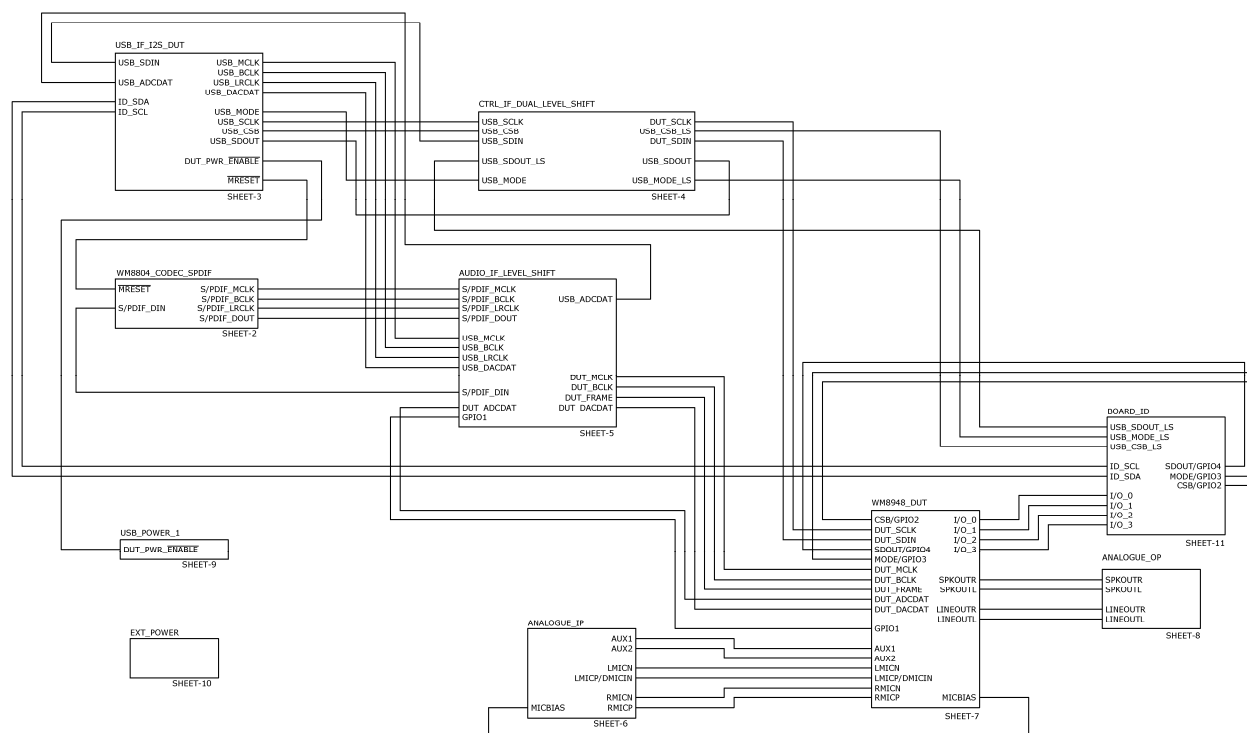


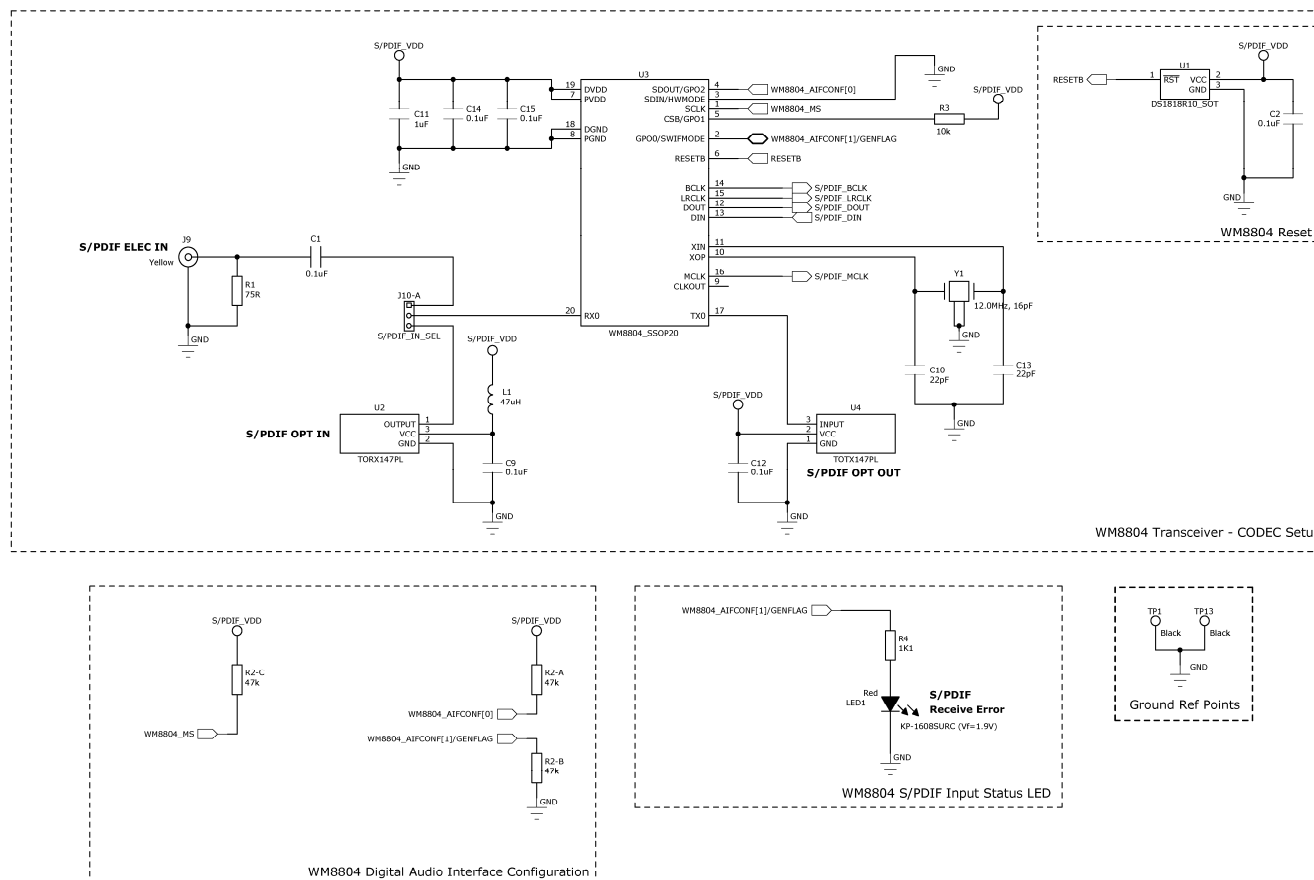
|                           |                                |
|---------------------------|--------------------------------|
| <b>DOC TYPE:</b>          | SCHEMATIC AND LAYOUT           |
| <b>BOARD REFERENCE:</b>   | 6229-EV1-REV2                  |
| <b>BOARD TYPE:</b>        | Customer Main                  |
| <b>WOLFSON DEVICE(S):</b> | WM8944, WM8945, WM8946, WM8948 |
| <b>DATE:</b>              | July 2009                      |
| <b>DOC REVISION:</b>      | Rev 1.0                        |

