Application Report
SLAA847–August 2018

Load TAS5825M Configurations from EEPROM via SPI

Andy Liu

ABSTRACT

Loading TAS5825M configurations from an external serial EEPROM via SPI is necessary in some audio systems that require a very short load time. This application report explains the entire loading procedure in details.

Contents

List of Figures

List of Tables

Trademarks

1 Introduction

The TAS5825M device is usually initialized by a host processor via I2C. However, a few audio systems demand a very short load time. In this use case, loading configurations from an external EEPROM via SPI is necessary due to the much higher speed full-duplex communication supported by SPI. Figure 1 shows how a TAS5825M device and a serial SPI EEPROM are connected to a host processor.

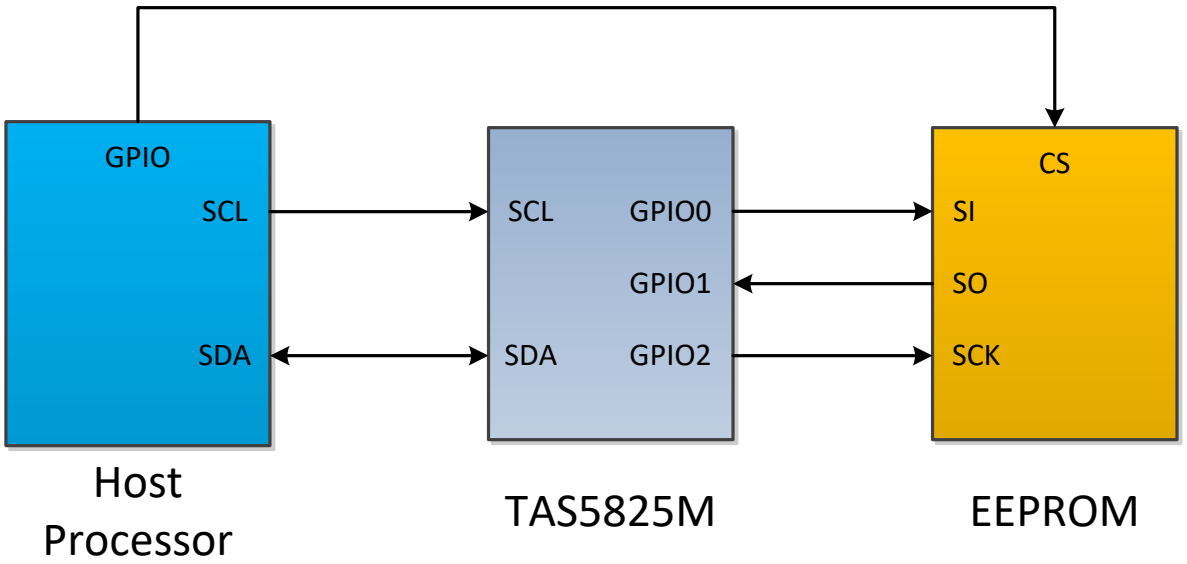


Figure 1. Typical Connections

2 Loading Procedure

The entire loading procedure can be split into three major steps:

1. Host processor downloads Book 0 register configurations to the TAS5825M device via I2C. This step cannot be ignored because these register configurations cannot be loaded directly from the external EEPROM.

   NOTE: Book 0 registers refer to the registers that are described in details in the Register Maps of TAS5825M datasheet. They are all located in the Book 0.

2. Host processor initiates a load request and then the TAS5825M device starts to load configurations from the EEPROM via SPI automatically.
3. Host processor checks whether the configurations are successfully loaded and initiates another load request if the first request fails.

3 Tutorial

A tutorial is provided for each step.

3.1 Book 0 Register Configurations and EEPROM Image

The Book 0 register configurations and EEPROM image can be generated by using the Dump feature found in the End-System Integration Page.

