEDs by P20 to P22
	J3-J5: Jumper-chip for connecting LEDs
	X1, C3, C4: Crystal Oscillator (32.768kHz) and capacitors
	CNE: Connector for EASE1000 V2(14pin connector)
	C1, C5, C15: Capacitors for VDD and VDDL
R4: Pull-up resistor for RESET_N	
Pads (or/and) Through holes for mounting components	CN1-CN2: Connectors for user application system (50pin, 2.54mm pitch, $\phi$ 1.0mm )
	C2, C16: Capacitors for VDD
	C10-C14, J8: Capacitors and jumper-chip for Successive Approximation Type A/D Converter
	J6-J7: CN1 connection jumper-chip
	J9-J10: Jumper-Chip for connecting Serial Memory Interface
Power check pin	VDD, VSS, UVDD: $\phi$ 0.8mm
Operating voltage	+1.8V to +5.5V
Board size	55.88 mm x 93.98 mm

For more information about the connection of the mounted components, see the schematic.

1.2. Outline Diagram

Fig. 1 shows the RB-D62Q2712TB52.

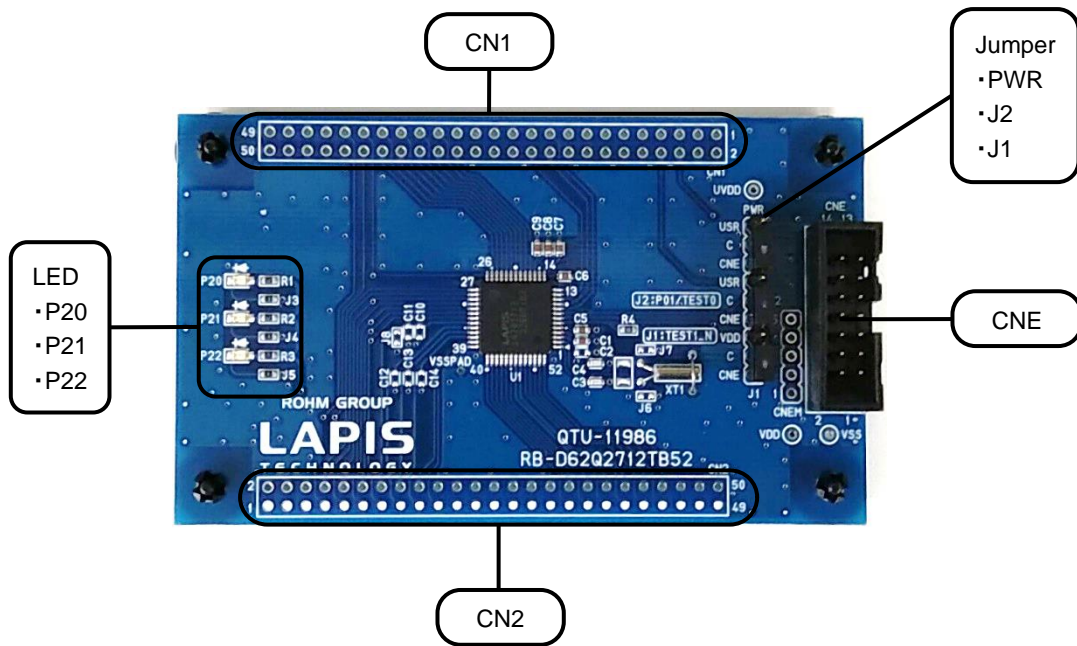


Fig. 1 Outline Diagram

## 2. Function

### 2.1. Power Circuit

The input to  $V_{DD}$  can be selected from 3.3VOUT of EASE1000 V2 or CN1\_3pin/CN2\_2pin by PWR jumper.

