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# EVAL-AD5697RSDZ
# EVALUATION BOARD

## Preliminary Technical Document

## Evaluation Board for AD5676R, Dual, 12-Bit, Serial Voltage-Output DAC

### FEATURES

**Full-featured evaluation board for the AD5697R**
**On-board reference**
**Various link options**
**PC control in conjunction with Analog Devices**
**System development platform (SDP)**
**PC software for control of DACs**
**On-board ADC for voltage readback**

### PACKAGE CONTENTS

**AD5697R evaluation board**
**AD5697R device**
**CD that includes**
   **Self-installing software that allows users to control the**
      **board and exercise all functions of the device**
   **Electronic version of the datasheet**
   **Electronic version of EVAL-AD5697RSDZ application note**

### GENERAL DESCRIPTION

The Analog Devices, Inc., AD5697R evaluation board is designed to help customers quickly prototype new AD5697R circuits and reduce design time. The AD5697R operates from a single 2.7 V to 5.5 V supply. The part incorporates an internal 2.5 Von-board reference to give an output voltage span of 2.5 V or 5 V. The on-chip reference is on at power-up

The part must be written to after power-up to turn off the internal reference.

Full data on the AD5697R may be found in the data sheet available from Analog Devices and should be consulted in conjunction with this data sheet when using the evaluation board.

The evaluation board interfaces to the USB port of an IBM compatible PC via the SDP board. Software is available with the evaluation board which allows the user to easily program the AD5697R.

The software has a simulation mode option to mimic the operation of the DAC without the use of the evaluation board. The System Demonstration Platform board can be ordered separately via www.analog.com.



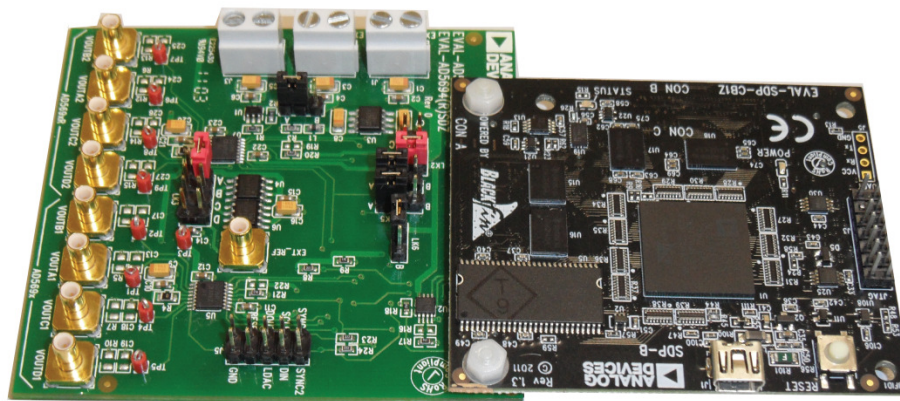*Figure 1. Universal Evaluation Board*

# EVALUATION BOARD HARDWARE

## POWER SUPPLIES

To power the AD5697R evaluation board supply 6V between the 6V terminal and GND inputs for the analog supply.

All supplies are decoupled to ground with 10 μF tantalum and 0.1 μF ceramic capacitors.

**Table 1. Power Supply Connector**

| Connector No. | Voltage |
|---|---|
| J1 | External Logic/Digital positive power supply, VDD. |
| J2 | Analog positive power supply, VDD. |
| J3 | Analog positive power supply, to ADP3331. For single-supply operation, supply 6V. |

## LINK OPTIONS

A number of link and switch options are incorporated in the evaluation board and should be set for the required operating setup before using the board. The functions of these link options are described in detail in Table 3. Table 2 describes the positions of the different links to control the evaluation board by PC, via the USB port, using the AD5669 is single-supply mode.

