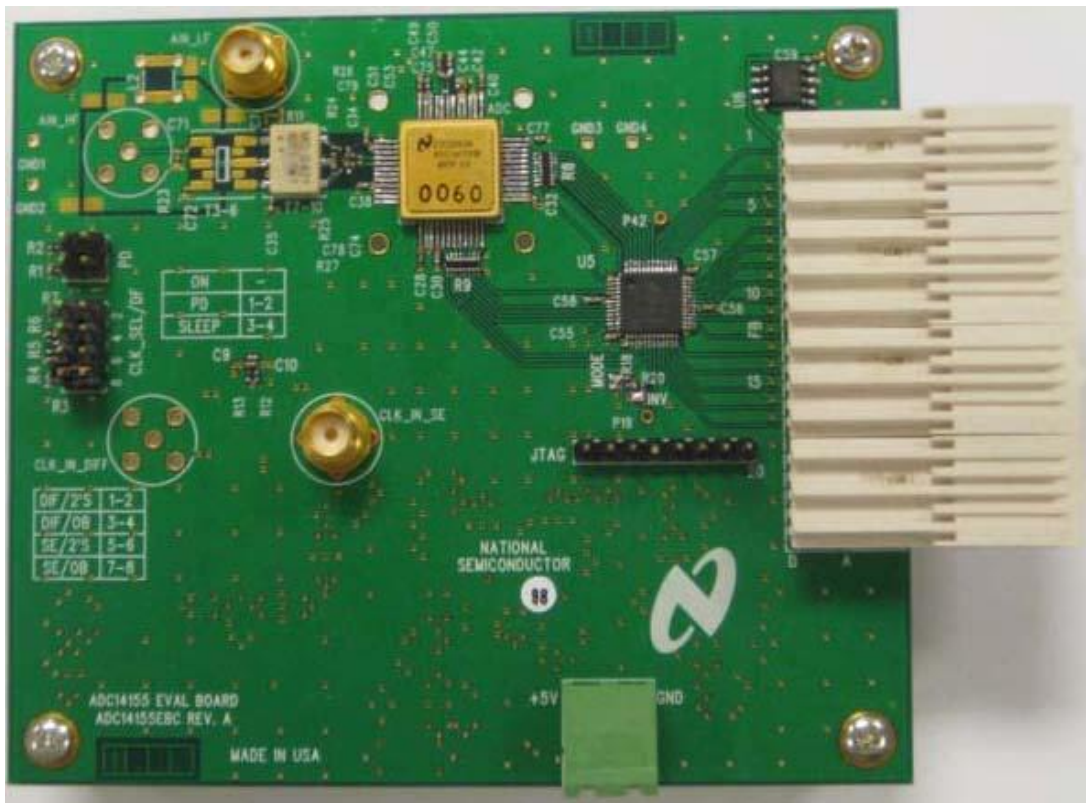


# Evaluation Board User's Guide for ADC14155W-MLS: 14-Bit, 155 MSPS Analog to Digital Converter



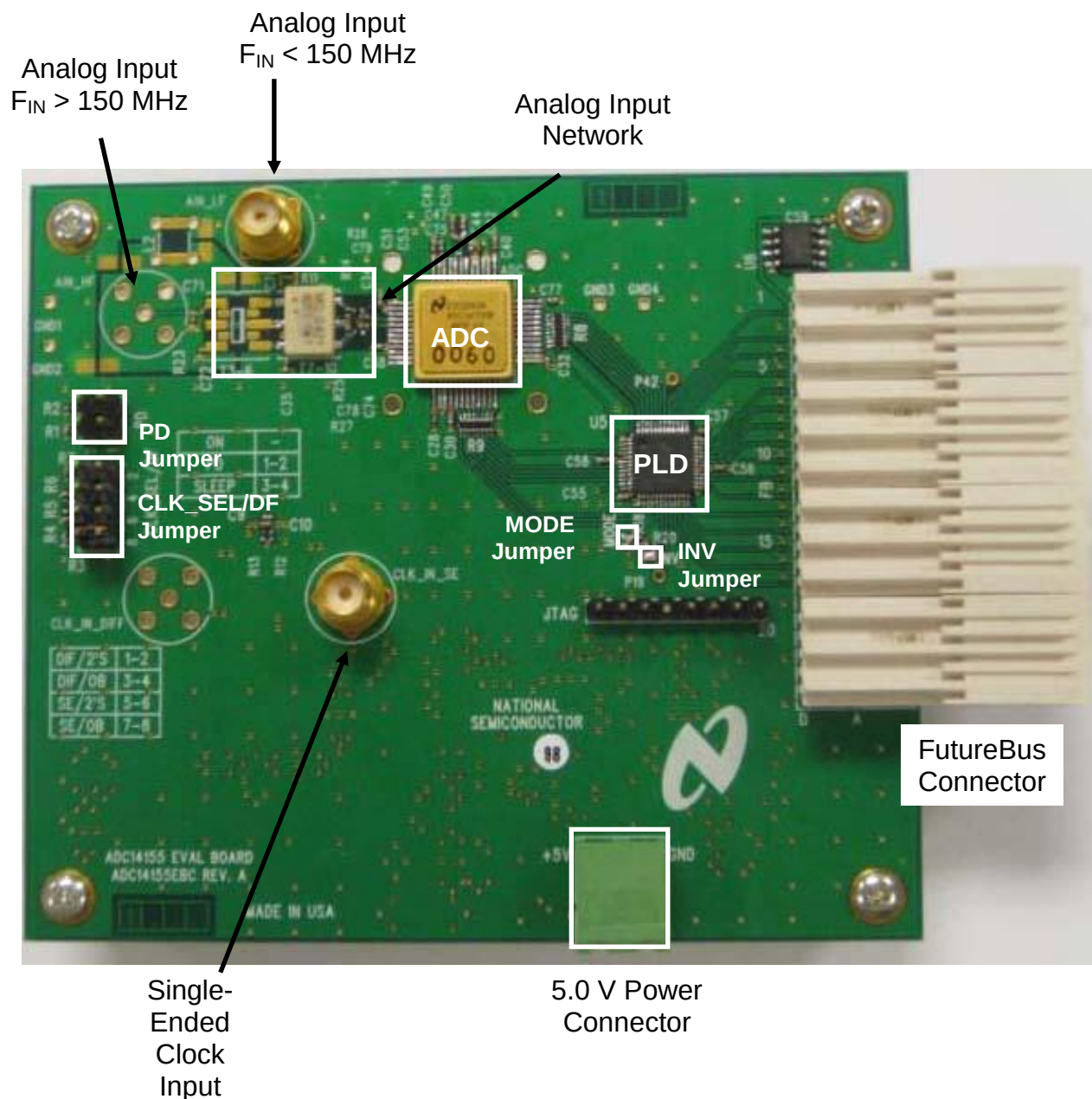


Figure 1. ADC14155 Evaluation Board and jumper locations.

The board shown is the ADC14155LCVAL, with the analog input network configured for optimum performance when input frequency is less than 150 MHz. The high speed board, ADC14155HCVAL, has a different analog input network, optimized for input frequencies greater than 150 MHz.

## 1.0 Introduction

The ADC14155 Evaluation Board is designed to support the ADC14155W-MLS 14-bit 155 Mega Sample Per Second (MSPS) Analog to Digital Converter.

The ADC14155 Evaluation Board comes in two versions:

1. **ADC14155HCVAL** (high frequency version) for input frequencies greater than 150 MHz.
2. **ADC14155LCVAL** (low frequency version) for input frequencies less than 150 MHz.

The digital data from the ADC14155 evaluation board can be captured with a suitable instrument, such as a logic analyzer, or with National Semiconductor's WaveVision 5 data acquisition hardware and software platform. The ADC14155 evaluation board can be connected to the data acquisition hardware through the FutureBus connector (schematic reference designator FB).

The ADC14155 evaluation board is compatible with National Semiconductor's WaveVision 5 Digital Interface Board and WaveVision software. Please note that the ADC14155 evaluation board is not compatible with the WaveVision 4.x Digital Interface Boards.

The WaveVision hardware and software package allows fast and easy data acquisition and analysis. The WaveVision hardware connects to a host PC via a USB cable and is fully configured and controlled by the latest WaveVision software. The latest WaveVision software is provided with the ADC14155 evaluation kit. The WaveVision data acquisition hardware is available through the National Semiconductor website (<http://www.national.com/appinfo/adc/>).

## 2.0 Board Assembly

Each evaluation board from the factory is configured for single-ended clock operation and is populated with an analog input network which has been optimized for one of two analog input frequencies ranges:

1. **ADC14155HCVAL** (high frequency version) for input frequencies greater than 150 MHz.
2. **ADC14155LCVAL** (low frequency version) for input frequencies less than 150 MHz.