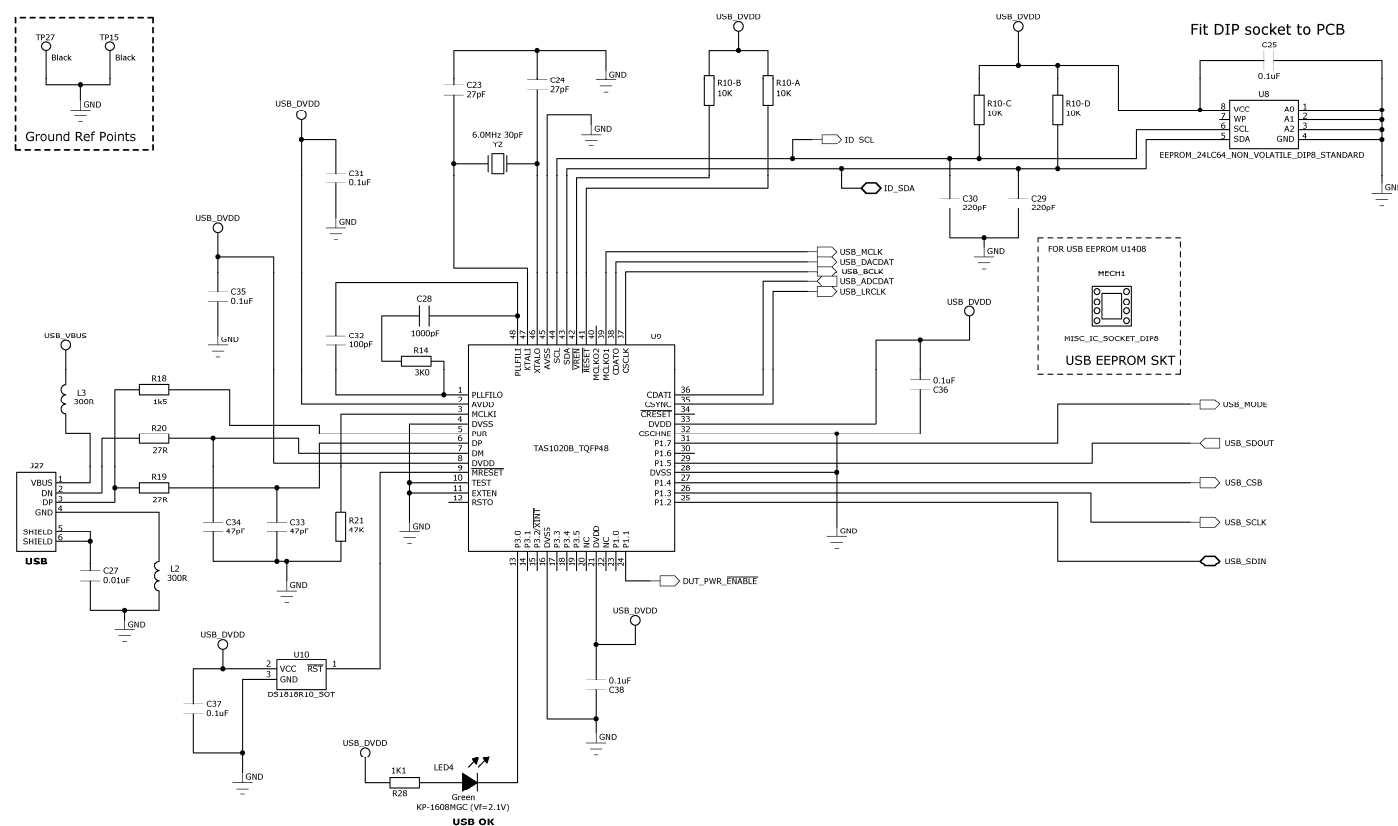
# SCHEMATIC

## Sheet 1: Top Level

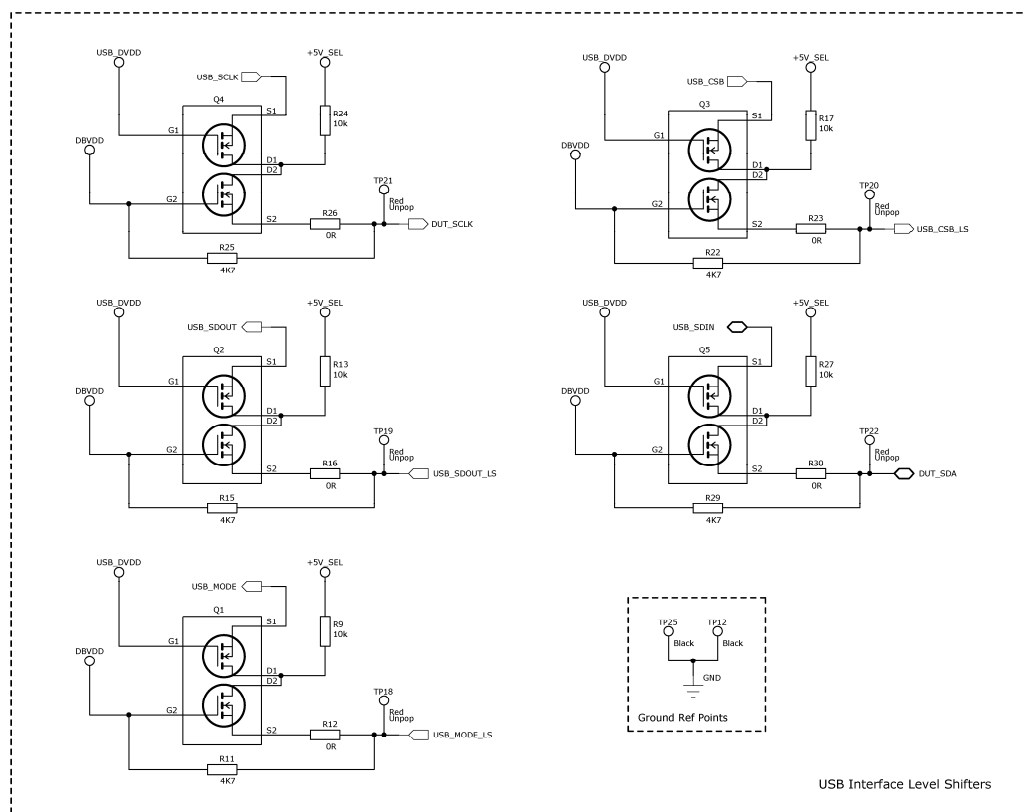


### Sheet 2: S/PDIF Interface

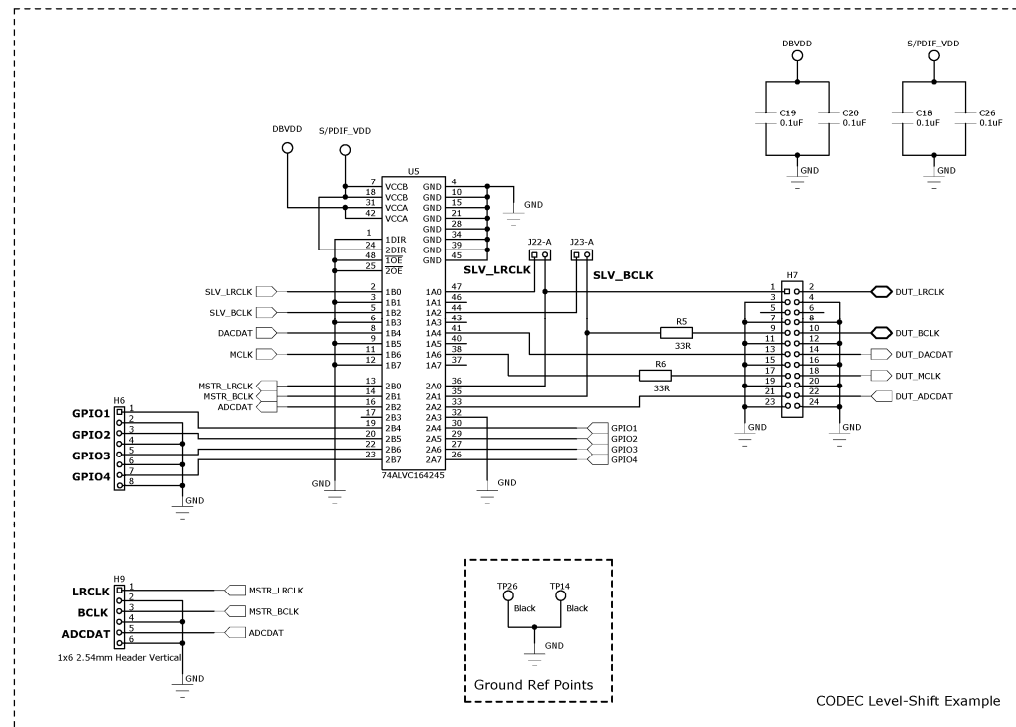
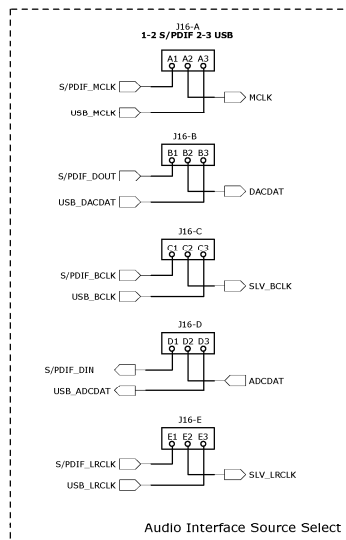




