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ROHM GROUP
LAPIS TECHNOLOGY

FEBL62Q2522RB-01

# RB-D62Q2522GD40
# User's Manual

Issue Date: August 30, 2022

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# Preface

This manual describes about the ML62Q2522 Reference Board : RB-D62Q2522GD40.

Refer to following documents when necessary.

– ML62Q2500 Group User's Manual
Provides the detailed information about the microcontroller ML62Q2500 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-D62Q2522GD40 can be used for learning 'how to use' the ML62Q2522, on which the user needs to provide additional external components if necessary. By using the RB-D62Q2522GD40 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-D62Q2522GD40, it can be used independently without connecting a EASE1000 V2.
Before using RB-D62Q2522GD40, be sure to understand and keep in mind the following information.

### 1.1.1. Features

- The board is provided with ML62Q2522 40pin WQFN.
- Mounted with the linked connector to EASE1000 V2.
- Through-holes for connecting the pins of LSI to external pheripheral boards.
- Power supply is selectable; supplied from the on-chip emulator EASE1000 V2 or CN1_3pin.
- Mounted with Crystal (32.768KHz)
- Mounted with LED (P20,P21,P22).
- Foot pattern with components for Successive Approximation Type A/D Converter is available (P30,P31,P32,P33).

### 1.1.2. Hardware specifications

Table 1 shows the hardware specifications of RB-D62Q2522GD40.

**Table 1 Hardware specifications**

| | |
|---|---|
| Mounted LSI | U1 : ML62Q2522 40pin WQFN |
| 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, C3: 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 (24pin, 2.54mm pitch, φ0.9mm ) |
| | C2: Capacitors for VDD |
| | C6-C10, J8: Capacitors and jumper chip for Successive Approximation Type A/D Converter |
| | J6-J7: CN1 connection jumper chip |
| Power check pin | VDD, VSS, UVDD: φ0.8mm |
| 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.



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## 1.2. Outline Diagram

Fig. 1 shows the RB-D62Q2522GD40.

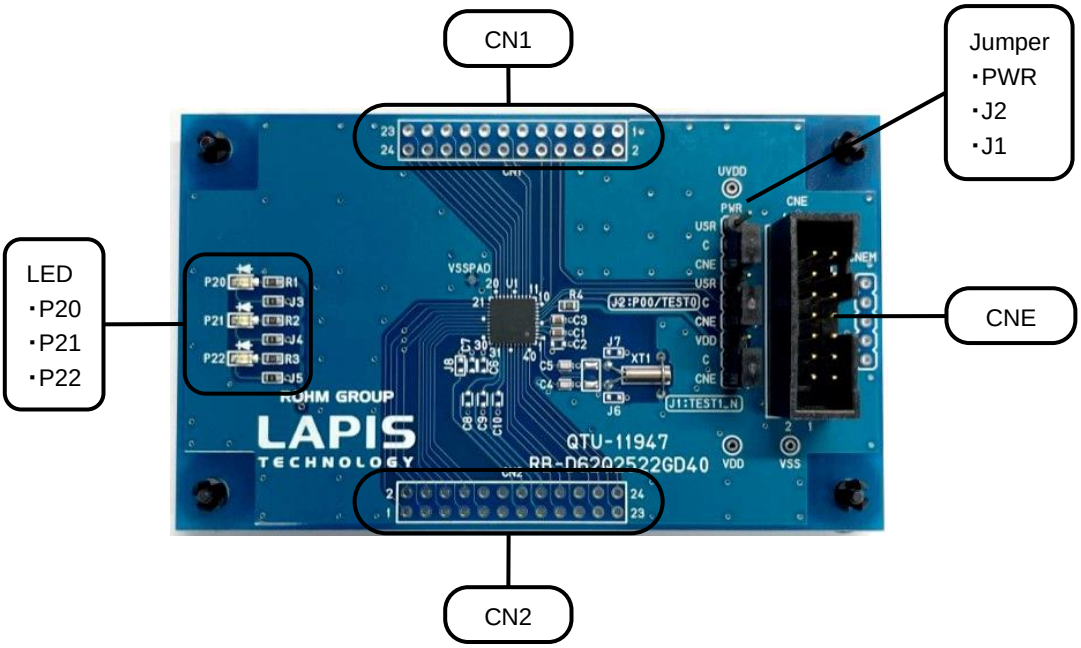



**Fig. 1 Outline Diagram**



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# 2. Function

## 2.1. Power Circuit

The input to$V_{DD}$ can be selected from 3.3VOUT of EASE1000 V2 or CN1_3pin by PWR jumper.

