

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

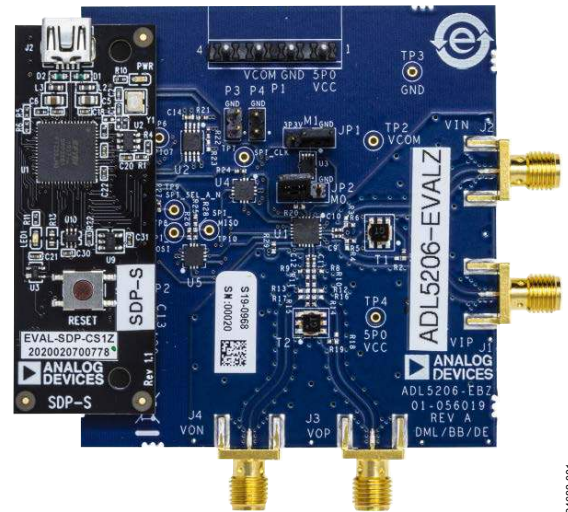


Figure 1. ADL5206-EVALZ, Top

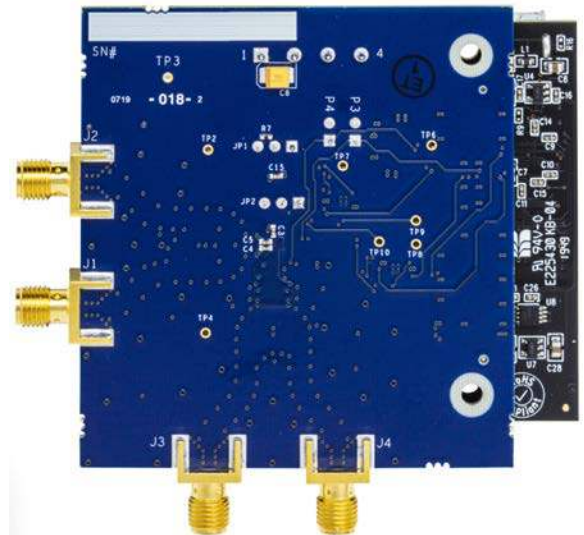


Figure 2. ADL5206-EVALZ, Bottom

TABLE OF CONTENTS

Features	1	Getting Started—Single-Tone Testing	3
Evaluation Kit Contents.....	1	Selecting the Digital Control Interface.....	3
Equipment Needed.....	1	Losses and Signal-to-Noise Ratio (SNR) Degradation	3
Software Needed	1	Evaluation Board Software Quick Start Procedures.....	4
General Description	1	Single-Tone Demonstration Using the ACE Software	4
Evaluation Board Photographs.....	1	Evaluation Board Schematics and Artwork.....	6
Revision History	2	Ordering Information.....	9
Evaluation Board Hardware.....	3	Bill of Materials.....	9
Hardware Setup.....	3		

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.

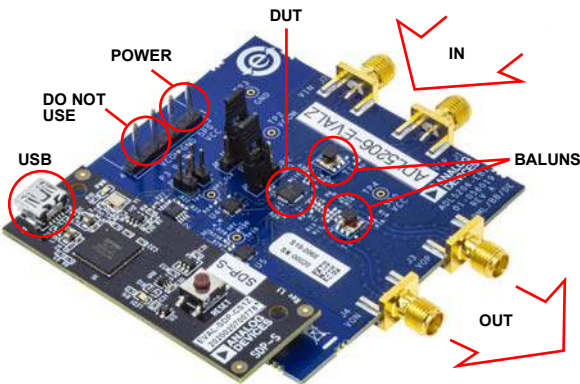


Figure 3. ADL5206-EVALZ Hardware Setup

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.