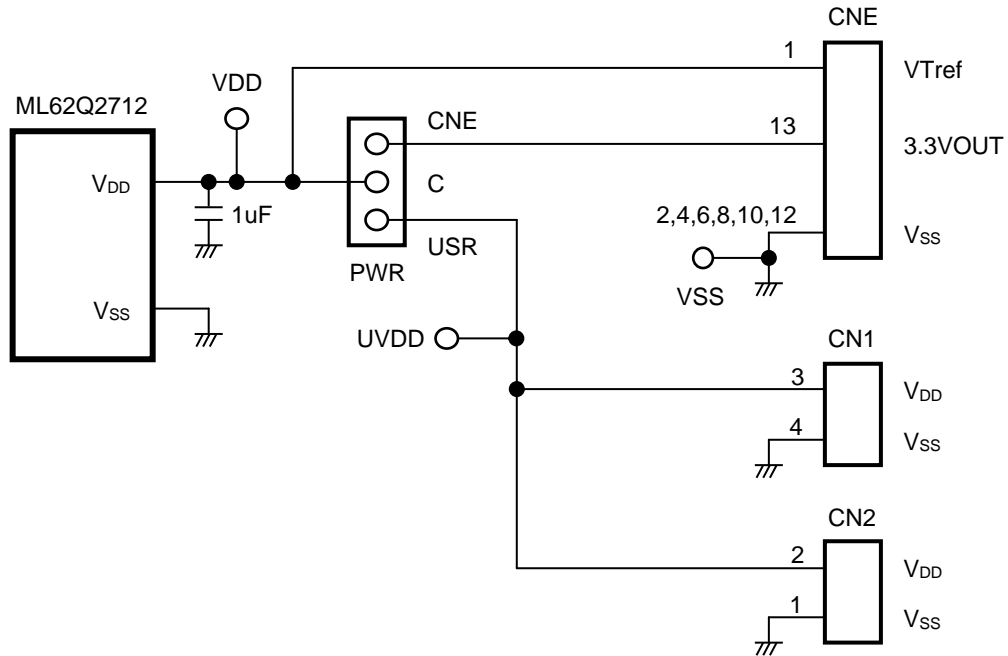


Fig. 2 Power Circuit

[Note]

The power supply ON/OFF procedure in case of setting PWR jumper to the USB-side when using EASE1000 V2.

- The procedure of power supply ON
  1. The USB cable of EASE1000 V2 is connected.
  2. The power supply of user's target system is turned on.
  
- The procedure of power supply OFF
  1. The power supply of user's target system is turned off
  2. The USB cable of EASE1000 V2 is removed



2.2. Connection for EASE1000 V2 (CNE)

EASE1000 V2 can be used if J1 and J2 jumper are set to “CNE”.

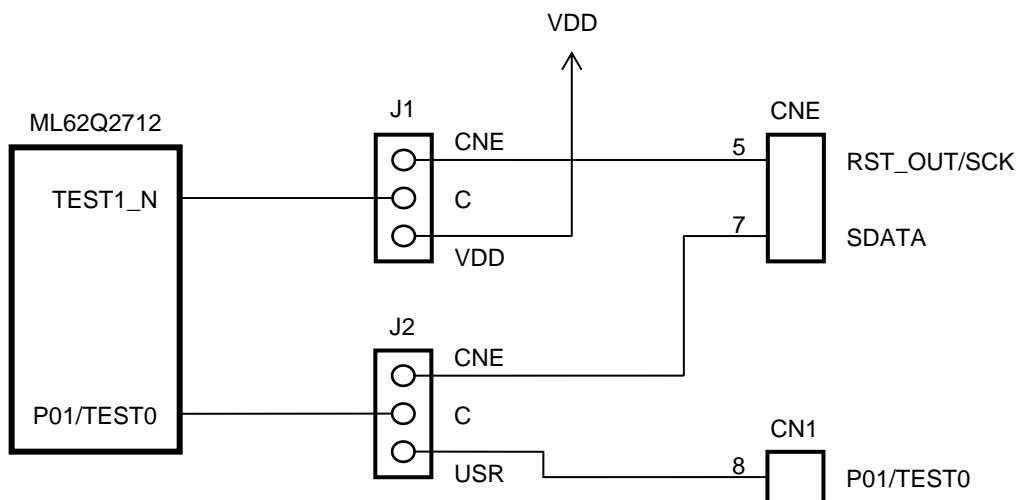


Fig. 3 EASE1000 V2 Interface

[Note]

P01/TEST0 pin:

P01/TEST0 pin of ML62Q2712 is initially set as a pull-up input mode

When using EASE1000 V2, do not set it as an output mode by using an application program, otherwise EASE1000 V2 cannot communicate with the ML62Q2712.