Please refer to the input circuit configurations described in the Analog Input Section (4.2) of this guide.

The location and description of the components on the ADC14155 evaluation board can be found in Figure 1 as well as Section 5.0 (Schematic) and Section 7.0 (Bill of Materials) of this user's guide.

## 3.0 Quick Start

The ADC14155 evaluation board enables easy set up for evaluating the performance of the ADC14155.

If the WaveVision data acquisition and data analysis system is to be used for capturing data, please follow the Quick Start Guide in the WaveVision User's Guide to install the required software and to connect the WaveVision Digital Interface Board to the PC. Please note that the ADC14155 evaluation board is only compatible with National Semiconductor's WaveVision 5 Digital Interface boards.

### 3.1 Evaluation Board Jumper Positions

The ADC14155 evaluation board jumpers should be configured as follows. Please refer to Figure 1 for the exact jumper locations.

1. J1 solder jumper on the reverse of the board should be shorted.
2. The MODE solder jumper on the front of the board should be shorted and the INV solder jumper should be left open. See Section 4.4 for more detailed information regarding the function of the MODE and INV jumpers.
3. The PD pin jumper places the ADC14155 into either power-down or sleep mode. Table 1 below shows how to select between the power-down modes.

| PD Jumper Setting | Mode             |
|-------------------|------------------|
| Open              | Normal Operation |
| 1-2               | Power-down       |
| 3-4               | Sleep            |

Table 1. PD/Sleep Selection Table

4. CLK\_SEL/DF pin jumpers select the output data format (2's complement or offset binary) and clock mode (single-ended or differential). Table 2 below shows how to select between the clock modes and output data formats. Please note that the ADC14155 evaluation board is delivered with the ADC14155 clock input configured for single-ended operation and Offset Binary output data format (Jumper 7-8).

| CLK_SEL/DF Jumper Setting | Clock Mode   | Output Data Format |
|---------------------------|--------------|--------------------|
| 1-2                       | Differential | 2's Complement     |
| 3-4                       | Differential | Offset Binary      |
| 5-6                       | Single-Ended | 2's Complement     |
| 7-8*                      | Single-Ended | Offset Binary      |

\* As assembled from factory.

