

# TAS5414CEVM User Guide

## User's Guide



Literature Number: SLOU359  
January 2013

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## TAS5414C EVM User Guide

The TAS5414C/TAS5424C evaluation module (EVM) is intended to be used to demonstrate the capabilities of the device. All the device features can be accessed through the hardware and the software graphical user interface (GUI) supplied. This user's guide contains a description of the EVM and the GUI. Included are the EVM schematics, bill of materials, and the board layout.

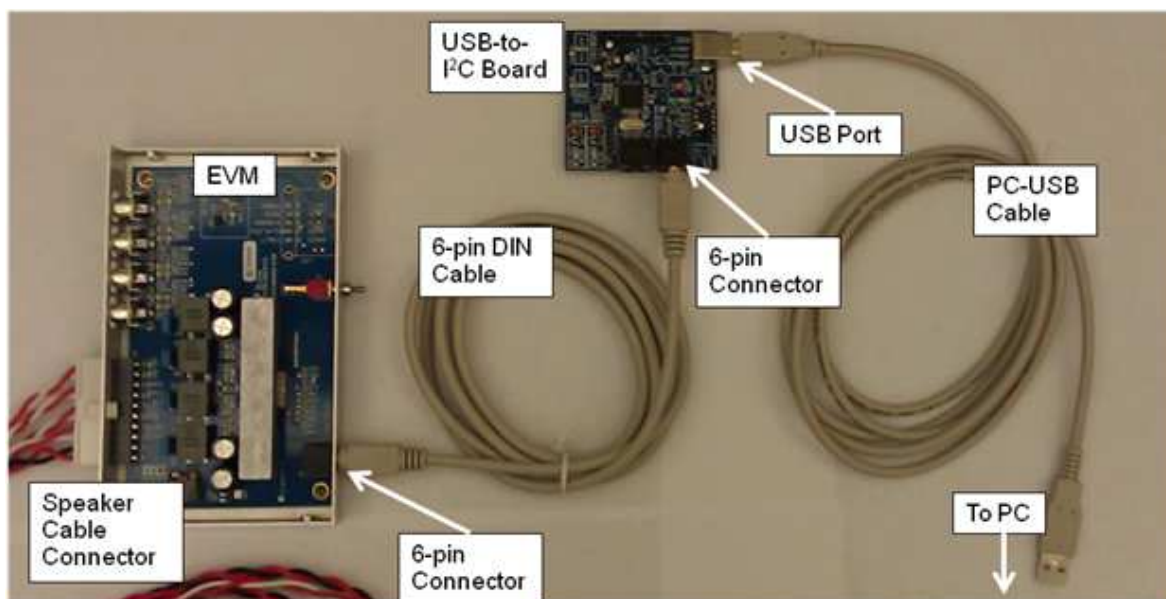
### 1 Quick-Start Guide

This section provides a guide to set up and power up the EVM without the details of its operation. For a more-detailed description, read the complete user's guide.

#### 1.1 Overview

The EVM consists of a single printed circuit board (PCB) mounted inside a metal chassis for EMC testing. The EVM must have an external I<sup>2</sup>C controller board to function. The USB-to-I<sup>2</sup>C controller board connects to a personal computer (PC) through a USB cable. The EVM connects to the I<sup>2</sup>C controller through a supplied 6-pin DIN cable. The PC needs the graphical user interface (GUI) software to control the EVM. See [Figure 1](#) for the device connections.

Software is available on the enclosed CDrom and provides the GUI, this document, and any other necessary documents. Hardware provided in the EVM modules consists of the EVM, an I<sup>2</sup>C controller board, a USB cable, a 6-pin DIN cable, and speaker cables.



**Figure 1. EVM to I<sup>2</sup>C Device Connections**

#### 1.2 Software Installation

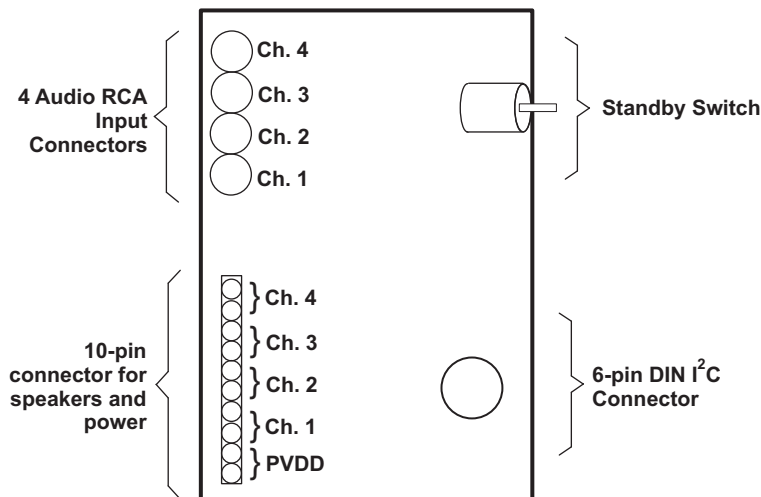
The software is provided on the TI Web site. Run the setup.exe program to install the GUI. For more details, see [Section 1.5, Basic Graphical User Interface Controls](#).

### 1.3 Connections

The connections are for an analog signal for the input, speaker loads, power, and I<sup>2</sup>C. The audio inputs are made through the four RCA connectors. The power connectors and speaker connectors are made using the 10-pin connector.

The I<sup>2</sup>C connections are made through a 6-pin DIN connector. The provided adapter PCB and cable connect the EVM to the PC. The adapter PCB is an I<sup>2</sup>C-to-USB converter, which is a human-interface device (HID) and is automatically recognized by the PC when connected. Therefore, no drivers are needed.

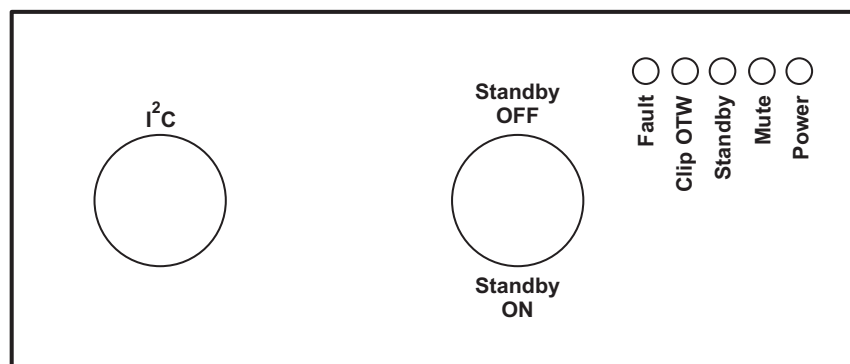
The basic connections are: PVDD or power is connected to the EVM through the supplied 10-pin connector with the twisted red and black wires. The speakers or loads are also connected through the same 10-pin connector with the twisted red and white wires. The 6-pin DIN is connected to the I<sup>2</sup>C-to-USB adapter board. See [Figure 2](#) for EVM input details.



**Figure 2. Connections for Input, Speaker Loads, Power, and I<sup>2</sup>C**

### 1.4 Initial Power Up

Before applying power, check to make sure the standby control switch is in the Standby OFF position, as shown in [Figure 3](#). If the switch is in the Standby ON position, then at power up the I<sup>2</sup>C LED indicator on the GUI is red (see [Section 3.4.3](#) for more details).



**Figure 3. End Panel for I<sup>2</sup>C Connections**

Apply power: the Standby, Mute, and Power LEDs should be on. The Fault LED may also be on, but not necessarily. This indicates that the unit is powered, and the TAS5414C or TAS5424C is in Standby Mode and Mute Mode. The fault indicated is an undervoltage fault during power up. This is normal and is cleared by reading I<sup>2</sup>C Register 0x00 (the Read Faults button) twice. Reading the faults once clears the faults, and the second read is to ensure that all the faults have been cleared.

## 1.5 Basic Graphical User Interface Controls

The default state for the device is mute. To unmute, click the Play All button at the top left of the window. To mute, click the Mute All button. The main EVM window is shown in [Figure 4](#).

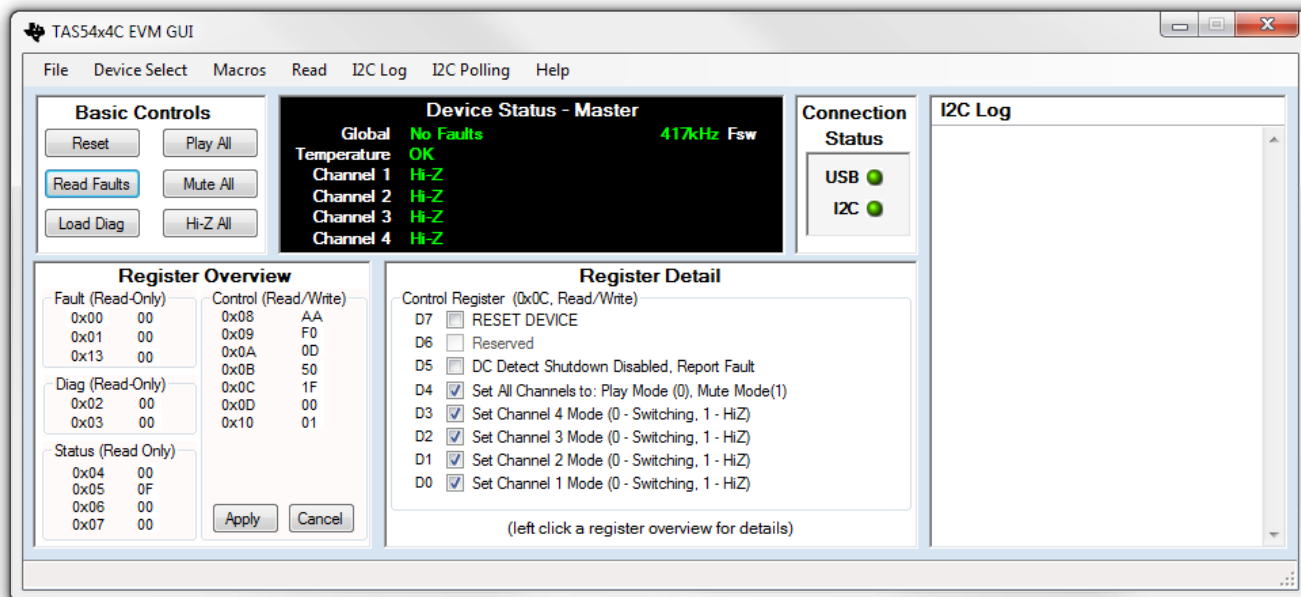


Figure 4. Main Window

## 2 EVM Description

### 2.1 Description of Inputs

#### 2.1.1 Analog Inputs

The TAS5424C EVM provides balanced input and the TAS5414C EVM provides unbalanced (single-ended) inputs. The four RCA jacks on either EVM are provided for the audio input. The unbalanced inputs have the shield of the RCA connected to ground. The balanced inputs have the plus (+) input on the center pin of the RCA and the minus (-) input on the shield. The balanced ground can be connected to the chassis or Power- (GND).

#### 2.1.2 Power

The EVM requires one dc power connection. The connection is made through a 10-pin supplied connector. The black wire is ground and the red wire is connected to PVDD, which can range from 6 to 24 Vdc.

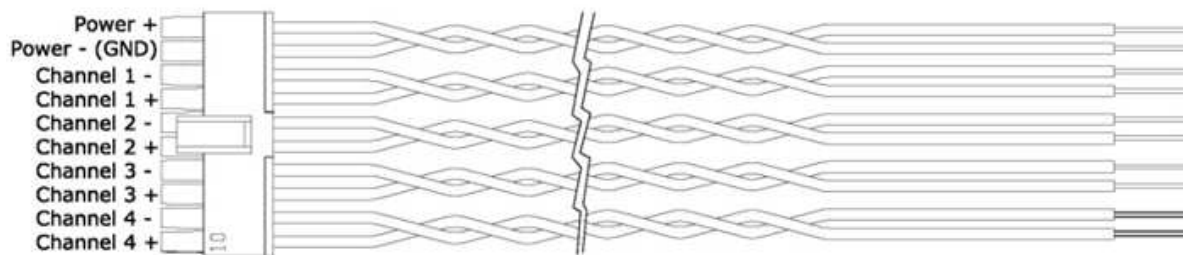
## 2.2 Description of Outputs

### 2.2.1 Speaker and Power Connections

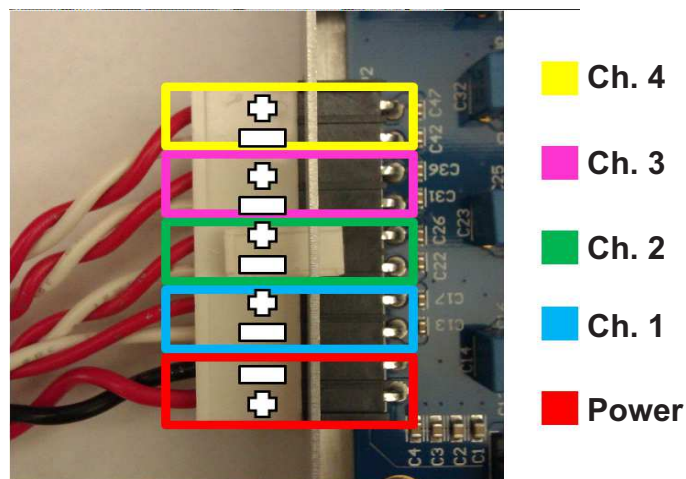
The 10-pin connector on the EVM and the wiring harness provide the power connections and the speaker connections. The power connection consists of a pair of red and black twisted wires, which correspond to the plus (+) output and minus (-) output, respectively. This pair of wires must be attached to a power supply.

