TAS5766MDCAEVM

This user's guide describes the operation of the TAS5766MDCAEVM. The TAS5766MDCAEVM is connected to the PurePath™ Console Motherboard (PPCMB). For questions and support go to the E2E forums (e2e.ti.com). The main contents of this document are:

- Hardware descriptions and implementation
- Start up procedure using PurePath Console (PPC) software with TAS5766M plug-in

Related documents:

- TAS5766M Data Sheet (SLASE25)
- *PurePath Console Motherboard User's Guide* (SLOU366)
- PurePath Graphic Development Suite (PurePath Console)

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1 Hardware Overview

The TAS5766MDCAEVM showcases the latest TI digital input class D closed loop amplifier. The TAS5766M is an I2S or TDM input class D amplifier with PurePath Smart Amp. The EVM is used in conjunction with the PurePath Console Motherboard (PPCMB). The PVDD supply is provided via the TAS5766MDCAEVM and is regulated to 5 VDC and 3.3 VDC on the PPCMB. The PPCMB provides the I2S, I2C and 3.3 VDC to the TAS5766MDCAEVM.

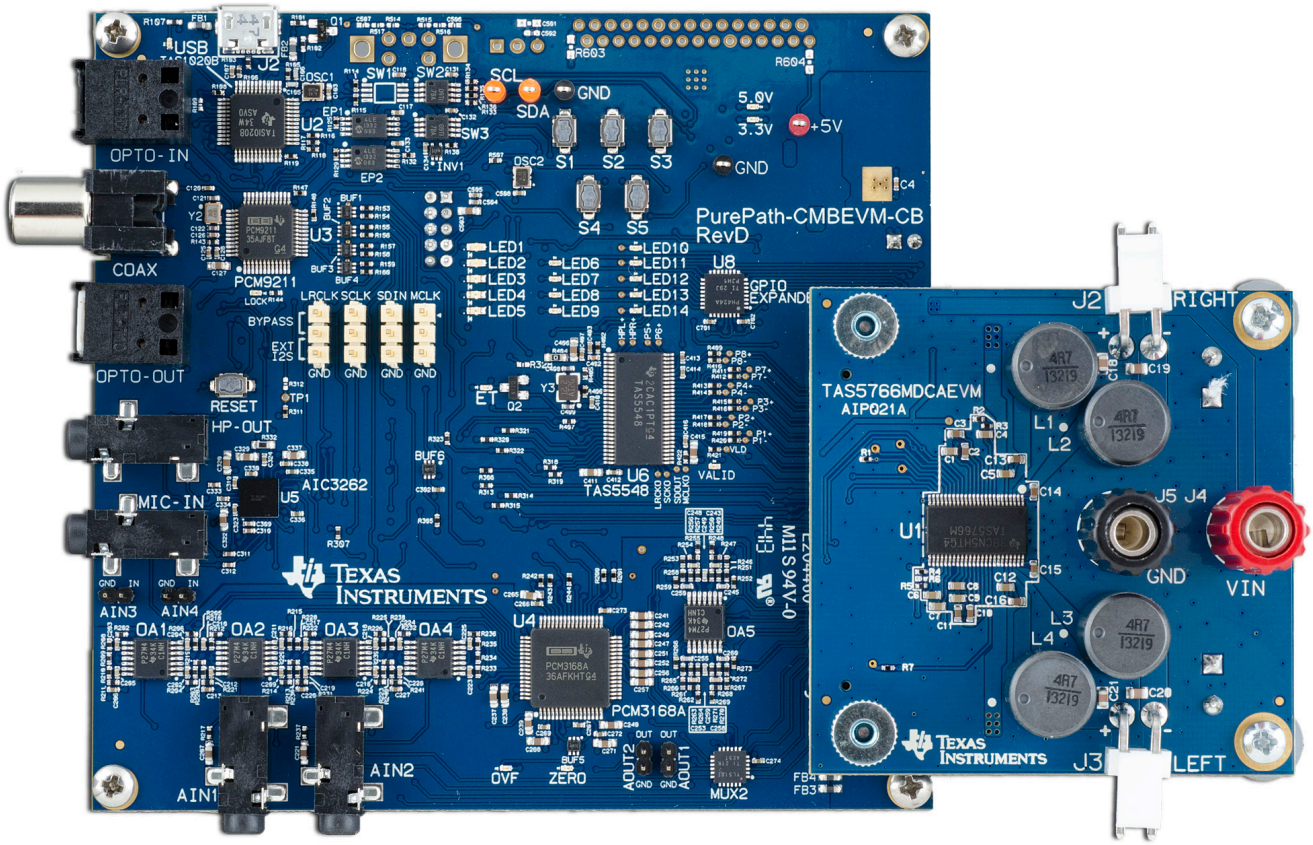

Figure 1. PPCMB and TAS5766MDCAEVM

1.1 TAS5766MDCAEVM Features

- GUI control via USB port
- Stereo channels with I2S or TDM

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Microsoft, Windows Media, Windows are registered trademarks of Microsoft Corporation.

1.2 TAS5766MDCAEVM Functions

The TAS5766MDCAEVM is controlled by the PPCMB. The PPCMB sends I2C commands from PPC to the TAS5766M. Upon PPC execution and connection, the TAS5766M is put in software mode.

The digital audio data input to the TAS5766MDCAEVM is sent from PPCMB and is selectable from USB audio, optical SPDIF, coaxial SPDIF, and analog ADC sources. When a digital audio data input is selected, the PPC automatically sends appropriate scripts to the device in use.

1.3 TAS5766MDCAEVM Detailed Operations

Upon power-on, the PPCMB uses USB audio input (default). The I2S signals, LRCLK, SCLK, SDIN, and MCLK, come from the TAS1020B. The Microsoft® Windows Media® player can stream audio. The TAS1020B enumerates as the following device on the Microsoft Windows® operating system: USB audio (USB-AudioEVM), human interface devices and USB composite device, see Figure 2.

