

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-S22620TB32**

## **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. Serial FLASH memory.....6

    3.10. Ceramic resonator, External Clock .....7

Revision History .....8

## 1. Overview

This instruction manual is for the RB-S22620TB32 which is the ML22620 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 ML22620.
- Writing voice data into serial FLASH memory.

Voice data can be written to the serial flash memory by connecting a flash writer to the RB-S22620TB32.

## 2. Operational notes

The following describes the precautions to follow when handling the RB-S22620TB32.

- Turn off the power when attaching the RB-S22620TB32 to the SDCB3.
- Turn off the power when loading devices into the RB-S22620TB32. 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 ML22620 supply voltages are 2.7 to 3.6V / 3.3 to 5.5V. Use the RB-S22620TB32 with a power supply voltage of 3.0V.
- RB-S22620TB32 is a device used only by experts in R&D facilities for research and development purposes. RB-S22620TB32 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-S22620TB32 support. Replace only in case of initial failure.

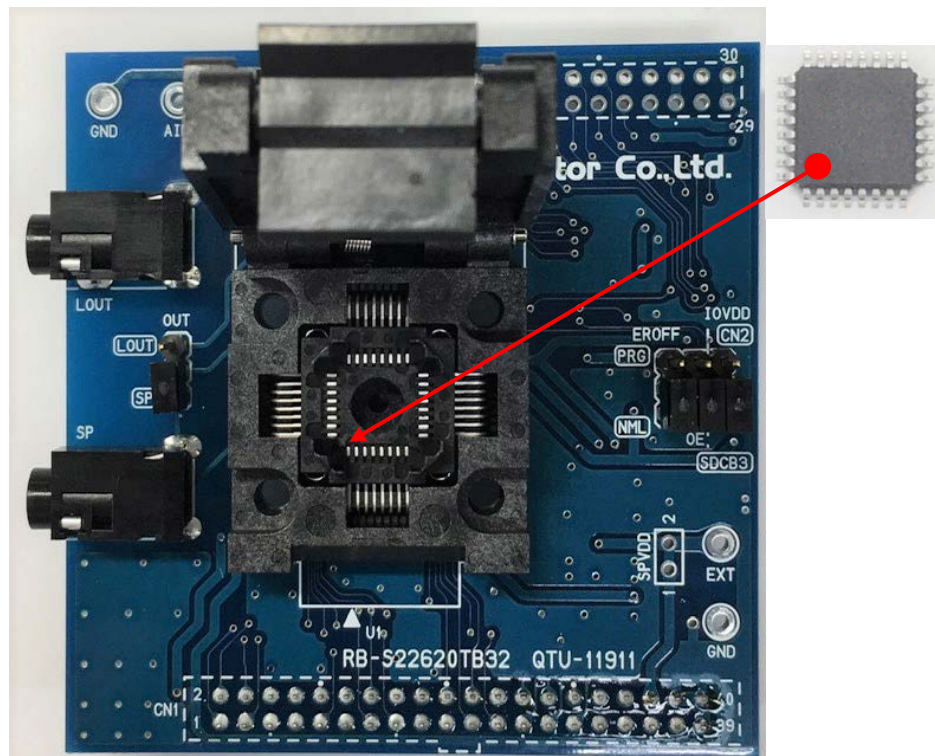


Figure 1 Outline Diagram

### 3. Specification

#### 3.1. Jumper Pin Setting

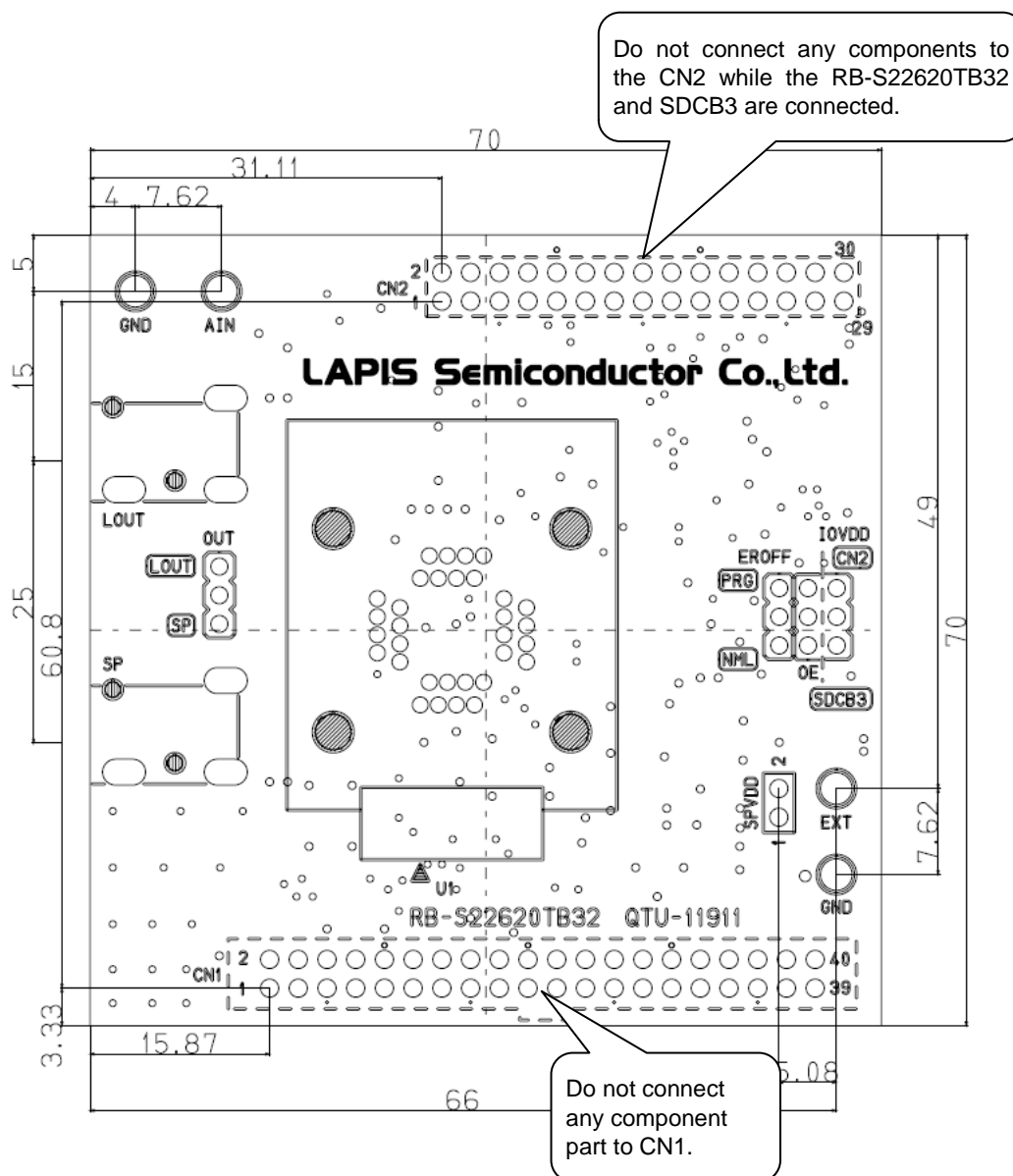
Table 1 shows the RB-S22620TB32 jumper pin settings.

**Table 1**

| Jumper Pin Name | Setting                           |  |
|-----------------|-----------------------------------|--|
|                 | Connecting the Board to the SDCB3 | Connecting the Board to a FLASH writer |
| EROFF           | Fixed on the NML side             | Fixed on the PRG side                  |
| OE              | Fixed on the NML side             | Fixed on the PRG side                  |
| IOVDD           | Fixed on the SDCB3 side           | Fixed on the CN2 side                  |

