

Dear customer

LAPIS Semiconductor Co., Ltd. ("LAPIS Semiconductor"), on the 1<sup>st</sup> day of October, 2020, implemented the incorporation-type company split (shinsetsu-bunkatsu) in which LAPIS established a new company, LAPIS Technology Co., Ltd. ("LAPIS Technology") and LAPIS Technology succeeded LAPIS Semiconductor's LSI business.

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

LAPIS Technology Co., Ltd.  
October 1, 2020

# **RB-S22Q62xTB32**

## **User's Manual**

---

Issue Date: March 26, 2020

Notes

- 1) The information contained herein is subject to change without notice.
- 2) Although LAPIS Semiconductor is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors. Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. LAPIS Semiconductor shall have no responsibility for any damages arising out of the use of our Products beyond the rating specified by LAPIS Semiconductor.
- 3) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.
- 4) The technical information specified herein is intended only to show the typical functions of the Products and examples of application circuits for the Products. No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of LAPIS Semiconductor or any third party with respect to the information contained in this document; therefore LAPIS Semiconductor 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 (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.
- 6) The Products specified in this document are not designed to be radiation tolerant.
- 7) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a LAPIS Semiconductor representative: transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.
- 8) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.
- 9) LAPIS Semiconductor shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.
- 10) LAPIS Semiconductor has used reasonable care to ensure the accuracy of the information contained in this document. However, LAPIS Semiconductor does not warrant that such information is error-free and LAPIS Semiconductor shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.
- 11) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. For more details, including RoHS compatibility, please contact a ROHM sales office. LAPIS Semiconductor shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.
- 12) 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.
- 13) This document, in part or in whole, may not be reprinted or reproduced without prior consent of LAPIS Semiconductor.

Copyright 2019 LAPIS Semiconductor Co., Ltd.

---

## LAPIS Semiconductor Co.,Ltd.

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

## Table of Contents

1. Overview .....	1
2. Operational notes .....	1
3. Specification.....	2
3.1. Jumper Pin Setting.....	2
3.2. PCB layout.....	2
3.3. BOM list, Schematic .....	3
3.4. CN1 .....	5
3.5. CN2 .....	5
3.6. LOUT jack .....	6
3.7. SP jack .....	6
3.8. AIN, GND terminal.....	6
3.9. Ceramic resonator, External Clock .....	7
Revision History .....	8

## 1. Overview

This instruction manual is for the RB-S22Q62xTB32 which is the ML22Q623/ML22Q624/ML22Q625/ML22Q626 reference board.

Combining the board with a Sound Device Control Board 3 (hereinafter referred to as "SDCB3") enables the following functions to be implemented:

- Voice playback by ML22Q623/ML22Q624/ML22Q625/ML22Q626.
- Writing voice data into ML22Q623/ML22Q624/ML22Q625/ML22Q626.

## 2. Operational notes

The following describes the precautions to follow when handling the RB-S22Q62xTB32.

- Turn off the power when attaching the RB-S22Q62xTB32 to the SDCB3.
- Turn off the power when loading devices into the RB-S22Q62xTB32. Be sure to orient the device correctly. Pin 1 direction is toward the lower left side when the lid is opened. The Figure 1 shows the setting directions of devices.
- The ML22Q623/ML22Q624/ML22Q625/ML22Q626 supply voltages are 2.7 to 3.6V / 3.3 to 5.5V. Use the RB-S22Q62xTB32 with a power supply voltage of 3.0V.
- RB-S22Q62xTB32 is a device used only by experts in R&D facilities for research and development purposes. RB-S22Q62xTB32 is not intended to be used in mass-produced products or parts thereof.
- The information in this document is subject to change without notice due to product improvement and technological improvement. Prior to use, please ensure that the information is up to date.
- LAPIS Semiconductor does not provide any RB-S22Q62xTB32 support. Replace only in case of initial failure.