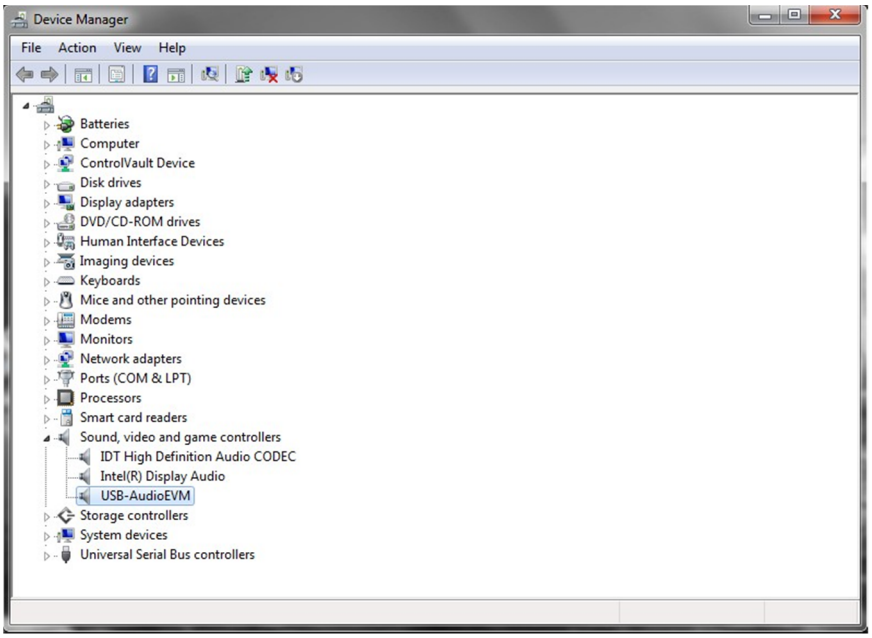

Figure 2. Device Manager

2 TAS5766MDCAEVM Setup

This section describes the TAS5766MDCAEVM setup and software installation. Since PPCMB connects to one of the device under test (DUT) EVMs, it is necessary to show the connection in this section. The TAS5766MDCAEVM is used for this purpose.

2.1 Hardware Setup

Figure 3 shows the EVM with the parts labeled.

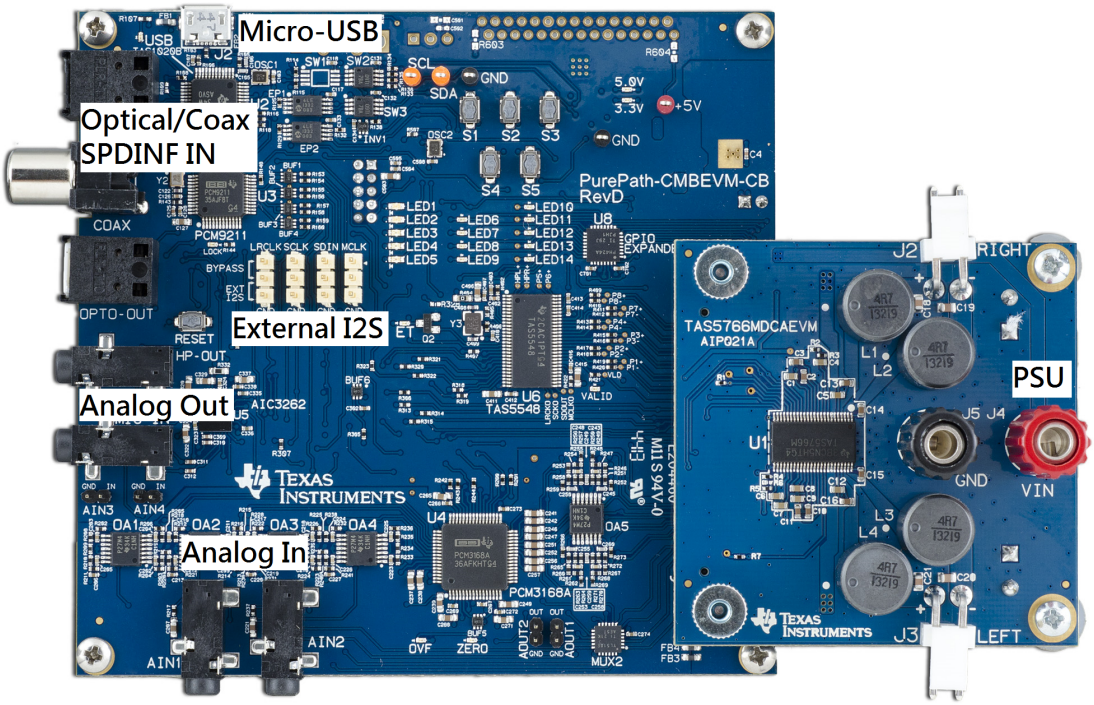

Figure 3. PPCMB and TAS5766MDCAEVM Connection

Hardware requirements:

- Desktop or laptop PC running Windows 7
- Power supply 4.5–26.4 VDC
- Speakers and cable
- A USB micro type B cable
- Audio source: This can be a DVD player with the appropriate SPDIF cable or Windows Media Player from Windows XP or Windows 7

Setup procedure:

- Plug in the USB cable from the PC to the PPCMB; the USB Lock LED (blue) is illuminated
- Connect the PPCMB to the TAS5766MDCAEVM
- Connect the PSU to TAS5766MDCAEVM and turn on the power. 5-V and 3.3-V LEDs are illuminated.
- If an optical SPDIF source is used, the blue SPDIF clock-locked LED is illuminated
- Disregard the orange LED indicating the energy threshold (ET) level is exceeded. Clearing the ET value turns the orange LED off.

2.2 Software Installation

Download the PurePath Console (PPC) GUI from the PurePath Console folder. The TI website has the latest release of the GUI.

Execute the GUI installation program, Setup_PurePathConsole_Main_v**xx**_rev**xx**.exe. Once the program is installed, the program group and shortcut icon is created in Start → Program → Texas Instruments Inc → PurePath Console → Choose Target. The *Target Selection* window is displayed; select *TAS5766M – Smart Amplifier*, as shown in Figure 4.