**Table 2. Link Options Setup for SDP Control (Default)**

| Link No. | Options |
|---|---|
| LK1 | A |
| LK2 | A |
| LK3 | DESERTED |
| LK4 | A |
| LK5 | A |
| LK6 | A |

**Table 3. Link Functions**

| Link No. | Option |
|---|---|
| LK1 | This selects the power source for the AD5697R:<br>• Position A selects internal VDD coming from the ADP3331<br>• Position B selects the use of an external supply(J2). |
| LK2 | This link selects the logics source for the AD5697R:<br>• Position A selects VIO, the voltage supply from the System Demonstration Platform.<br>• Position B selects EXT_VLOGIC(J1).<br>• Position C selects VDD power source(See LK1). |
| LK3 | This link selects the reference source for AD5697R:<br>• Position A selects the AD5696R's(U7) 2.5V on-chip reference.<br>• Position B selects the ADR431.<br>• Position C selects the REF195.<br>• Position D selects the external SMB connector EXT_REF. |
| LK4 | This link selects the Gain pin of the AD5697R:<br>• Position A selects Logic HIGH and a gain of 2 (0V to 5V output voltage range).<br>• Position B selects Logic LOW and a gain of 1 (0V to 2.5V output voltage range). |
| LK5 | This link selects the RSTSEL pin on the AD5697R:<br>• Position A selects reset to midscale.<br>• Position B selects reset to zero-scale. |
| LK6 | This link selects the pull-up voltage for the i2C interface:<br>• Position A selects the AVDD analog circuitry power supply source.<br>• Position B selects the on-board 5 V reference as the power supply source. |

# EVALUATION BOARD SOFTWARE

## INSTALLING THE SOFTWARE

The EVAL-AD5696RSDZ/ EVAL-AD5694RSDZ evaluation kit includes self-installing software on CD. The software is compatible with Windows® XP, Windows Vista (32-/64-bits) and Windows 7 (32-/64-bits).

Install the software before connecting the SDP board to the USB port of the PC. This ensures that the SDP board is recognized when it connects to the PC.

1. Start the Windows® operating system and insert CD.
2. The installation software must open automatically. If it does not, run the **setup.exe** file from the CD.
3. After installation is completed, power-up the evaluation board as described in the Power Supplies section
4. Plug the EVAL-AD5696RSDZ/ EVAL-AD5694RSDZ into the SDP board and the SDP board into the PC using the USB cable included in the box.
5. When the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation.

## RUNNING THE SOFTWARE

To run the program, do the following:

1. Click **Start** > **All Programs** > **Analog Devices** > **AD5696R/ AD56964R**> **AD5696R/ AD5694R Evaluation Software**. To uninstall the program, click **Start** > **Control Panel** > **Add or Remove Programs** > **AD5696R/ AD5694R Evaluation Software**.

2. If the SDP board is not connected to the USB port when the software is launched, a connectivity error is displayed (see Figure 2). Simply connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.
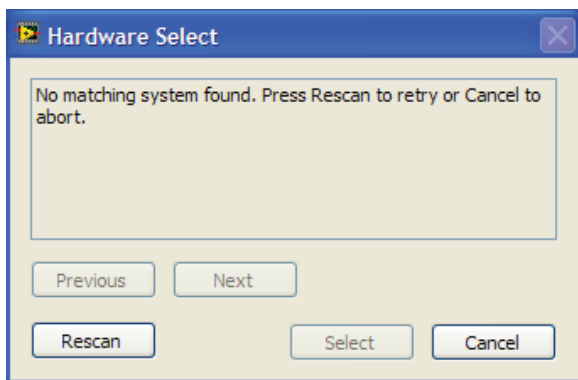