The speaker connections consist of the remaining four pairs of red and white twisted wire. Each pair of red and white wires corresponds with a channel. The red wire corresponds to the plus (+) output, and the white wire corresponds to the minus (-) output. These wires must be terminated to a speaker load or resistive load.

See [Figure 2](#) for more details on the 10-pin connector on the EVM, [Figure 5](#) for more details about the speaker cables, and [Figure 6](#) for the speaker cables connection to the EVM.



**Figure 5. Wiring Harness for Power and Speaker Connections**



**Figure 6. Power and Speaker Connections to the EVM**

**NOTE:** Do not connect any of the speaker outputs to ground. The TAS5414C and TAS5424C have full bridged outputs; connecting to ground triggers a fault.

The outputs can be paralleled by connecting the plus (+) of one channel to the plus (+) of the other channel. The minus (-) connection of one channel and the minus (-) connection of the other channel must be connected also. See the data sheet for more details on parallel outputs (PBTl).



## 2.3 Controls

### 2.3.1 Standby

The standby switch is located next to the 6-pin DIN I<sup>2</sup>C input connector. Having the toggle in the Standby ON position forces the TAS5414C or TAS5424C into the standby mode. This is the same as a power-on reset (POR). POR shuts down the device, and I<sup>2</sup>C is not functional.

Setting the switch to the Standby OFF position puts the device in the EVM into its default power up mode. The I<sup>2</sup>C registers are set to their defaults. The amplifier output is in Hi-Z mode.

## 2.4 Indicator Description

There are five LED indicators on the chassis next to the standby switch. The LED farthest away from the standby switch is for the 3.3 Vdc supply. The 3.3 V supply is needed for the LEDs and the standby circuit. The other four LEDs indicate the four non-I<sup>2</sup>C output pins: FAULT, CLIP\_OTW, STANDBY, and MUTE. The FAULT and CLIP\_OTW signals are also routed to the 6-pin DIN for the GUI. In normal play mode, these four LEDs should not light.

## 3 Graphical User Interface

### 3.1 Introduction

The TAS5414C/TAS5424C GUI software is designed to demonstrate the features of the TAS5414C and TAS5424C. It is also able to assist the applications programmer in generating and saving the desired operating characteristics.

The TAS5414C/TAS5424C GUI has a feature by which it can log the I<sup>2</sup>C data being sent to the device. This can be helpful to the programmer in understanding the I<sup>2</sup>C commands needed for proper function.

### 3.2 Software Installation

The GUI software is available on the CDrom provided with the EVM. Run the setup.exe program on a personal computer (PC) with the Windows OS to install the GUI.

The software is currently supported up to Windows XP and is not supported by Windows 7.

The PC may need to connect to the internet to download the Microsoft .Net 2.0 environment, if it is not already on the PC.

### 3.3 Hardware Installation

In the EVM package is a small PCB labeled USB2IIC2 on the PCB. This is the USB-to-I<sup>2</sup>C converter to communicate from the PC to the EVM. Connect the USB cable to the PC and the PCB. Connect the 6-pin cable to the connector labeled I<sup>2</sup>C on the converter PCB to the 6-pin connector on the EVM. The USB connection provides power for this card. The PC should automatically connect to the USB-connected PCB. See [Figure 1, EVM to I<sup>2</sup>C Device Connections](#), for more details.

## 3.4 Using the GUI

### 3.4.1 The Main Window

#### 3.4.1.1 TAS5414C Control Panel

The control panel consists of six buttons that perform basic functions on all four channels.

**Reset:** This button sends a software reset to the device via I<sup>2</sup>C. It is equivalent to sending 0x9F to register 0x0C. All the I<sup>2</sup>C defaults are restored.

**Read Faults:** This button reads the two fault registers 0x00 and 0x01 and reports the data to the Device Status Panel.

**Load Diag:** This button runs a script to perform the built-in load diagnostics and reports any faults to the Device Status Panel. The details are displayed for each channel.

**Play All:** This button uses I<sup>2</sup>C to write 0x00 to register 0x0C which places all four channels into play mode.

**Mute All:** This button uses I<sup>2</sup>C to set all channels to mute mode by writing 0x10 to register 0x0C. All channels switch at 50% duty cycle, and no signal will pass from the input to the output.

**Hi-Z All:** This button places all four channel outputs into a high-impedance state by writing 0x1F to register 0x0C. The device is first placed in mute. The Low-Low state is then invoked. Lastly, the outputs are placed in Hi-Z.

### 3.4.2 Device Status Panel

**Device Panel Title:** The title at the top of the Device Status Panel shows which device the GUI is set to communicate. The four options are: Master, Slave1, Slave 2, and Slave 3. This is changed in the menu item Device Select.

**Global:** This provides fault feedback from the device. If a fault occurs a red Fault is indicated. Read the fault detail in the register 0x00 and 0x01.

**Temperature:** This shows the temperature of the device. When the device is below 125°C, the color is green. At Level 1 OTW, the color is yellow. At Level 2 OTW, the color is orange. At Level 3 OTW, the color is red.

**Channel 1-4:** These four items provide individual channel output states: Hi-Z, Mute, Low-Low, and Play. The gain setting will be displayed with the play indication.

**Fsw:** This item provides the switching frequency of the outputs.

### 3.4.3 Connection Status Panel

There are two LED indicators to provide connection status.

**USB:** This indicator is gray when there is no USB connection to the USB2II2C PCB. The I<sup>2</sup>C LED is off. The indicator is green when a connection is good.

**I<sup>2</sup>C:** This indicator is red when there is a USB connection, but no I<sup>2</sup>C connection. A green indicator shows that I<sup>2</sup>C communication is functioning properly. If the LED is off, then there is no USB connection.

### 3.4.4 I<sup>2</sup>C Log Panel

All the I<sup>2</sup>C commands that are sent or received by the TAS5414C and TAS5424C are shown in this panel except for I<sup>2</sup>C polling information. The displayed data can be copied to the clipboard for a programming aid.

This type of information can be controlled by the I<sup>2</sup>C Log menu item. An R indicates a value read from the device and a W indicates a value sent to the device. Valuable comments are also provided. Polling I<sup>2</sup>C reads are not shown to prevent over-running the panel with background reads. See [Section 3.4.7](#) for further details on each tab.

### 3.4.5 Register Overview Panel

This panel provides the hexadecimal (hex) data for each I<sup>2</sup>C register. The hex data in the control registers can be directly changed here and sent to the device with the Apply button. Any changes made to the data are cleared by clicking the Cancel button. The Register Detail panel is changed either by changing the hex value of the register directly or by clicking on the register and changing the specific bit in the Register Detail panel. (See [Section 3.4.6](#))

### 3.4.6 Register Detail Panel

This panel provides a detailed view of each register. By clicking on a register in the Register Overview panel, the details of that register are shown. Each bit has its description and its value shown by the checkbox. A checkbox with a check mark indicates a logical 1 and an unchecked checkbox indicates a logical 0. Changes to each bit can be made by clicking on the checkbox. The changes are sent to the device by clicking on the Apply button in the Register Overview panel.

### 3.4.7 Menu

**File:** In this menu, the Exit function can be found at the bottom of the drop-down menu.

**Device Select:** The I<sup>2</sup>C device select value can be changed in the Menu. For the EVM, use the default value, which is Master.

**Macros:** In this menu, macros can be used. Macros are currently not being implemented at this time.

**Custom Macros:** This allows the users to create then save their own macros for later use.

**Preloaded Macros:** This menu item provides a list of built-in macros to perform typical I<sup>2</sup>C routines.

**Read:** The Read panel controls are located in this menu:

**Fault Registers:** When selected, the values of the fault registers are displayed in the I<sup>2</sup>C log. Note that reading fault registers is different from reading faults. The data in a fault register is cleared on read. The actual value displayed may show the fault, but the value in the device register will be cleared. A second read of the fault registers will show a cleared fault register.

**Load Diagnostic Registers:** When selected, the values of the load diagnostic registers are read.

**Status Registers:** When selected, the values of the status registers are read.

**Control Registers:** When selected, the values of the control registers are read.

**All Registers:** When selected, the values of all the registers are read.

**Options:** The Options panel controls are located in this menu:

**Crosstalk Compensation Enabled:** When selected, Crosstalk is optimized. When this option is disabled, the standard operation optimizes PSRR.

**180 Phase Difference:** When selected, the channels switch at 180° phase difference

**Switching Frequency:** When selected, the switching-frequency setting for AM avoidance can be changed to 357 kHz or 500 kHz.

**All Channels Gain:** When selected, the gain on all the channels can be changed to 12 dB, 20 dB, or 32 dB.

**I<sup>2</sup>C Log:** The I<sup>2</sup>C Log panel controls are located in this menu:

**Enabled:** When selected, this menu option shows the I<sup>2</sup>C Log panel. When disabled, the I<sup>2</sup>C Log panel is hidden.

**Show I<sup>2</sup>C Reads:** When selected, this menu option shows the values read from the device. These are indicated with an R.

**Show I<sup>2</sup>C Writes:** When selected, this menu option shows the values that are sent to the device. These are indicated with a W.

**Show Comments:** When selected, this menu option shows the comments. The comments are not shown when this item is not selected.

**Clear:** This menu item clears the log data. The data is lost.

**I<sup>2</sup>C Polling:** The I<sup>2</sup>C Polling panel controls are located in this menu:

**Enabled:** When selected, the I<sup>2</sup>C actively samples the status registers specifically. When I<sup>2</sup>C Polling is disabled, there is no guarantee that the register readings are valid.

**Rate:** When selected, the poll rate can be changed (in ms). The default setting is 250 ms.

**Help:** This menu item provides four items:

**About:** This provides the revision level of the software.

**User Guide:** This opens the User Guide in the Adobe<sup>TM</sup> Acrobat<sup>TM</sup> Reader<sup>TM</sup>. Acrobat Reader needs to be available on the PC.

