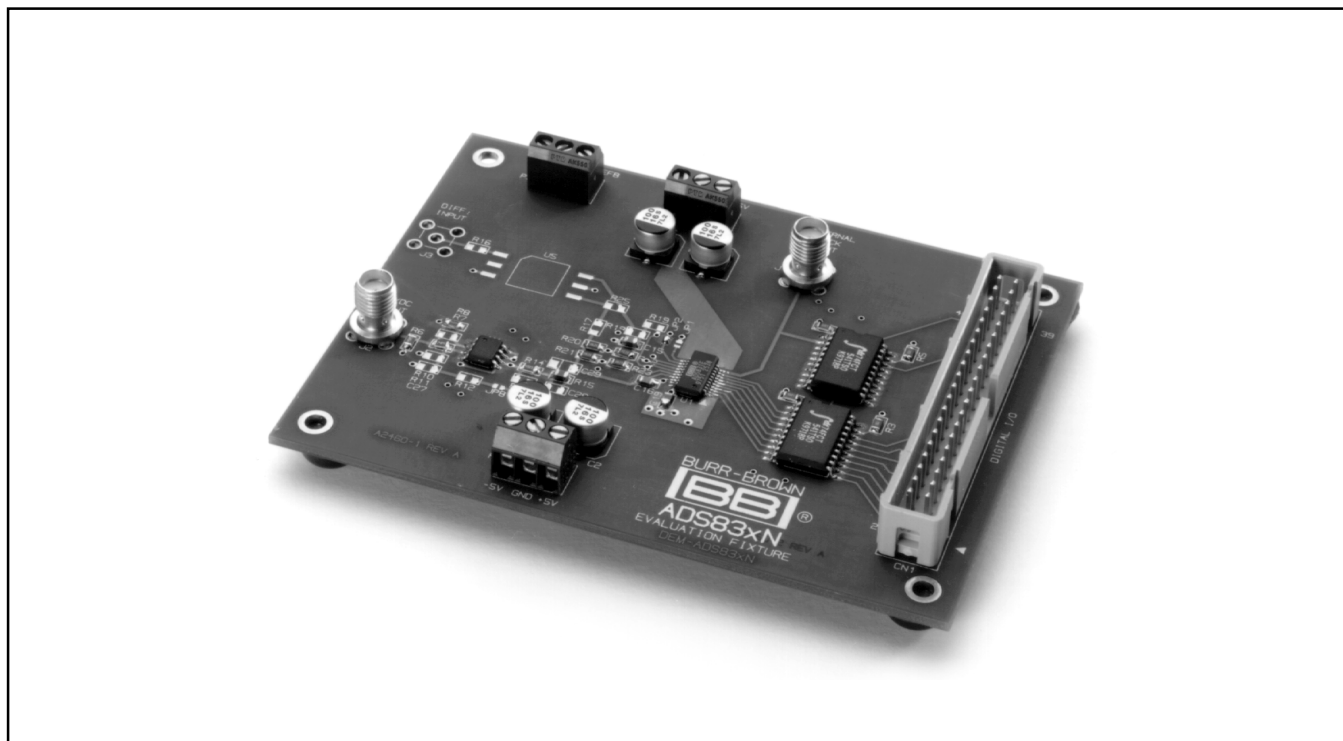




FEATURES

- PROVIDES FAST AND EASY PERFORMANCE TESTING FOR ADS830/831
- AC- OR DC-COUPLED INPUTS
- SINGLE-ENDED OR DIFFERENTIAL INPUT CONFIGURATION
- EXTERNAL REFERENCE OPTION

DESCRIPTION

The DEM-ADS83xE evaluation fixture is designed for ease of use when evaluating the 8-bit high speed Analog-to-Digital (A/D) converter ADS830 or ADS831. The ADS830 operates with a 60Msps maximum sampling rate while the ADS831 run up to 80Msps. Because of its flexible design, the user can evaluate the converter in many different configurations: either with DC-coupled or ac-coupled inputs, single-ended, or differential inputs. The data output of the ADS83x-E converter are decoupled from the connector by CMOS octal logic buffer.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

INITIAL CONFIGURATION

By using solder switches and resistor placements, the demonstration board, DEM-ADS83xE, can be set up in a variety of configurations to accommodate a specific mode of operation. Before starting evaluation, the user should decide on the configuration and make the appropriate connections or changes. The evaluation board comes with the following factory-set configuration:

