

## Evaluating the ADL5206 1 GHz DGA with 30 dB Range and 1 dB Step Size

### FEATURES

- Full featured evaluation board for the ADL5206
- Easy connection to test equipment and other circuits
- PC control via a separately purchased system demonstration platform ([EVAL-SDP-CS1Z](#))
- 5.0 V or 3.3V single-supply operation

### EVALUATION KIT CONTENTS

- ADL5206-EVALZ evaluation board

### EQUIPMENT NEEDED

- 5 V dc power supply
- EVAL-SDP-CS1Z ([SDP-S](#)) controller board
- Oscilloscope with high-Z probe
- PC running Windows with 2 or more USB ports
- Analog signal generator
- Analog signal analyzer

### SOFTWARE NEEDED

- Analysis | Control | Evaluation ([ACE](#)) software

### GENERAL DESCRIPTION

The ADL5206-EVALZ evaluation board allows the manual control of the ADL5206 through the serial and parallel interface ports, as well as through the USB port on a PC operating Microsoft® Windows® via the system demonstration platform (SDP-S) controller board. A 3.3 V low dropout (LDO) voltage regulator supplies the logic circuits when the ADL5206 is running on a 5 V supply.

Connect the ADL5206-EVALZ to the SDP-S to allow for quick evaluation of the ADL5206 (see Figure 3). In addition, the ADL5206-EVALZ can be configured over a USB from a panel within the Analog Devices, Inc., ACE software.

For full details on the ADL5206, see the ADL5206 data sheet, which must be consulted in conjunction with this user guide when using the ADL5206-EVALZ.

### EVALUATION BOARD PHOTOGRAPHS

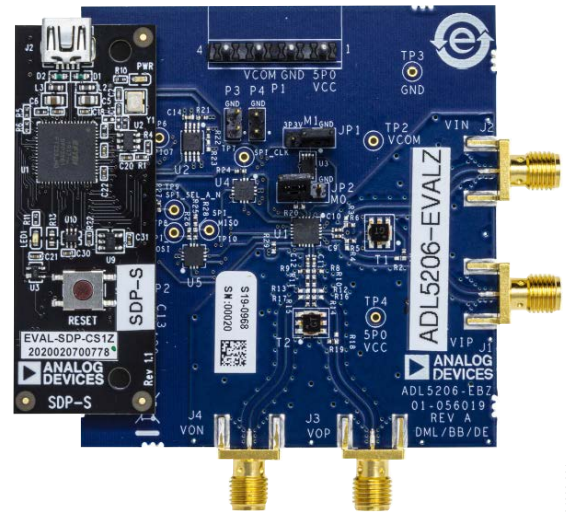


Figure 1. ADL5206-EVALZ, Top

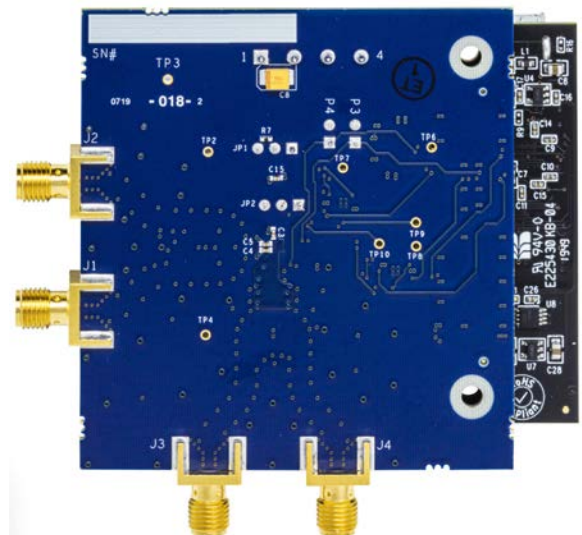


Figure 2. ADL5206-EVALZ, Bottom

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**REVISION HISTORY**

9/2020—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE

### HARDWARE SETUP

The hardware can be connected as shown in Figure 3. A single 5 V power supply powers the ADL5206-EVALZ. The power supply must be able to source at least 150 mA to its operating conditions. The PC connects to the SDP-S through USB cable.