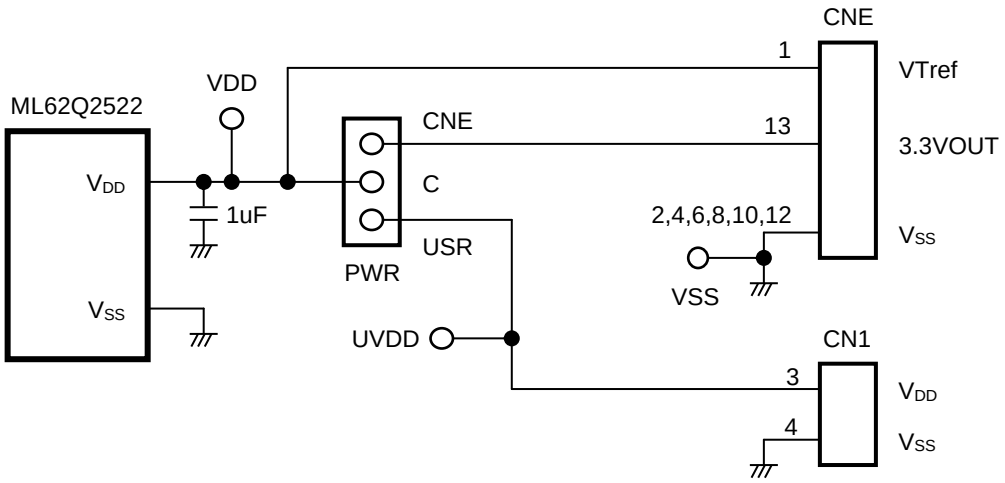



**Fig. 2 Power Circuit**

[Note]

The power supply ON/OFF procedure in case of setting 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 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



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## 2.2. Connection for EASE1000 V2 (CNE)

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

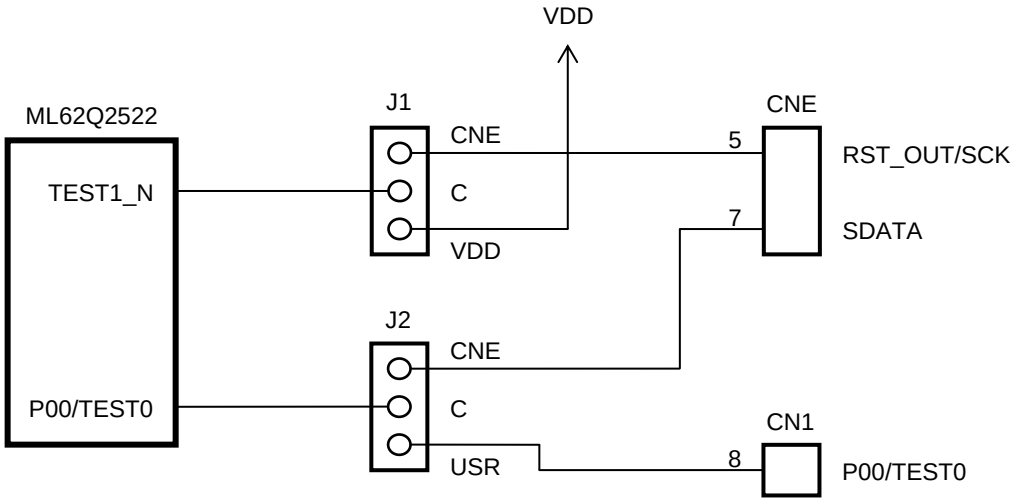



**Fig. 3 EASE1000 V2 Interface**

[Note]

P00/TEST0 pin:

P00/TEST0 pin of ML62Q2522 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 ML62Q2522.



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## 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.

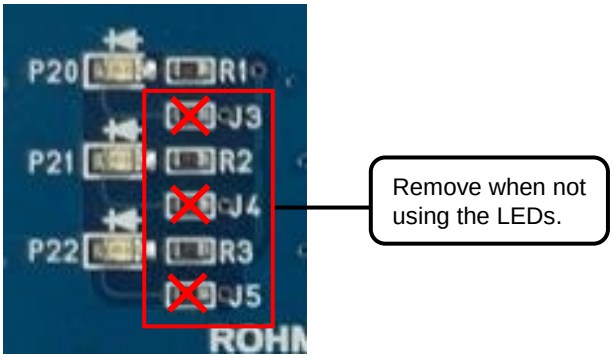



**Fig. 4 Jumper-chip removal of LEDs**

## 2.4. XT0/PIO0, XT1/PIO1

RB-D62Q2522GD40 can be mounted with cylinder type or SMD type crystal oscillator.

