



Dear customer

ROHM Co., Ltd. ("ROHM"), on the 1st day of April, 2024,  
has absorbed into merger with 100%-owned subsidiary of LAPIS Technology Co., Ltd.

Therefore, all references to "LAPIS Technology Co., Ltd.", "LAPIS Technology"  
and/or "LAPIS" in this document shall be replaced with "ROHM Co., Ltd."

Furthermore, there are no changes to the documents relating to our products other than  
the company name, the company trademark, logo, etc.

Thank you for your understanding.

ROHM Co., Ltd.  
April 1, 2024

# RB-D62Q2703TB48 User's Manual

---

Issue Date: June 30, 2023

Notes

- 1) The information contained herein is subject to change without notice.
- 2) When using LAPIS Technology Products, refer to the latest product information (data sheets, user's manuals, application notes, etc.), and ensure that usage conditions (absolute maximum ratings, recommended operating conditions, etc.) are within the ranges specified. LAPIS Technology disclaims any and all liability for any malfunctions, failure or accident arising out of or in connection with the use of LAPIS Technology Products outside of such usage conditions specified ranges, or without observing precautions. Even if it is used within such usage conditions specified ranges, semiconductors can break down and malfunction due to various factors. Therefore, in order to prevent personal injury, fire or the other damage from break down or malfunction of LAPIS Technology Products, please take safety at your own risk measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. You are responsible for evaluating the safety of the final products or systems manufactured by you.
- 3) Descriptions of circuits, software and other related information in this document are provided only to illustrate the standard 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. And the peripheral conditions must be taken into account when designing circuits for mass production. LAPIS Technology disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, and other related information.
- 4) No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of LAPIS Technology or any third party with respect to LAPIS Technology Products or the information contained in this document (including but not limited to, the Product data, drawings, charts, programs, algorithms, and application examples, etc.). Therefore LAPIS Technology shall have no responsibility whatsoever for any dispute, concerning such rights owned by third parties, arising out of the use of such technical information.
- 5) The Products are intended for use in general electronic equipment (AV/OA devices, communication, consumer systems, gaming/entertainment sets, etc.) as well as the applications indicated in this document. For use of our Products in applications requiring a high degree of reliability (as exemplified below), please be sure to contact a LAPIS Technology representative and must obtain written agreement: transportation equipment (cars, ships, trains, etc.), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems, etc. LAPIS Technology disclaims any and all liability for any losses and damages incurred by you or third parties arising by using the Product for purposes not intended by us. Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters, etc.
- 6) The Products specified in this document are not designed to be radiation tolerant.
- 7) LAPIS Technology has used reasonable care to ensure the accuracy of the information contained in this document. However, LAPIS Technology does not warrant that such information is error-free and LAPIS Technology shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.
- 8) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. LAPIS Technology shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.
- 9) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act..
- 10) Please contact a ROHM sales office if you have any questions regarding the information contained in this document or LAPIS Technology's Products.
- 11) This document, in part or in whole, may not be reprinted or reproduced without prior consent of LAPIS Technology.

(Note) "LAPIS Technology" as used in this document means LAPIS Technology Co., Ltd.

Copyright 2023 LAPIS Technology Co., Ltd.

---

## LAPIS Technology Co., Ltd.

2-4-8 Shinyokohama, Kouhoku-ku, Yokohama 222-8575, Japan  
<https://www.lapis-tech.com/en/>

---

## Preface

This manual describes about the ML62Q2703 Reference Board : RB-D62Q2703TB48.

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.

