# K2G AUDIO DAUGHTER CARD

## TABLE OF CONTENTS

| | |
|---|---|
| REV | B |
| VER | 1.2 |

Project :

AUD K2G

Designed for TI by Mistral Solutions Pvt Ltd

TEXAS INSTRUMENTS

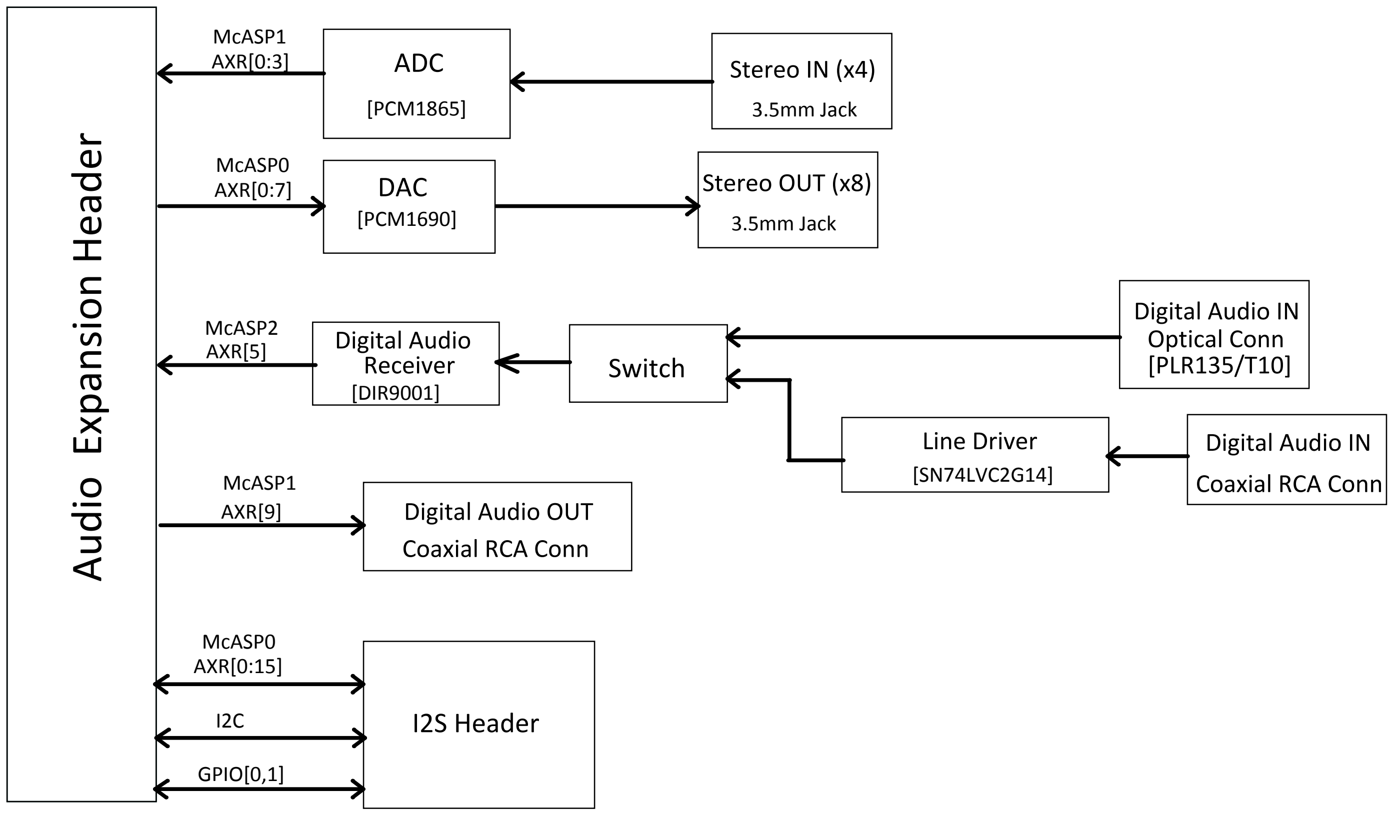
MISTRAL

| | | | |
|---|---|---|---|
| Title | TABLE OF CONTENTS | | |
| Size<br>C | Document Number<br>MS_TI_AUDK2G_SCH_REVB | | Rev<br>B |
| Date: | Thursday, April 28, 2016 | Sheet 1 of 15 | |

# VERSION HISTORY

| VER # | DATE | DESCRIPTION OF CHANGES | AUTHOR |
|---|---|---|---|
| 0.1 | 28st JUL 2015 | INITIAL DRAFT | MISTRAL DESIGN TEAM |
| 1.0 | 13th AUG 2015 | BASELINED SCHEMATICS | MISTRAL DESIGN TEAM |
| 1.1 | 16th SEP 2015 | CUSTOMER COMMENTS UPDATED | MISTRAL DESIGN TEAM |
| 1.2 | 21st SEP 2015 | BASELINED SCHEMATICS FOR BETA | MISTRAL DESIGN TEAM |

# BLOCK DIAGRAM



## McASP CONFIGURATION

| McASP PORT | DEVICES | DEVICE MODE |
|---|---|---|
| McASP0 | DAC- PCM1690 x2 | SLAVE |
| | I2S HEADER | MASTER |
| McASP1 | ADC- PCM1865 x2 | SLAVE |
| McASP2 | HDMI TRANSMITTER (DEFAULT) | SLAVE |
| | AUDIO CODEC AIC3106 | |
| | DIR9001(DEFAULT) | MASTER |
| | COM8 | |

## I2C Device Address

| I2C Device | Address | |
|---|---|---|
| PCM1865DBTR | ADC1 | 0x4A |
| PCM1865DBTR | ADC2 | 0x4B |
| PCM1690IDCARQ2 | DAC0 | 0x4D |
| PCM1690IDCARQ1 | DAC1 | 0x4C |

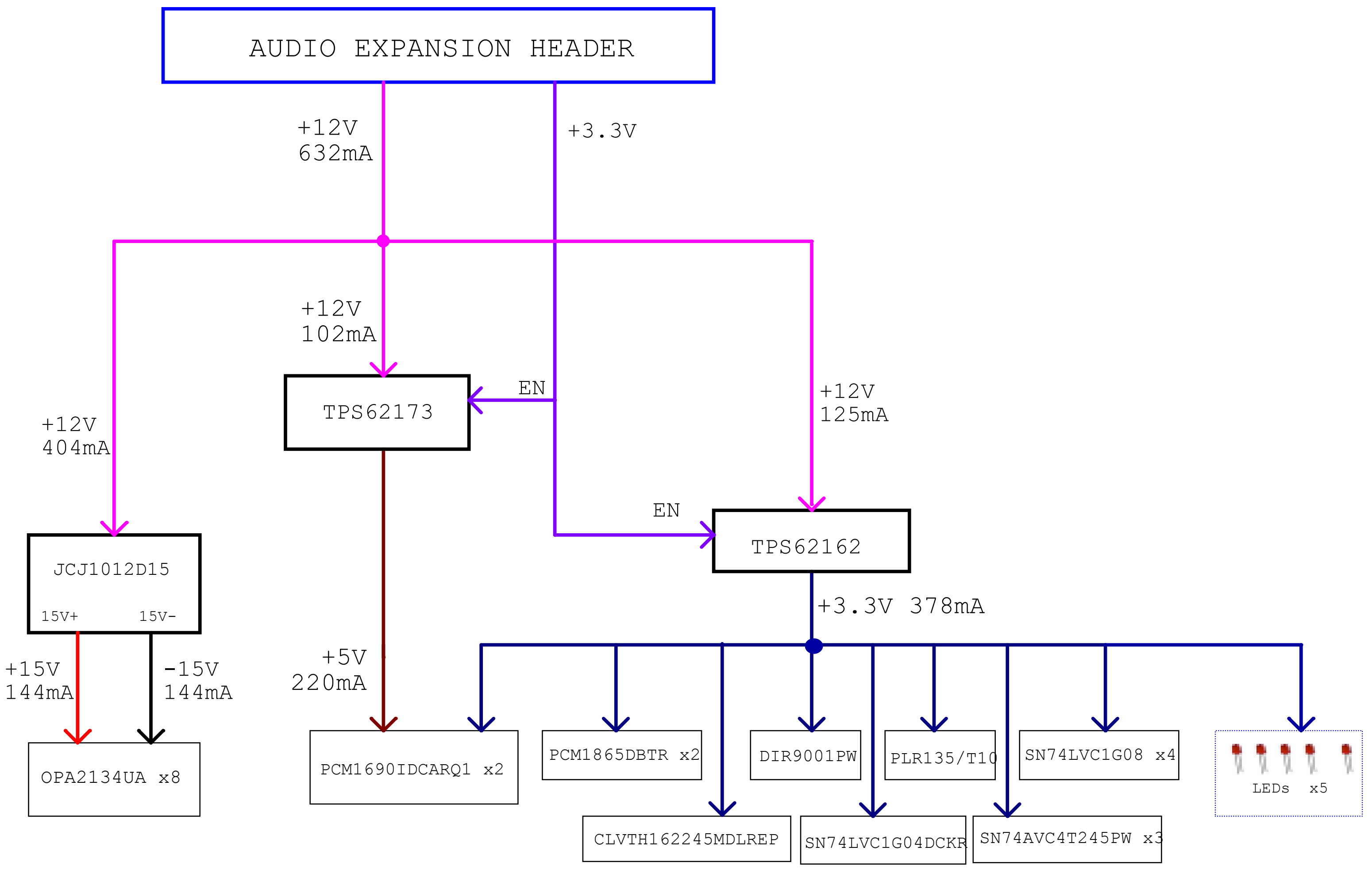
Project :

