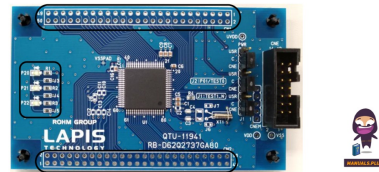


ROHM FEBL62Q2737RB-01 Introduces Power Efficient Zero Cross Detection



ROHM FEBL62Q2737RB-01 Introduces Power Efficient Zero Cross Detection User Manual

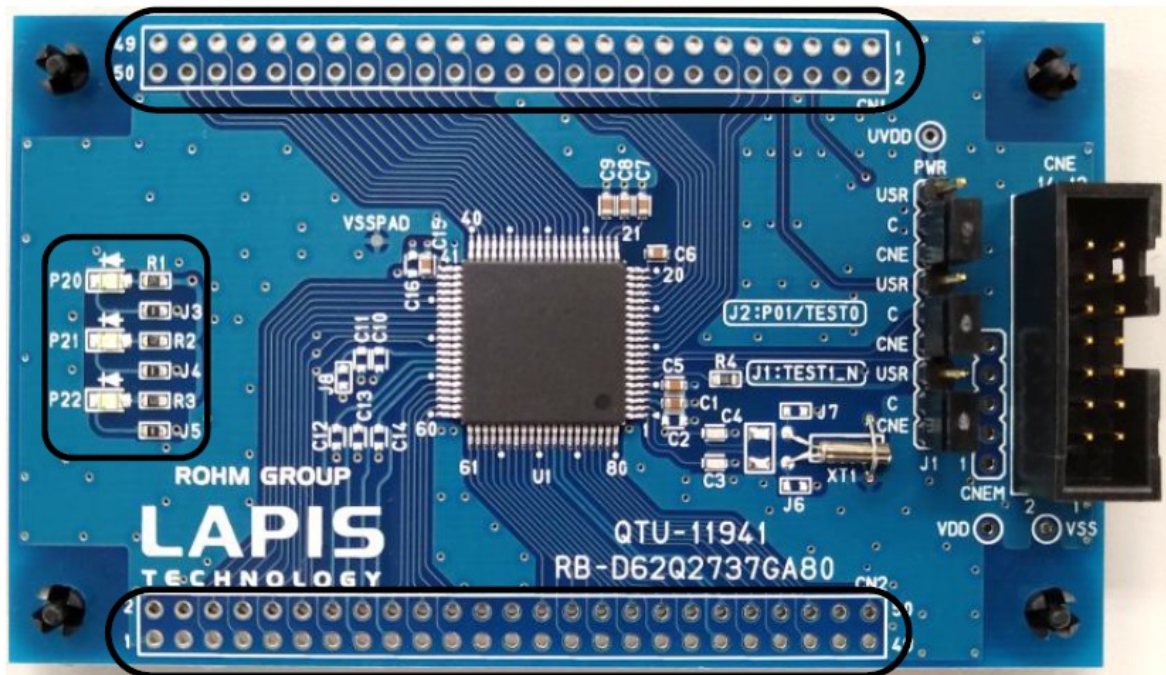
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ROHM
SEMICONDUCTOR

ROHM FEBL62Q2737RB-01 Introduces Power Efficient Zero Cross Detection



Product Information

- **Product Name:** ML62Q2737 Reference Board
- **Model:** RB-D62Q2737GA80
- **Issue Date:** June 10, 2022
- Not Radiation Tolerant
- **Manufacturer:** ROHM Co., Ltd.

Product Usage Instructions

1. Overview

The ML62Q2737 Reference Board RB-D62Q2737GA80 is designed as a development tool for the ML62Q2737 microcontroller. It provides essential features for prototyping and testing applications.

2. Features

The board features include:

- Support for ML62Q2737 microcontroller
- User interface connectors CN1, CN2, and CNE
- Outline diagram for easy reference

3. User Interface

• CN1, CN2 Connectors

The CN1 and CN2 connectors provide interfaces for connecting external devices or peripherals to the reference board. Refer to the pinout diagrams for proper connections.

• CNE Connector

The CNE connector serves a specific purpose, refer to the documentation for details on its functionality and usage.

Frequently Asked Questions

Q: Is the ML62Q2737 Reference Board suitable for high-radiation environments?