## Table of Contents

1. Overview.....	1
1.1. Features.....	1
1.2. Outline Diagram .....	2
2. Function.....	3
2.1. Power Circuit.....	3
2.2. Connection for EASE1000 V2 (CNE) .....	4
2.3. LED (P20, P21, P22) .....	5
2.4. XT0/PIO0, XT1/PIO1 .....	5
2.5. P23, P24, P25, P26 .....	6
2.6. Jumper-Chip for connecting Serial Memory Interface (J9,J10,J11) .....	6
3. User Interface .....	7
3.1. CN1, CN2.....	7
3.2. CNE.....	9
4. Precaution for usage .....	10
5. PCB specification, BOM list and Schematic .....	11
5.1. PCB specification .....	11
5.2. BOM list.....	12
5.3. Schematic.....	12
6. Revision History.....	14

## 1. Overview

### 1.1. Features

The RB-D62Q2703TB48 can be used for learning 'how to use' the ML62Q2703, on which the user needs to provide additional external components if necessary. By using the RB-D62Q2703TB48 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-D62Q2703TB48, it can be used independently without connecting a EASE1000 V2.

Before using RB-D62Q2703TB48, be sure to understand and keep in mind the following information.

#### 1.1.1. Features

- The board is provided with ML62Q2703 48pin 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-D62Q2703TB48.

**Table 1 Hardware specifications**

Mounted LSI	U1 : ML62Q2703 48pin 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-D62Q2703TB48.

