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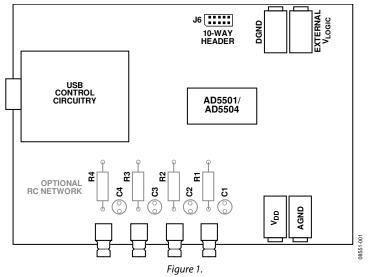
Evaluation Board for AD5501/AD5504

FEATURES

Full-featured evaluation board for the AD5501/AD5504 USB interface PC software for register programming Standalone operation

GENERAL DESCRIPTION

This user guide describes the operation and functionality of the AD5501/AD5504 evaluation board. Use this user guide in conjunction with the AD5501 or AD5504 data sheet (as appropriate) to evaluate board the functionality and performance of the AD5501/AD5504. The evaluation board can be used as a standalone board, with control coming from an external DSP or microcontroller, or it can be connected to a PC. Software is provided that can be used to program the registers of the AD5501/AD5504. Control of the AD5501/AD5504 is via a USB interface.



FUNCTIONAL BLOCK DIAGRAM

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11/09—Revision 0: Initial Version

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FUNCTIONALITY OVERVIEW

The evaluation board for the AD5501/AD5504 allows the user to fully evaluate all the functions and performance of the AD5501/ AD5504 prior to designing it into a system. The evaluation board can be used in a standalone mode with the control signals provided through the 10-pin header, J6, or it can be connected to a PC using the USB cable supplied with the evaluation board kit. Software is provided that allows the user to program the various registers of the AD5501/AD5504 with ease. The operation of the software is described in the Using the USB Software section.

SAFETY REQUIREMENTS

Because the AD5501/AD5504 are capable of producing voltages up to 60 V, the evaluation board is shipped with a perspex cover on the top and bottom. This cover should remain in place to prevent accidental contact with any high voltage components or tracks.

POWER SUPPLIES

To supply V_{LOGIC} , the evaluation board requires a 2.7 V to 5 V supply. The V_{DD} supply can be any value within the power supply limit as specified in the AD5501/AD5504 data sheets. Power supply connections are made to the banana sockets of J2 to J5. The USB interface, if used, gets its power supply from the USB port of the PC. This power supply is not used by the AD5501/AD5504 or any of its associated circuitry. When connecting the power supply leads, it is recommended that the supplies be turned off and that the ground leads be connected first.

DAC OUTPUTS

The DAC output for the AD5501 is available on the SMB connector, T1. The DAC outputs V_{OUTA} to V_{OUTD} for the AD5504 are available on the SMB connectors, T1 to T4.

Table 2. Summary of Link Positions

USB INTERFACE

The software provided with the evaluation board kit allows the user to program the registers of the AD5501/AD5504 via the USB interface. It is important that the software supplied is installed on the PC before the board is connected. The USB circuitry gets its power from the USB port of the PC and generates the required interface signals: CLR, SYNC, and SCLK to control the AD5501/AD5504. To use the interface Link LK1 should be inserted.

STANDALONE OPERATION

The evaluation board can be used as a standalone device if required. The advantage to this is that it lets the user connect the interface pins of the AD5501/AD5504 to their own DSP or microcontroller, thus allowing them to write code to operate the AD5501/AD5504 as their application requires. To use the board in standalone mode, the connection to the USB interface must be removed. This is achieved by removing LK1, which three-states the connections to $\overline{\text{CLR}}$, $\overline{\text{LDAC}}$, $\overline{\text{SYNC}}$, SCLK and SDI. LK10 should be in Position B or Position C so that the $\overline{\text{R}}$ -SEL pin is connected to DGND or V_{LOGIC} as required. The interface signals required to control the AD5501/AD5504 can then be provided through the 10-pin header, J6. The pinout of J6 is shown in Table 1.