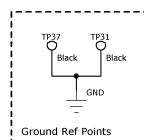
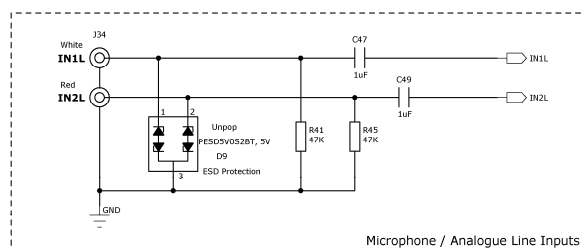
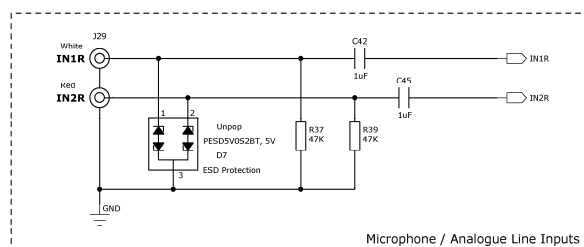
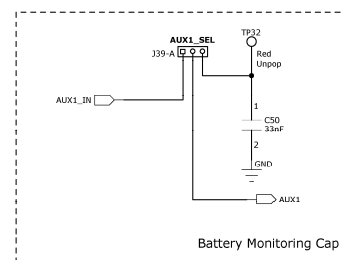
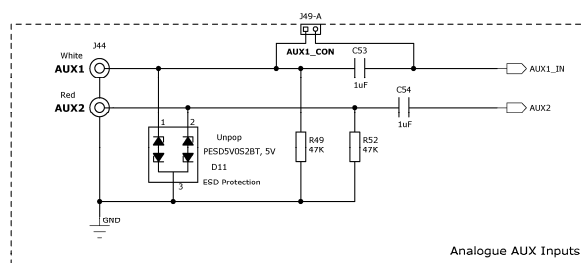
### Sheet 4: Control Interface Level Shift



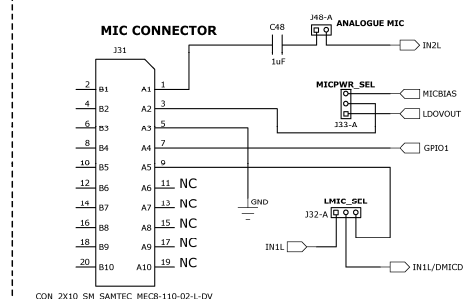
### Sheet 5: Audio Interface Level Shift