2.3. LED (P20, P21, P22)

The P20-P22 pins are ports that can directly drive LED. The Ports are connected to the LEDs through jumper-chip. Remove the jumper-chip when not using the LEDs.

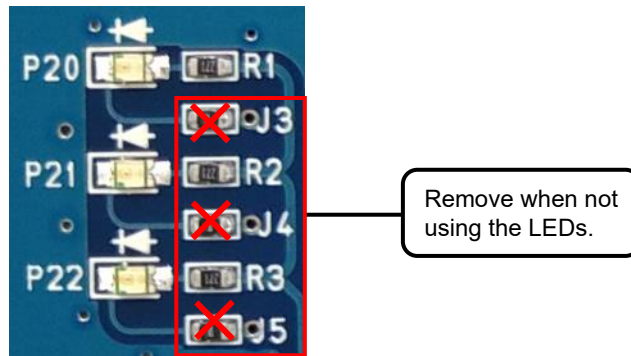


Fig. 4 Jumper-chip removal of LEDs

2.4. XT0/PIO0, XT1/PIO1

RB-D62Q2712TB52 can be mounted with cylinder type or SMD type crystal oscillator.

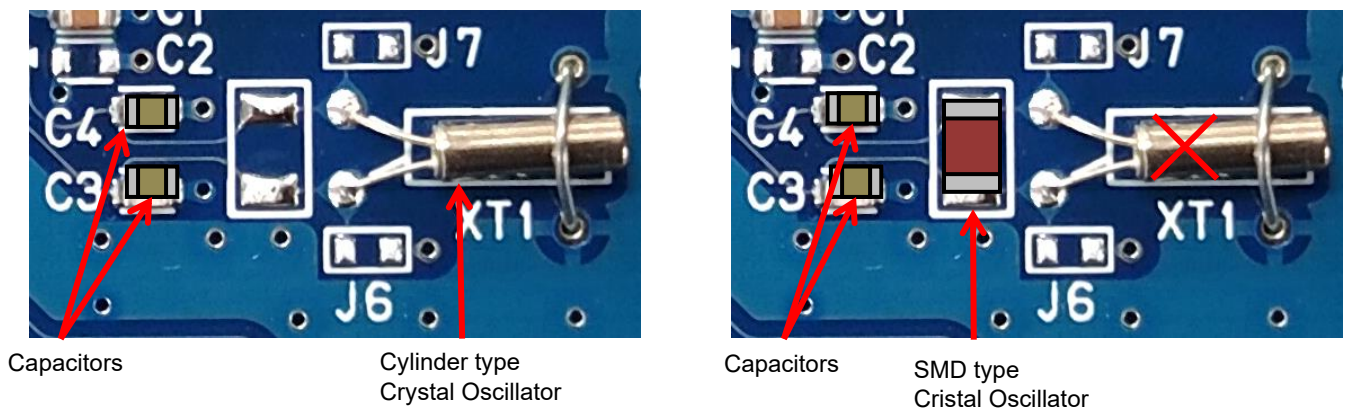


Fig. 5 Example of processing of Crystal Oscillator

### 2.5. P23, P24, P25, P26

When the P23 pin is used as VREF function of the successive approximation type A/D converter, C10, C11 can implement a bypass capacitor. In addition, VDD can be connected by mounting the J8 jumper-chip.