Table 1.	J6 Header	Pinout
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Pin	Signal	Pin	Signal
1	CLR	6	SDO
2	SYNC	7	R_SEL
3	SCLK	8	ALARM
4	SDI	9	DGND
5	LDAC	10	DGND

Link	Description		
LK1	This link determines if the USB interface is to be used.		
	If this link is inserted, the USB interface generates the signals required to control the AD5501/AD5504.		
	If this link is removed, the USB interface is not used, and Header J3 must be used to provide signals to the AD5501/AD5504.		
LK2	This link connects the V _{LOGIC} pin of the AD5501/AD5504 to the V _{LOGIC} source. This link can be removed and an ammeter connected across the two pins if it is required to measure the V _{LOGIC} current. The source for V _{LOGIC} is determined by LK9.		
LK3	This link connects the V_{DD} pin of the AD5501/AD5504 to the V_{DD} source. This link can be removed and an ammeter connected across the two pins if it is required to measure the V_{DD} current.		
LK9	This link selects the voltage source for V_{LOGIC} .		
	If this link is in Position A, $V_{LOGIC} = 5$ V from the USB interface.		
	If this link is in Position B, $V_{LOGIC} = 3$ V from the voltage regulator, U3.		
	If this link is in Position C, V _{LOGIC} is connected to the banana sockets, J4 and J5. An external voltage source should be applied to these sockets.		
LK10	This link selects the logic level applied to R_SEL.		
	If this link is in Position A, R_SEL is controlled by software.		
	If this link is in Position B, R_SEL is connected to DGND.		
	If this link is in Position C, \overline{R} SEL is connected to V_{LOGIC} .		

USING THE USB SOFTWARE

The evaluation board kit is supplied with a CD containing PC software that allows the user to control the evaluation board via the USB interface. Note that the software must be installed before the evaluation board is connected to the USB port. The software installation program usually runs automatically when the CD is inserted in the drive; however, if this doesn't happen, double-click the **setup.exe** file in the root directory of the CD. The software is installed, and shortcuts are placed on the start menu in a folder called Analog Devices. When the software is installed, the evaluation board can be connected to the USB port.

When the software is started, the user is presented with a selection box. The selection box presents a choice of using the AD5501 or AD5504. Click the appropriate button for the board being used.

The main control panel for the AD5504 software is shown in Figure 2. Use this panel to load values to the DACs and set the status of the LDAC and CLR pins. It should be noted that when power is first applied to the AD5501/AD5504, the DACs are powered down by default. The DACs are powered up by selecting the appropriate options in the control register panel.

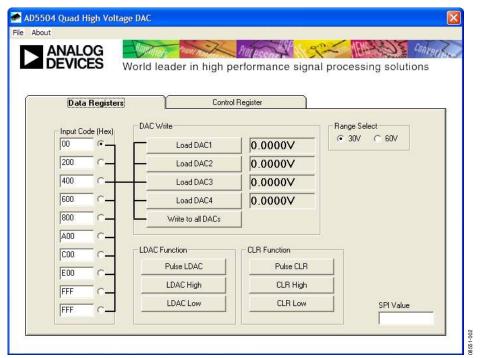


Figure 2. Main Control Panel

SCHEMATICS AND ARTWORK

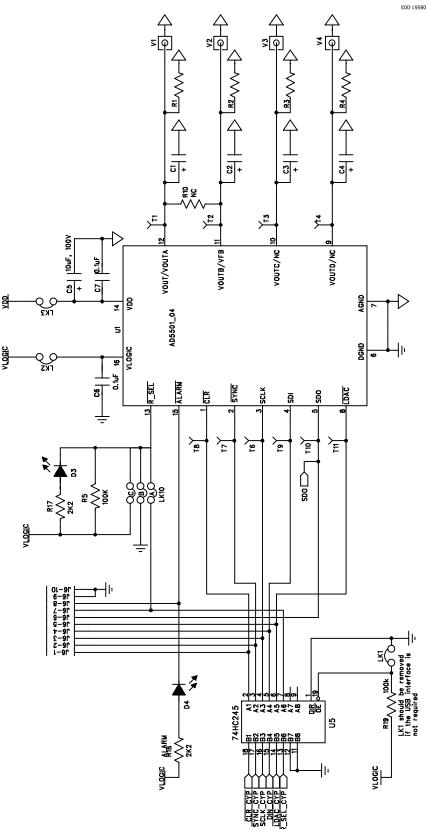


Figure 3. Evaluation Board Schematic (1 of 3)

