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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

Sound Device Control Board 3 User's Manual

Issue Date: October 11, 2019

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Preface

This manual describes about the Sound Device Control Board 3.

Refer to following documents when necessary.

- **Speech LSI Utility User's Manual**
Provides the information on how to use the SDCB Controller.
- **Speech Synthesis LSI Reference Board User's Manual**
Provides the detailed information about the Speech Synthesis LSI Reference Board.
- **Speech Synthesis LSI Datasheet**
Provides the detailed information about the Speech Synthesis LSI.

Notation

Classification	Notation	Description
◆ Numeric value	<i>0xnn</i>	Indicates a hexadecimal number.
	<i>0bnnnn</i>	Indicates a binary number.
◆ Address	<i>0xnnnn_nnnn</i>	Indicates a hexadecimal number.
◆ Unit	word, W	1 word = 16 bits
	byte, B	1 byte = 8 bits
	nibble, N	1 nibble = 4 bits
	mega-, M	10^6
	kilo-, K	$2^{10} = 1024$
	kilo-, k	$10^3 = 1000$
	milli-, m	10^{-3}
	micro-, μ	10^{-6}
	nano-, n	10^{-9}
second, s (lower case)	second	
◆ Terminology	"H" level	Indicates high level voltage V_{IH} and V_{OH} as specified by the electrical characteristics in the data-sheet.
	"L" level	Indicates low level voltage V_{IL} and V_{OL} as specified by the electrical characteristics in the data-sheet..

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1. Read This First

1.1. Precaution for Safe and Proper Use

This manual uses various labels and icons that serve as your guides to operating this product safely and properly so as to prevent death, personal injury, and property damage. The following table lists these labels and their definitions.

Labels

 Warning	This label indicates precautions that, if ignored or otherwise not completely followed, could lead to death or serious personal injury.
 Caution	This label indicates precautions that, if ignored or otherwise not completely followed, could lead to personal injury or property damage.

Icons



A triangular icon draws your attention to the presence of a hazard. The illustration inside the triangular frame indicates the nature of the hazard—in this example, an electrical shock hazard.









A circular icon with a solid background illustrates an action to be performed. The illustration inside this circle indicates this action—in this example, unplugging the power cord.










A circular icon with a crossbar indicates prohibition. The illustration inside this circle indicates the prohibited action—in this example, disassembly.

1.2. Important Safety Notes

Please read this page before using the product.

 Warning	
Use only the specified voltage. Using the wrong voltage risks fire or electrical shock.	
At the first signs of smoke, an unusual smell, or other problems, unplug the board and disconnect all external power cords. Continued use risks fire and electrical shock.	
Do not use the product in an environment exposing it to moisture or high humidity. Such exposure risks fire or electrical shock.	
Do not pile objects on top of the product. Such pressure risks fire or electrical shock.	
At the first signs of breakdown, immediately stop using the product, unplug the board, and disconnect all external power cords. Continued use risks fire and electrical shock.	

 Caution	
Do not use this product on an unstable or inclined base as it can fall or overturn, producing injury.	
Do not use this product in an environment exposing it to excessive vibration, strong electromagnetic fields, or corrosive gases. Such factors can loosen or even disconnect cable connectors, producing a breakdown.	
Do not use this product in an environment exposing it to temperatures outside the specified range, direct sunlight, or excessive dust. Such factors risk fire and breakdown.	
Use only the cables and other accessories provided. Using non-compatible parts risks fire or breakdown.	
Always observe the specified order for turning equipment on and off. Using the incorrect order risks fire or breakdown.	
Do not use the cables and other accessories provided with other systems. Such improper usage risks fire.	

2. Overview

Sound Device Control Board 3 (hereinafter referred to as "SDCB3") is a control board commonly used by LAPIS Semiconductor speech synthesis LSIs. Auditioning and writing speech data can be performed by connecting the SDCB3 to a reference board with a speech synthesis LSI. The SDCB3 is connected to a computer. The SDCB3 is controlled by the application SDCB Controller *1 of the PC.

*1 For how to use the SDCB Controller, see the Speech LSI Utility User's Manual.

2.1. Features

- Speech synthesis LSIs can be controlled using SDCB Controller.
- Auditioning of speech synthesis LSI
- Speech data can be written to the speech synthesis LSI.
- Power supply for Speech Synthesis LSI Reference Board (no external power supply required)

2.2. System Configuration

Fig. 1 shows the system configuration when the SDCB3 is used.