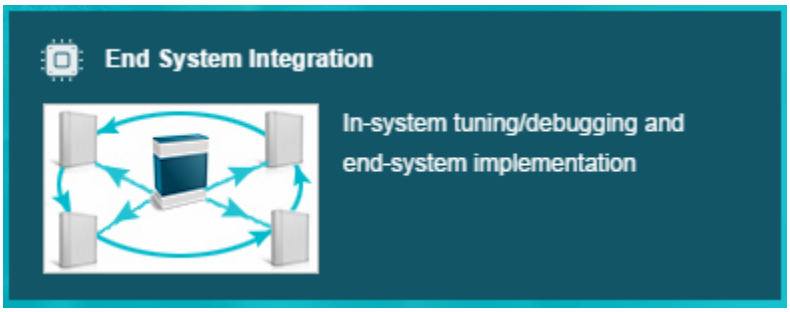
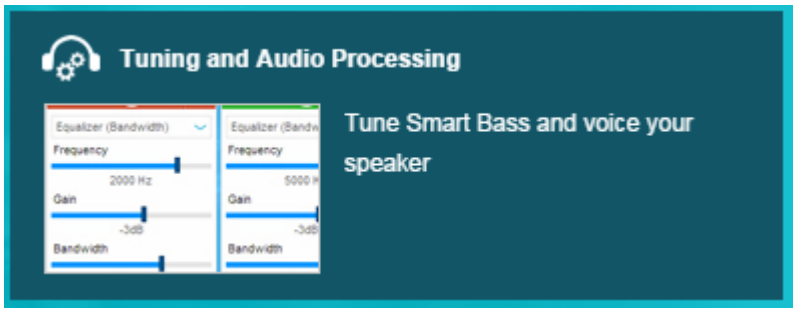


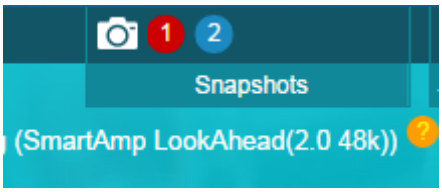
Figure 2. End-System Integration

NOTE: A TAS5825MEVM must be connected, and the system gain calibration must be performed properly.

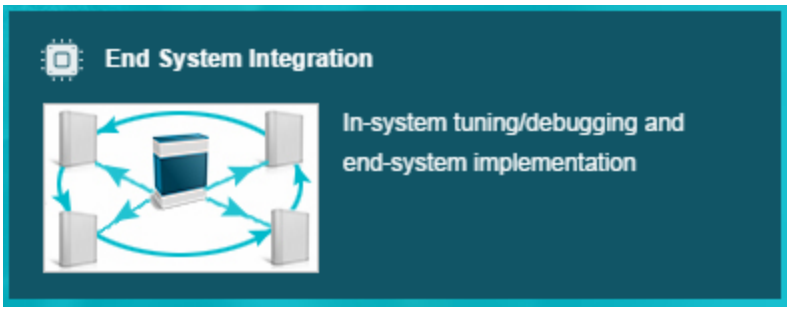
1. Open *Tuning and Audio Processing*. This loads tuning settings to the target TAS5825M device on the EVM.



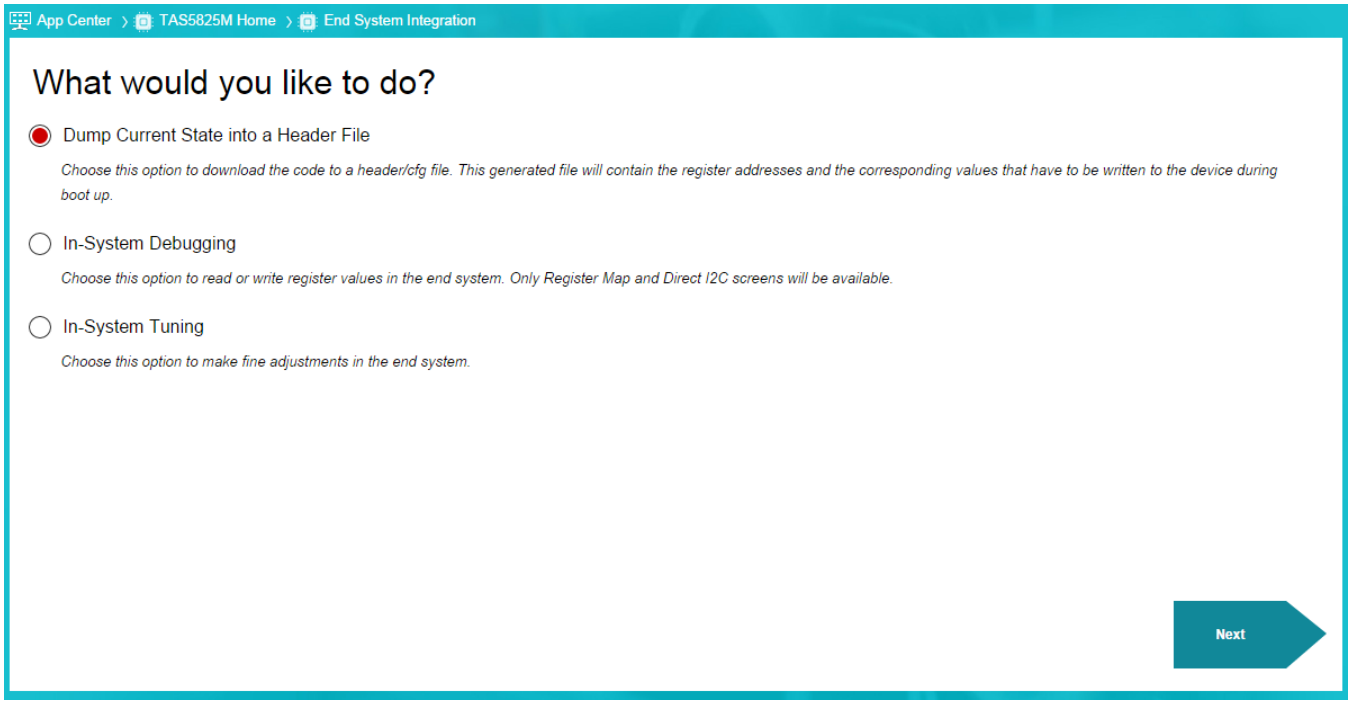
2. Select the desired *Snapshot* if any has been saved before.



