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April 1, 2024

ROHM GROUP
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FEBL22660GDRB-02

# RB-S22660GD32
# User's Manual

Issue Date: February 5, 2021

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LAPIS Technology Co., Ltd.

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

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# 1. Overview

This instruction manual is for the RB-S22660GD32 which is reference board for the ML22660 (hereinafter referred to as "Speech Synthesis LSIs").

This board can be combined with Sound Device Control Board 3 (hereinafter referred to as "SDCB3") to do the following:

- Voice playback by ML22660.
- Writing sound code data into serial FLASH memory.

By connecting a flash writer to the RB-S22660GD32, sound code data can be written to the serial flash memory.

# 2. Operational notes

The following describes the precautions to follow when handling the RB-S22660GD32.

- Turn off the power when attaching the RB-S22660GD32 to the SDCB3.
- Turn off the power when loading Speech Synthesis LSIs into the RB-S22660GD32. Pin 1 is the position of the board silk ▲ at the bottom left with respect to the socket opening. The Figure 1 shows the setting directions of Speech Synthesis LSIs.
- The ML22660 supply voltages are 2.7 to 3.6V / 3.3 to 5.5V. Use the RB-S22660GD32 with a power supply voltage of 3.0V.
- Connect LOUT jack and SP jack to the mono speaker.

- RB-S22660GD32 is a device used only by experts in R&D facilities for research and development purposes. RB-S22660GD32 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 Technology does not provide any RB-S22660GD32 support. Replace only in case of initial failure.
-

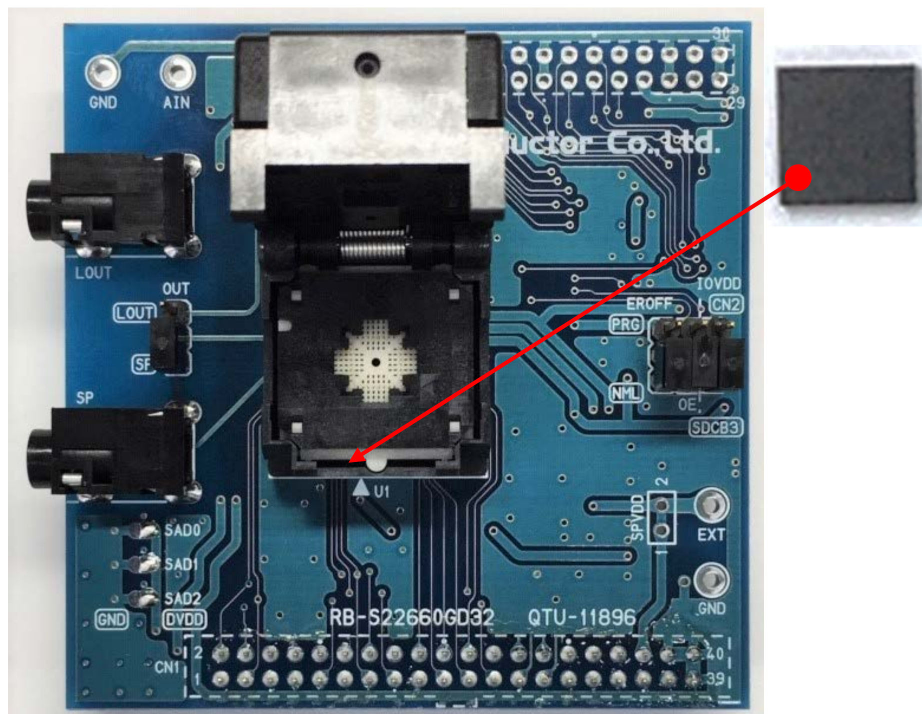



**Figure 1 Outline Diagram**

# 3. Specification

## 3.1. EROFF jumper pin

EROFF jumper pin is jumper pin that switch the connection of EROFF pin of Speech Synthesis LSIs.

| EROFF | Contents |
|---|---|
| NML | EROFF pin is connected to CN1,CN2. |
| PRG | EROFF pin is connected to IOVDD. |

Set to NML when connecting to SDCB3 for use. EROFF pin is controlled from SDCB3.
When this board is used by itself, setting PRG enables the serial flash memory interface of Speech Synthesis LSIs.