### Sheet 6: Analogue Inputs

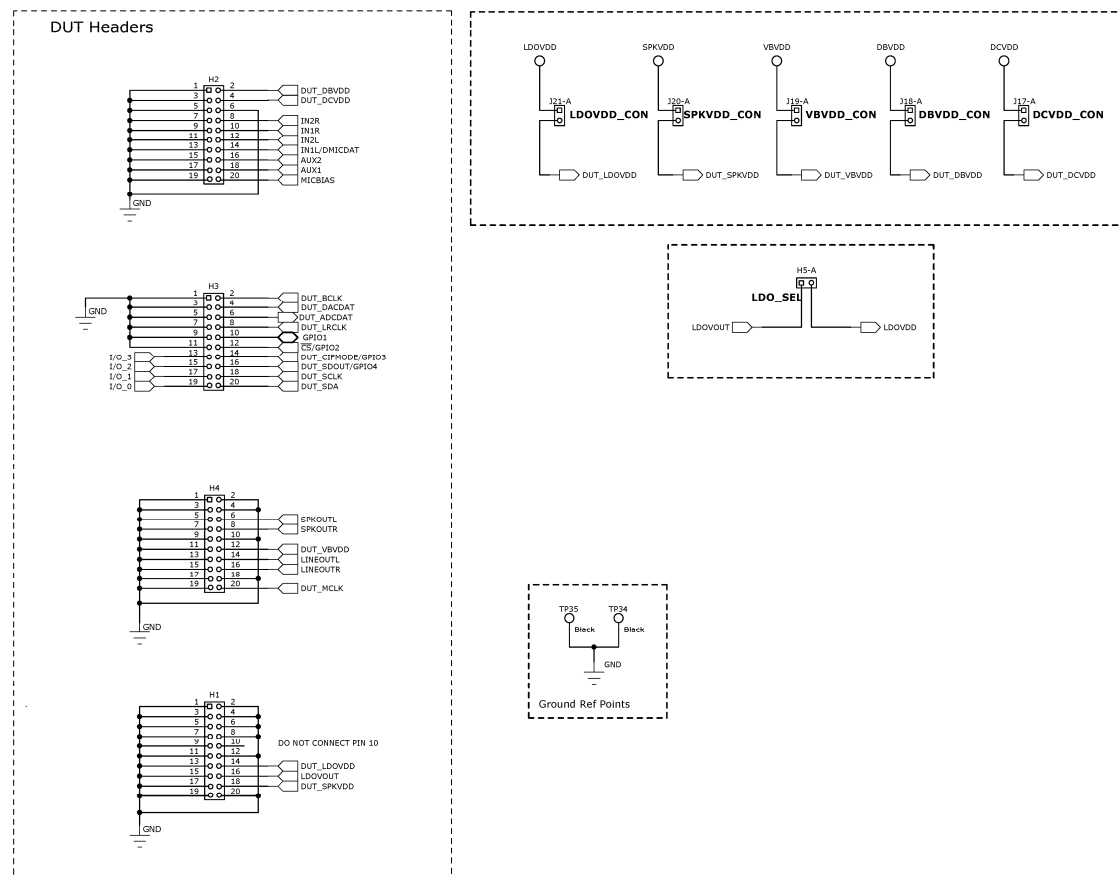


#### Analogue / Digital Microphone Interface

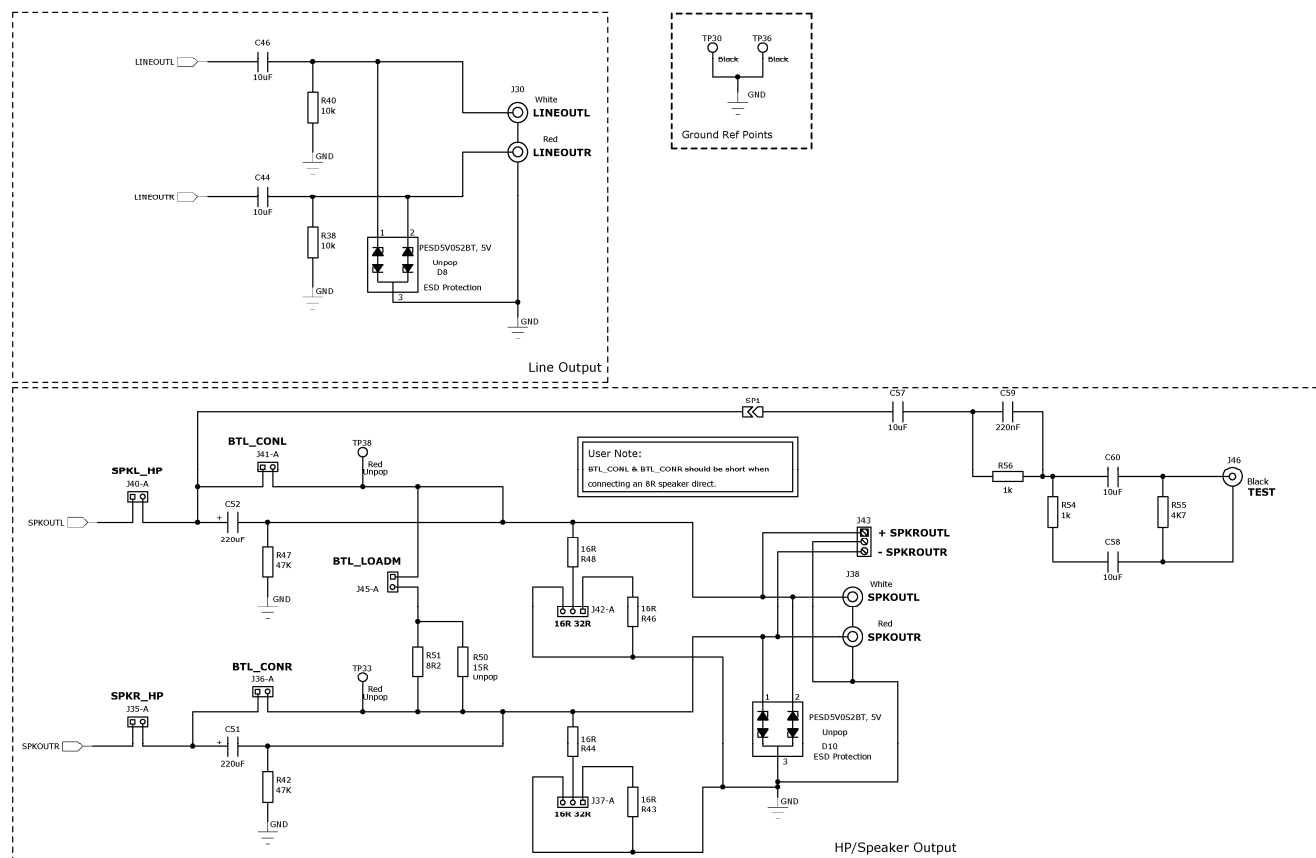


**User Note:**  
 When external analogue MIC is used MICBIAS should be used (J33:2-3 shorted) and J48 shorted.  
 When external digital MIC is used LDOOUT should be used - J31:1-2. Select J32:2-32 and leave J48 open.  
 When MIC is not in use MICBIAS should be disabled in the register settings

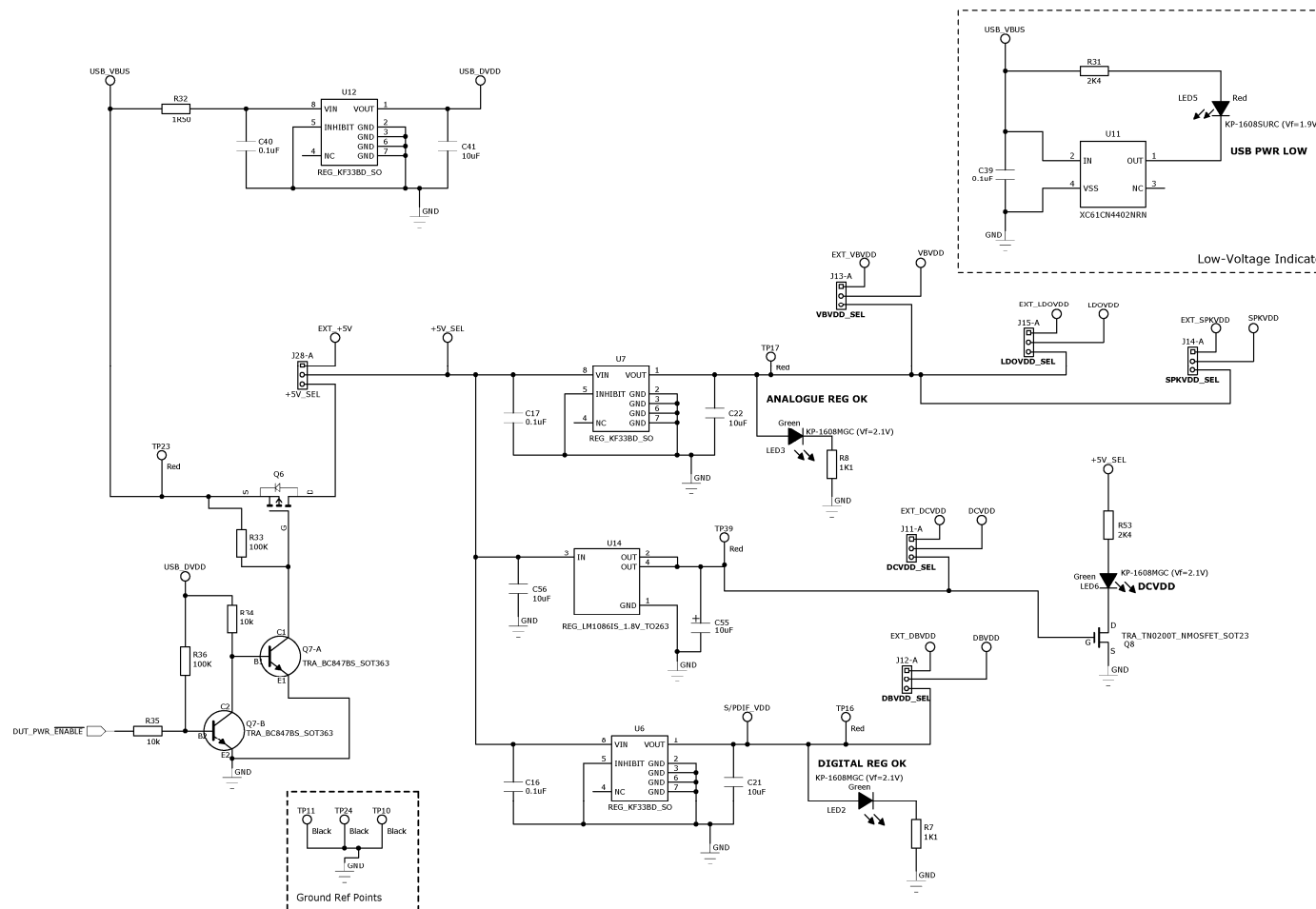
### Sheet 7: CODEC Interface



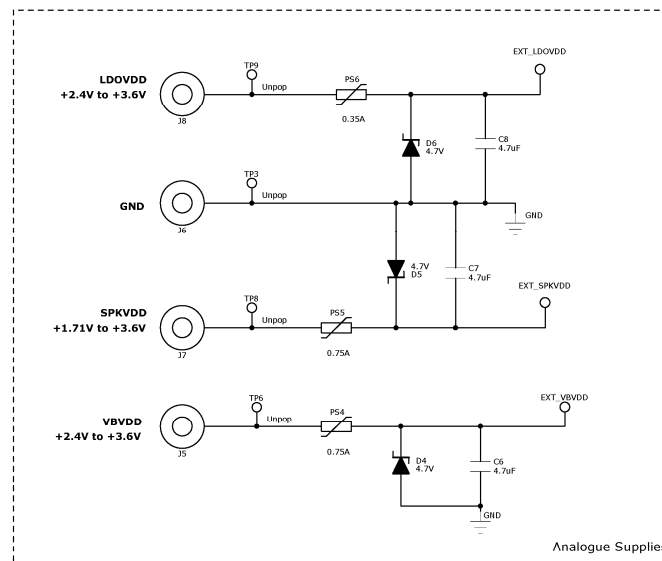
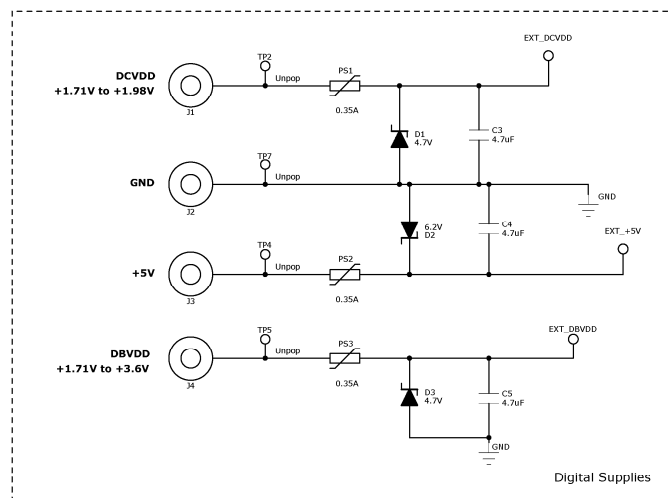
### Sheet 8: Analogue Outputs