When P24, P25, P26 pin is used as AIN4, AIN5, AIN6 function of the successive approximation type A/D converter, the C12, C13 and C14 can implement a by-pass capacitor.

Fig. 6 shows the connection diagram.

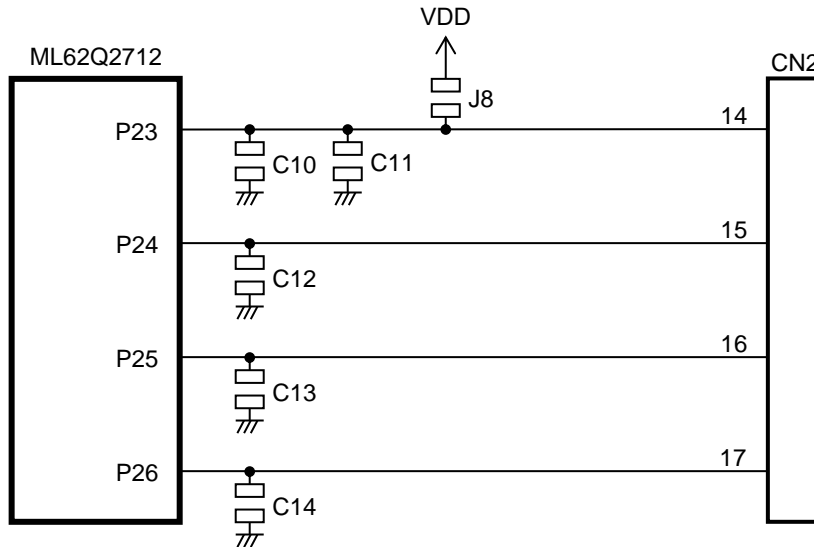


Fig. 6 P23, P24, P25, P26 Circuit

### 2.6. Serial Memory Interface

Serial Memory Interface can also be connected to CN1 by mounting jumper-chips on J9 and J10.

Fig. 7 shows an example of such processing.

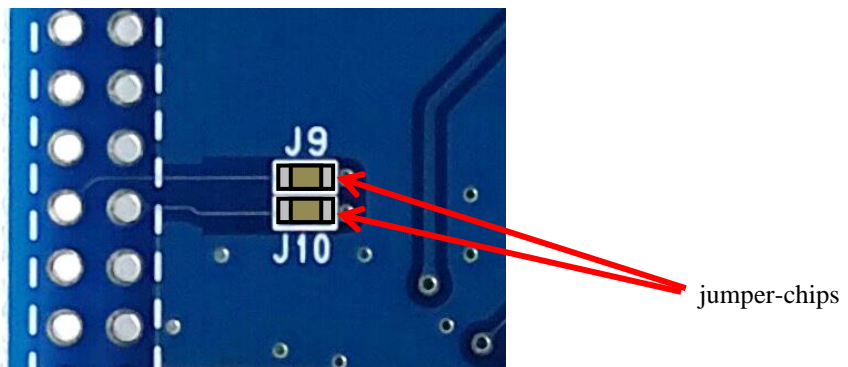


Fig. 7 Mounting jumper-chip on J9 and J10

### 2.7. Others

Do not mount a jumper-chip on J11.

### 3. User Interface

#### 3.1. CN1, CN2

Table 2 and Table 3 show the pin list of the RB-D62Q2712TB52 user interface connection CN1 and CN2.