## 3.2. OE jumper pin

OE jumper pin is a jumper pin that enables or disables the signal input/output of CN1 pins to the serial flash memory pins.

| OE | Contents |
|---|---|
| NML | Enable: The pins of the serial flash memory are input/output from the pins of CN1. |
| PRG | Disable: The pins of the serial flash memory do not input/output from the pins of CN1. |

Set to NML when connecting to SDCB3 for use.
When this board is used by itself, the serial flash memory interface signal of Speech Synthesis LSIs and CN2 signal are input/output to the serial flash memory when OE jumper pin is set to PRG.

## 3.3. IOVDD jumper pin

IOVDD jumper pin is jumper pin that switch the connection of IOVDD pin of Speech Synthesis LSIs.

| IOVDD | Contents |
|---|---|
| SDCB3 | IOVDD pin is connected to the output (3.0V) of the LDO mounted on this board. |
| CN2 | IOVDD pin is connected to 23pin of CN2. |

Set to SDCB3 when connecting to SDCB3 for use.
When this board is used by itself, power can be supplied to IOVDD terminal of the speech synthesis LSI from 23pin of CN2 when IOVDD jumper pin is set to CN2.

## 3.4. OUT jumper pin

OUT jumper pin is jumper pin that switch the connection of SPP pin of Speech Synthesis LSIs.

| OUT | Contents |
|---|---|
| LOUT | SPP pin is connected to LOUT jack. |
| SP | SPP pin is connected to SP jack. |

## 3.5. LOUT jack

LOUT jack is a jack where the signal from LOUT pins of Speech Synthesis LSIs is output via the speaker amplifier.
Set Mode of Play setting of SDCB Controller to Line AMP(SPP). (Refer to Speech LSI Utility User's Manual.)
Connect a monaural speaker.

## 3.6. SP jack

SP jack is a jack where the signal from SPP,SPM pins of Speech Synthesis LSIs is output.
Set Mode of Play setting of SDCB Controller to Speaker AMP. (Refer to Speech LSI Utility User's Manual.)
Connect a monaural speaker.

## 3.7. AIN through hall

AIN through hole is used to input signals from an external source to the AIN pin of Speech Synthesis LSIs.
Input the speaker amplifier input signal to AIN through hole.

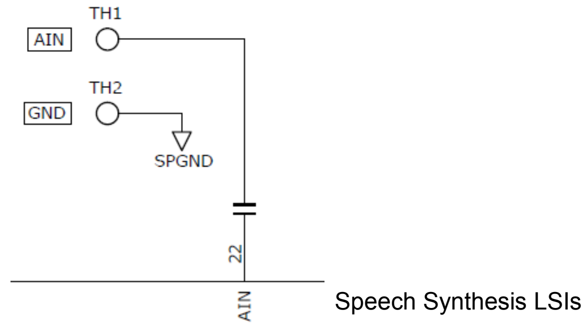



**Figure 2 AIN through hall**

## 3.8. SPVDD jumper terminal, EXT through hall

SPVDD jumper terminal is used to switch the destination of SPVDD pins of Speech Synthesis LSIs.
When supplying from SDCB3, connect 1-2pin of SPVDD jumper terminal.
To supply from an external source, cut the pattern between 1 and 2 pins of SPVDD jumper terminal and input SPVDD from the EXT throughhole.

