

TAS5705EVM2 : STEREO DIGITAL INPUT AMPLIFIER WITH EQ and DRC

This manual describes the operation of the TAS5705EVM2 to evaluate the performance of the TAS5705. This main contents of this document are:

- Details on how to properly connect a TAS5705 Evaluation Module (TAS5705EVM2) and the details of the EVM.
- Details on how to install and use the GUI to program the TAS5705.
- Details on how to use the audio processing features like EQ and DRC.
- Quick-Start Guide for the common modes in which TAS5705EVM2 can be used

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I²C is a trademark of Philips Corporation.

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1 Overview

The TAS5705 evaluation module (TAS5705EVM2) demonstrates the TAS5705 device from Texas Instruments.

The TAS5705 combines a high-performance PWM processor with a class-D audio power amplifier. This EVM can be configured with two bridge-tied loads (BTL) (2.0). When operated with an external subwoofer power stage such as the TAS5601EVM4. TAS5705 supports two bridge-tied channels plus a bridge-tied subwoofer using an external TAS5601amplifier. For detailed information about the TAS5705 device, review the device data sheet, document number [SLOS606](#). Pulse Width Modulator (PWM) is based on TI's Equibit™ technology. Review the board schematic and TAS5601EVM4 documents.

The EVM software with its graphic user interface facilitates evaluation by providing access to the TAS5705 registers through a USB port. Refer to the [Using the EVM Software](#) section for further details.

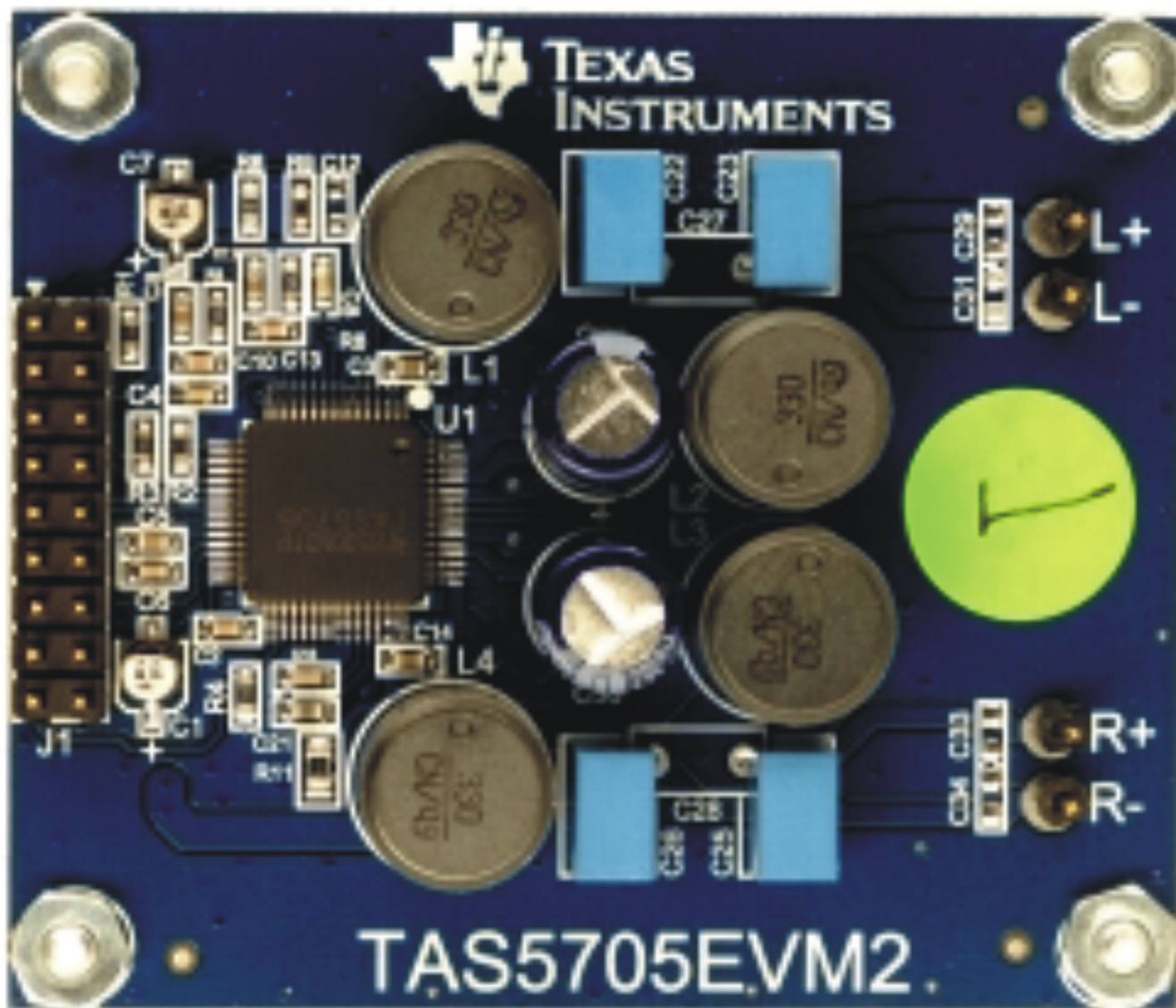


Figure 1. TAS5705EVM2 Printed-Circuit Board

The TAS5705EVM2, together with other TI components on this board, is a complete 2.1-channel digital audio amplifier system. The MC57XXPSIA Controller board includes a USB interface, a digital input (SPDIF), analog inputs via the ADC (PCM1808), power inputs and other features like a mute function and power down.

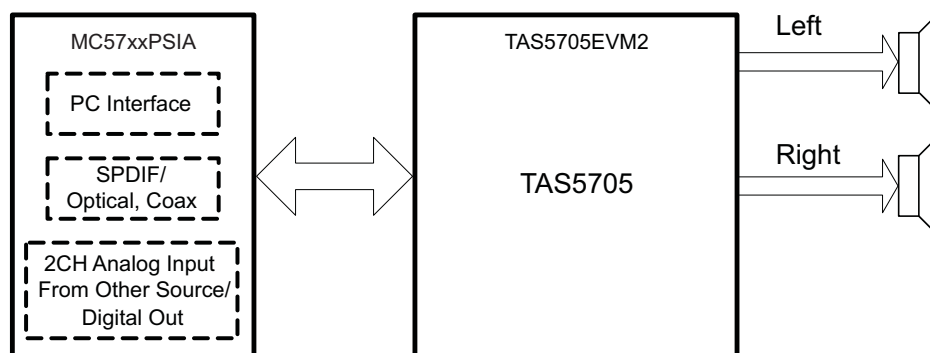


Figure 2. Complete System and EVM Signal Path Overview

1.1 TAS5705EVM2 and MC57xxPSIA Features

- Channel evaluation module design.
- Self-contained protection systems and control pins
- USB interface
- Standard I²S data input using optical or coaxial inputs
- Analog input through analog to digital converter
- Subwoofer connection—the PWM terminal provides the PWM signal and power to an external subwoofer board
- Double-sided plated-through PCB, 1-oz copper
- Access to control signal gain and data format through EVM-software graphic user interface (GUI)

2 Installation

This section describes the EVM and software installation.

2.1 EVM Installation

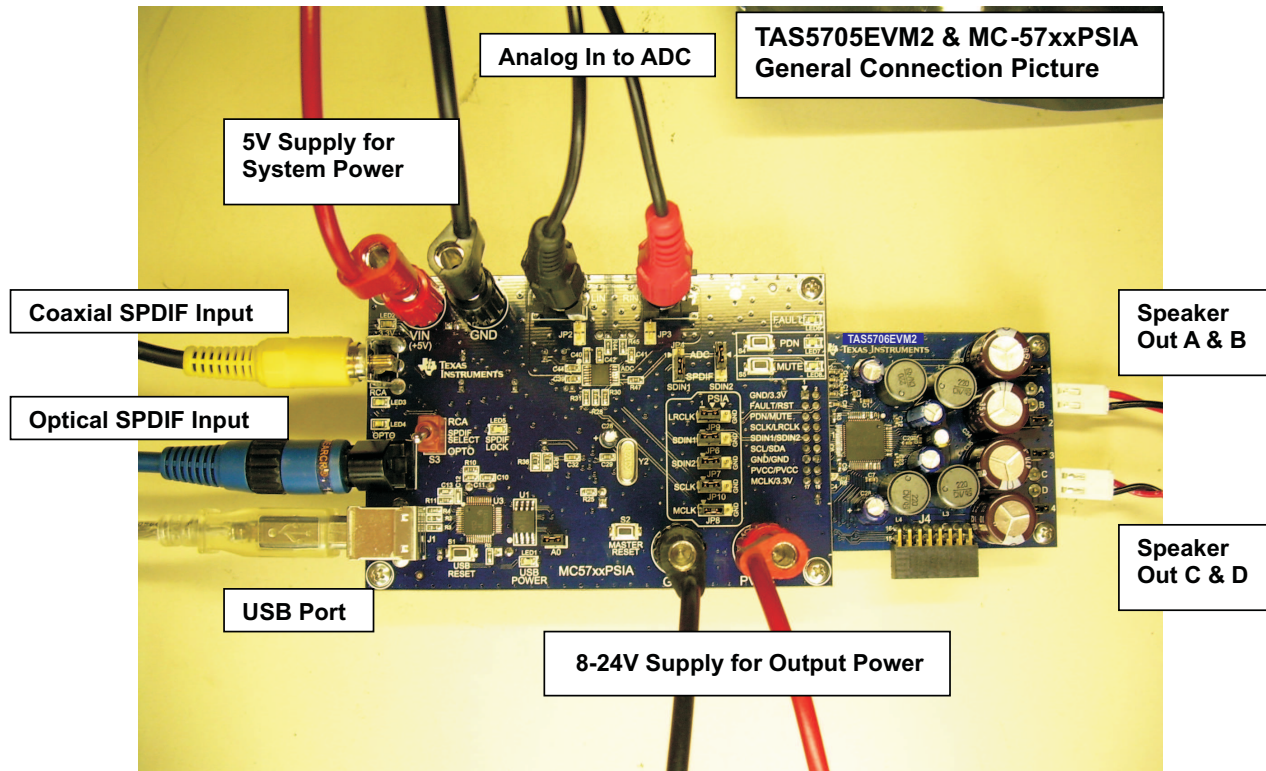


Figure 3. General Connection Picture

The following are the basic tools for the initial EVM power up.

- 5-V, 1-A power supply (VIN)
- 8–24-V, 4-A power supply (PVCC)
- Banana-style test leads for power supplies and speakers
- Optical or coaxial cable for SPDIF interface based on signal source
- USB cable
- EVM software
- Two 8-Ω speakers or loads

The following sections describe the TAS5705EVM2 board in regards to power supply (PSU) and system interfaces.

2.1.1 Connecting the TAS5705EVM2 to MC57xxPSIA

On the right side of the MC57xxPSIA is a terminal block and another on the left of the TAS5705EVM2 (labeled J1). Carefully place the MC57xxPSIA block above the TAS5705EVM2 block and gently push down.