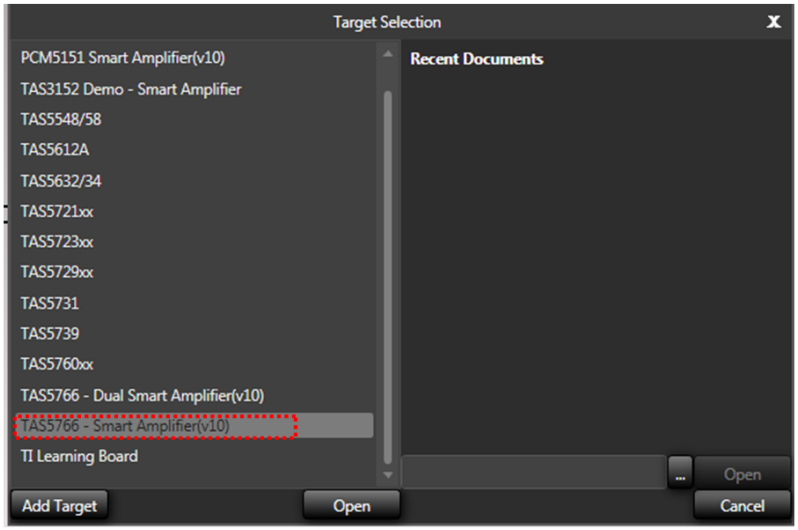

Figure 4. Target Selection List

If the device is not listed in the *Target Selection* list, click on *Add Target* and Windows Explorer displays. Navigate to the folder containing the target .ppc files (plugins) and choose the device plugin. Make sure that the plugin has the same version and revision number as the PPC you are using.

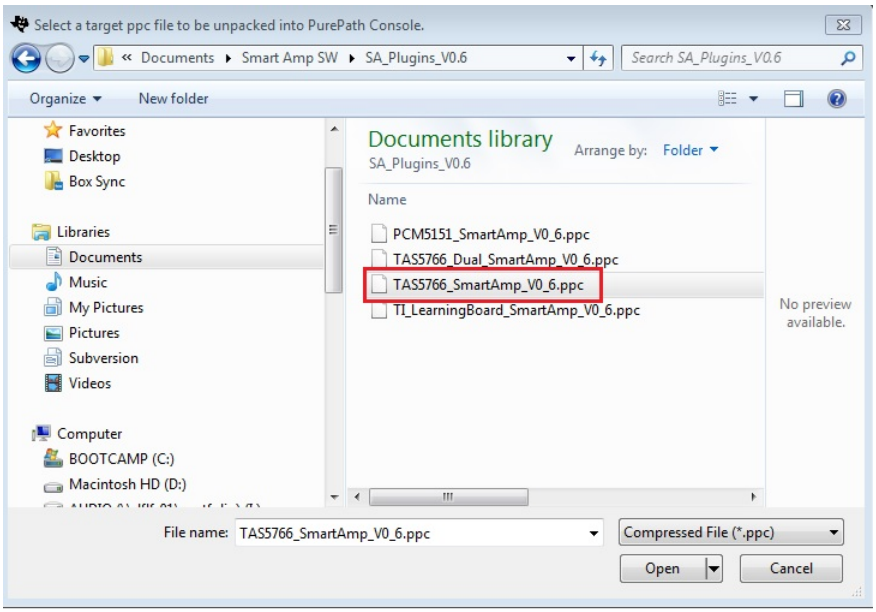

Figure 5. Add Target List

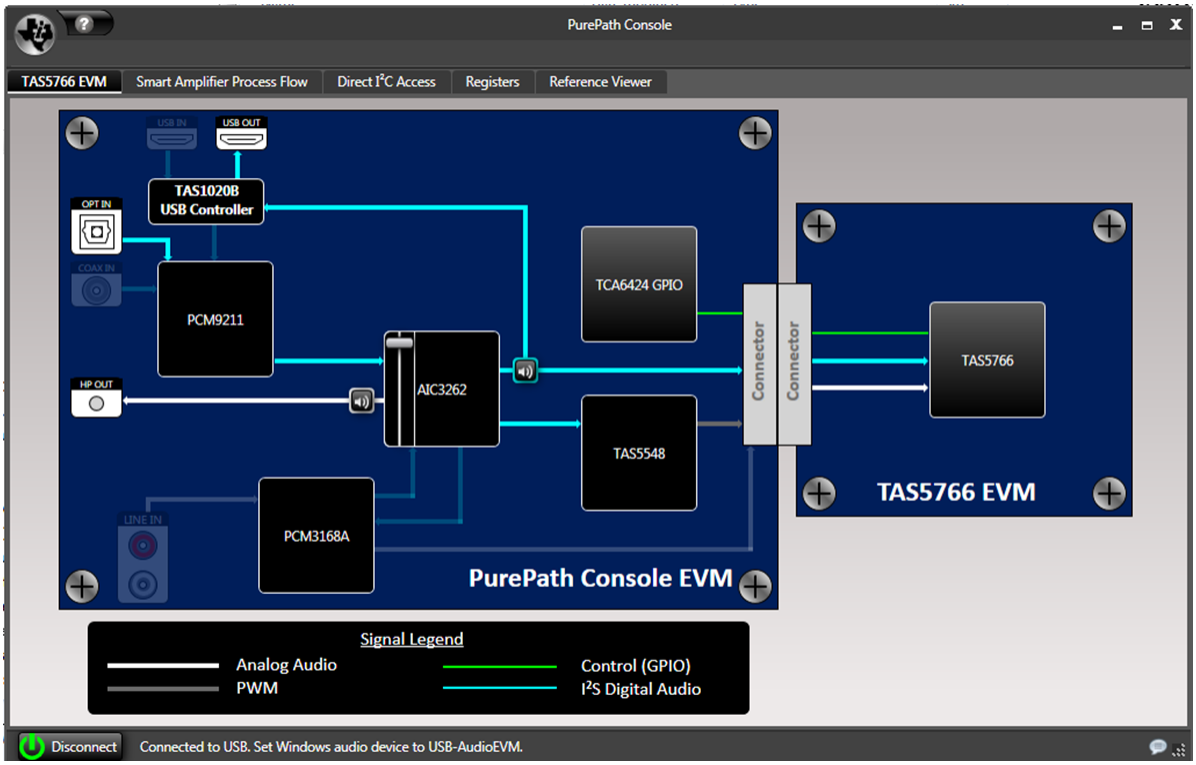

Figure 6. PPCMB and TAS5766MDCAEVM

The green LED on the bottom left corner of the PPC window indicates the initialization of TAS5766M is valid.

The PPCMB is initialized with the USB audio (USB-AudioEVM) selected. Streaming audio from the USB host is routed to the TAS5766M.

If an optical input is used, click on the OPT IN symbol on the PPC software, the I2S is then routed with this signal. Likewise, with a COAX/SPDIF input using the COAX IN symbol. If an analog input is used, click on the LINE IN symbol on the PPC software, the ADC (PCM3168A) is the source of I2S data.