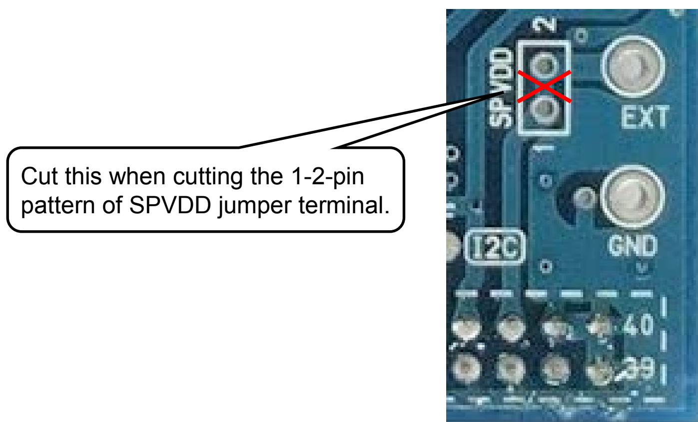



**Figure 3 SPVDD jumper terminal**

## 3.9. SAD2-0 lands

SAD2-0 lands are used to change SAD2-0 setting of Speech Synthesis LSIs.
This board is shipped to DVDD (I2C slave address is 111_101).
When connecting this board to SDCB3 and using it, set DVDD to the factory default settings.
To set any I2C slave address, change the connection of SAD2-0 lands.

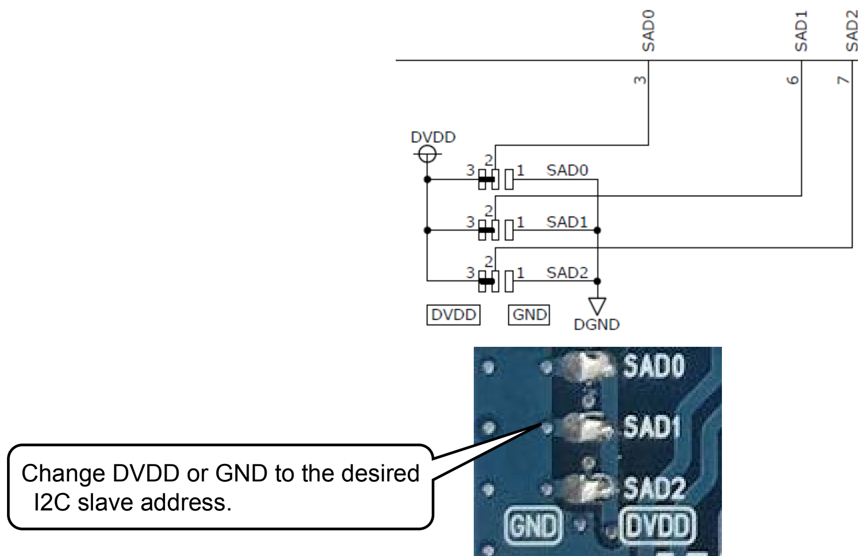



**Figure 4 SAD2-0 lands**

## 3.10. XT1 land, J1 land

XT1 land is used to mount the Ceramic resonator.
When using a ceramic resonator for the clock of Speech Synthesis LSIs, mount the components.
When no component is mounted, Speech Synthesis LSIs operates with built-in RC oscillation.

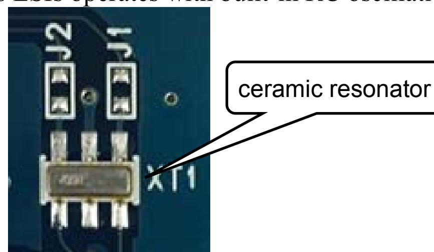



**Figure 5 Ceramic resonator**

A typical example of a ceramic resonator that matches XT1 land foot pattern is shown below.

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

J1 land is land connecting the XT pin of speech synthesis LSIs to the 28pin (XT) of CN2.
To use an external clock for Speech Synthesis LSIs clock, connect the pins of the J1 land and input them from the 28pin (XT) of CN2.