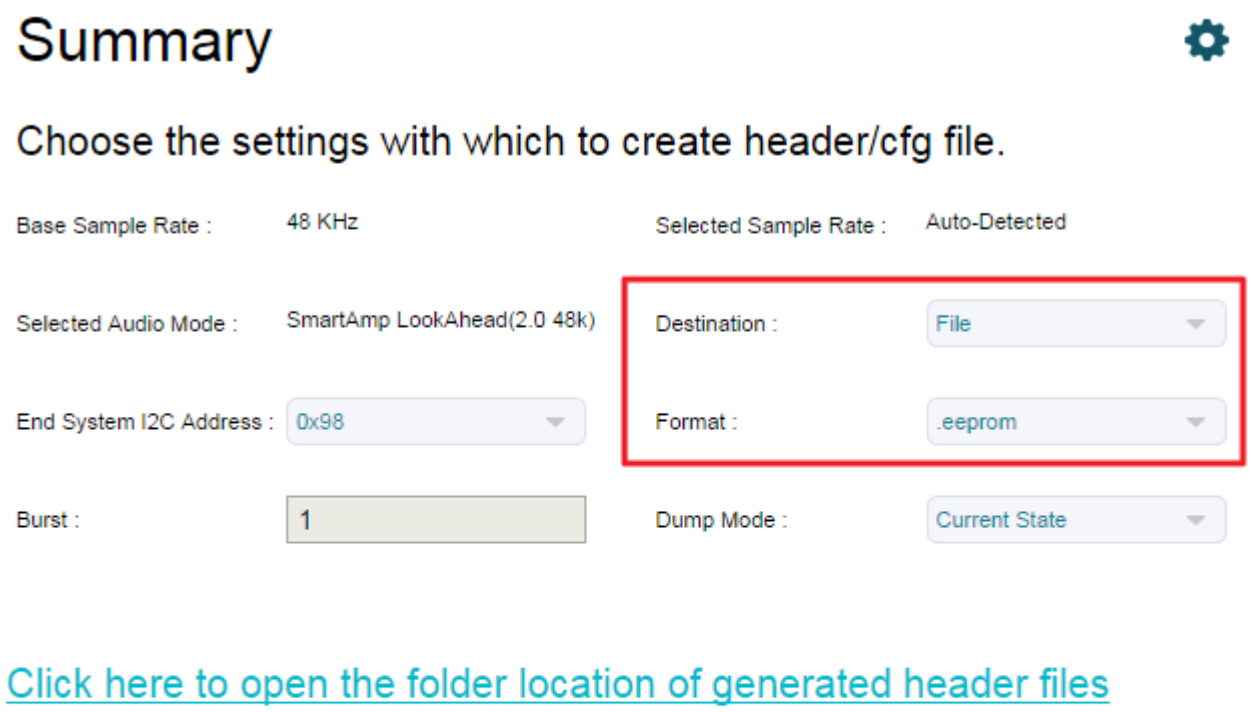
3. Go into *End System Integration*.