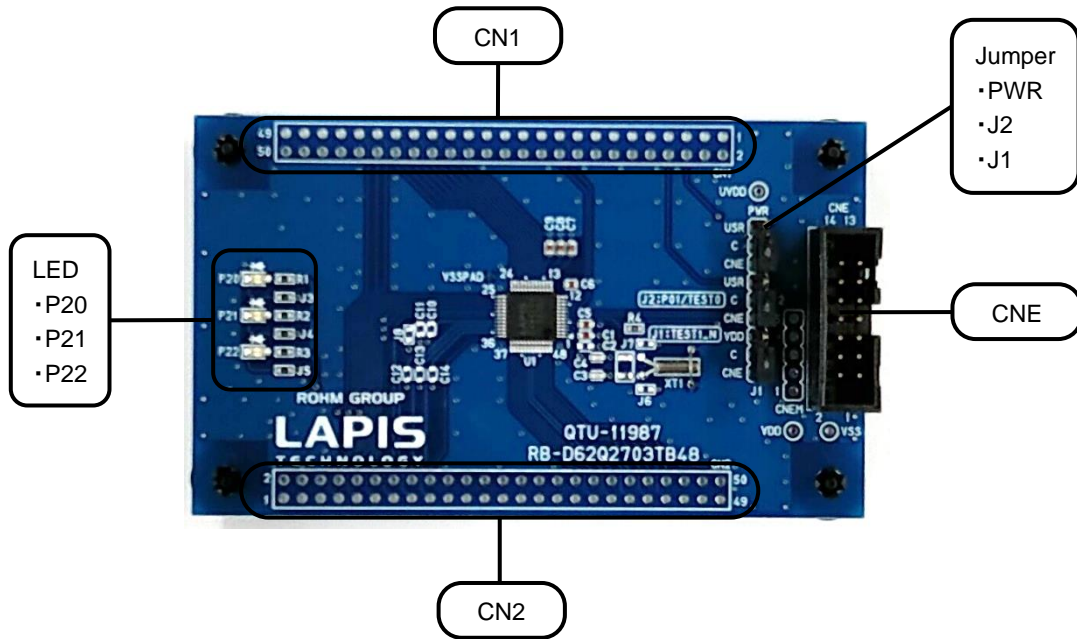


Fig. 1 Outline Diagram

## 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.

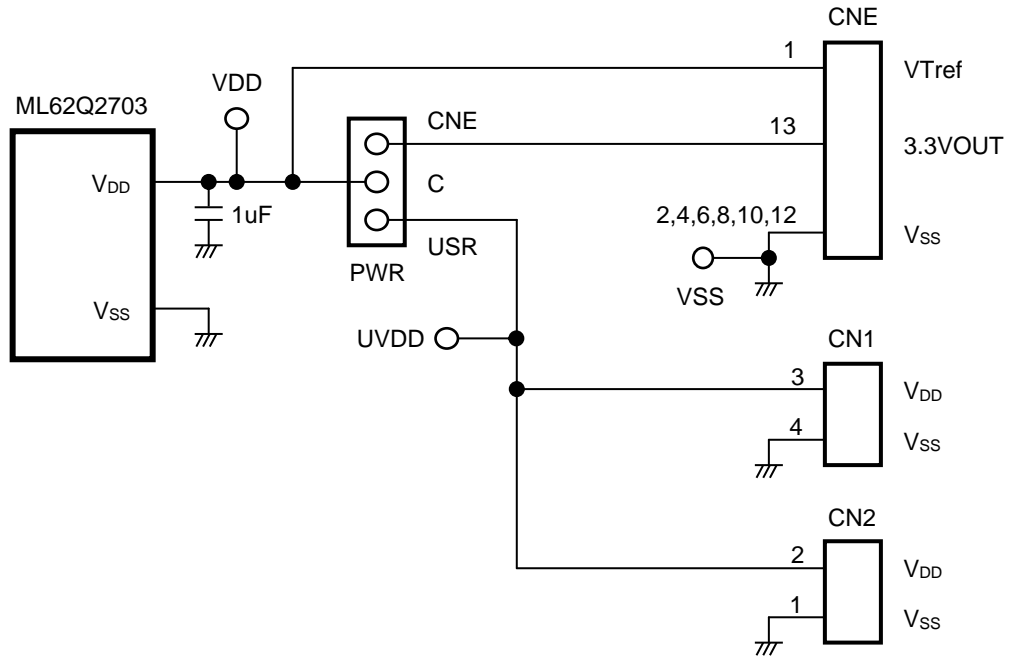


Fig. 2 Power Circuit

[Note]

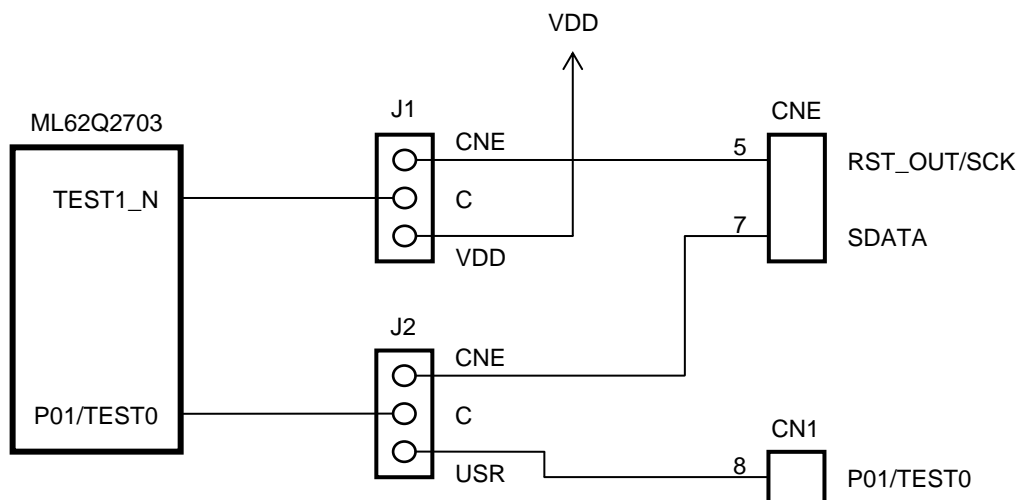
The power supply ON/OFF procedure in case of setting PWR jumper to the USB-side when using EASE1000 V2.

- 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 ML62Q2703 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 ML62Q2703.

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.

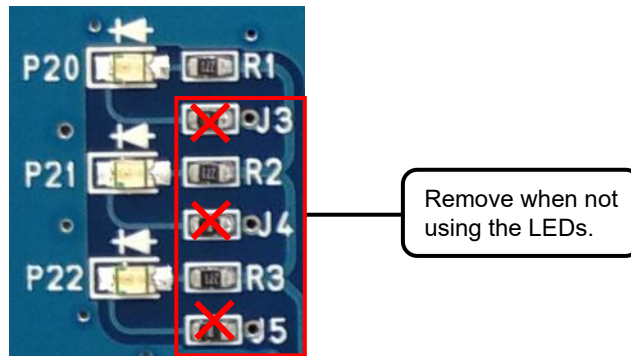


Fig. 4 Jumper-chip removal of LEDs

2.4. XT0/PIO0, XT1/PIO1

RB-D62Q2703TB48 can be mounted with cylinder type or SMD type crystal oscillator.