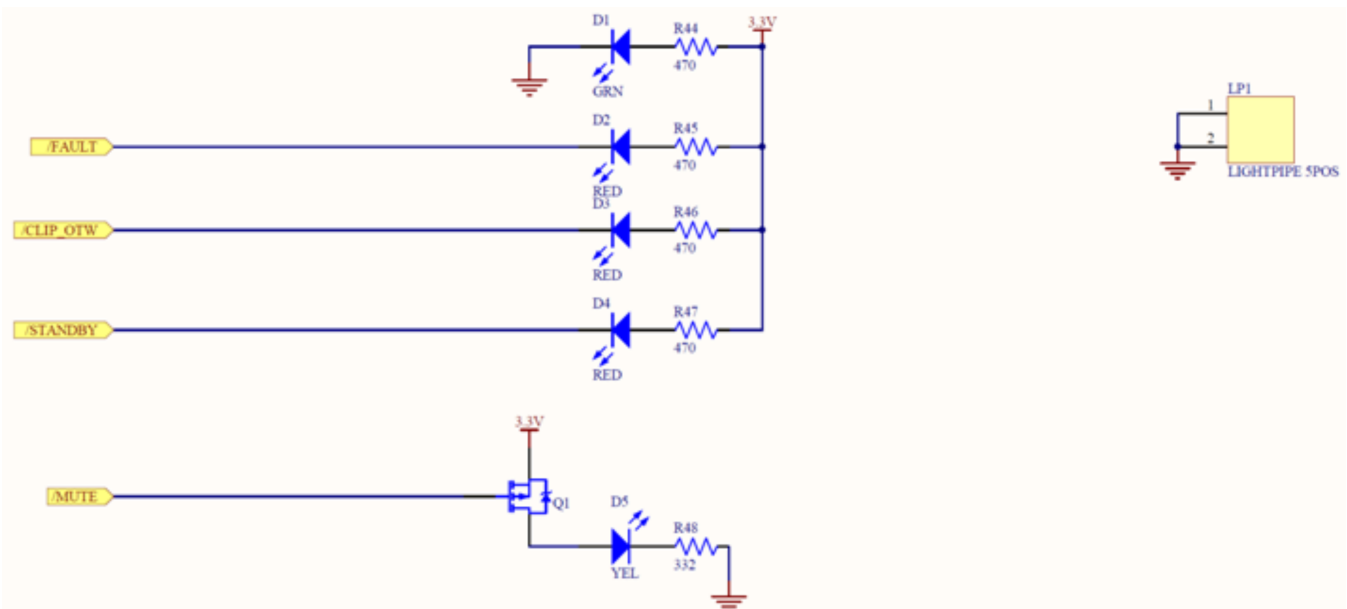
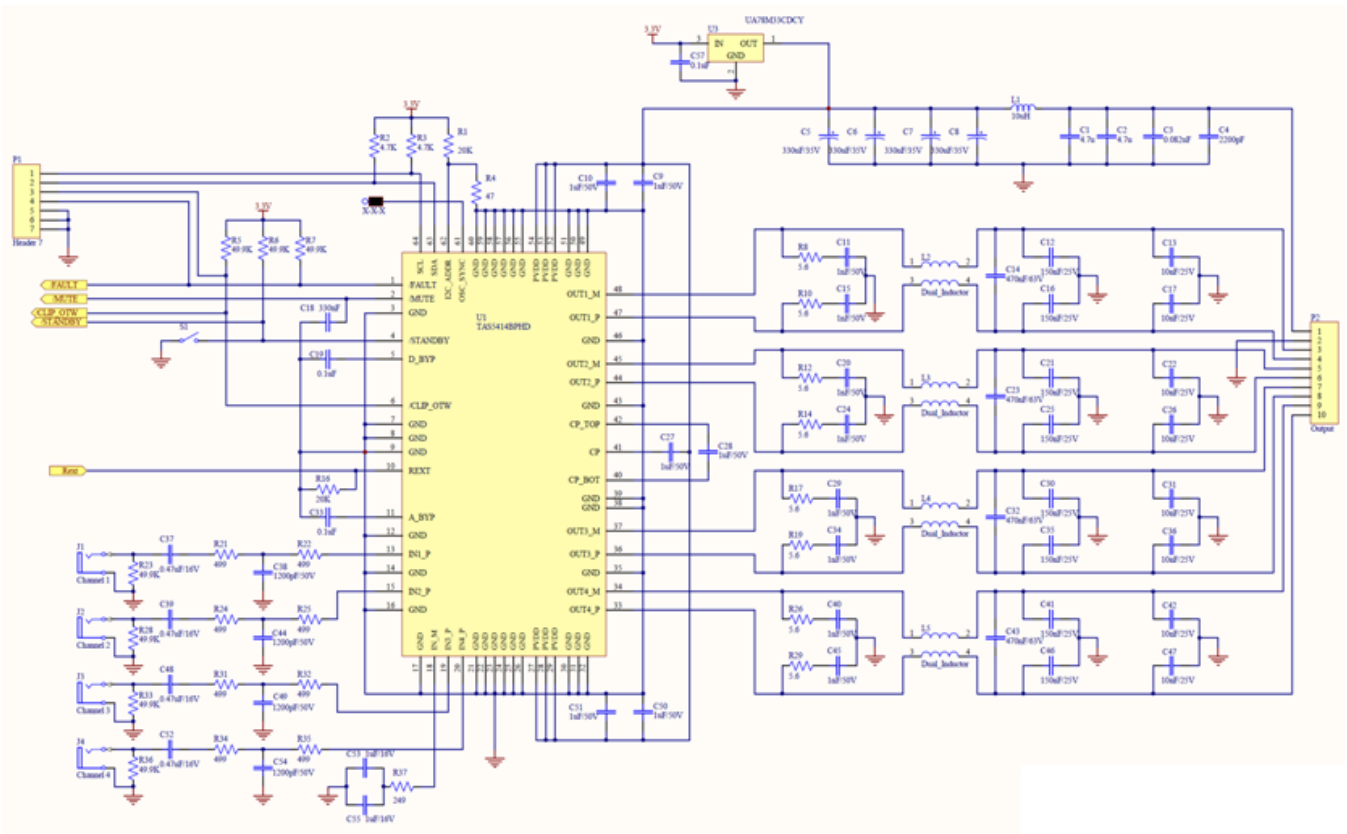
**Device Webpage:** This opens the TAS5414C/TAS5424C web page at the Texas Instruments Web site in the default browser. The most-current data sheets, application reports, and GUI software is available for downloading.

**Check for EVM Updates:** This checks to see if any new updates of the GUI are available.

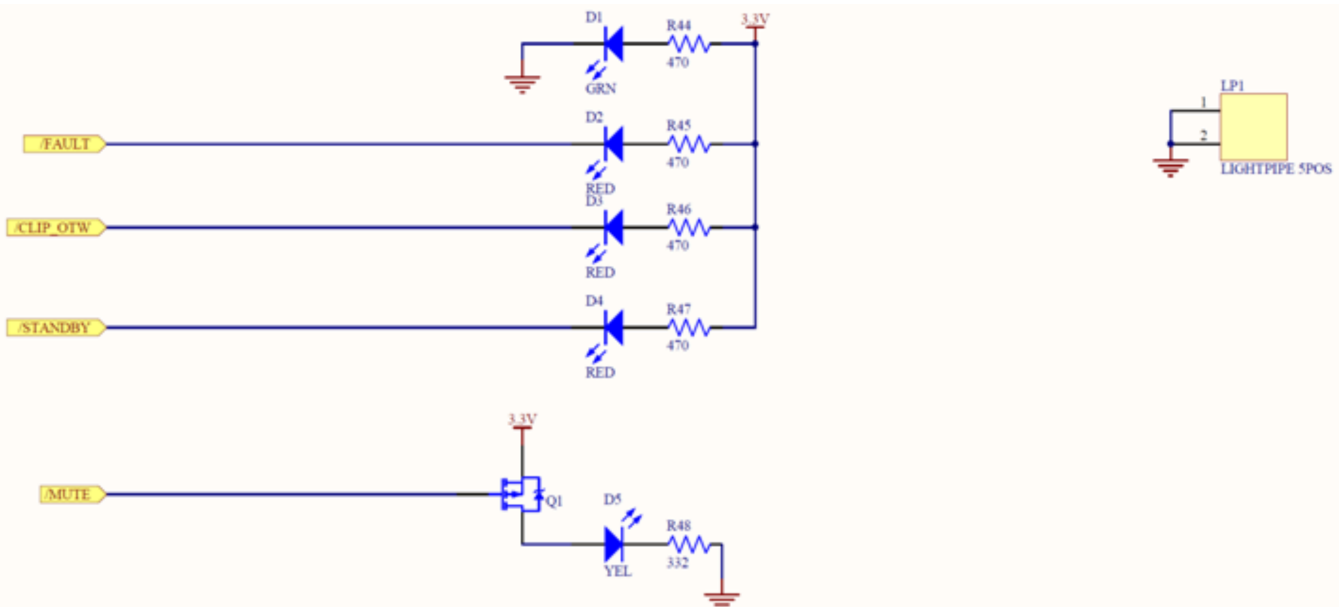
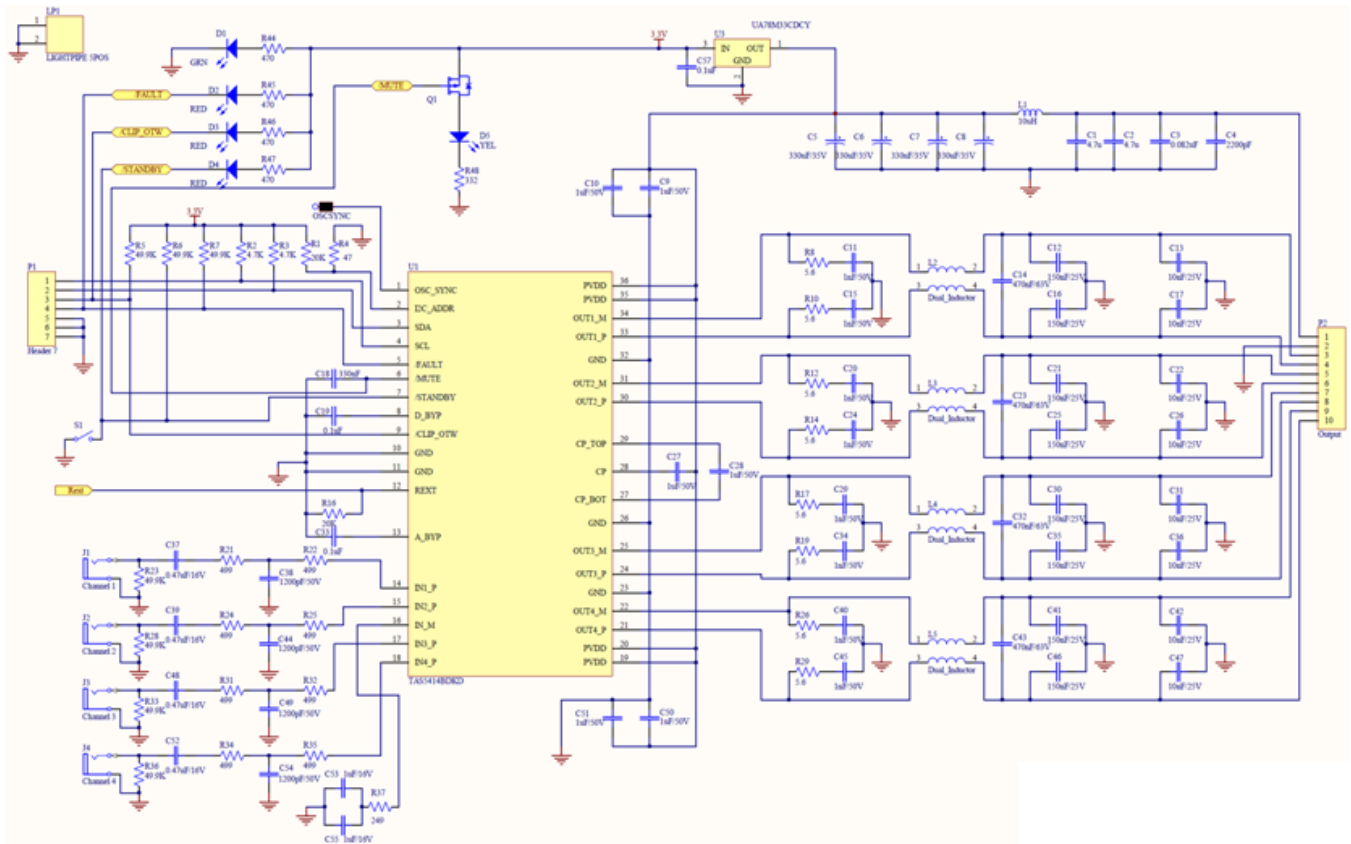
#### 4 TAS5414/TAS5424C EVM Schematics

The schematics for the TAS5414CPHD, TAS5414CDKD, and TAS5424CDKD are shown on the following pages.