AUD K2G

Designed for TI by Mistral Solutions Pvt Ltd

| | | |
|---|---|---|
| Title | BLOCK DIAGRAM | |
| Size<br>C | Document Number<br>MS_TI_AUDK2G_SCH_REVB | Rev<br>B |
| Date: Thursday, April 28, 2016 | Sheet 3 of 15 | |

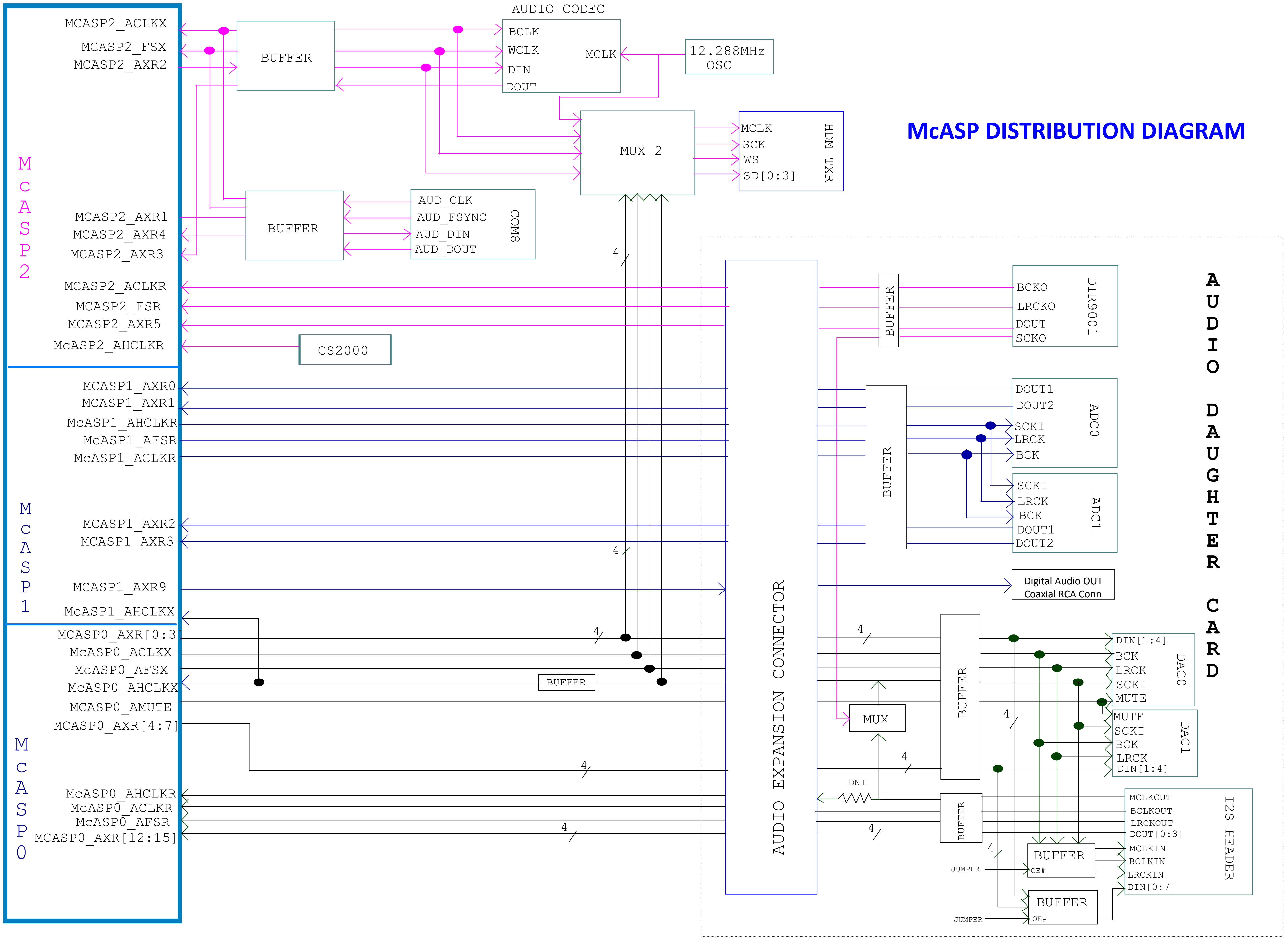
# POWER FLOW DIAGRAM



| | | | |
|---|---|---|---|
| Project : | Designed for TI by Mistral Solutions Pvt Ltd | Title | POWER FLOW DIAGRAM |
| AUD K2G | | Size C | Document Number MS_TI_AUDK2G_SCH_REVB | 
| | | Date: Thursday, April 28, 2016 | Sheet 4 of 15 |

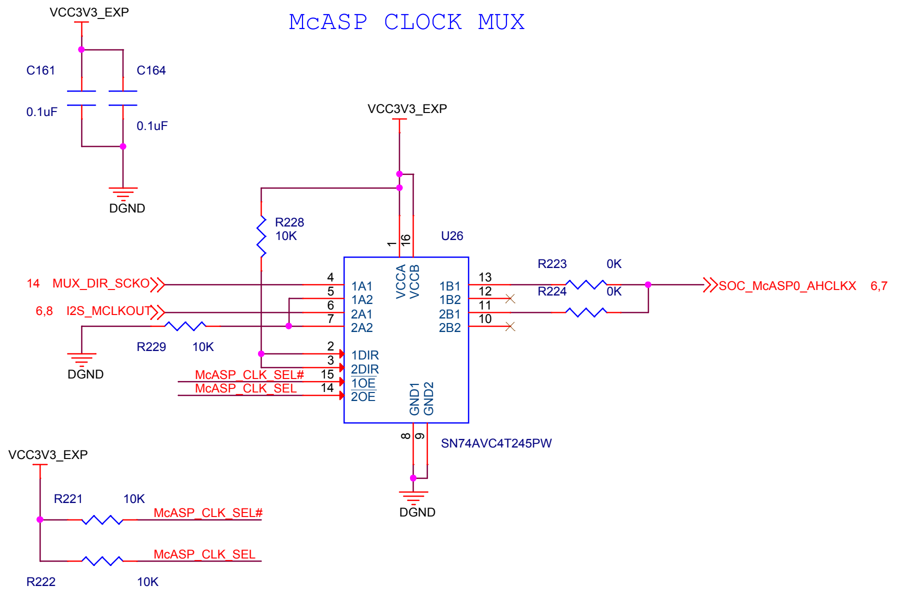
Rev B

# McASP DISTRIBUTION DIAGRAM



| Project : | Designed for TI by Mistral Solutions Pvt Ltd | Title MCASP TREE |
|---|---|---|
| AUD K2G | TEXAS INSTRUMENTS MISTRAL | Size C Document Number MS_TI_AUDK2G_SCH_REVB Rev B |
| | | Date: Thursday, April 28, 2016 Sheet 5 of 15 |