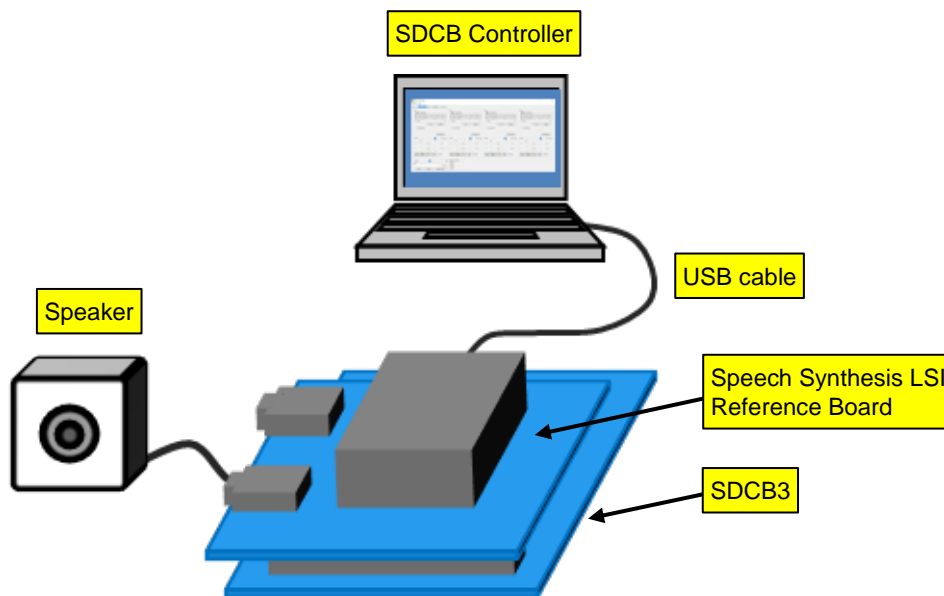


Fig. 1 System Configuration Diagram

Table 1 System Configuration

Item	Description
SDCB3	Boards that use SDCB Controller to control speech synthesis LSIs
Speech Synthesis LSI Reference Board	Boards with speech synthesis LSIs
SDCB Controller	Applications Controlling Speech Synthesis LSIs
USB Cable	Cables connecting the SDCB3's USB Micro-B receptacles to the PCs
Speaker	Speakers for Audio Preview Connected to the Speech Synthesis LSI Reference Board

2.3. Operating condition

Table 2 shows the operating condition.

Table 2 Operating condition

Item	Description
Power supply	Input USB: DC+4.40V-5.25V, 500mA External RVDD input terminal: DC+3.00V-5.50V, 1,000mA
	Output RVDD: DC+3.00-5.50V, 350mA ^{*1,2,3} DC+3.00V-5.50V, 1,000mA ^{*4} RVPP: DC+7.00-8.20V, 10mA ^{*1,2} RVDD50: DC+4.40V-5.25V, 500mA ^{*1}
Environment	Temperature: 5~40deg. Humidity: 30~80%RH (do not condense dew)

*1 The total output current of the RVDD, RVPP, RVDD50 is Max.350mA.

*2 The RVDD, RVPP outputs are controlled by the board controller.

*3 This condition is used when RVDD is supplied by SDCB3 internally generated.

*4 This is the condition for using when RVDD is supplied from the external RVDD input pin.

2.4. Hardware specifications

Table 3 shows the hardware specifications.

Table 3 Hardware specifications

Item	Description	Remarks
Board size	70.0mm x 90.0mm x 15.5mm	
Interface	Speech Synthesis LSI Reference Board connection connector (CN1)	40pin
	USB2.0 HS	Micro-B Receptacle
	External RVDD input terminal	
Jumper socket	RVDD select jumper socket (J1)	
Indicator	RVDD50, RVDD	

2.5. Outline Diagram

Table 4 shows the SDCB3.