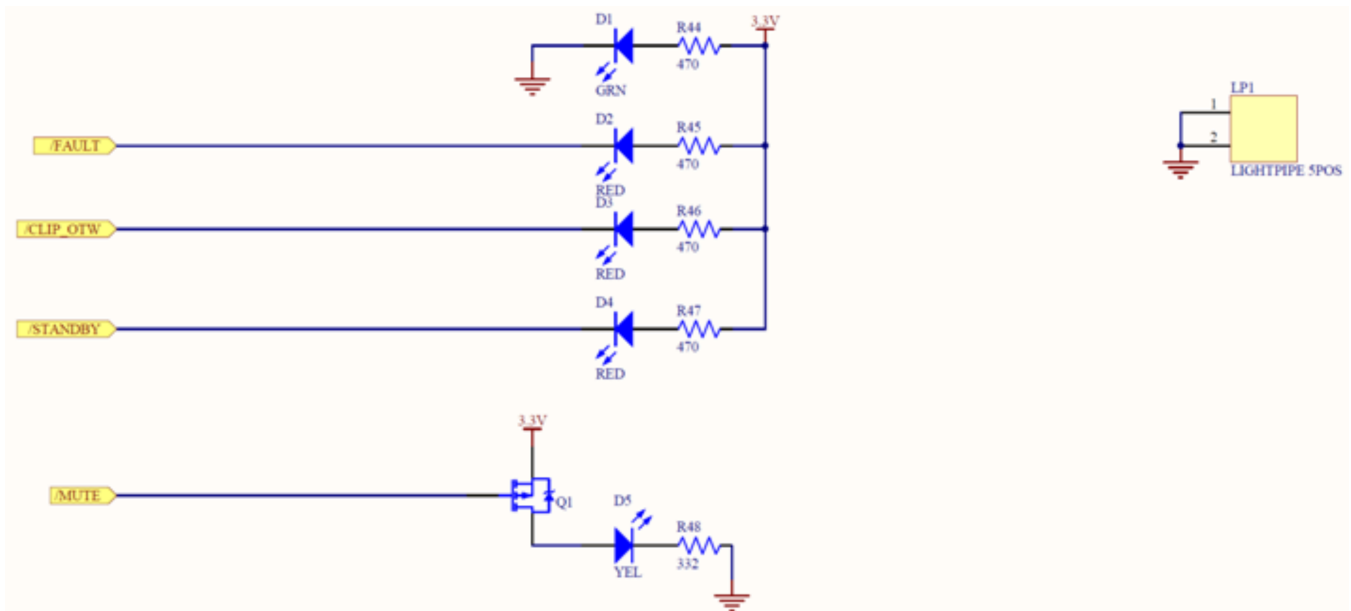
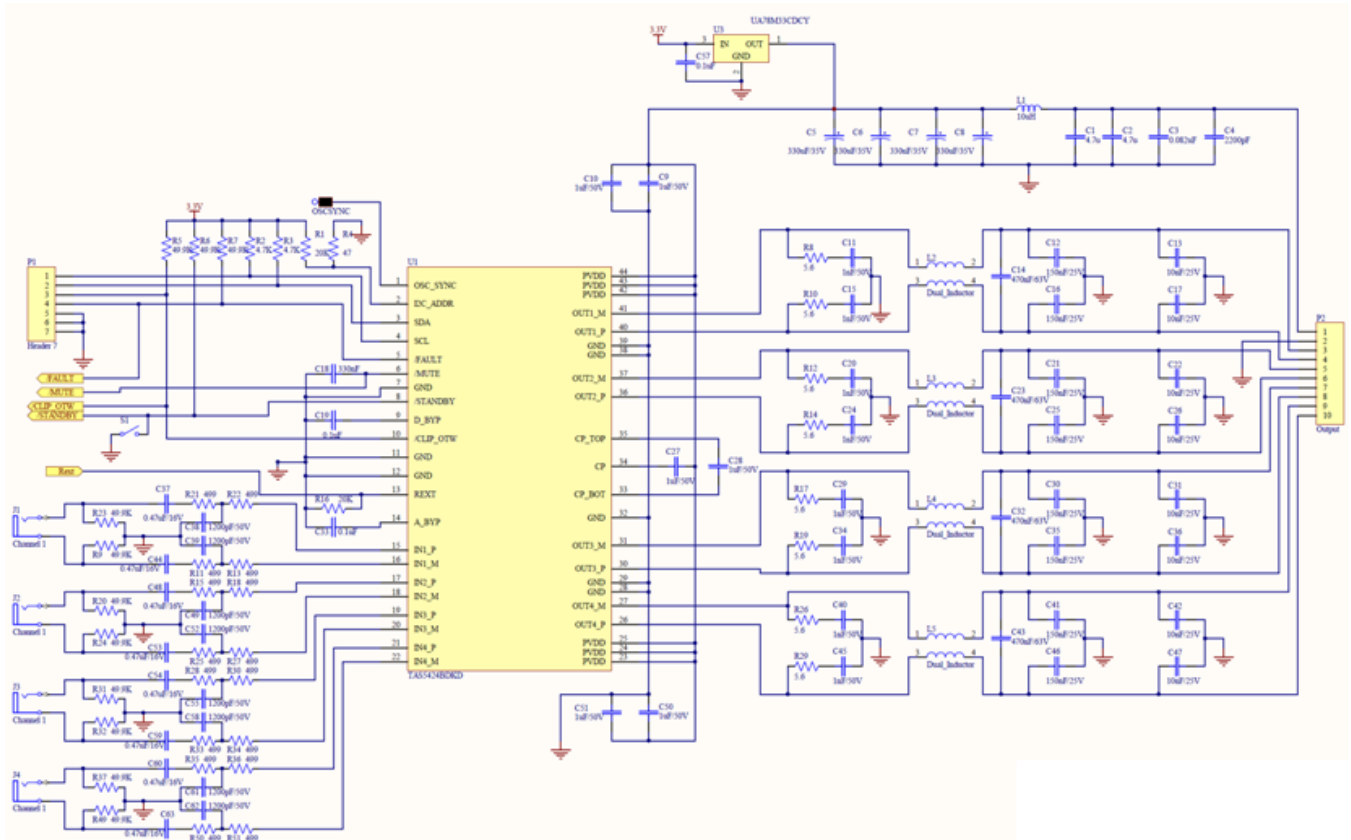
TAS5414CPHD EVM Schematics