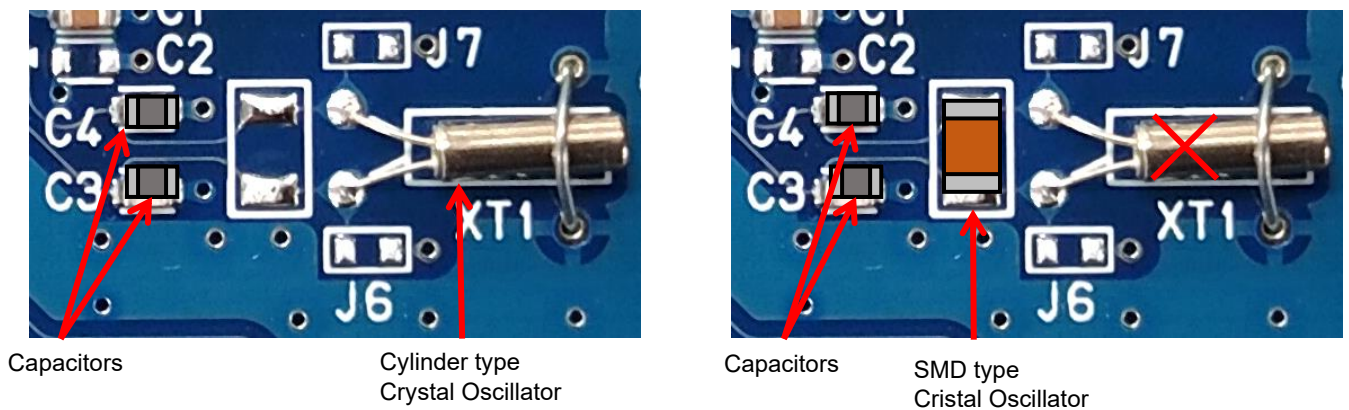


Fig. 5 Example of processing of Crystal Oscillator

### 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.

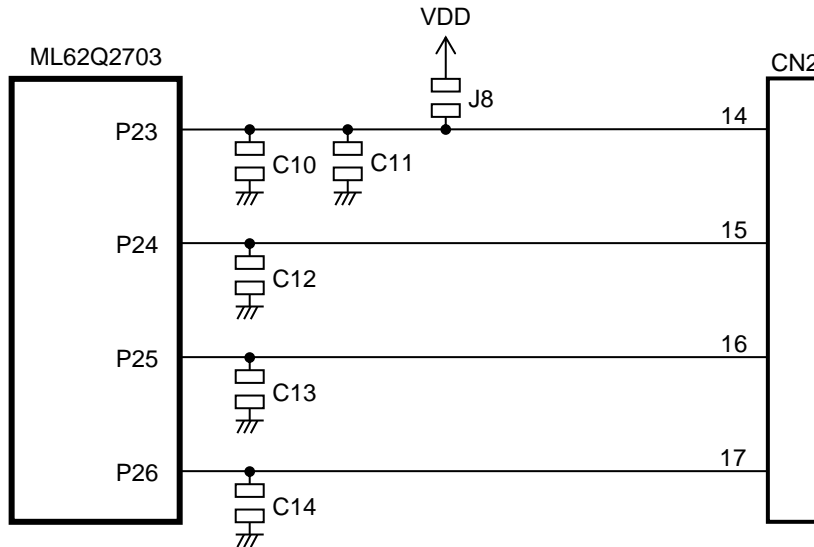


Fig. 6 P23, P24, P25, P26 Circuit

### 2.6. Serial Memory Interface

Serial Memory Interface can also be connected to CN1 by mounting jumper-chips on J9, J10 and J11.

Fig. 7 shows an example of such processing.