A: No, the product is not designed to be radiation tolerant.

Q: Where can I find more information about environmental compliance for the product?

A: Please refer to the RoHS Directive and comply with applicable environmental laws and regulations when using the product.

Q: Can I reproduce or reprint the user manual without prior consent?

A: No, the user manual or its parts cannot be reprinted or reproduced without prior consent from ROHM Co., Ltd.

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

This manual describes the ML62Q2737 Reference Board: RB-D62Q2737GA80.

Refer to the following documents when necessary.

- **ML62Q2700 Group User's Manual**

Provides 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.

Features

- The RB-D62Q2737GA80 can be used for learning 'how to use' the ML62Q2737, on which the user needs to provide additional external components if necessary. By using the RB-D62Q2737GA80 together with 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-

D62Q2737GA80, it can be used independently without connecting an EASE1000 V2.

- Before using RB-D62Q2737GA80, be sure to understand and keep in mind the following information.
 - The board is provided with ML62Q2737 80pin QFP.
 - 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).

Hardware specifications

Table 1 shows the hardware specifications of RB-D62Q2737GA80.

Table 1 Hardware specifications

Mounted LSI	U1 : ML62Q2737 80pin QFP
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 P00/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
Pads (or/and) Through holes for mounting components	R4: Pull-up resistor for RESET_N
	CN1-CN2: Connectors for user application system (50pin, 2.54mm pitch, ϕ 1.0mm)
	C2, C16: Capacitors for VDD
	C10-C14, J8: Capacitors and jumper chip for Successive Approximation Type A/D C onverter
Power check pin	J6-J7: CN1 connection jumper chip
	VDD, VSS, UVDD: ϕ 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.

Outline Diagram

Fig. 1 shows the RB-D62Q2737GA80.

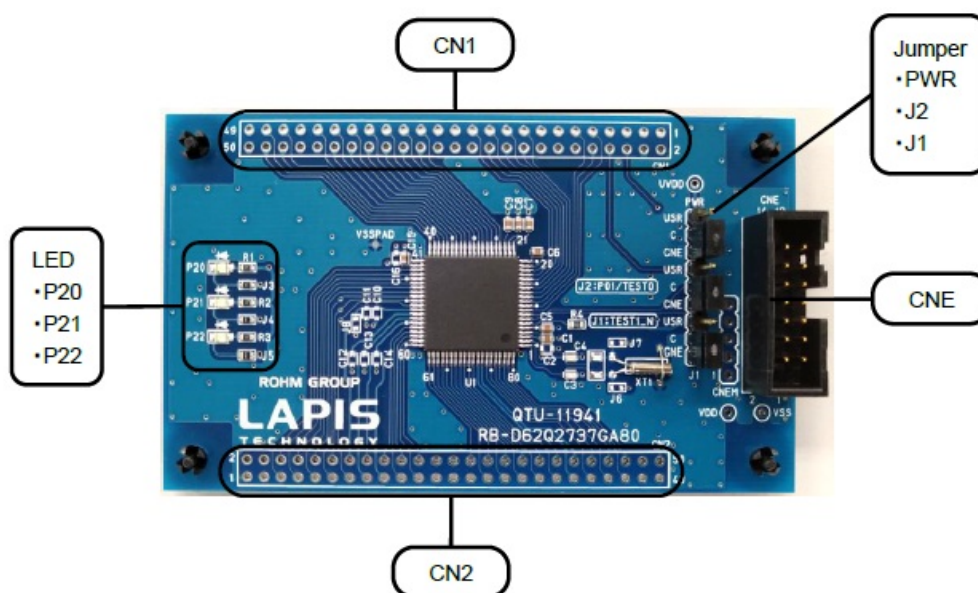


Fig. 1 Outline Diagram

Function

Power Circuit

The input to VDD can be selected from 3.3VOUT of EASE1000 V2 or CN1_3pin/CN2_2pin by PWR jumper.

