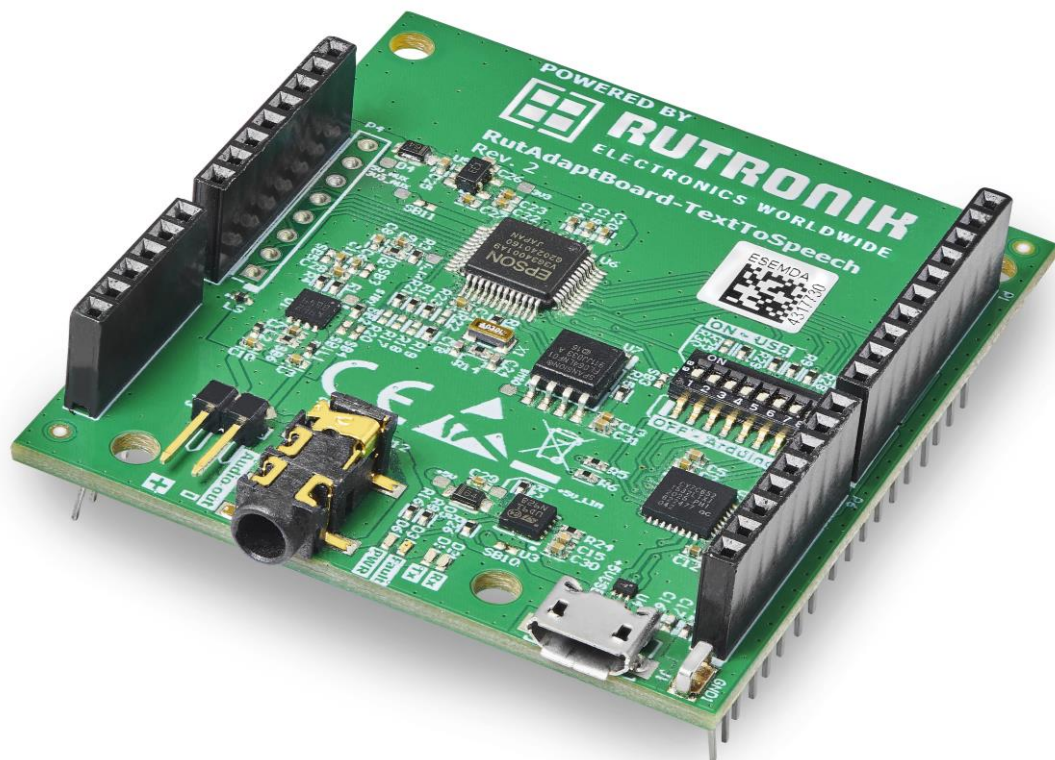


RAB – TextToSpeech User Manual



Versions

Version	Date	Rationale
0	August 20, 2020	First draft.
1.0	September 03, 2020	Rev. 1 Release.
1.1	September 25, 2020	Rev. 2 Release.
1.2	November 30, 2023	Updated template, new chapters. Author: KOA

Legal Disclaimer

The evaluation board is for testing purposes only and, because it has limited functions and limited resilience, is not suitable for permanent use under real conditions. If the evaluation board is nevertheless used under real conditions, this is done at one's responsibility;
any liability of Rutronik is insofar excluded.

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Overview

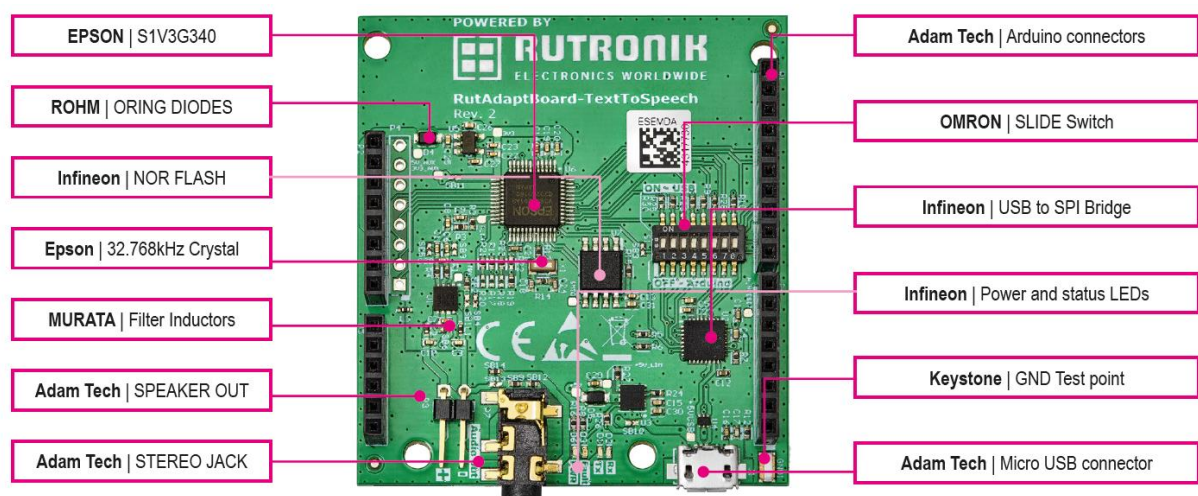
Features

RutAdaptBoard-TextToSpeech is a Voice/Audio evaluation board to familiarize with Epson Text To Speech solution and let customers develop their own solutions. It enables faster Time-to-Market for products with voice guidance functions. RutAdaptBoard-TextToSpeech was designed by Rutronik to promote outstanding products selected only from its suppliers. RutAdaptBoard-TextToSpeech designed as Arduino compatible shield board.