## McASP CLOCK MUX



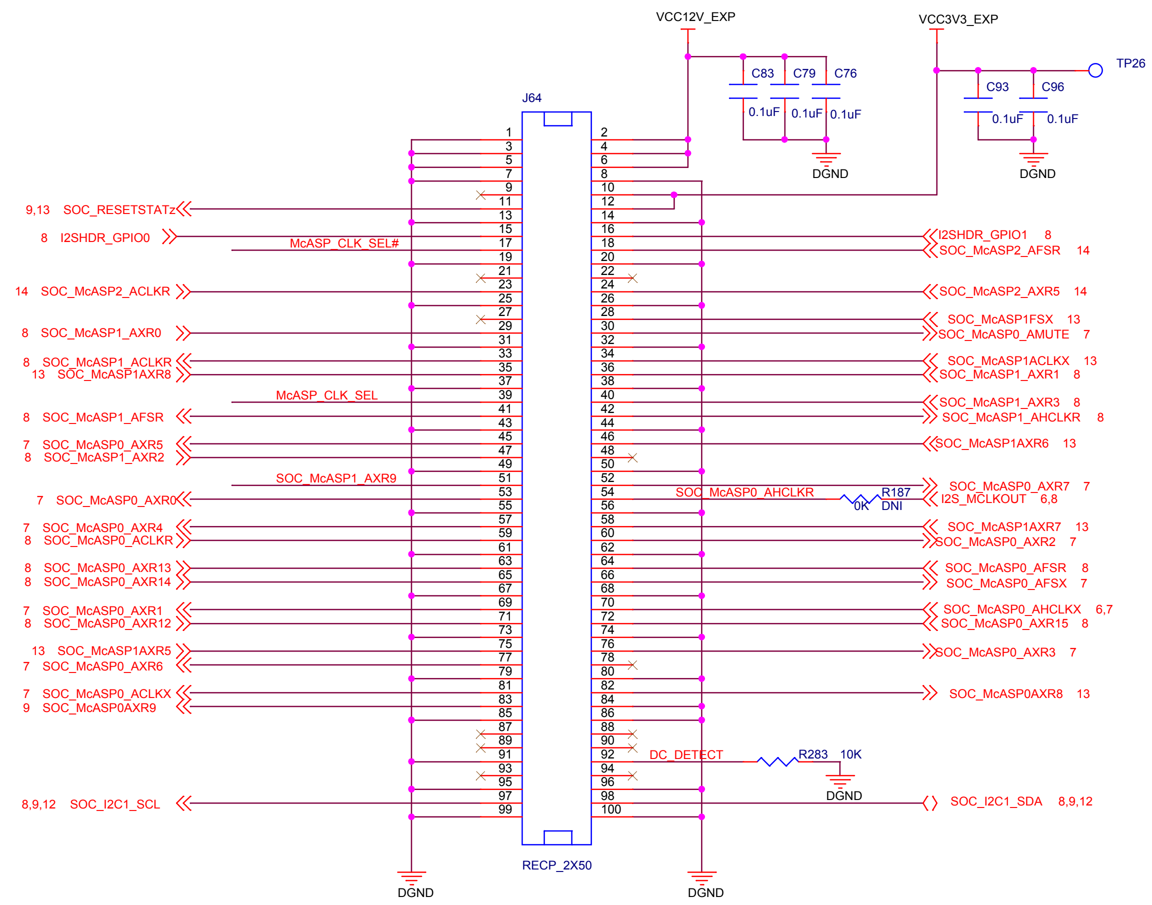
## McASP CLOCK SELECTION

| McASP_CLK_SEL# | McASP_CLK_SEL | SOC_McASP0_AHCLKX |
|---|---|---|
| H | L | I2S |
| L | H | DIR |

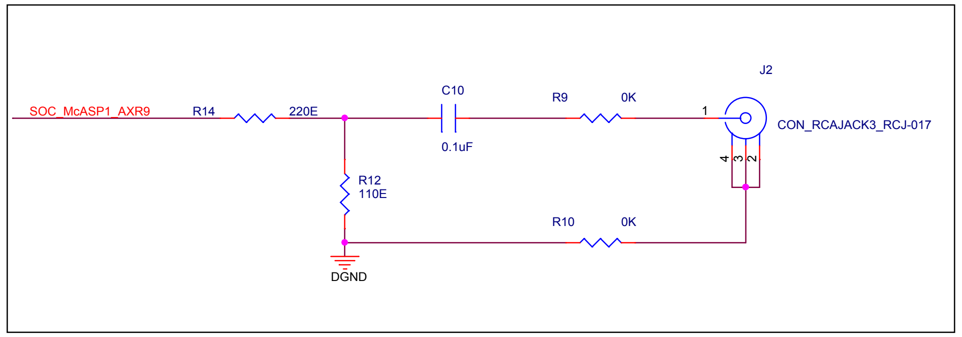
Note:
For SoC-generated AHCLKX0, set MUX to I2S mode
and disconnect any I2S source connected to the I2S header.

| GPIOs ON AUDIO CARD | SOC SIGNAL |
|---|---|
| McASP_CLK_SEL | SOC_MCASP1AXR4/GPIO0_132 |
| PCM1690_RST# | SOC_MCASP0AXR9/GPIO1_10 |
| DAC0_AMUTEI#<br>DAC1_AMUTEI# | SOC_McASP0_AMUTE |
| DIR_RST# | SOC_MCASP0AXR8/GPIO1_09 |
| DIR_AUDIO# | SOC_MCASP1AXR6/GPIO0_134 |
| DIR_EMPH | SOC_MCASP1AXR7/GPIO0_135 |
| DIR_ERROR | SOC_MCASP1AXR8/GPIO0_136 |
| DIR_CLKST | SOC_MCASP1AXR5/GPIO0_133 |
| DIR_FSOUT0 | SOC_MCASP1ACLKX/GPIO0_124 |
| DIR_FSOUT1 | SOC_MCASP1FSX /GPIO0_125 |
| McASP_CLK_SEL# | SOC_SPI2_SCS0 /GPIO0_101 |
| DC_DETECT | GPMCBE1N/GPIO0_21 |
| I2SHDR_GPIO0 | SOC_SPI2_MOSI |
| I2SHDR_GPIO1 | SOC_SPI2_MISO |

## AUDIO EXPANSION CONN

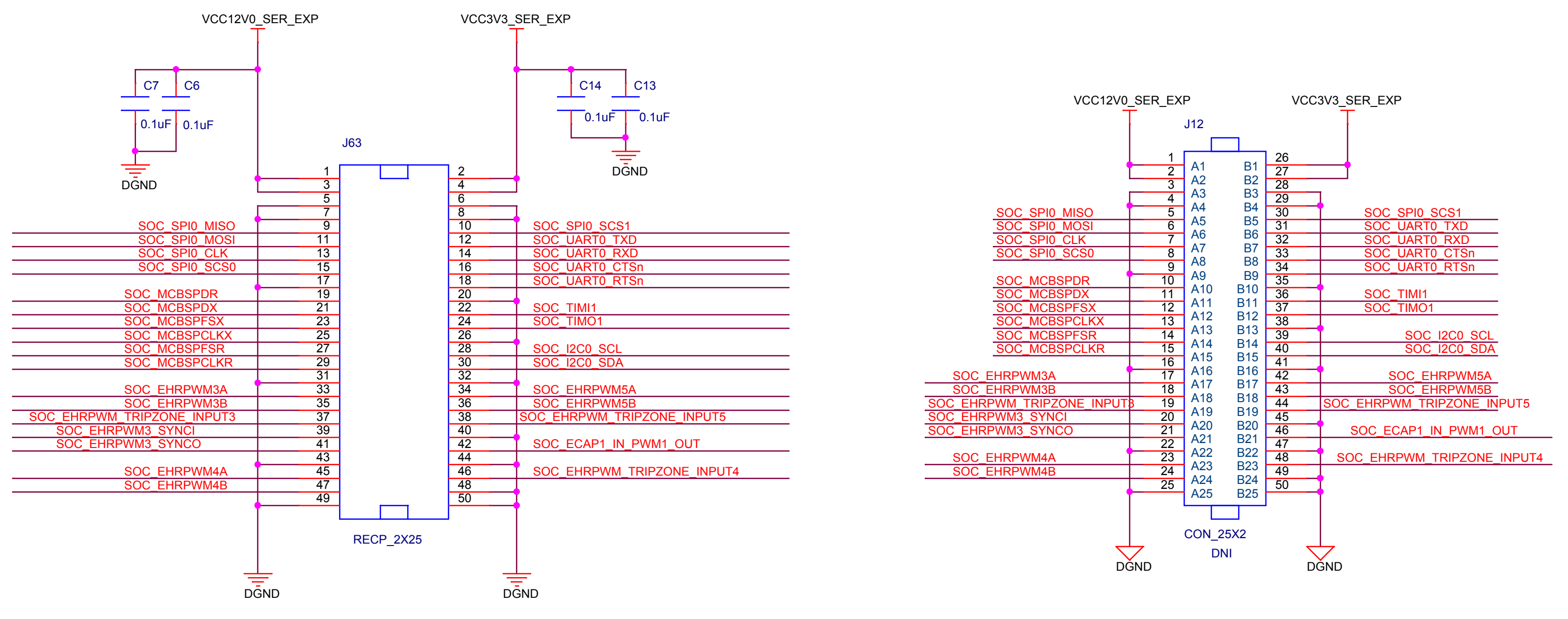


## DIT

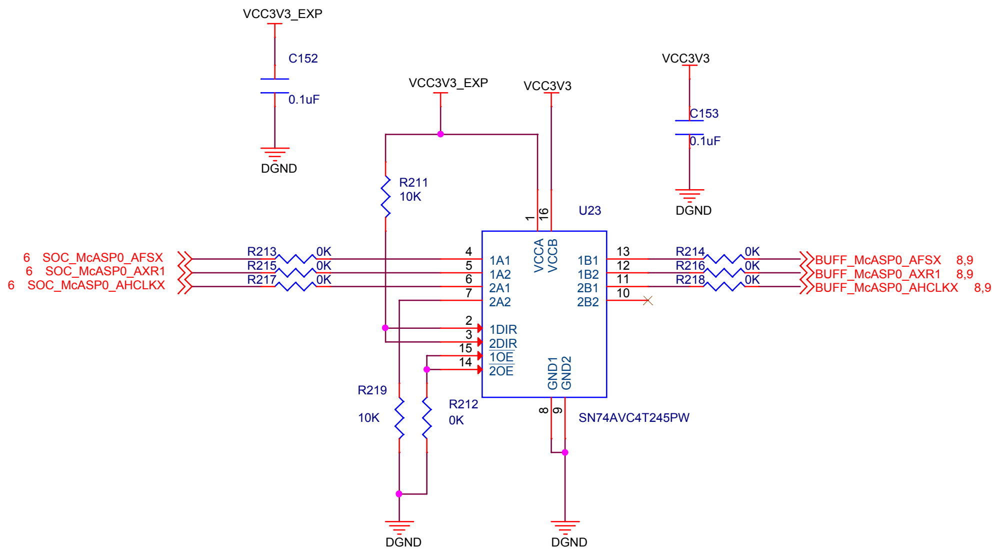


| Project : | Designed for TI by Mistral Solutions Pvt Ltd | Title | AUDIO EXPANSION CONN | | | |
|---|---|---|---|---|---|---|
| AUD K2G | | Size | Document Number | | | Rev |
| | | C | MS_TI_AUDK2G_SCH_REVB | | | B |
| | | Date: | Thursday, April 28, 2016 | Sheet | 6 | of 15 |