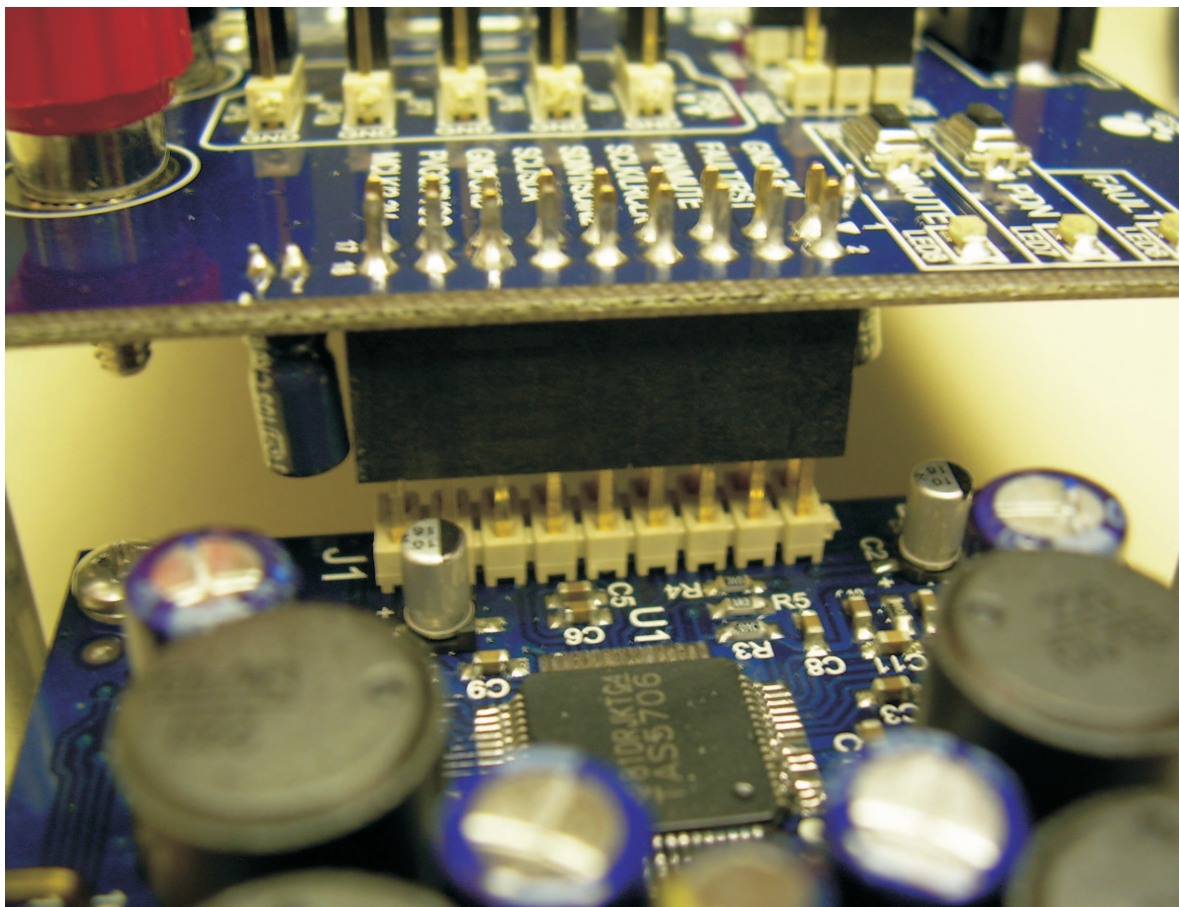


Figure 4. Connecting TAS5705EVM2 to MC57xxPSIA

2.1.2 PSU Interface

The TAS5705EVM2 is powered by two power supplies connected to the MC57xx controller board: a 5-V power supply (VIN) and a 8-V to 24-V (PVDD) power supply. The 3.3-V level is generated on the board by a voltage regulator from the 5-V supply.

Note: The power-supply cable length must be minimized. Increasing the length of the PSU cable increases the distortion of the amplifier at high output levels and low frequencies

The maximum output-stage supply voltage depends on the speaker load resistance. Check the recommended maximum supply voltage in the TAS5705 data sheet.

Table 1. Recommended Power Supplies

Description	Voltage Limitations (8-Ω Load)	Current Recommendations
System power supply	5 V	1 A
Output power stage supply	8–24 V	4 A ⁽¹⁾

⁽¹⁾ The rated current corresponds to two channels, full scale.

2.1.3 Loudspeaker Connectors

CAUTION

All speaker outputs are biased at $V_{CC}/2$ and may not be connected to ground (e.g., through an oscilloscope ground).

Loudspeaker connections vary by device setup. Consult the quick-start guide ([Section 4](#)) for more details. However, the following is a general guideline:

When connecting a speaker in BTL mode, connect the speaker's two terminals (L+ and L-) and (R+ and R-) across two outputs on the TAS5705EVM2.

2.1.4 USB Interface

The TAS5705 registers are accessed through I²C™ bus lines SDA and SCL. The USB circuit and USB connector on the MC57xxPSIA board facilitates the connection between a host computer and the device. The EVM USB circuit is powered by the 5-V USB line of the host PC and is independent of the power supplies available on the board. The USB device that is used is a TAS1020B from Texas Instruments.

2.1.5 Digital Audio Interface SPDIF (RCA/OPTO)

The Digital Audio Interface accepts digital audio data using the I²S protocol. See the TAS5705 data sheet ([SLOS549](#)) for more information.

The RCA connector and the OPTO connector are the two SPDIF interfaces on the MC57xxPSIA board. The switch S3 toggles between the OPTO and RCA connector to accommodate the signal source. When the RCA cable or optical cable is connected and the signal source is powered up, verify that the SPDIF lock indicator (blue LED5) illuminates, confirming that a viable signal is available to the device. Install a jumper on JP4 across the middle pin and the pin marked SPDIF to connect the digital source to SDIN1. Install jumper on JP5 to connect the digital source to SDIN2.

For detailed information on how the data and clocks are provided to the TAS5705, see the schematic appearing at the end of this document and the DIR9001 device data sheet ([SLES198](#)).

2.1.6 ADC Interface

In the absence of a digital signal source, the PCM1808 ADC can be used to convert an analog audio signal to a digital signal to the TAS5705. The DIR9001 still provides clock signals to the ADC in this process. The DIR9001 oscillator frequency (Y2) determines the sampling frequency in the absence of a digital signal. If the OSC frequency is 24 MHz, the sampling frequency is set at 96 kHz; if the OSC is set at 12 MHz, the sampling frequency defaults to 48 kHz when no signal is on the SPDIF input terminals. A 12-MHz crystal is installed on the MC57xxPSIA board. The ADC is an additional feature of this board to provide flexibility in sourcing an audio signal to the TAS5705. Review the PCM1808 data sheet ([SLES177](#)) for a detailed description of the ADC on this EVM. Install the jumper on JP4 across the middle pin and the pin marked ADC to select ADC as the source for SDIN1. Do the same for JP5 to select the ADC as the source for SDIN2.

2.1.7 Board Power-Up General Guidelines

Connect the MC-57xx and the TAS5705EVM2 boards by locating pin 1 on each board, indicated by a small white triangle. The MC-57xx plugs down onto the TAS5705EVM2 board (i.e., the TAS5705EVM2 board fits underneath the MC57xxPSIA board). Pin 1 on each board must be connected to each other.

Install the EVM software on the PC before powering up the board. After connecting the loudspeakers or other loads, power supplies, and the data line, power up the 5-V power supply first; then power up the PVDD power supply. It is recommended initially to set the PVDD level to 10 V, then ramp it up to 20 V to verify cable connections.

2.2 Software Installation

Download the TAS570X GDE from the TI Web site, which always has the latest release of the GUI. Check versions for any updates to the GUI on the [TI Web site](#).

Execute the GUI install program, Setup_TAS570X_version_number.exe

Once the program is installed, the program group and shortcut icon is created in Start → Program → Texas Instruments Inc → TAS570X GDE.

THE GUI come ups as shown in [Figure 5](#).

Select the appropriate tab; in this case, select the TAS5705/TAS5706 tab.

It has two subwindows. One shows the Process Flow window. From the Process Flow window, each of the signal processing function tools can be selected by clicking on it. The Biquad GUI and the DRC GUI can be opened by using the right button of the mouse. This window also shows input select, Mode select, Channel, and Master Volume. All functions are shown in the order that they are in the device.

The other subwindow, Properties window, has the properties where a user can update by selecting from the available options. The properties that are available depends on the device selected. From the main window, the user must set three properties before connecting to the EVM.

Select the device, Enable/Disable auto bank switch function and set the sample rate. The TAS5705 automatically detects sample rates. The setting here is simply to synchronize the GUI and the device.

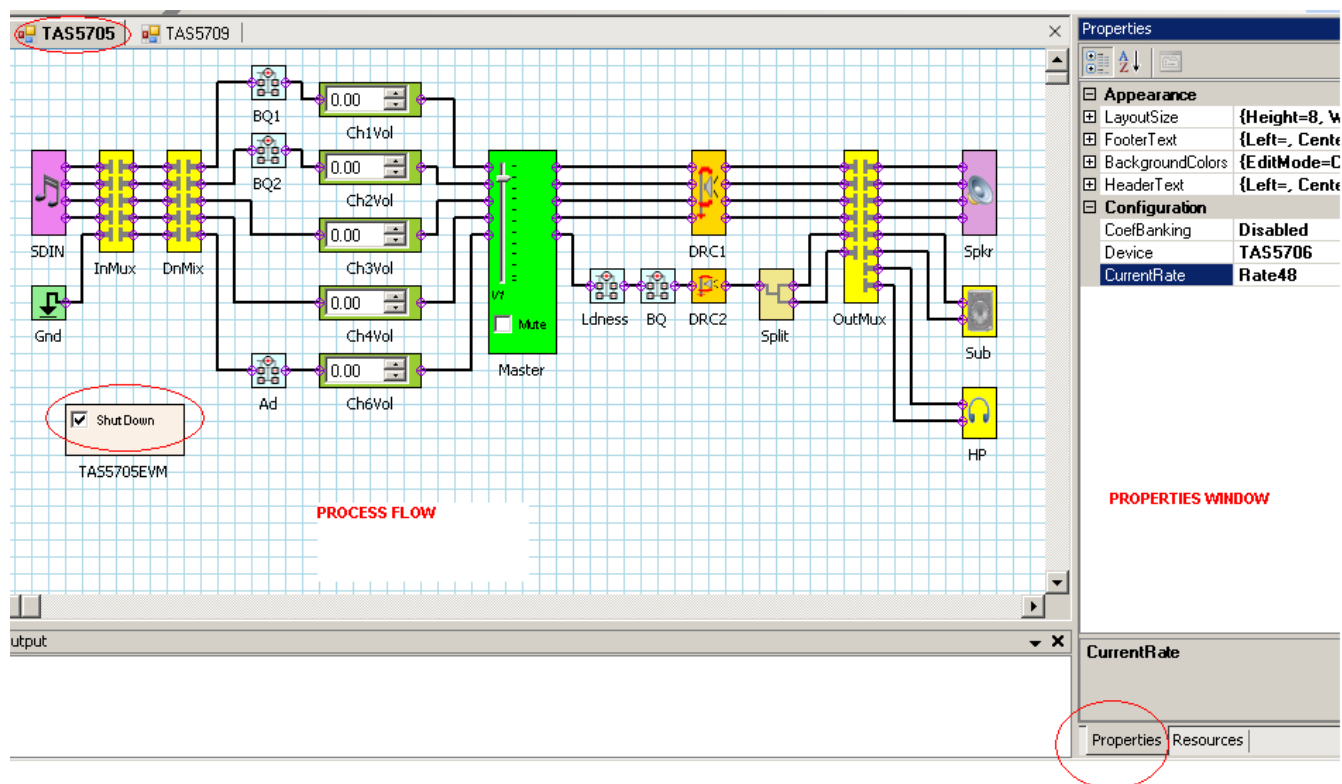


Figure 5. Graphical User Interface Initial Window

3 Using the EVM Software

3.1 Connect the GUI to the EVM

Once the properties window selections have been made, go to the menu Target → Connect.