- On the PPCMB, the USB blue LED is on, the green LEDs for 3.3 V and 5 V are on
- On the PPC, the green LED on the bottom left corner is on

3 Using the PurePath Console with the TAS5766MDCAEVM Board

The TAS5766MDCAEVM is initialized upon PurePath Console startup. Audio is streaming to the speakers if Windows Media (or similar program) is playing and mini-USB EVM is selected in the sound playback properties. The following indicators show both the PPC GUI and TAS5766MDCAEVM are operating correctly:

3.1 TAS5766M Main Tab

Figure 6 shows the DUT tab as displayed when the PPC GUI starts up. Here, you can click on the TAS5766M icon and it directs you to the device block diagram.

3.2 TAS5766M Block Diagram Tab

This tab, illustrated in Figure 7, shows the device major blocks. Some of the blocks are selectable. When a block is selected (double click), it shows pop-up settings for the particular setting.

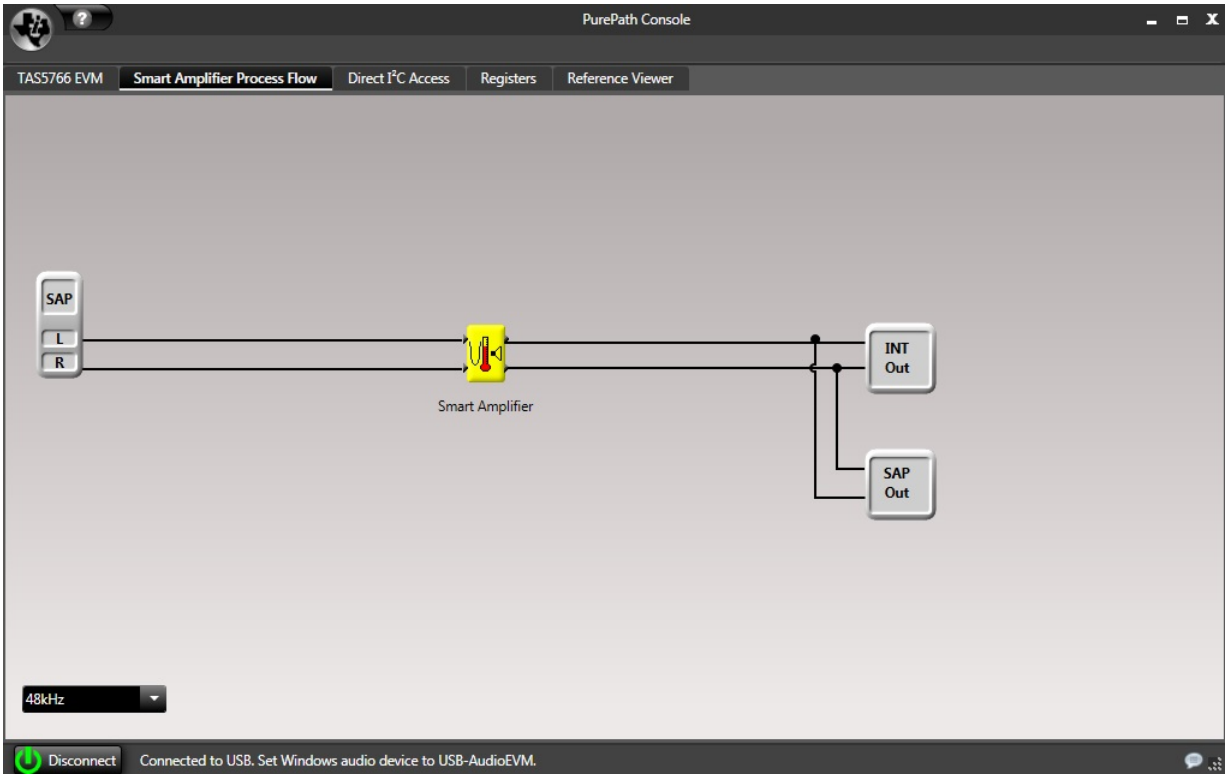

Figure 7. TAS5766M Block Diagram

3.3 Pop-Up Windows

For TAS5766M, there are several settings that are done via I2C. The GUI facilitates these settings seamlessly using the pop-up windows seen in Figure 8 and Figure 9.