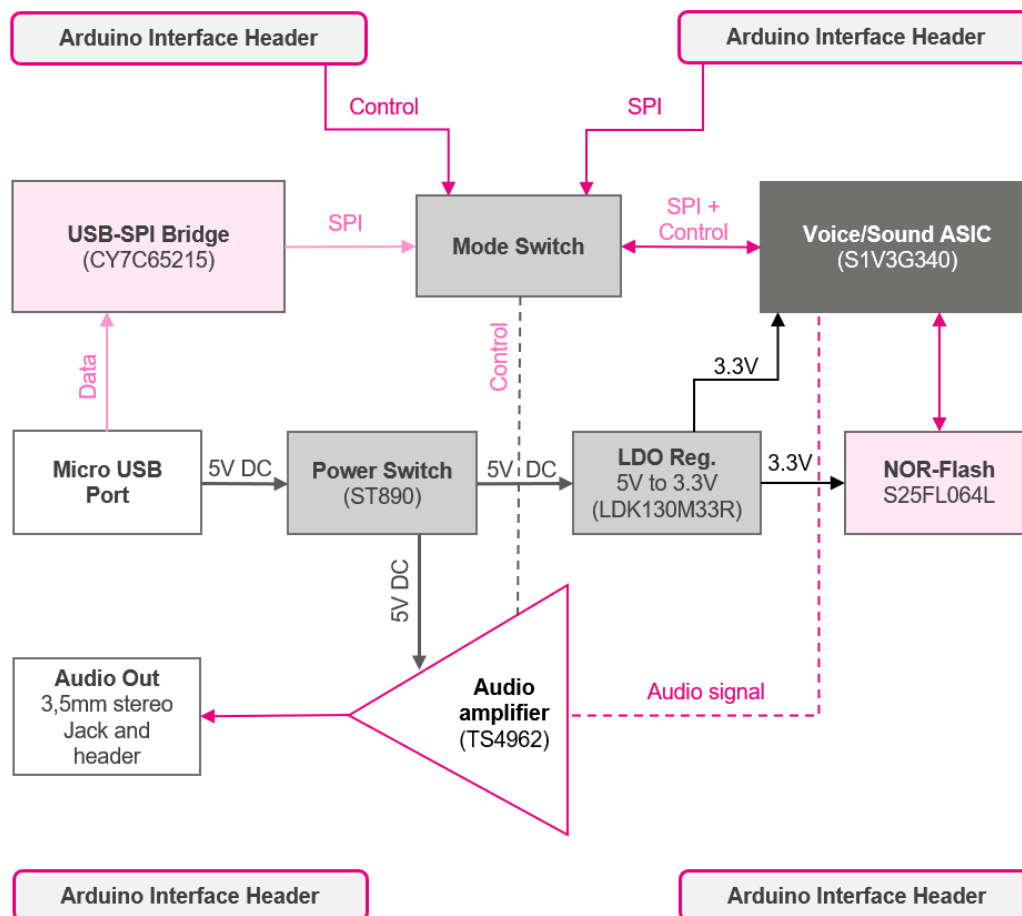
The board has the following features:

- EPSON Voice/Sound ASIC: S1V3G340.
- Cypress Semiconductor USB to SPI Bridge CY7C65215.
- Cypress Semiconductors NOR flash 64MBit memory S25FL064L.
- STMicroelectronics Class D 2.8W audio amplifier.
- Adam-Tech 3.5 Stereo Jack connector.
- Adam-Tech Arduino compatible headers.
- STMicroelectronics USB ESD protectors.
- Keystone test point.
- Omron slide switch for Select mode.
- Murata Inductors.
- Quartz Oscillators from Epson.

Component Placement

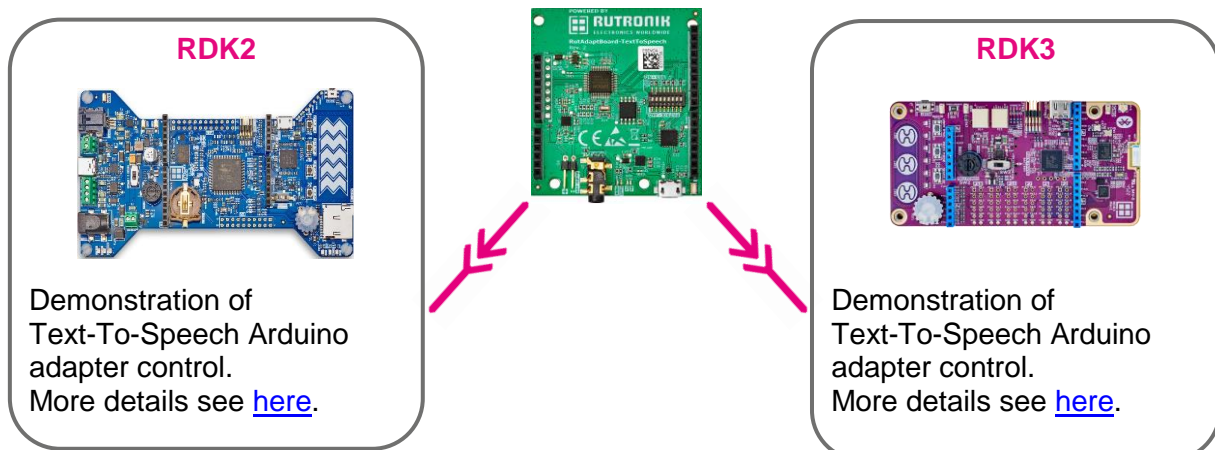


Functional Block Diagram



Applicable Boards

The following Rutronik System Solution boards are compatible with TextToSpeech and can be connected to it to provide the additional functionality.



Hardware

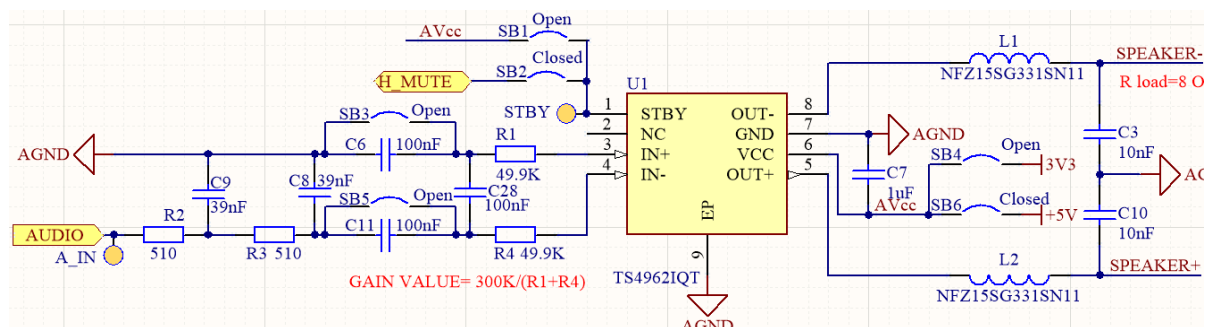
Power Sources

RutAdapBoard-TextToSpeech board can be powered from USB when it is connected by cable for programming purposes or from Arduino socket from 5V DC. Alternatively, it can be powered from 3.3V DC from Arduino socket. To do this following solder bridge configuration should be changed.