#### 3.2. PCB layout

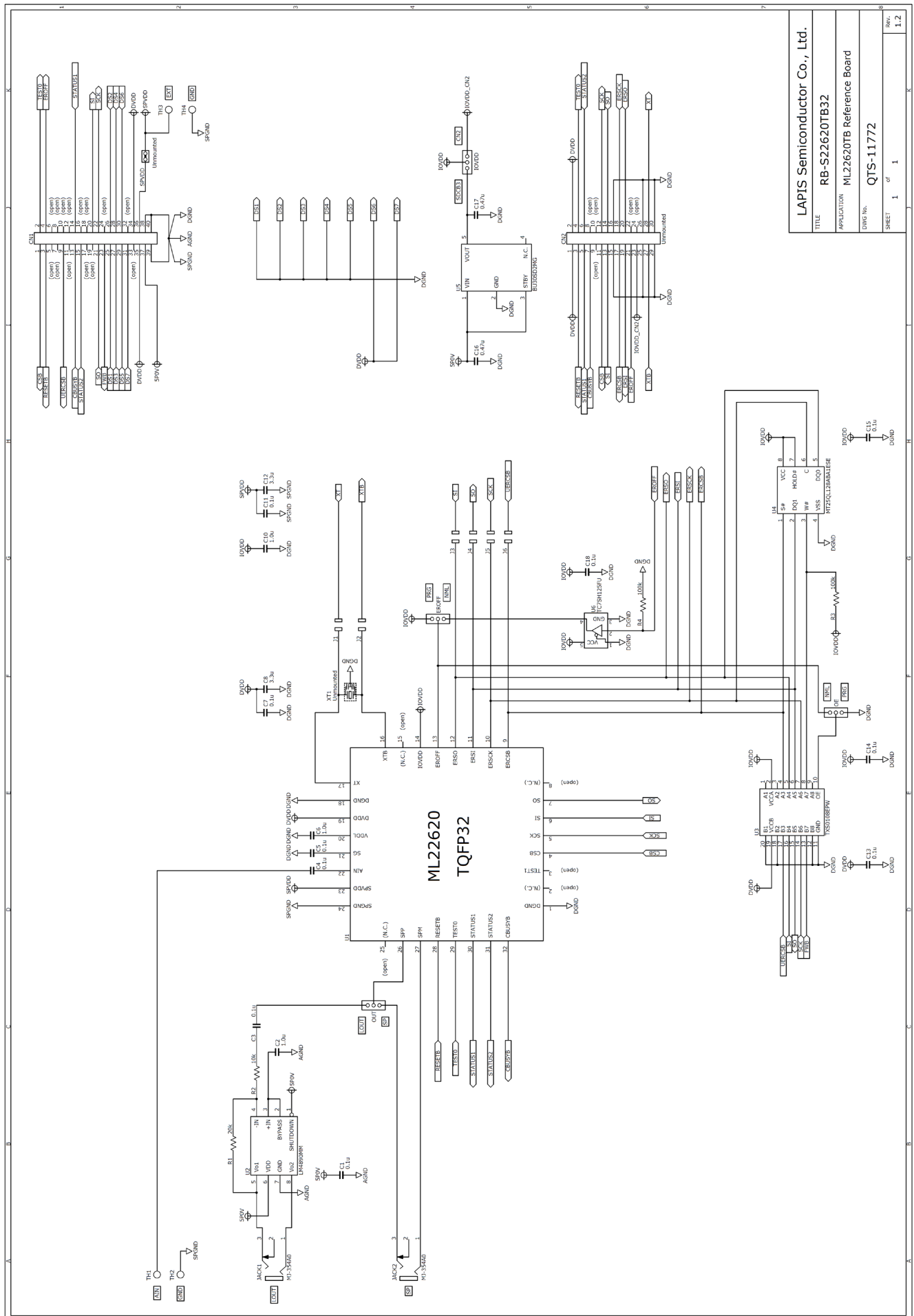
Figure 2 shows the RB-S22620TB32 PCB layout.