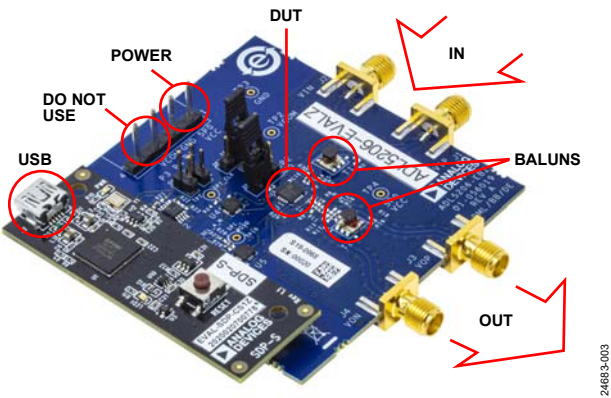


Figure 3. ADL5206-EVALZ Hardware Setup

### GETTING STARTED—SINGLE-TONE TESTING

It is recommended for users to verify the basic setup before making any modifications to the ADL5206-EVALZ.

#### Basic Hardware Setup

Connect the equipment detailed in Table 1 to the ADL5206-EVALZ and connect the PC USB cable to the SDP-S at J2.

Table 1. ADL5206-EVALZ Equipment Connections

| Equipment                    | Connecting to the ADL5206-EVALZ                     |
|------------------------------|---|
| Power Supply                 | P1: Pin 1 (+5V), Pin 2 (GND)                        |
| Signal Source                | J2 (VIP), set the source to 100 MHz, -18 dBm output |
| SDP-S                        | P2  |
| Spectrum Analyzer (Optional) | J3 (VOP)  |

### SELECTING THE DIGITAL CONTROL INTERFACE

The ADL5206 supports three different digital control interfaces that can be setup using board jumpers. There are two pin connectors on the ADL5206-EVALZ, JP1 (MODE1) and JP2 (MODE0). By default, serial mode is selected.

Table 2. ADL5206-EVALZ Jumper Options

| MODE1 | MODE0 | Interface   |
|-------|-------|-------------|
| 0     | 0     | Parallel    |
| 0     | 1     | Serial      |
| 1     | 0     | Up and down |
| 1     | 1     | Up and down |

### LOSSES AND SIGNAL-TO-NOISE RATIO (SNR) DEGRADATION

The voltage gain of 32 dB is defined between the input and output pins of the ADL5206. The miscellaneous components of the ADL5206-EVALZ add to the signal losses, and therefore, degrade the SNR as well.

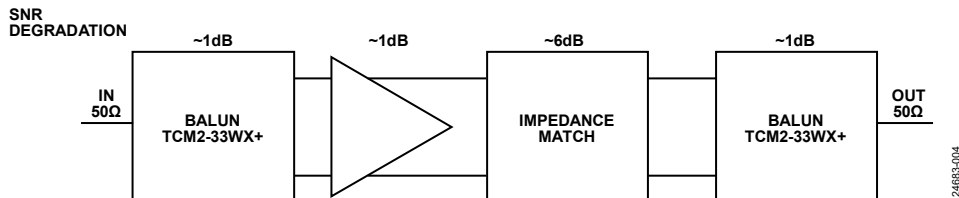


Figure 4. SNR Degradation

## EVALUATION BOARD SOFTWARE QUICK START PROCEDURES

Download the [ACE](#) software to evaluate the ADL5206-EVALZ. When the ACE software is installed, the plugin for the [ADL5206](#) family can be downloaded and installed the following two ways:

1. Launch the ACE application, go to **Tools > Manage Plugins**, and under **Available Packages**, search for, select, and install the ADL5206 selected plugin.
2. Download the ADL5206 .acezip file from either the ADL5206-EVALZ evaluation board webpage or go to the ACE software webpage and search for the ADL5206 plugin. Once the .acezip file is downloaded, double-click the file to install the plugin, which launches the ACE software automatically. Note, if using Internet Explorer, it is possible that the .acezip file extension automatically changes to a .zip file extension during the download. If this happens, simply rename the file extension back to .acezip and double-click the file to install.