Solder No.	Default Configuration	3.3V Operation
SB4	OPEN	CLOSED
SB6	CLOSED	OPEN
SB11	OPEN	CLOSED

Audio Amplifier

The board has a Class D audio amplifier. On the input, there is a low pass input filter circuit to reduce high frequencies. The gain is controlled by two resistors R1 and R4. The amplifier provides low on/off switch noise with 5ms delay. A standby current consumption is 10nA. The amplifier is powered from a 5V supply rail, it can be powered also from 3.3V for battery-powered evaluations.

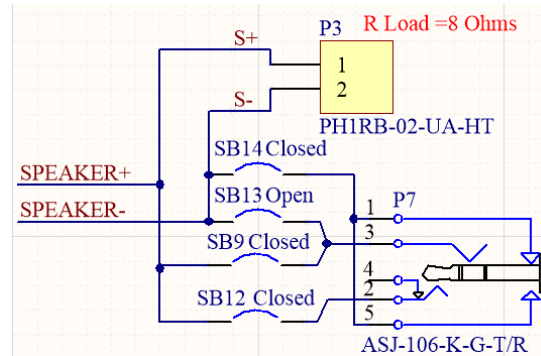


Low pass filter

The audio amplifier peripheral is intended for reference only and does not provide a performance guarantee. The component parameters must be tuned to the specific speaker to get the best audio quality.

Audio Output

There are two audio output connectors on the board: 2.54 mm header and audio jack. Audio output is optimized for 8 Ohms load speaker.

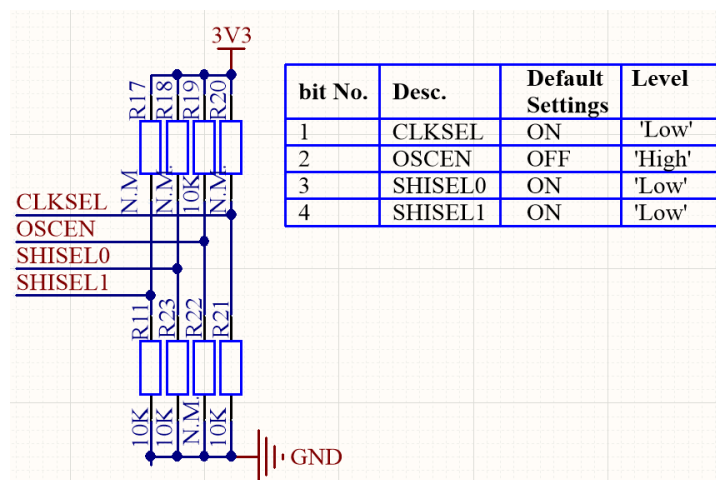


Audio jack output P7 can be configured for serial and parallel connection. Default configuration is a parallel Right and Left channel. To select a serial configuration, solder bridges SB9, SB12, SB13 and SB14 must be reconfigured, see table below for details.

Solder Bridge No.	Default Configuration (Parallel R and L Channel Output)	Series R and L Channel Output
SB9	Closed	Open
SB12	Open	Closed
SB13	Open	Closed
SB14	Closed	Open

Clock Source

The system clock of the S1V3G340 is provided by the 32.768kHz onboard oscillator. Although the clock source can be provided to the CLKI pin from the external clock sources.



Clock source configuration

Interface Selection

To work with Rutronik Epson Tool, the interface switch S1 should be in “ON” position. The default position is USB mode as shown in the picture below. To work with the Arduino interface, S1 should be turned off. To do this all S1 switches should be in “OFF” position to disable USB and enable communication with the host on the Arduino interface.

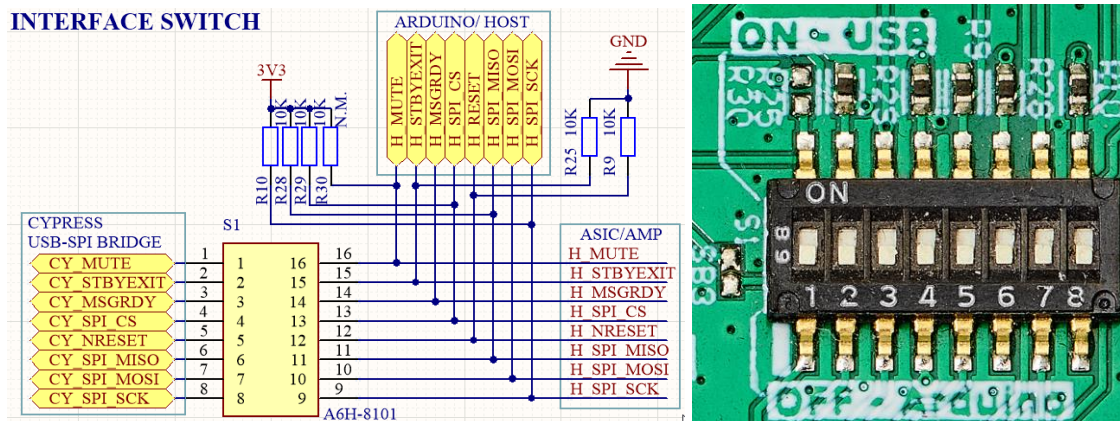
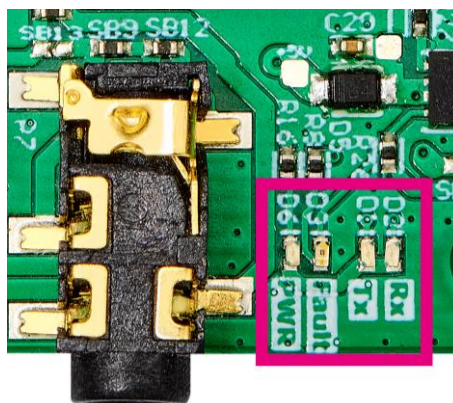


Diagram of interface switch S1 and its placement on the board

LEDs

There are four indication LEDs to indicate boards state. They are located next to the Audio Jack. Here is the indication LEDs description from top to bottom:

1. D2 Green LED communication Rx LED of USB-SPI Bridge.
2. D1 Green LED communication Tx LED of USB-SPI Bridge.
3. D3 Red LED indicates overcurrent of the power switch (more than 500mA) when powered from the USB port.
4. D6 Green LED indicates 3.3V power supply status.