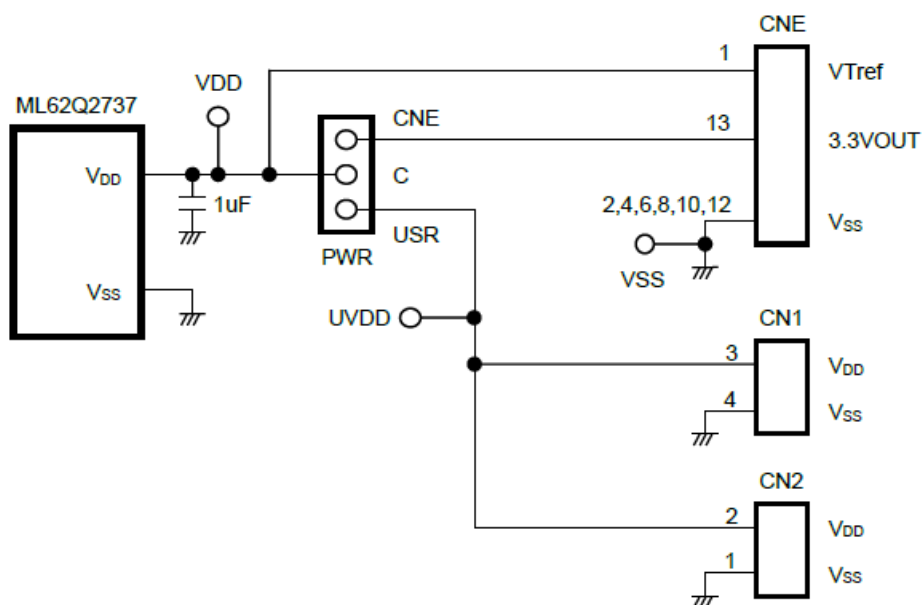


Fig. 2 Power Circuit

Note

The power supply ON/OFF procedure in case of setting the PWR jumper to the USR-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 the user's target system is turned on.

The procedure of power supply OFF

1. The power supply of the user's target system is turned off
2. The USB cable of EASE1000 V2 is removed

Connection for EASE1000 V2 (CNE)

EASE1000 V2 can be used if J1 and J2 jumpers are set to "CNE".

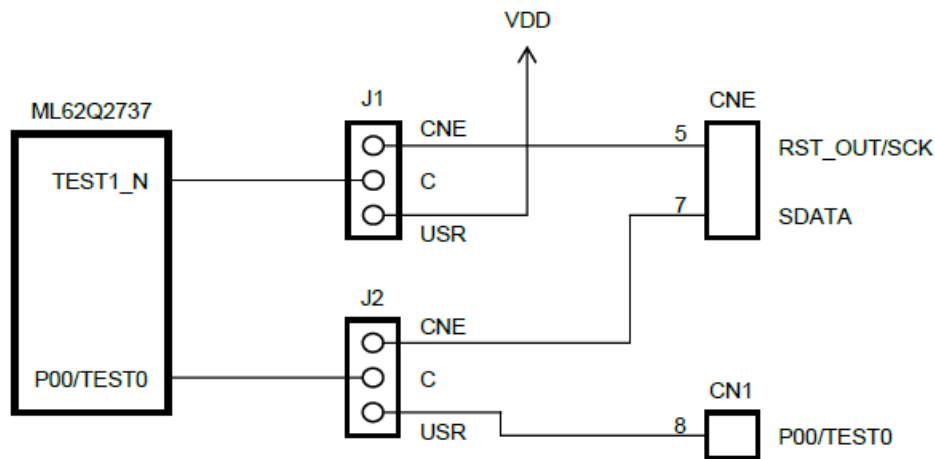


Fig. 3 EASE1000 V2 Interface

Note

P01/TEST0 pin:

- P01/TEST0 pin of ML62Q2737 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 ML62Q2737.

LED (P20, P21, P22)

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

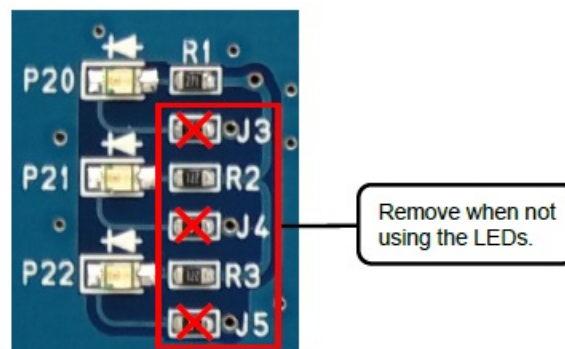


Fig. 4 Jumper-chip removal of LEDs

XT0/PIO0 XT1/PIO1

RB-D62Q2737GA80 can be mounted with cylinder type or SMD type crystal oscillator.