This sends the initialization commands to the device. Master volume is in mute. Select the master volume function. Type the required volume in the properties window. For TAS5705, type –12 dB. For TAS5705, type 0 dB. The difference is due the power stage gain in both devices. At this time, audio, if connected properly, plays through the device. Check All channel shutdown button. It must be un-checked. When the Connect command is issued, if an error appears that indicates a USB problem. Check the connections and press USB RESET button on the controller board. Then disconnect and re-connect from the Target menu.

3.2 I2C Memory Tool

This tool can be opened from GDE (Tools → I2C Memory Tool) or independent of GDE from Start → Program → Texas Instruments Inc → Memory Tool

Select I2C as show in [Figure 6](#).

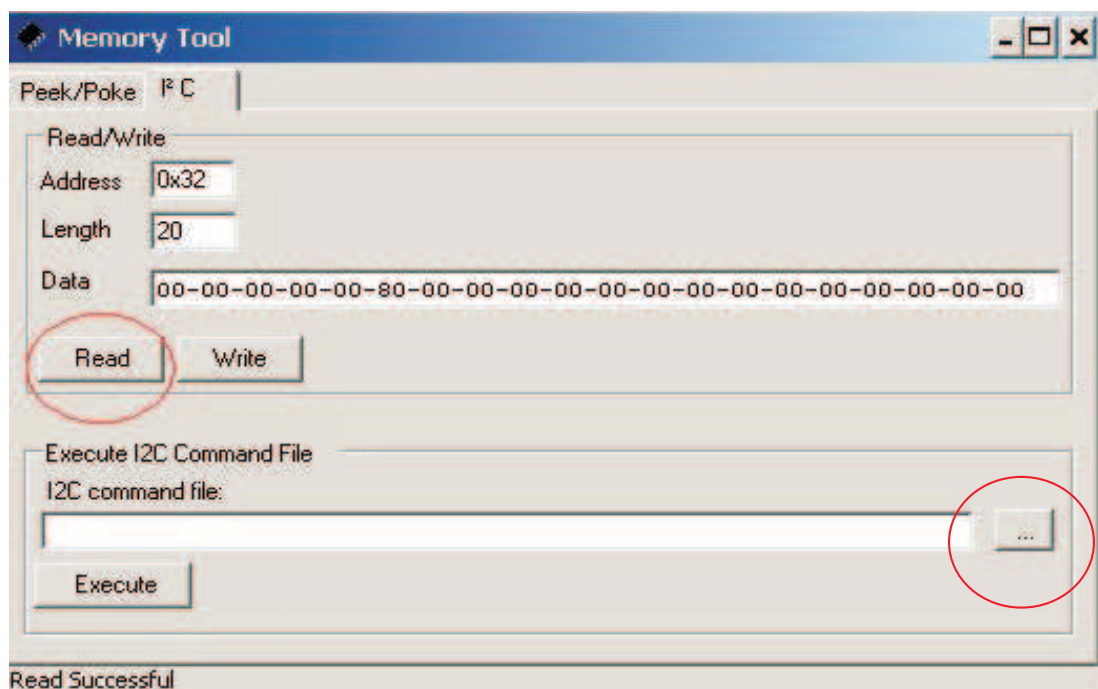


Figure 6. Memory Tool Window

I2C registers can be written or read using this tool. I2C command file can be sent by selecting the command file and *Execute* command.

3.3 Volume Function

Individual and Master volume can be selected, and the required volume value can be entered by typing on the property Window after selecting the function with the mouse (see [Figure 7](#)).

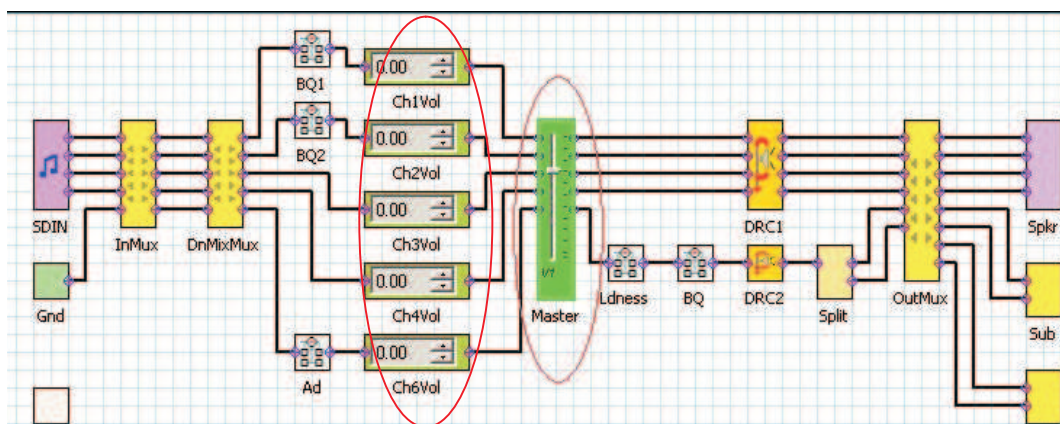


Figure 7. Volume Control

3.4 Biquad GUI

Using the right button of mouse, select Biquad GUI ([Figure 8](#)).

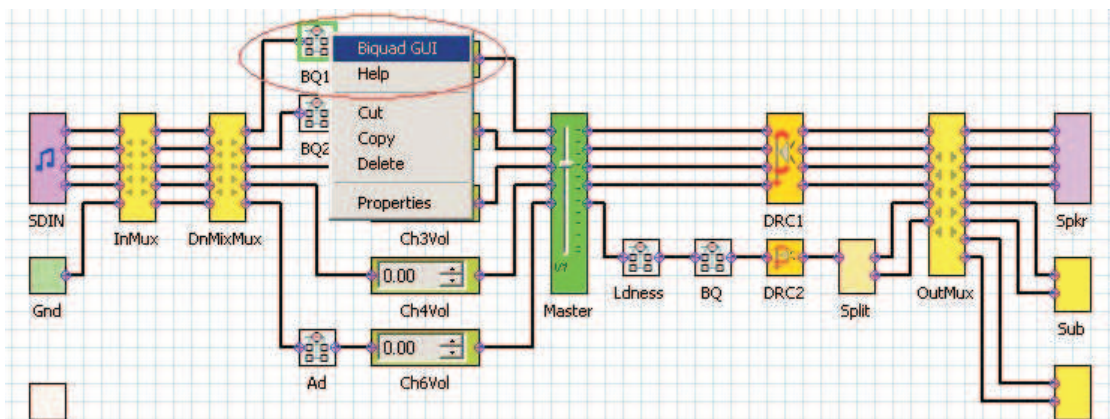


Figure 8. Selecting Biquad GUI

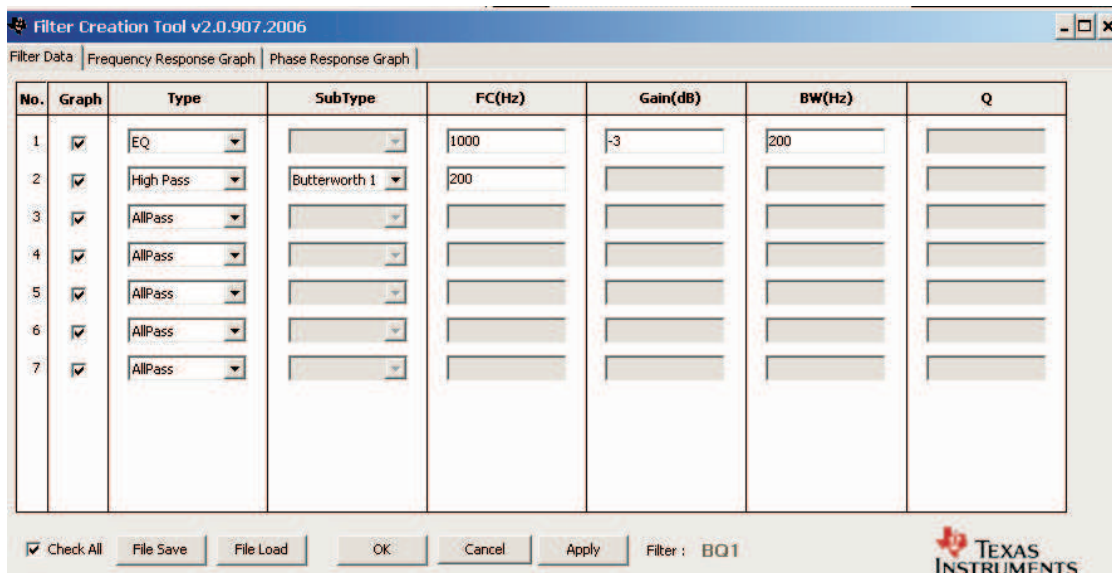


Figure 9. Filter Creation Tool Window

Check mark selects the Biquad. If not selected, the Biquad is in ALL PASS Mode.

Frequency response for the current settings can be viewed and adjusted in **Frequency Response Window** Tab (Figure 9). Individual Biquad Gains must be within ± 12 db.

Apply from the filter data window sends all the three banks of coefficients (providing auto bank is enabled).

3.5 DRC GUI

Clicking on the function selects DRC GUI (Figure 10). Click on the DRC function, and check to see if DRC is enabled in the property window.