**Figure 2 PCB layout**

## 3.3. BOM list, Schematic

|    | Parts Number            | Symbol                               | Contents                         | Qty. | Vendor                           |
|----|-------------------------|--------------------------------------|----------------------------------|------|----------------------------------|
| 1  | QTU-11911               | RB-S22620TB32                        | PCB                              | 1    | LAPIS Semiconductor Co., Ltd.    |
| 2  | CGA3E2X7R1E104K080AA    | C1,C3,C4,C5, C7,C11,C13,C14, C15,C18 | Ceramic Capacitor 0.1μF/25V X7R  | 10   | TDK Corporation                  |
| 3  | CGA3E1X7R1C474M080AC    | C16,C17                              | Ceramic Capacitor 0.47μF/16V X7R | 2    | TDK Corporation                  |
| 4  | CGA3E1X7R1C105K080AC    | C2,C6,C10                            | Ceramic Capacitor 1.0μF/16V X7R  | 3    | TDK Corporation                  |
| 5  | C1608X5R1C335K080AC     | C8,C12                               | Ceramic Capacitor 3.3μF/16V X5R  | 2    | TDK Corporation                  |
| 6  | HIF3FB-40DA-2.54DSA(71) | CN1                                  | 40pin Receptacle                 | 1    | Hirose Electric Co., Ltd.        |
| 7  | A2-3PA-2.54DSA          | EROFF,OUT,IOVDD,OE                   | 3pin Pin Header                  | 4    | Hirose Electric Co., Ltd.        |
| 8  | MJ-354A0                | JACK1,JACK2                          | 2-Conductor Miniature Jack       | 2    | MARUSHIN ELECTRIC MFG. CO., LTD. |
| 9  | MCR03EZPJ203            | R1                                   | Resistor 20kΩ ±5%                | 1    | Rohm Co., Ltd.                   |
| 10 | MCR03EZPJ103            | R2                                   | Resistor 10kΩ ±5%                | 1    | Rohm Co., Ltd.                   |
| 11 | MCR03EZPJ104            | R3,R4                                | Resistor 100kΩ ±5%               | 2    | Rohm Co., Ltd.                   |
| 12 | FPQ-32-0.8-007S-00      | U1                                   | QFP P0.80 32P Socket             | 1    | Enplas Corporation               |
| 13 | LM4890MM/NOPB           | U2                                   | Audio Power Amplifier            | 1    | Texas Instruments Incorporated   |
| 14 | TXS0108EPWR             | U3                                   | Voltage level translation        | 1    | Texas Instruments Incorporated   |
| 15 | MT25QL128ABA1ESE        | U4                                   | 128Mb Serial NOR Flash Memory    | 1    | Micron Technology, Inc.          |
| 16 | BU30SD2MG-MTR           | U5                                   | LDO Regulator                    | 1    | Rohm Co., Ltd.                   |
| 17 | TC7SH125FU              | U6                                   | Bus Buffer with 3-State Output   | 1    | Toshiba Corporation              |
| 18 | HIF3GA-2.54SP           | -                                    | Short Pin                        | 4    | Hirose Electric Co., Ltd.        |
| 19 | M20-7831542             | CN2                                  | Unmounted                        | 1    | Harwin Plc                       |
| 20 | -                       | J1,J2,J3,J4,J5,J6                    | Unmounted                        | 6    | -                                |
| 21 | A2-2PA-2.54DSA          | SPVDD                                | Unmounted                        | 1    | Hirose Electric Co., Ltd.        |
| 22 | -                       | TH1,TH2,TH3,TH4                      | Unmounted                        | 4    | -                                |
| 23 | CSTCR4M00G55B-R0        | XT1                                  | Unmounted                        | 1    | Murata Manufacturing Co., Ltd.   |



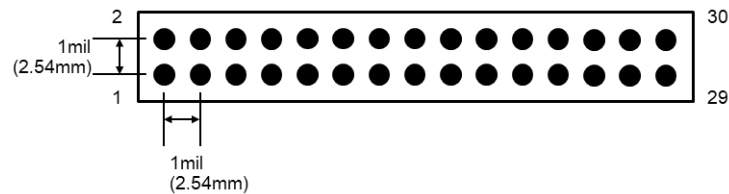


### 3.4. CN1

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 ML22620 terminals are connected.