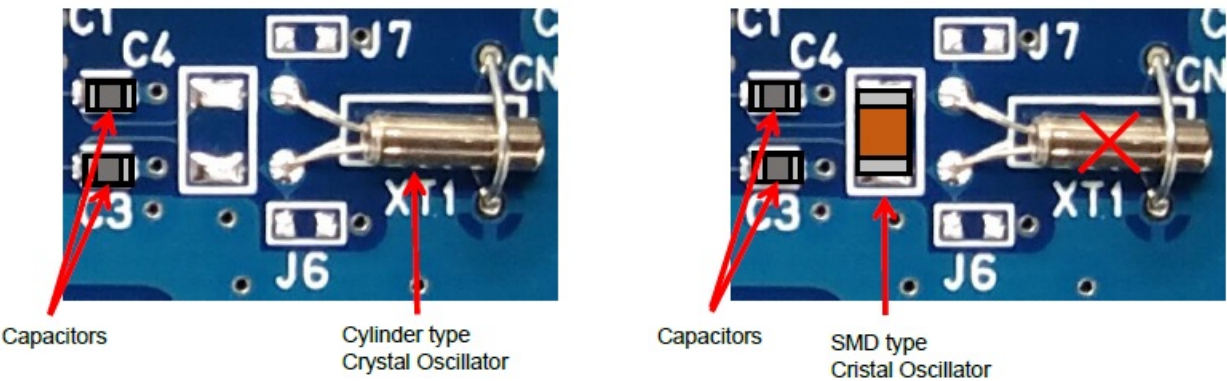


Fig. 5 Example of processing of Crystal Oscillator

P23, P24, P25, P26

- When the P23 pin is used as a VREF function of the successive approximation type A/D converter, C10, and C11 can implement a bypass capacitor. In addition, VDD can be connected by mounting the J8 jumper chip.
- Then P24, P25, and P26 pin is used as AIN4, AIN5, and AIN6 functions of the successive approximation type A/D converter, and the C12, C13 and C14 can implement a by-pass capacitor.
- Fig. 6 shows the connection diagram.