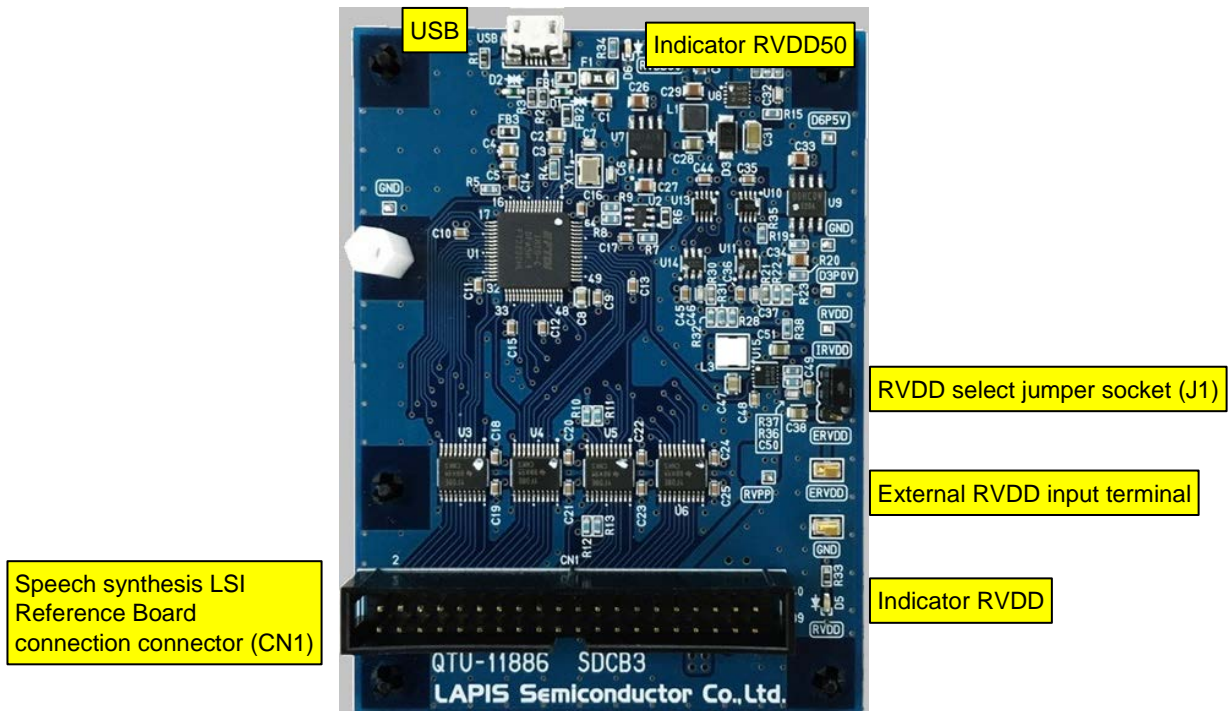


Fig. 2 Outline Diagram

Table 4 Parts description

Item	Description
Speech synthesis LSI Reference Board connection connector (CN1)	This connector is used to connect a Speech Synthesis LSI reference board.
USB	Connect the monitor to a PC with a USB cable.
External RVDD input terminal	This pin is for inputting RVDD from an external device.
RVDD select jumper socket (J1)	The RVDD is selected from the SDCB3 internally generated and external RVDD pins.
Indicator RVDD50	Illuminates when RVDD50 is supplied.
Indicator RVDD	Illuminates when RVDD is supplied.

3. Function

3.1. Speech Synthesis LSI Reference Board connection connector (CN1)

Connects a Speech Synthesis LSI Reference Board. Turn off the SDCB3 before connecting the SDCB3 to the Speech Synthesis LSI Reference Board. When connecting the SDCB3 to a Speech Synthesis LSI Reference Board, pay attention to the direction in which the connectors are connected. The connector connection direction is shown in Fig. 3.

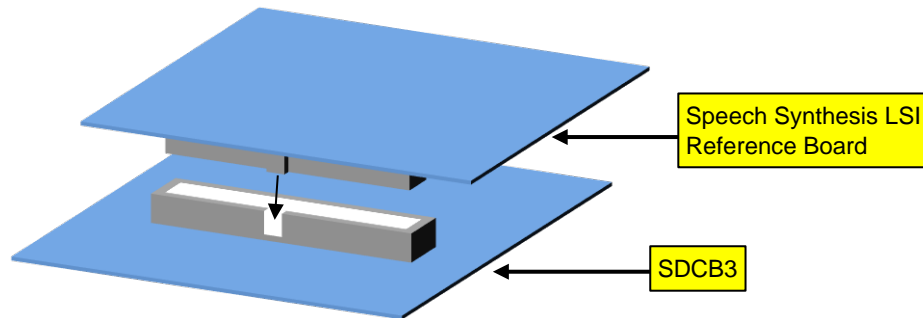


Fig. 3 Speech Synthesis LSI Reference Board connection

3.2. USB

Connect the SDCB3 to a computer with a USB cable. Use the USB Std.A-Micro, B cables provided.