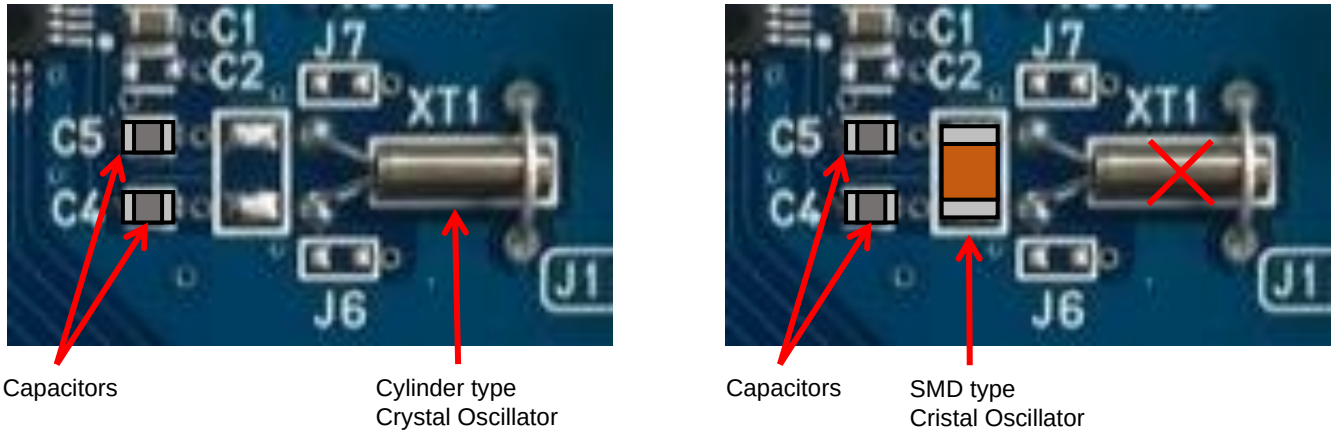



**Fig. 5 Example of processing of Crystal Oscillator**



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## 2.5. P30, P31, P32, P33

When the P30 pin is used as VREF function of the successive approximation type A/D converter, C6, C7 can implement a bypass capacitor. In addition, VDD can be connected by mounting the J8 jumper chip.
When P31, P32, P33 pin is used as AIN8, AIN9, AIN10 function of the successive approximation type A/D converter, the C8 and C9, C10 can implement a by-pass capacitor.
Fig. 6 shows the connection diagram.

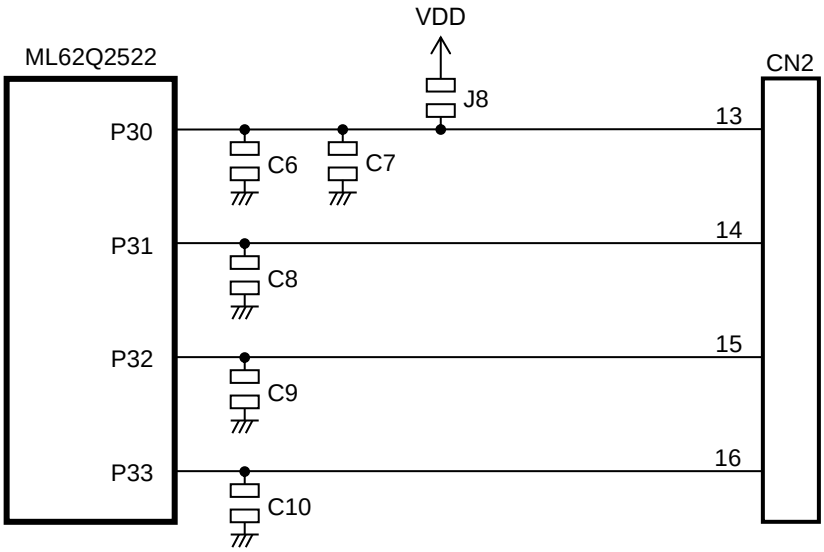



**Fig. 6 P30, P31, P32, P33 Circuit**



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# 3. User Interface

## 3.1. CN1, CN2

Table 2 shows the pin list of the RB-D62Q2522GD40 user interface connection CN1 and CN2.