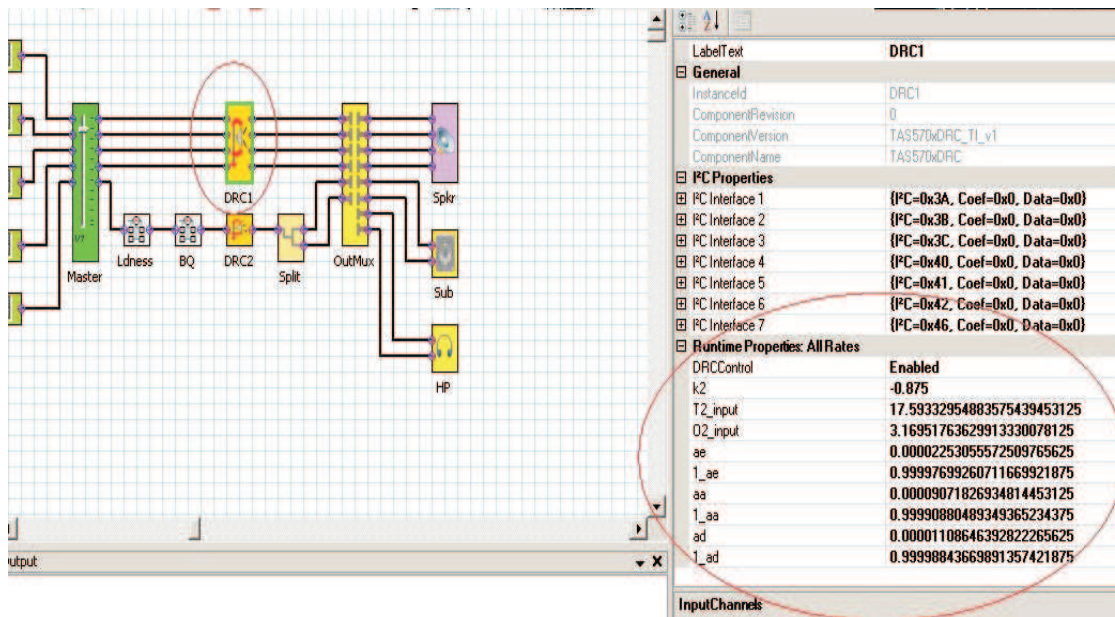


Figure 10. DRC Parameters

Next, using the right button of the mouse, select **Activate DRC GUI** (Figure 11).

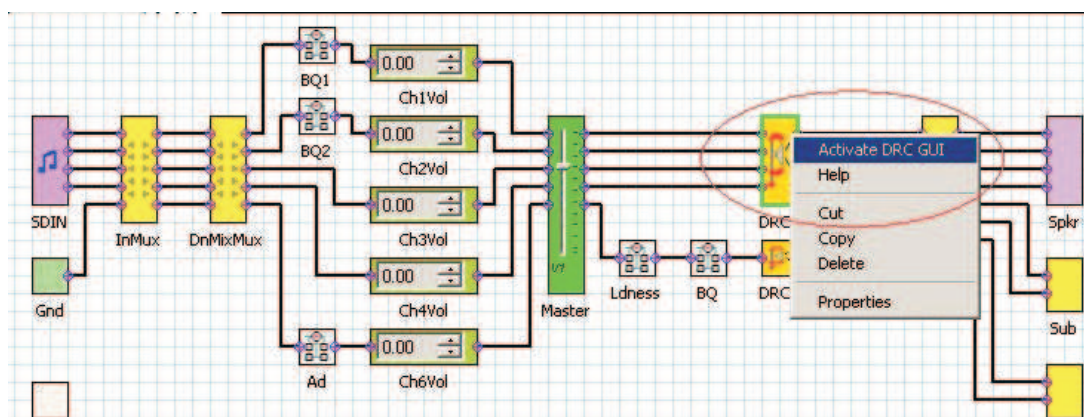


Figure 11. Activating the DRC GUI

Set the **compression ratio** to a value between 1 and 50.

The **offset** has a range of ± 6 dB. A value of 0 is illegal. If no offset is required, set the offset to 0. Offset is generally not required in a DRC application because it just provides a gain.

Threshold is selected with a value of 0 to -72 dB.

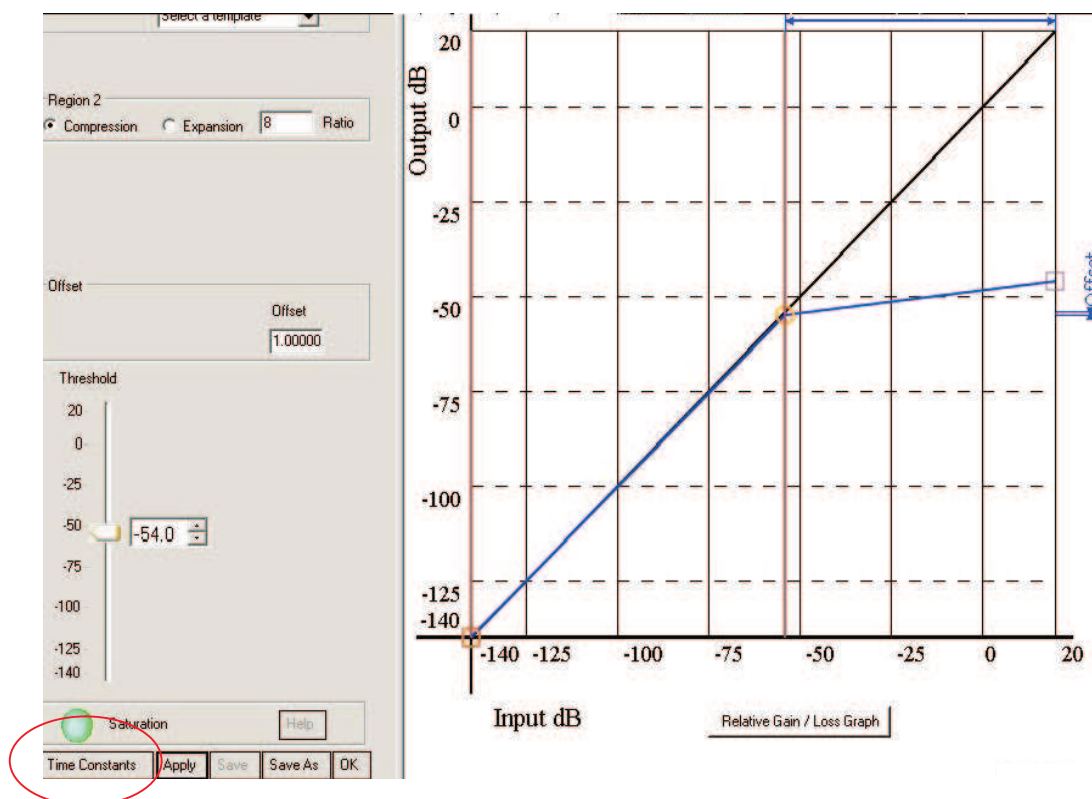


Figure 12. Time Constants Button

Time constants: Select the time constants to adjust the energy, attack, and decay filters (Figure 12).

3.6 Disable Biquads

The Biquads on channel1 and channel2 can be disabled from the GUI (Figure 13). Ensure that this is properly enabled before using Biquad GUI. Otherwise, changes on the GUI do not appear on the device output because the biquads (channel1 and channel2) are bypassed.

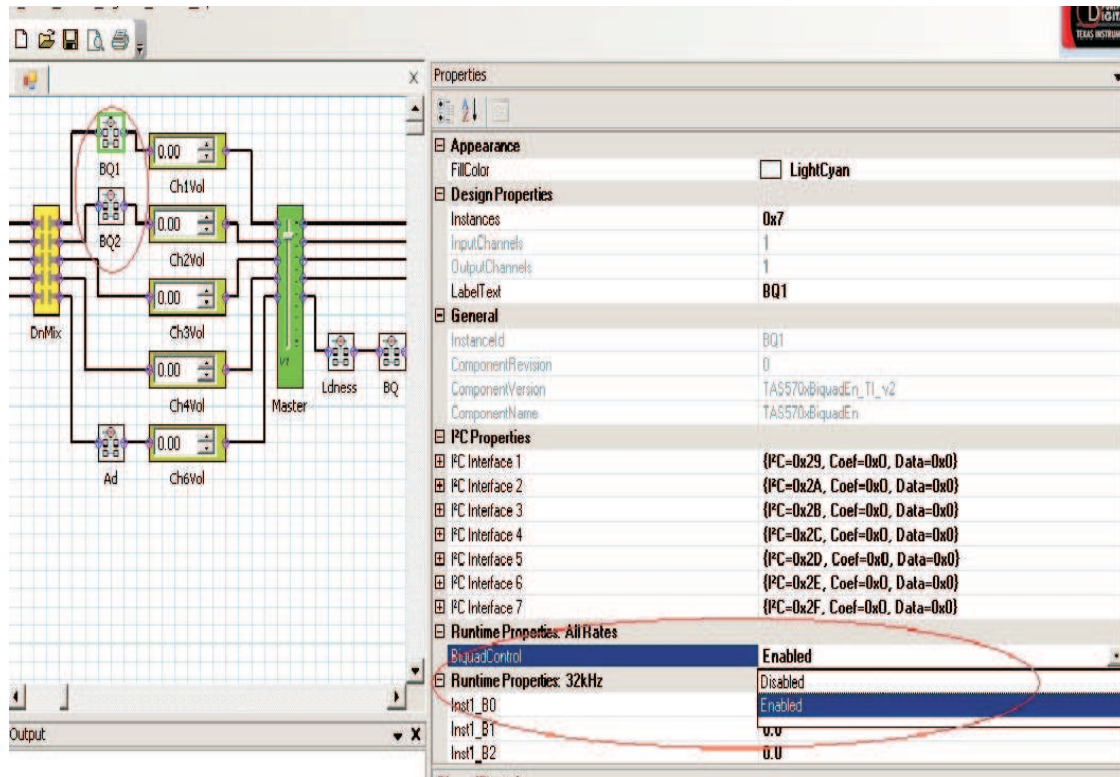


Figure 13. Disabling the Biquads

4 TAS5705EVM2 Quick-Start Setup Guide

This section discusses the five most common configurations of the TAS5705EVM2, and how to enable the headphone mode. For faster setup, you can load the I²C initialization script of each configuration from the CD. Directions for loading initialization scripts follow this section.

Common Configurations:

1. 2 × BTL BD Mode
2. 2 × BTL AD Mode

Corresponding I²C script

TAS5705_BD_2xBTL.ini
TAS5705_AD_2XBTL.ini

See [Section 7](#) for details on how to set up each of these modes.

Note:

AD : AD Modulation

BD : BD Modulation

BTL : Bridge-Tied Load

5 Jumpers and Control Utilities on MC57xxPSIA board

5.1 RCA/OPTICAL Jumpers

Select the jumper to reflect the source whether it is RCA or OPTICAL.

5.2 Switches

Reset is an active-low function. Pressing the master reset switch (S2) resets the TAS5705 resets device, USB RESET (S1) reset the USB bus, PDNZ(S4) power down TAS5705 and MUTE(S5) mutes (volume mute) TAS5705.