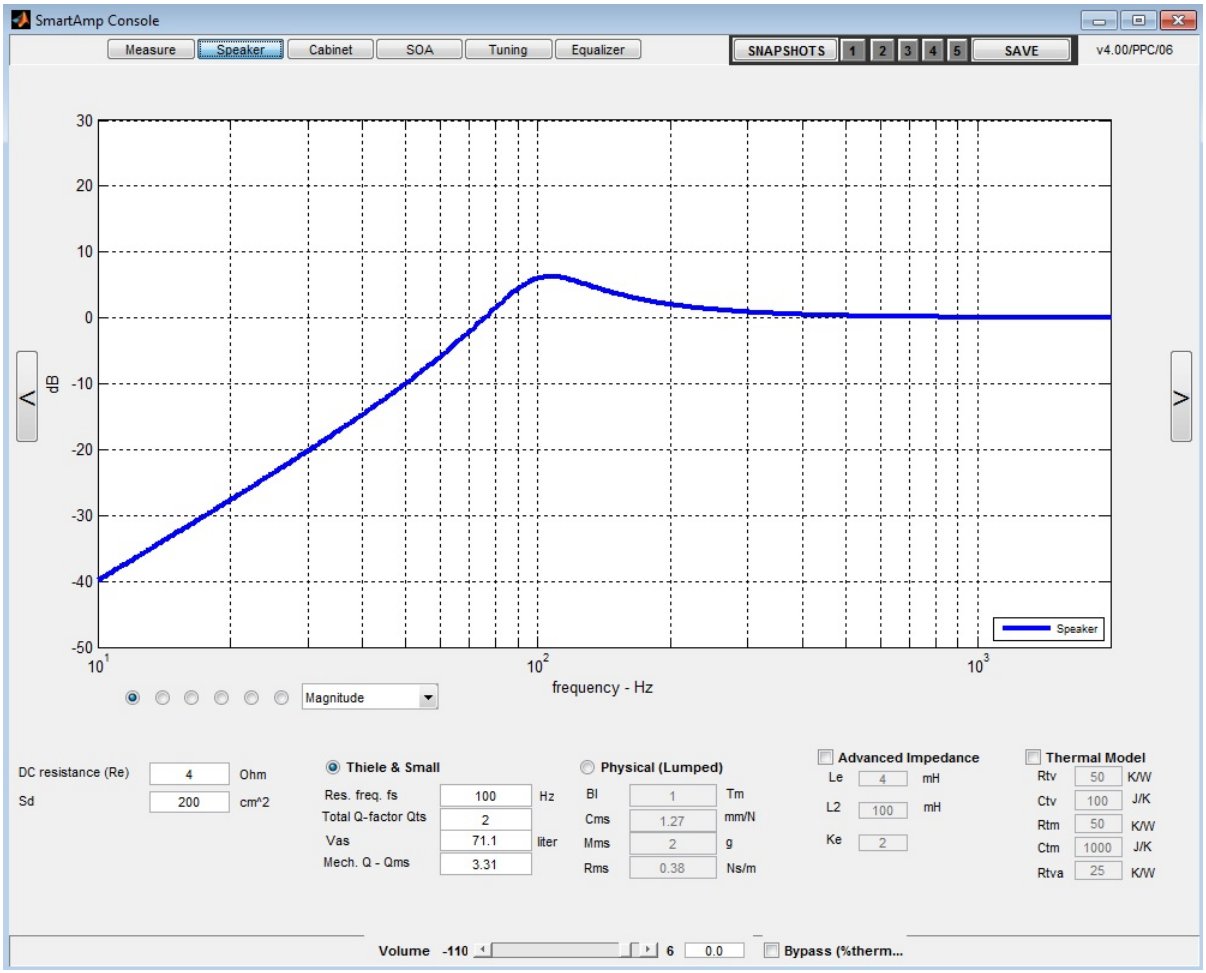

Figure 8. Smart Amplifier GUI Pop-Up

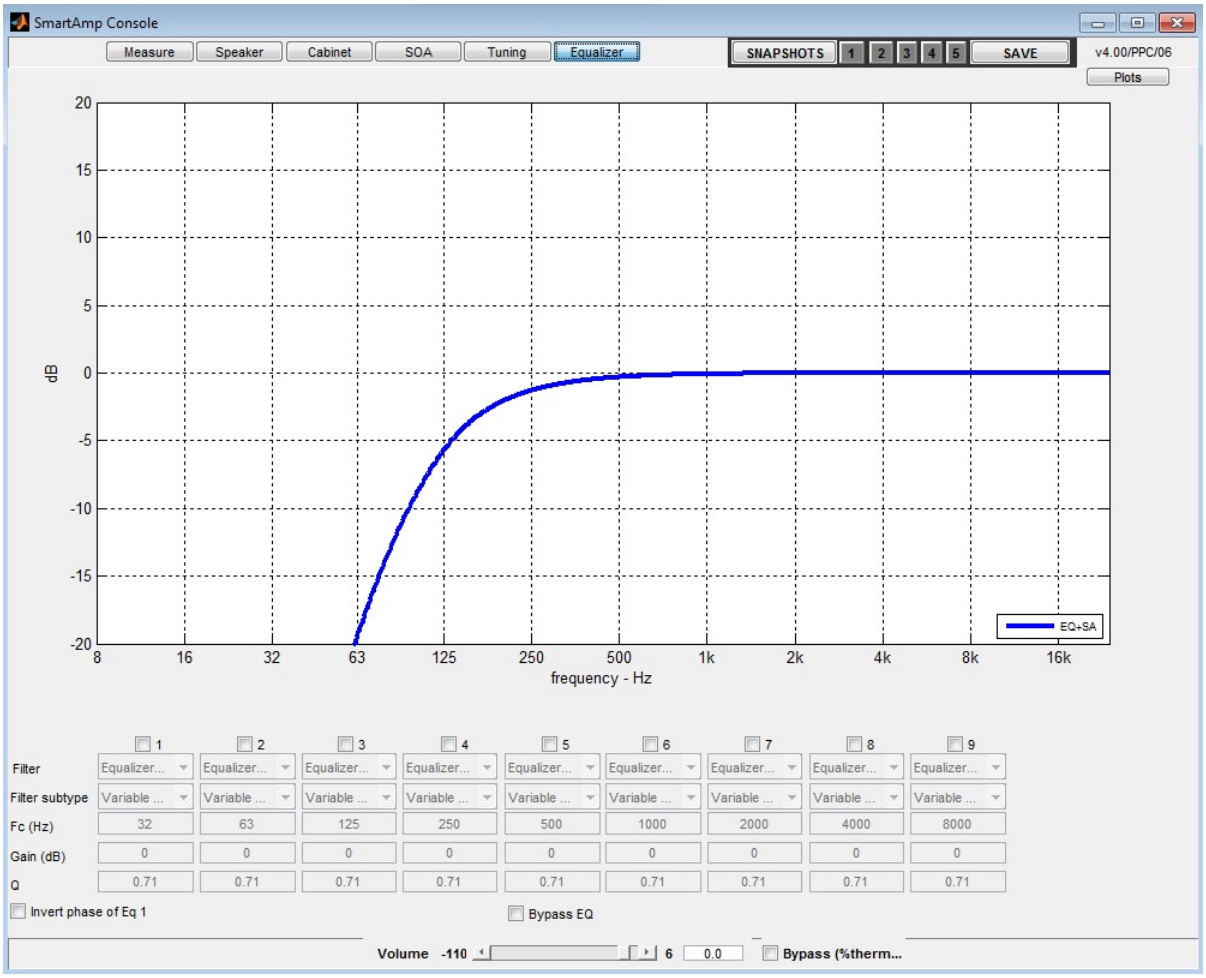

Figure 9. Biquad Block Pop-up

3.4 Direct I²C Access Tab

I²C registers read and write can be performed on this tab (see Figure 10). Type in the device I²C address and click *Set*. On the *Direct I²C Read/Write* box, enter a valid I²C register for read and type in both valid register and data for write.