**Table 2 CN1, CN2**

| CN1 Pin No. | Connection destination | | | CN2 Pin No. | Connection destination | | |
|---|---|---|---|---|---|---|---|
| | Device | Pin No. | Name | | Device | Pin No. | Name |
| 1 | J6 | 1 | XT0 | 1 | ML62Q2522 | 25 | P17 |
| 2 | J7 | 1 | XT1 | 2 | ML62Q2522 | 26 | P20 |
| 3 | PWR | USR | VDD | 3 | ML62Q2522 | 27 | P21 |
| 4 | - | - | VSS | 4 | ML62Q2522 | 28 | P22 |
| 5 | - | - | N.C. | 5 | ML62Q2522 | 29 | P23 |
| 6 | ML62Q2522 | 6 | RESET_N | 6 | ML62Q2522 | 30 | P24 |
| 7 | - | - | N.C. | 7 | ML62Q2522 | 31 | P25 |
| 8 | J2 | USR | P00/TEST0 | 8 | ML62Q2522 | 32 | P26 |
| 9 | ML62Q2522 | 9 | P02 | 9 | ML62Q2522 | 33 | P27 |
| 10 | ML62Q2522 | 10 | P03 | 10 | - | - | N.C. |
| 11 | - | - | N.C. | 11 | - | - | N.C. |
| 12 | - | - | N.C. | 12 | - | - | N.C. |
| 13 | ML62Q2522 | 13 | P54 | 13 | ML62Q2522 | 37 | P30 |
| 14 | ML62Q2522 | 14 | P55 | 14 | ML62Q2522 | 38 | P31 |
| 15 | - | - | N.C. | 15 | ML62Q2522 | 39 | P32 |
| 16 | - | - | N.C. | 16 | ML62Q2522 | 40 | P33 |
| 17 | ML62Q2522 | 17 | P04 | 17 | ML62Q2522 | 41 | P34 |
| 18 | ML62Q2522 | 18 | P05 | 18 | ML62Q2522 | 42 | P35 |
| 19 | ML62Q2522 | 19 | P06 | 19 | ML62Q2522 | 43 | P36 |
| 20 | ML62Q2522 | 20 | P07 | 20 | - | - | N.C. |
| 21 | ML62Q2522 | 21 | P10 | 21 | ML62Q2522 | 45 | P70 |
| 22 | ML62Q2522 | 22 | P11 | 22 | ML62Q2522 | 46 | P71 |
| 23 | ML62Q2522 | 23 | P12 | 23 | ML62Q2522 | 47 | P72 |
| 24 | ML62Q2522 | 24 | P13 | 24 | ML62Q2522 | 48 | P73 |

N.C. : Not Connected



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## 3.2. CNE

Table 3 shows the pin list of the RB-D62Q2522GD40 user interface connection CNE.

**Table 3 CNE**

| CNE | | Connection | | |
|---|---|---|---|---|
| Pin No. | Name | Parts | Pin No. | ML62Q2522 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



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# 4. Precaution for usage

(1) The RB-D62Q2522GD40 is an unfinished product and intended for research and development and for expert use in the research and development facility only. The RB-D62Q2522GD40 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 ML62Q2500 group user's manual and EASE1000 V2 user's manual when using the RB-D62Q2522GD40.
(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 reparing the board.
(6) RB-D62Q2522GD40 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.



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# 5. PCB specification, BOM list and Schematic