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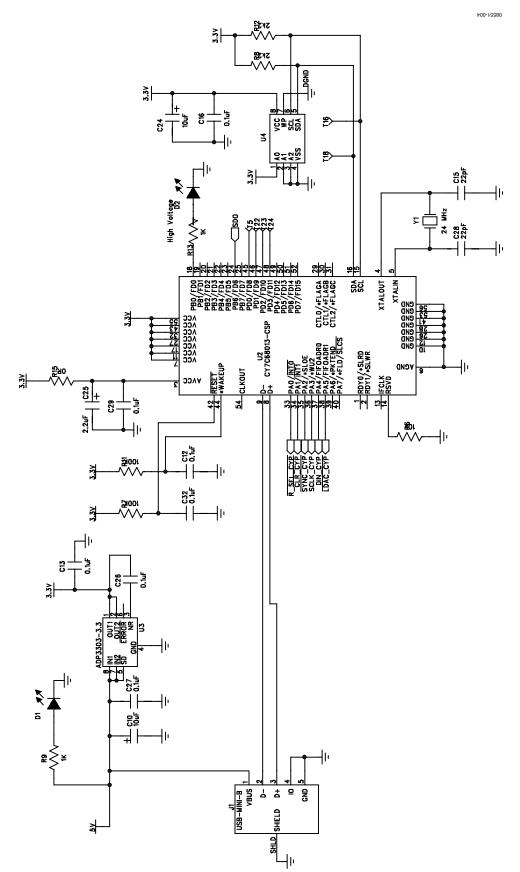


Figure 4. Evaluation Board Schematic (2 of 3)

Evaluation Board User Guide

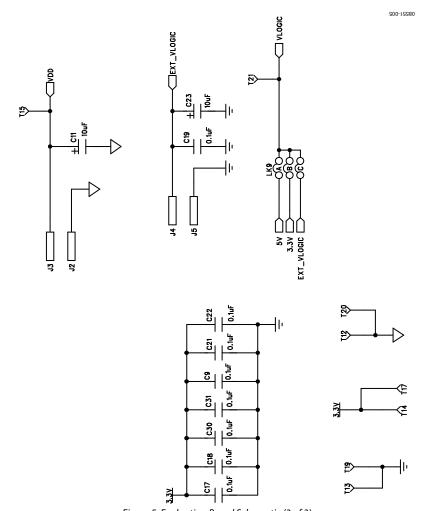


Figure 5. Evaluation Board Schematic (3 of 3)

BILL OF MATERIALS

Table 3. AD5504

	3. AD5504 Name	Part Description	Stock Code ¹
Qty		Part Description	
4	C1 to C4	Socket pins × 2	FEC 329563 (two required)
2	C5, C11	Capacitor, 10 μF, 100 V	FEC 9693130
17	C6, C7, C9, C12, C13, C16 to C19, C21, C22, C26, C27, C29 to C32	Capacitor, 0603, 100 nF, 50 V	FEC 431989
3	C10, C23, C24	Capacitor, Case A, 10 µF, 10 V	FEC 9751041
2	C15, C28	Capacitor, 0603, 22 pF, 50 V	FEC 9406107
1	C25	Capacitor, Case A, 2.2 μF, 10 V	FEC 9753796
4	D1 to D4	LED, SMD 0805 green	FEC 8529906
1	J1	Socket, USB MINI-AB SMT	FEC 9786490
2	J2, J5	Black 4 mm banana socket	FEC 1101128
2	J3, J4	Red 4 mm banana socket	FEC 1101127
1	J6	10-pin (2 × 5) 0.1" pitch 90° header	FEC 102-2233
3	LK1 to LK3	2-pin 0.1" pitch header and shorting shunt	FEC 102-2247 and FEC 150-411
2	LK9, LK10	6-pin (3 $ imes$ 2) 0.1" header and shorting shunt	FEC 102-2231 and FEC 150-411
4	R1 to R4	Socket pins × 2	FEC 329563 (two required)
4	R5, R7, R11, R19	Resistor, 0603, 100 kΩ	FEC 9330402
1	R6	Resistor, 0603, 10 kΩ	FEC 9330399
4	R8, R12, R16, R17	Resistor, 0603, 2.2 kΩ	FEC 9330810
2	R9, R13	Resistor, 0603, 1 kΩ	FEC 9330380
1	R10	Not populated	N/A
1	R15	Resistor, 0603, 0 Ω	FEC 9331662
20	T1 to T11, T14 to T19, T22 to T24	Terminal, PCB red	FEC 8731144
4	T12, T13, T20, T21	Terminal, PCB black	FEC 8731128
1	U1	High voltage, quad-channel DAC	AD5504BRUZ
1	U2	USB microcontroller	Digi-Key 428-1669-ND
1	U3	Precision low dropout voltage regulator	ADP3303ARZ-3.3
1	U4	IC serial EEPROM 64K 2.5 V 8-SOIC	FEC 9758070
1	U5	Bus transceiver	Digi-Key 296-8279-1-ND
4	V1 to V4	50 Ω SMB 90° PCB jack	FEC 121-2895
1	Y1	CM309S SMD crystal	FEC 9509658

¹ FEC refers to Farnell In One; Digi-Key refers to the Digi-Key Corporation.