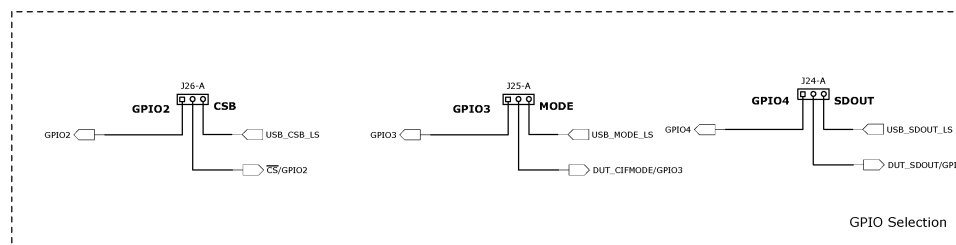
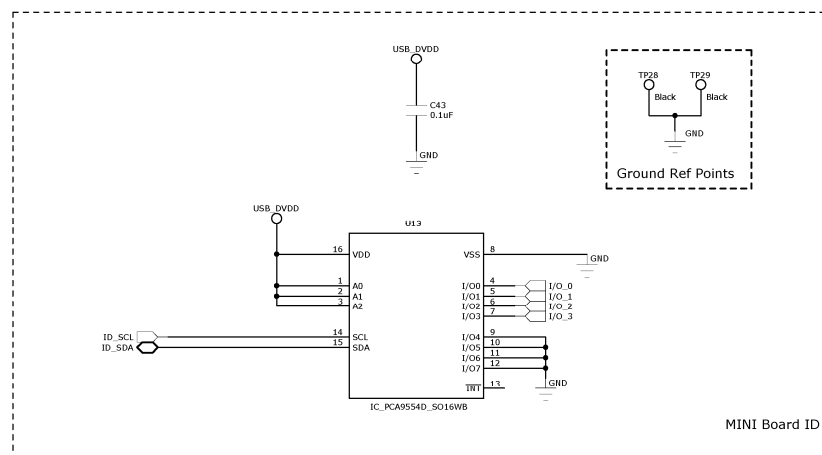
### Sheet 9: USB Power



### Sheet 10: External Power



### Sheet 11: Board ID & GPIO Selection



|  |       |      |                   |
|--|-------|------|-------------------|
|  | Short | Open | LNK J23<br>YELLOW |
|--|-------|------|-------------------|

TABLES & TEXT TO GO ON PCB

To go next to H7

| J16-F  | Short 1-2     | Short 2-3     | PCB Ref:           |
|--------|---------------|---------------|--------------------|
| Row A: | EXT_AUDIO_1/F | USB_AUDIO_1/F | 1-2 S/PDIF 2-3 USB |
| Row B: | EXT_AUDIO_1/F | USB_AUDIO_1/F | AUDIO_1/F_SEL      |
| Row C: | EXT_AUDIO_1/F | USB_AUDIO_1/F | AUDIO_1/F_SEL      |
| Row D: | EXT_AUDIO_1/F | USB_AUDIO_1/F | AUDIO_1/F_SEL      |
| Row E: | EXT_AUDIO_1/F | USB_AUDIO_1/F | AUDIO_1/F_SEL      |

|          |                |                |                                      |
|----------|----------------|----------------|--------------------------------------|
|          | Short          | Open           | LINK 323<br>YELLOW<br>Fit to 323-1-2 |
| J23-B    | SLAVE          | MASTER         |                                      |
| PCB Ref: | SLV_BCLK       |                | Short                                |
|          | Short 1-2      | Short 2-3      | LINK 324<br>YELLOW<br>Fit to 324-2-3 |
| J24-B    | GPIO4 selected | SDOUT selected |                                      |
| PCB Ref: | GPIO4/SDOUT    |                | 2-3                                  |
|          | Short 1-2      | Short 2-3      | LINK 325<br>YELLOW<br>Fit to 325-2-3 |
| J25-B    | GPIO3 selected | MODE selected  |                                      |
| PCB Ref: | GPIO3          |                | 2-3                                  |
|          | Short 1-2      | Short 2-3      | LINK 326<br>YELLOW<br>Fit to 326-2-3 |
| J26-B    | GPIO2 selected | CSB selected   |                                      |
| PCB Ref: | GPIO2          |                | 2-3                                  |
|          | Short 1-2      | Short 2-3      | LINK 332<br>YELLOW<br>Fit to 332-1-2 |
| J32-B    | ANALOGUE       | DIGITAL        |                                      |
| PCB Ref: | LMIC_SEL       |                | 1-2                                  |
|          | Short 1-2      | Short 2-3      | LINK 333<br>YELLOW<br>Fit to 333-2-3 |
| J33-B    | LODOVOUT       | MICBIAS        |                                      |
| PCB Ref: | MICPWR_SEL     |                | 2-3                                  |
|          | Short          | Open           | LINK 335<br>YELLOW<br>Fit to 335-1-2 |
| J35-B    | SPKR_HP        | No OUTPUT      |                                      |
| PCB Ref: | SPKR_HP        |                | Short                                |
|          | Short          | Open           |                                      |
| J36-B    | BTL            | No BTL         |                                      |
| PCB Ref: | BTL_CONR       |                | Open                                 |
|          | Short 1-2      | Short 2-3      |                                      |
| J37-B    | 32R Load       | 16R Load       |                                      |
| PCB Ref: | 16R 32R        |                | Open                                 |
|          | Short 1-2      | Short 2-3      | LINK 339<br>YELLOW<br>Fit to 339-1-2 |
| J39-B    | AUX1           | BATT_MON       |                                      |
| PCB Ref: | AUX1_SEL       |                | 1-2                                  |
|          | Short          | Open           | LINK 340<br>YELLOW<br>Fit to 340-1-2 |
| J40-B    | SPKL_HP        | No OUTPUT      |                                      |
| PCB Ref: | SPKL_HP        |                | Short                                |
|          | Short          | Open           |                                      |
| J41-B    | BTL            | No BTL         |                                      |
| PCB Ref: | BTL_CONL       |                | Open                                 |
|          | Short 1-2      | Short 2-3      |                                      |
| J42-B    | 32R Load       | 16R Load       |                                      |
| PCB Ref: | 16R 32R        |                | Open                                 |
|          | Short          | Open           |                                      |
| J45-B    | 8R 8TL load    | No 8TL load    |                                      |
| PCB Ref: | RTL_LOADM      |                | Open                                 |

## BILL OF MATERIALS (BOM)

| <i>Item</i> | <i>RefDes</i>   | <i>Description</i>  | <i>Manufacturer</i> | <i>Manufacturer's Part Number</i> |
|-------------|---|---|---------------------|-----------------------------------|
| 1           | MSC1  | Grip Seal Bag, 90x115mm                                     | CPC                 | PA123                             |
| 2           | U5  | 74ALVC164245 16 Bit Dual Supply Bus Transceiver SSO         | Philips             | 74ALVC164245DL                    |
| 3           | U9  | USB Streaming Controller                                    | Texas Instruments   | TAS1020BPFB                       |
| 4           | C59   | 220nF 0603 SMD Ceramic Capacitor 10V X7R                    | MuRata              | GRM188R71A224KA01D                |
| 5           | C21 C22 C41 C44 C46 C56 C57 C58 C60                         | 10uF 0603 SMD Ceramic Capacitor 6.3V X5R                    | MuRata              | GRM188R60J106ME47D                |
| 6           | C23 C24   | 27pF 0603 SMD Ceramic Capacitor 50V NPO                     | Panasonic           | ECJ-1VC1H270J                     |
| 7           | J46   | Phono Socket PCB mount BLACK                                | Dragon City         | RS109 - Black                     |
| 8           | J9  | Phono Socket PCB mount YELLOW                               | Dragon City         | RS109 - Yellow                    |
| 9           | MISC2   | Lead-free label, 15mm round                                 | Brady               | Y436425                           |
| 10          | H1 H2 H3 H4   | 2x10 2.54mm pitch PCB Pin Header VERTICAL                   | Harwin              | M20-9981045                       |
| 11          | J17 J18 J19 J20 J21 J22 J23 J35 J36 J40 J41 J45 J47 J48 J49 | 1x2 PCB Pin Header 0.1" VERTICAL                            | Harwin              | M20-9990245                       |
| 12          | J10 J11 J12 J13 J14 J15 J24 J25 J26 J28 J32 J33 J37 J39 J42 | 1x3 2.54mm Header Vertical                                  | Harwin              | M20-9990345                       |
| 13          | H9  | 1x6 2.54mm Header Vertical                                  | Harwin              | M20-9990645                       |
| 14          | H6  | 1x8 2.54mm pitch PCB Pin Header VERTICAL                    | Harwin              | M20-9990845                       |
| 15          | Q8  | TN0200T N- Channel MOSFET SOT23                             | Vishay              | TN0200K-T1-E3                     |
| 16          | Q7  | BC847BS NPN Dual Bipolar Transistor SOT363                  | Philips             | BC847BS                           |
| 17          | J27   | USB receptacle Type B                                       | FCI                 | 61729-0010BLF                     |
| 18          | MECH1   | IC Socket DIL 8 WAY   | Multicomp           | 2227MC-08-03-F1                   |
| 19          | PS1 PS2 PS3 PS6   | 0.35A Poly Switch 1210                                      | Tyco                | MICROSMD035F-2                    |
| 20          | J43   | PCB mount 1X3 terminal block for 2.5mm wire gauge           | LUMBERG             | KRM 03                            |
| 21          | L2 L3   | 300R 0805 BMB2A Ferrite Bead                                | Meggitt             | BMB2A0300AN1                      |
| 22          | L1  | 47uH 1210 Surface Mount Inductor 'PA series'                | Panasonic           | ELJPA470KF                        |
| 23          | U2  | TORX147PL Digital Audio Fiber Optic Receiver                | Toshiba             | TORX147PL                         |
| 24          | U4  | Fiber Optic Transmitting Module for Digital Audio Interface | Toshiba             | TOTX147PL                         |
| 25          | PS4 PS5   | 0.75A Poly Switch 1210                                      | Raychem             | MICROSMD075F-2                    |