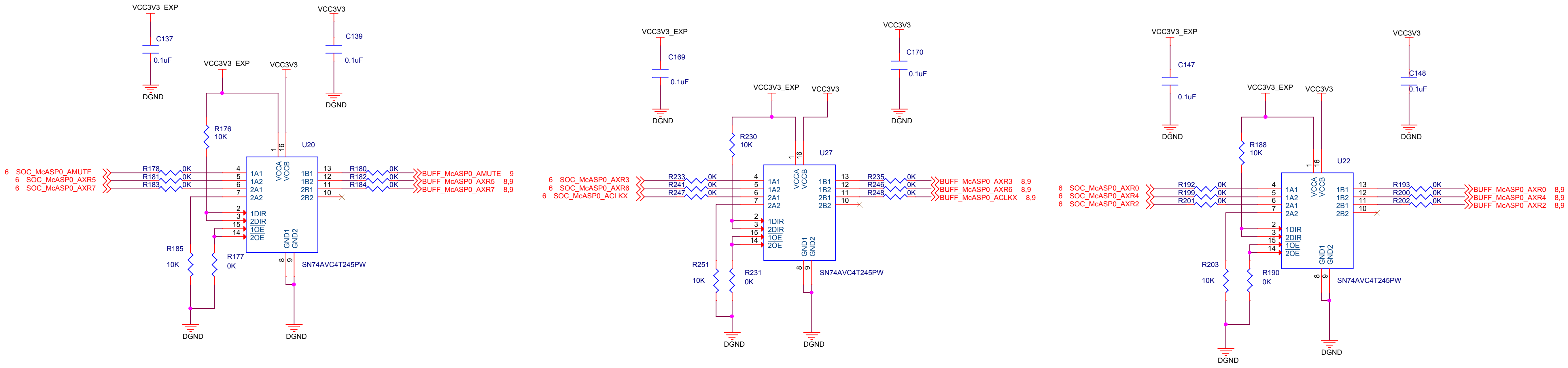
## SERIAL EXPANSION CONN



## DAC CLOCK AND DATA BUFFER

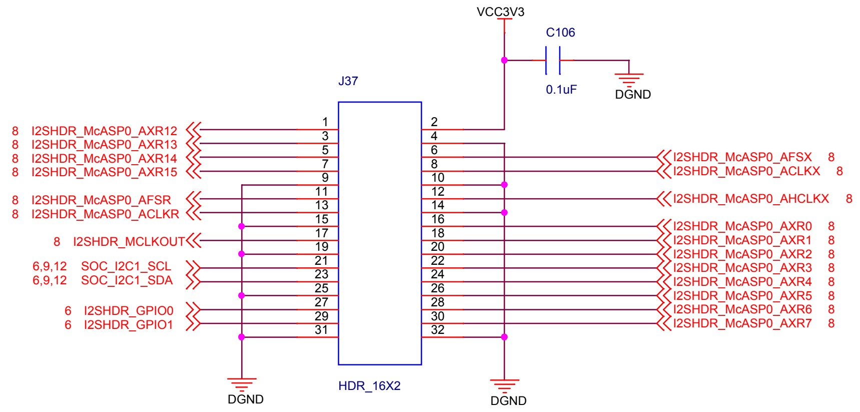


## DAC CLOCK AND DATA BUFFER

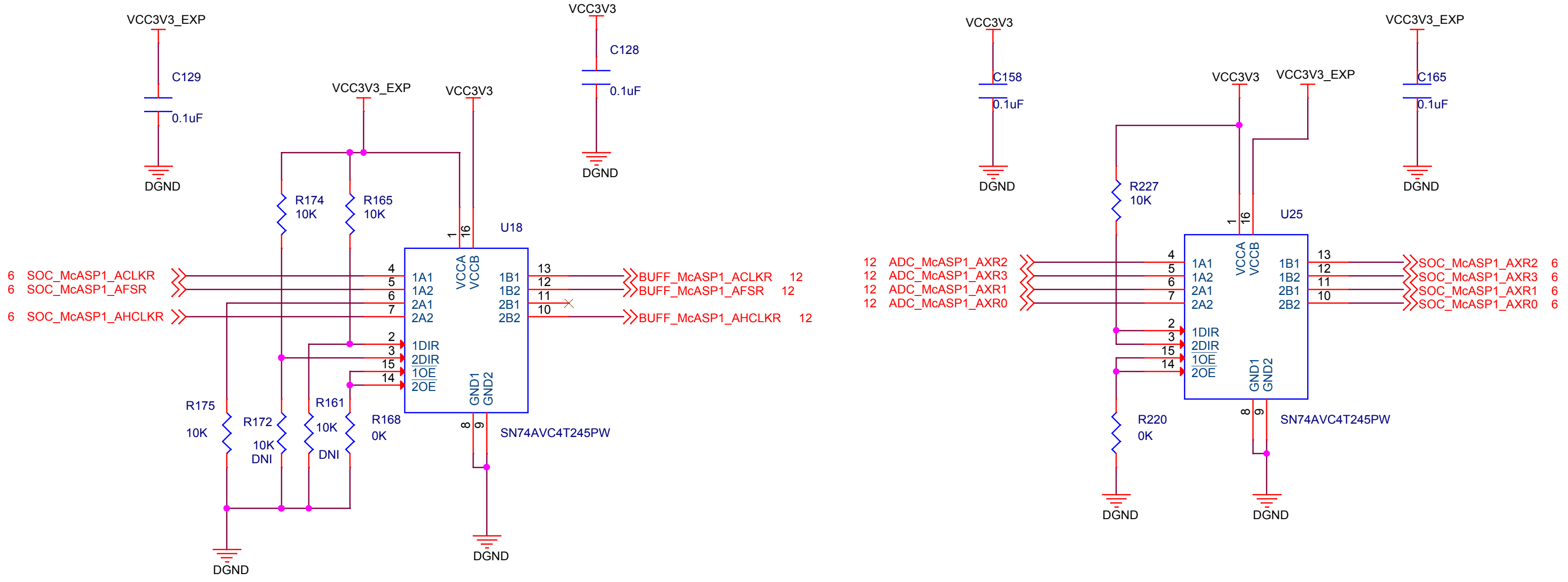


| | | |
|---|---|---|
| Project : | Designed for TI by Mistral Solutions Pvt Ltd | Title SERIAL EXPANSION CONN |
| AUD K2G | | Size C; Document Number MS_TI_AUDK2G_SCH_REVB; Rev B |
| | | Date: Thursday, April 28, 2016; Sheet 7 of 15 |