Table 4. AD5501

1 C1 Socket pins $\times 2$ FEC 329563 (two required) 3 C2 to C4 Not populated FEC 329563 (two required) 4 C5, C11 Capacitor, 10 µF, 100 V FEC 329563 (two required) 7 C6, C7, C9, C12, C13, C16 to C19, C21, Capacitor, 0603, 100 nF, 50 V FEC 431989 7 C22, C26, C27, C29 to C32 Capacitor, 0603, 22 pF, 50 V FEC 9751041 2 C15, C28 Capacitor, 0603, 22 pF, 50 V FEC 9753796 4 D1 to D4 LED, SMD 0805 green FEC 9753796 1 J1 Socket, USB MINI-AB SMT FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 1101128 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 122-221 and FEC 150-411 1 R1 Socket pins $\times 2$ R2 Sitor, 0603, 10 kΩ FEC 933030 1 R1 Socket pins $\times 2$ FEC 329563 (two required) 1 R1 Socket pins $\times 2$ FEC 333060 1 R1 Socket pins $\times 2$ FEC 9330399 1	Qty	Name	Part Description	Stock Code ¹
2 C5, C11 Capacitor, 10 μF, 100 V FEC 9693130 17 C2, C7, C9, C12, C13, C16 to C19, C21, C2, C26, C27, C29 to C32 Capacitor, 0603, 100 nF, 50 V FEC 431989 3 C10, C23, C24 Capacitor, 0603, 20 pF, 50 V FEC 9751041 2 C15, C28 Capacitor, Case A, 10 μF, 10 V FEC 9751041 4 D1 to D4 LED, SMD 0805 green FEC 8529906 1 J1 Socket, USB MINI-AB SMT FEC 9766490 2 J3, J4 Black 4 mm banana socket FEC 1101128 3 LK1 to LK3 2-pin 0.1° pitch 90° header FEC 102-2233 4 LK1 to LK3 2-pin 0.1° pitch header and shorting shunt FEC 102-2231 and FEC 150-411 1 J6 10-pin (2 × 5) 0.1° pitch 90° header FEC 329563 (two required) 1 R1 Socket pins × 2 FEC 329563 (two required) 1 R4 Not populated FEC 933030 1 R6 Resistor, 603, 10 kΩ FEC 933080 2 R9, R13 Resistor, 603, 0 Ω FEC 933030 1 R10 Resistor	1	C1	Socket pins × 2	FEC 329563 (two required)
17 C6, C7, C9, C12, C13, C16 to C19, C21, C22, C26, C27, C29 to C32 Capacitor, Case A, 10 μF, 10V FEC 431989 2 C10, C23, C24 Capacitor, Case A, 10 μF, 10V FEC 9751041 2 C15, C28 Capacitor, Case A, 2.2 μF, 10V FEC 9753796 4 D1 to D4 LED, SMD 0805 green FEC 8529906 5 J1 Socket, USB MINI-AB SMT FEC 9753796 2 J2, J5 Black 4 mm banana socket FEC 1101128 2 J3, J4 Red 4 mm banana socket FEC 102-2233 3 LK1 to LK3 2-pin 0.1° pitch header and shorting shunt FEC 102-2237 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1° header and shorting shunt FEC 102-2233 and FEC 150-411 3 R2 to R4 Not populated FEC 9330402 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330380 1 R10 Resistor, 0603, 100 kΩ FEC 9330380 1 R10 Resistor, 0603, 100 kΩ FEC 9330380 1 R10 Resistor, 0603, 100 kΩ FEC 9330380 1 R15<	3	C2 to C4	Not populated	FEC 329563 (two required)
C22, C26, C27, C29 to C32 Fec FEC P751041 3 C10, C23, C24 Capacitor, Case A, 10 μf, 10 V FEC 9406107 1 C25 Capacitor, Case A, 2.2 μf, 10 V FEC 9753796 4 D1 to D4 LED, SMD 0805 green FEC 8529906 1 J1 Socket, USB MINI-AB SMT FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 1011128 3 J4 Red 4 mm banana socket FEC 1011127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2247 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 10 kΩ FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 10 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 0 Ω FEC 933080 1 R10 Resistor, 0603, 0 Ω FEC 933080 1 R15 Resistor, 0603, Ω Ω <td>2</td> <td>C5, C11</td> <td>Capacitor, 10 μF, 100 V</td> <td>FEC 9693130</td>	2	C5, C11	Capacitor, 10 μF, 100 V	FEC 9693130
2 C15, C28 Capacitor, 0603, 22 pF, 50 V FEC 9406107 1 C25 Capacitor, Case A, 2.2 μF, 10 V FEC 973796 4 D1 to D4 LED, SMD 0805 green FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 1101128 2 J3, J4 Red 4 mm banana socket FEC 1101127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 2 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 3330402 4 R5, R7, R11, R19 Resistor, 0603, 10 kΩ FEC 933080 4 R6 Resistor, 0603, 10 kΩ FEC 933080 1 R10 Resistor, 0603, 10 kΩ FEC 933080 2 R9, R13 Resistor, 0603, 10 Ω FEC 933080 3 T2 to T4 Not populated N/A 4 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB black FEC 933080	17		Capacitor, 0603, 100 nF, 50 V	FEC 431989