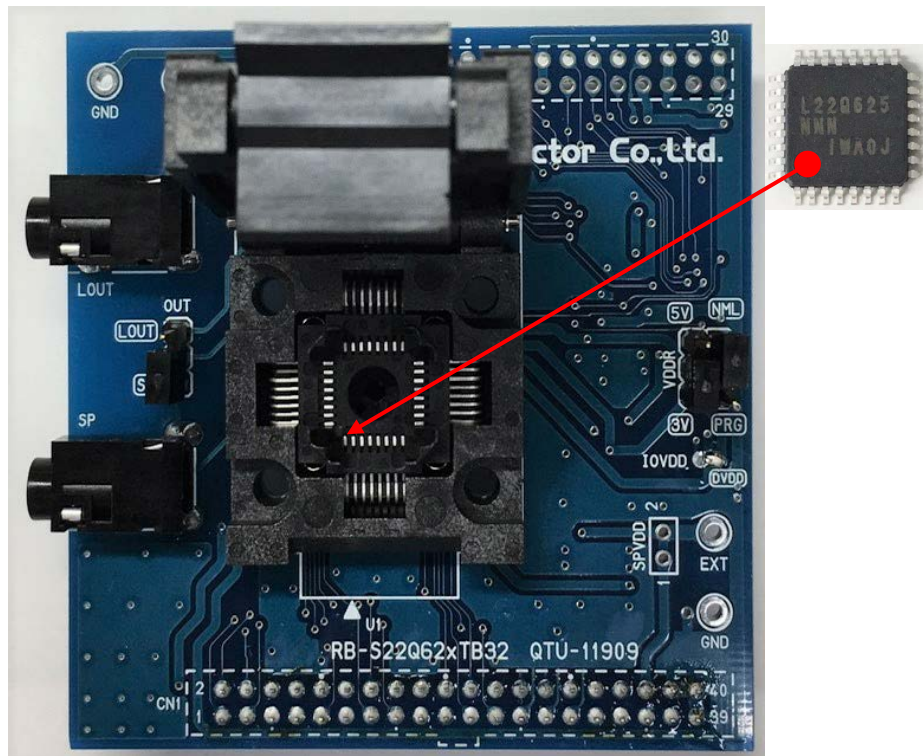


Figure 1 Outline Diagram

### 3. Specification

#### 3.1. Jumper Pin Setting

Table 1 shows the RB-S22Q62xTB32 jumper pin settings.

**Table 1**

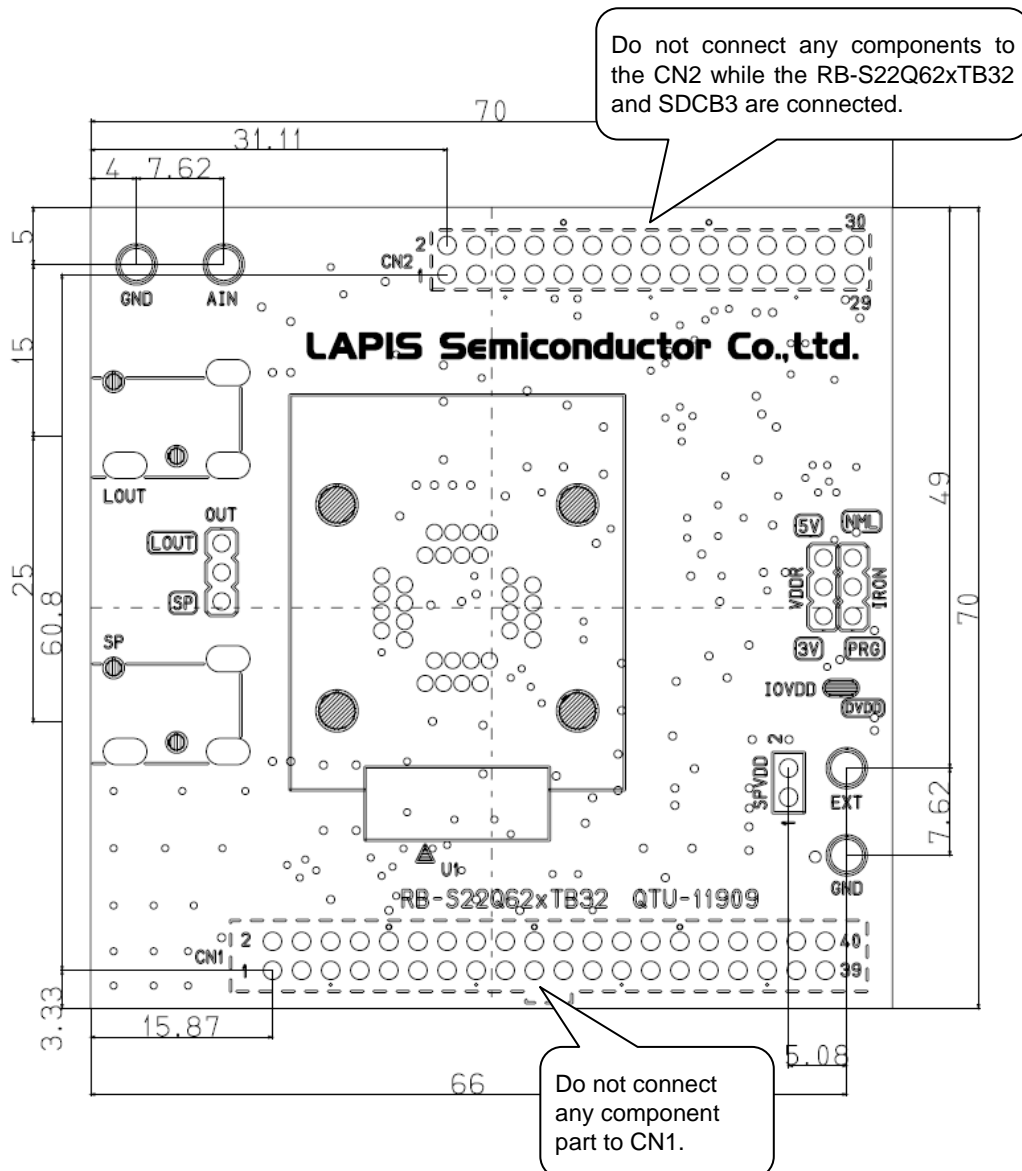
Jumper Pin Name	Setting
VDDR	Fixed on the 3V side
IRON	Fixed on the NML side