Table 2. CLK\_SEL/DF Selection Table

## 3.2 Connecting Power and Signal Sources

1. To power the ADC14155 evaluation board, connect a 5.0V power supply capable of supplying up to 500mA to the green power connector labeled "+5V" which is located along the bottom edge of the ADC14155 evaluation board.
2. Use the FutureBus connector (FB) to connect the ADC14155 evaluation board to the instrument being used to capture the data from the evaluation board. If the WaveVision Digital Interface Board is being used for data capture, please consult the WaveVision User's Guide for details on installing and operating the WaveVision hardware and software system.
3. Connect the clock and signal inputs to the SMA connectors labeled CLK\_IN\_SE (for clock) and AIN\_LF (for the ADC14155LCVAL) or AIN\_HF (for the ADC14155HCVAL).

## 4.0 Functional Description

### 4.1 Clock Input

The clock used to sample the analog input should be applied to the CLK\_IN\_SE SMA connector (if using the single-ended clock mode as provided from the factory).

To achieve the best noise performance (best SNR), a low jitter clock source with total additive jitter less than 150 fs should be used. A low jitter crystal oscillator is recommended, but a sinusoidal signal generator with low phase noise, such as the SMA100A from Rohde & Schwarz or the HP8644B (discontinued) from Agilent / HP, can also be used with a slight degradation in the noise performance. The SNR is primarily degraded by the broadband noise of the signal generator. The clock signal generator amplitude is typically set to +19.9 dBm to produce the highest possible slew rate, but the SNR performance will be impacted minimally by slightly lowering the signal generator amplitude. Placing a bandpass filter between the clock source and the CLK\_IN\_SE SMA connector will further improve the noise performance of the ADC by filtering out the

broadband noise of the clock source. All results in the ADC14155QML datasheet are obtained with a tunable bandpass filter made by Trilithic, Inc. (Indianapolis, IN) in the clock signal path.

The noise performance of the ADC14155 can be improved further by making the edge transitions of the clock signal entering the ADC clock input (pin 11, CLK+) very sharp. The ADC14155 evaluation board is assembled with a high speed buffer gate (NC7WV125K8X, schematic reference designator U2) in the clock input path to provide a sharp clock edge to the clock inputs and improve the noise performance of the ADC. The amplitude of the clock signal from the NC7WV125K8X high speed buffer is 3.3V.

### 4.2 Analog Input

To obtain the best distortion results (best SFDR), the analog input network on the evaluation board must be optimized for the signal frequency being applied.

For analog input frequencies up to 150 MHz, the circuit in Figure 2 is recommended. This is the configuration of the assembled ADC14155LCVAL as it is delivered from the factory. For input frequencies above 150 MHz, the circuit in Figure 3 is recommended. This is the configuration of the assembled ADC14155HCVAL as it is delivered from the factory.

A low noise signal generator such as the SMA100A from Rohde & Schwarz or the HP8644B (discontinued) from Agilent / HP is recommended to drive the signal input of the ADC14155 evaluation board. The output of the signal generator must be filtered to suppress the harmonic distortion produced by the signal generator and to allow accurate measurement of the ADC14155 distortion performance. A low pass or a bandpass filter is recommended to filter the analog input signal. In some cases, a second low pass filter may be necessary. The bandpass filter on the analog input will further improve the noise performance of the ADC by filtering the broadband noise of the signal generator. Data shown in the ADC14155QML datasheet was taken with a tunable bandpass filter made by Trilithic (Indianapolis, IN) in the analog signal path.



## 4.4 Board Outputs

The digitized 14-bit output word from the ADC14155 evaluation board is available at pins B4 (MSB) through B17 (LSB) on the FutureBus connector (schematic reference designator FB). The rising edge of the data ready (DRDY) signal should be used to capture the output data. The DRDY signal is available at pin D2 of the FutureBus connector and the over-range (OVR) bit which indicates that the input signal to the ADC has exceeded the maximum digitizable signal amplitude is available at pin B18 on the FutureBus connector. See the Evaluation Board schematic in Section 5.0 for details.

The ADC14155 evaluation board uses a PLD device from Lattice Semiconductor (LC4032V-25TN48C, schematic reference designator U5) to translate the ADC output from 1.8V CMOS to 3.3V CMOS, which is compatible with the WaveVision Digital Interface Board and other data capture instruments which the user may choose.

The ADC14155 evaluation board has been designed to give the user the flexibility to choose between passing the data from the ADC to the capture instrument either with or without latching the data in the PLD. Tables 3 and 4 show how to configure the PLD device through the MODE and INV jumpers on the evaluation board to enable the latching function. The ADC14155 evaluation board is factory assembled with the MODE jumper shorted and the INV jumper open.

| MODE Jumper | Data Transfer Through PLD                |
|-------------|------------------------------------------|
| Short*      | Latch data with DRDY signal              |
| Open        | Pass data transparently without latching |

\* As assembled from factory.

*Table 3. PLD Data Transfer Selection Table*

The data from the ADC14155 in the PLD can be latched either on the rising or falling edge of DRDY.