**Table 2 CN1 Pin List**

CN1 Pin No.	Connection destination			CN1 Pin No.	Connection destination		
	Device	Pin No.	Name		Device	Pin No.	Name
1	J6	1	XT0	2	J7	1	XT1
3	PWR	USR	VDD	4	-	-	VSS
5	-	-	N.C.	6	ML62Q2712	6	RESET_N
7	-	-	N.C.	8	J2	USR	P01/TEST0
9	-	-	N.C.	10	-	-	N.C.
11	-	-	N.C.	12	-	-	N.C.
13	-	-	N.C.	14	-	-	N.C.
15	-	-	N.C.	16	-	-	N.C.
17	-	-	N.C.	18	-	-	N.C.
19	ML62Q2712	9	P02	20	ML62Q2712	10	P03
21	-	-	N.C.	22	ML62Q2712	11	P47
23	-	-	N.C.	24	-	-	N.C.
25	-	-	N.C.	26	-	-	N.C.
27	-	-	N.C.	28	-	-	N.C.
29	-	-	N.C.	30	ML62Q2712	17	P04
31	ML62Q2712	18	P05	32	ML62Q2712	19	P06
33	ML62Q2712	20	P07	34	ML62Q2712	21	P10
35	ML62Q2712	22	P11	36	ML62Q2712	23	P12
37	ML62Q2712	24	P13	38	ML62Q2712	25	P50
39	ML62Q2712	26/29* <sub>1</sub>	P51/P16* <sub>1</sub>	40	-/ML62Q2712* <sub>2</sub>	-/27* <sub>2</sub>	-/P14* <sub>2</sub>
41	-/ML62Q2712* <sub>3</sub>	-/28* <sub>3</sub>	-/P15* <sub>3</sub>	42	-	-	N.C.
43	-	-	N.C.	44	-	-	N.C.
45	-	-	N.C.	46	-	-	N.C.
47	-	-	N.C.	48	-	-	N.C.
49	-	-	N.C.	50	-	-	N.C.

N.C. : Not Connected

\*1: CN1.39 is also connected to Pin No.29/P16 when J11 is mounted. Refer to “2.7.Others”.

\*2: CN1.40 is connected to Pin No.27/P14 when J9 is mounted. Refer to “2.6.Serial Memory Interface”

\*3: CN1.41 is connected to Pin No.28/P15 when J10 is mounted. Refer to “2.6.Serial Memory Interface”

Table 3 CN2 Pin List

CN2 Pin No.	Connection destination			CN2 Pin No.	Connection destination		
	Device	Pin No.	Name		Device	Pin No.	Name
1	-	-	VSS	2	PWR	USR	VDD
3	-	-	N.C.	4	-	-	N.C.
5	-	-	N.C.	6	-	-	N.C.
7	ML62Q2712	27	P14	8	ML62Q2712	28	P15
9	ML62Q2712	29	P16	10	ML62Q2712	30	P17
11	ML62Q2712	31	P20	12	ML62Q2712	32	P21
13	ML62Q2712	33	P22	14	ML62Q2712	34	P23
15	ML62Q2712	35	P24	16	ML62Q2712	36	P25
17	ML62Q2712	37	P26	18	ML62Q2712	38	P27
19	ML62Q2712	39	P56	20	-	-	N.C.
21	-	-	N.C.	22	-	-	N.C.
23	-	-	N.C.	24	-	-	N.C.
25	-	-	N.C.	26	-	-	N.C.
27	-	-	N.C.	28	-	-	N.C.
29	-	-	N.C.	30	-	-	N.C.
31	-	-	N.C.	32	-	-	N.C.
33	ML62Q2712	40	P41	34	ML62Q2712	41	P30
35	ML62Q2712	42	P31	36	ML62Q2712	43	P32
37	ML62Q2712	44	P33	38	ML62Q2712	45	P60
39	ML62Q2712	46	P61	40	ML62Q2712	47	P62
41	ML62Q2712	48	P63	42	ML62Q2712	49	P64
43	ML62Q2712	50	P65	44	ML62Q2712	51	P66
45	-	-	N.C.	46	-	-	N.C.
47	-	-	N.C.	48	-	-	N.C.
49	-	-	N.C.	50	ML62Q2712	52	P43

N.C. : Not Connected

## 3.2. CNE

Table 4 shows the pin list of the RB-D62Q2712TB52 user interface connection CNE.