### SINGLE-TONE DEMONSTRATION USING THE ACE SOFTWARE

The following settings configure the ADL5206 to amplify a 100 MHz sine wave using the ACE software:

1. Configure the hardware according to the hardware setup instructions (see the Basic Hardware Setup section).

Set the frequency of the signal generator to 100 MHz and the output level to  $-18$  dBm. Optionally, connect the spectrum analyzer to J3.

2. Open the ACE software by going to **Start > Analog Devices > ACE**. The ACE software then displays the ACE **Start** window shown in Figure 5. The ADL5206-EVALZ is detected automatically and displays within the **Attached Hardware** section.
3. Click the **ADL5206-EVALZ** icon to open the board level view window (see Figure 6). Because the ADL5206-EVALZ is a simple evaluation board, only the ADL5206 is represented as a controllable component.
4. Click the **ADL5206** icon to open the IC level view window (see Figure 7). Changes made within this view are not automatically applied. Click **Apply Changes** for these changes to take effect (see Figure 7).
5. Within the IC level view window, check off the **Pin 13: PWUP** box, select a gain within the **Voltage Gain Up/Down Control** pulldown menu (see Figure 7), and click **Apply Changes** for these changes to take effect. To change the gain again, repeat this step.

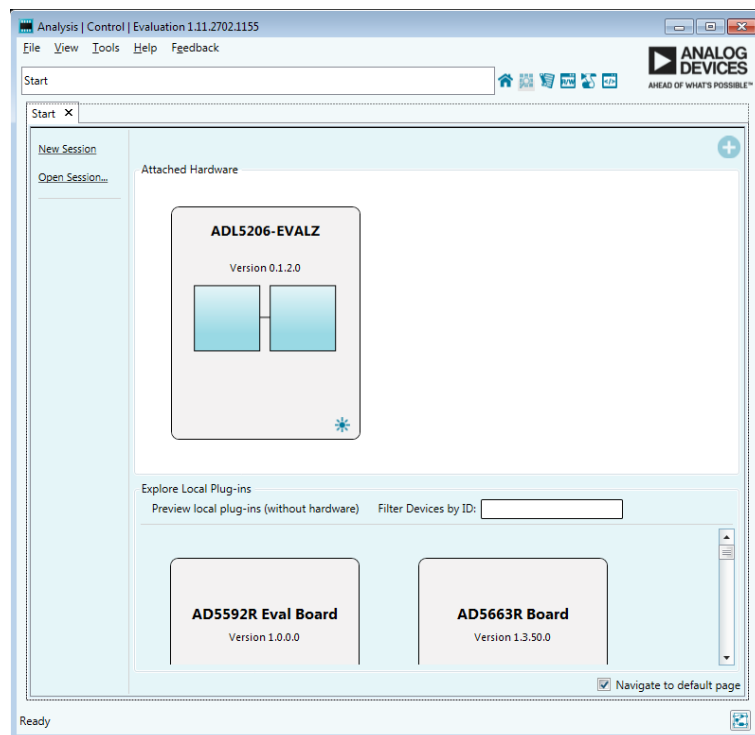


Figure 5. Initial ACE Start Window

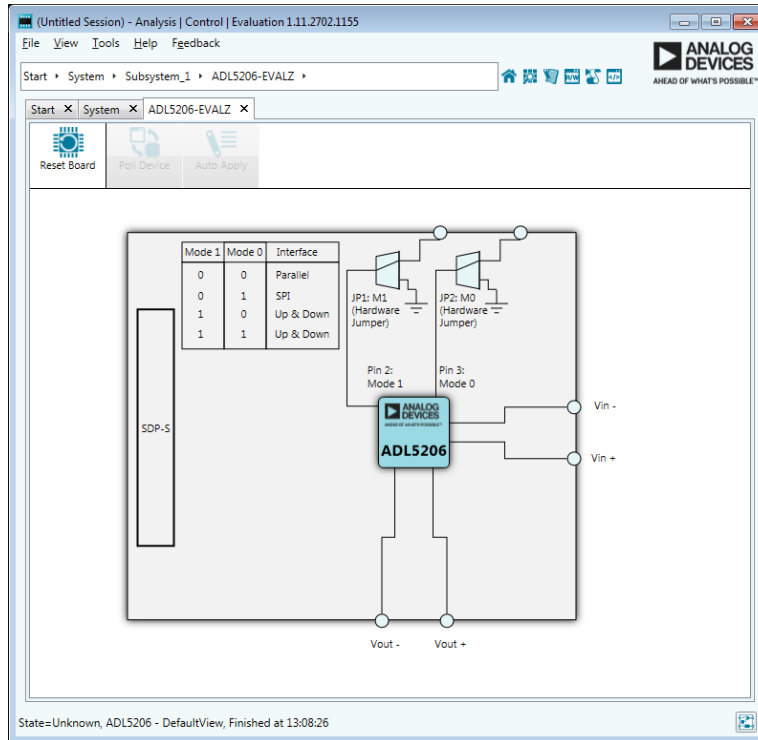


Figure 6. ADL5206-EVALZ Board Level View Window in ACE

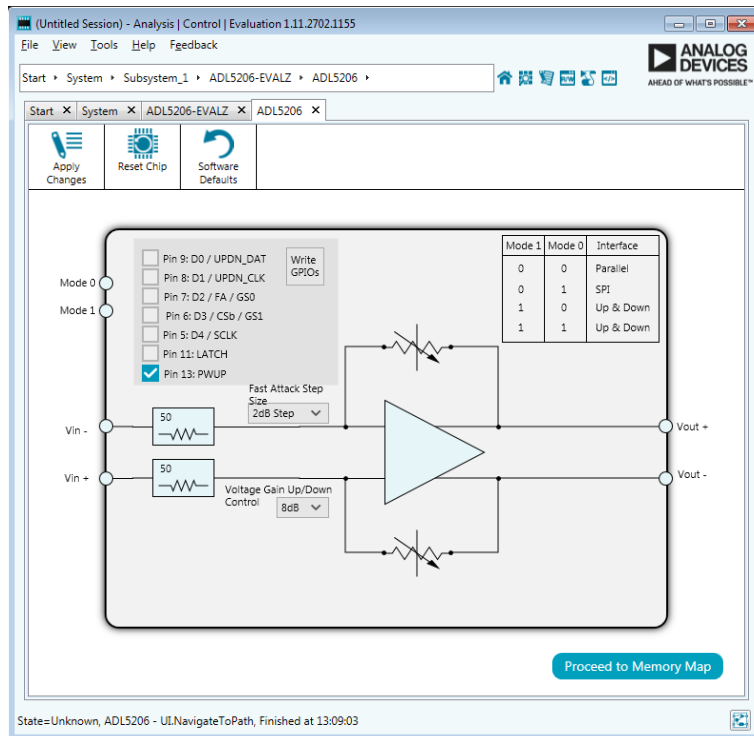
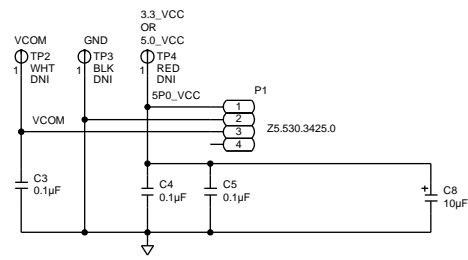