Table 4 shows how to choose which edge of DRDY will be used to latch the ADC data into the PLD.

| INV Jumper | DRDY Latching Edge |
|------------|--------------------|
| Short      | Falling            |
| Open*      | Rising             |

\* As assembled from factory.

*Table 4. PLD Latch Edge Selection Table*

### 4.5 Power requirements.

Power to the ADC14155 evaluation board is supplied through the green power connector labeled "+5V" which is located along the bottom edge of the board. Voltage and current requirements are:

- +5V capable of delivering up to 500mA (ADC14155 evaluation board only)

## **5.0 Evaluation Board Schematic**

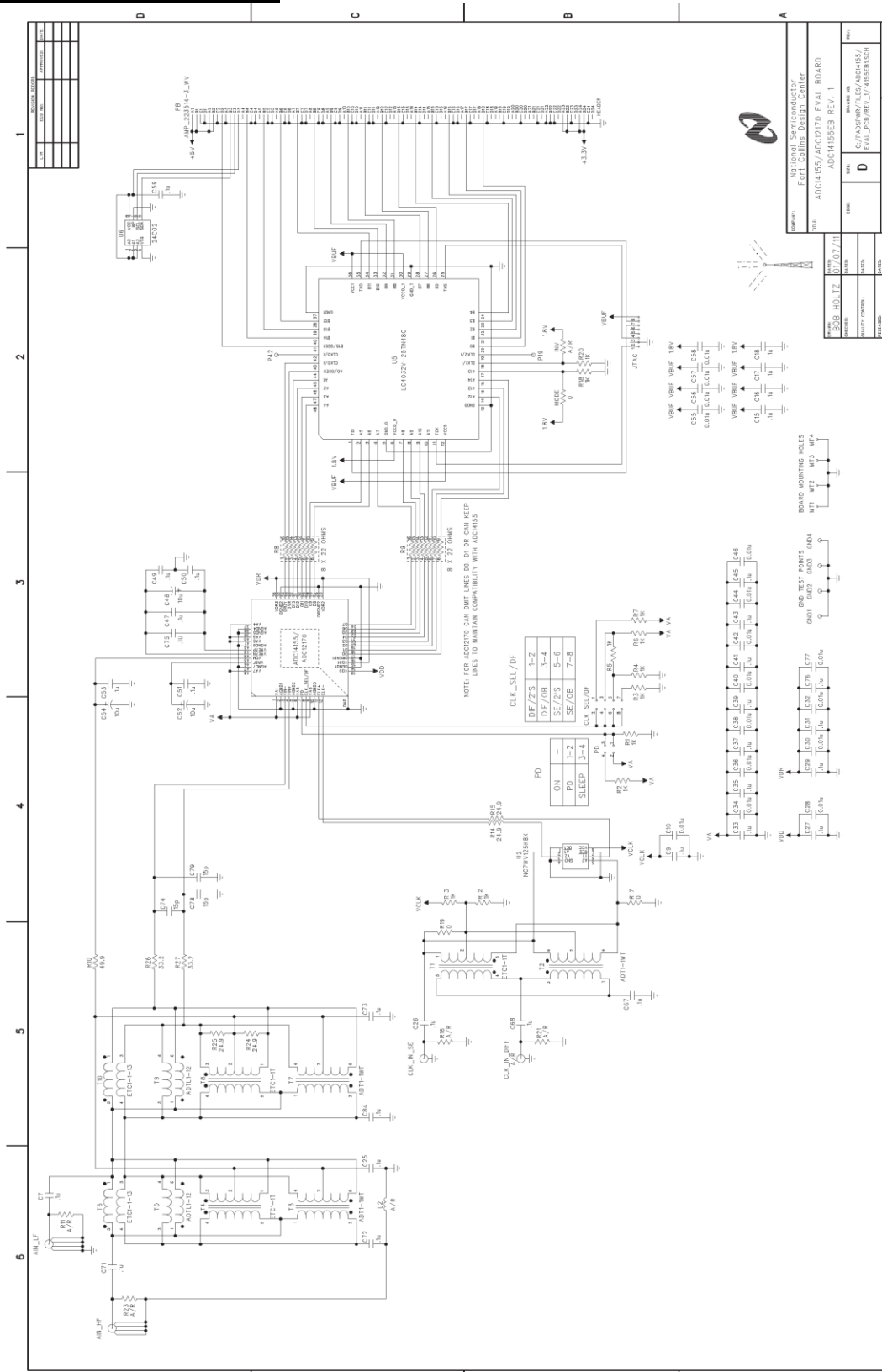


Figure 4. Signals



## 5.0 Schematic (cont.)

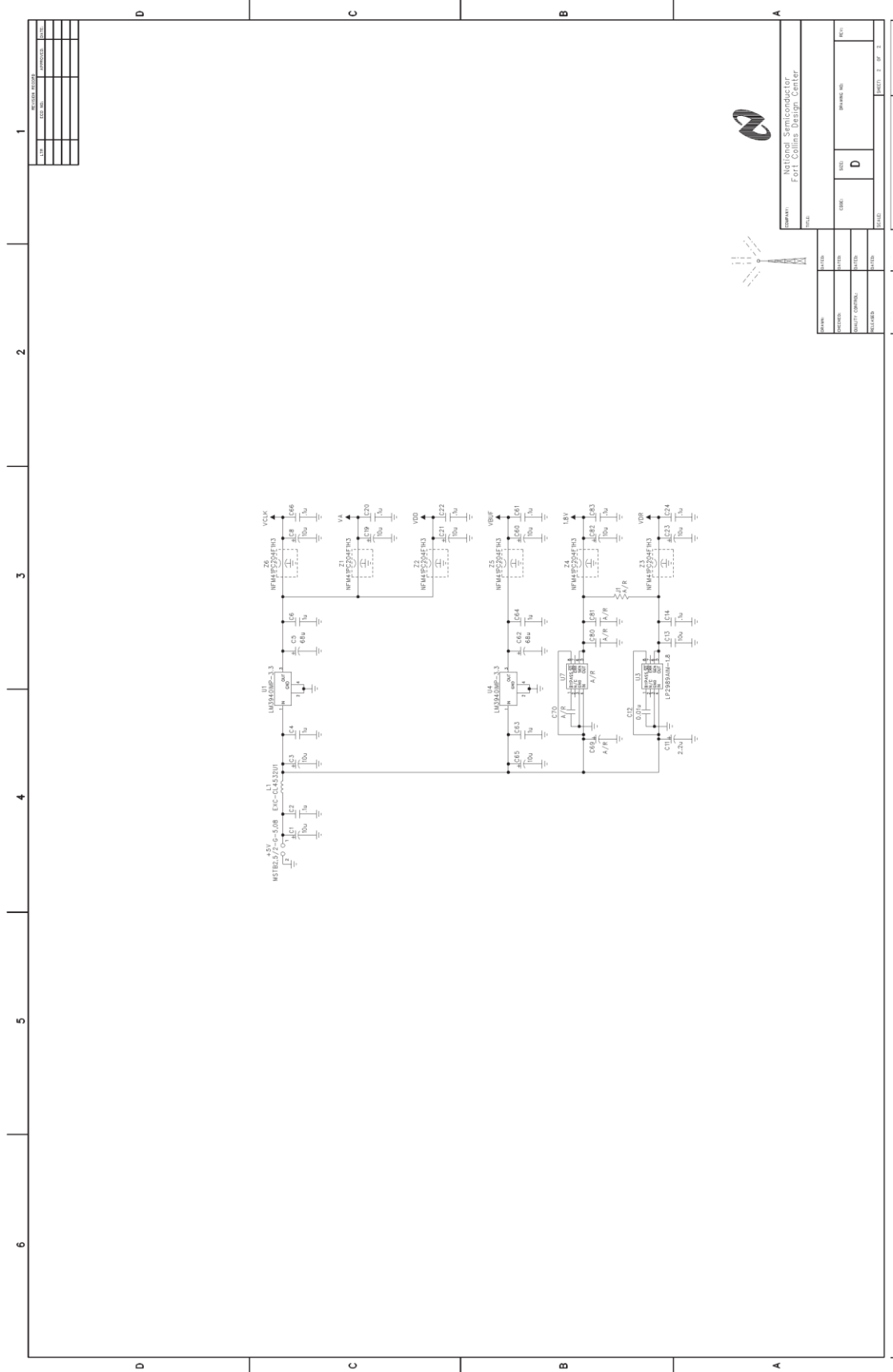


Figure 5. Power Distribution



## 6.0 Evaluation Board Bill of Materials

### 6.1 ADC14155HFEB (For Fin > 150 MHz)

| Item | Quantity | Schematic Reference                                                                                        | Part Name                | Description                                                    | PCB Footprint  | Manufacturer                       |
|------|----------|------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------|----------------|------------------------------------|
| 1    | 1        | U6                                                                                                         | 24C02                    | 2K SERIAL EEPROM 1.8V                                          | SOIC-8         | Atmel                              |
| 2    | 1        | ADC                                                                                                        | ADC14155                 | 14-Bit, 155 MSPS Analog/Digital Converter                      | 48-LLP         | National Semiconductor             |
| 3    | 2        | T6, T10                                                                                                    | ETC1-1-13                | BALUN TRANSFORMER                                              |                | MA/COM                             |
| 4    | 4        | FB                                                                                                         | AMP_5223514-1            | Z-PACK 2mm FB (Futurebus) RIGHT ANGLE HEADER CONNECTOR         | -              | AMP                                |
| 5    | 1        | C75                                                                                                        | 0.1uF                    | 0.1uF SMD CAP CERAMIC 6.3V X5R 10%                             | sm1c_0201      | Panasonic - ECG                    |
| 6    | 8        | C2, C14, C20, C22, C24, C61, C66, C83                                                                      | 0.1uF                    | 0.1uF SMD CAP CERAMIC 25V X7R 10%                              | sm1c_1206      | Panasonic - ECG                    |
| 7    | 26       | C9, C15-18, C26-27, C29, C31, C33, C35, C37, C39, C41, C43, C45, C47, C49-51, C53, C59, C71, C72, C73, C76 | 0.1uF                    | 0.1uF SMD CAP CERAMIC 10V X5R 10%                              | sm1c_0402      | Panasonic - ECG                    |
| 8    | 17       | C10, C12, C28, C30, C32, C34, C36, C38, C40, C42 C44, C46, C55-58, C77                                     | 0.01uF                   | 0.01uF SMD CAP CERAMIC 16V X7R 10%                             | sm1c_0402      | AVX Corporation                    |
| 9    | 1        | C13                                                                                                        | 10uF                     | 10uF SMD CAP CERAMIC 10V X5R 20%                               | sm1c_1206      | Panasonic - ECG                    |