1 C25 Capacitor, Case A, 2.2 μF, 10 V FEC 9753796 4 D1 to D4 LED, SMD 0805 green FEC 8529906 1 J1 Socket, USB MINI-AB SMT FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 1101128 2 J3, J4 Red 4 mm banana socket FEC 101127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch Pader and shorting shunt FEC 102-2247 and FEC 150-411 1 R6 G-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 330390 4 R5, R7, R11, R19 Resistor, 603, 10 kΩ FEC 9330402 1 R6 Resistor, 603, 10 kΩ FEC 9330402 2 R9, R13 Resistor, 603, 0 Ω FEC 9330810 2 R9, R13 Resistor, 603, 0 Ω FEC 9330380 1 R10 Resistor, 603, 0 Ω FEC 9331662 <	3	C10, C23, C24	Capacitor, Case A, 10 μF, 10 V	FEC 9751041
4 D1 to D4 LED, SMD 0805 green FEC 8529906 1 J1 Socket, USB MINI-AB SMT FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 101128 2 J3, J4 Red 4 mm banana socket FEC 101127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2231 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 3 R2 to R4 Not populated FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 10 kΩ FEC 9330380 1 R10 Resistor, 0603, 0 Ω FEC 9330402 1 R15 Resistor, 0603, 0 Ω FEC 9330462 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red N/A 1 U1 High voltage, 12-bit voltage o	2	C15, C28	Capacitor, 0603, 22 pF, 50 V	FEC 9406107
1 J1 Socket, USB MIN-AB SMT FEC 9786490 2 J2, J5 Black 4 mm banana socket FEC 1101128 2 J3, J4 Red 4 mm banana socket FEC 1101127 1 J6 10-pin (2 × 5) 0.1" pitch 90' header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 9330402 4 R5, R7, R11, R19 Resistor, 0603, 10 kΩ FEC 9330810 1 R6 Resistor, 0603, 10 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 1 kΩ FEC 9330810 1 R10 Resistor, 0603, 0 Ω FEC 9330810 1 R15 Resistor, 0603, 0 Ω FEC 9330810 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 1 U1 High voltage, 12-bit voltage output DAC AD55018RUZ	1	C25	Capacitor, Case A, 2.2 µF, 10 V	FEC 9753796
2 J2, J5 Black 4 mm banana socket FEC 1101128 2 J3, J4 Red 4 mm banana socket FEC 1101127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2231 and FEC 150-411 1 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 9330402 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 100 kΩ FEC 933080 1 R6 Resistor, 0603, 2.2 kΩ FEC 933080 1 R10 Resistor, 0603, 0 Ω FEC 933080 1 R15 Resistor, 0603, 0 Ω FEC 933080 1 R15 Resistor, 0603, 0 Ω FEC 9331662 1 R15 Resistor, 0603, 0 Ω FEC 8731128 1 I1, To To T1, T14 to T19, T22 to T24 Terminal, PCB black FEC 8731128<	4	D1 to D4	LED, SMD 0805 green	FEC 8529906
2 J3, J4 Red 4 mm banana socket FEC 1101127 1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2247 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 329563 (two required) 1 R6 Resistor, 0603, 10 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 10 kΩ FEC 9330810 3 R10 Resistor, 0603, 1 kΩ FEC 933080 1 R10 Resistor, 0603, 0 Ω FEC 9330810 1 R15 Resistor, 1Ω FEC 8731144 3 T1 to T11, T14 to T19, T22 to T24 Terminal, PCB lack FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 US Not populated	1	J1	Socket, USB MINI-AB SMT	FEC 9786490