**Table 2**

Jumper Pin Name	LINE output	Speaker amplifier output
OUT	Fixed on the LOUT side	Fixed on the SP side

#### 3.2. PCB layout

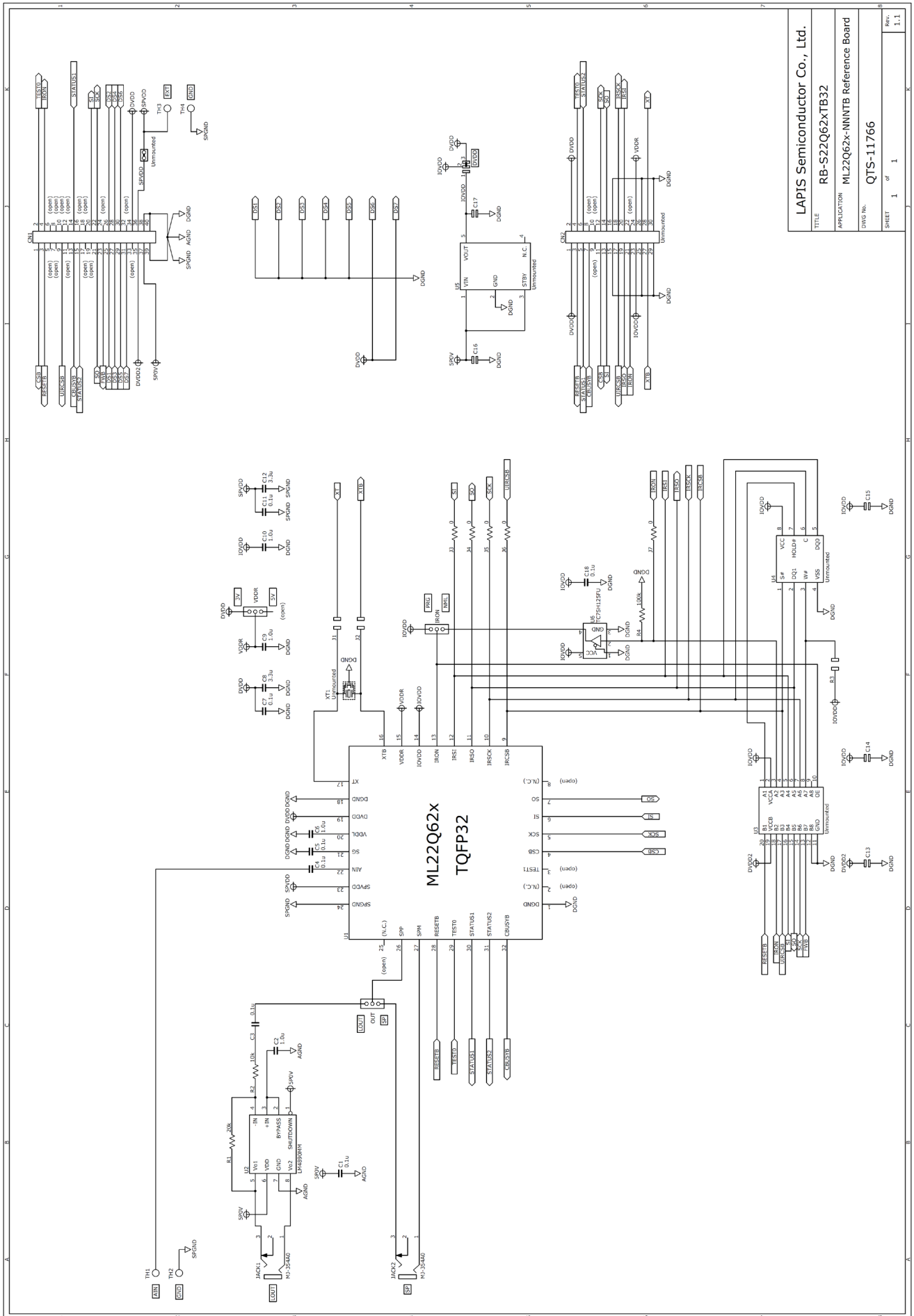
Figure 2 shows the RB-S22Q62xTB32 PCB layout.