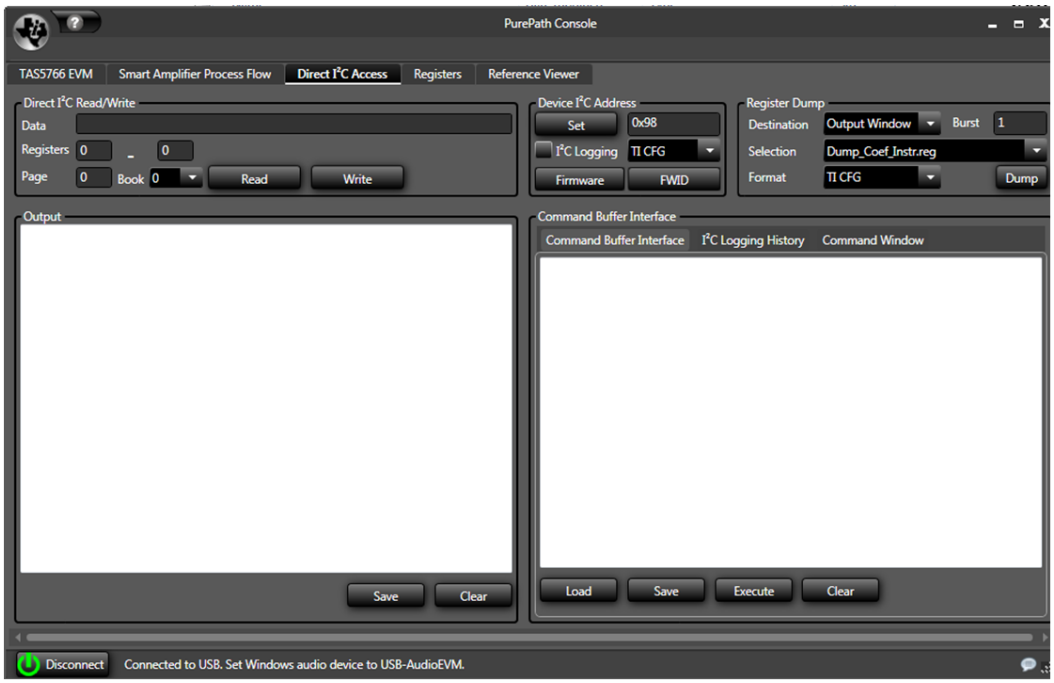

Figure 10. Direct I²C Access

3.5 Device Registers Tab

Figure 11 shows the current I²C registers values (hexadecimal and decimal) in the TAS5766M.

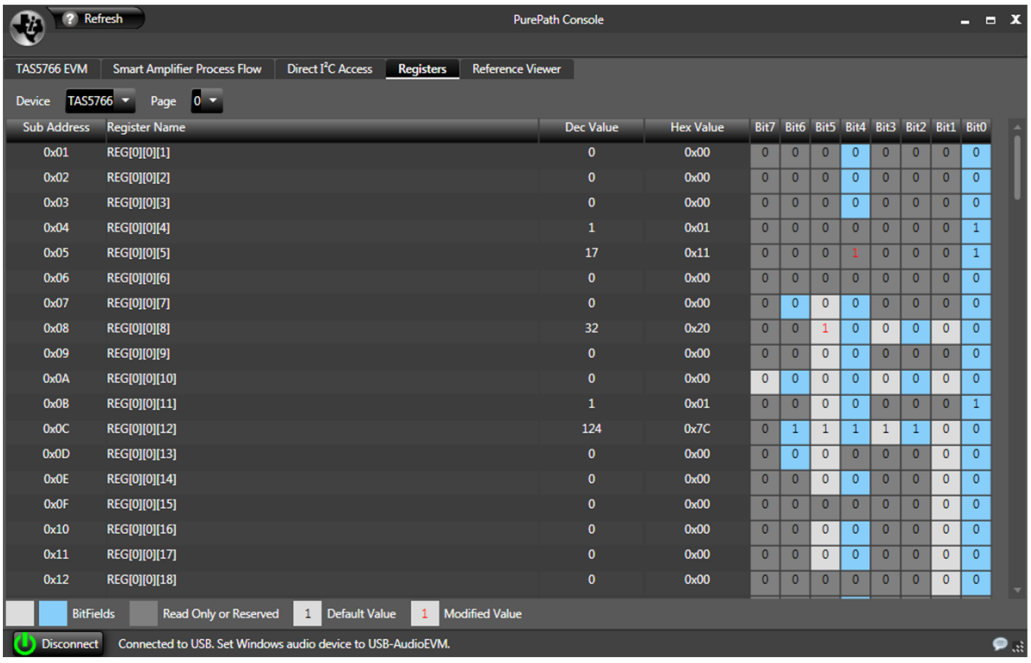

Figure 11. Device Registers Tab

4 Board Layouts, Bill of Materials, and Schematics

4.1 TAS5766MDCAEVM Board Layouts

Figure 12 and Figure 13 illustrate the board layouts for the EVM.

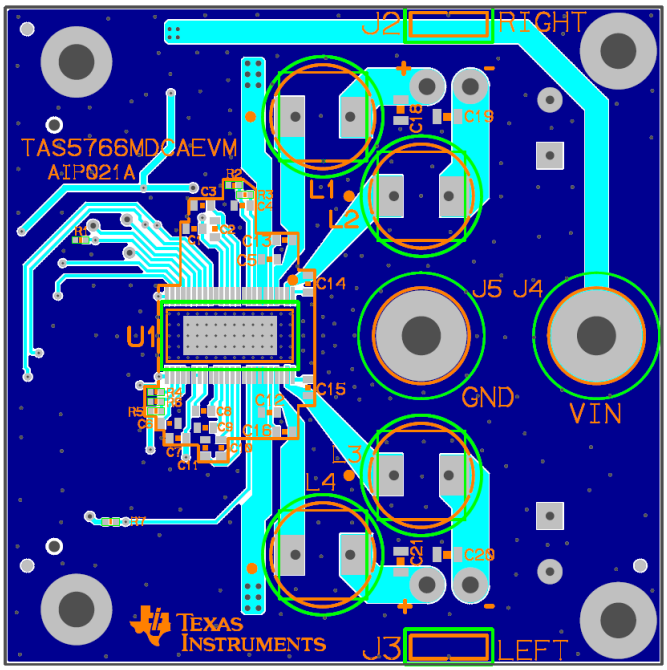

Figure 12. TAS5766MDCAEVM Top Composite Assembly

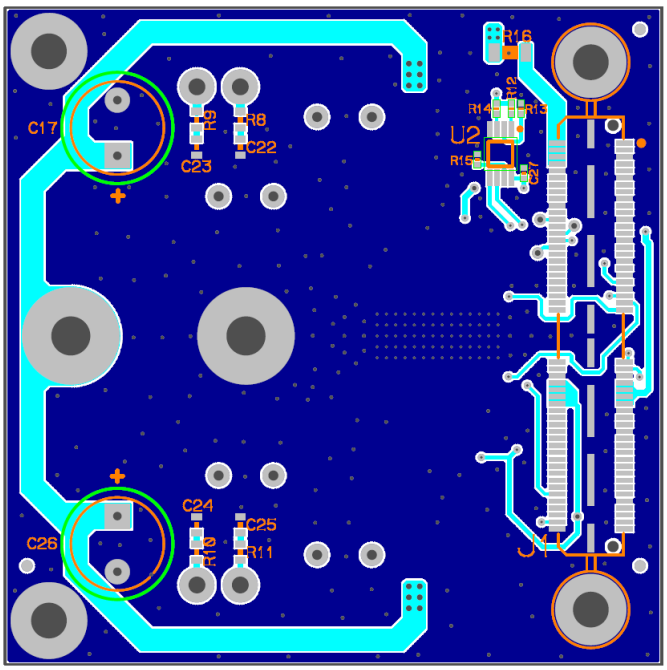

Figure 13. TAS5766MDCAEVM Bottom Composite Assembly

4.2 Bill of Materials

Table 1 displays the BOM for this EVM.