- The OPA681 is set for a noninverting configuration with a gain of $+2V/V$ ($R_8 = R_9 = 402\Omega$). R_7 , R_{11} , R_{12} , R_{13} , and C_{27} are not assembled.
- With capacitor C_{29} , the output of the driver op amp OPA681 is ac-coupled to the converter input.
- The converter is set to operate with the internal reference—solder switch JP2 is closed.
- The full-scale input range is set to 2Vp-p. The solder switch JP1 is open.
- The required common-mode voltage to bias the input of the ADS83xE is derived from the internal top and bottom references by R_{20} and R_{21} and applied to the signal input of the ADS83xE, pin 17 (U1).
- The bias for the complementary input ($\overline{IN}$) of the ADS83xE is developed similarly with R_{22} and R_{23} .

POWER SUPPLY

The evaluation board typically operates with a $\pm 5V$ power supply. This $\pm 5V$ supply, applied at connector P1, is the supply for the analog front end and is separated from the converter supply. The ADS83xE is powered with a +5V supply through connector P2. By using the negative supply for the driving op amp, the applied input signal can be a ground referenced signal with a bipolar swing and does not need to be level shifted. However, the input driver, OPA681, can be set to operate with a single +5V supply as well.

SIGNAL INPUT

DC-Coupled

The standard configuration of the evaluation board uses the high-speed op amp OPA681, a current-feedback type op amp that features low distortion. In order to implement level shifting for the dc-coupled circuit configuration op amp, U4 needs to be re-configured for inverting mode. For this, remove R_8 and install R_7 . The level shifting voltage is derived from the +5V supply and applied to the noninverting input. To generate the correct DC-voltage, calculate appropriate values for resistors R_{11} and R_{12} and close solder switch JP8. Note that in this configuration the input impedance to the board is also determined by the input resistor, R_7 , and an appropriate termination resistor (R_6) value should be selected. Connect terminal 3 of connector P1 to terminal 2 (GND).

To change the input full-scale range from 2Vp-p to 1Vp-p close solder switch JP1.

Transformer Coupled

The evaluation board provides the option to evaluate the A/D converter with differential signal inputs. Here, a RF-transformer is used to convert the single-ended input signal applied to SMA connector J3 into a differential signal. The following steps have to be done to reconfigure the board:

- Remove resistors R_{20} , R_{21} , and R_{22} , R_{23} .
- Remove C_{15} and replace with a 47pF capacitor.
- Remove R_{15} , C_{28} (C_{29}).
- Install R_{17} and R_{18} , typically 22 Ω .
- Install RF-transformer (U5). The model TT1-6, for example, is a 1:1 wideband RF-transformer manufactured by “Mini-Circuits”. The layout is prepared for the “KK81” case style (surface mount). Note to add a proper termination resistor (R_{25}) depending on the selected transformer model.
- Install R_{16} . Consider to use a 0.1 μF capacitor to block the DC path in the case the input signal carries a DC voltage.

This differential input configuration can be operated with external references as well.

CLOCK

The DEM-ADS83xE evaluation board requires an external clock applied at SMA connector J1. This input represents a 50 Ω input to the source. In order to preserve the specified performance of the ADS83xE converter the clock source should feature a very low jitter. This is particularly important if the converter is to be evaluated at its maximum sampling rate or for undersampling condition.

EXTERNAL REFERENCE

The ADS830E and ADS831E converter can be operated with an external reference. For this solder switch JP2 must be opened, disabling the internal references. Close solder switches JP3 and JP4 and apply the external reference voltage at connector P3.

The selected reference voltage determines the full-scale input signal range of the converter.

DIGITAL OUTPUT DRIVER SUPPLY, V_{DRV}

The ADS83xE converter features a dedicated supply pin for the output logic drivers, V_{DRV} , which is not internally connected to the other supply pins. This allows the ADS83xE to be interfaced to either +3V or +5V logic. On the evaluation board the V_{DRV} supply available at connector P2 is shorted to the analog +5V supply with the 0 Ω resistor, R_{25} .

DATA OUTPUT

The data output is provided at CMOS logic levels. The ADS83xE converter uses straight offset binary coding. The data output pins of the converter are buffered from the I/O connector, CN1, by two CMOS octal buffers (FCT541).