| 10   | 1        | C74                                                                                                        | 2pF                      | 2pF SMD CAP CERAMIC 50V +/-0.25pF                              | sm1c_0402      | Murata Electronics                 |
| 11   | 4        | C4, C6, C63-64                                                                                             | 1uF                      | 1uF SMD CAP CERAMIC 25V X7R 10%                                | sm1c_1206      | Panasonic - ECG                    |
| 12   | 12       | C1, C3, C8, C19, C21, C23, C48, C52, C54, C60, C65, C82                                                    | 10uF                     | 10uF SMD CAP TANTALUM 6.3V 20%                                 | sm1c_3216      | Kemet                              |
| 13   | 1        | C11                                                                                                        | 2.2uF                    | 2.2uF SMD CAP TANTALUM 16V 10%                                 | sm1c_3216      | Kemet                              |
| 14   | 2        | C5, C62                                                                                                    | 68uF                     | 68uF SMD CAP TANTALUM 6.3V 10%                                 | sm1c_7343      | Kemet                              |
| 15   | 2        | R8-9                                                                                                       | 8x22 ohm                 | 22 OHM SMD 8 RES ARRAY 5%                                      | sm1r_0402 x 8  | Panasonic - ECG                    |
| 16   | 2        | L1, L2                                                                                                     | Ferrite Bead Core        | SMD FERRITE BEAD CORE 4.5X3.2X1.8                              | -              | Panasonic - ECG                    |
| 17   | 1        | JTAG                                                                                                       | Jumpier 1x8              | JUMPER BLOCK USING 8 PIN SIP HEADER                            | -              | Samtec                             |
| 18   | 1        | PD                                                                                                         | Jumpier 2x2              | 2X2 JUMPER BLOCK HEADER CUT TO SIZE FROM 2X6 HEADER            | -              | Samtec                             |
| 19   | 1        | CLK_SEL/DF                                                                                                 | Jumpier 2x4              | 2X4 JUMPER BLOCK HEADER CUT TO SIZE FROM 2X6 HEADER            | -              | Samtec                             |
| 20   | 1        | -                                                                                                          | Shunt                    | PLACE SHUNT ACROSS PINS 7-8 ON CLK_SEL/DF JUMPER               | -              | FCI Electronic                     |
| 21   | 1        | U5                                                                                                         | PLD                      | ispMACH PLD, 3.3V core                                         | 48-TQFP        | Lattice Semiconductor              |
| 22   | 2        | U1, U4                                                                                                     | 3.3V Regulator           | 1A LOW DROPOUT REGULATOR FOR 5V TO 3.3 V CONVERSION            | SOT-223        | National Semiconductor             |