LEDs location on the board

GPIO Ports

The S1V3G340 features general-purpose output ports for flexible system design. All functions are controlled by commands over a serial interface. All Epson GPIOs of S1V3G340 are available at socket P4.

Socket P4 Pinout		
Pin No.	Name	Description
1	GP05	General-purpose output
2	GP04	General-purpose output
3	GP01	General-purpose output
4	GP03	General-purpose output
5	GP02	General-purpose output
6	GP06	General-purpose output
7	GP00	General-purpose output
8	GND	Ground connection

The board provides Arduino headers for open-source electronics prototyping platforms. The pin configuration of headers is shown in the table below.

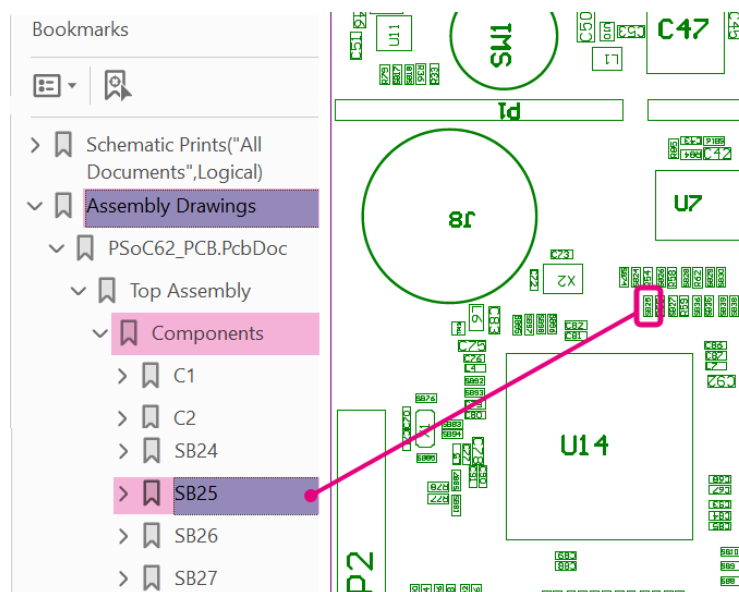
Socket P1 Pinout			Socket P2 Pinout		
Pin No.	Name	Description	Pin No.	Name	Description
1	-	-	1	-	-
2	H_MUTE	Audio amplifier mute signal	2	-	-
3	CLKI	Clock source input	3	-	-
4	H_SPI_MOSI	A serial data output signal	4	3.3V DC	3.3 V DC power input (for low power operation)
5	H_SPI_MISO	A serial data input signal	5	5V DC	5 V DC power input
6	H_SPI_SCK	Serial clock signal	6	GND	Ground connection
7	GND	Ground connection	7	GND	Ground connection
8	-	-	8	-	-
9	-	-			
10	-	-			

Socket P5 Pinout			Socket P6 Pinout		
Pin No.	Name	Description	Pin No.	Name	Description
1	-	-	1	-	-
2	-	-	2	-	-
3	-	-	3	-	-
4	-	-	4	H_MSGRDY	Serial output data ready
5	-	-	5	H_STBEXIT	STANDBY mode exit control Input
6	-	-	6	-	-
			7	H_RESET	Hardware reset input (active low)
			8	H_SPI_CS	Slave device select input

Solder Bridges

Solder Bridge	Circuit	Default
SB1	Permanent amplifier standby connect to AVcc	Open
SB2	Arduino/USB controlled amplifier standby	Closed
SB3	Amplifier non-inverting input capacitor bypass	Open
SB4	Amplifier power from 3.3V DC	Open
SB5	Amplifier inverting input capacitor bypass	Open
SB6	Amplifier power from +5 DC	Closed
SB8	CLKI clock source Arduino header	Open
SB9	Audio jack output configuration	Closed
SB10	Current limit switch ST890 bypass	Open
SB11	3.3V DC power only	Closed
SB12	Audio jack output configuration	Closed
SB13	Audio jack output configuration	Open
SB14	Audio jack output configuration	Closed

The locations of the solder bridges can be found in [3D model](#) and [assembly drawings](#) of TextToSpeech.



How to find a component on the layout

Software and Firmware

Getting Started

1. Register at [Epson](#) to get ESPER2 software license (it takes up to several days to complete the registration and receive an email with confirmation):

Some data for registration form:

Product Number - S1V3G340

Distributor person mail address – email address of Rutronik employee

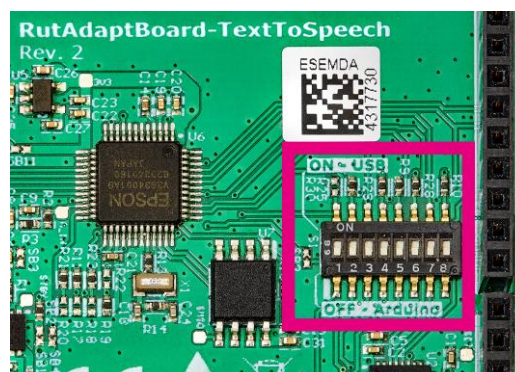
Board serial number – 0001

MAC address – check out your network parameters

2. Download and install [Voice Creation PC Tool](#). The password for zip file can be found in the confirmation email (see previous step). The application is designed to generate and edit ROM files based on user-entered text phrases.
3. Download and install [driver](#) for Cypress CY7C65215-32LTXI (after going to the link address, select Design Support - Development Tools – CypressDriverInstaller).
4. Download [Rutronik Flash tool](#). It is used for flashing the TextToSpeech board and playing the ROM files.
5. Connect your board with a speaker and PC.