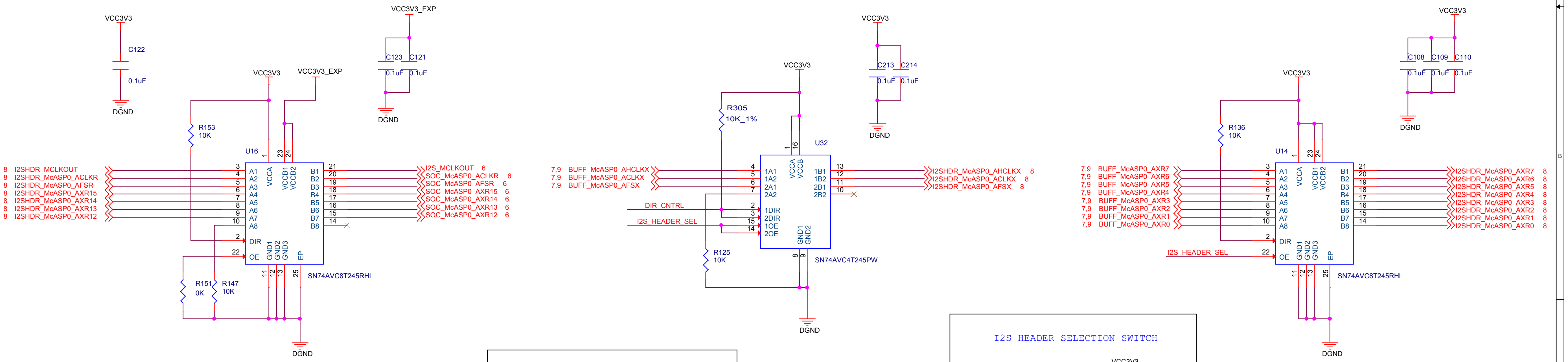
## I2S HEADER



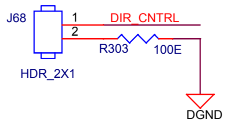
## ADC CLOCK & DATA BUFFER



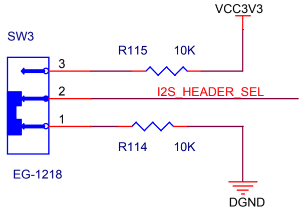
## I2S CLOCK AND DATA BUFFER



### INSTALL JUMPER FOR TX SLAVE MODE



### I2S HEADER SELECTION SWITCH



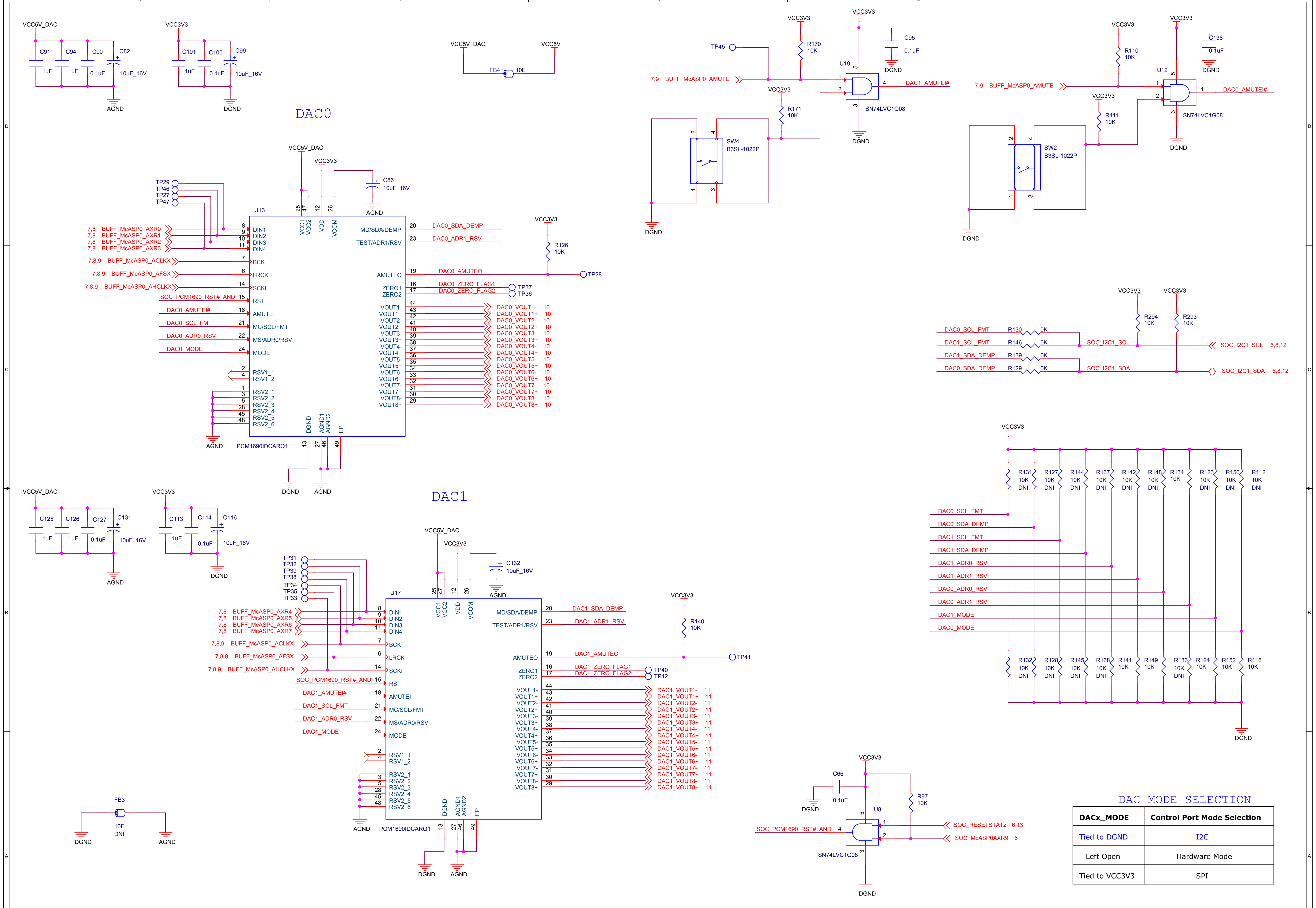
Project : AUD K2G

Designed for TI by Mistral Solutions Pvt Ltd

Title I2S HEADER

Size C
Document Number MS_TI_AUDK2G_SCH_REVB
Rev B

Date: Thursday, April 28, 2016
Sheet 8 of 15



## DAC MODE SELECTION

| DACx_MODE | Control Port Mode Selection |
|---|---|
| Tied to DGND | I2C |
| Left Open | Hardware Mode |
| Tied to VCC3V3 | SPI |

Project :