## 5.1. PCB specification

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

PCB part number:
RB-D62Q2522GD40

Dimension:
55.88mm x 93.98mm

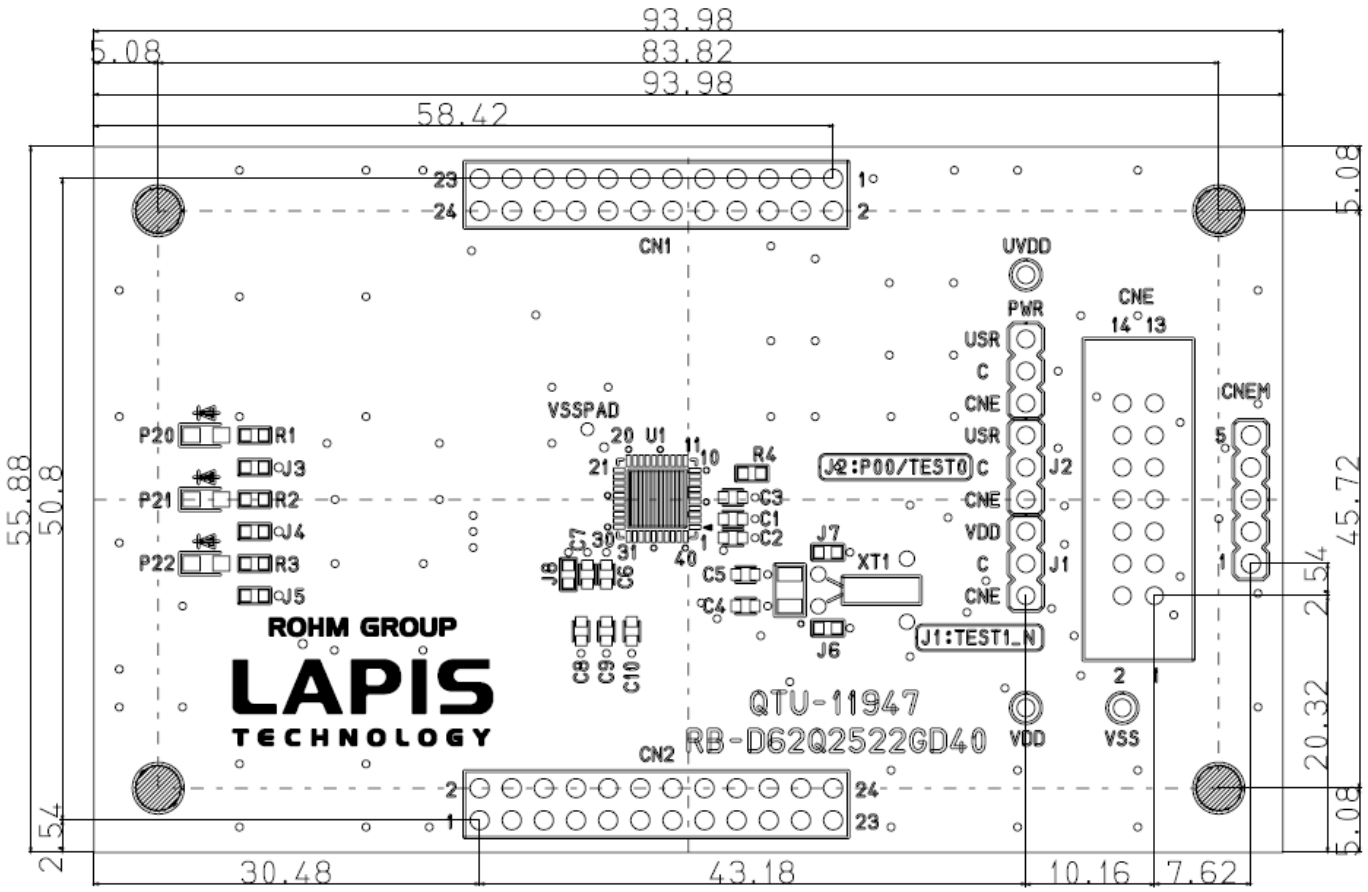



**Fig. 7 PCB dimensional outline diagram and layout of components (Top view)**



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## 5.2. BOM list

**Table 4 BOM list**

| | Parts Number | Symbol | Contents | Qty. | Vendor |
|---|---|---|---|---|---|
| 1 | QTU-11947 | RB-D62Q2522GD40 | PCB | 1 | LAPIS Technology Co., Ltd. |
| 2 | C1608X7R1E105K080AB | C1, C3 | Ceramic Capacitor 1.0μF/25V X7R | 2 | TDK Corporation |
| 3 | - | C2, C6, C7, C8, C9, C10 | Unmounted | 6 | - |
| 4 | GRM1885C1H220JA01 | C4, C5 | Ceramic Capacitor 22pF/50V C0G | 2 | Murata Manufacturing Co., Ltd. |
| 5 | A1-24PA-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 0Ω | 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 270Ω ±5% | 3 | Rohm Co., Ltd. |
| 13 | MCR03EZPJ103 | R4 | Resistor 10kΩ ±5% | 1 | Rohm Co., Ltd. |
| 14 | ML62Q2522-NNNGD | 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. |