| 23   | 1        | U3                                                                                                         | 1.8V Regulator           | MICROPOWER/LOW NOISE, 500 mA ULTRA LOW-DROPOUT REGULAT         | SOIC NARROW -8 | National Semiconductor             |
| 24   | 1        | +5V                                                                                                        | Power Connector          | TERMINAL BLOCK 2POS 5.08mm                                     | -              | Phoenix Contact                    |
| 25   | 1        | -                                                                                                          | Power Connector Plug     | TERMINAL BLOCK 2POS 5.08mm                                     | -              | Phoenix Contact                    |
| 26   | 4        | MT1-4                                                                                                      | Bump-on Rubber Feet      | PLACE BUMP ON AT THE 4 CORNERS, ON BOTTOM OF BOARD             | -              | 3M                                 |
| 27   | 1        | U2                                                                                                         | Tinylogic Buffer         | TINYLOGIC ULP-A BUFFER WITH 3-STATE OUTPUT                     | -              | Fairchild Semiconductor            |
| 28   | 6        | Z1-6                                                                                                       | Noise Suppression Filter | 8-LEAD USB, JEDEC MO-187, CA 3.1 mm WIDE                       | 1806           | Murata Electronics                 |
| 29   | 2        | J1, MODE                                                                                                   | Solder Short             | FILTER LC HIGH FREQ. 2uF                                       | -              | -                                  |
| 30   | 2        | R17, R19                                                                                                   | 0 ohms                   | SOLDER SHORT ACROSS THE PADS OF "J1" AND ACROSS PADS OF "MODE" | sm1r_0402      | Vishay Dale                        |
| 31   | 11       | R1-7, R12-13, R18, R20                                                                                     | 1 kOHM                   | 0 OHM SMD RESISTOR                                             | sm1r_0402      | Panasonic - ECG                    |
| 32   | 2        | R14-15                                                                                                     | 24.9 ohms                | 1 KOHM SMD RESISTOR 1/16W 1%                                   | sm1r_0402      | Panasonic - ECG                    |
| 33   | 2        | R26-27                                                                                                     | 33.2 ohms                | 24.9 OHM SMD RESISTOR 1/16W 1%                                 | sm1r_0402      | Yageo Corporation                  |
| 34   | 3        | R10, R24-25                                                                                                | 49.9 ohms                | 33.2 OHM SMD RESISTOR 1/16W 1%                                 | sm1r_0402      | Yageo Corporation                  |
| 35   | 2        | AIN_HF, CLK_IN_SE                                                                                          | SMA Input                | 49.9 OHM SMD RESISTOR 1/16W 1%                                 | sm1r_0402      | Yageo Corporation                  |
|      |          |                                                                                                            |                          | PCB MOUNTABLE SMA CONNECTOR                                    | -              | Emerson Network Power Connectivity |