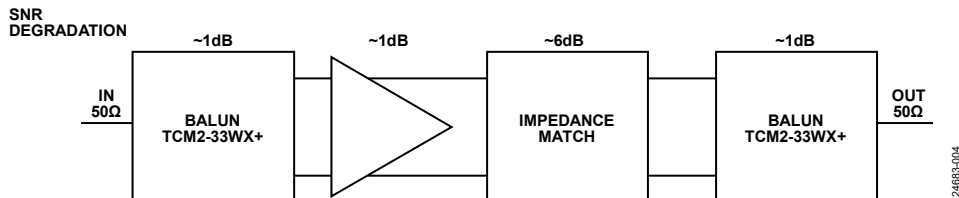


Figure 4. SNR Degradation

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

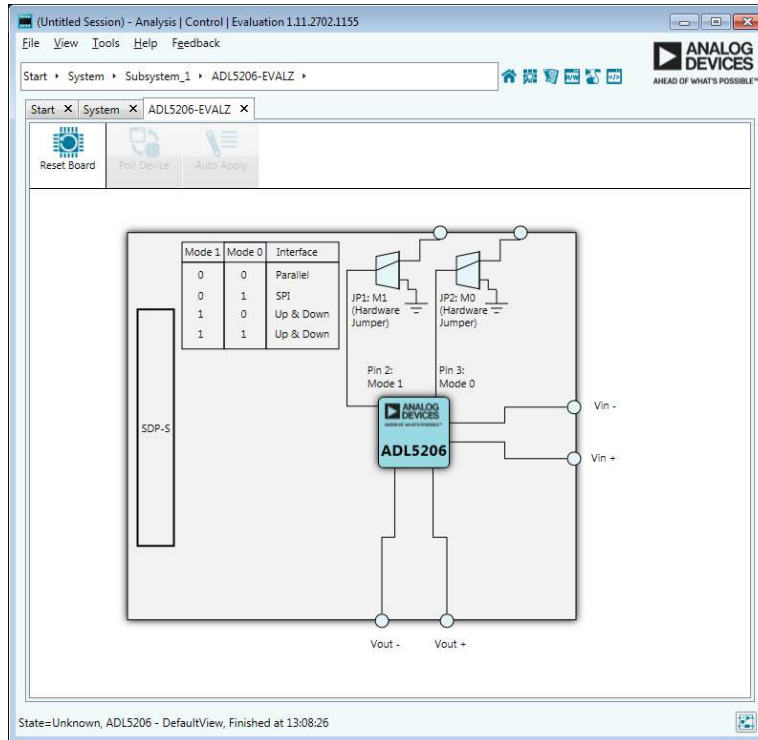


Figure 6. ADL5206-EVALZ Board Level View Window in ACE

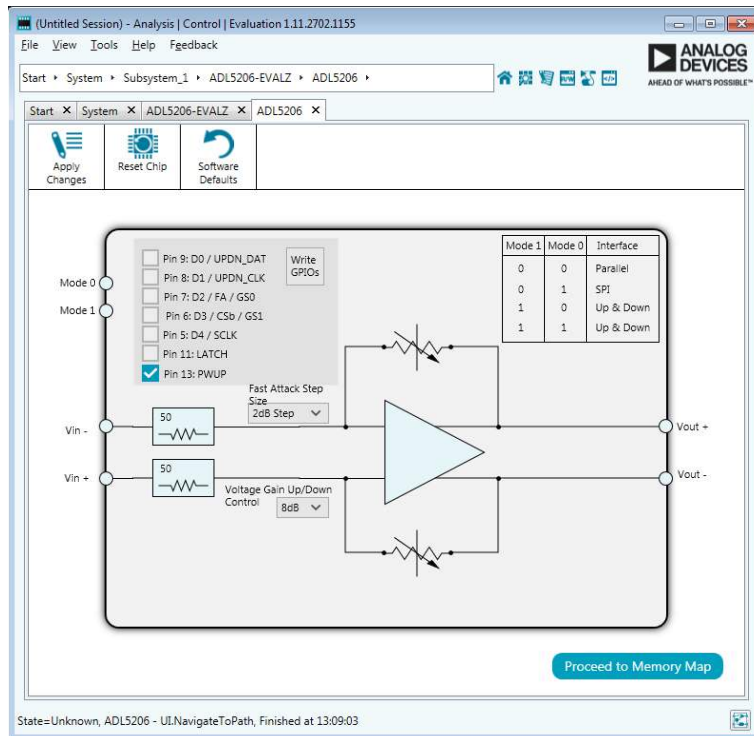
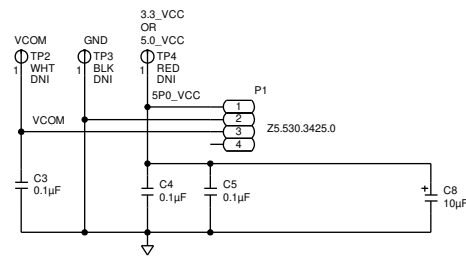