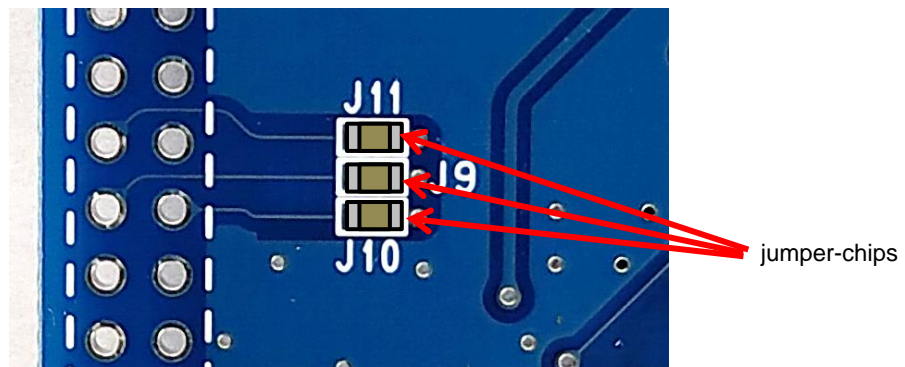


Fig. 7 Mounting jumper-chips on J9, J10 and J11

### 3. User Interface

#### 3.1. CN1, CN2

Table 2 and Table 3 show the pin list of the RB-D62Q2703TB48 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	ML62Q2703	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	ML62Q2703	9	P02	20	ML62Q2703	10	P03
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	ML62Q2703	16	P04
31	ML62Q2703	17	P05	32	ML62Q2703	18	P06
33	ML62Q2703	19	P07	34	ML62Q2703	20	P10
35	ML62Q2703	21	P11	36	ML62Q2703	22	P12
37	ML62Q2703	23	P13	38	ML62Q2703	24	P50
39	-/ML62Q2703* <sub>1</sub>	-/27* <sub>1</sub>	-/P16* <sub>1</sub>	40	-/ML62Q2703* <sub>2</sub>	-/25* <sub>2</sub>	-/P14* <sub>2</sub>
41	-/ML62Q2703* <sub>3</sub>	-/26* <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 connected to Pin No.27/P16 when J11 is mounted. Refer to “2.6.Serial Memory Interface”.

\*2: CN1.40 is connected to Pin No.25/P14 when J9 is mounted. Refer to “2.6.Serial Memory Interface”

\*3: CN1.41 is connected to Pin No.26/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	ML62Q2703	25	P14	8	ML62Q2703	26	P15
9	ML62Q2703	27	P16	10	ML62Q2703	28	P17
11	ML62Q2703	29	P20	12	ML62Q2703	30	P21
13	ML62Q2703	31	P22	14	ML62Q2703	32	P23
15	ML62Q2703	33	P24	16	ML62Q2703	34	P25
17	ML62Q2703	35	P26	18	ML62Q2703	36	P27
19	-	-	N.C.	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	-	-	N.C.	34	ML62Q2703	37	P30
35	ML62Q2703	38	P31	36	ML62Q2703	39	P32
37	ML62Q2703	40	P33	38	ML62Q2703	41	P60
39	ML62Q2703	42	P61	40	ML62Q2703	43	P62
41	ML62Q2703	44	P63	42	ML62Q2703	45	P64
43	ML62Q2703	46	P65	44	ML62Q2703	47	P66
45	-	-	N.C.	46	-	-	N.C.
47	-	-	N.C.	48	-	-	N.C.
49	-	-	N.C.	50	ML62Q2703	48	P43

N.C. : Not Connected

## 3.2. CNE

Table 4 shows the pin list of the RB-D62Q2703TB48 user interface connection CNE.