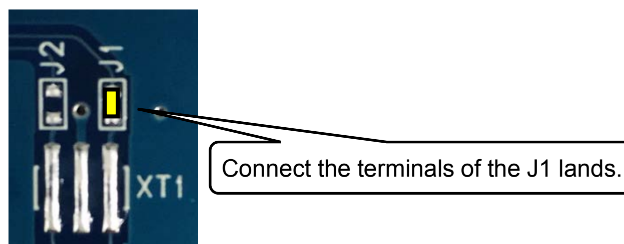



**Figure 6 J1 land**

## 3.11. CN1 connector

CN1 connector is used to connect to SDCB3.

## 3.12. CN2 connector

CN2 connector is used to connect to the pins of Speech Synthesis LSIs.

| CN2 Pin No | LSI | | I/O | | |
|---|---|---|---|---|---|
| | Pin No | Pin Name | SDCB3 connection | Single unit serial flash memory interface: Enable | Single unit serial flash memory interface: Disable |
| 1 | 19 | DVDD *1 | O | I | I |
| 2 | 19 | DVDD *1 | O | I | I |
| 3 | 28 | RESETB | O | I | I |
| 4 | 29 | TEST0 | O | I | I |
| 5 | 30 | STATUS1 | O | O | O |
| 6 | 31 | STATUS2 | O | O | O |
| 7 | 32 | CBUSYB | O | O | O |
| 8 | - | - | - | - | - |
| 9 | 4 | SCL | O | I | I |
| 10 | 5 | SDA | O | I/O | I/O |
| 11 | - | - | - | - | - |
| 12 | 10 | ERSCK *4 | O | I | I |
| 13 | 12 | ERSO *4 | O | I | I |
| 14 | 11 | ERSI | O | O | O |
| 15 | 1, 18 | DGND | - | - | - |
| 16 | 1, 18 | DGND | - | - | - |
| 17 | 9 | ERCSB | O | O | I |
| 18 | 10 | ERSCK | O | O | I |
| 19 | 11 | ERSI | O | O | O |
| 20 | 12 | ERSO | O | O | I |
| 21 | 13 | EROFF | O | O | I |
| 22 | - | - | - | - | - |
| 23 | 14 | IOVDD *1,3 | O | I | I |
| 24 | - | - | - | - | - |
| 25 | 1, 18 | DGND | - | - | - |
| 26 | 1, 18 | DGND | - | - | - |
| 27 | 16 | XTB *2 | O | O | O |
| 28 | 17 | XT *2 | O | I | I |
| 29 | 1, 18 | DGND | - | - | - |
| 30 | 1, 18 | DGND | - | - | - |

*1 Do not supply DVDD,IOVDD from CN2 when connecting SDCB3.
*2 When the J1 and J2 lands are connected, the XT and XTB pins of Speech Synthesis LSIs are input and output.
*3 Supply IOVDD externally when IOVDD jumper pin is set to CN2.
*4 When IOVDD jumper pin is set to SDCB3, this pin is not connected to the terminal of the speech synthesis LSI. When IOVDD jumper pin is set to CN2, this pin is connected to the pin of the speech synthesis LSI.

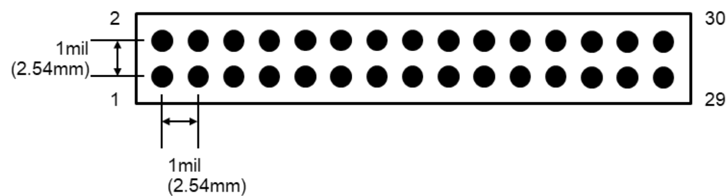



**Figure 7 CN2 connectors hole pattern**

# 4. Appendix

## 4.1. PCB layout

Figure 8 shows the RB-S22660GD32 PCB layout.