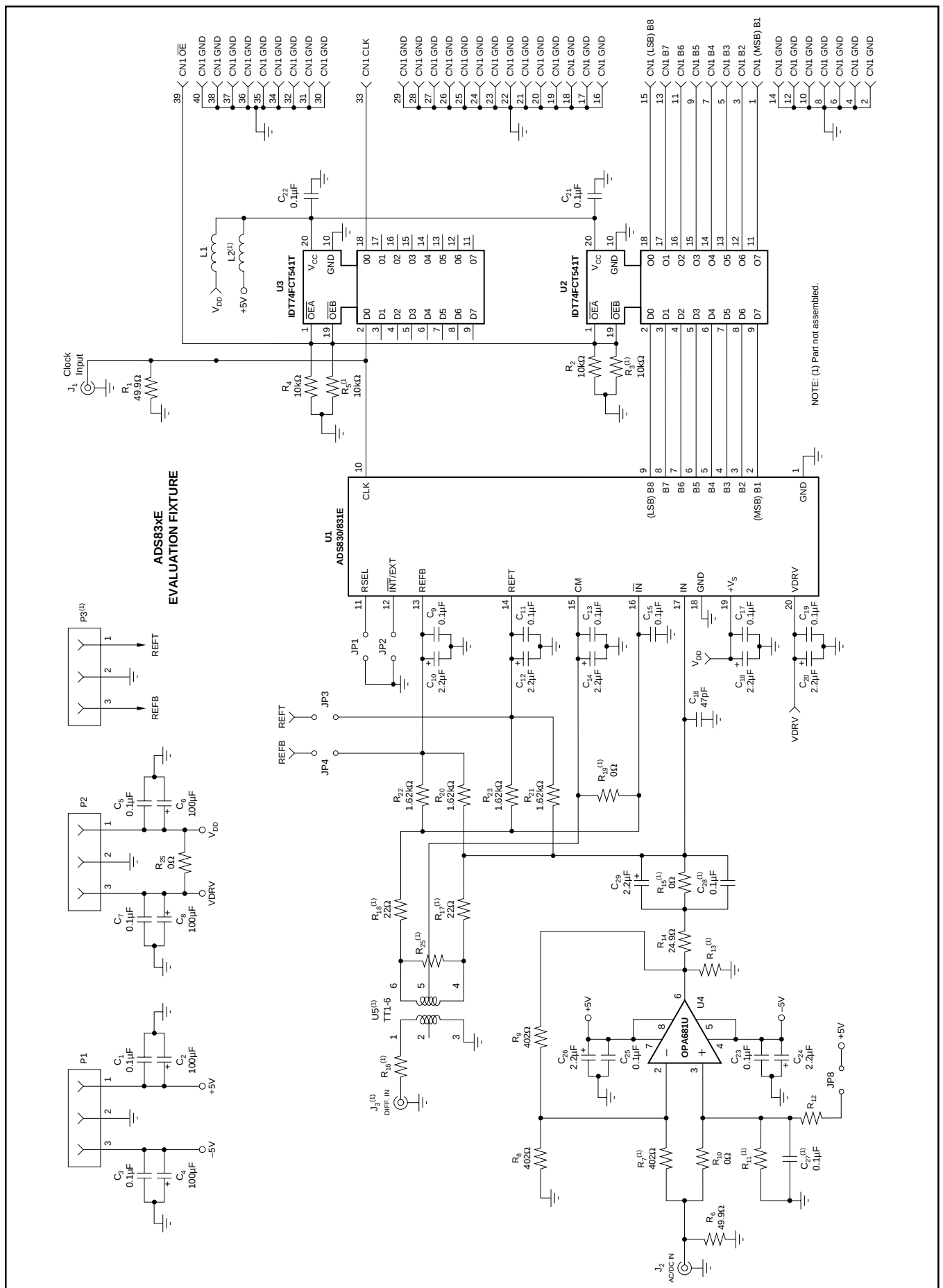


FIGURE 1. Circuit Schematic DEM-ADS83xE.