AUD K2G

Designed for TI by Mistral Solutions Pvt Ltd

Title AUDIO DAC PCM1690

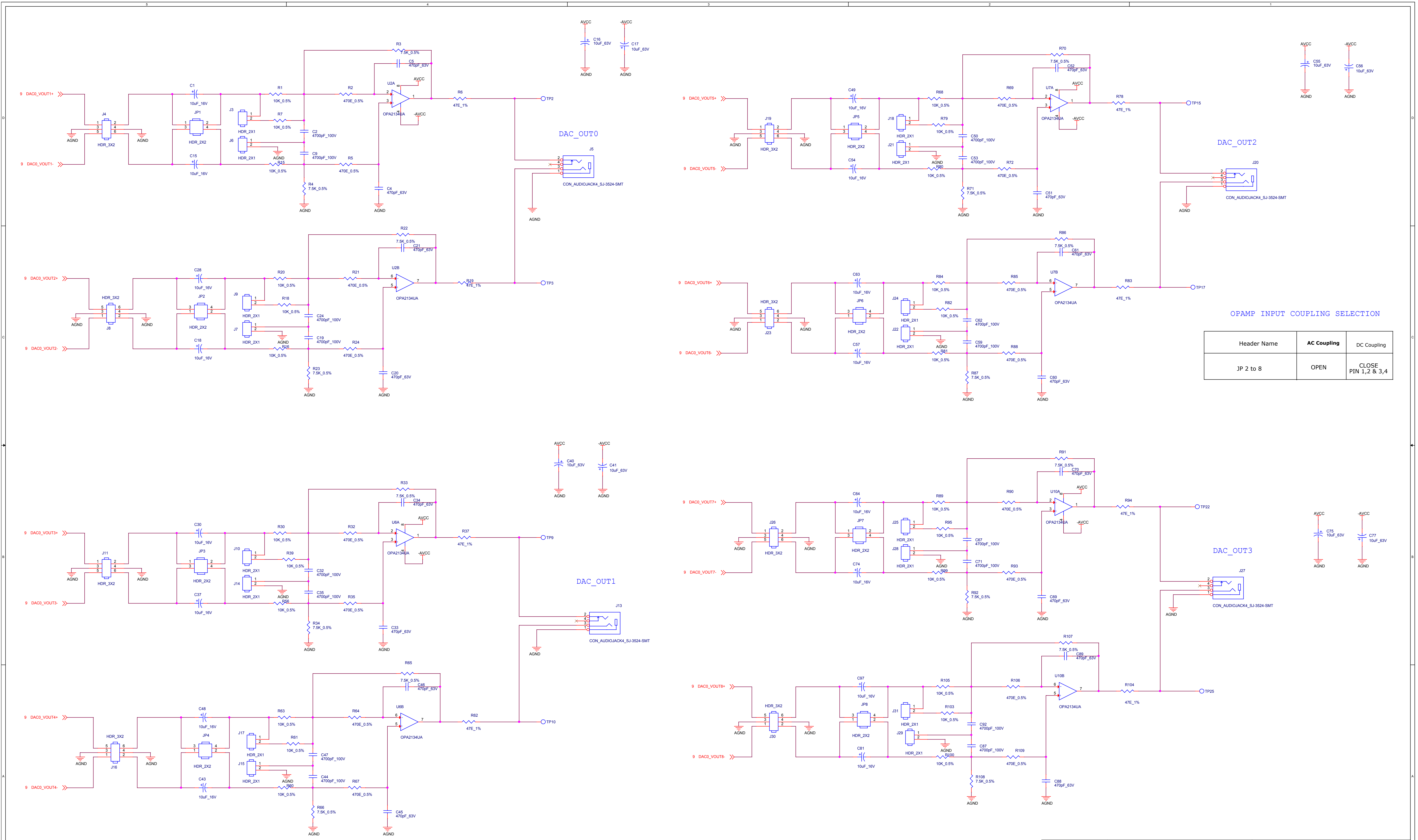
Size C

Document Number MS_TI_AUDK2G_SCH_REVB

Rev B

Date: Thursday, April 28, 2016

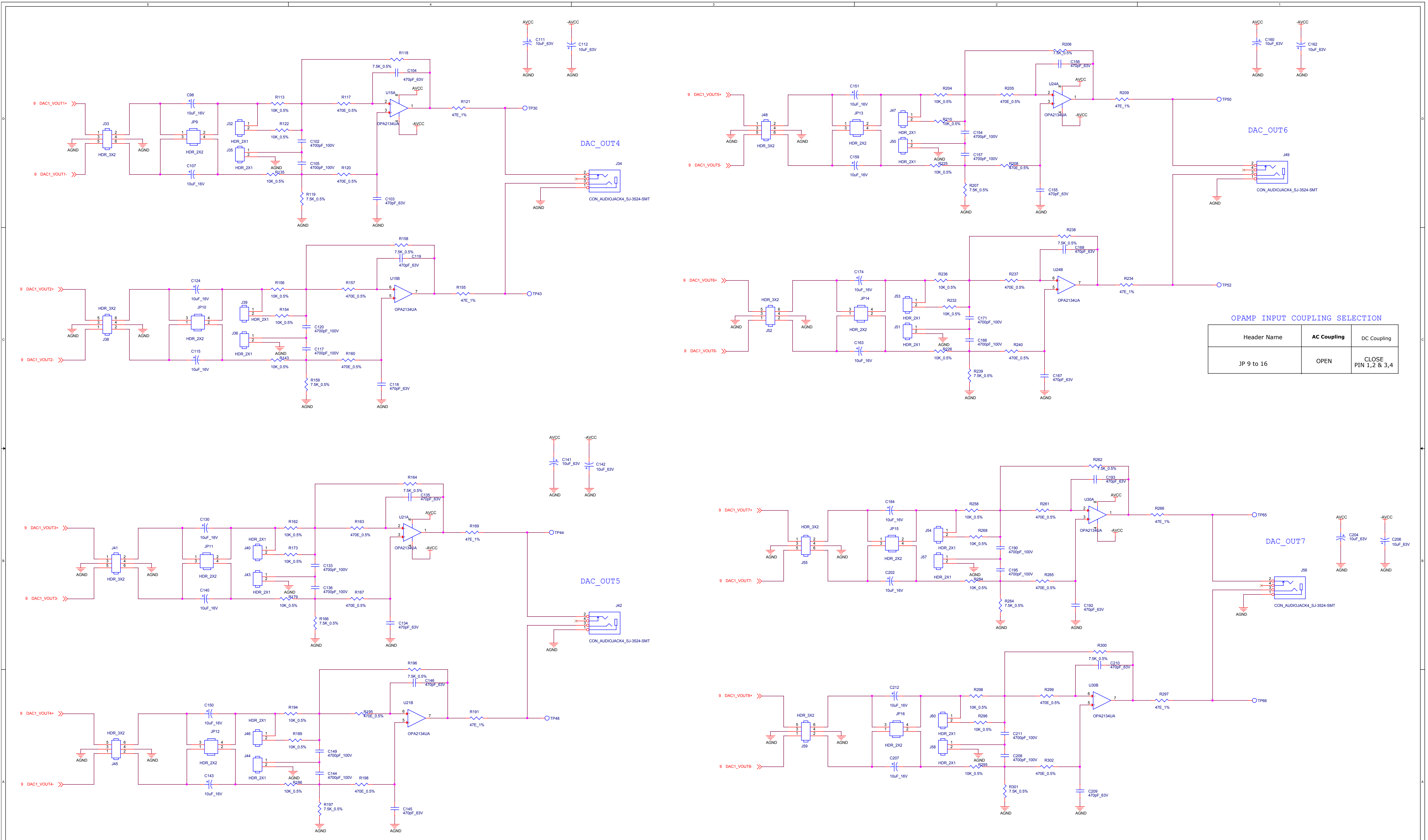
Sheet 9 of 15



## OPAMP INPUT COUPLING SELECTION

| Header Name | AC Coupling | DC Coupling |
|---|---|---|
| JP 2 to 8 | OPEN | CLOSE<br>PIN 1,2 & 3,4 |

| | | |
|---|---|---|
| Project :<br>AUD K2G | Designed for TI by Mistral Solutions Pvt Ltd | Title DAC0 LPF & BUFFERS |
| | | Size D |
| | | Document Number MS_TI_AUDK2G_SCH_REVB |
| | | Rev B |
| | | Date: Thursday, April 28, 2016 |
| | | Sheet 10 of 15 |



### OPAMP INPUT COUPLING SELECTION

| Header Name | **AC Coupling** | DC Coupling |
|---|---|---|
| JP 9 to 16 | OPEN | CLOSE<br>PIN 1,2 & 3,4 |

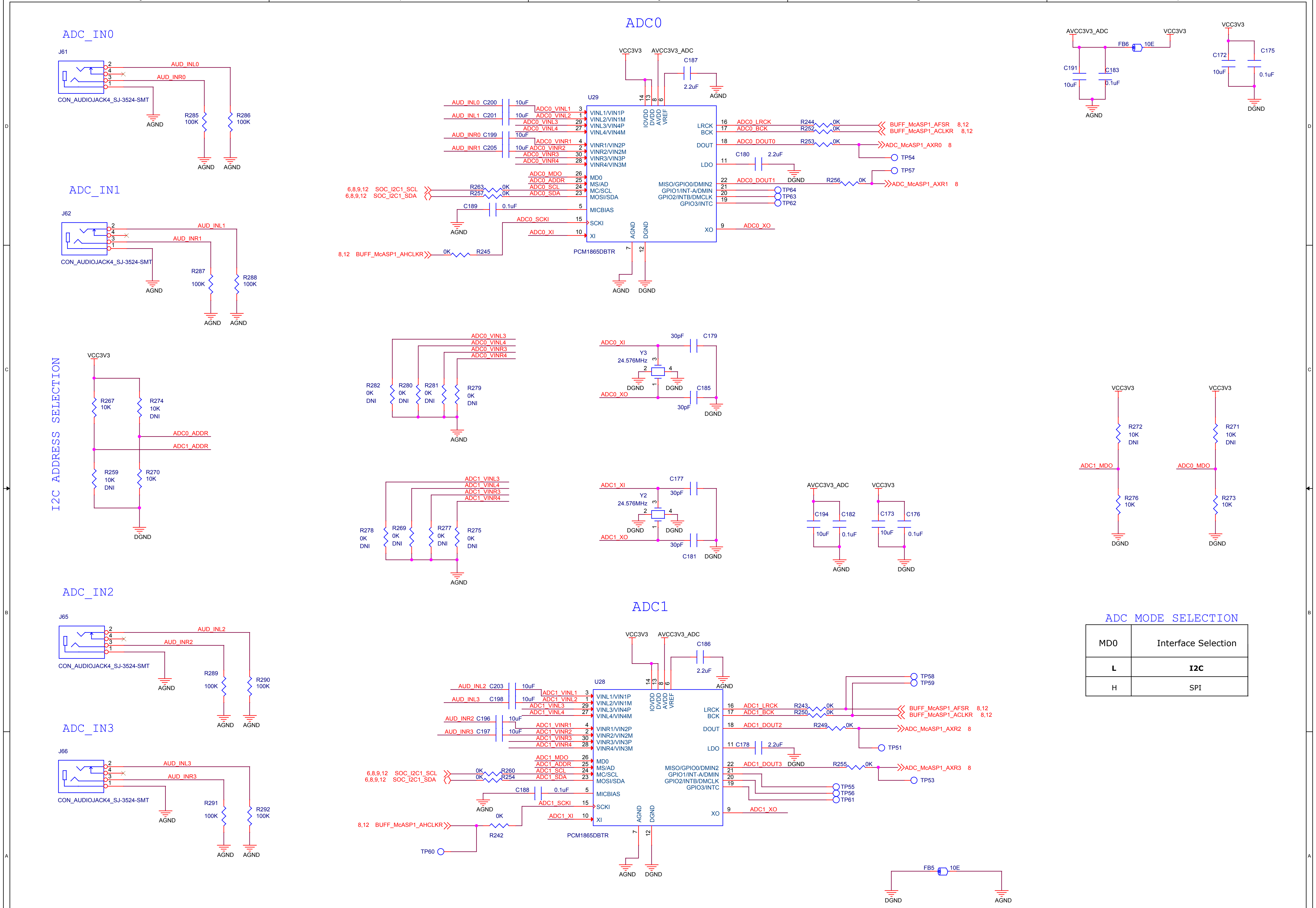
Project :
AUD K2G

Designed for TI by Mistral Solutions Pvt Ltd

Title DAC1 LPF & BUFFERS

Size D
Document Number MS_TI_AUDK2G_SCH_REVB
Rev B

Date: Thursday, April 28, 2016
Sheet 11 of 15



## ADC MODE SELECTION

| MD0 | Interface Selection |
|---|---|
| L | I2C |
| H | SPI |

Project :

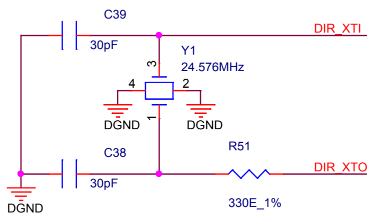
AUD K2G

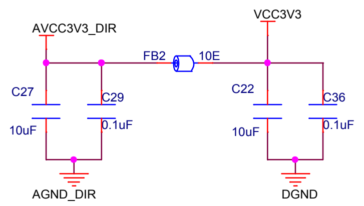
Designed for TI by Mistral Solutions Pvt Ltd