**Figure 2 PCB layout**

## 3.3. BOM list, Schematic

	Parts Number	Symbol	Contents	Qty.	Vendor
1	QTU-11909	RB-S22Q62xTB32	PCB	1	LAPIS Semiconductor Co., Ltd.
2	CGA3E2X7R1E104K080AA	C1,C3,C4,C5, C7,C11,C18	Ceramic Capacitor 0.1 $\mu$ F/25V X7R	7	TDK Corporation
3	CGA3E1X7R1C105K080AC	C2,C6,C9,C10	Ceramic Capacitor 1.0 $\mu$ F/16V X7R	4	TDK Corporation
4	C1608X5R1C335K080AC	C8,C12	Ceramic Capacitor 3.3 $\mu$ F/16V X5R	2	TDK Corporation
5	HIF3FB-40DA-2.54DSA(71)	CN1	40pin Receptacle	1	Hirose Electric Co., Ltd.
6	A2-3PA-2.54DSA	IRON,VDDR,OUT	3pin Pin Header	3	Hirose Electric Co., Ltd.
7	MCR03EZPJ000	J3,J4,J5,J6, J7	Resistor 0 $\Omega$	5	Rohm Co., Ltd.
8	-	IOVDD	Select pad	1	-
9	MJ-354A0	JACK1,JACK2	2-Conductor Miniature Jack	2	MARUSHIN ELECTRIC MFG. CO., LTD.
10	MCR03EZPJ203	R1	Resistor 20k $\Omega$ $\pm$ 5%	1	Rohm Co., Ltd.
11	MCR03EZPJ103	R2	Resistor 10k $\Omega$ $\pm$ 5%	1	Rohm Co., Ltd.
12	MCR03EZPJ104	R4	Resistor 100k $\Omega$ $\pm$ 5%	1	Rohm Co., Ltd.
13	FPQ-32-0.8-007S-00	U1	QFP P0.80 32P Socket	1	Enplas Corporation
14	LM4890MM/NOPB	U2	Audio Power Amplifier	1	Texas Instruments Incorporated
15	TC7SH125FU	U6	Bus Buffer with 3-State Output	1	Toshiba Corporation
16	HIF3GA-2.54SP	-	Short Pin	3	Hirose Electric Co., Ltd.
17	-	C13,C14,C15,C16, C17	Unmounted	5	-
18	-	CN2	Unmounted	1	-
19	-	J1,J2	Unmounted	2	-
20	-	SPVDD	Unmounted	1	-
21	-	R3	Unmounted	1	-
22	-	TH1,TH2,TH3,TH4	Unmounted	4	-
23	-	U3	Unmounted	1	-
24	-	U4	Unmounted	1	-
25	-	U5	Unmounted	1	-
26	-	XT1	Unmounted	1	-





### 3.4. CN1

CN1 is a 40-pin connector that is used to connect to the SDCB3.