Table 1. TAS5766MDCAEVM Bill of Materials

Item	MFG Part Num	MFG	QTY	Ref Designators	Description
1	TAS5766DCA	TEXAS INSTRUMENTS	1	U1	NO DATA YET HTSSOP48-DCA ROHS
2	24LC256-I/MS	MICROCHIP	1	U2	SERIAL EEPROM I2C 256K 400kHz MSOP8-MS ROHS
3	UMK107AB7105KA-T	TAIYO YUDEN	6	C1, C4, C6, C7, C8, C9	CAP SMD0603 CERM 1.0UFD 50V 10% X7R ROHS
4	GCM188R71H224KA64D	MURATA	4	C2, C3, C10, C11	CAP SMD0603 CERM 0.22UFD 50V 10% X7R ROHS
5	UMK107AB7105KA-T	TAIYO YUDEN	2	C5, C12	CAP SMD0603 CERM 1.0UFD 50V 10% X7R ROHS
6	GCM188R71H224KA64D	MURATA	4	C13, C14, C15, C16	CAP SMD0603 CERM 0.22UFD 50V 10% X7R ROHS
7	EEU-FC1H221	PANASONIC	2	C17, C26	CAP THRU ALUM-ELECT FC SERIES 220ufd 50V 20% 10x5x20mm ROHS
8	C2012X7R1H684K	TDK	4	C18, C19, C20, C21	CAP SMD0805 CERM 0.68ufd 50V 10% X7R ROHS
9	GRM188R71H103KA01D	MURATA	4	C22, C23, C24, C25	CAP SMD0603 CERM 0.01UFD 50V 10% X7R ROHS
10	C1005X5R1A105K	TDK CORP	1	C30	CAP SMD0402 CERM 1.0UFD 10V 10% X5R ROHS
11	CRCW040210K0FKED	VISHAY	7	R1, R4, R7, R20, R21, R22, R23	RESISTOR SMD0402 10.0K OHMS 1% 1/16W ROHS
12	ERJ-2RKF1003X	PANASONIC	2	R2, R5	RESISTOR SMD0402 THICK FILM 100K OHMS 1/16W 1% ROHS
12a	ERJ-2RKF1003X	PANASONIC	0	R6 (DNP)	RESISTOR SMD0402 THICK FILM 100K OHMS 1/16W 1% ROHS
13	CRCW040220K0FKED	VISHAY	1	R3	RESISTOR SMT 0402 1% 1/16W 20.0K ROHS
14	ERJ-3GEYJ3R3V	PANASONIC	4	R8, R9, R10, R11	RESISTOR SMD0603 3.3 OHMS 5% 1/10W ROHS
15	ERJ-8GEY0R00V	PANASONIC	1	R12	RESISTOR SMD1206 0.0 OHM 5% 1/4W ROHS
16	A7503AY-4R7M	TOKO	4	L1, L2, L3, L4	INDUCTOR SERIES 11RHBP/A7503AY 4.7uH/5.1A ROHS
17	QTS-050-01-F-D-A	SAMTEC	1	J1	CONNECTOR SMT/THU 100 POS+GND MATE HEIGHT 5mm ROHS
18	B2PS-VH(LF)(SN)	JST	2	LEFT, RIGHT	JACK JST-VH RA 2-PIN 3.96mmLS ROHS
19	7006	KEYSTONE ELECTRONICS	1	VIN	BINDING POST, RED, 15A ECONO ROHS
20	7007	KEYSTONE ELECTRONICS	1	GND	BINDING POST, BLACK, 15A ECONO ROHS
21	95947A060	MCMASTER-CARR	2	STANDOFFS	STANDOFF M3x30mm 6mm DIA HEX ALUM F-F ROHS
22	92000A118	MCMASTER-CARR	2	STANDOFF SCREWS	SCREW M3x8 PHILIPS PANHEAD STAINLESS STEEL ROHS
23	92148A150	MCMASTER-CARR	2	STANDOFF WASHERS	WASHER SPLIT-LOCK M3 6.2mm OD 0.7mm THICK STAINLESS STEEL ROHS

4.3 TAS5766MDCAEVM Schematic

The schematics for TAS5766MDCAEVM are illustrated in Figure 14 and Figure 15.