**Table 4 CNE**

CNE		Connection destination		
Pin No.	Name	Device	Pin No.	ML62Q2703 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-D62Q2703TB48 is an unfinished product and intended for research and development and for expert use in the research and development facility only. The RB-D62Q2703TB48 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-D62Q2703TB48.
- (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-D62Q2703TB48 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-D62Q2703TB48

Dimension:  
55.88mm x 93.98mm

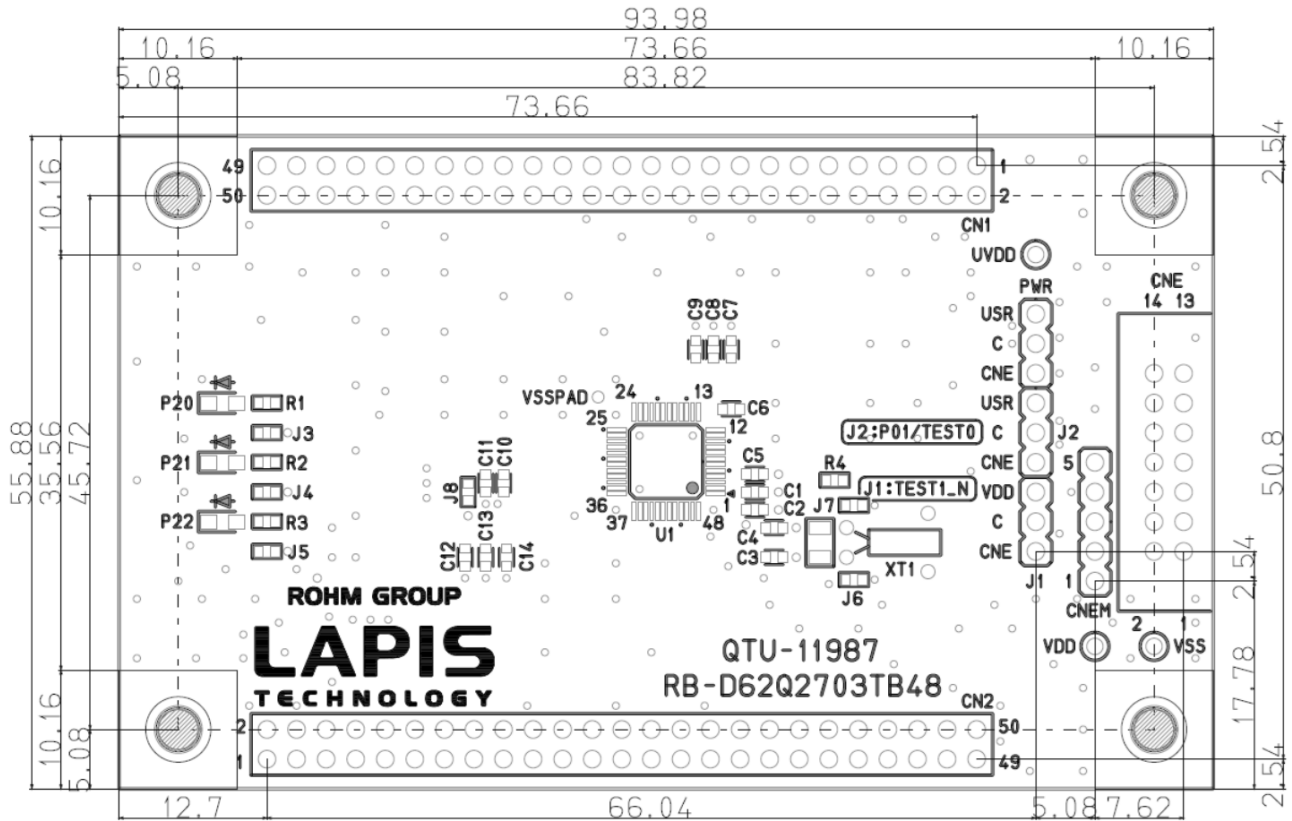


Fig. 8 PCB dimensional outline diagram and layout of components (Top view)