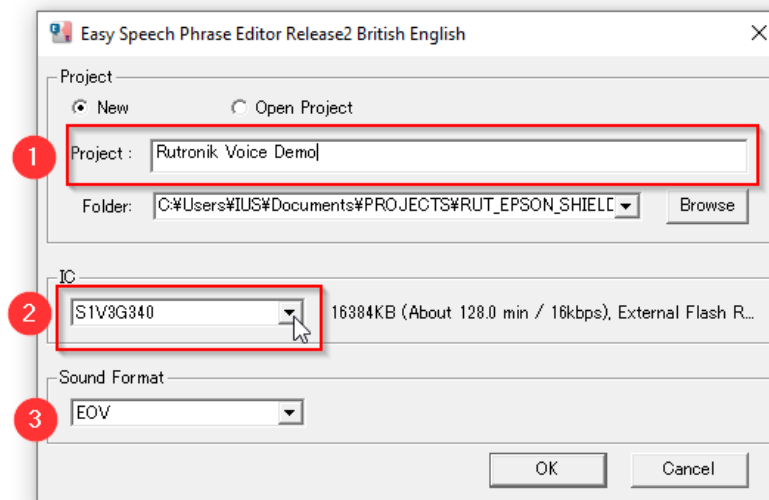


6. For PC communication and flash programming all configuration switches should be in ON - USB position.

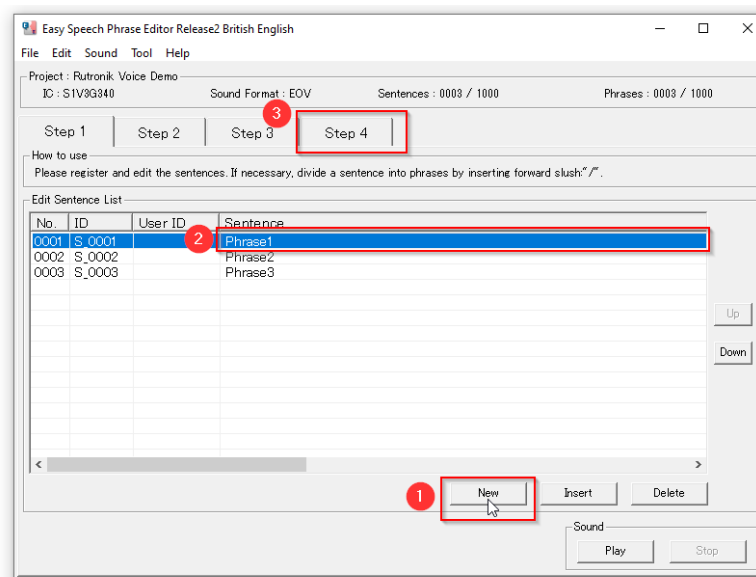


Generating ROM Files

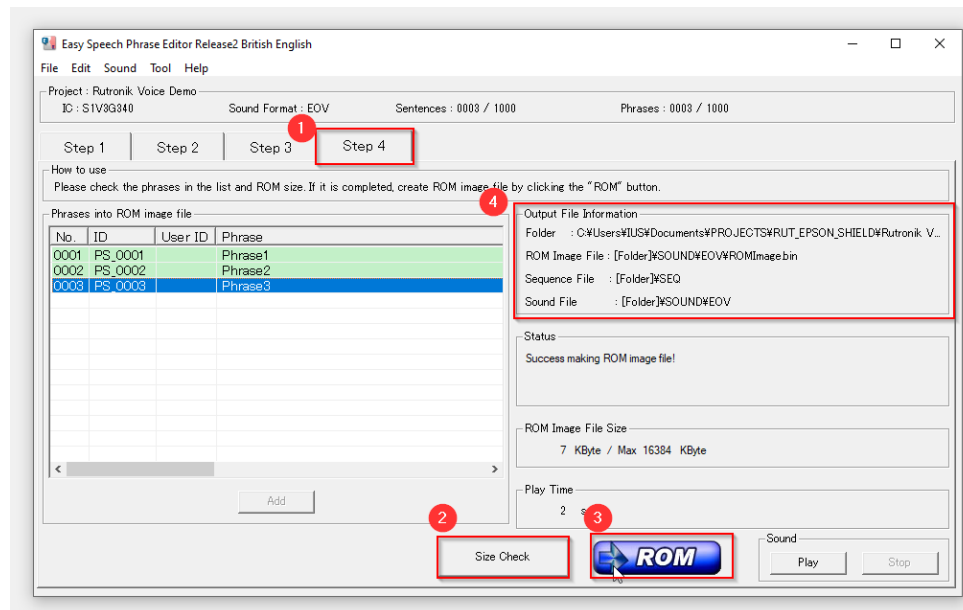
1. Launch ESPER2 application and create a new project: enter the **Project** name, select **IC S1VG340** and **EOV Sound Format**.



2. Create new phrases by pressing **New**, type them in the **Sentence** field and go to the **Step 4** tab.



3. Check file size using **Size Check** button (it should not exceed Flash size), press **ROM** to generate ROM files. The **Output Files** are stored in the ROM Image folder.