5.3 LED Indicators

LED1 : USB Power connector installed at J1

LED2 : 3.3V Power is valid

LED3: RCA connection made

LED4: Optical connection made

LED5: SPDIF signal locked

LED6: FAULT (Not used with TAS5705EVM2)

LED7: PDN switch (S4) is depressed

LED8: MUTE switch (S5) is depressed

6 Board Layouts, Bill of Materials, and Schematic

6.1 TAS5705EVM2 and MC57xxPSIA Board Layouts

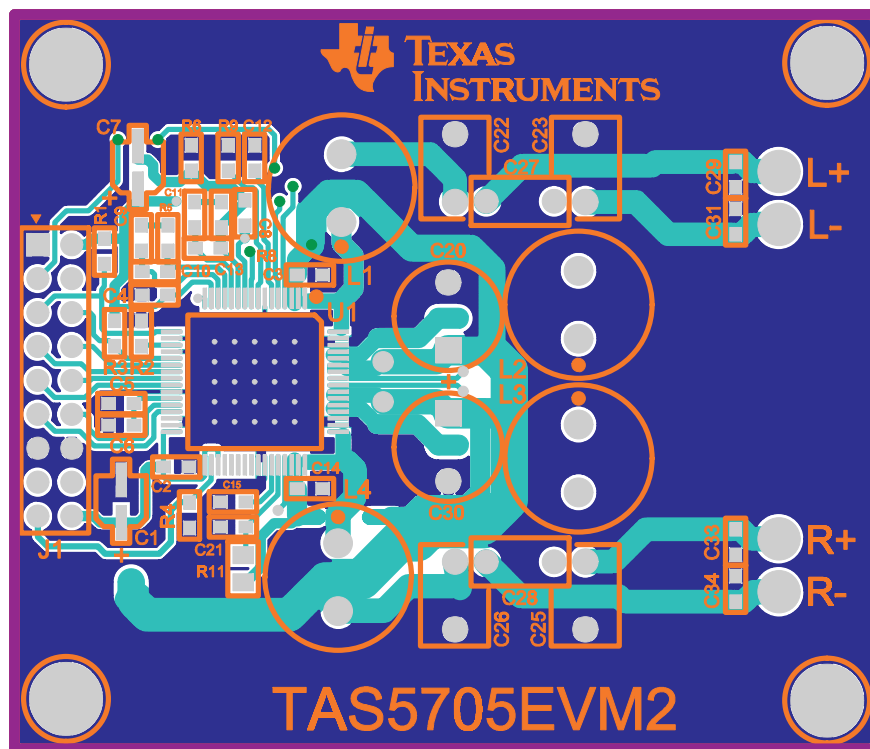


Figure 14. TAS5705EVM2 Top Assembly

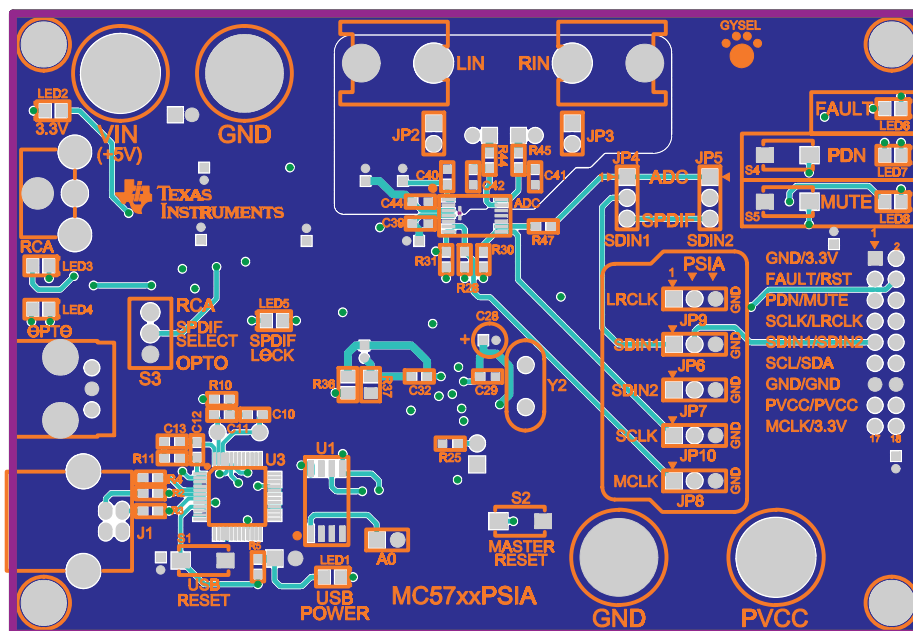


Figure 15. MC57xxPSIA Top Assembly

6.2 Bill of Materials

Table 2. Bill of Materials for TAS5705EVM2

TI SEMICONDUCTORS								
Item	Description	Ref Des	Qty	MFG	MFG:Part No.	Vendor	Vendor: Part No.	Alt. Part No.
1	Modulator/HBRIDGE TQFP64-PAP	U1	1	Texas Instruments	TAS5705PAP	Texas Instruments	TAS5705PAP	No Alt. Part Num
CAPACITORS								
2	CAP 4700PFD 50V CERM 0603 X7R	C10, C13	2	Panasonic	ECJ-1VB1H472K	Digi-Key	PCC1780TR	PCC1780CT
3	CAP 0.01UFD 25V CERM 0603 X7R	C35-C38	4	Panasonic	ECJ-1VB1E103K	Digi-Key	PCC1763TR	PCC1763CT
4	CAP 0.33UFD 50V CERM 0603 X7R	C16-C19	4	Panasonic	ECJ-1VB1H333K	Digi-Key	PCC2284TR	PCC2284CT
5	CAP 0.047UFD 16V CERM 0603 X7R	C9, C11	2	Panasonic	ECJ-1VB1C473K	Digi-Key	PCC1758TR	PCC1758CT
6	CAP 0.1UFD 16V CERM 0603 X7R	C2, C4, C6, C8, C15	5	Panasonic	ECJ-1VB1C104K	Digi-Key	PCC1762TR	PCC1762CT
7	CAP 0.1UFD 50V CERM 0603 X7R	C3, C14, C24, C32	4	Murata	GRM188R71H104KA93D	Digi-Key	490-1519-2	490-1519-1
8	CAP 1.0UFD 25V CERM 0603 X5R ROHS	C21, C39	2	Taiyo Yuden	TMK107BJ105KA-T	Digi-Key	587-1248-2	587-1248-1
9	CAP 4.7UFD 6.3V CERM 0603 X5R	C5	1	TDK Corp.	C1608X5R0J475M	Digi-Key	445-1417-2	445-1417-1
10	CAP 1.0UFD 63V METAL POLYESTER FILM MKT	C22, C23, C25, C26	4	EPCOS	B32529C105J	Digi-Key	495-1119	No Alt. Part Num
11	CAP 10UFD 16V ALUM ELEC SMD VSA	C1, C7	2	Panasonic	ECE-V1CS100SR	Digi-Key	PCE3061TR	PCE3061CT
12	CAP 220UFD 35V ALUM ELEC M-Series	C20, C30	2	Panasonic	ECA-1VM221BJ6	Digi-Key	P10419TB	No Alt. Part Num
RESISTORS								
13	RES 0.0 Ω 1/16W 5% SMD 0603	R6	1	Panasonic	ERJ-3GEY0R00V	Digi-Key	P0.0GTR	P0.0GCT
14	RES 3.3 Ω 1/16W 5% SMD 0603	R7, R12, R13, R14	4	Yageo	9C06031A3R30JLHFT	Digi-Key	311-3.3GTR	311-3.3GCT
15	RES 470 Ω 1/10W 5% SMD 0603	R5, R8	2	Panasonic	ERJ-3GEYJ471V	Digi-Key	P470GTR	P470GCT
16	RES 10 k Ω 1/16W 5% SMD 0603	R1, R3, R4	3	Panasonic	9C06031A1002JLHFT	Digi-Key	311-10KGTR	311-10KGCT
17	RES 18.2 k Ω 1/10W 1% SMD 0603	R2	1	Yageo	9C06031A1822FKHFT	Digi-Key	311-18.2KHTR	311-18.2KHCT
18	RES 22.1 k Ω 1/16W 1% SMD 0603	R9	1	Panasonic	ERJ-3EKF2212V	Digi-Key	P22.1KHTR	P22.1KHCT
INDUCTORS								
19	INDUCTOR, SERIES 11RHBP, 22UH	L1-L4	4	Toko America	A7503AY-220M	Toko America	A7503AY-220M	No Alt. Part Num
HEADERS								
20	Header, 1 Pin Male, PCB Straight Gold ROHS	LM, LP, RM, RP	4	Sullins	PBC01SAAN	Digi-Key	S1011E-01	No Alt. Part Num
21	Header, 2X9 Pin Male, PCB Straight Gold ROHS	J1	1	Sullins	PBC02DAAN	Digi-Key	S2011E-09	No Alt. Part Num
STANDOFFS AND HARDWARE								
22	Standoff 4-40 Threaded M/F 0.50 in. ALUM-HEX	HW1-HW4	4	Keystone Electronics	8401	Digi-Key	8401K	No Alt. Part Num
23	Hex Nut, 4-40, Zinc/Steel	HW1-HW4	4	Building Fasteners	HNZ440	Digi-Key	H216	No Alt. Part Num

6.3 Schematic

The schematic for TAS5705EVM2 and MC57xxPSIA are located at the end of this document.

7 Quick-Start Setup Guide

This section discusses the five most common configurations of the TAS5705EVM2, and how to enable the Headphone mode.