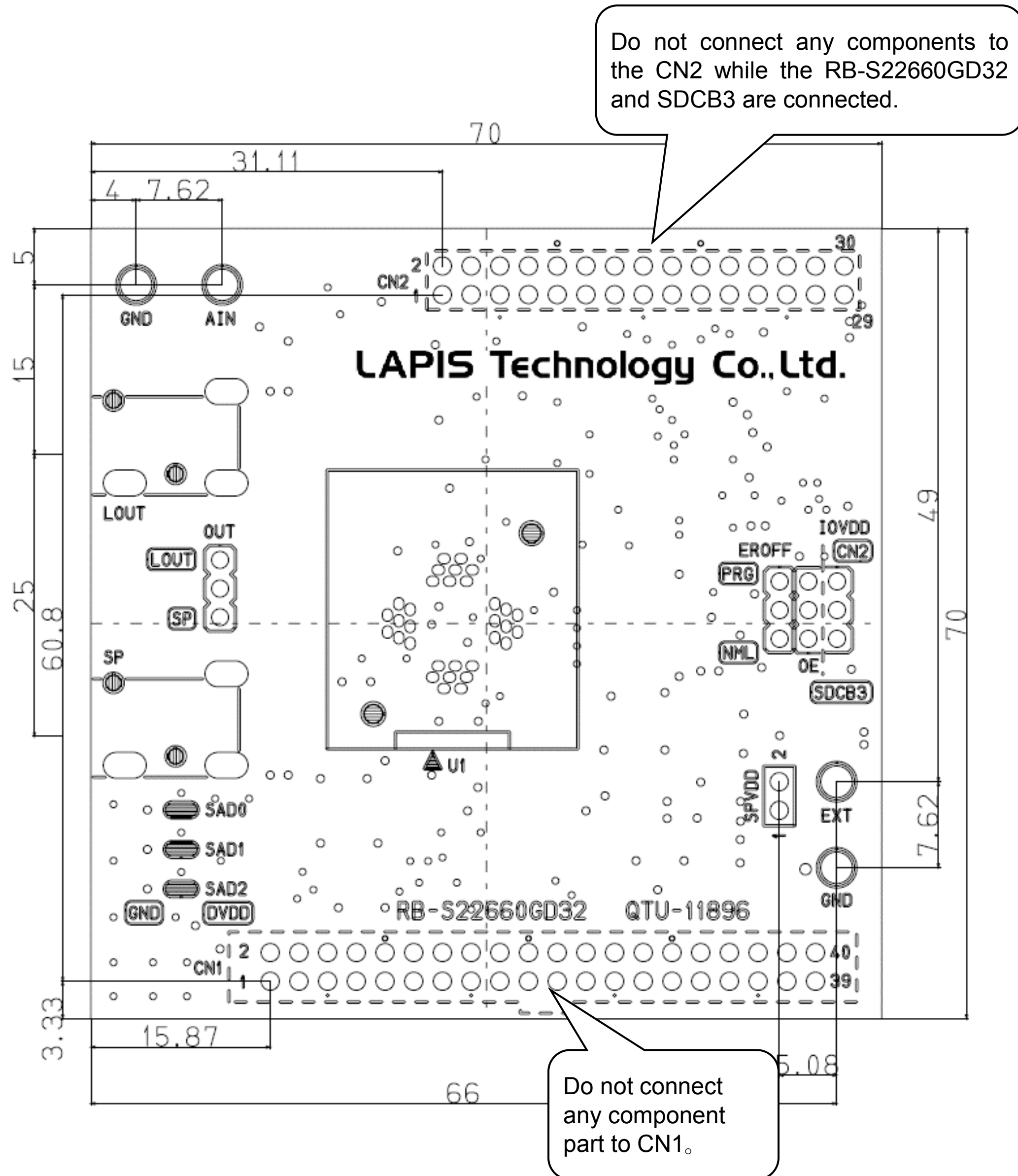