## 6.2 ADC14155LFEB (For Fin < 150 MHz)

| Item | Quantity | Schematic Reference                                                                                            | Part Name                | Description                                                    | PCB Footprint  | Manufacturer                       |
|------|----------|----------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------|----------------|------------------------------------|
| 1    | 1        | U6                                                                                                             | 24C02                    | 2K SERIAL EEPROM 1.8V                                          | SOIC-8         | STMicroelectronics                 |
| 2    | 1        | ADC                                                                                                            | ADC14155                 | 14-Bit, 155 MSPS Analog/Digital Converter                      | 48-LLP         | National Semiconductor             |
| 3    | 1        | T7                                                                                                             | ADT1-1WT+                | WIDEBAND RF TRANSFORMER 0.4MHz - 800 MHz                       | CD542          | MINI CIRCUITS                      |
| 4    | 4        | FB                                                                                                             | AMP_5223514-1            | Z-PACK 2mm FB (futurebus+) RIGHT ANGLE HEADER CONNECTOR        | -              | AMP                                |
| 5    | 1        | C75                                                                                                            | 0.1uF                    | 0.1uF SMD CAP CERAMIC 6.3V X5R 10%                             | sm/c_0201      | Panasonic - ECG                    |
| 6    | 8        | C2, C14, C20, C22, C24, C61, C66, C83                                                                          | 0.1uF                    | 0.1uF SMD CAP CERAMIC 25V X7R 10%                              | sm/c_1206      | Panasonic - ECG                    |
| 7    | 26       | C7, C9, C15-18, C25, C26-27, C29, C31, C33, C35, C37, C39, C41, C43, C45, C47, C49-51, C53, C59, C73, C76, C84 | 0.1uF                    | 0.1uF SMD CAP CERAMIC 10V X5R 10%                              | sm/c_0402      | Panasonic - ECG                    |
| 8    | 17       | C10, C12, C28, C30, C32, C34, C36, C38, C40, C42 C44, C46, C55-58, C77                                         | 0.01uF                   | 0.01uF SMD CAP CERAMIC 16V X7R 10%                             | sm/c_0402      | AVX Corporation                    |
| 9    | 1        | C13                                                                                                            | 10uF                     | 10uF SMD CAP CERAMIC 10V X5R 20%                               | sm/c_1206      | Panasonic - ECG                    |
| 10   | 3        | C74, C78-79                                                                                                    | 15pF                     | 15pF SMD CAP CERAMIC 50V NP0 5%                                | sm/c_0402      | Panasonic - ECG                    |
| 11   | 4        | C4, C6, C63-64                                                                                                 | 1uF                      | 1uF SMD CAP CERAMIC 25V X7R 10%                                | sm/c_1206      | Panasonic - ECG                    |
| 12   | 12       | C1, C3, C8, C19, C21, C23, C48, C52, C54, C60, C65, C82                                                        | 10uF                     | 10uF SMD CAP TANTALUM 6.3V 20%                                 | sm/c_3216      | Kemet                              |
| 13   | 1        | C11                                                                                                            | 2.2uF                    | 2.2uF SMD CAP TANTALUM 16V 10%                                 | sm/c_3216      | Kemet                              |
| 14   | 2        | C5, C62                                                                                                        | 68uF                     | 68uF SMD CAP TANTALUM 6.3V 10%                                 | sm/c_7343      | Kemet                              |
| 15   | 2        | R8-9                                                                                                           | 8x22 ohm                 | 22 OHM SMD 8 RES ARRAY 5%                                      | sm/r_0402 x 8  | Panasonic - ECG                    |
| 16   | 1        | L1                                                                                                             | Ferrite Bead Core        | SMD FERRITE BEAD CORE 4.5X3.2X1.8                              | -              | Panasonic - ECG                    |
| 17   | 1        | JTAG                                                                                                           | Jumper 1x8               | JUMPER BLOCK USING 8 PIN SIP HEADER                            | -              | Samtec                             |
| 18   | 1        | PD                                                                                                             | Jumper 2X2               | 2X2 JUMPER BLOCK HEADER CUT TO SIZE FROM 2X6 HEADER            | -              | Samtec                             |
| 19   | 1        | CLK_SEL/DF                                                                                                     | Jumper 2X4               | 2X4 JUMPER BLOCK HEADER CUT TO SIZE FROM 2X6 HEADER            | -              | Samtec                             |
| 20   | 1        | -                                                                                                              | Shunt                    | PLACE SHUNT ACROSS PINS 7-8 ON CLK_SEL/DF JUMPER               | -              | FCI Electronic                     |
| 21   | 1        | U5                                                                                                             | PLD                      | ispMACH PLD, 3.3V core                                         | 48-TQFP        | Lattice Semiconductor              |
| 22   | 2        | U1, U4                                                                                                         | 3.3V Regulator           | 1A LOW DROPOUT REGULATOR FOR 5V TO 3.3 V CONVERSION            | SOT-223        | National Semiconductor             |
| 23   | 1        | U3                                                                                                             | 1.8V Regulator           | MICROPOWER/LOW NOISE, 500 mA ULTRA LOW-DROPOUT REGULAT         | SOIC NARROW -8 | National Semiconductor             |
| 24   | 1        | +5V                                                                                                            | Power Connector          | TERMINAL BLOCK 2POS 5.08mm                                     | -              | Phoenix Contact                    |
| 25   | 1        | -                                                                                                              | Power Connector Plug     | TERMINAL BLOCK PLUG 2POS 5.08mm                                | -              | Phoenix Contact                    |
| 26   | 4        | MT1-4                                                                                                          | Bump-on Rubber Feet      | PLACE BUMP ONS AT THE 4 CORNERS, ON BOTTOM OF BOARD            | -              | 3M                                 |
| 27   | 1        | U2                                                                                                             | Tinylogic Buffer         | TINYLOGIC ULP-A BUFFER WITH 3-STATE OUTPUT                     | -              | Fairchild Semiconductor            |
| 28   | 6        | Z1-6                                                                                                           | Noise Suppression Filter | 8-LEAD US8, JEDEC MO-187, CA 3.1 mm WIDE                       | -              | Murata Electronics                 |
| 29   | 2        | J1, MODE                                                                                                       | Solder Short             | FILTER LC HIGH FREQ. 2UF                                       | 1806           | -                                  |
| 30   | 2        | R17, R19                                                                                                       | 0 ohms                   | SOLDER SHORT ACROSS THE PADS OF "J1" AND ACROSS PADS OF "MODE" | -              | -                                  |
| 31   | 11       | R1-7, R12-13, R18, R20                                                                                         | 1 kohm                   | 0 OHM SMD RESISTOR                                             | sm/r_0402      | Vishay Dale                        |
| 32   | 4        | R14-15, R24-25                                                                                                 | 24.9 ohms                | 1 KOHM SMD RESISTOR 1/16W 1%                                   | sm/r_0402      | Panasonic - ECG                    |
| 33   | 2        | R26-27                                                                                                         | 33.2 ohms                | 24.9 OHM SMD RESISTOR 1/16W 1%                                 | sm/r_0402      | Yageo Corporation                  |
| 34   | 1        | R10                                                                                                            | 49.9 ohms                | 33.2 OHM SMD RESISTOR 1/16W 1%                                 | sm/r_0402      | Vishay Dale                        |
| 35   | 2        | AIN_LF, CLK_IN_SE                                                                                              | SMA Input                | 49.9 OHM SMD RESISTOR 1/16W 1%                                 | sm/r_0402      | Yageo Corporation                  |
|      |          |                                                                                                                |                          | PCB MOUNTABLE SMA CONNECTOR                                    | -              | Emerson Network Power Connectivity |