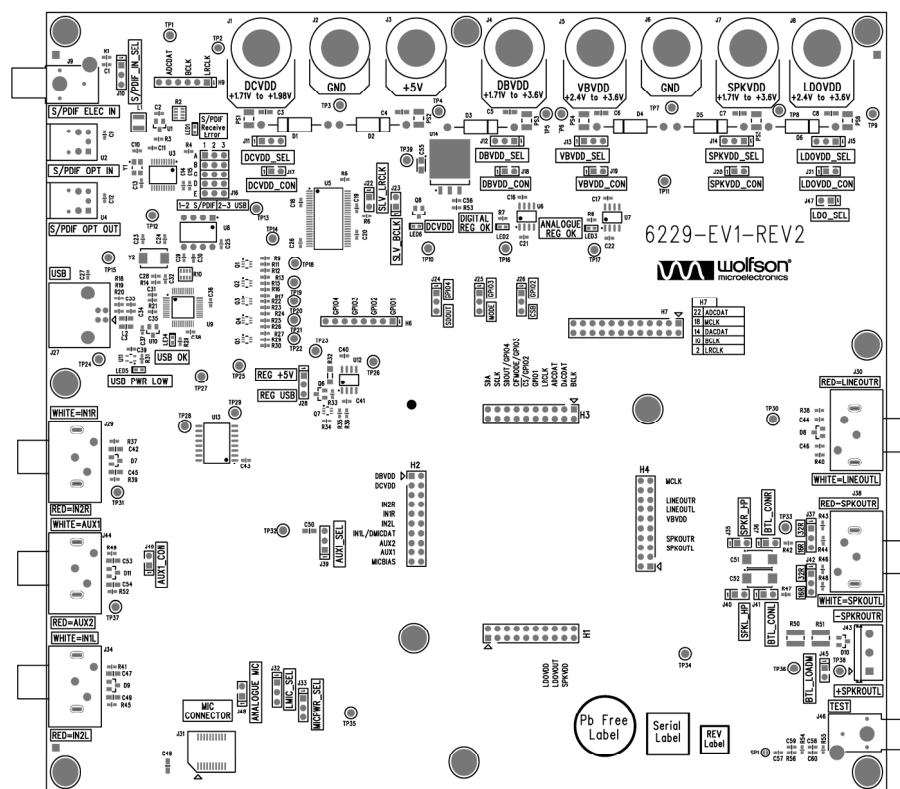
| Item | RefDes   | Description                                  | Manufacturer | Manufacturer's Part Number |
|------|--|--|--------------|----------------------------|
| 26   | SC100 SC101 SC102 SC103 SC104<br>SC105 SC106 SC107 SC108 SC109   | Slotted Panhead Screw - M3 thread; 12mm long | TR Fasteners | M312 PSSTMCZ100-           |
| 27   | W100 W101 W102 W103 W104 W105<br>W106 W107 W108 W109   | Plain M3 size washer                         | TR Fasteners | M3-FABRWAN100-             |
| 28   | C55  | 10uF 10V SMD Tantalum Capacitor case A       | Kemet        | T491A106K010AT             |
| 29   | Q1 Q2 Q3 Q4 Q5   | Si1902DL N- Channel Dual MOSFET SC-70        | Vishay       | SI1902DL-T1-E3             |
| 30   | C51 C52  | Tantalum Capacitor SMD-D 220uF - 10V - AVX   | AVX          | TAJD227K010R               |
| 31   | R32  | 1R50 1206 SMD chip resistor 5% 0.25W         | Vishay       | 2312 1551 1508             |
| 32   | C1 C2 C9 C12 C14 C15 C16 C17 C18<br>C19 C20 C25 C26 C31 C35 C36 C37<br>C38 C39 C40 C43                 | 0.1uF 0603 SMD Ceramic Capacitor 16V X7R     | Phycomp      | 2238 786 15649             |
| 33   | C33 C34  | 47pF 0603 SMD Ceramic Capacitor 50V NPO      | AVX          | 06035A470JAT2A             |
| 34   | C29 C30  | 220pF 0603 SMD Ceramic Capacitor 50V NPO     | AVX          | 06035A221JAT2A             |
| 35   | P100 P101 P102 P103 P104 P105<br>P106 P107 P108 P109   | Hexagonal brass M3 size spacer 20mm length   | Harwin       | R6379-02                   |
| 36   | C50  | 33nF 0805 SMD Ceramic Capacitor 50V X7R      | Phycomp      | 2238 580 15643             |
| 37   | C10 C13  | 22pF 0603 SMD Ceramic Capacitor 50V NPO      | Phycomp      | 2238 867 15229             |
| 38   | C27  | 0.01uF 0603 SMD Ceramic Capacitor 50V X7R    | Phycomp      | 2238 586 15636             |
| 39   | LED2 LED3 LED4 LED6  | KP-1608MGC 0603 SMD Chip LED GREEN           | Kingbright   | KP-1608MGC                 |
| 40   | LED1 LED5  | KP-1608SURC 0603 SMD Chip LED RED            | Kingbright   | KP-1608SURC                |
| 41   | TP1 TP10 TP11 TP12 TP13 TP14<br>TP15 TP24 TP25 TP26 TP27 TP28<br>TP29 TP30 TP31 TP34 TP35 TP36<br>TP37 | 1.32mm PCB Test Terminal BLACK               | Vero         | 20-2136                    |
| 42   | TP16 TP17 TP23 TP39  | 1.32mm PCB Test Terminal RED                 | Vero         | 20-313141                  |
| 43   | C3 C4 C5 C6 C7 C8  | 4.7uF 0805 SMD Ceramic Capacitor 16V X5R     | Kemet        | C0805C475K4PAC             |
| 44   | R10  | 10K 1206 SMD chip 4 resistor array 5% 0.063W | Phycomp      | 2350 03510 103             |
| 45   | R2   | 47k 1206 SMD chip 4 resistor array 5% 0.063W | Phycomp      | 2350 035 10473             |
| 46   | R51  | 8R2 1218 SMD chip resistor 1% 1W             | Phycomp      | 2322 7357 8208             |
| 47   | R3 R9 R13 R17 R24 R27 R34 R35<br>R38 R40   | 10k 0603 SMD chip resistor 1% 0.063W         | Multicomp    | MC 0.063W 0603 1% 10K      |