TAS5414CDKD EVM Schematics



**TAS5424CDKD EVM Schematics**





## 5 Board Layouts

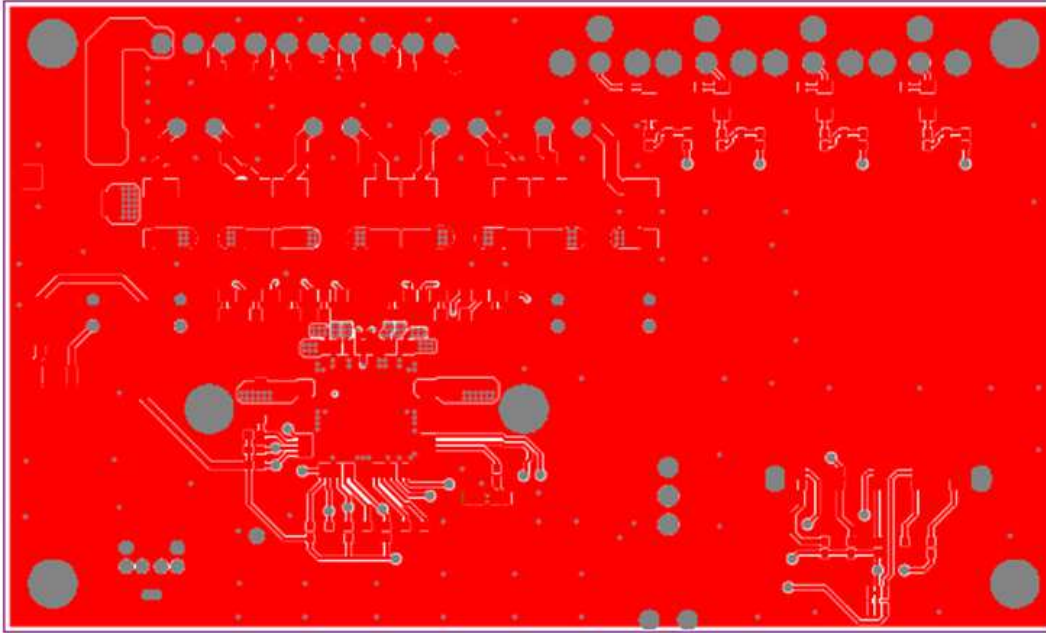


Figure 7. TAS5414CPHD Top Layer

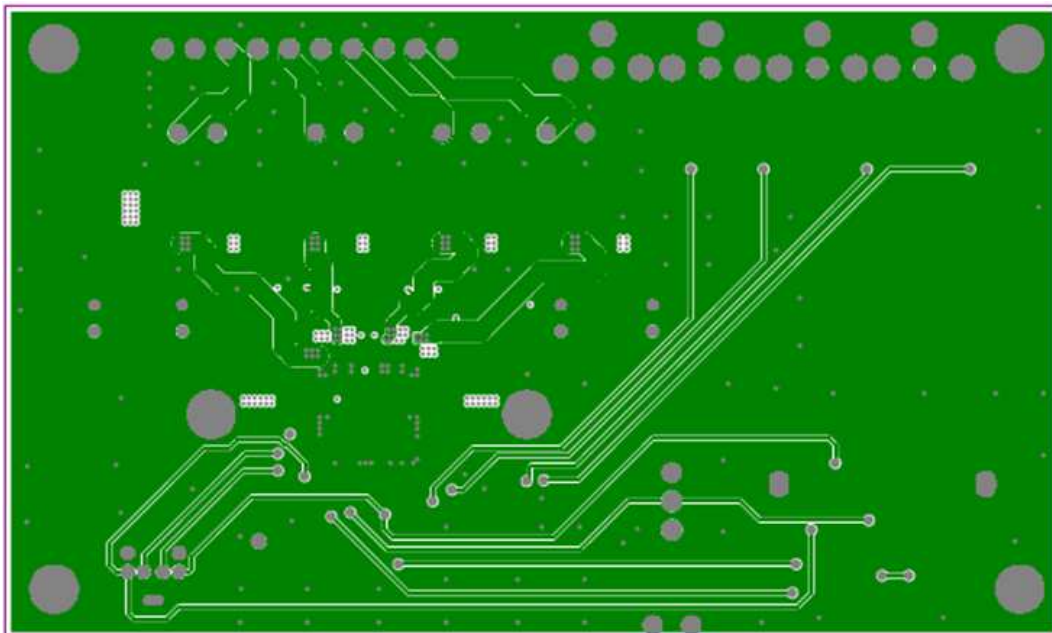


Figure 8. TAS5414CPHD Mid Layer Level 1



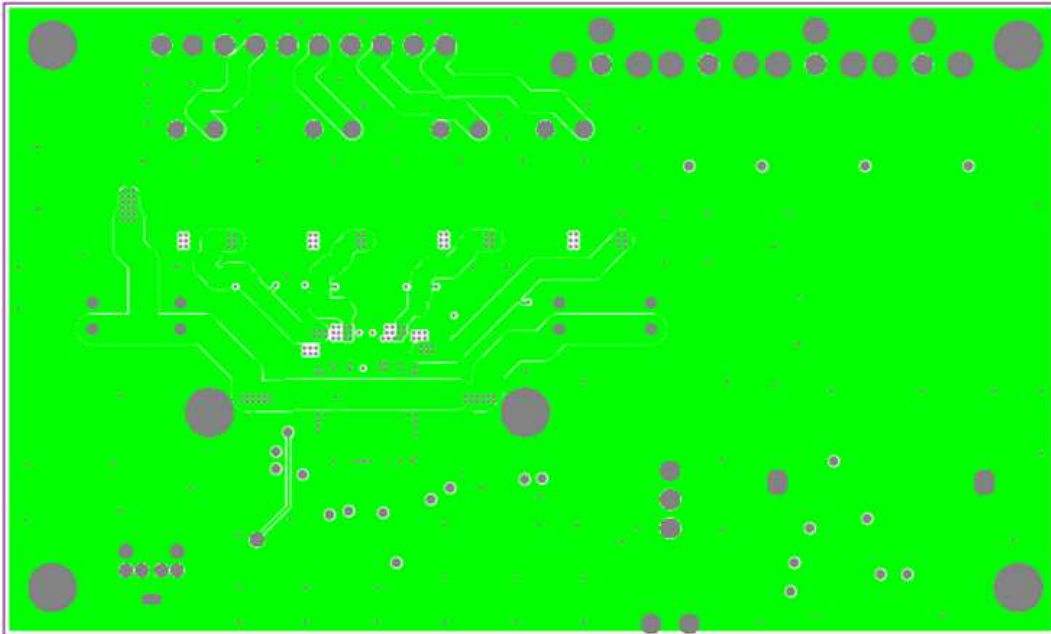


Figure 9. TAS5414CPHD Mid Layer Level 2

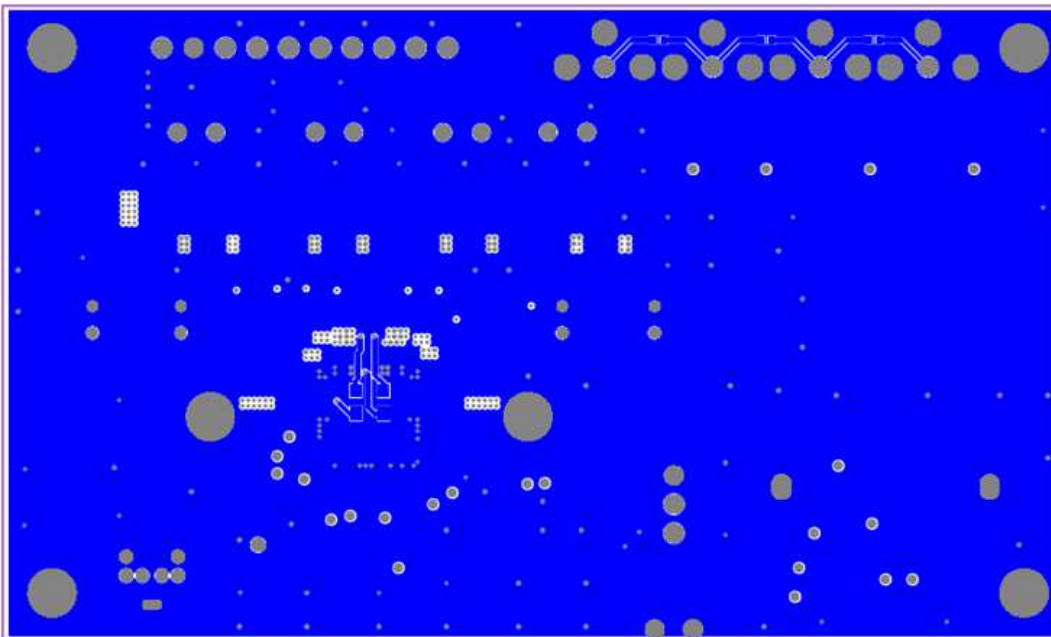


Figure 10. TAS5414CPHD Bottom Layer

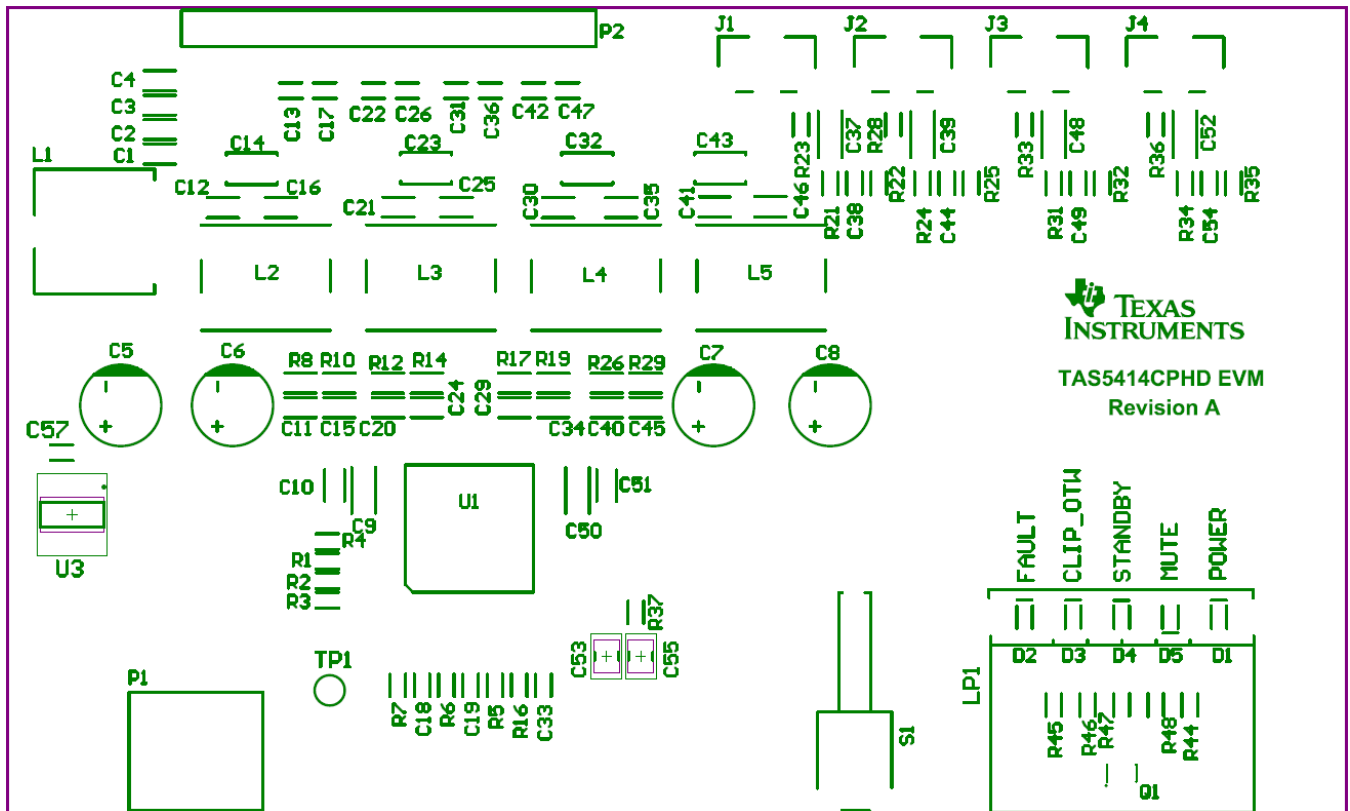


Figure 11. TAS5414CPHD Top Silkscreen Overlay

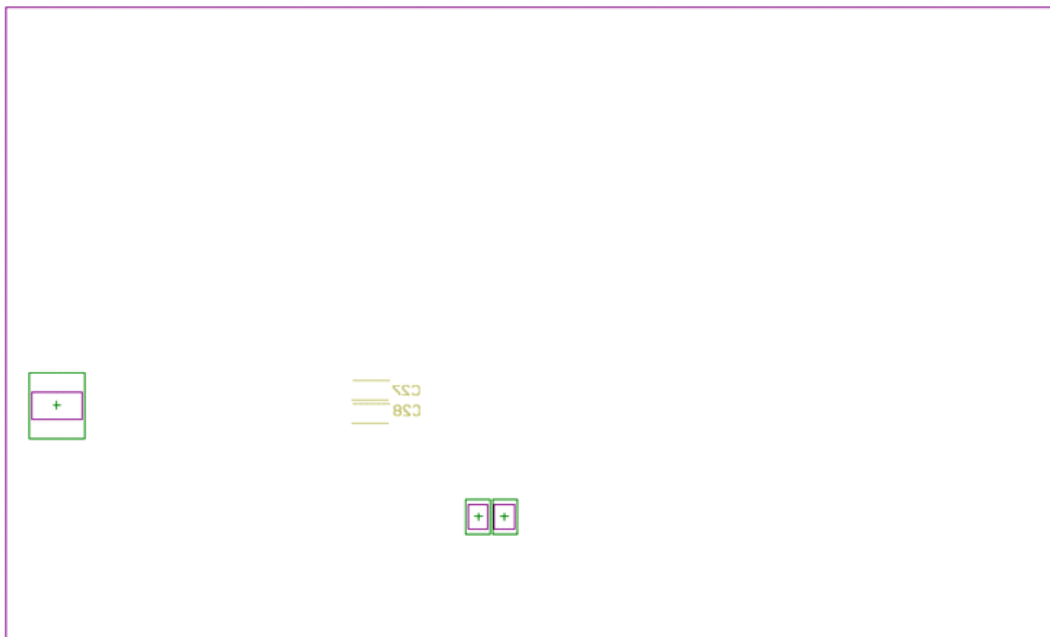


Figure 12. TAS5414CPHD Bottom Silkscreen Overlay

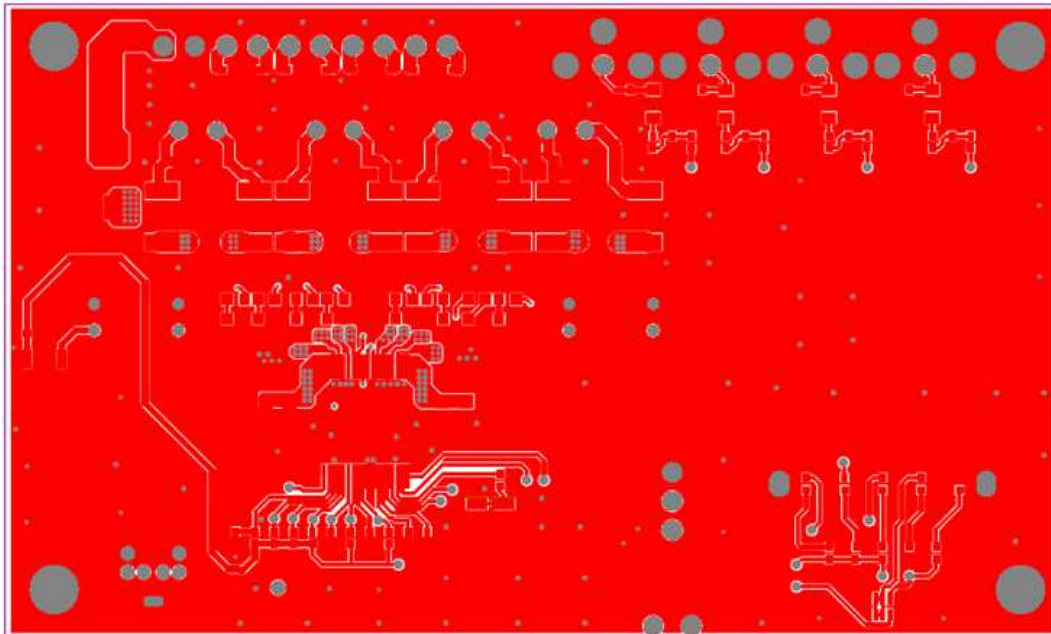


Figure 13. TAS5414CDKD Top Layer

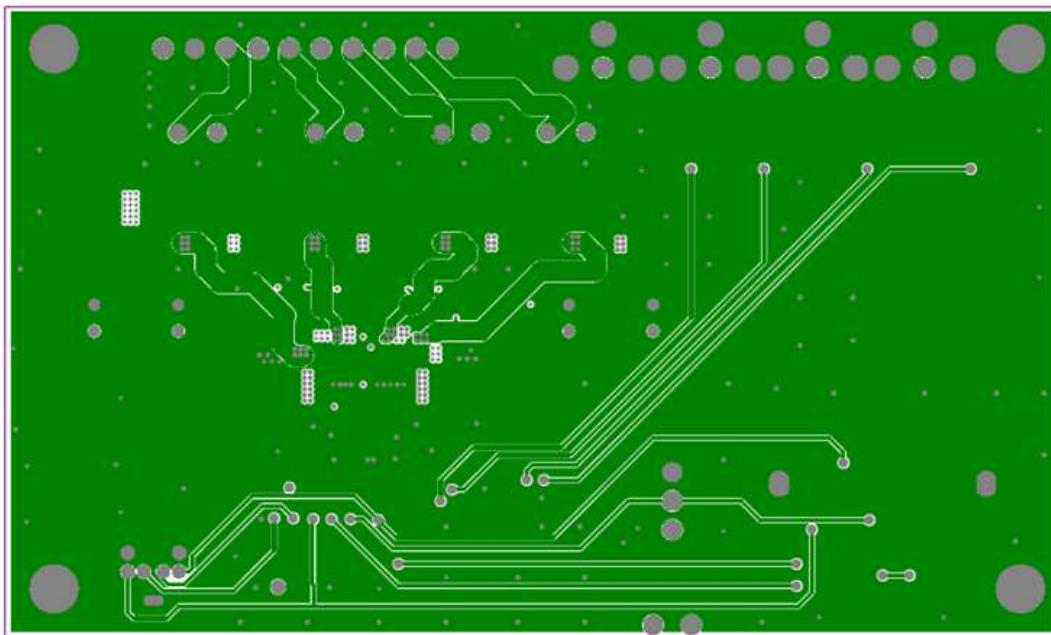


Figure 14. TAS5414CDKD Mid Layer Level 1

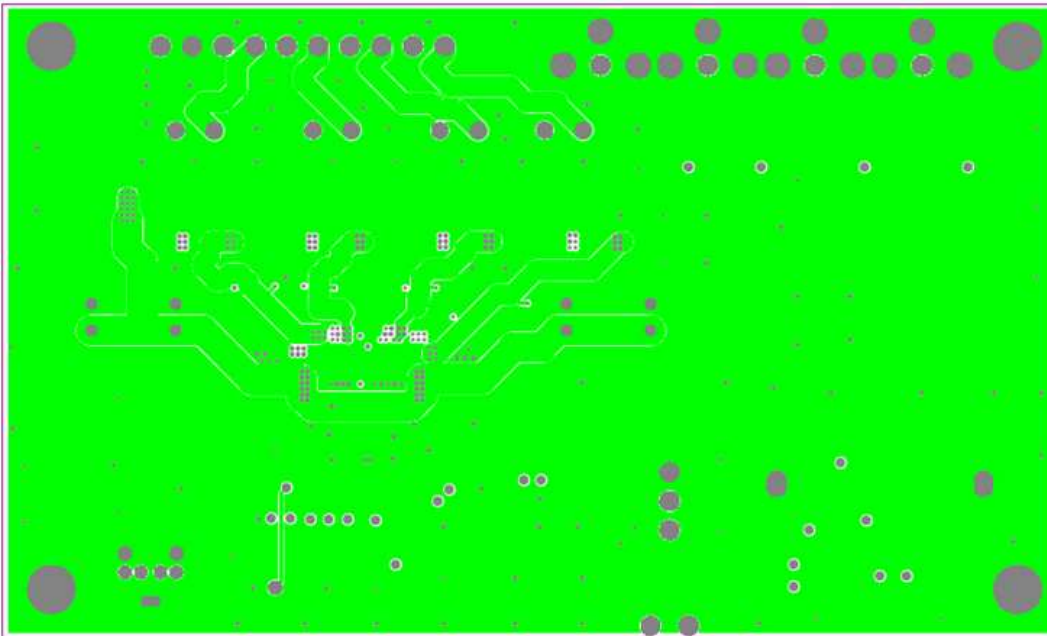


Figure 15. TAS5414CDKD Mid Layer Level 2

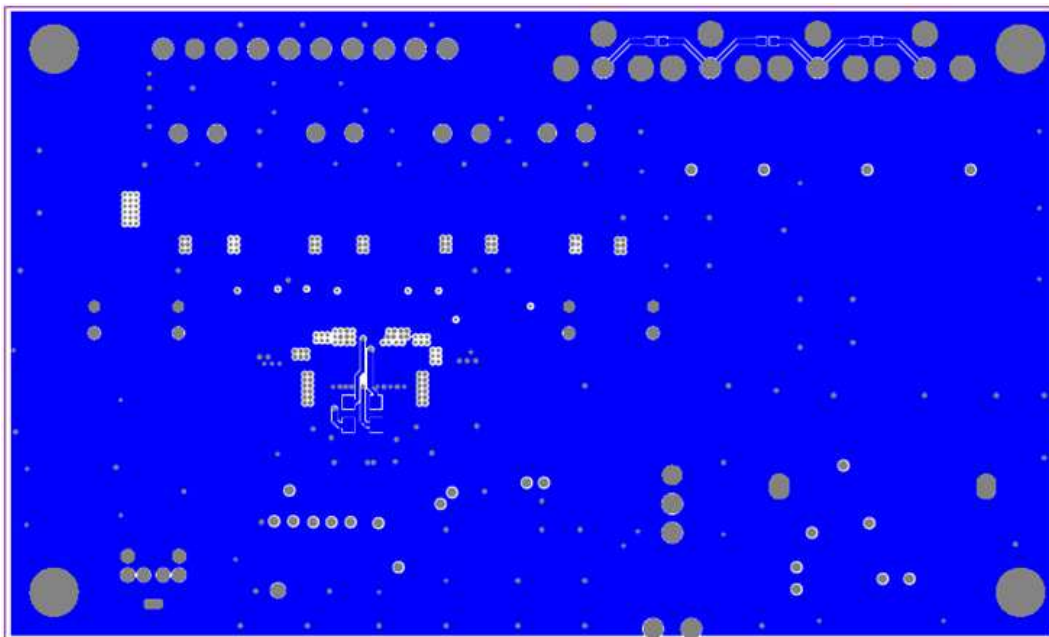


Figure 16. TAS5414CDKD Bottom Layer

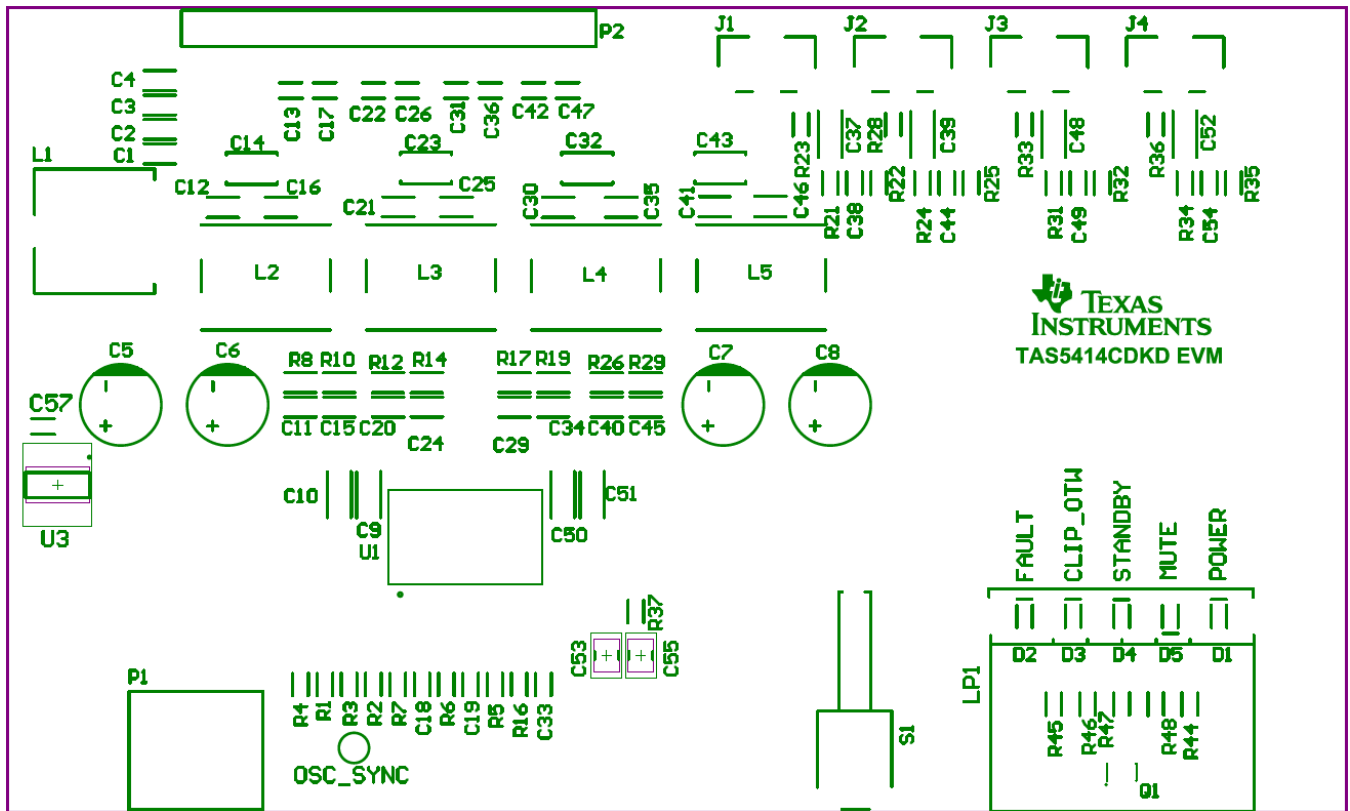


Figure 17. TAS5414CDKD Top Silkscreen Overlay

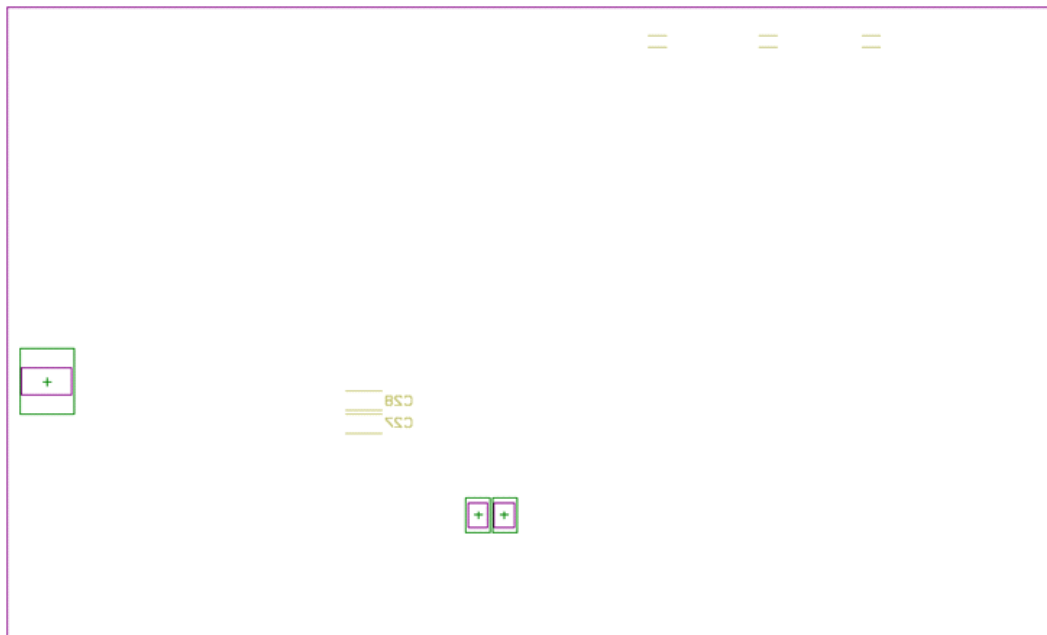


Figure 18. TAS5414CDKD Bottom Silkscreen Overlay



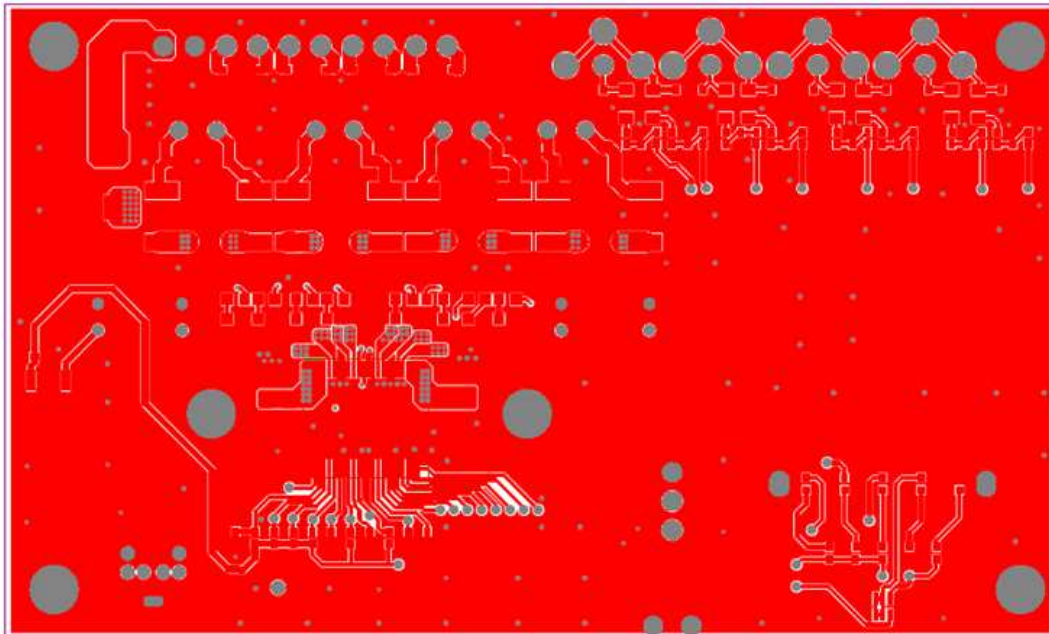


Figure 19. TAS5424CDKD Top Layer

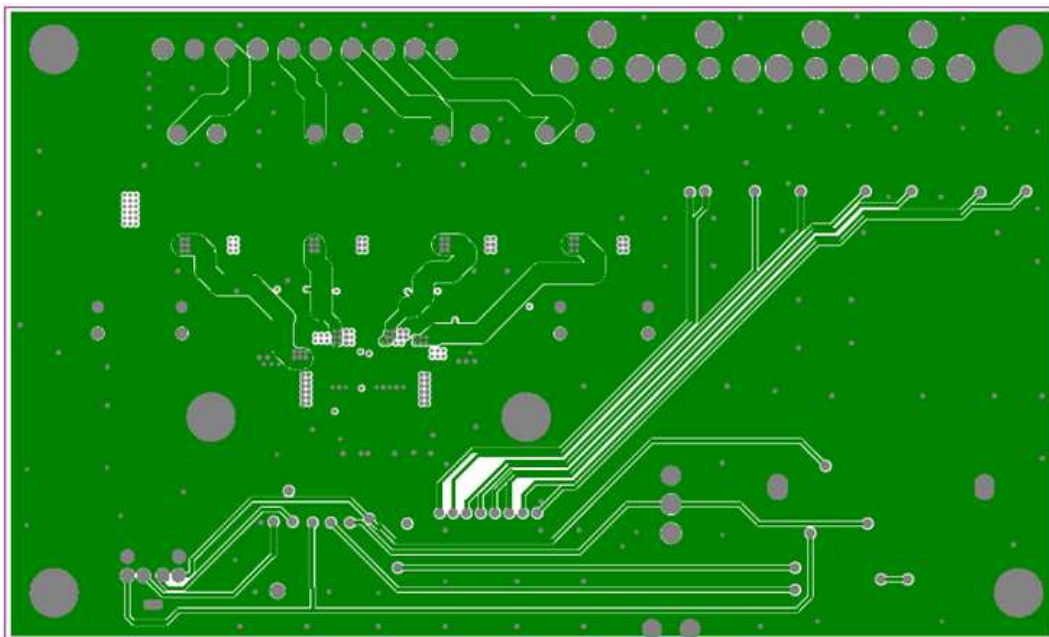


Figure 20. TAS5424CDKD Mid Layer Level 1

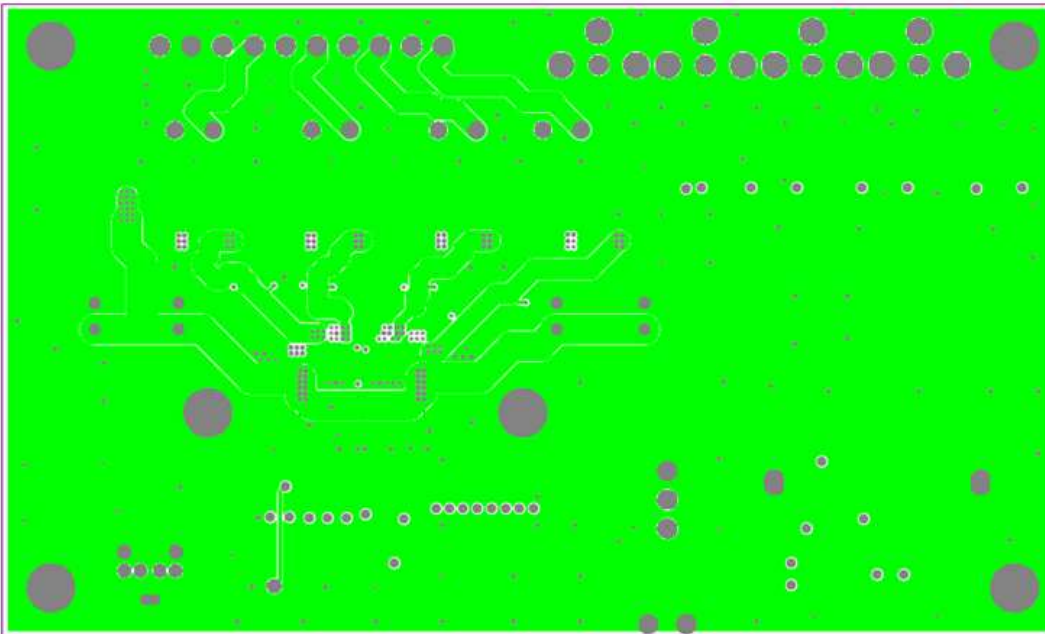


Figure 21. TAS5424CDKD Mid Layer Level 2

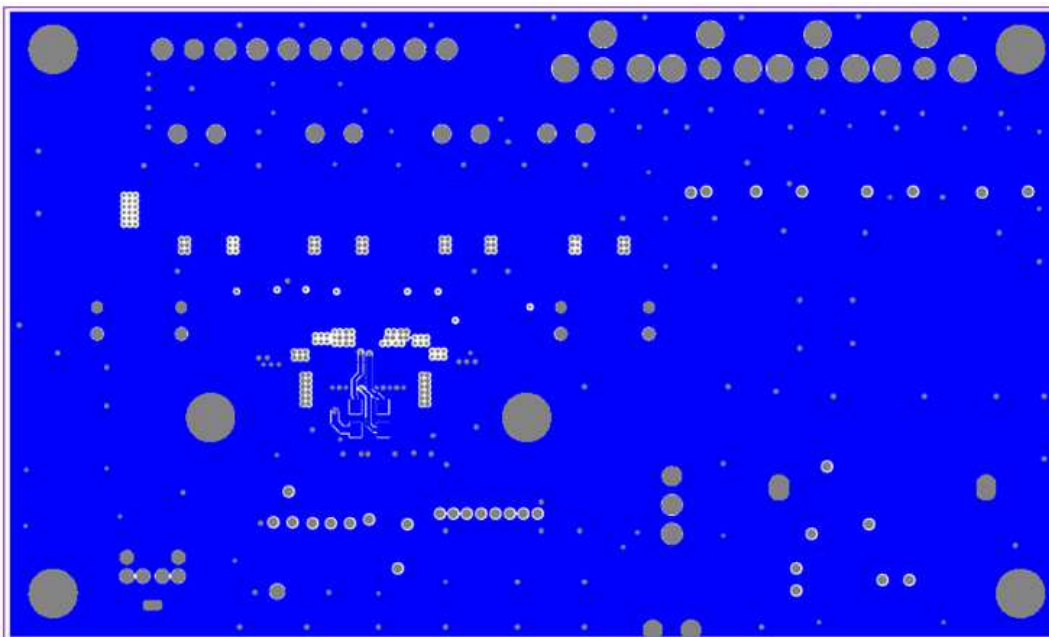


Figure 22. TAS5424CDKD Bottom Layer

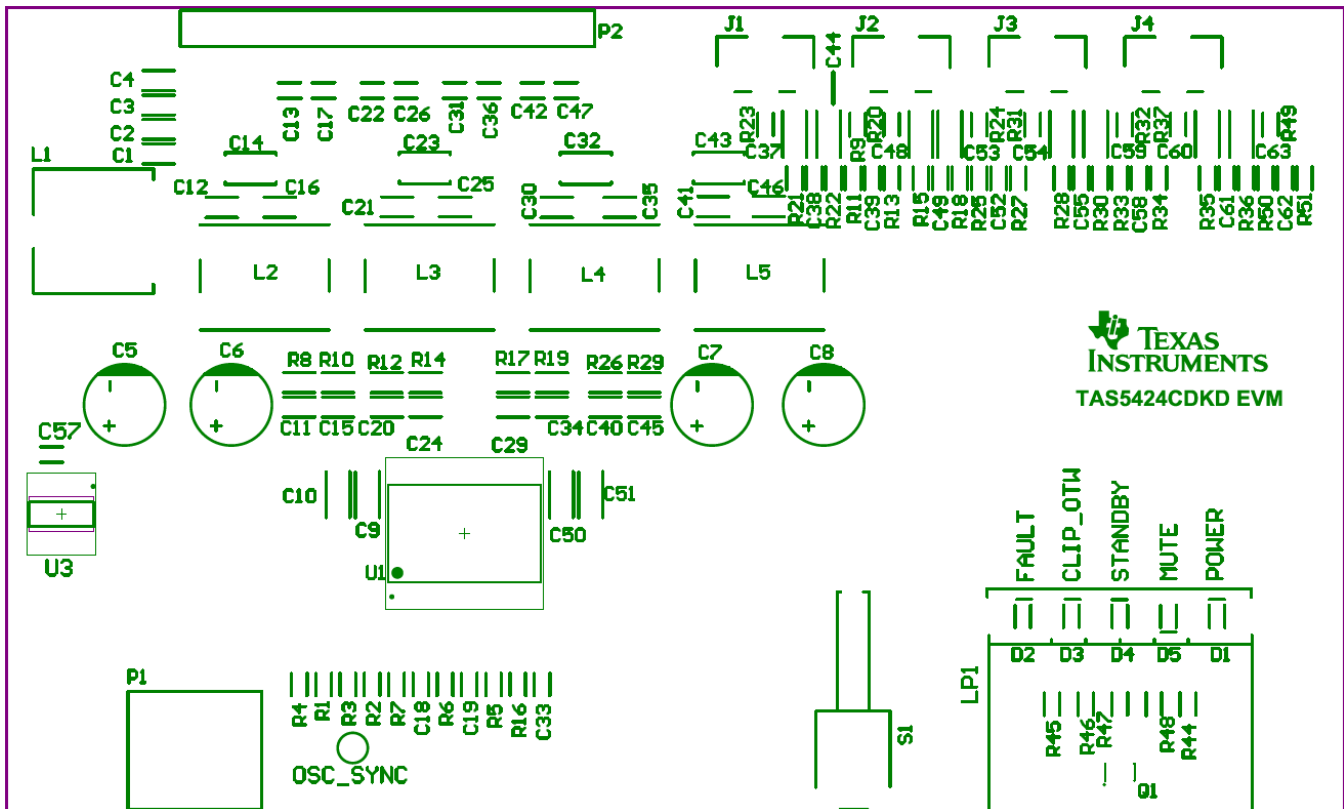


Figure 23. TAS5424CDKD Top Silkscreen Overlay

## 6 Bill of Materials

Table 1, Table 2, and Table 3 present the bill of materials for TAS5414CPHD, TAS5414CDKD, and TAS5424CDKD respectively.

Table 1. Bill of Materials for TAS5414CPHD

| VALUE             | DESCRIPTION             | DESIGNATOR                             | P/N              | P/N (DIGIKEY) | QUANTITY |
|-------------------|-------------------------|--|------------------|---------------|----------|
| 4.7 $\mu$ F       | Capacitor, ceramic      | C1, C2                                 | C2012X5R1E475K   | 445-4116-1-ND | 2        |
| 0.082 $\mu$ F     | Capacitor, ceramic      | C3                                     | ECJ-2YB1H823K    | PCC1839CT     | 1        |
| 2200 pF           | Capacitor, ceramic      | C4                                     | ECJ-2VB1H222K    | PCC222BNCT-ND | 1        |
| 330 $\mu$ F/35 V  | Capacitor, electrolytic | C5, C6, C7, C8                         | UVR1V331MPD      | 493-1083-ND   | 4        |
| 1 $\mu$ F/50 V    | Capacitor, ceramic      | C9, C10, C27, C28, C50, C51            | C3216X7R1H105K   | 445-1423-1-ND | 6        |