PC-BOARD LAYOUT

The DEM-ADS83xE evaluation demo board consists of a four-layer PC board. To achieve the highest level of performance, surface-mount components are used wherever possible. This reduces the trace length and minimizes the effects of parasitic capacitance and inductance. The A/D converter is treated like an analog component. Therefore, the evaluation board has one

consistent ground plane. Keep in mind that this approach may not necessarily yield optimum performance results when designing the ADS83xE into different individual applications. In any case, thoroughly bypassing the power supply and reference pins of the converter, as demonstrated on the evaluation board, is strongly recommended.

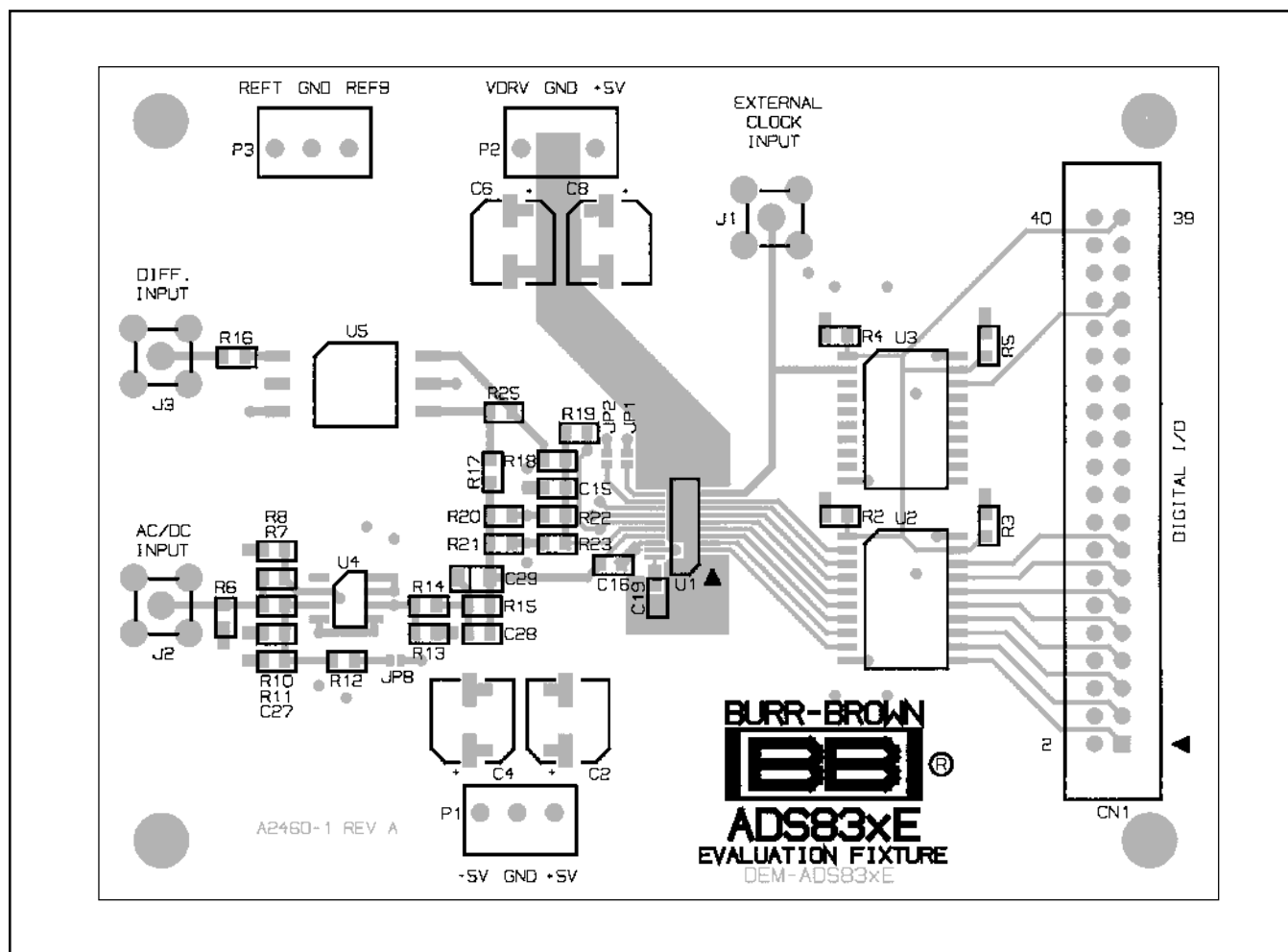


FIGURE 2. Top Layer with Silk-Screen.