The ADC14155 Evaluation Board is intended for product evaluation purposes only and is not intended for resale to end consumers, is not authorized for such use and is not designed for compliance with European EMC Directive 89/336/EEC.

WaveVision is a trademark of National Semiconductor Corporation. National does not assume any responsibility for use of any circuitry or software supplied or described. No circuit patent licenses are implied.

## **LIFE SUPPORT POLICY**

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

|   |                                                                                                                            |                                                                                                                                                                                    |                                                                                                                                        |                                                                                        |
|---|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| N | <b>National Semiconductor Corporation Americas</b><br>Tel: 1-800-272-9959<br>Fax: 1-800-737-7018<br>Email: support@nsc.com | <b>National Semiconductor Europe</b><br>Fax: +49 (0) 1 80-530 85 86<br>Email: europe.support@nsc.com<br>Deutsch Tel: +49 (0) 1 80-530 85 85<br>English Tel: +49 (0) 1 80 532 78 32 | <b>National Semiconductor Asia Pacific Customer Response Group</b><br>Tel: 65-2544466<br>Fax: 65-2504466<br>Email: sea.support@nsc.com | <b>National Semiconductor Japan Ltd.</b><br>Tel: 81-3-5639-7560<br>Fax: 81-3-5639-7507 |
|---|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|

National does not assume any responsibility for any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

### Products

|                              |                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------|
| Audio                        | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                               |
| Amplifiers                   | <a href="http://amplifier.ti.com">amplifier.ti.com</a>                               |
| Data Converters              | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>                       |
| DLP® Products                | <a href="http://www.dlp.com">www.dlp.com</a>                                         |
| DSP                          | <a href="http://dsp.ti.com">dsp.ti.com</a>                                           |
| Clocks and Timers            | <a href="http://www.ti.com/clocks">www.ti.com/clocks</a>                             |
| Interface                    | <a href="http://interface.ti.com">interface.ti.com</a>                               |
| Logic                        | <a href="http://logic.ti.com">logic.ti.com</a>                                       |
| 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> |

### Applications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| Automotive and Transportation | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>                         |
| Communications and Telecom    | <a href="http://www.ti.com/communications">www.ti.com/communications</a>                 |
| Computers and Peripherals     | <a href="http://www.ti.com/computers">www.ti.com/computers</a>                           |
| Consumer Electronics          | <a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>                   |
| Energy and Lighting           | <a href="http://www.ti.com/energy">www.ti.com/energy</a>                                 |
| Industrial                    | <a href="http://www.ti.com/industrial">www.ti.com/industrial</a>                         |
| Medical                       | <a href="http://www.ti.com/medical">www.ti.com/medical</a>                               |
| Security                      | <a href="http://www.ti.com/security">www.ti.com/security</a>                             |
| Space, Avionics and Defense   | <a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a> |
| Video and Imaging             | <a href="http://www.ti.com/video">www.ti.com/video</a>                                   |

### TI E2E Community

[e2e.ti.com](http://e2e.ti.com)