## 5.2. BOM list

Table 5 BOM list

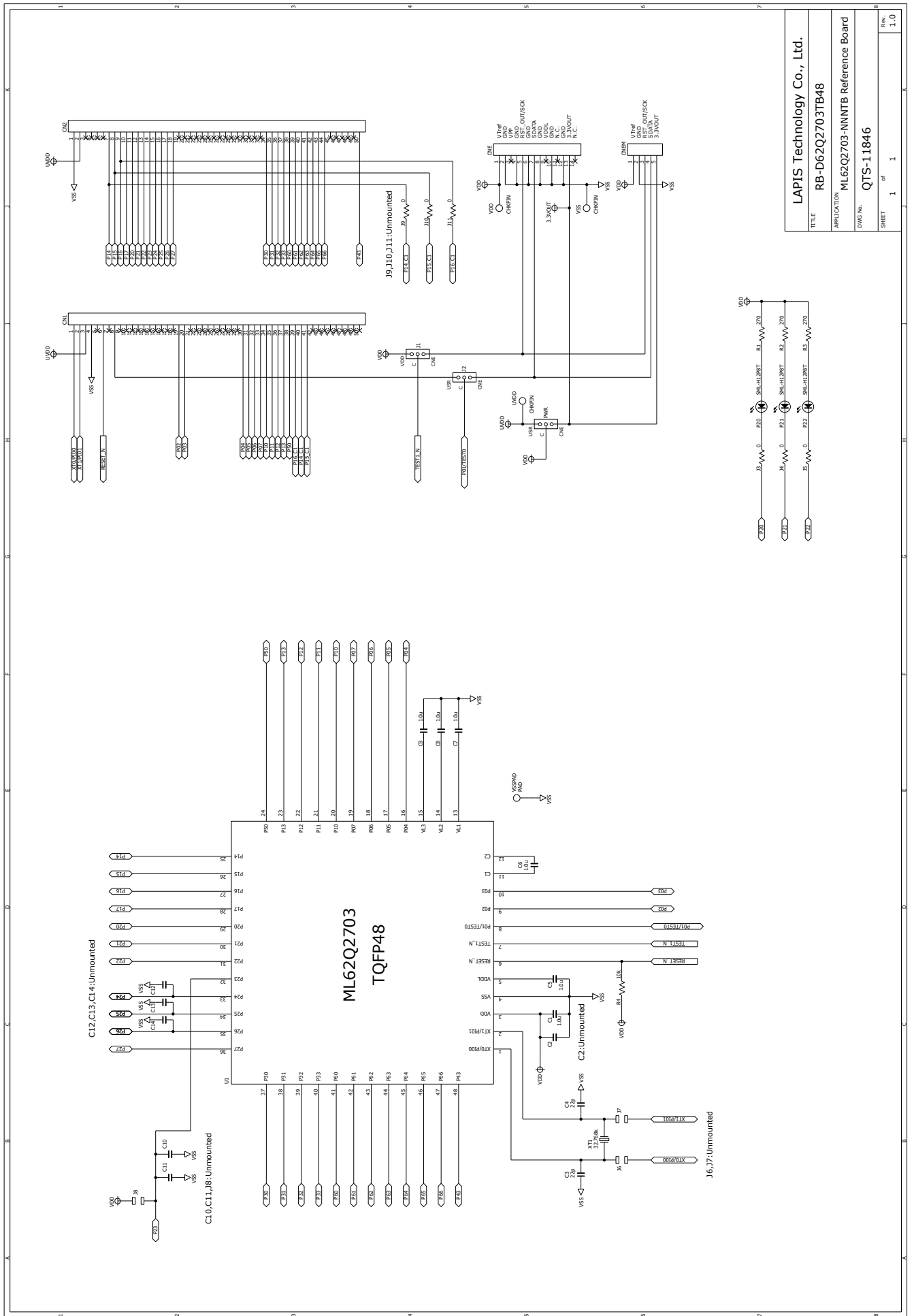
	Parts Number	Symbol	Contents	Qty.	Vendor
1	QTU-11987	RB-D62Q2703TB48	PCB	1	LAPIS Technology Co., Ltd.
2	C1608X7R1E105K080AB	C1,C5,C6,C7,C8, C9	Ceramic Capacitor 1.0 $\mu$ F/25V X7R	6	TDK Corporation
3	-	C2,C10,C11,C12, C13,C14	Unmounted	6	-
4	GRM1885C1H220JA01	C3,C4	Ceramic Capacitor 22pF/50V C0G	2	Murata 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	ML62Q2703-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-D62Q2703TB48.



## 6. Revision History

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEBL62Q2703RB-01	June 30, 2023	–	–	First edition.