Common Configurations:

1. 2 × BTL BD
2. 2 × BTL AD Mode

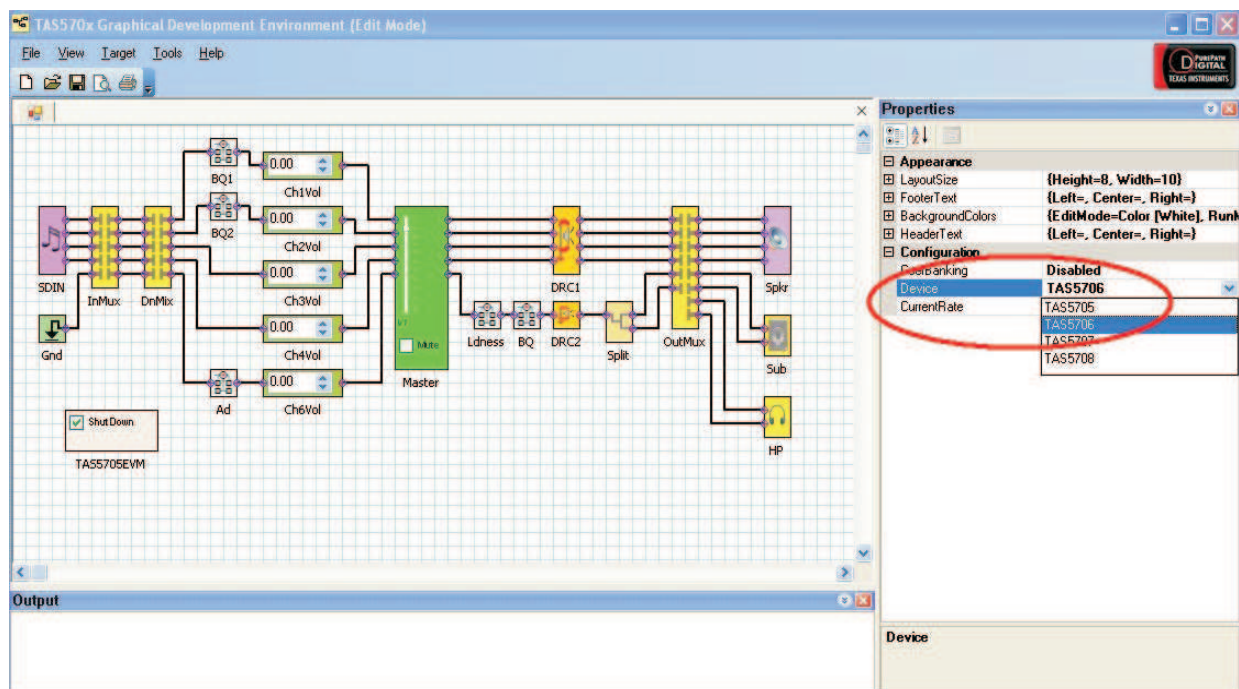
Corresponding I²C Script

TAS5705_BD_2xBTL.ini

TAS5705_AD_2xBTL.ini

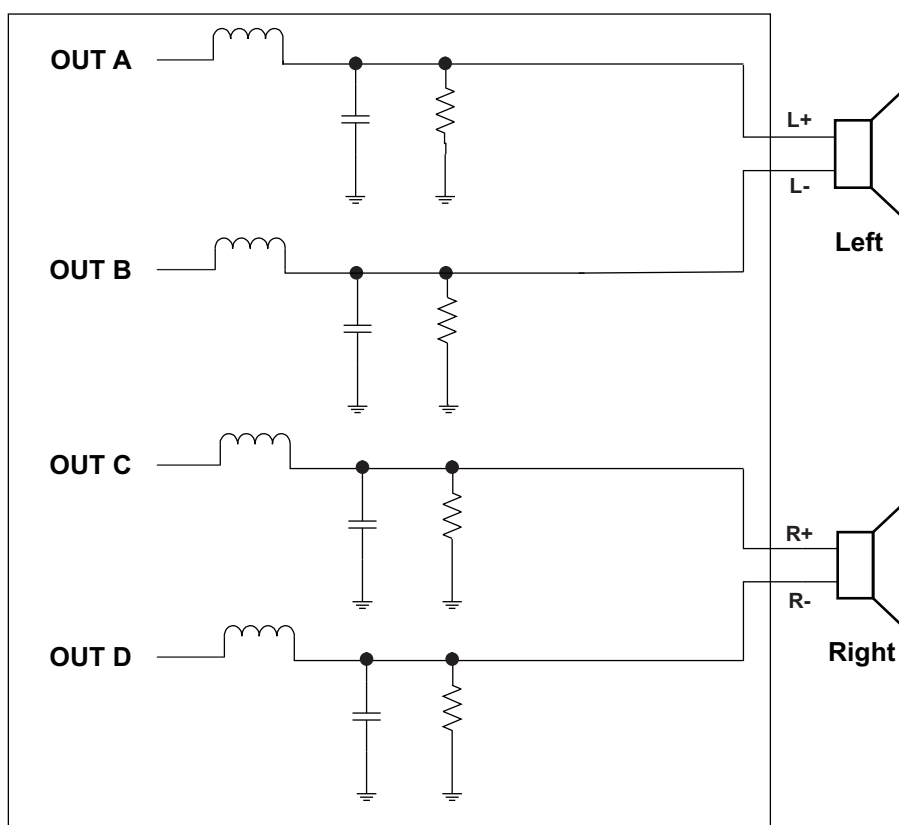
Before you begin:

- Follow all steps in the EVM Installation section ([Section 2.1](#)).
- Click on GUI background, and in the Properties sidebar, set Device to TAS5705:

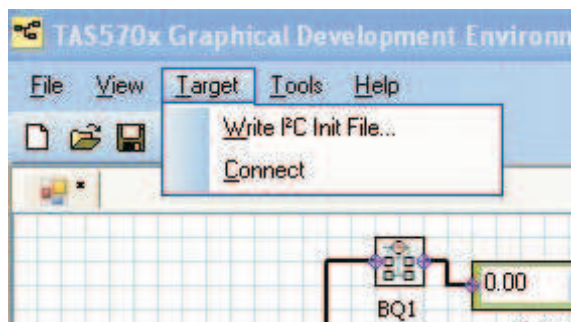


7.1 2 X BTL BD (Default: BD mode)

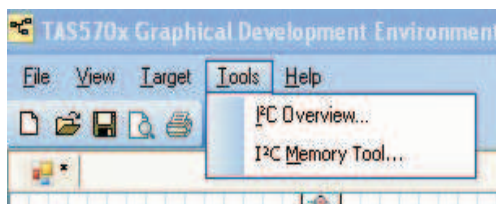
1. Set up the hardware as shown in the following illustration. Ensure that all the four jumpers (JP1-JP4) are plugged in. This provides you with BTL output configurations for both left and right channels.



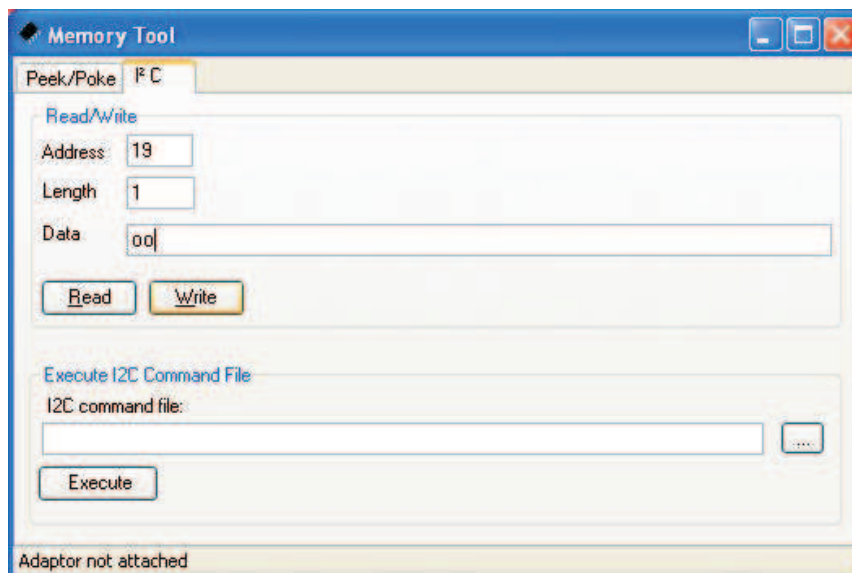
2. Go to [Appendix A](#) of this document, and save the script as **NAME.ini**. (OR use the corresponding script from the CD or TI Web site). The format for the config file can be .ini or .CFG
3. Connect to the device: **Target > Connect**.