1 J6 10-pin (2 × 5) 0.1" pitch 90° header FEC 102-2233 3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2247 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 330302 4 R5, R7, R11, R19 Resistor, 0603, 10 kΩ FEC 9330309 4 R6 Resistor, 0603, 10 kΩ FEC 9330810 2 R9, R12, R16, R17 Resistor, 0603, 12 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 1 kΩ FEC 933080 1 R15 Resistor, 0603, 0 Ω FEC 933030 1 R15 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 9730142 1 U1 High voltage, 12-bit voltage output DAC<	2	J2, J5	Black 4 mm banana socket	FEC 1101128
3 LK1 to LK3 2-pin 0.1" pitch header and shorting shunt FEC 102-2247 and FEC 150-411 2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 2.2 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 0.Ω FEC 933080 1 R15 Resistor, 0603, 0.Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red N/A 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 U2 US B microcontroller Digi-Key 428-1669-ND 1 U2 US B microcontroller Digi-Key 428-1669-ND 1 U3 IC serial	2	J3, J4	Red 4 mm banana socket	FEC 1101127
2 LK9, LK10 6-pin (3 × 2) 0.1" header and shorting shunt FEC 102-2231 and FEC 150-411 1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 12 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 1 kΩ FEC 9330380 1 R10 Resistor, 0603, 0 Ω FEC 9331662 1 R15 Resistor, 0603, 0 Ω FEC 9331662 1 R15 Resistor, 0603, 0 Ω FEC 9331662 1 R15 Resistor, 0603, 0 Ω FEC 9331662 1 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 9731124 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ	1	J6	10-pin (2 × 5) 0.1" pitch 90° header	FEC 102-2233
1 R1 Socket pins × 2 FEC 329563 (two required) 3 R2 to R4 Not populated FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 12, 2 kΩ FEC 9330380 2 R9, R13 Resistor, 0603, 1 kΩ FEC 9330380 1 R10 Resistor, 0603, 0 Ω FEC 9330380 1 R15 Resistor, 0603, 0 Ω FEC 933080 1 R15 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 LC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1	3	LK1 to LK3	2-pin 0.1" pitch header and shorting shunt	FEC 102-2247 and FEC 150-411
3 R2 to R4 Not populated FEC 329563 (two required) 4 R5, R7, R11, R19 Resistor, 0603, 100 kΩ FEC 9330402 1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 2.2 kΩ FEC 9330380 2 R9, R13 Resistor, 0603, 1 kΩ FEC 9330380 1 R10 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 87311662 18 T2 to T4 Not populated N/A 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator ADP3303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND	2	LK9, LK10	6-pin (3 $ imes$ 2) 0.1" header and shorting shunt	FEC 102-2231 and FEC 150-411
4R5, R7, R11, R19Resistor, 0603, 100 kΩFEC 93304021R6Resistor, 0603, 10 kΩFEC 93303994R8, R12, R16, R17Resistor, 0603, 2.2 kΩFEC 93308102R9, R13Resistor, 0603, 1 kΩFEC 93303801R10Resistor, 0603, 1 kΩFEC 94655611R15Resistor, 0603, 0 ΩFEC 933166217T1, T5 to T11, T14 to T19, T22 to T24Terminal, PCB redFEC 87311443T2 to T4Not populatedN/A4T12, T13, T20, T21Terminal, PCB blackFEC 87311281U1High voltage, 12-bit voltage output DACAD5501BRUZ1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V1S0 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	1	R1	Socket pins × 2	FEC 329563 (two required)
1 R6 Resistor, 0603, 10 kΩ FEC 9330399 4 R8, R12, R16, R17 Resistor, 0603, 2.2 kΩ FEC 9330810 2 R9, R13 Resistor, 0603, 1 kΩ FEC 9330380 1 R10 Resistor, 0603, 1 kΩ FEC 933080 1 R10 Resistor, 0603, 0 Ω FEC 9465561 1 R15 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator ADP3303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 S0 Ω SMB 90° PCB jack FEC 121-2895 3 <	3	R2 to R4	Not populated	FEC 329563 (two required)