**Table 4 CNE**

CNE		Connection destination		
Pin No.	Name	Device	Pin No.	ML62Q2712 Pin Name
1	VTref	-	-	VDD
2	GND	-	-	VSS
3	VPP	-	-	N.C.
4	GND	-	-	VSS
5	RST_OUT/SCK	J1	CNE	TEST1_N
6	GND	-	-	VSS
7	SDATA	J2	CNE	P01/TEST0
8	GND	-	-	VSS
9	VDDL	-	-	N.C.
10	GND	-	-	VSS
11	N.C.	-	-	N.C.
12	GND	-	-	VSS
13	3.3VOUT	PWR	CNE	VDD
14	N.C.	-	-	N.C.

N.C. : Not Connected

## 4. Precaution for usage

- (1) The RB-D62Q2712TB52 is an unfinished product and intended for research and development and for expert use in the research and development facility only. The RB-D62Q2712TB52 is not intended to be used for volume production or parts thereof.
- (2) Since the content specified herein is subject to change for improvement without notice, confirm the latest content when using the board.
- (3) See the other documents, the ML62Q2700 group user's manual and EASE1000 V2 user's manual when using the RB-D62Q2712TB52.
- (4) Confirm the final electrical characteristics by using the mass production parts on your mass production boards.
- (5) LAPIS supports replacing the board for an initial failure soon after the shipment. However LAPIS doesn't support repairing the board.
- (6) RB-D62Q2712TB52 have signal patterns on the underside, it might work abnormally if using on conductive materials. Use it on insulating materials or having any preventable parts.

## 5. PCB specification, BOM list and Schematic

### 5.1. PCB specification

Fig. 8 shows the PCB dimensional outline diagram and layout of components.