Power is supplied when the SDCB3 is connected to a computer with a USB-cable.

When the installation of the driver is required, please install a driver by a method listed in Speech LSI Utility User Manual.

3.3. Power supply

The power is supplied from the USB. Power is supplied to the SDCB3 when the USB cable is connected to a PC with a USB cable.

The SDCB3 provides power to the Speech Synthesizer Reference Boards. The RVDD, RVPP, RVDD50 three types of power are supplied.

- RVDD is selected by the RVDD selection jumper socket (J1) for the power supplied from the power supply generated inside the SDCB3 or the external RVDD input pin. The RVDD selection jumper socket (J1) configuration is shown in Table 5 and Fig. 4.
- The RVPP uses power generated internally in the SDCB3.
- The RVDD50 uses USB-powered power.

The LEDs (RVDD) light up when the RVDD is applied.

The LEDs (RVDD50) light up when the RVDD50 is applied.

The application of each power supply is determined by the voice synthesis LSI reference board to be connected, so please refer to the instruction manual of the voice synthesis LSI reference board for details.

Table 5 RVDD select jumper socket (J1)

RVDD	RVDD select jumper socket (J1)
Power supply generated inside the SDCB3	IRVDD side
Power supplied from the external RVDD input terminal	ERVDD side

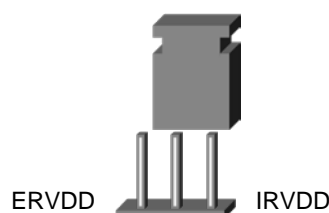


Fig. 4 RVDD select jumper socket (J1)

Fig. 5 shows the power supply circuit.

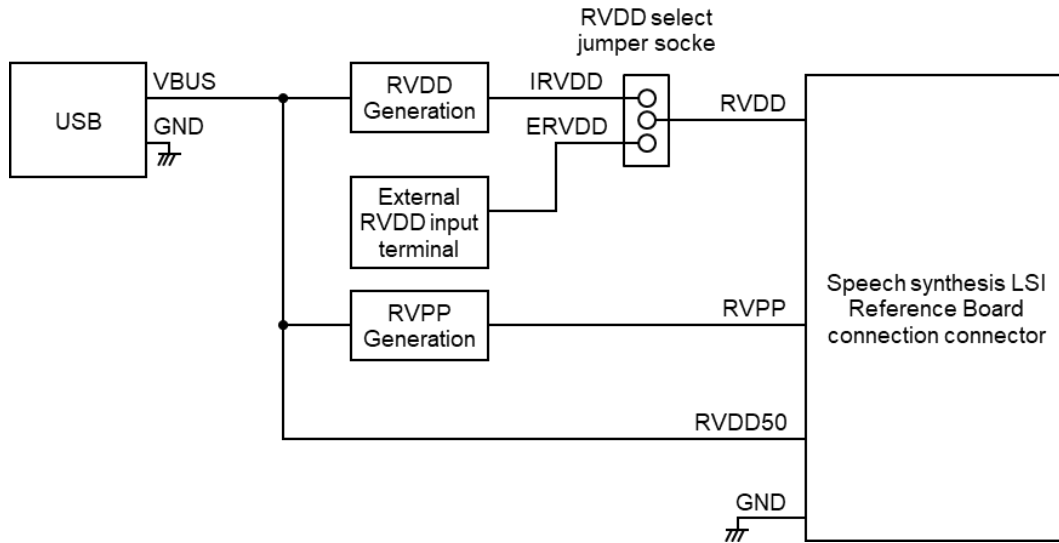


Fig. 5 Power supply circuit

Caution

When the power supplied to the RVDD from the external RVDD input terminal is selected, turn the power on/off as follows.

- The procedure of power supply ON
 1. Connect the SDCB3 to the PC with the USB cable.
 2. Turn on the power of the external RVDD input terminal.
- The procedure of power supply OFF
 1. Turn off the power to the external RVDD input terminal.
 2. Disconnect the USB cable from the SDCB3

4. Interface

4.1. Speech Synthesis LSI Reference Board connection connector

This connector is used to connect a Speech Synthesis LSI Reference Board.
The number of pins is 40 pins.