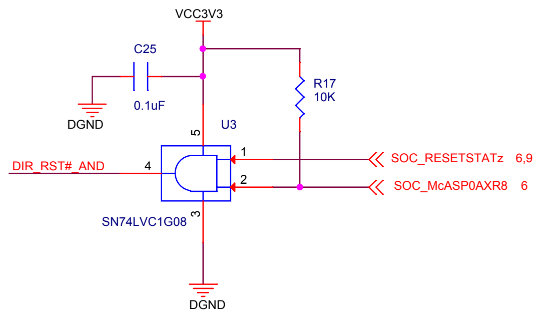
Texas Instruments

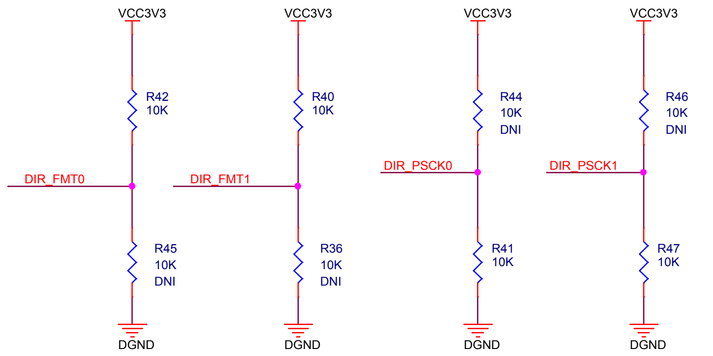
MISTRAL

| Title | AUDIO ADC PCM1865 | | |
|---|---|---|---|
| Size | Document Number | | Rev |
| C | MS_TI_AUDK2G_SCH_REVB | | B |
| Date: | Thursday, April 28, 2016 | Sheet 12 of 15 | |

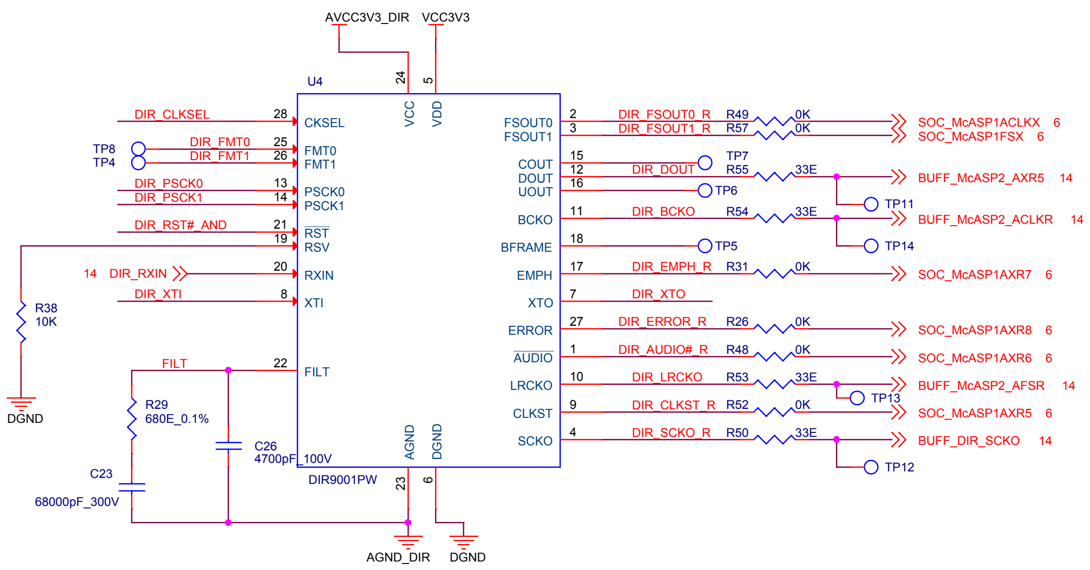








## DIR9001



### SERIAL AUDIO DATA OUTPUT FORMAT SELECTION

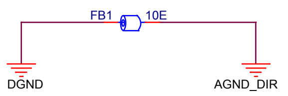
| FMT[1:0] SETTINGS | | DOUT SERIAL AUDIO DATA OUTPUT FORMAT |
|---|---|---|
| FMT1 | FMT0 | |
| L | L | 16-bit, MSB-first, right-justified |
| L | H | 24-bit, MSB-first, right-justified |
| H | L | 24-bit MSB-first, left-justified |
| H | H | 24-bit, MSB-first, I2S |

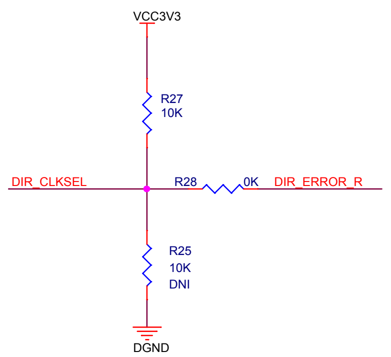
### SYSTEM CLK FREQUENCY OF PLL SELECTION

| PSCK[1:0] SETTING | | OUTPUT CLOCK FROM PLL SOURCE | | |
|---|---|---|---|---|
| PSCK1 | PSCK0 | SCKO | BCKO | LRCKO |
| L | L | 128 fs | 64 fs | fs |
| L | H | 256 fs | 64 fs | fs |
| H | L | 384 fs | 64 fs | fs |
| H | H | 512 fs | 64 fs | fs |

### LED STATUS TABLE

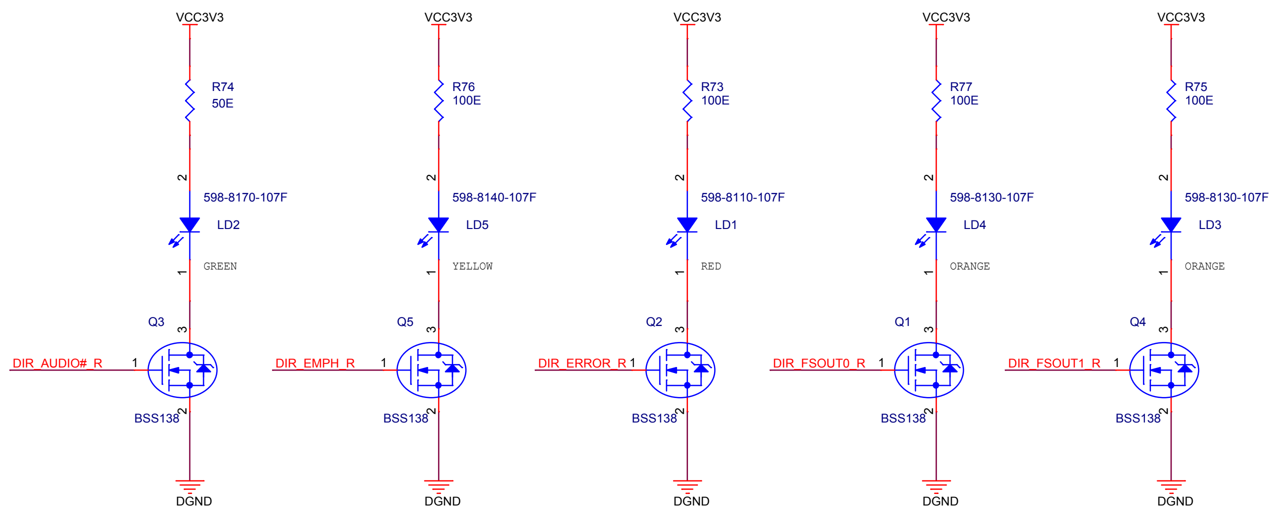
| STATUS | LED1 | LED2 | LED3 | LED4 | LED5 |
|---|---|---|---|---|---|
| Non Audio Sample Word | ON | OFF | OFF | OFF | OFF |
| Pre-Emphasis (50 ms/15 ms) | OFF | ON | OFF | OFF | OFF |
| Internal PLL or Data parity error | OFF | OFF | ON | OFF | OFF |
| Sample Frequency Result Output 0 | OFF | OFF | OFF | ON | OFF |
| Sample Frequency Result Output 1 | OFF | OFF | OFF | OFF | ON |





### DIR Operation Mode and Clock Source

| Operation Mode | CLKSEL | ERROR Pin Status | SCKO, BCKO, LRCKO CLOCK SOURCE |
|---|---|---|---|
| PLL | L | H | PLL (VCO) free-running Clock |
| | | L | PLL recovered clock |
| XTAL | H | H | XTAL clock |
| | | L | XTAL clock |
| **AUTO** | **Connected to ERROR Pin** | H | XTAL clock |
| | | L | PLL recovered clock |



Project :

AUD K2G

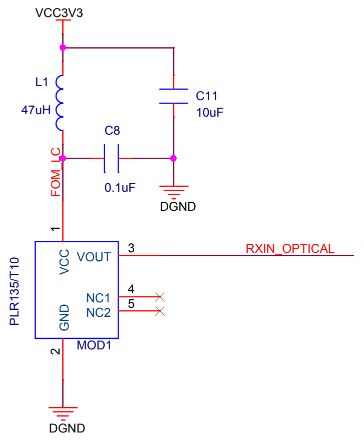
Designed for TI by Mistral Solutions Pvt Ltd