**Figure 3 CN2 connectors hole pattern**

**Table 2 CN2 connector pin connections**

| CN2 Pin No |          | Connect LSI          | LSI Pin No | LSI Pin Name |
|------------|----------|----------------------|------------|--------------|
| 1          | VDD (3V) | ML22620              | 19         | DVDD         |
| 2          | VDD (3V) | ML22620              | 19         | DVDD         |
| 3          | I/O      | ML22620              | 28         | RESETB       |
| 4          | I/O      | ML22620              | 29         | TEST0        |
| 5          | I/O      | ML22620              | 30         | STATUS1      |
| 6          | I/O      | ML22620              | 31         | STATUS2      |
| 7          | I/O      | ML22620              | 32         | CBUSYB       |
| 8          | I/O      | -                    | -          | -            |
| 9          | I/O      | -                    | -          | -            |
| 10         | I/O      | -                    | -          | -            |
| 11         | I/O      | ML22620              | 4          | CSB          |
| 12         | I/O      | ML22620              | 5          | SCK          |
| 13         | I/O      | ML22620              | 6          | SI           |
| 14         | I/O      | ML22620              | 7          | SO           |
| 15         | GND      | ML22620              | 1, 18      | DGND         |
| 16         | GND      | ML22620              | 1, 18      | DGND         |
| 17         | I/O      | ML22620              | 9          | ERCSB        |
| 18         | I/O      | ML22620              | 10         | ERSCK        |
| 19         | I/O      | ML22620              | 11         | ERSI         |
| 20         | I/O      | ML22620              | 12         | ERSO         |
| 21         | I/O      | TC7SH125FU - ML22620 | 13         | EROFF        |
| 22         | I/O      | -                    | -          | -            |
| 23         | IOVDD    | ML22620              | 14         | IOVDD        |
| 24         | I/O      | -                    | -          | -            |
| 25         | GND      | ML22620              | 1, 18      | DGND         |
| 26         | GND      | ML22620              | 1, 18      | DGND         |
| 27         | I/O      | ML22620              | 16         | XTB          |
| 28         | I/O      | ML22620              | 17         | XT           |
| 29         | GND      | ML22620              | 1, 18      | DGND         |
| 30         | GND      | ML22620              | 1, 18      | DGND         |

### 3.6. LOUT jack

LOUT is a jack to which the ML22620 line-amp outputs are connected via a speaker amplifier.

### 3.7. SP jack

SP is the jack to which ML22620 speaker amplifier outputs are connected.

### 3.8. AIN, GND terminal

This terminal is connected to the ML22620 speaker amplifier input terminal. Input a speaker amplifier input signal between the AIN pin and GND pin.

### 3.9. Serial FLASH memory

The RB-S22620TB32 has 128-Mbit serial FLASH memory (Micron Technology, Inc., MT25QL128ABA1ESE) for voice data. The FLASH memory is used for voice data.

The serial FLASH memory can write voice data by the SDCB Controller <sup>\*1</sup> of the application of the PC. RB-S22620TB32 is combined with SDCB3. Connect the SDCB3 to a computer.

Voice data can be written to the serial FLASH memory by using the FLASH writer. Connect the FLASH writer to the CN2 of the RB-S22620TB32. Table 3 shows how the CN2 is connected to the FLASH writer.

**Table 3 Connecting the CN2 to the FLASH writer**

|    | CN2 Pin No | LSI Pin Name | FLASH writer function |
|----|------------|--------------|-----------------------|
| 16 | GND        | DGND         | GND                   |
| 17 | I/O        | ERCSB        | CSB                   |
| 18 | I/O        | ERSCK        | SCK                   |
| 19 | I/O        | ERSI         | MOSI                  |
| 20 | I/O        | ERSO         | MISO                  |
| 23 | IOVDD      | IOVDD        | VDD                   |

<sup>\*1</sup> For details on using the SDCB Controller, see the Speech LSI Utility User's Manual.

3.10. Ceramic resonator, External Clock

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

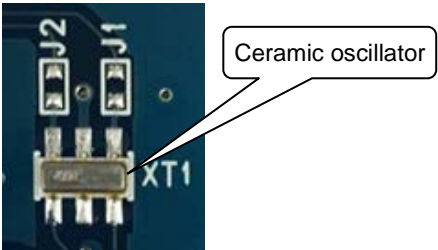


Figure 4 Ceramic resonator

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.

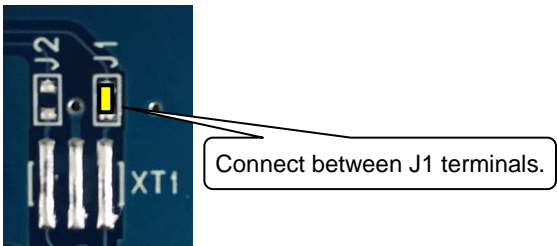


Figure 5 External clock

## Revision History

| Document No.   | Issue Date       | Page             |             | Description              |
|----------------|------------------|------------------|-------------|--------------------------|
|                |                  | Previous Edition | New Edition |                          |
| FEBL22620RB-01 | October 31, 2019 | –                | –           | First edition.           |
| FEBL22620RB-03 | March 26, 2020   | 1                | 1           | Figure 1 Outline Diagram |
|                |                  | 2                | 2           | Figure 2 PCB layout      |
|                |                  | 3                | 3           | 3.3. BOM list, Schematic |