Figure 7. ADL5206 IC Level View Window in ACE

EVALUATION BOARD SCHEMATICS AND ARTWORK



CAP SIZE 5MHz TO 1.7GHz

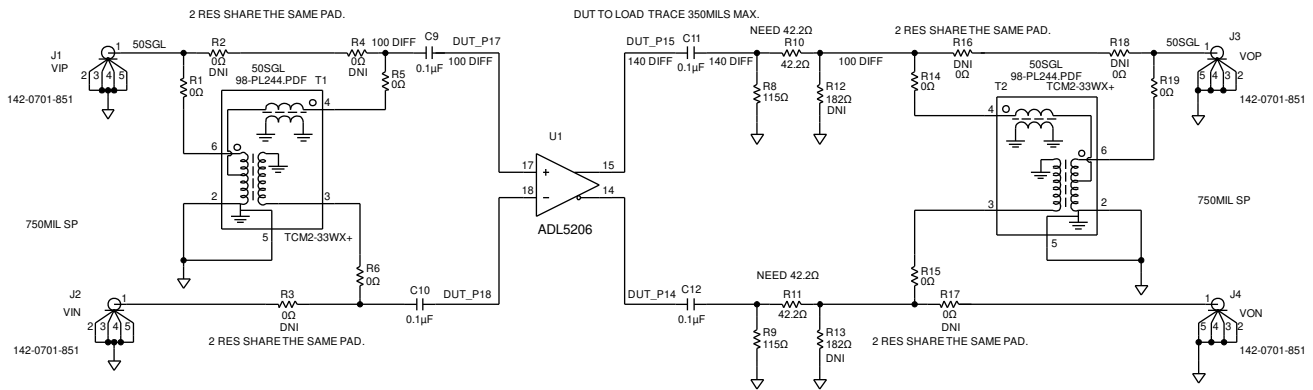


Figure 8. ADL5206-EVALZ Evaluation Board Schematic, Page 1

244833-008

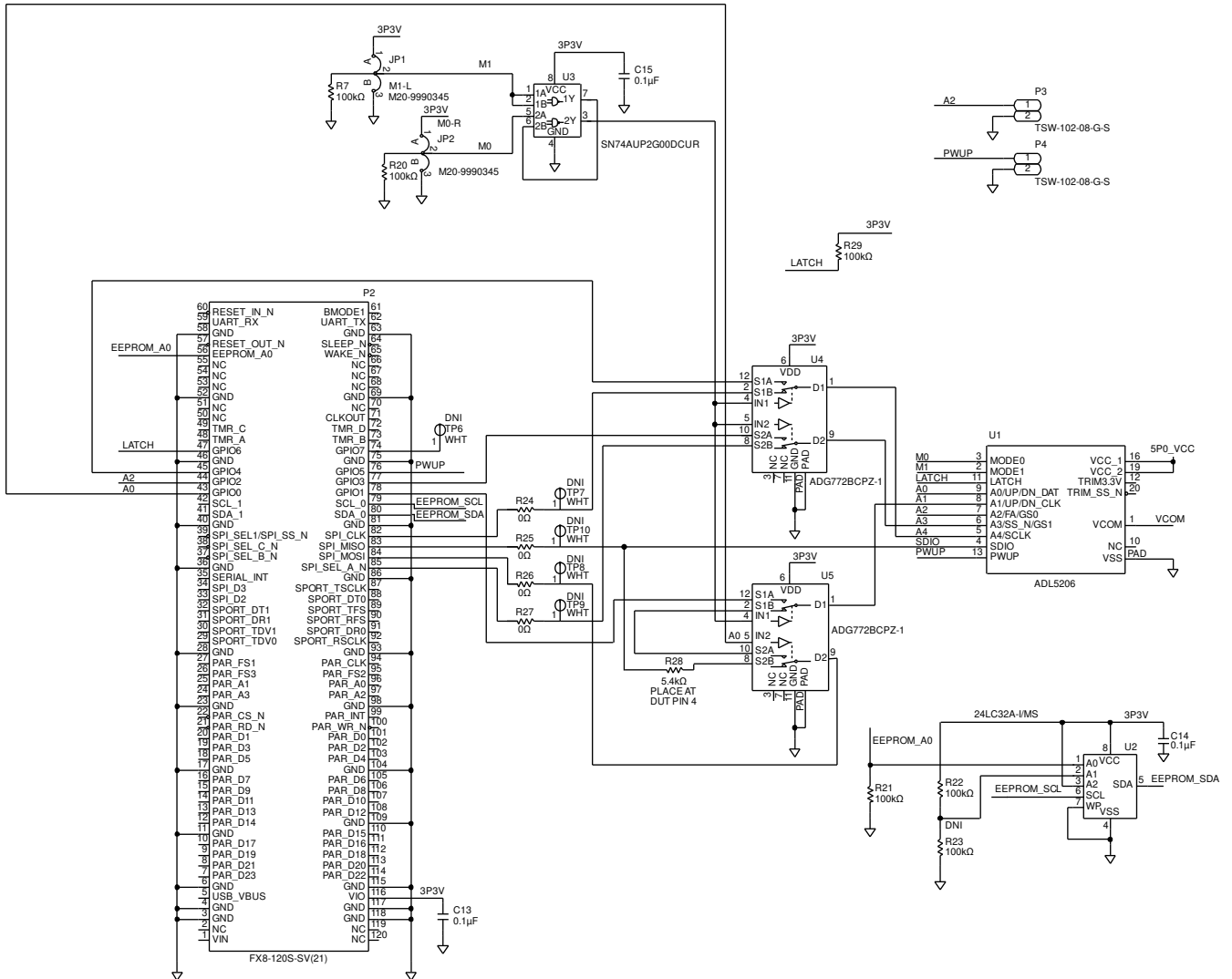


Figure 9. ADL5206-EVALZ Evaluation Board Schematic, Page 2

24885-009

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 Ω 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 Ω	Mini-Circuits	TCM2-33WX+
1	U1	1 GHz digital gain amplifier (DGA) with 30 dB range and 1 dB step size	Analog Devices	ADL5206
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	ADG772BCPZ-1REEL
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.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.