PCB part number:  
RB-D62Q2712TB52

Dimension:  
55.88mm x 93.98mm

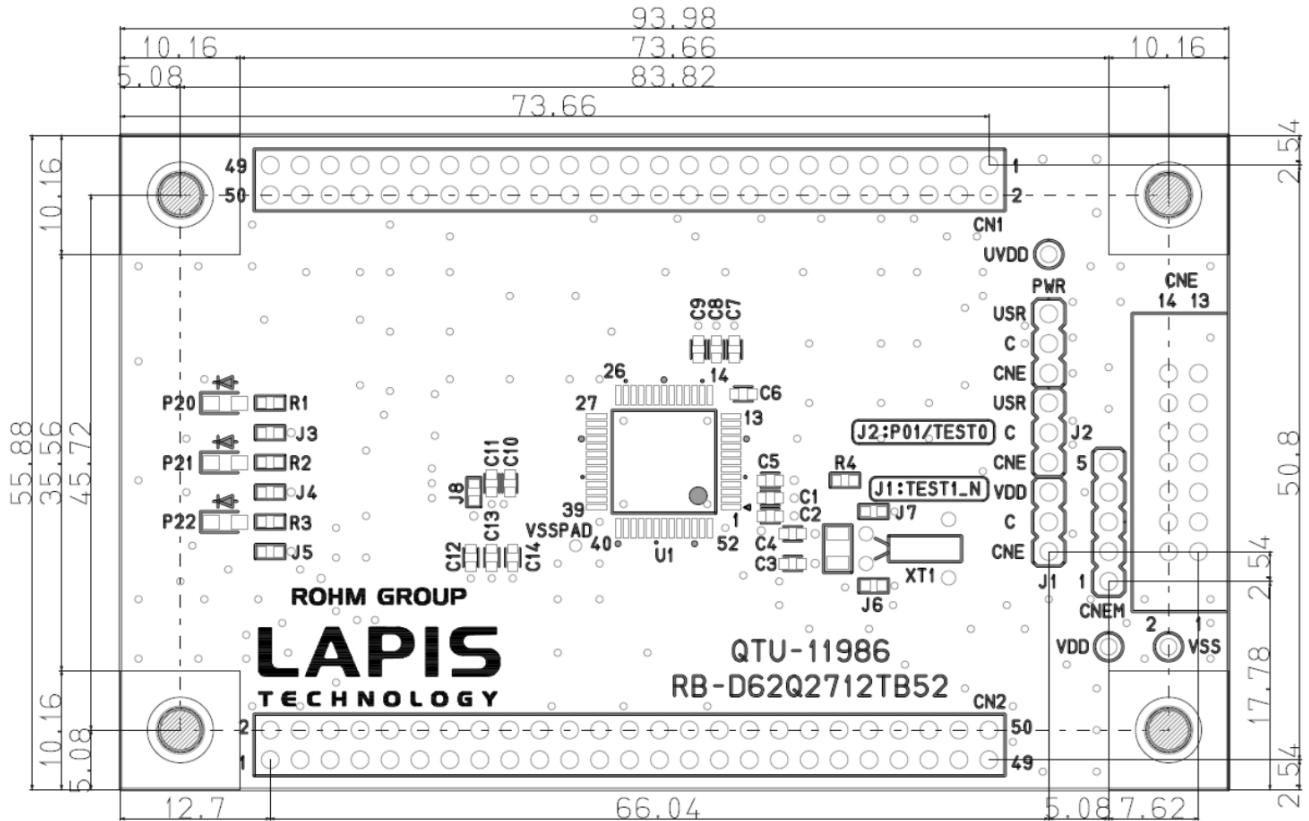


Fig. 8 PCB dimensional outline diagram and layout of components (Top view)