4. Select *Dump Current State into a Header File*.



5. Click the *Dump to File* button. Make sure the right Destination and Format are selected.



Two files like the following are generated. Basically, the .cfg file is the Book 0 register configurations and the .eeprom file is the EEPROM image file.

3.2 EEPROM Programming

EEPROM manufacturers usually provide programming tools. In addition, there exist quite a few universal programmers that are able to support a variety of EEPROM chips from different manufacturers. Use the programming tool provided to program the EEPROM chip connected to the TAS5825M using the EEPROM image that has been built in Section 3.1.

3.3 Loading Configurations from EEPROM

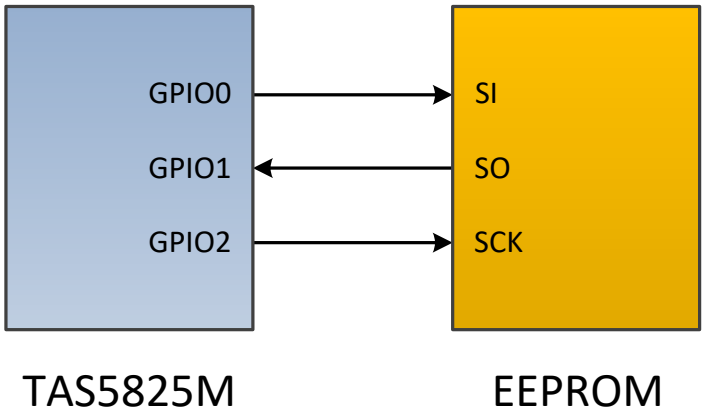
1. Make sure the chip select (CS) pin of EEPROM is high.
2. Host processor downloads Book 0 register configurations (the .cfg file generated in Section 3.1) to the TAS5825M device via I2C.
3. Put the TAS5825M into SLEEP or DEEP SLEEP mode.

```
w 98 00 00
w 98 7f 00
w 98 03 01    #Put TAS5825M into sleep
```

4. Configure GPIO pins as SPI.

```
w 98 61 0d    #Configure GPIO0 as SPI MOSI pin
w 98 63 0c    #Configure GPIO2 as SPI CLK pin
w 98 64 80    #GPIO1 is selected as SPI MISO pin
w 98 60 05    #Configure GPIO0 and GPIO2 as output pins
w 98 48 0c
```

NOTE: It is assumed that the connections between TAS5825M and EEPROM are as follows.



5. Set EEPROM starting address for read operations.

```
w 98 58 00    #Starting address = 0x000000 (24bit)
w 98 59 00
w 98 5a 00
```

6. Pull low the chip select (CS) pin of EEPROM.
7. Host processor checks whether the configurations are successfully loaded.

```
r 98 5b 01    #Check whether the load operation is done yet.
              #Make sure the LOAD_EEPROM_DONE bit of return value is set to 1.

r 98 71 01    #If the LOAD_EEPROM_ERROR bit is 0, that means configurations
              #in the EEPROM are successfully loaded.
```

IMPORTANT NOTICE FOR TI DESIGN INFORMATION AND RESOURCES

Texas Instruments Incorporated ('TI") technical, application or other design advice, services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using any particular TI Resource in any way, you (individually or, if you are acting on behalf of a company, your company) agree to use it solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources.

You understand and agree that you remain responsible for using your independent analysis, evaluation and judgment in designing your applications and that you have full and exclusive responsibility to assure the safety of your applications and compliance of your applications (and of all TI products used in or for your applications) with all applicable regulations, laws and other applicable requirements. You represent that, with respect to your applications, you have all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. You agree that prior to using or distributing any applications that include TI products, you will thoroughly test such applications and the functionality of such TI products as used in such applications. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

You are authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING TI RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY YOU AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

You agree to fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of your non-compliance with the terms and provisions of this Notice.

This Notice applies to TI Resources. Additional terms apply to the use and purchase of certain types of materials, TI products and services. These include; without limitation, TI's standard terms for semiconductor products http://www.ti.com/sc/docs/stdterms.htm), evaluation modules, and samples (http://www.ti.com/sc/docs/sampterms.htm).

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265