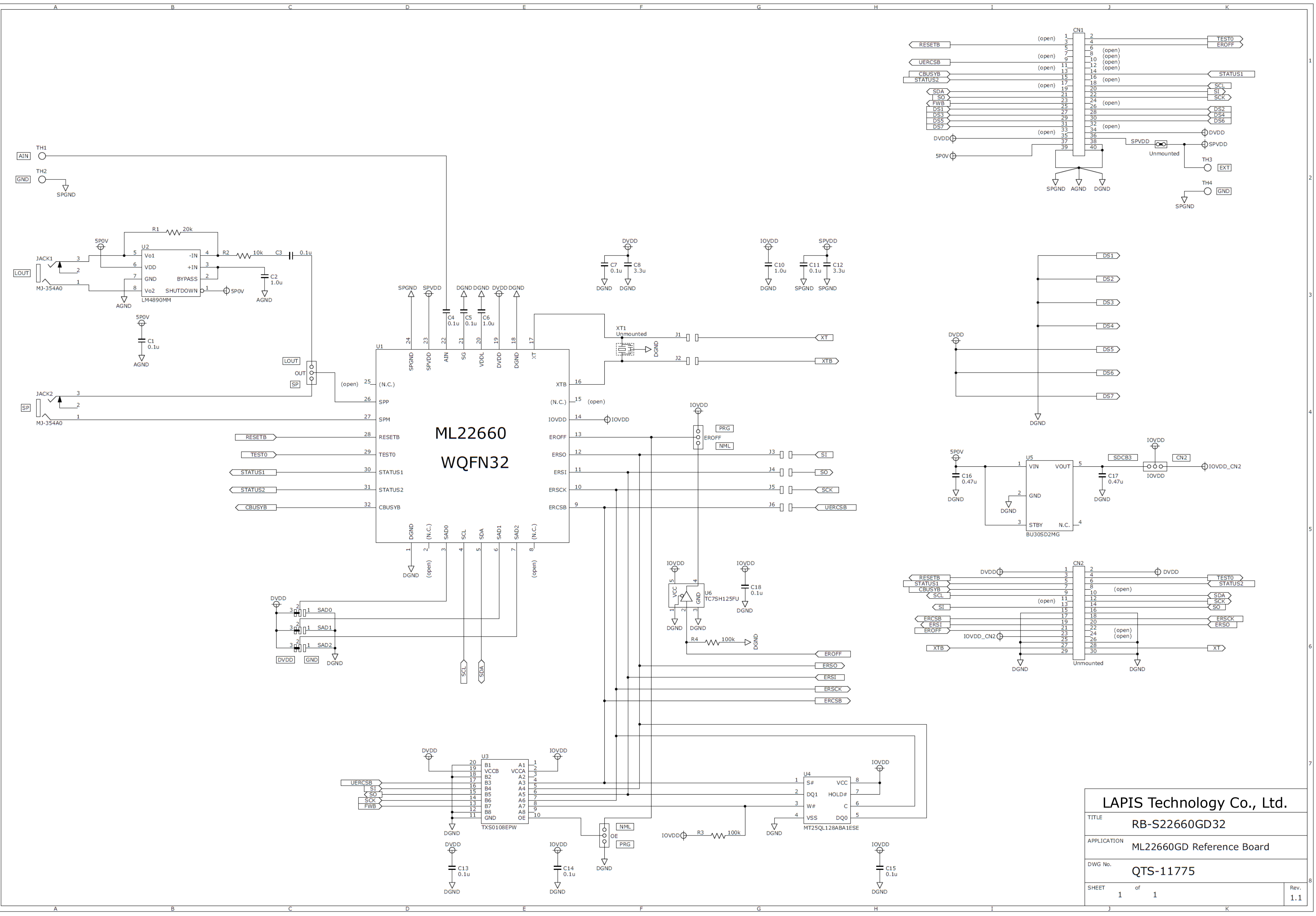