Figure 7. ADL5206 IC Level View Window in ACE

EVALUATION BOARD SCHEMATICS AND ARTWORK



CAP SIZE 5MHz TO 1.7GHz

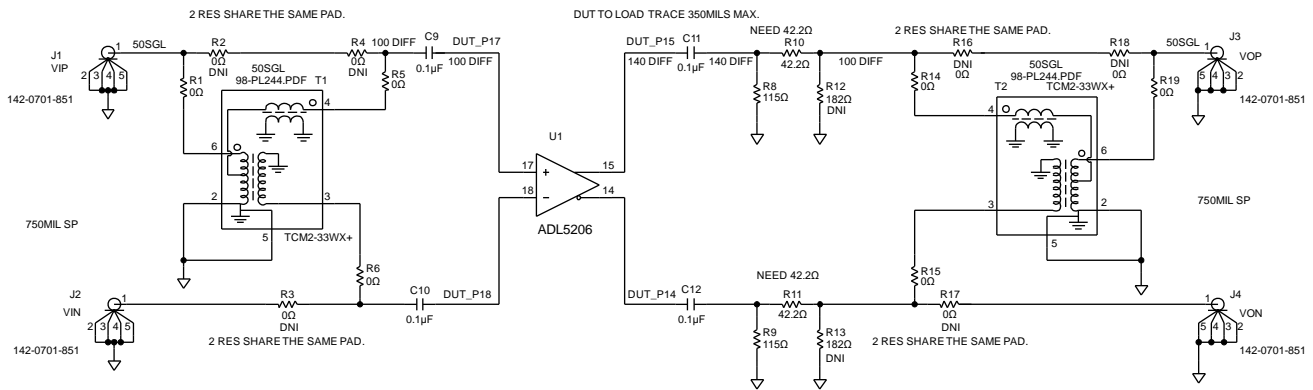


Figure 8. ADL5206-EVALZ Evaluation Board Schematic, Page 1

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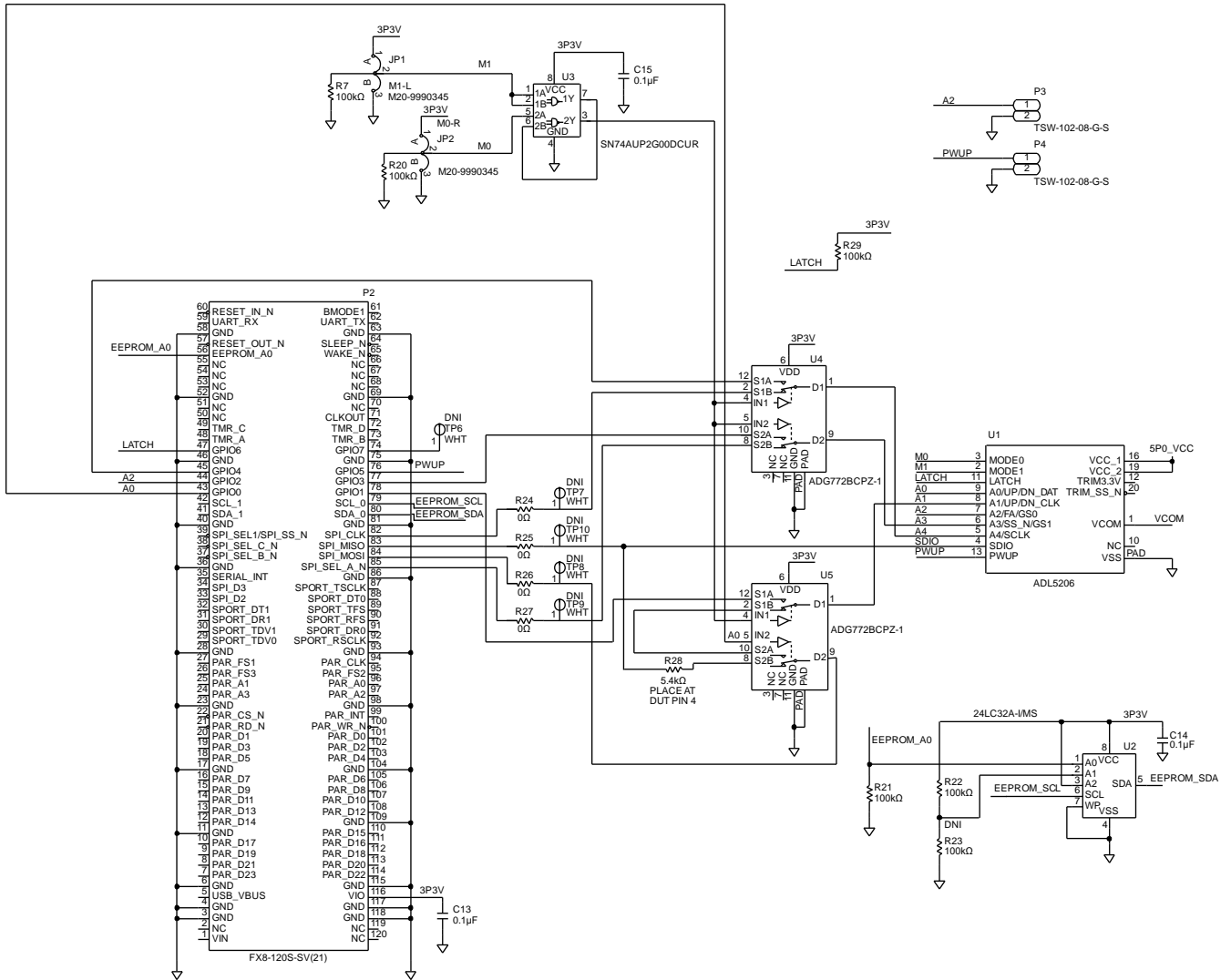