## 5.2. BOM list

Table 5 BOM list

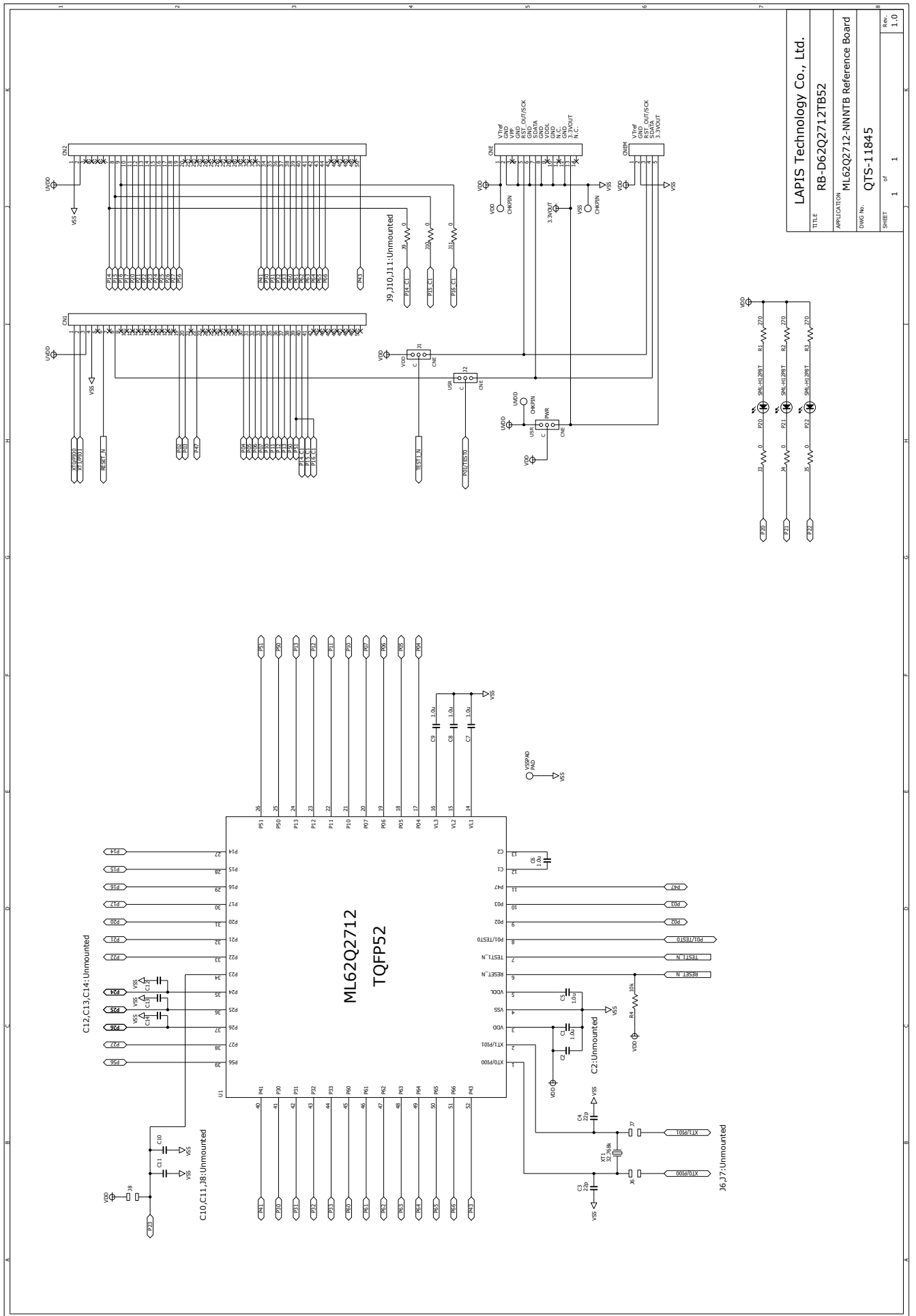
	Parts Number	Symbol	Contents	Qty.	Vendor
1	QTU-11986	RB-D62Q2712TB52	PCB	1	LAPIS Technology Co., Ltd.
2	C1608X7R1E105K080AB	C1,C5,C6,C7,C8, C9	Ceramic Capacitor 1.0 $\mu$ F/25V X7R	6	TDK Corporation
3	-	C2,C10,C11,C12, C13,C14	Unmounted	6	-
4	GRM1885C1H220JA01	C3,C4	Ceramic Capacitor 22pF/50V C0G	2	Murata Manufacturing Co., Ltd.
5	HIF3H-50DA-2.54DSA(71)	CN1, CN2	Unmounted	2	Hirose Electric Co., Ltd.
6	HIF3FC-14PA-2.54DSA(71)	CNE	14pin Header Connector	1	Hirose Electric Co., Ltd.
7	-	CNEM	Unmounted	1	-
8	A2-3PA-2.54DSA	J1, J2, PWR	3pin Header Connector	3	Hirose Electric Co., Ltd.
9	MCR03ERTJ000	J3, J4, J5	Resistor 0 $\Omega$	3	Rohm Co., Ltd.
10	-	J6,J7,J8,J9,J10,J11	Unmounted	6	-
11	SML-H12P8T	P20, P21, P22	LED Green	3	Rohm Co., Ltd.
12	MCR03EZPJ271	R1, R2, R3	Resistor 270 $\Omega$ $\pm$ 5%	3	Rohm Co., Ltd.
13	MCR03EZPJ103	R4	Resistor 10k $\Omega$ $\pm$ 5%	1	Rohm Co., Ltd.
14	ML62Q2712-NNNTB	U1	16-bit Microcontroller	1	LAPIS Technology Co., Ltd.
15	-	UVDD, VDD, VSS	Unmounted	3	-
16	-	VSSPAD	Unmounted	1	-
17	VT-200-F 12.5pF	XT1	X'tal 32.768kHz 12.5pF	1	Seiko Instruments Inc.
18	HIF3GA-2.54SP	-	Short pin	3	Hirose Electric Co., Ltd.

## [Note]

- The diameter of through hole of CN1 and CN2 is 1.0 mm.  
Using CN1 and CN2, the diameter of connector pin should use the connector below 0.6mm, such as 0.64mm.
- The parts may be changed into another parts with equivalent part special quality.

## 5.3. Schematic

The next page shows the schematic of RB-D62Q2712TB52.



## 6. Revision History

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEBL62Q2712RB-01	July 10, 2023	–	–	First edition.