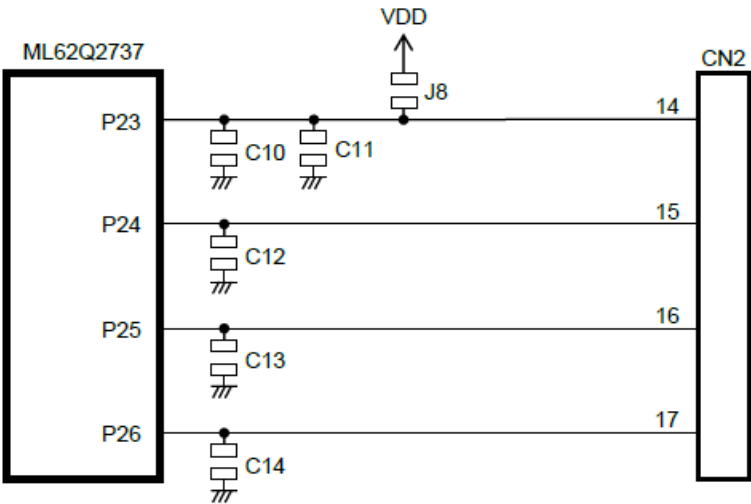


Fig. 6 P23, P24, P25, P26 Circuit

User Interface

CN1, CN2

Table 2 and Table 3 show the pin list of the RB-D62Q2737GA80 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	ML62Q2737	6	RESET_N
7	–	–	N.C.	8	J2	USR	P00/TEST0
9	ML62Q2737	9	P80	10	ML62Q2737	10	P81
11	ML62Q2737	11	P82	12	–	–	N.C.
13	–	–	N.C.	14	–	–	N.C.
15	–	–	N.C.	16	–	–	N.C.
17	ML62Q2737	12	P44	18	ML62Q2737	13	P45
19	ML62Q2737	14	P02	20	ML62Q2737	15	P03
21	ML62Q2737	16	P46	22	ML62Q2737	17	P47
23	ML62Q2737	18	P76	24	–	–	N.C.
25	–	–	N.C.	26	–	–	N.C.
27	–	–	N.C.	28	–	–	N.C.
29	ML62Q2737	24	P70	30	ML62Q2737	25	P04
31	ML62Q2737	26	P05	32	ML62Q2737	27	P06
33	ML62Q2737	28	P07	34	ML62Q2737	29	P10
35	ML62Q2737	30	P11	36	ML62Q2737	31	P12
37	ML62Q2737	32	P13	38	ML62Q2737	33	P50
39	ML62Q2737	34	P51	40	ML62Q2737	35	P52
41	ML62Q2737	36	P53	42	–	–	N.C.
43	–	–	N.C.	44	–	–	N.C.
45	ML62Q2737	37	P93	46	ML62Q2737	38	P94
47	ML62Q2737	39	P95	48	ML62Q2737	40	P96
49	–	–	N.C.	50	–	–	N.C.

N.C.: Not Connected

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	ML62Q2737	43	P54	6	ML62Q2737	44	P55
7	ML62Q2737	45	P14	8	ML62Q2737	46	P15
9	ML62Q2737	47	P16	10	ML62Q2737	48	P17
11	ML62Q2737	49	P20	12	ML62Q2737	50	P21
13	ML62Q2737	51	P22	14	ML62Q2737	52	P23
15	ML62Q2737	53	P24	16	ML62Q2737	54	P25
17	ML62Q2737	55	P26	18	ML62Q2737	56	P27
19	ML62Q2737	57	P56	20	ML62Q2737	58	P57
21	ML62Q2737	59	PA3	22	ML62Q2737	60	PA4
23	–	–	N.C.	24	–	–	N.C.
25	–	–	N.C.	26	–	–	N.C.
27	–	–	N.C.	28	ML62Q2737	61	PB2
29	ML62Q2737	62	PB3	30	ML62Q2737	63	PB4
31	ML62Q2737	64	PB5	32	ML62Q2737	65	P40
33	ML62Q2737	66	P41	34	ML62Q2737	67	P30
35	ML62Q2737	68	P31	36	ML62Q2737	69	P32
37	ML62Q2737	70	P33	38	ML62Q2737	71	P60
39	ML62Q2737	72	P61	40	ML62Q2737	73	P62
41	ML62Q2737	74	P63	42	ML62Q2737	75	P64
43	ML62Q2737	76	P65	44	ML62Q2737	77	P66
45	ML62Q2737	78	P67	46	ML62Q2737	79	P42
47	–	–	N.C.	48	–	–	N.C.
49	–	–	N.C.	50	ML62Q2737	80	P43

CNE

Table 4 shows the pin list of the RB-D62Q2737GA80 user interface connection CNE.

Table 4 CNE

CNE		Connection destination		
Pin No.	Name	Device	Pin No.	ML62Q2737 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	P00/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

Precaution For Usage

1. The RB-D62Q2737GA80 is an unfinished product intended for research and development and expert use in the research and development facility only. The RB-D62Q2737GA80 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 the EASE1000 V2 user's manual when using the RB-D62Q2737GA80.
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-D62Q2737GA80 have signal patterns on the underside, it might work abnormally if used on conductive materials. Use it on insulating materials or having any preventable parts.

PCB specification, BOM list and Schematic

PCB specification

Fig. 7 shows the PCB dimensional outline diagram and layout of components.