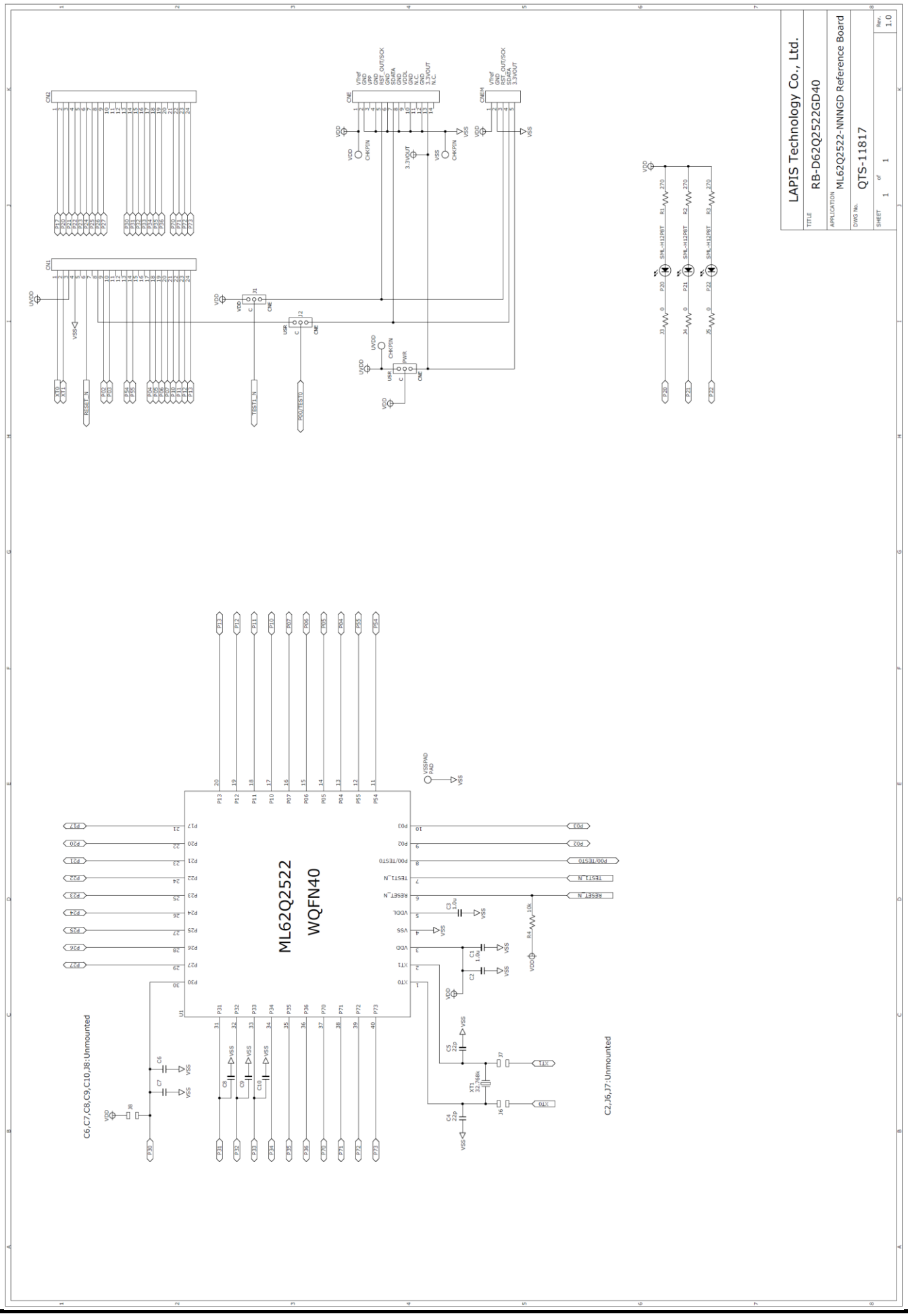
[Note]
- The diameter of through hole of CN1 and CN2 is 0.9 mm.
  Using CN1 and CN2, the diameter of connector pin should use the connector below 0.9mm, such as 0.5mm.
- The parts may be changed into another parts with equivalent part special quality.

## 5.3. Schematic

The next page shows the schematic of RB-D62Q2522GD40.



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# 6. Revision History

| Document No. | Issue Date | Page | | Description |
|---|---|---|---|---|
| | | Previous Edition | New Edition | |
| FEBL62Q2522RB-01 | August 30, 2022 | – | – | First edition. |



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