4.2. USB

Micro-B receptacles to be connected to PC.
Supports USB2.0 HS.

4.3. External RVDD input terminal

This pin supplies RVDD from an external power source.
Connect the external power supply between ERVDD and GND.

5. Precaution for usage

- (1) The SDCB3 is an unfinished product and intended for research and development and for expert use in the research and development facility only. The SDCB3 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) LAPIS supports replacing the board for an initial failure soon after the shipment. However LAPIS doesn't support repairing the board.
- (4) SDCB3 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.

6. PCB specification

Fig. 6 shows the PCB dimensional outline diagram and layout of components.

PCB part number:
SDCB3

Dimension:
70.0mm x 90.0mm x 15.5mm

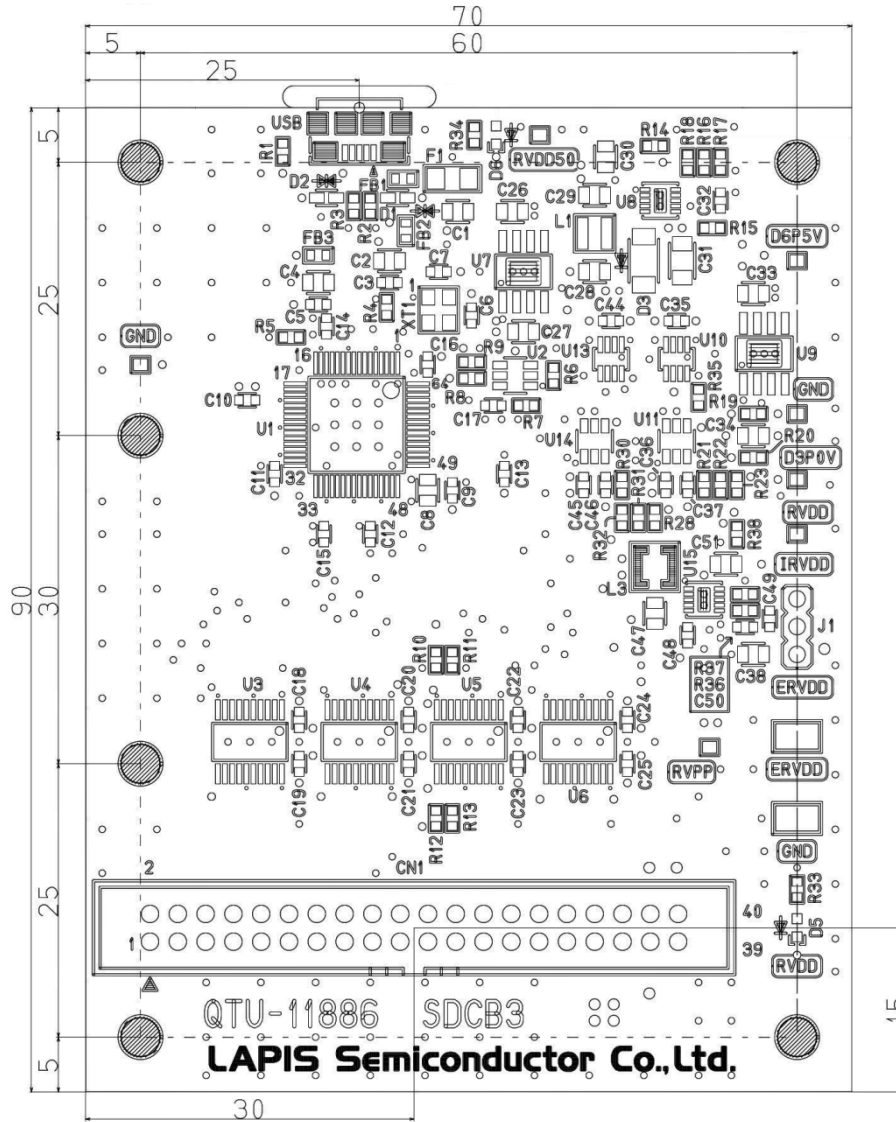


Fig. 6 PCB dimensional outline diagram and layout of components (Top view)

Revision History

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEBLSDCB3-01	October 11, 2019	–	–	First edition.