4. Go to **Tools > I²C Memory Tools**.

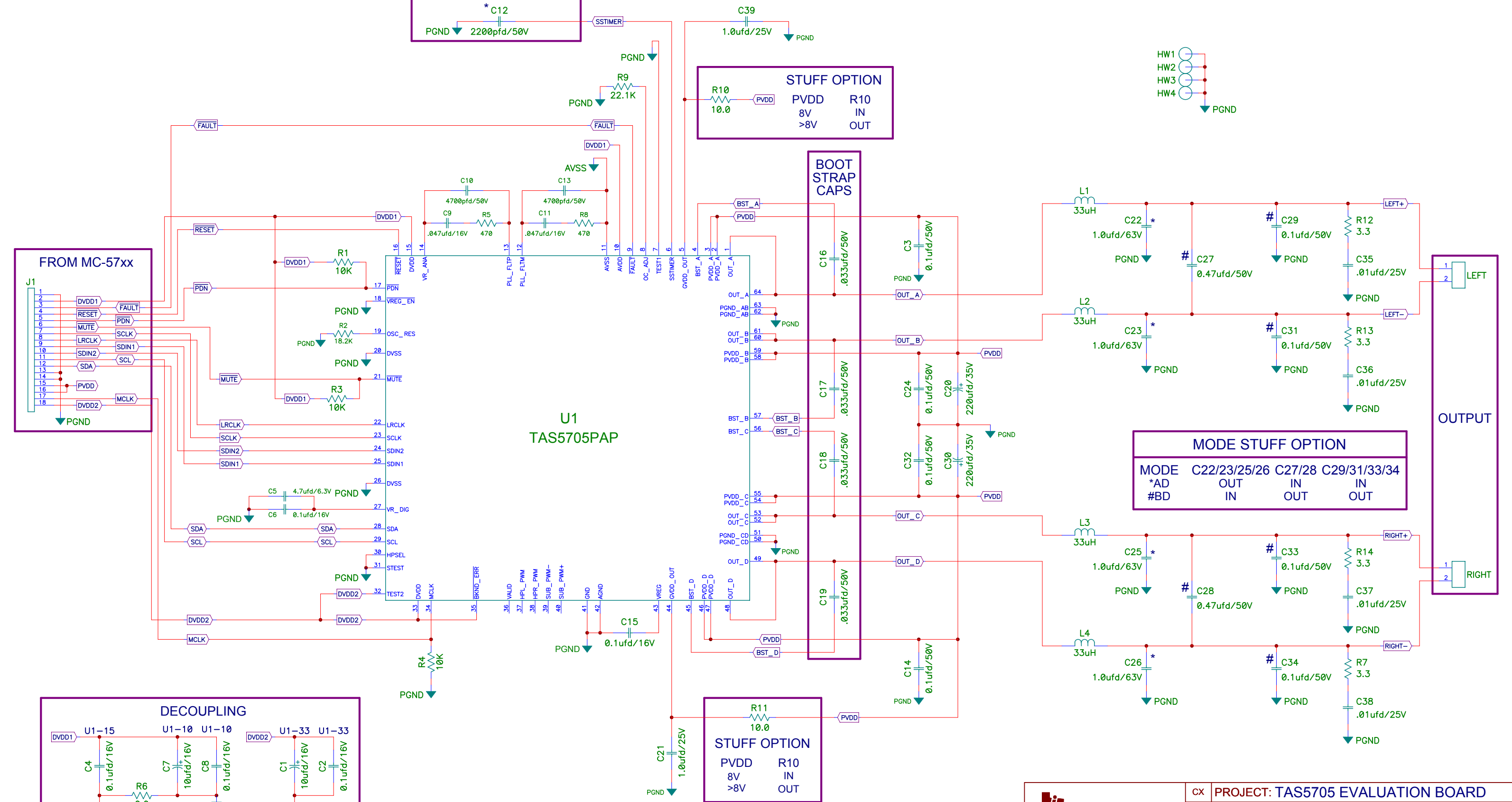


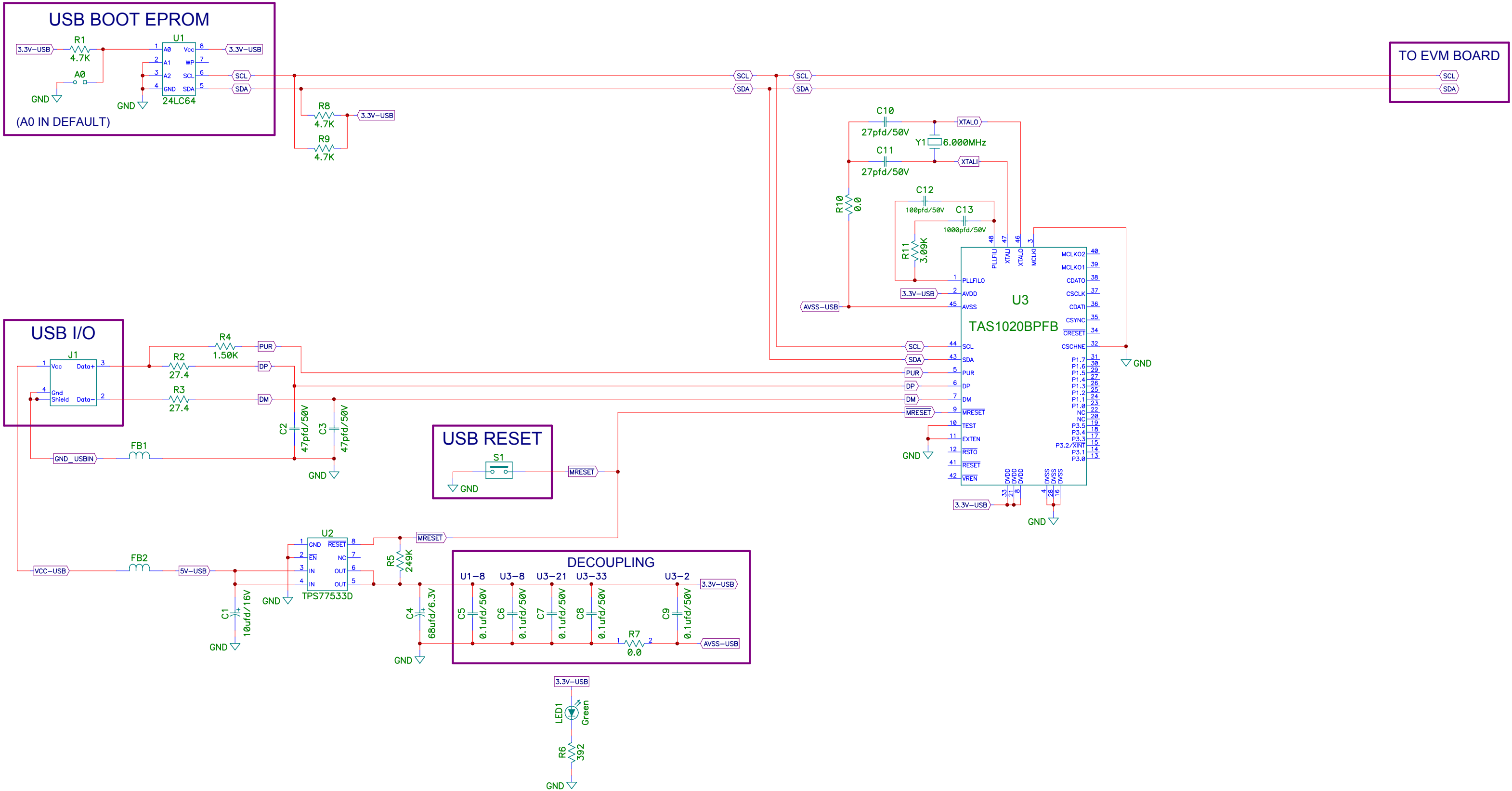
5. Click on the **I²C** tab, and upload the saved configuration script **NAME.ini** into the **I²C command File** window. Click **Execute**.



6. Finally uncheck the **shutdown** box to bring the device out of Shutdown mode, and adjust the **Master Volume** as desired.

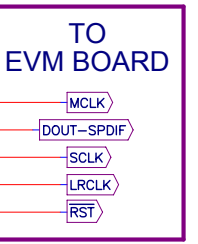
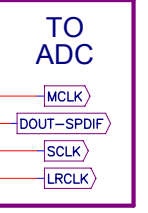
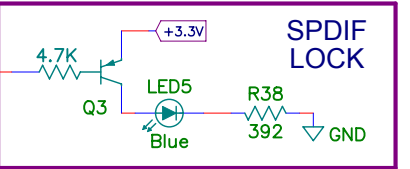
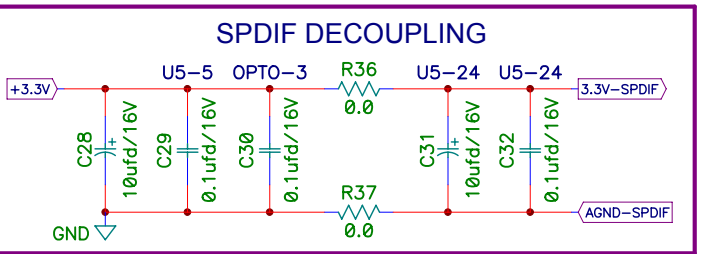
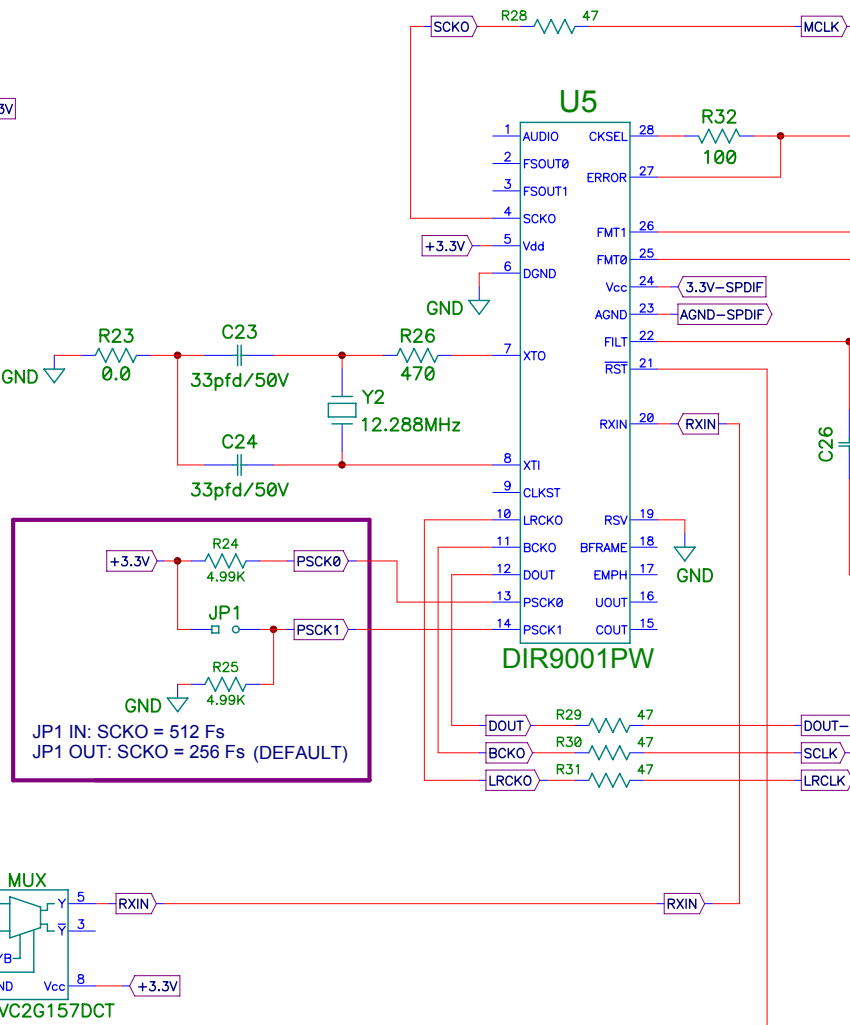
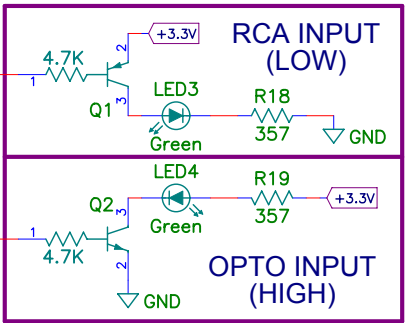
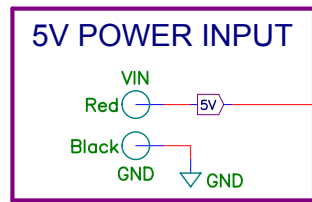
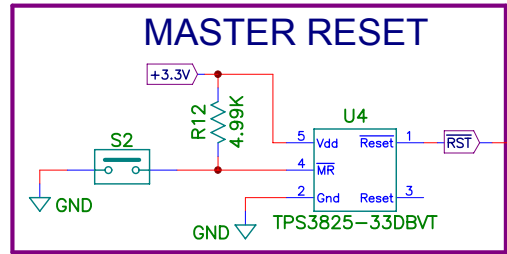
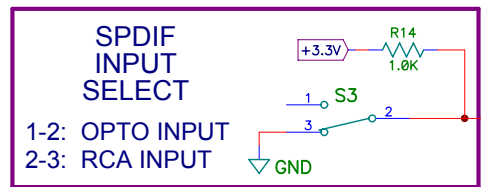
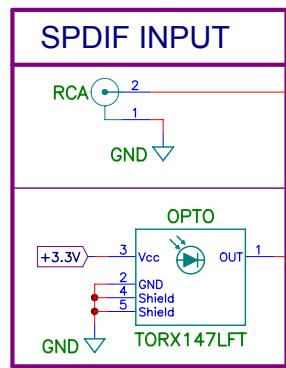
TAS5705