| <i>Item</i> | <i>RefDes</i>                       | <i>Description</i>                                      | <i>Manufacturer</i>    | <i>Manufacturer's Part Number</i> |
|-------------|-------------------------------------|---|------------------------|-----------------------------------|
| 48          | R33 R36                             | 100K 0603 SMD chip resistor 1% 0.063W                   | Multicomp              | MC 0.063W 0603 1% 100K            |
| 49          | R4 R7 R8 R28                        | 1K1 0603 SMD chip resistor 1% 0.1W                      | Multicomp              | MC 0.063W 0603 1% 1K1             |
| 50          | R18                                 | 1k5 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 1K5             |
| 51          | R43 R44 R46 R48                     | 16R 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 16R             |
| 52          | R31 R53                             | 2K4 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 2K4             |
| 53          | R19 R20                             | 27R 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 27R             |
| 54          | R14                                 | 3K0 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 3K              |
| 55          | R5 R6                               | 33R 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 33R             |
| 56          | R11 R15 R22 R25 R29 R55             | 4K7 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 4K7             |
| 57          | R21 R37 R39 R41 R42 R45 R47 R49 R52 | 47K 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 47K             |
| 58          | R1                                  | 75R 0603 SMD chip resistor 1% 0.063W                    | Multicomp              | MC 0.063W 0603 1% 75R             |
| 59          | R12 R16 R23 R26 R30                 | 0R 0603 SMD chip resistor 1% 0.063W                     | Multicomp              | MC 0.063W 0603 0R                 |
| 60          | C32                                 | 100pF 0603 SMD Ceramic Capacitor 50V NPO                | Multicomp              | U0603C101JCT                      |
| 61          | C28                                 | 1000pF 0603 SMD Ceramic Capacitor 50V NPO               | Multicomp              | U0603C102JCT                      |
| 62          | C42 C45 C47 C48 C49 C53 C54         | 1uF 0805 SMD Ceramic Capacitor 10V X7R                  | Multicomp              | N0805R105KCT                      |
| 63          | U14                                 | 1.5A low dropout positive regulator - 1.8V fixed        | National Semiconductor | LM1086IS-1.8                      |
| 64          | Q6                                  | P-Channel MOSFET 60v, Rds(on) = 0.17R - SOT23           | Vishay                 | SI2309DS                          |
| 65          | D1 D3 D4 D5 D6                      | 1N5337B 4.7V 5W Zener Diode PTH                         | ON Semiconductor       | 1N5337BG                          |
| 66          | D2                                  | 1N5341B 6.2V 5W Zener Diode PTH                         | ON Semiconductor       | 1N5341BG                          |
| 67          | U1 U10                              | DS1818 3.3V active-low Power-On-Reset chip SOT          | Dallas Semiconductor   | DS1818R-10+                       |
| 68          | U6 U7 U12                           | KF33BD Very Low Drop +3.3V Voltage Regulator SO         | ST Microelectronics    | KF33BD                            |
| 69          | U8                                  | EEPROM 8x8 i2c interface - with Wolfson "Standard" code | Microchip Technology   | 24LC64-I/P                        |
| 70          | Y1                                  | XTAL 12MHz 16pF SM GSX-433 Series                       | Golledge               | GSX-433/111DF 12MHz               |
| 71          | Y2                                  | 6.0MHz GSX-752A/351JF SM Crystal 30pF                   | Golledge               | GSX-752A/351JF 6.0MHz             |
| 72          | J1 J2 J3 J4 J5 J6 J7 J8             | 4mm Non-Insulated Panel Socket 16A                      | PJP                    | 3110I                             |
| 73          | J29 J30 J34 J38 J44                 | Phono Socket PCB mount Pair Red/White                   | Rapid                  | 20-1290                           |

| Item | RefDes   | Description  | Manufacturer             | Manufacturer's Part Number |
|------|--|--|--------------------------|----------------------------|
| 74   | LNK_J11 LNK_J12 LNK_J13 LNK_J14<br>LNK_J15 LNK_J17 LNK_J18 LNK_J19<br>LNK_J20 LNK_J21 LNK_J28  | 0.1" OPEN JUMPER LINK RED                                      | Protech                  | 22-3565                    |
| 75   | LNK_H7-5 LNK_H7-4 LNK_H7-3<br>LNK_H7-2 LNK_H7-1 LNK_J10<br>LNK_J22 LNK_J23 LNK_J24 LNK_J25<br>LNK_J26 LNK_J32 LNK_J33 LNK_J35<br>LNK_J39 LNK_J40 LNK_SP1<br>LNK_SP2 LNK_SP3 LNK_SP4<br>LNK_SP5 LNK_SP6 LNK_SP7<br>LNK_SP8 LNK_SP9 LNK_SP10 | 0.1" OPEN JUMPER LINK YELLOW                                   | Protech                  | 22-3570                    |
| 76   | R54 R56  | 1k 0603 SMD chip resistor 1% 0.063W                            | TruOhm                   | 72-9326                    |
| 77   | U13  | PCA9554D I2C I/O Expander                                      | Philips                  | PCA9554D                   |
| 78   | C11  | 1uF 0603 SMD Ceramic Capacitor 6.3V X5R                        | MuRata                   | GRM188R60J105KA01D         |
| 79   | LNK_J16  | 5way, 0.1" Pitch, Open, Black, Jumper Link - Block             | Toby                     | C33-GAG1-2x5-G             |
| 80   | J31  | 2x10 way socket, mates with edge connector on 0.062" thick PCB | Samtec                   | MEC8-110-02-L-DV           |
| 81   | H7   | 2x12 2.54mm pitch PCB Pin Header VERTICAL                      | Toby                     | THD-12-R                   |
| 82   | J16  | 3x5 2.54mm Header Vertical                                     | Toby                     | THT-5-R                    |
| 83   | U11  | XC61C Low Power Consumption Voltage Detector                   | Torex                    | XC61CN4402NRN              |
| 84   | PCB1   | PCB  | Kelan Circuits Ltd       | 6229-EV1-REV2              |
| 85   | U3   | WM8804 1:1 Digital Interface Transceiver with PLL              | Wolfson Microelectronics | WM8804GEDS                 |

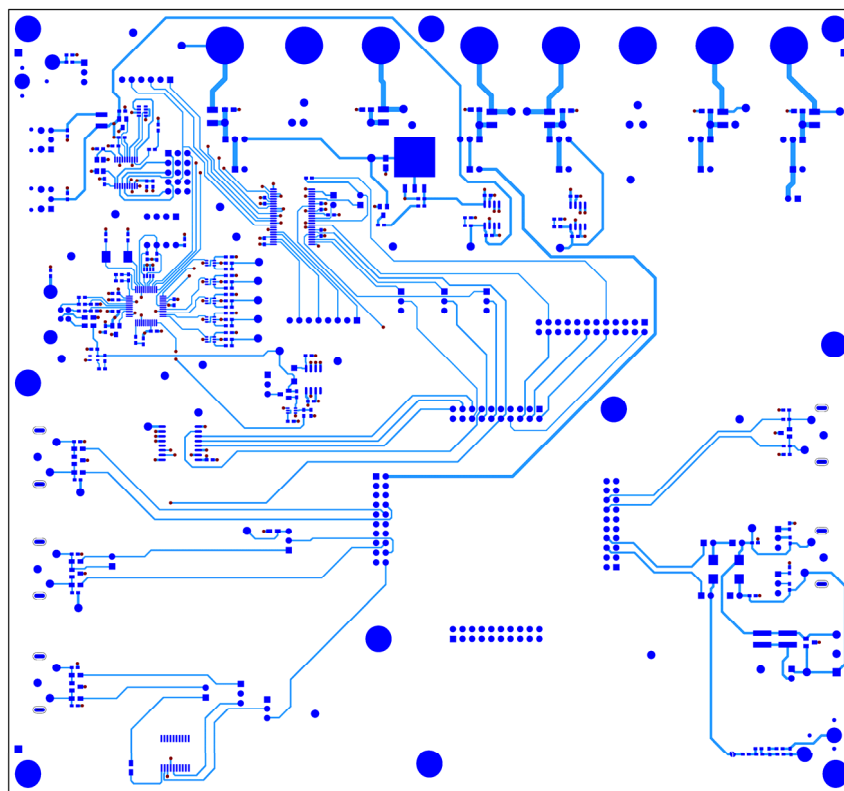
| <i>Item</i> | <i>RefDes</i>                              | <i>Description</i>  | <i>Manufacturer</i> | <i>Manufacturer's Part Number</i> |
|-------------|--|---|---------------------|-----------------------------------|
| Unpop       |  |   |                     |                                   |
| 86          | TP18 TP19 TP20 TP21 TP22 TP32<br>TP33 TP38 | 1.32mm PCB Test Terminal RED  | Vero                | 20-313141                         |
| 87          | D7 D8 D9 D10 D11                           | TVS Diode PESD5V0S2BT V <sub>rw</sub> m=5V dual ESD<br>Protection SOT23 | Philips             | PESD5V0S2BT                       |
| 88          | R50  | 15R 1218 SMD chip resistor 5% 1W  | Phycomp             | 232273564159                      |
| 89          | SP1  | Surface mount shorting point  | N/A                 | N/A                               |
| 90          | TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9            | 1.32mm off-board connection point                                       | N/A                 | N/A                               |