| 1 nF/50 V         | Capacitor, ceramic      | C11, C15, C20, C24, C29, C34, C40, C45 | ECJ-2VB1H102K    | PCC102BNCT-ND | 8        |
| 150 nF/25 V       | Capacitor, ceramic      | C12, C16, C21, C25, C30, C35, C41, C46 | C2012X7R1E474K   | 445-1353-1-ND | 8        |
| 10 nF/25 V        | Capacitor, ceramic      | C13, C17, C22, C26, C31, C36, C42, C47 | ECJ-1VB1E103K    | PCC1763CT-ND  | 8        |
| 470 nF/63 V       | Capacitor, ceramic      | C14, C23, C32, C43                     | B32529C474J      | 495-1110-ND   | 4        |
| 220 nF            | Capacitor, ceramic      | C18                                    | C0603C334K4RACTU | 399-4916-1-ND | 1        |
| 0.1 $\mu$ F       | Capacitor, ceramic      | C19, C33, C57                          | ECJ-1VB1C104K    | PCC1762CT-ND  | 3        |
| 0.47 $\mu$ F/16 V | Capacitor, film         | C37, C39, C48, C52                     | ECP-U1C474MA5    | PCF1130CT-ND  | 4        |
| 1200 pF/50 V      | Capacitor, ceramic      | C38, C44, C49, C54                     | ECJ-1VB1H122K    | PCC1773CT-ND  | 4        |
| 1 $\mu$ F/16 V    | Capacitor, film         | C53, C55                               | ECP-U1C105MA5    | PCF1132CT-ND  | 2        |
| GRN               | Typical GREEN GaAs LED  | D1                                     | SML-LX0603GW-TR  | 67-1549-1-ND  | 1        |
| RED               | Typical RED GaAs LED    | D2, D3, D4                             | SML-LX0603SRW-TR | 67-1551-1-ND  | 3        |
| YEL               | Typical YELLOW GaAs LED | D5                                     | SML-LX0603YW-TR  | 67-1550-1-ND  | 1        |



**Table 1. Bill of Materials for TAS5414CPHD (continued)**

| VALUE                    | DESCRIPTION                                     | DESIGNATOR                            | P/N                        | P/N (DIGIKEY)      | QUANTITY |
|--------------------------|---|---------------------------------------|----------------------------|--------------------|----------|
| Channel 1, 2, 3, 4 input | RCA phono jack, right angle, thru-hole, snap-in | J1                                    | RCJ-011                    | CP-1400-ND         | 4        |
| 10 $\mu$ H               | 10- $\mu$ H inductor, SMT                       | L1                                    | Coilcraft SER1360H-103L    |                    | 1        |
| Dual_inductor            | Dual inductor                                   | L2, L3, L4, L5                        | Toko HEAW                  |                    | 4        |
| LIGHTPIPE 5POS           |   | LP1                                   | LPF-C051303S               |                    | 1        |