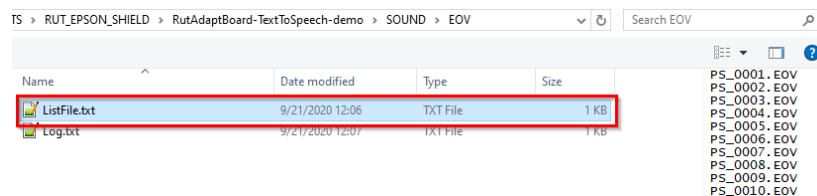
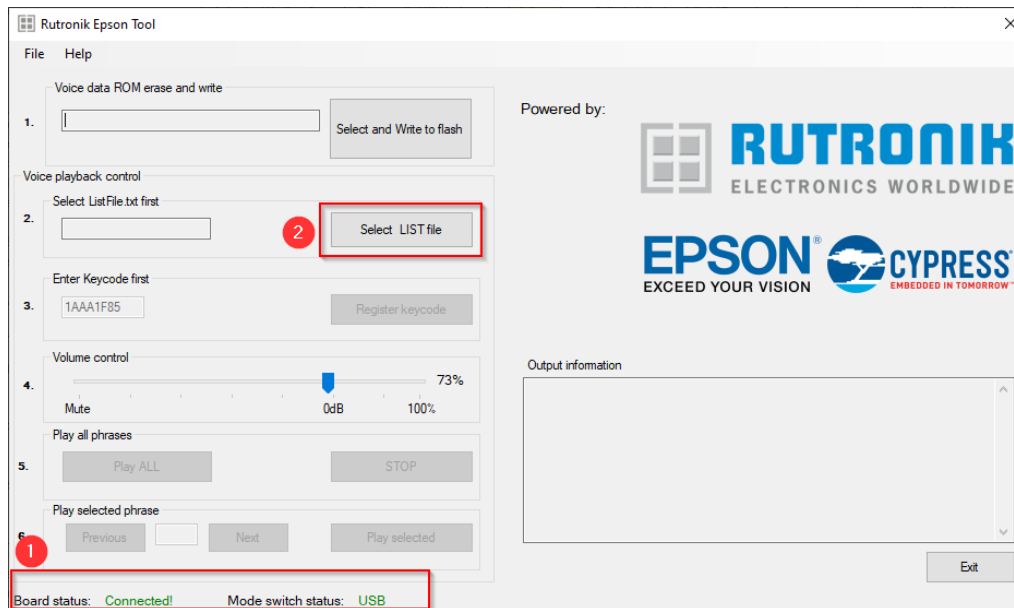
To get more information about ESPER2 application, check out [this document](#).

Playing the Phrases

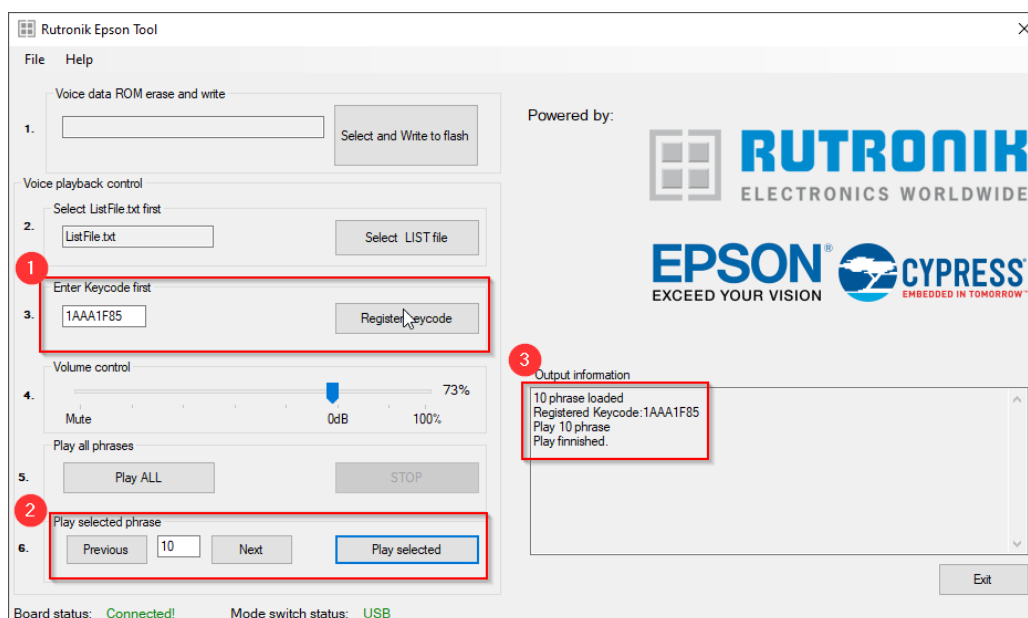
TextToSpeech board comes with 10 pre-programmed demonstration phrases in the flash memory. Use a computer with Rutronik Epson Tool or a host microcontroller that resides on Rutronik development kits RDK2 and RDK3 to evaluate TextToSpeech. An evaluation via PC using pre-programmed phrases is described here (steps 1-6).

You can also play your own phrases generated as described in [Generating ROM Files](#), check out steps 7-12.

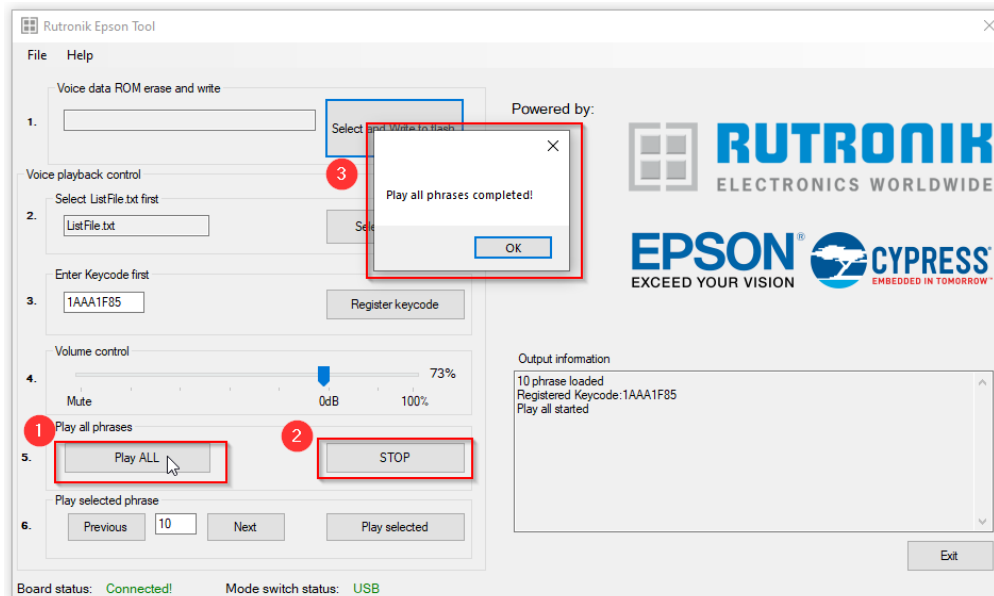
1. Connect TextToSpeech to the PC, for more details see [here](#).
2. Run Rutronik Epson Tool (.exe file is stored here: ...\\RutronikEpsonFlashTool-main\\executable\\RutEpsonFlashTool.exe). Check if **Board status** is Connected and **Mode switch status** is USB.
3. Press **Select LIST file** and select ListFile.txt of the RutAdaptBoard-demo project.