*Figure 2. Pop-Up Window Error*

3. If the SDP board is not connected to the evaluation boards a message box appears as shown in Figure 3. Check the connection between the SDP and EVAL-AD5696SDZ/ EVAL-AD5694SDZ boards and or use simulation mode.
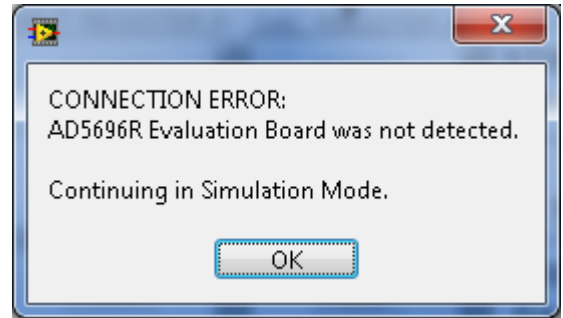


*Figure 3. Simulation Mode Message*

4. If the SDP board is connect the System Development Platform will connect for a brief period.
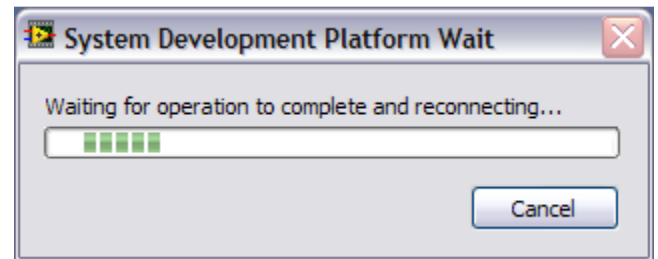


*Figure 4.System Develop Platform Wait Window*

5. The main window of the AD5696R evaluation software then opens, as shown in Figure 5.
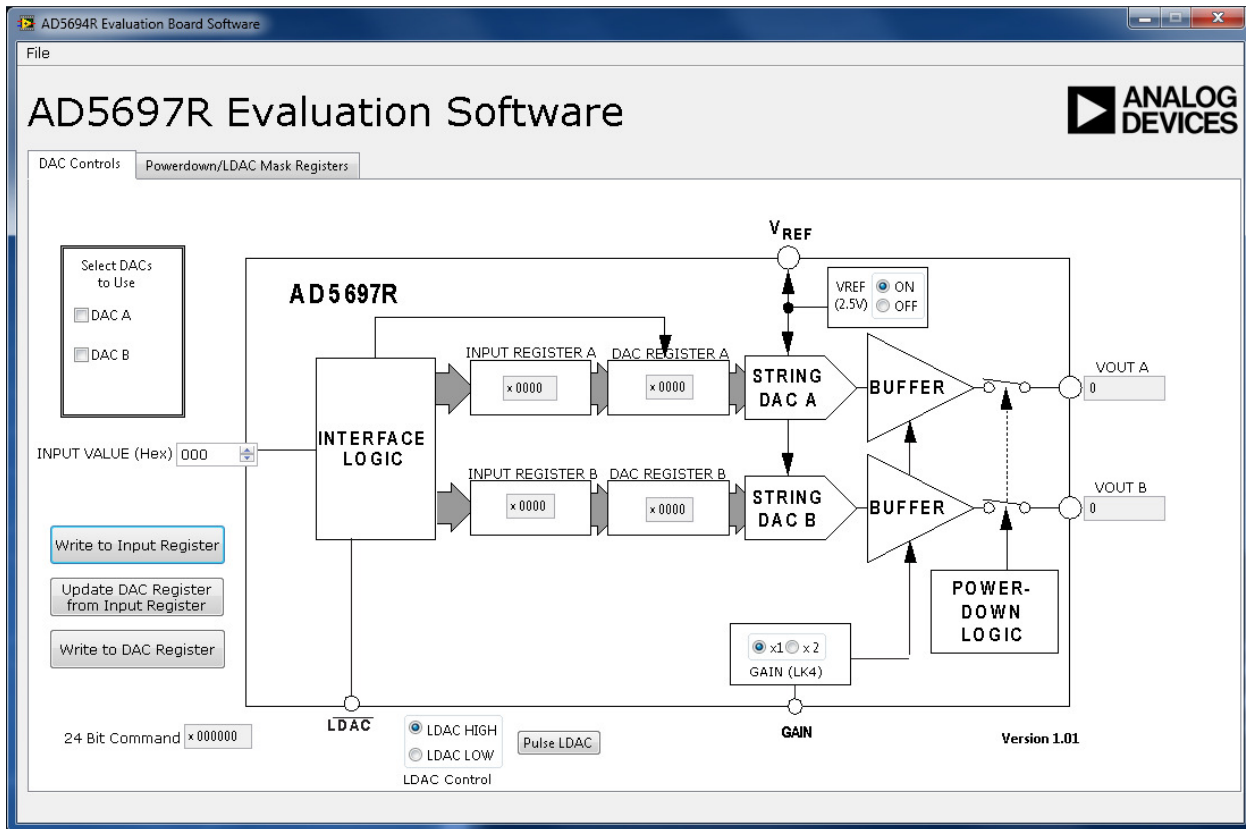
*Figure 5. AD5697R Evaluation Board Main Window*