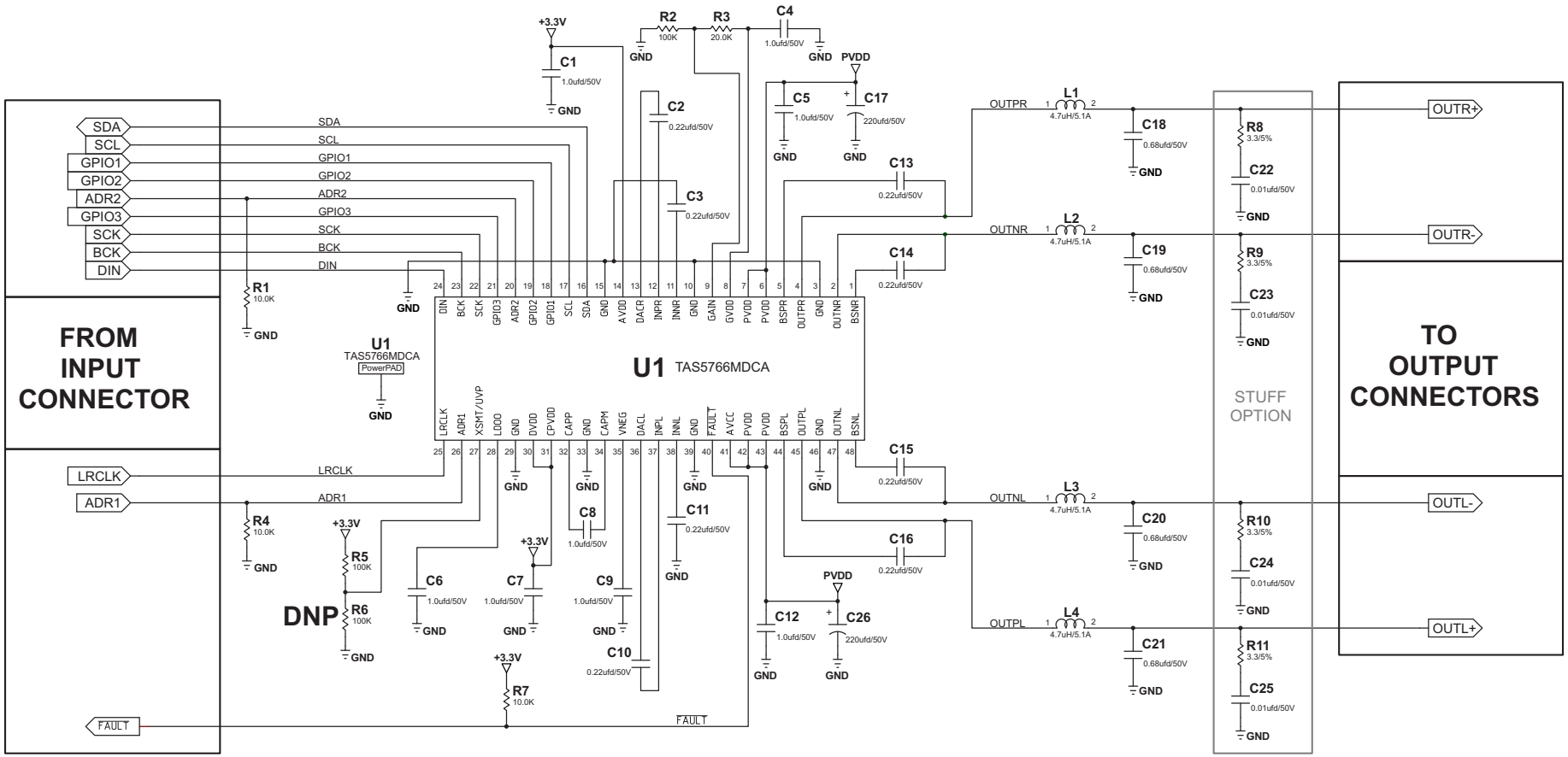

Figure 14. TAS5766MDCAEVM Schematic (Page 1 of 2)

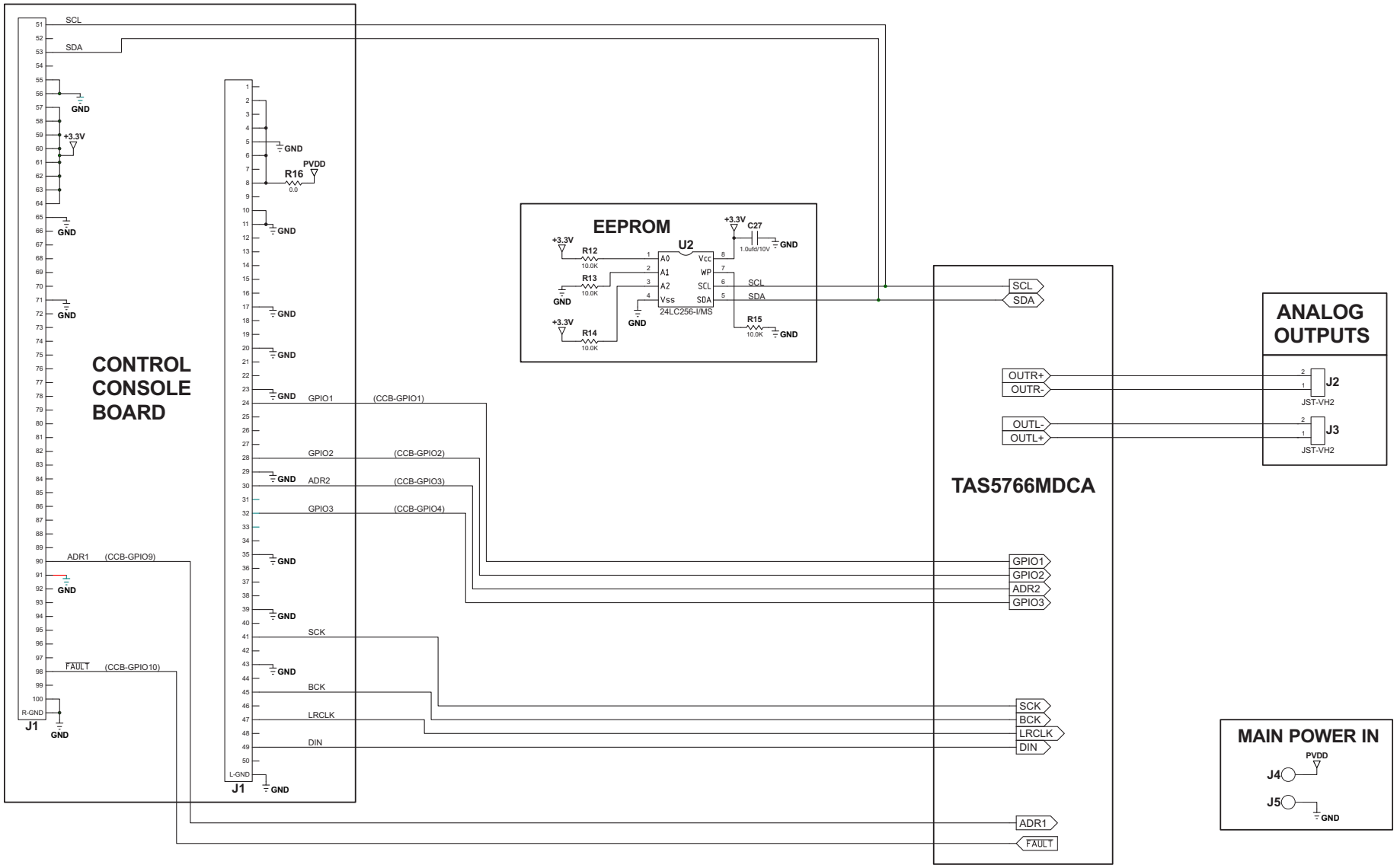

Figure 15. TAS5766MDCAEVM Schematic (Page 2 of 2)

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3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

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