| Header 7                 | Header, 7-pin                                   | P1                                    | MD-60S                     | CP-2460            | 1        |
| Output                   | Header, 10-pin, right                           | P2                                    | Samtech IPBT-110-H1-T-S-RA |                    | 1        |
| N MOS                    | FET - P W/DIODE                                 | Q1                                    | IRLMS5703TRPBF             | IRLMS5703PBFCT-ND  | 1        |
| 20 k $\Omega$            | Resistor, SMT                                   | R1, R16                               | ERJ-3EKF2002V              | P20.0KHCT-ND       | 2        |
| 4.7 k $\Omega$           | Resistor, SMT                                   | R2, R3                                | ERJ-3EKF4701V              | P4.70KHCT-ND       | 2        |
| 47 $\Omega$              | Resistor, SMT                                   | R4                                    | ERJ-3EKF47R0V              | P47.0HCT-ND        | 1        |
| 49.9 k $\Omega$          | Resistor, SMT                                   | R5, R6, R7, R23,R28, R33, R36         | ERJ-3EKF4992V              | P49.9KHCT-ND       | 7        |
| 5.6 $\Omega$             | Resistor, SMT                                   | R8, R10, R12, R14,R17, R19, R26, R29  | RL1220S-5R6-F              | RL12S5.6FCT-ND     | 8        |
| 499 $\Omega$             | Resistor, SMT                                   | R21, R22, R24, R25,R31, R32, R34, R35 | ERJ-3EKF4990V              | P499HCT-ND         | 8        |
| 249 $\Omega$             | Resistor, SMT                                   | R37                                   | ERJ-3EKF2490V              | P249HCT-ND         | 1        |
| 470 $\Omega$             | Resistor, SMT                                   | R44, R45, R46, R47                    | ERJ-3GEYJ471V              | P470GCT-ND         | 4        |
| 332 $\Omega$             | Resistor, SMT                                   | R48                                   | ERJ-3EKF3320V              | P332HCT-ND         | 1        |
| S1                       | E-switch, SPDT, right-angle                     | S1                                    | 100SP1T2B4M7RE             | EG2364-ND          | 1        |
| TAS5414CPHD              | 4-channel class-D amplifier                     | U1                                    | TAS5414CTPHDRQ1            | TAS5414CTPHDRQ1-ND | 1        |
| UA78M33CDCY              | Positive-voltage regulator                      | U3                                    | UA78M33CDCYR               | 296-13424-1-ND     | 1        |