Texas Instruments

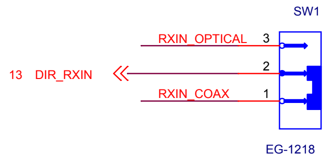
MISTRAL

| | |
|---|---|
| Title | DIGITAL AUDIO RECEIVER |
| Size | C |
| Document Number | MS_TI_AUDK2G_SCH_REVB |
| Rev | B |
| Date: | Thursday, April 28, 2016 |
| Sheet | 13 of 15 |

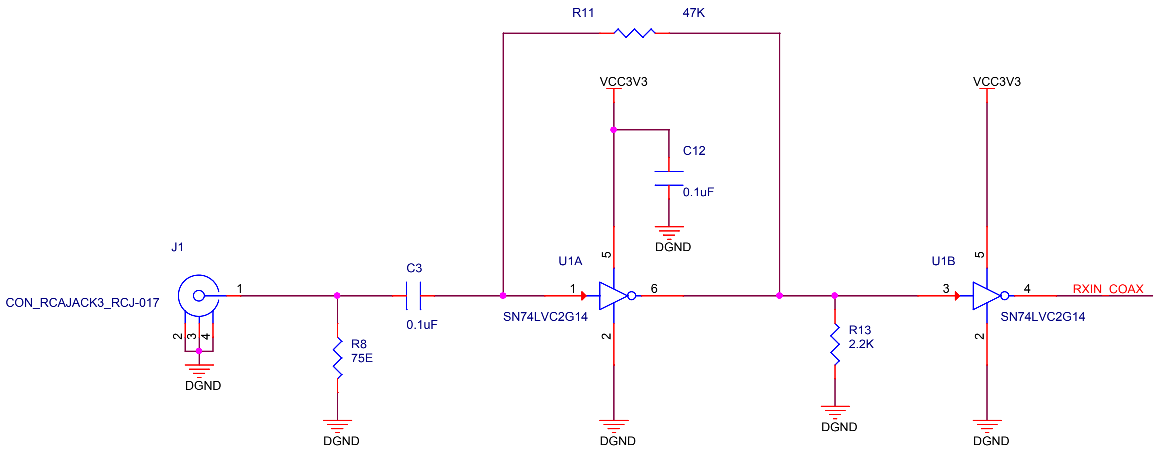
## FIBER OPTIC RECEIVER MODULE



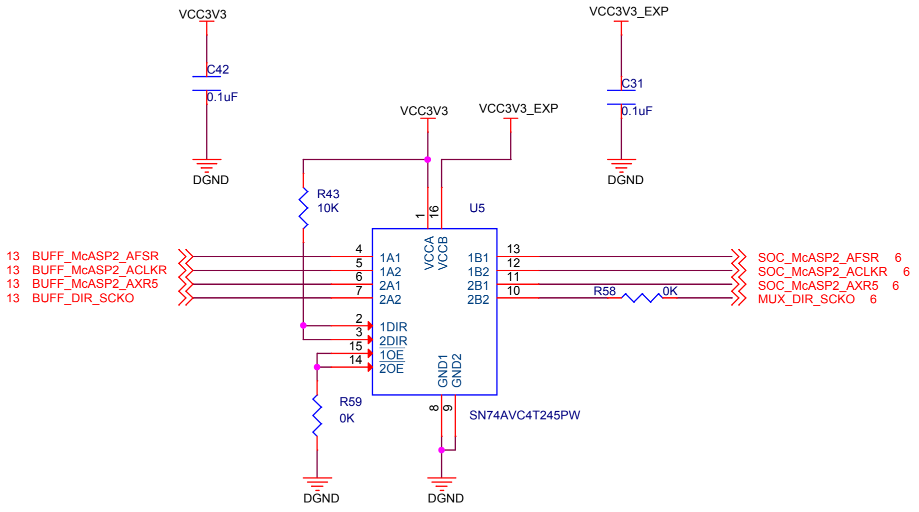
## INPUT SELECTION SWITCH



## COAXIAL RCA CONNECTOR & LINE DRIVER

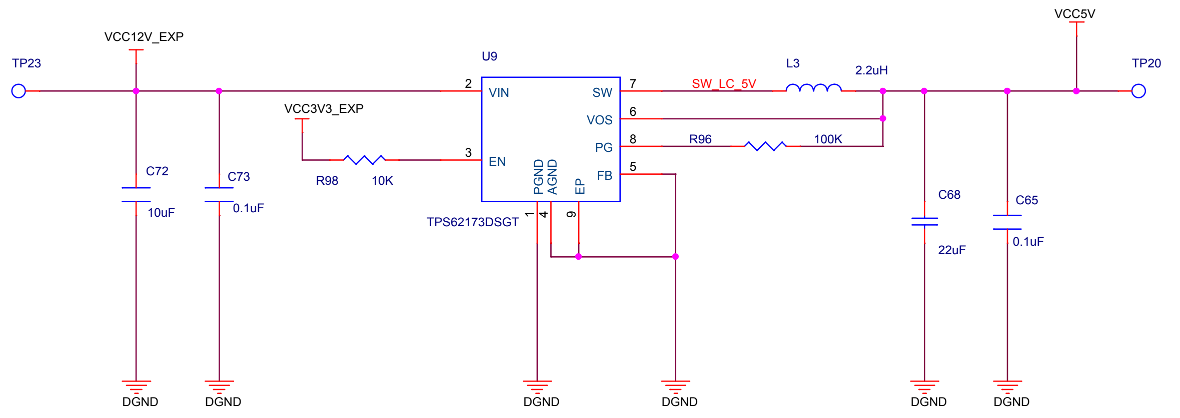


## DIR CLOCK AND DATA BUFFER

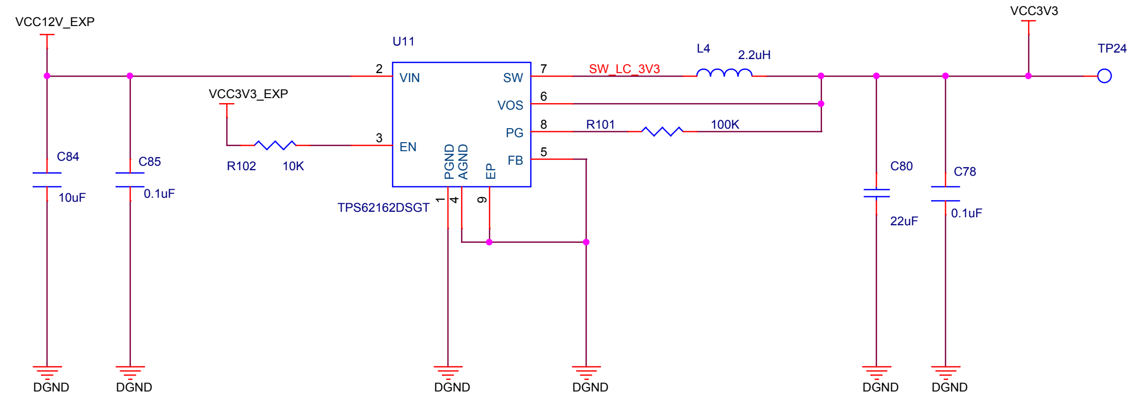


| | | | | |
|---|---|---|---|---|
| Project : | Designed for TI by Mistral Solutions Pvt Ltd | Title | DIR OPTICAL & COAXIAL INPUT | |
| AUD K2G | | Size | Document Number | Rev |
| | | C | MS_TI_AUDK2G_SCH_REVB | B |
| | | Date: | Thursday, April 28, 2016 | Sheet 14 of 15 |

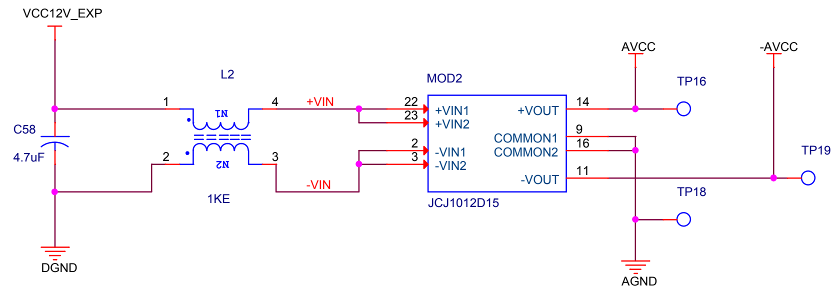
# 12V TO 5V SUPPLY

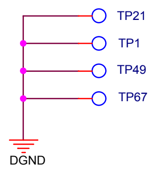


# 12V TO 3.3V SUPPLY



# OPAMP POWER +/-15V





| | | | |
|---|---|---|---|
| Project :<br>AUD K2G | Designed for TI by Mistral Solutions Pvt Ltd | Title | OPAMP POWER |
| | | Size<br>C | Document Number<br>MS_TI_AUDK2G_SCH_REVB |
| | | Rev | B |
| | | Date: | Thursday, April 28, 2016 |
| | | Sheet | 15 of 15 |

## 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
Copyright © 2017, Texas Instruments Incorporated