4R8, R12, R16, R17Resistor, 0603, 2.2 kΩFEC 93308102R9, R13Resistor, 0603, 1 kΩFEC 9330301R10Resistor, 1 ΩFEC 94655611R15Resistor, 0603, 0 ΩFEC 933166217T1, T5 to T11, T14 to T19, T22 to T24Terminal, PCB redFEC 87311443T2 to T4Not populatedN/A4T12, T13, T20, T21Terminal, PCB blackFEC 87311281U1High voltage, 12-bit voltage output DACAD5501BRUZ1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorAD9303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V1S0 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	4	R5, R7, R11, R19	Resistor, 0603, 100 kΩ	FEC 9330402
2R9, R13Resistor, 0603, 1 kΩFEC 93303801R10Resistor, 1 ΩFEC 94655611R15Resistor, 0603, 0 ΩFEC 933166217T1, T5 to T11, T14 to T19, T22 to T24Terminal, PCB redFEC 87311443T2 to T4Not populatedN/A4T12, T13, T20, T21Terminal, PCB blackFEC 87311281U1High voltage, 12-bit voltage output DACAD5501BRUZ1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V1S0 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	1	R6	Resistor, 0603, 10 kΩ	FEC 9330399
1 R10 Resistor, 1 Ω FEC 9465561 1 R15 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator ADP3303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	4	R8, R12, R16, R17	Resistor, 0603, 2.2 kΩ	FEC 9330810
1 R15 Resistor, 0603, 0 Ω FEC 9331662 17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator AD9303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	2	R9, R13	Resistor, 0603, 1 kΩ	FEC 9330380
17 T1, T5 to T11, T14 to T19, T22 to T24 Terminal, PCB red FEC 8731144 3 T2 to T4 Not populated N/A 4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator AD9303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	1	R10	Resistor, 1 Ω	FEC 9465561
3T2 to T4Not populatedN/A4T12, T13, T20, T21Terminal, PCB blackFEC 87311281U1High voltage, 12-bit voltage output DACAD5501BRUZ1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V150 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	1	R15	Resistor, 0603, 0 Ω	FEC 9331662
4 T12, T13, T20, T21 Terminal, PCB black FEC 8731128 1 U1 High voltage, 12-bit voltage output DAC AD5501BRUZ 1 U2 USB microcontroller Digi-Key 428-1669-ND 1 U3 Precision low dropout voltage regulator AD9303ARZ-3.3 1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	17	T1, T5 to T11, T14 to T19, T22 to T24	Terminal, PCB red	FEC 8731144
1U1High voltage, 12-bit voltage output DACAD5501BRUZ1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V150 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	3	T2 to T4	Not populated	N/A
1U2USB microcontrollerDigi-Key 428-1669-ND1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V150 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	4	T12, T13, T20, T21	Terminal, PCB black	FEC 8731128
1U3Precision low dropout voltage regulatorADP3303ARZ-3.31U4IC serial EEPROM 64K 2.5 V 8-SOICFEC 97580701U5Bus transceiverDigi-Key 296-8279-1-ND1V150 Ω SMB 90° PCB jackFEC 121-28953V2 toV4Not populatedN/A	1	U1	High voltage, 12-bit voltage output DAC	AD5501BRUZ
1 U4 IC serial EEPROM 64K 2.5 V 8-SOIC FEC 9758070 1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	1	U2	USB microcontroller	Digi-Key 428-1669-ND
1 U5 Bus transceiver Digi-Key 296-8279-1-ND 1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	1	U3	Precision low dropout voltage regulator	ADP3303ARZ-3.3
1 V1 50 Ω SMB 90° PCB jack FEC 121-2895 3 V2 toV4 Not populated N/A	1	U4	IC serial EEPROM 64K 2.5 V 8-SOIC	FEC 9758070
3 V2 toV4 Not populated N/A	1	U5	Bus transceiver	Digi-Key 296-8279-1-ND
	1	V1	50 Ω SMB 90° PCB jack	FEC 121-2895
1 Y1 CM309S SMD crystal FEC 9509658	3	V2 toV4	Not populated	N/A
	1	Y1	CM309S SMD crystal	FEC 9509658

¹ FEC refers to Farnell In One; Digi-Key refers to the Digi-Key Corporation.

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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