Figure 9. ADL5206-EVALZ Evaluation Board Schematic, Page 2

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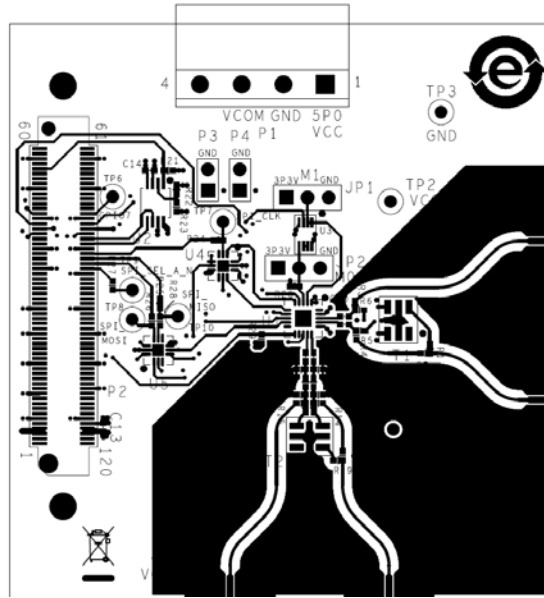


Figure 10. ADL5206-EVALZ Evaluation Board Side A

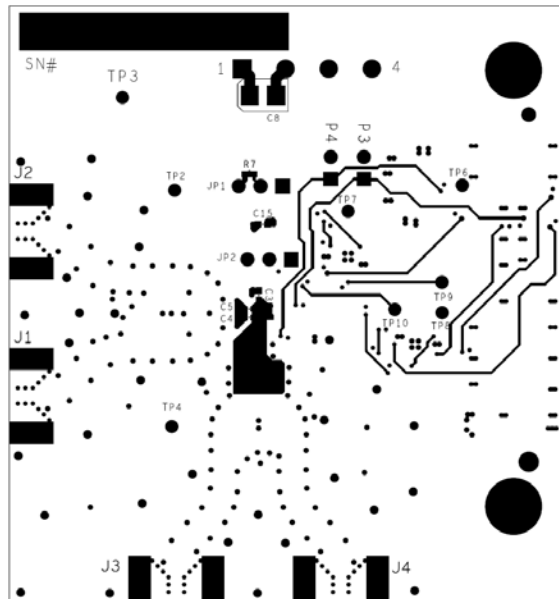


Figure 11. ADL5206-EVALZ Evaluation Board Side B



## ORDERING INFORMATION

### BILL OF MATERIALS

Table 3.