## SOFTWARE OPERATION

From the **Analog Devices** menu, click **Start > All Programs > Analog Devices >AD5697R>AD5697R SDP Evaluation Software**.

For older PCs, click **Start > Programs > Analog Devices > AD5697R > AD5697R SDP Evaluation Software**.

The AD5696R/AD5694R main window opens, as shown in Figure 5. The data programmed into the 24 bit input shift register is displayed. You can select the different write commands by clocking on the buttons.

To select a command with which to program the part, select the Appropriate channel in the **Select DACs to Use** section.

Under **Data Bits**, type the data in decimal format. To execute click **Write to Part**. You must click **Write to Part** to execute all writes to the part.

The AD5697R evaluation board lets you set up the power down.

DAC bits, the clear code register bits and the LDAC register bits, by selecting the appropriate option from the drop down menu under **Command Menu** and clicking **Write to Part**. You can also set the register bits for the required mode of operation. Consult the AD5697R datasheet for details.

Set /LDAC and /RESET to High or Low by clicking the corresponding checkbox under **Hardware Pins**. This command is executed immediately so there is no need to click **Write to**

**Part**

# EVALUATION BOARD SCHEMATICS AND ARTWORK
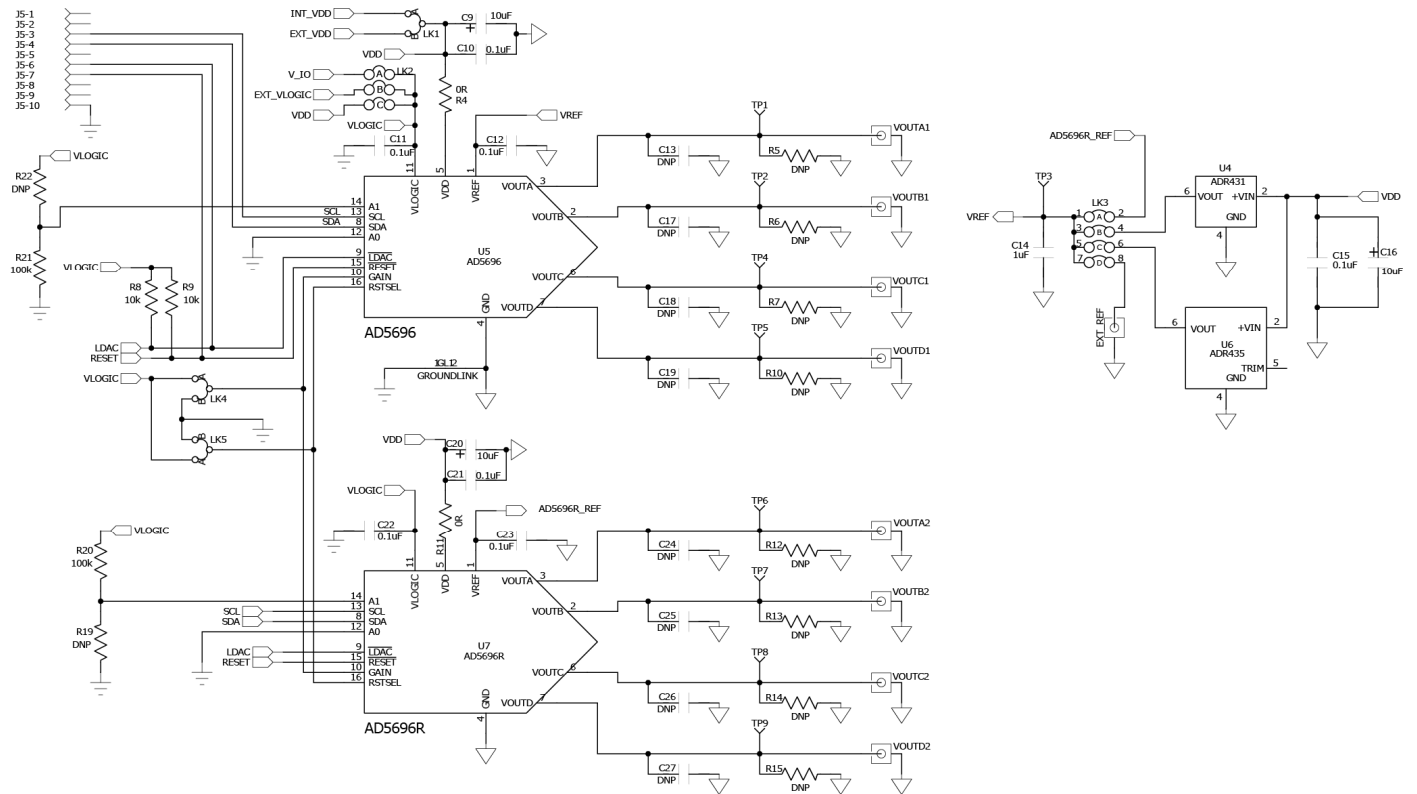


Figure 6. Schematic of AD5669 Evaluation Circuitry
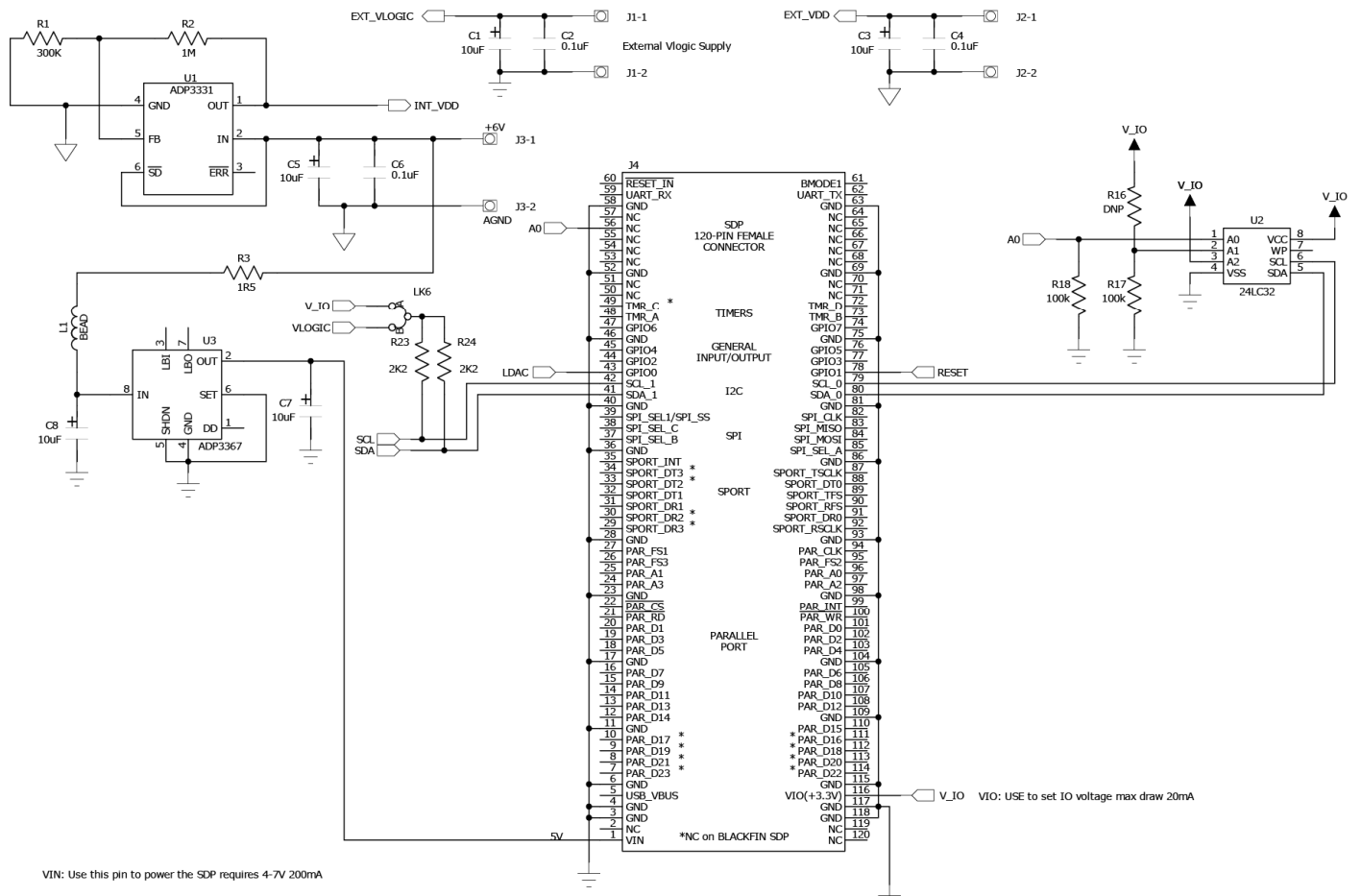


Figure 7. Schematic of SDP Connector
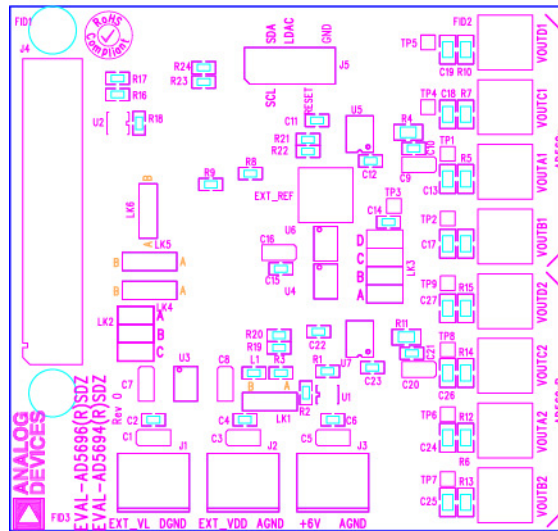
*Figure 8. Component Placement Drawing*
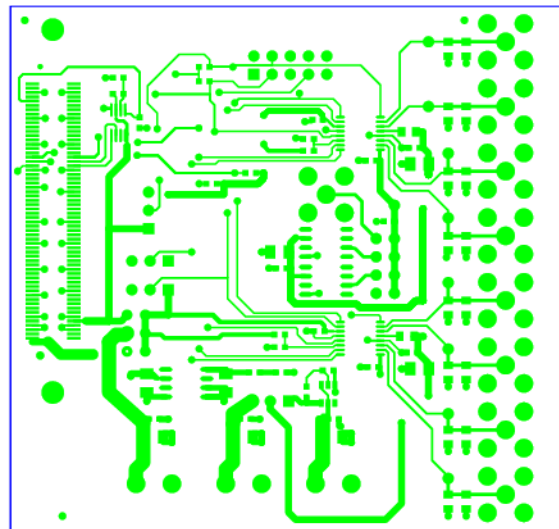