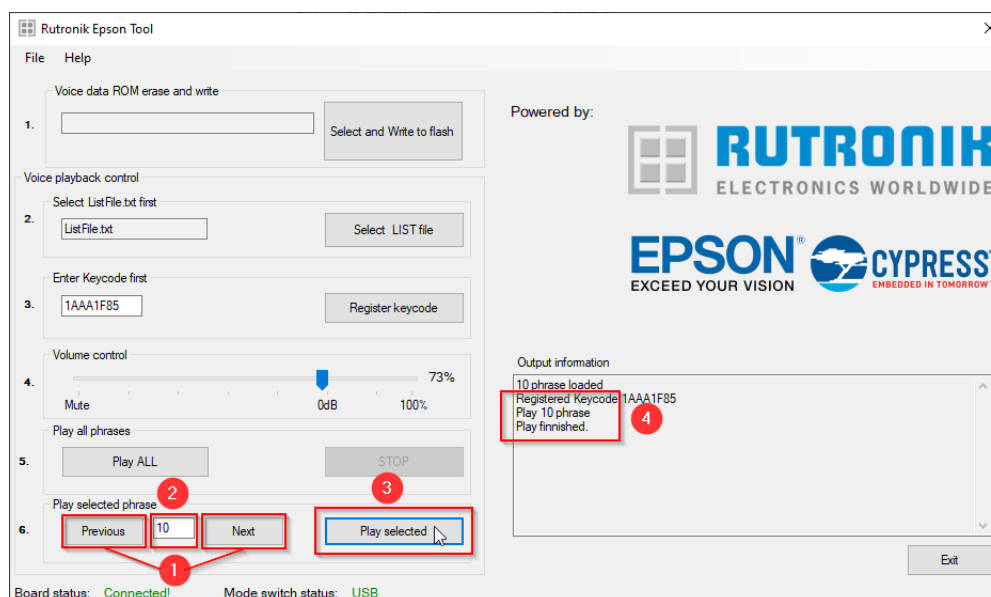
4. Enter the keycode that you've received in EPSON confirmation email and press **Register keycode**. Check **Output information** window.



5. Now you can play all phrases or the selected ones. To play all phrases, press **Play ALL**. If you want to interrupt the playback sequence, press **STOP**. After all phrases finish to play, a message window will be shown.

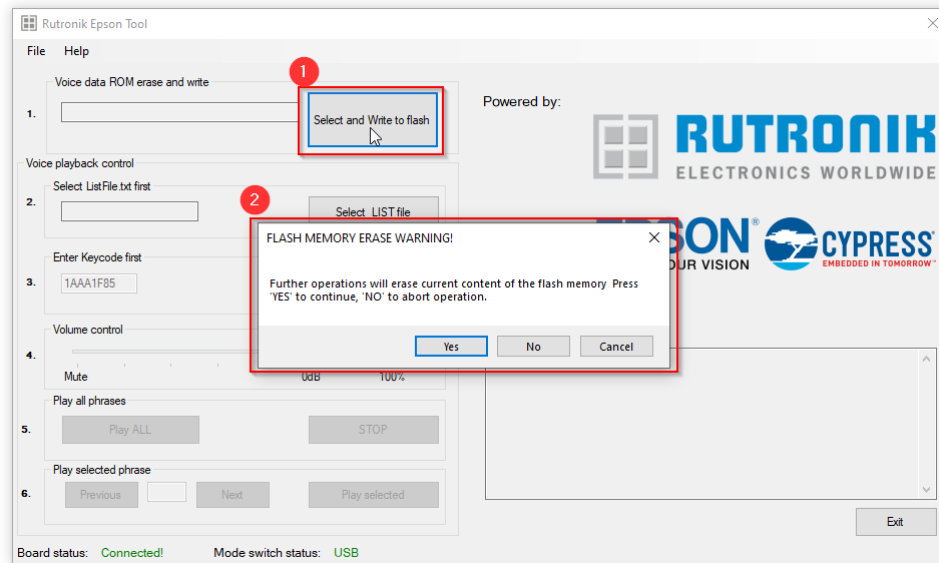


6. To play a specific phrase, insert its number in the field or press **Next** and **Previous** to go to the required phrase. Press **Play selected**. Check **Output information** window.

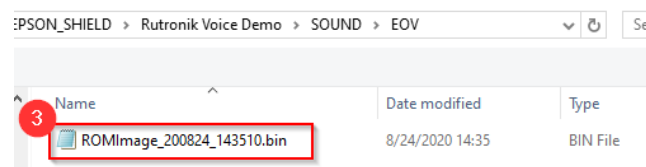


If you want to play your own phrases, follow next steps.