### 3.5. CN2

CN2 is a 30-pin connector to which ML22Q623/ML22Q624/ML22Q625/ML22Q626 terminals are connected.

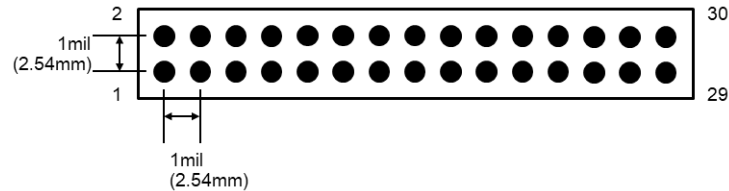


Figure 3 CN2 connectors hole pattern

Table 3 CN2 connector pin connections

CN2 Pin No	Connect LSI	LSI Pin No	LSI Pin Name	
1	VDD (3V)	ML22Q623/ML22Q624/ML22Q625/ML22Q626	19	DVDD
2	VDD (3V)	ML22Q623/ML22Q624/ML22Q625/ML22Q626	19	DVDD
3	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	28	RESTB
4	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	29	TEST0
5	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	30	STATUS1
6	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	31	STATUS2
7	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	32	CBUSYB
8	I/O	-	-	-
9	I/O	-	-	-
10	I/O	-	-	-
11	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	4	CSB
12	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	5	SCK
13	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	6	SI
14	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	7	SO
15	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND
16	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND
17	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	9	IRCSB
18	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	10	IRSCK
19	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	11	IRSO
20	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	12	IRSI
21	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	13	IRON
22	I/O	-	-	-
23	IOVDD	ML22Q623/ML22Q624/ML22Q625/ML22Q626	14	IOVDD
24	VDDR	ML22Q623/ML22Q624/ML22Q625/ML22Q626	15	VDDR
25	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND
26	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND
27	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	16	XTB
28	I/O	ML22Q623/ML22Q624/ML22Q625/ML22Q626	17	XT
29	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND
30	GND	ML22Q623/ML22Q624/ML22Q625/ML22Q626	1, 18	DGND

### 3.6. LOUT jack

LOUT is a jack to which the ML22Q623/ML22Q624/ML22Q625/ML22Q626 line-amp outputs are connected via a speaker amplifier.

### 3.7. SP jack

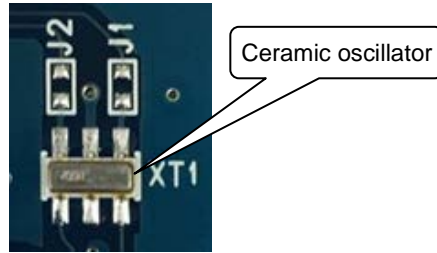
SP is the jack to which ML22Q623/ML22Q624/ML22Q625/ML22Q626 speaker amplifier outputs are connected.

### 3.8. AIN, GND terminal

This terminal is connected to the ML22Q623/ML22Q624/ML22Q625/ML22Q626 speaker amplifier input terminal. Input a speaker amplifier input signal between the AIN pin and GND pin.

### 3.9. Ceramic resonator, External Clock

Ceramic resonator can be mounted on a XT1. Table 4 table shows the ceramic resonators used.

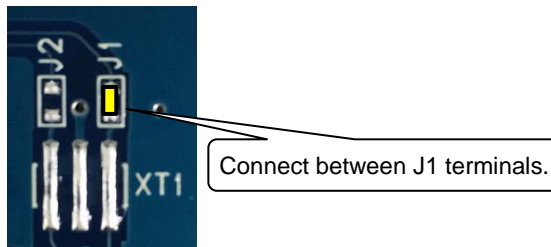


**Figure 4 Ceramic resonator**

**Table 4 Ceramic resonator**

Vendor	Frequency[Hz]	Parts Number
Murata Manufacturing Co., Ltd.	4M	CSTCR4M00G55B-R0
Murata Manufacturing Co., Ltd.	4.096M	CSTCR4M09G55B-R0

External clocks can be entered from the CN2's 28 pins. Connect between J1 terminals.



**Figure 5 External clock**

## Revision History

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEBL22Q62xRB-01	October 31, 2019	–	–	First edition.
FEBL22Q62xRB-03	March 26, 2020	1	1	Figure 1 Outline Diagram
		2	2	Figure 2 PCB layout
		3	3	3.3. BOM list, Schematic