**Table 2. Bill of Materials for TAS5414CDKD**

| VALUE                    | DESCRIPTION                                     | DESIGNATOR                             | P/N                        | P/N (DIGIKEY)     | QUANTITY |
|--------------------------|---|--|----------------------------|-------------------|----------|
| 4.7 $\mu$ F              | Capacitor, ceramic                              | C1, C2                                 | C2012X5R1E475K             | 445-4116-1-ND     | 2        |
| 0.082 $\mu$ F            | Capacitor, ceramic                              | C3                                     | ECJ-2YB1H823K              | PCC1839CT         | 1        |
| 2200 pF                  | Capacitor, ceramic                              | C4                                     | ECJ-2VB1H222K              | PCC222BNCT-ND     | 1        |
| 330 $\mu$ F/35 V         | Capacitor, electrolytic                         | C5, C6, C7, C8                         | UVR1V331MPD                | 493-1083-ND       | 4        |
| 1 $\mu$ F/50 V           | Capacitor, ceramic                              | C9, C10, C27, C28,C50, C51             | C3216X7R1H105K             | 445-1423-1-ND     | 6        |
| 1 nF/50 V                | Capacitor, ceramic                              | C11, C15, C20, C24, C29, C34, C40, C45 | ECJ-2VB1H102K              | PCC102BNCT-ND     | 8        |
| 150 nF/25 V              | Capacitor, ceramic                              | C12, C16, C21, C25, C30, C35, C41, C46 | C2012X7R1E474K             | 445-1353-1-ND     | 8        |
| 10 nF/25 V               | Capacitor, ceramic                              | C13, C17, C22, C26,C31, C36, C42, C47  | ECJ-1VB1E103K              | PCC1763CT-ND      | 8        |
| 470 nF/63 V              | Capacitor, ceramic                              | C14, C23, C32, C43                     | B32529C474J                | 495-1110-ND       | 4        |
| 220 nF                   | Capacitor, ceramic                              | C18                                    | C0603C334K4RACTU           | 399-4916-1-ND     | 1        |
| 0.1 $\mu$ F              | Capacitor, ceramic                              | C19, C33, C57                          | ECJ-1VB1C104K              | PCC1762CT-ND      | 3        |
| 0.47 $\mu$ F/16 V        | Capacitor, film                                 | C37, C39, C48, C52                     | ECP-U1C474MA5              | PCF1130CT-ND      | 4        |
| 1200 pF/50 V             | Capacitor, ceramic                              | C38, C44, C49, C54                     | ECJ-1VB1H122K              | PCC1773CT-ND      | 4        |
| 1 $\mu$ F/16 V           | Capacitor, film                                 | C53, C55                               | ECP-U1C105MA5              | PCF1132CT-ND      | 2        |
| GRN                      | Typical GREEN GaAs LED                          | D1                                     | SML-LX0603GW-TR            | 67-1549-1-ND      | 1        |
| RED                      | Typical RED GaAs LED                            | D2, D3, D4                             | SML-LX0603SRW-TR           | 67-1551-1-ND      | 3        |
| YEL                      | Typical YELLOW GaAs LED                         | D5                                     | SML-LX0603YW-TR            | 67-1550-1-ND      | 1        |
| Channel 1, 2, 3, 4 input | RCA phono jack, right angle, thru-hole, snap-in | J1                                     | RCJ-011                    | CP-1400-ND        | 4        |
| 10 $\mu$ H               | 10- $\mu$ H Inductor, SMT                       | L1                                     | Coilcraft SER1360H-103L    |                   | 1        |
| Dual_inductor            | Dual inductor                                   | L2, L3, L4, L5                         | Toko HEAW                  |                   | 4        |
| LIGHTPIPE 5POS           |   | LP1                                    | LPF-C051303S               |                   | 1        |
| Header 7                 | Header, 7-pin                                   | P1                                     | MD-60S                     | CP-2460           | 1        |
| Output                   | Header, 10-pin, right                           | P2                                     | Samtech IPBT-110-H1-T-S-RA |                   | 1        |
| N MOS                    | FET - P W/DIODE                                 | Q1                                     | IRLMS5703TRPBF             | IRLMS5703PBFCT-ND | 1        |
| 20 k $\Omega$            | Resistor, SMT                                   | R1, R16                                | ERJ-3EKF2002V              | P20.0KHCT-ND      | 2        |
| 4.7 k $\Omega$           | Resistor, SMT                                   | R2, R3                                 | ERJ-3EKF4701V              | P4.70KHCT-ND      | 2        |
| 47 $\Omega$              | Resistor, SMT                                   | R4                                     | ERJ-3EKF47R0V              | P47.0HCT-ND       | 1        |

**Table 2. Bill of Materials for TAS5414CDKD (continued)**

| VALUE       | DESCRIPTION                 | DESIGNATOR                            | P/N             | P/N (DIGIKEY)      | QUANTITY |
|-------------|-----------------------------|---------------------------------------|-----------------|--------------------|----------|
| 49.9 kΩ     | Resistor, SMT               | R5, R6, R7, R23,R28, R33, R36         | ERJ-3EKF4992V   | P49.9KHCT-ND       | 7        |
| 5.6 Ω       | Resistor, SMT               | R8, R10, R12, R14,R17, R19, R26, R29  | RL1220S-5R6-F   | RL12S5.6FCT-ND     | 8        |
| 499 Ω       | Resistor, SMT               | R21, R22, R24, R25,R31, R32, R34, R35 | ERJ-3EKF4990V   | P499HCT-ND         | 8        |
| 249 Ω       | Resistor, SMT               | R37                                   | ERJ-3EKF2490V   | P249HCT-ND         | 1        |
| 470 Ω       | Resistor, SMT               | R44, R45, R46, R47                    | ERJ-3GEYJ471V   | P470GCT-ND         | 4        |
| 332 Ω       | Resistor, SMT               | R48                                   | ERJ-3EKF3320V   | P332HCT-ND         | 1        |
| S1          | E-switch, SPDT, right-angle | S1                                    | 100SP1T2B4M7RE  | EG2364-ND          | 1        |
| TAS5414CDKD | 4-channel class-D amplifier | U1                                    | TAS5414CTDKDRQ1 | TAS5414CTDKDRQ1-ND | 1        |
| UA78M33CDCY | Positive-voltage regulator  | U3                                    | UA78M33CDCYR    | 296-13424-1-ND     | 1        |

**Table 3. Bill of Materials for TAS5424CDKD**

| VALUE                    | DESCRIPTION                                     | DESIGNATOR   | P/N                        | P/N (DIGIKEY)      | QUANTITY |
|--------------------------|---|--|----------------------------|--------------------|----------|
| 4.7 μF                   | Capacitor, ceramic                              | C1, C2   | C2012X5R1E475K             | 445-4116-1-ND      | 2        |
| 0.082 μF                 | Capacitor, ceramic                              | C3   | ECJ-2YB1H823K              | PCC1839CT          | 1        |
| 2200 pF                  | Capacitor, ceramic                              | C4   | ECJ-2VB1H222K              | PCC222BNCT-ND      | 1        |
| 330 μF/35 V              | Capacitor, electrolytic                         | C5, C6, C7, C8   | UVR1V331MPD                | 493-1083-ND        | 4        |
| 1 μF/50 V                | Capacitor, ceramic                              | C9, C10, C27, C28,C50, C51   | C3216X7R1H105K             | 445-1423-1-ND      | 6        |
| 1 nF/50 V                | Capacitor, ceramic                              | C11, C15, C20, C24, C29, C34, C40, C45   | ECJ-2VB1H102K              | PCC102BNCT-ND      | 8        |
| 150 nF/25 V              | Capacitor, ceramic                              | C12, C16, C21, C25, C30, C35, C41, C46   | C2012X7R1E474K             | 445-1353-1-ND      | 8        |
| 10 nF/25 V               | Capacitor, ceramic                              | C13, C17, C22, C26,C31, C36, C42, C47  | ECJ-1VB1E103K              | PCC1763CT-ND       | 8        |
| 470 nF/63 V              | Capacitor, ceramic                              | C14, C23, C32, C43   | B32529C474J                | 495-1110-ND        | 4        |
| 22 nF                    | Capacitor, ceramic                              | C18  | C0603C334K4RACTU           | 399-4916-1-ND      | 1        |
| 0.1 μF                   | Capacitor, ceramic                              | C19, C33, C57  | ECJ-1VB1C104K              | PCC1762CT-ND       | 3        |
| 0.47μF/16V               | Capacitor, film                                 | C37, C44, C48, C53, C54, C59, C60, C63   | ECP-U1C474MA5              | PCF1130CT-ND       | 8        |
| 1200 pF/50 V             | Capacitor, ceramic                              | C38, C39, C49, C52, C55, C58, C61, C62   | ECJ-1VB1H122K              | PCC1773CT-ND       | 8        |
| GRN                      | Typical GREEN GaAs LED                          | D1   | SML-LX0603GW-TR            | 67-1549-1-ND       | 1        |
| RED                      | Typical RED GaAs LED                            | D2, D3, D4   | SML-LX0603SRW-TR           | 67-1551-1-ND       | 3        |
| YEL                      | Typical YELLOW GaAs LED                         | D5   | SML-LX0603YW-TR            | 67-1550-1-ND       | 1        |
| Channel 1, 2, 3, 4 input | RCA phono jack, right angle, thru-hole, snap-in | J1   | RCJ-011                    | CP-1400-ND         | 4        |
| 10 μH                    | 10-μH inductor, SMT                             | L1   | Coilcraft SER1360H-103L    |                    | 1        |
| Dual_inductor            | Dual inductor                                   | L2, L3, L4, L5   | Toko HEAW                  |                    | 4        |
| LIGHTPIPE 5POS           |   | LP1  | LPF-C051303S               |                    | 1        |
| Header 7                 | Header, 7-pin                                   | P1   | MD-60S                     | CP-2460            | 1        |
| Output                   | Header, 10-pin, right                           | P2   | Samtech IPBT-110-H1-T-S-RA |                    | 1        |
| N MOS                    | FET - P W/DIODE                                 | Q1   | IRLMS5703TRPBF             | IRLMS5703PBFCT-ND  | 1        |
| 20 kΩ                    | Resistor, SMT                                   | R1, R16  | ERJ-3EKF2002V              | P20.0KHCT-ND       | 2        |
| 4.7 kΩ                   | Resistor, SMT                                   | R2, R3   | ERJ-3EKF4701V              | P4.70KHCT-ND       | 2        |
| 47 Ω                     | Resistor, SMT                                   | R4   | ERJ-3EKF47R0V              | P47.0HCT-ND        | 1        |
| 49.9 kΩ                  | Resistor, SMT                                   | R5, R6, R7, R23, R9, R20, R24, R31, R32, R37, R49                              | ERJ-3EKF4992V              | P49.9KHCT-ND       | 11       |
| 5.6 Ω                    | Resistor, SMT                                   | R8, R10, R12, R14,R17, R19, R26, R29   | RL1220S-5R6-F              | RL12S5.6FCT-ND     | 8        |
| 499 Ω                    | Resistor, SMT                                   | R21, R22, R11, R13, R15, R18, R25, R27, R28, R30, R33, R34, R35, R36, R50, R51 | ERJ-3EKF4990V              | P499HCT-ND         | 16       |
| 470 Ω                    | Resistor, SMT                                   | R44, R45, R46, R47   | ERJ-3GEYJ471V              | P470GCT-ND         | 4        |
| 332 Ω                    | Resistor, SMT                                   | R48  | ERJ-3EKF3320V              | P332HCT-ND         | 1        |
| S1                       | E-switch, SPDT, right-angle                     | S1   | 100SP1T2B4M7RE             | EG2364-ND          | 1        |
| TAS5424CDKD              | 4-channel class-D amplifeir                     | U2   | TAS5424CTDKDRQ1            | TAS5424CTDKDRQ1-ND | 1        |
| UA78M33CDCY              | Positive-voltage regulator                      | U3   | UA78M33CDCYR               | 296-13424-1-ND     | 1        |

## **7 Related Documentation from Texas Instruments**

The TAS5414C, TAS5424C, Four-Channel Automotive Digital Amplifiers data sheet can be found online at [www.ti.com](http://www.ti.com).

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| Power Mgmt                   | <a href="http://power.ti.com">power.ti.com</a>                                       |
| Microcontrollers             | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a>                   |
| RFID                         | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>                                 |
| OMAP Applications Processors | <a href="http://www.ti.com/omap">www.ti.com/omap</a>                                 |
| Wireless Connectivity        | <a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a> |

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