- **PCB part number:** RB-D62Q2737GA80

- **Dimension:** 55.88mm x 93.98mm

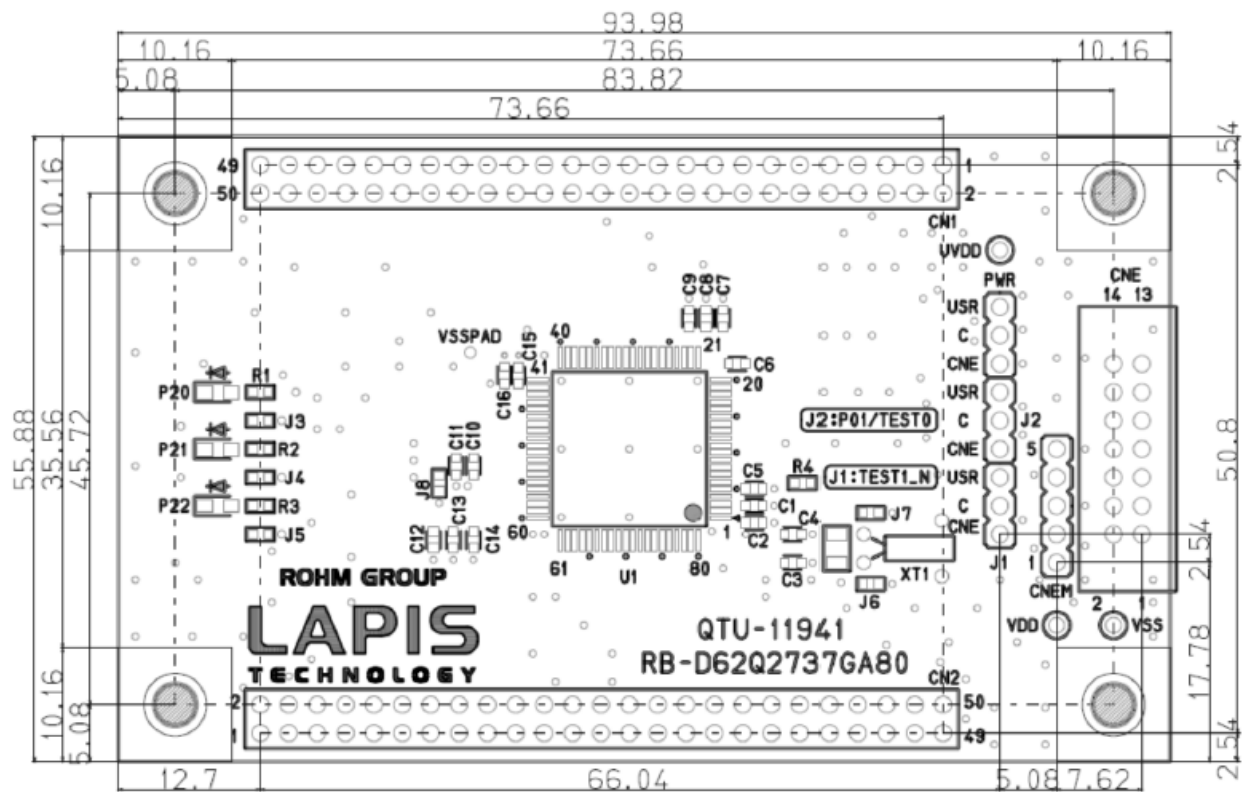


Fig. 7 PCB dimensional outline diagram and layout of components (Top view)

BOM list

Table 5 BOM list

	Parts Number	Symbol	Contents	Qty.	Vendor
1	QTU-11941	RB-D62Q2737GA80	PCB	1	LAPIS Technology Co., Ltd.
2	C1608X7R1E105K080AB	C1,C5,C6,C7,C8,C9,C15	Ceramic Capacitor 1.0 μ F/25V X7R	7	TDK Corporation
3	–	C2,C10,C11,C12,C13,C14,C16	Unmounted	7	–
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 Ω	3	Rohm Co., Ltd.
10	–	J6, J7, J8	Unmounted	3	–
11	SML-H12P8T	P20, P21, P22	LED Green	3	Rohm Co., Ltd.
12	MCR03EZPJ271	R1, R2, R3	Resistor 270 Ω \pm 5%	3	Rohm Co., Ltd.
13	MCR03EZPJ103	R4	Resistor 10k Ω \pm 5%	1	Rohm Co., Ltd.
14	ML62Q2737-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:

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

Schematic


The next page shows the schematic of RB-D62Q2737GA80.

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEBL62Q2737RB-01	June 10, 2022	—	—	First edition.

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- <https://www.lapis-tech.com/en/>.

Documents / Resources

	<p>ROHM FEBL62Q2737RB-01 Introduces Power Efficient Zero Cross Detection [pdf] User Manual</p> <p>FEBL62Q2737RB-01 Introduces Power Efficient Zero Cross Detection, FEBL62Q2737RB-01, I ntroduces Power Efficient Zero Cross Detection, Power Efficient Zero Cross Detection, Efficient Zero Cross Detection, Zero Cross Detection, Cross Detection, Detection</p>
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