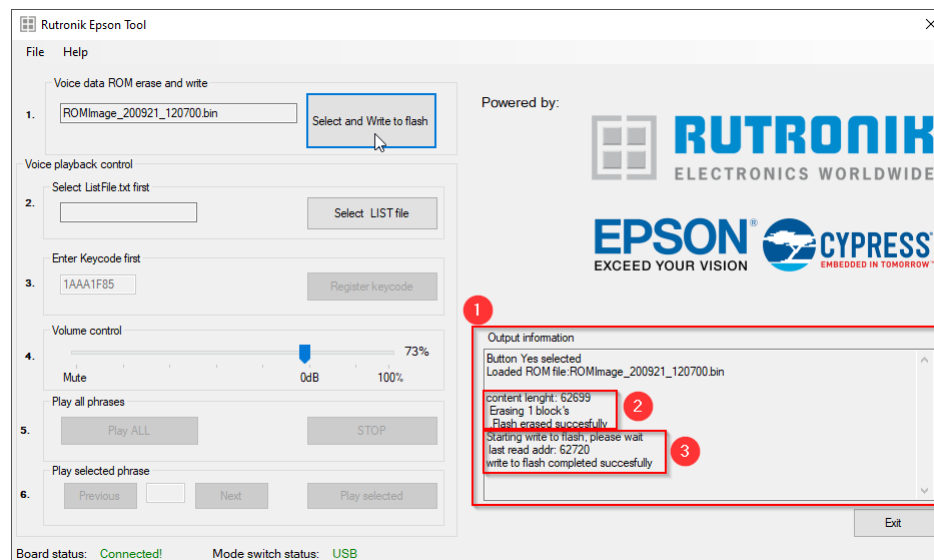
7. Run Rutronik Epson Tool (.exe file is stored here: ...\\RutronikEpsonFlashTool-main\\executable\\RutEpsonFlashTool.exe). Check if **Board status** is Connected and **Mode switch status** is USB.
8. Press **Select and Write to Flash**, then **Yes** in the popup window. Entire flash content will be overwritten.



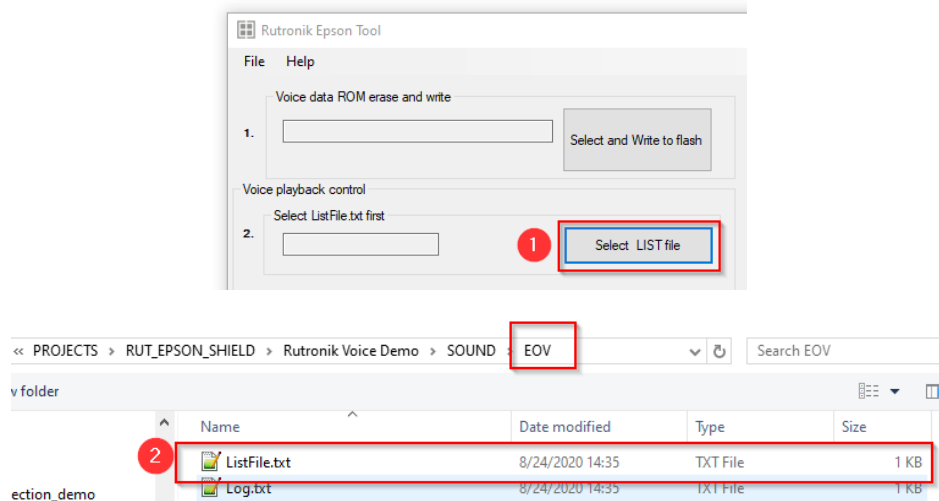
9. Select ROMImage... .bin file that you've generated before.



10. **Output Information** window provides operation status.



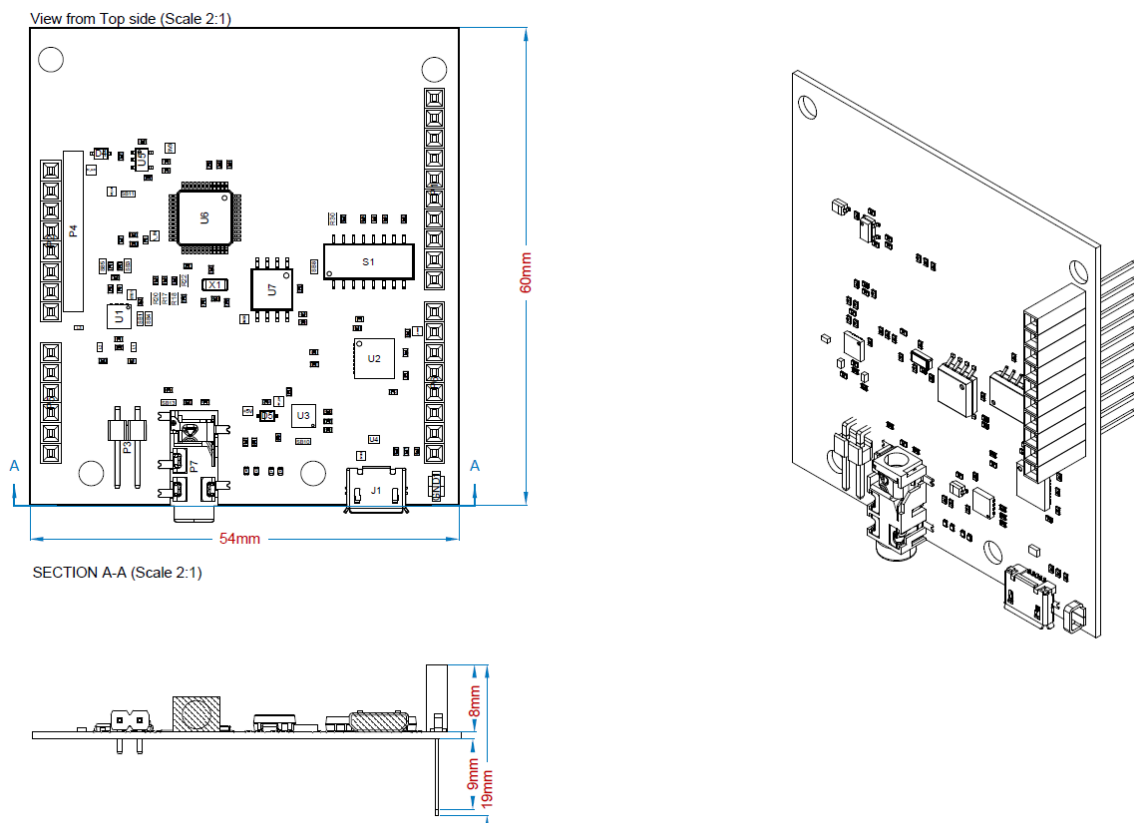
11. Press **Select LIST file** and select ListFile.txt in EOY folder of ESPER2 project.



12. Follow the steps 4-6 described earlier in this chapter.

Production Data

Mechanical Layout



Schematics

You'll find the schematics of TextToSpeech [here](#).

BOM

You'll find the [BOM](#) for TextToSpeech here.