*Figure 9. Component Side PCB Drawing*
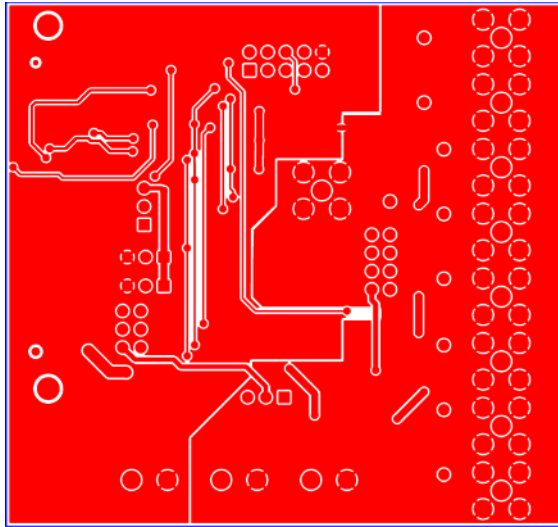
*Figure 10. Solder Side PCB Drawing*

# ORDERING INFORMATION

## COMPONENTS LIST

**Table 4.**

| Qty | Reference Designator | Description | Supplier/Part Number |
|---|---|---|---|
| 1 | U5 | Quad, 16bit, DAC | AD5694BUZ/AD5696BUZ |
| 1 | U7 | Quad, 16bit, DAC | AD5694BRUZ/AD5696BRUZ |
| 10 | C2,C4,C6,C10,C11,C12,C15,C21,C22,C23 | 0.1µF Capacitor | FEC 8820023 |
| 2 | R4, R11 | 0Ω Resistor | FEC 9333681 |
| 4 | R17, R18, R20, R21 | 100kΩ Resistor | FEC 9330402 |
| 2 | R8, R9 | 10kΩ Resistor | FEC 933-0399 |
| 8 | C1, C3, C5, C7, C8, C9, C16, C20 | 10 µF Capacitor | FEC 197-130 |
| 1 | R2 | 1M Ω Resistor | Digikey RMCF1/161MFRCT-ND |
| 1 | R3 | 1.5Ω Resistor | FEC 9331832 |
| 1 | C14 | 1µF Capacitor | FEC 318-8840 |
| 2 | R23, R24 | 2.2kΩ Resistor | FEC 157 7611 |
| 1 | R1 | 300kΩ Resistor | Digikey 541-300KHCT-ND |
| 1 | L1 | Inductor, 600 ohms @ 100MHz | Digikey 490-1024-1-ND |
| 9 | EXT_REF, VOUTA1, VOUTA2, VOUTB1, VOUTB2, VOUTC1, VOUTC2, VOUTD1, VOUTD2 | PCB Mount SMB Jack | FEC 1206013 |
| 3 | J1-3 | 2 Pin Terminal Block (5mm Pitch) | FEC 151789 |
| 2 | Lk2, Lk3 | 6/8 Pin 0.1" Header & Shorting Block | FEC 150-411 |
| 1 | J4 | 120-Way Female Connector, 0.6mm Pitch | FEC 1324660 |
| 1 | J5 | 10 Pin (2x5) 0.1" Pitch SMT Header | FEC 1022244 |
|  | Lk4, LK5, Lk6 | JUMPER BLOCK USING 3 PIN SIP HEADER | FEC 1022248 |
| 9 | TP1-9 | Test Point | FEC 8731144 (Pack) |
| 1 | U1 | Adjustable LDO Regulator | ADP3331ARTZ |
| 1 | U2 | 32K I2C Serial EEPROM | FEC 1331330 |
| 1 | U3 | +5V Fixed, Adjustable Voltage Regulator | ADP3367ARZ |
| 1 | U6 | XREF Voltage Reference | ADR435ARZ |

# NOTES

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