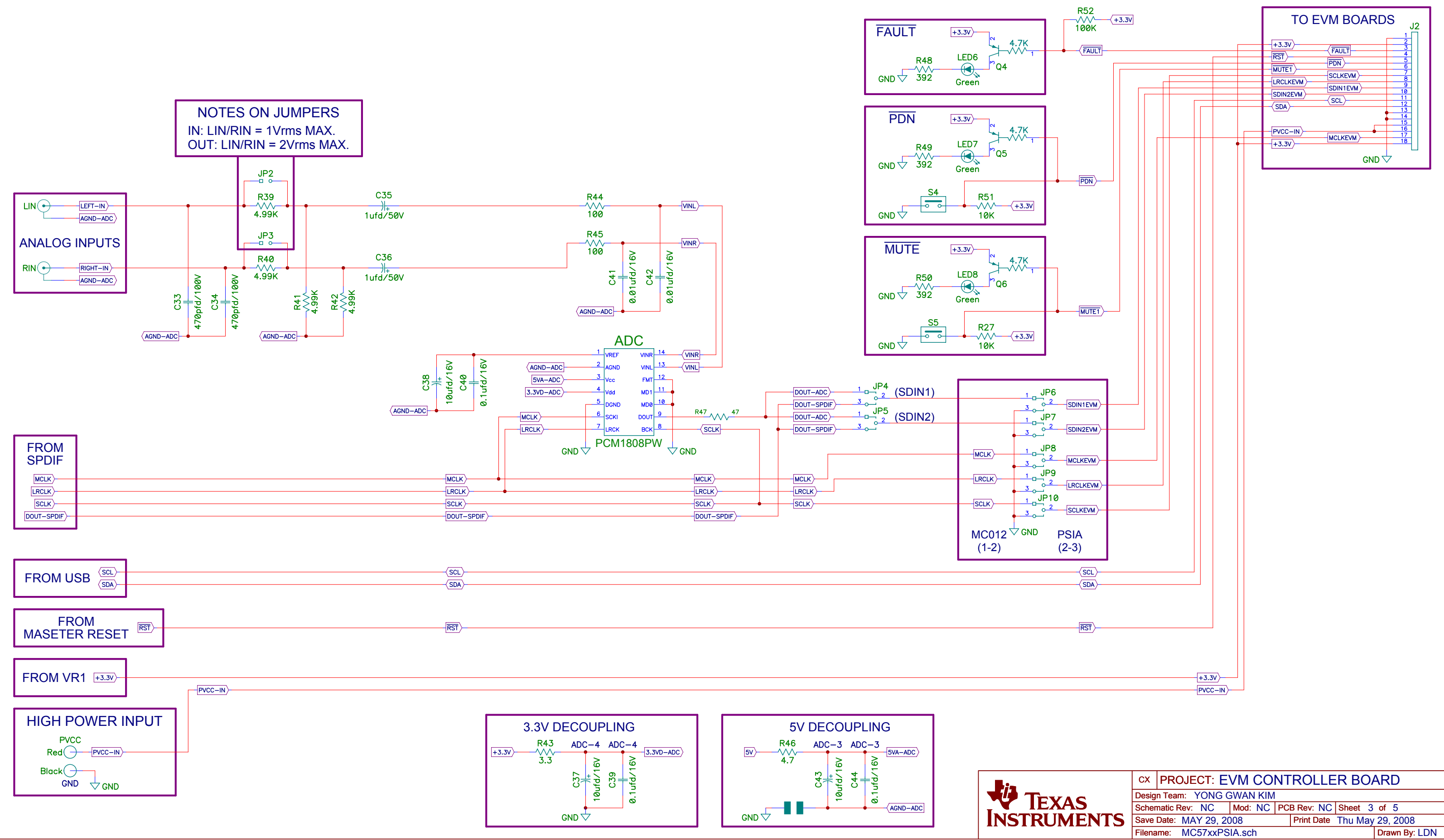




SPDIF RECEIVER

ENGINEERING EVALUATION ONLY





Appendix A 2 X BTL BD (Default: BD mode)

Following initial scripts may also be found on the installation CD or TI Web site. **The following scripts use .ini format where the first column is type of write command ("01" means single byte, "02" means multi-byte, "00" means comment), the following column is the I2C address and then followed by data(s).**

```

01 1B 00 Oscillator Trim
01 03 A0 System Control Register 1
01 04 05 Serial Data Interface Register
01 06 00 Soft Mute Register
01 07 00 Master Volume Register (0xFF = Mute)
01 08 30 Channel 1 Volume
01 09 30 Channel 2 Volume
01 0A 30 Channel 3 Volume
01 0B 30 Channel 4 Volume
01 0C 30 Channel 5 Volume
01 0D 30 Channel 6 Volume
01 0E 91 Micro Register
01 10 02 Modulation Limit
01 19 30 Shutdown Group Resister
01 1A 0A Split Capacitor Charge Period
01 1C 02 Back-end Error Register
00 01 (Below) Input Mux Register
02 20 00 89 77 7A
00 01 (Below) Downmix Register
02 21 00 00 42 03
00 01 (Below) AM Mode Register
02 22 00 00 00 00
00 01 (Below) Biquad1 Coeff
02 23 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) Biquad2 Coeff
02 24 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) PWM Output MUX Register (Note: Writes to this register affect Inter-Channel Delay)
02 25 01 02 13 45
00 01 (Below) 1/G
02 26 00 80 00 00
00 01 (Below) Scale = 1/(1-1/G)
02 28 00 80 00 00
01 11 B8 Inter-Channel Delay Channel 1
01 12 60 Inter-Channel Delay Channel 2
01 13 A0 Inter-Channel Delay Channel 3
01 14 48 Inter-Channel Delay Channel 4
01 15 F4 Inter-Channel Delay Channel 5
01 16 0C Inter-Channel Delay Channel 6
01 17 00 Offset Register (Absolute Delay)
01 05 00 System Control Register 2 (active)

```

Appendix B 2 X BTL AD (Default: AD mode)

Following initial scripts may also be found on the installation CD or TI Web site. **The following scripts use .ini format where the first column is type of write command ("01" means single byte, "02" means multi-byte, "00" means comment), the following column is the I2C address and then followed by data(s).**

```

01 1B 00 Oscillator Trim
01 03 A0 System Control Register 1
01 04 05 Serial Data Interface Register
01 06 00 Soft Mute Register
01 07 00 Master Volume Register (0xFF = Mute)
01 08 30 Channel 1 Volume
01 09 30 Channel 2 Volume
01 0A 30 Channel 3 Volume
01 0B 30 Channel 4 Volume
01 0C 30 Channel 5 Volume
01 0D 30 Channel 6 Volume
01 0E 91 Micro Register
01 10 02 Modulation Limit
01 19 30 Shutdown Group Resister
01 1A 0F Split Capacitor Charge Period
01 1C 02 Back-end Error Register
00 01 (Below) Input Mux Register
02 20 00 01 77 72
00 01 (Below) Downmix Register
02 21 00 00 40 03
00 01 (Below) AM Mode Register
02 22 00 00 00 00
00 01 (Below) Biquad1 Coeff
02 23 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) Biquad2 Coeff
02 24 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) PWM Output MUX Register (Note: Writes to this register affect Inter-Channel Delay)
02 25 01 02 13 45
00 01 (Below) 1/G
02 26 00 80 00 00
00 01 (Below) Scale = 1/(1-1/G)
02 28 00 80 00 00
01 11 AC Inter-Channel Delay Channel 1
01 12 54 Inter-Channel Delay Channel 2
01 13 AC Inter-Channel Delay Channel 3
01 14 54 Inter-Channel Delay Channel 4
01 15 00 Inter-Channel Delay Channel 5
01 16 00 Inter-Channel Delay Channel 6
01 17 00 Offset Register (Absolute Delay)
01 05 00 System Control Register 2 (active)

```

Appendix C BD 2.1 Using External SUB

Following initial scripts may also be found on the installation CD or TI Web site. **The following scripts use .ini format where the first column is type of write command ("01" means single byte, "02" means multi-byte, "00" means comment), the following column is the I2C address and then followed by data(s).**

```

01 1B 00 Oscillator Trim
01 03 A0 System Control Register 1
01 04 05 Serial Data Interface Register
01 06 00 Soft Mute Register
01 07 00 Master Volume Register (0xFF = Mute)
01 08 30 Channel 1 Volume
01 09 30 Channel 2 Volume
01 0A 30 Channel 3 Volume
01 0B 30 Channel 4 Volume
01 0C 30 Channel 5 Volume
01 0D 30 Channel 6 Volume
01 0E 91 Micro Register
01 10 02 Modulation Limit
01 19 00 Shutdown Group Resister
01 1A 0A Split Capacitor Charge Period
01 1C 02 Back-end Error Register
00 01 (Below) Input Mux Register
02 20 00 89 77 7A
00 01 (Below) Downmix Register
02 21 00 00 40 03
00 01 (Below) AM Mode Register
02 22 00 00 00 00
00 01 (Below) Biquad1 Coeff
02 23 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) Biquad2 Coeff
02 24 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) PWM Output MUX Register (Note: Writes to this register affect Inter-Channel Delay)
02 25 01 02 13 45
00 01 (Below) 1/G
02 26 00 80 00 00
00 01 (Below) Scale = 1/(1-1/G)
02 28 00 80 00 00
01 11 B8 Inter-Channel Delay Channel 1
01 12 60 Inter-Channel Delay Channel 2
01 13 A0 Inter-Channel Delay Channel 3
01 14 48 Inter-Channel Delay Channel 4
01 15 F4 Inter-Channel Delay Channel 5
01 16 0C Inter-Channel Delay Channel 6
01 17 00 Offset Register (Absolute Delay)
01 05 20 System Control Register 2 (active)

```

Appendix D AD 2.1 Using External SUB

Following initial scripts may also be found on the installation CD or TI Web site. **The following scripts use .ini format where the first column is type of write command ("01" means single byte, "02" means multi-byte, "00" means comment), the following column is the I2C address and then followed by data(s).**

```

01 1B 00 Oscillator Trim
01 03 A0 System Control Register 1
01 04 05 Serial Data Interface Register
01 06 00 Soft Mute Register
01 07 00 Master Volume Register (0xFF = Mute)
01 08 30 Channel 1 Volume
01 09 30 Channel 2 Volume
01 0A 30 Channel 3 Volume
01 0B 30 Channel 4 Volume
01 0C 30 Channel 5 Volume
01 0D 30 Channel 6 Volume
01 0E 91 Micro Register
01 10 02 Modulation Limit
01 19 00 Shutdown Group Resister
01 1A 0F Split Capacitor Charge Period
01 1C 02 Back-end Error Register
00 01 (Below) Input Mux Register
02 20 00 01 77 72
00 01 (Below) Downmix Register
02 21 00 00 40 03
00 01 (Below) AM Mode Register
02 22 00 00 00 00
00 01 (Below) Biquad1 Coeff
02 23 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) Biquad2 Coeff
02 24 00 80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 01 (Below) PWM Output MUX Register (Note: Writes to this register affect Inter-Channel Delay)
02 25 01 02 13 45
00 01 (Below) 1/G
02 26 00 80 00 00
00 01 (Below) Scale = 1/(1-1/G)
02 28 00 80 00 00
01 11 AC Inter-Channel Delay Channel 1
01 12 54 Inter-Channel Delay Channel 2
01 13 AC Inter-Channel Delay Channel 3
01 14 54 Inter-Channel Delay Channel 4
01 15 00 Inter-Channel Delay Channel 5
01 16 00 Inter-Channel Delay Channel 6
01 17 00 Offset Register (Absolute Delay)
01 05 20 System Control Register 2 (active)

```

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During normal operation, some circuit components may have case temperatures greater than 85°C. The EVM is designed to operate properly with certain components above 85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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