**Figure 8 PCB layout**

## 4.2. BOM list, Schematic

| | Parts Number | Symbol | Contents | Qty. | Vendor |
|---|---|---|---|---|---|
| 1 | QTU-11896 | RB-S22660GD32 | PCB | 1 | LAPIS Technology 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 | - | SAD0,SAD1,SAD2 | Select pad | 3 | - |
| 13 | IC610-0324-007 | U1 | QFN P0.50 32P Socket | 1 | YAMAICHI ELECTRONICS Co., Ltd. |
| 14 | LM4890MM/NOPB | U2 | Audio Power Amplifier | 1 | Texas Instruments Incorporated |
| 15 | TXS0108EPWR | U3 | Voltage level translation | 1 | Texas Instruments Incorporated |
| 16 | MT25QL128ABA1ESE | U4 | 128Mb Serial NOR Flash Memory | 1 | Micron Technology, Inc. |
| 17 | BU30SD2MG-MTR | U5 | LDO Regulator | 1 | Rohm Co., Ltd. |
| 18 | TC7SH125FU | U6 | Bus Buffer with 3-State Output | 1 | Toshiba Corporation |
| 19 | HIF3GA-2.54SP | - | Short Pin | 4 | Hirose Electric Co., Ltd. |
| 20 | - | CN2 | Unmounted | 1 | - |
| 21 | - | J1,J2,J3,J4,J5,J6 | Unmounted | 6 | - |
| 22 | - | SPVDD | Unmounted | 1 | - |
| 23 | - | TH1,TH2,TH3,TH4 | Unmounted | 4 | - |
| 24 | - | XT1 | Unmounted | 1 | - |


ML22660
WQFN32
LAPIS Technology Co., Ltd.
TITLE RB-S22660GD32
APPLICATION ML22660GD Reference Board
DWG No. QTS-11775
SHEET 1 of 1
Rev. 1.1

# 5. Revision History

| Document No. | Issue Date | Page | | Description |
|---|---|---|---|---|
| | | Previous Edition | New Edition | |
| FEBL22660RGDB-01 | March 9, 2020 | – | – | First edition. |
| FEBL22660GDRB-02 | February 5 2021 | Notes | Notes | Change the description. |
| | | | | Company name change. |
| | | 1 | 1 | 2. Operational notes<br>Added to connect a monaural speaker to the LOUT jack and SP jack. |
| | | - | 2 | 3.1. EROFF jumper pin<br>Added chapter. |
| | | | | 3.2. OE jumper pin<br>Added chapter. |
| | | | | 3.3. IOVDD jumper pin<br>Added chapter. |
| | | | | 3.4. OUT jumper pin<br>Added chapter. |
| | | | | 3.5. LOUT jack<br>Changed chapter number.<br>Added SDCB Controller settings when using LOUT jack.<br>Added to connect a monaural speaker to the LOUT jack. |
| | | - | 3 | 3.6. SP jack<br>Changed chapter number.<br>Added SDCB Controller settings when using SP jack.<br>Added to connect a monaural speaker to the LOUT jack. |
| | | | | 3.7. AIN through hall<br>Changed chapter number.<br>Changed chapter name.<br>Added connection diagram. |
| | | | | 3.8, SPVDD jumper terminal, EXT through hall<br>Added chapter. |
| | | | | 3.9, SAD2-0 lands<br>Added chapter. |
| | | - | 4 | 3.10. XT1 land, J1 land<br>Changed chapter number.<br>Changed chapter name.<br>Added operation in RC oscillation. |
| | | | | 3.11. CN1 connector<br>Changed chapter number. |
| | | - | 5 | 3.12. CN2 connector<br>Changed chapter number.<br>Added input/output directions when SDCB3 is connected and single unit is used. |
| | | - | 6 | 4. Appendix<br>Added chapter. |

| | | | | |
|---|---|---|---|---|
| | | | | 4.1. PCB layout<br>Changed chapter number.<br>Changed Figure 8. |
| | | - | 7 | 4.2. BOM list, Schematic<br>Changed chapter number.<br>Company name change. |
| | | - | 8 | 4.2. BOM list, Schematic<br>Changed chapter number.<br>Company name change. |