## PCB LAYOUT

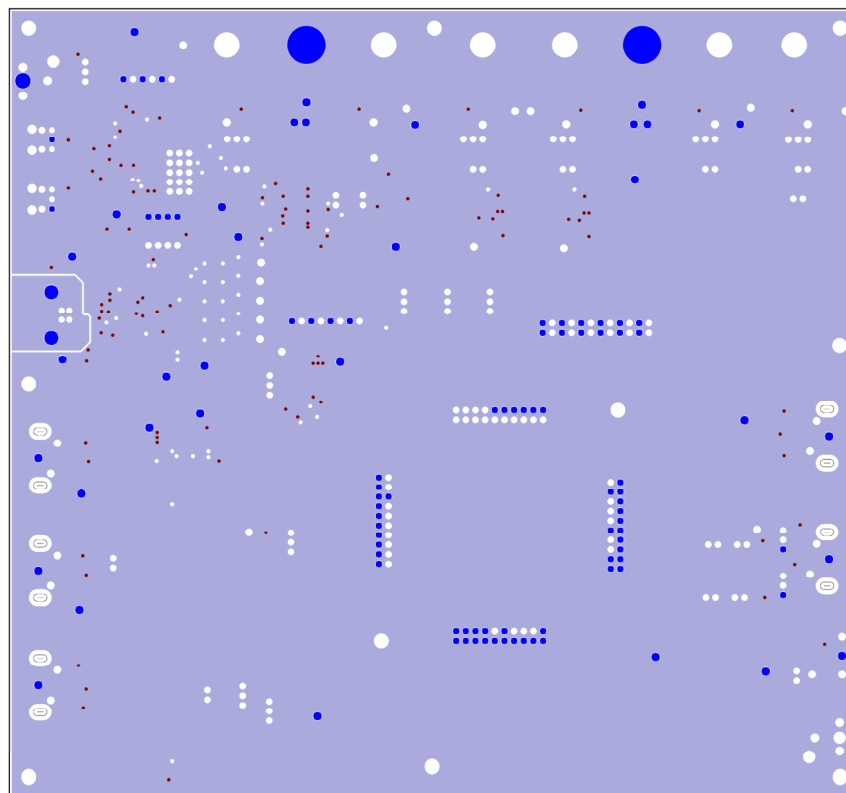


Top Layer: Overview

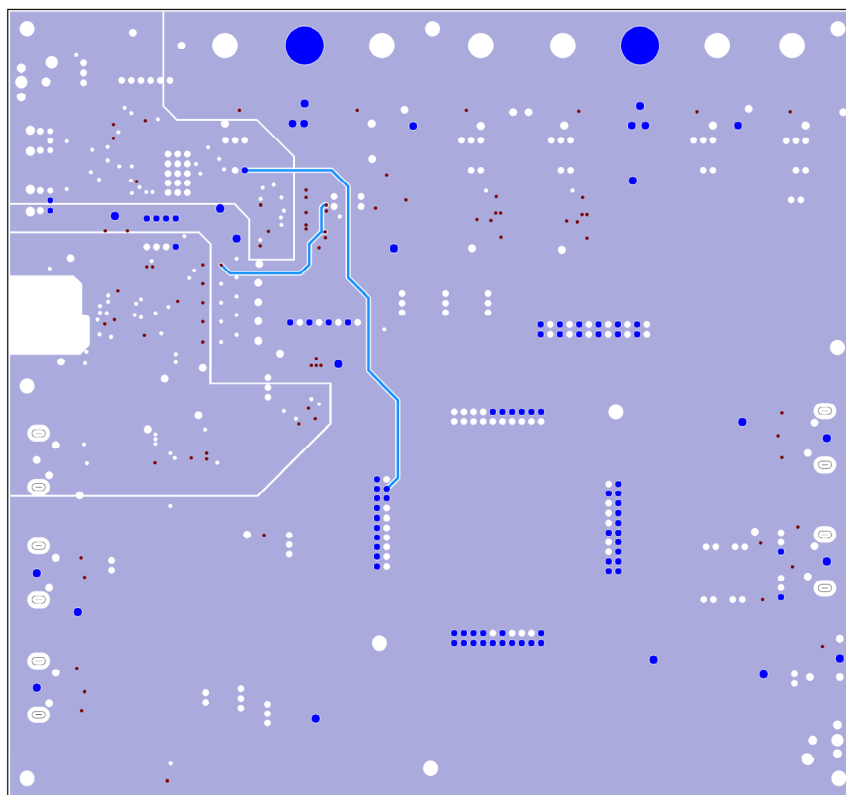




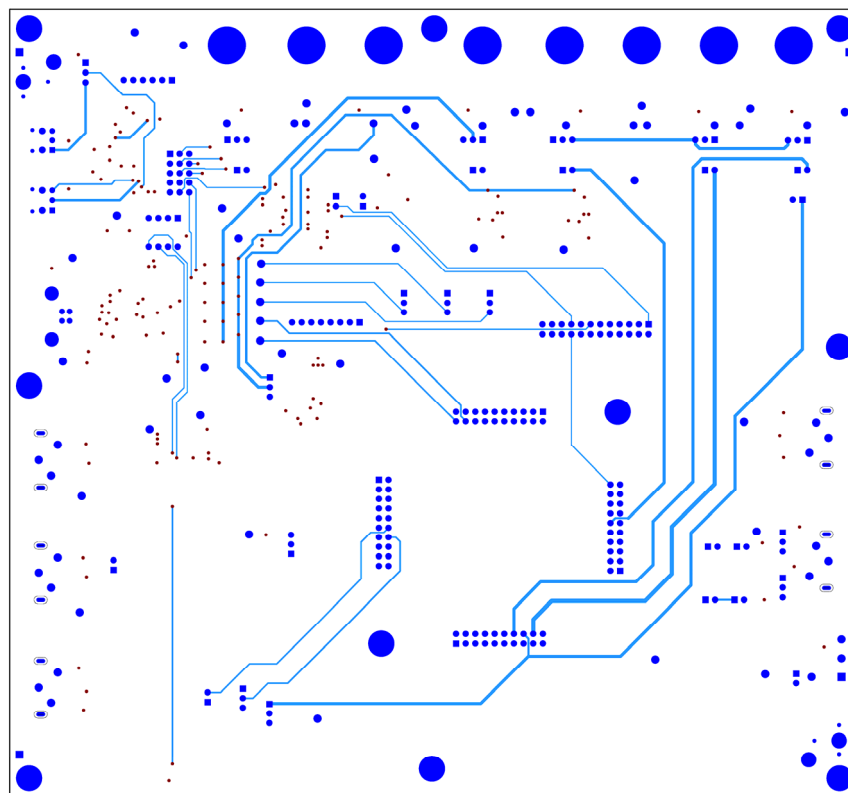
Top Layer: Copper



Layer 2: Copper



Layer 3: Copper



Bottom Layer: Copper

The image displays a complex printed circuit board (PCB) layout for the 6229-EV1-REV2 evaluation board. The board is populated with numerous components, including integrated circuits, resistors, capacitors, and connectors. Key features include:

- Connectors:** S/PDIF ELEC IN, S/PDIF OPT IN, S/PDIF OPT OUT, USB, MIC CONNECT I/O, and various header pins.
- Voltage Regulation:** Multiple DC/DOVDD, DBVDD, VBVD, and LDOVDD regulators are shown, along with their respective ground and power connections.
- Signal Processing:** Blocks for DIGITAL REG. OK and ANALOGUE REG. OK are visible, indicating digital and analog regulation stages.
- Component Labels:** Numerous labels identify specific components, such as resistors (e.g., 10K, 100K), capacitors (e.g., 100nF, 10µF), and ICs (e.g., U1, U2).
- Board Orientation:** The top edge of the board features several circular mounting holes and a series of pin headers.

The overall design is dense, with fine traces connecting the various components across the board's surface.

## **APPLICATION SUPPORT**

If you require more information or require technical support, please contact the Wolfson Microelectronics Applications group through the following channels:

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Mail: Applications Engineering at the address on the last page

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