| Qty | Reference Designator                  | Description  | Manufacturer                | Part Number                      |
|-----|---------------------------------------|--|-----------------------------|----------------------------------|
| 1   | Not applicable                        | PCB  | Analog Devices supplied     | 08_056019a                       |
| 7   | C3 to C5, C9 to C12                   | Ceramic capacitors, X7R  | KEMET Corporation           | C0402C104K4RACTU                 |
| 1   | C8                                    | Standard tantalum capacitors, Case B   | AVX Corporation             | TAJB106K016RNJ                   |
| 3   | C13 to C15                            | Ceramic capacitors, X7R, broadband   | American Technical Ceramics | 530L104KT16T                     |
| 4   | J1 to J4                              | Subminiature A (SMA) connectors, 50 $\Omega$ end launch jack receptacle, tab contact             | Cinch Connectivity Solution | 142-0701-851                     |
| 2   | JP1, JP2                              | Connectors, PCB, 3 position, male header, unshrouded single row, 2.54 mm pitch, 3 mm solder tail | Harwin                      | M20-9990345                      |
| 1   | P1                                    | Connector, PCB, terminal strip header  | Wieland Electric            | Z5.530.3425.0                    |
| 1   | P2                                    | Connector, PCB, vertical type receptors  | HRS                         | FX8-120S-SV(21)                  |
| 2   | P3, P4                                | Connectors, PCB, header, 2 position  | Samtec                      | TSW-102-08-G-S                   |
| 10  | R1, R5, R6, R14, R15, R19, R24 to R27 | Resistors, thick film chip   | Multicomp Pro               | MC00625W040210R                  |
| 6   | R2 to R4, R16 to R18                  | Resistors, thick film chip   | Multicomp Pro               | MC00625W040210R                  |
| 5   | R7, R20 to R22, R29                   | Resistors, precision thick film chip   | Panasonic                   | ERJ-2RKF1003X                    |
| 2   | R8, R9                                | Resistors, precision thick film chip   | Panasonic                   | ERJ-2RKF1150X                    |
| 2   | R10, R11                              | Resistors, precision thick film chip   | Panasonic                   | ERJ-2RKF42R2X                    |
| 2   | R12, R13                              | Resistors, antislurated, thick film chip, R0402  | Panasonic                   | ERJ-S02F1820X                    |
| 1   | R23                                   | Resistor, precision thick film chip  | Panasonic                   | ERJ-2RKF1003X                    |
| 1   | R28                                   | Resistor, precision thick film chip  | Panasonic                   | ERJ-2RKF5401X                    |
| 2   | T1, T2                                | XFMR, RF, 10 MHz to 3000 MHz, 50 $\Omega$  | Mini-Circuits               | TCM2-33WX+                       |
| 1   | U1                                    | 1 GHz digital gain amplifier (DGA) with 30 dB range and 1 dB step size                           | Analog Devices              | <a href="#">ADL5206</a>          |
| 1   | U2                                    | IC 32 Kbit serial EEPROM   | Microchip Technology        | 24LC32A-I/MS                     |
| 1   | U3                                    | IC gate, low power, dual 2 input, positive NAND  | Texas Instruments           | SN74AUP2G00DCUR                  |
| 2   | U4, U5                                | CMOS, low power, dual, 2:1 mux/demux USB 2.0 (480 Mbps)/USB 1.1 (12 Mbps)                        | Analog Devices              | <a href="#">ADG772BCPZ-1REEL</a> |
| 6   | TP2, TP6 to TP10                      | Connector PCB, test points, white  | Keystone Electronics        | 5002                             |
| 1   | TP3                                   | Connector PCB, test point, black   | Keystone Electronics        | 5001                             |
| 1   | TP4                                   | Connector PCB, test point, red   | Keystone Electronics        | 5000                             |

## NOTES

**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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