ORDERING INFORMATION

PRODUCT	ANALOG-TO-DIGITAL CONVERTER
DEM-ADS830E	ADS830E, 8-Bit 60Msps
DEM-ADS831E	ADS831E, 8-Bit 80Msps

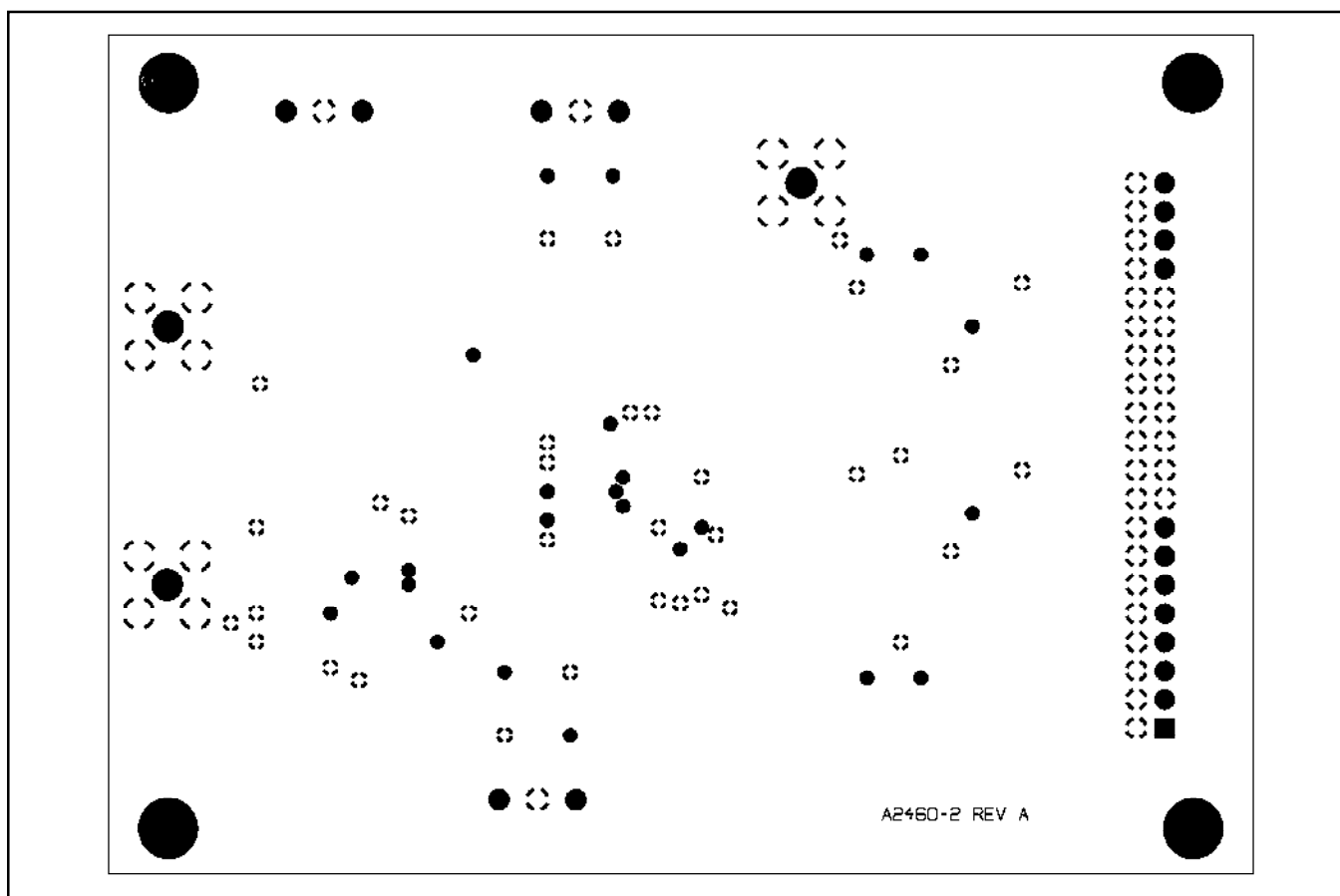


FIGURE 3. Ground Plane.

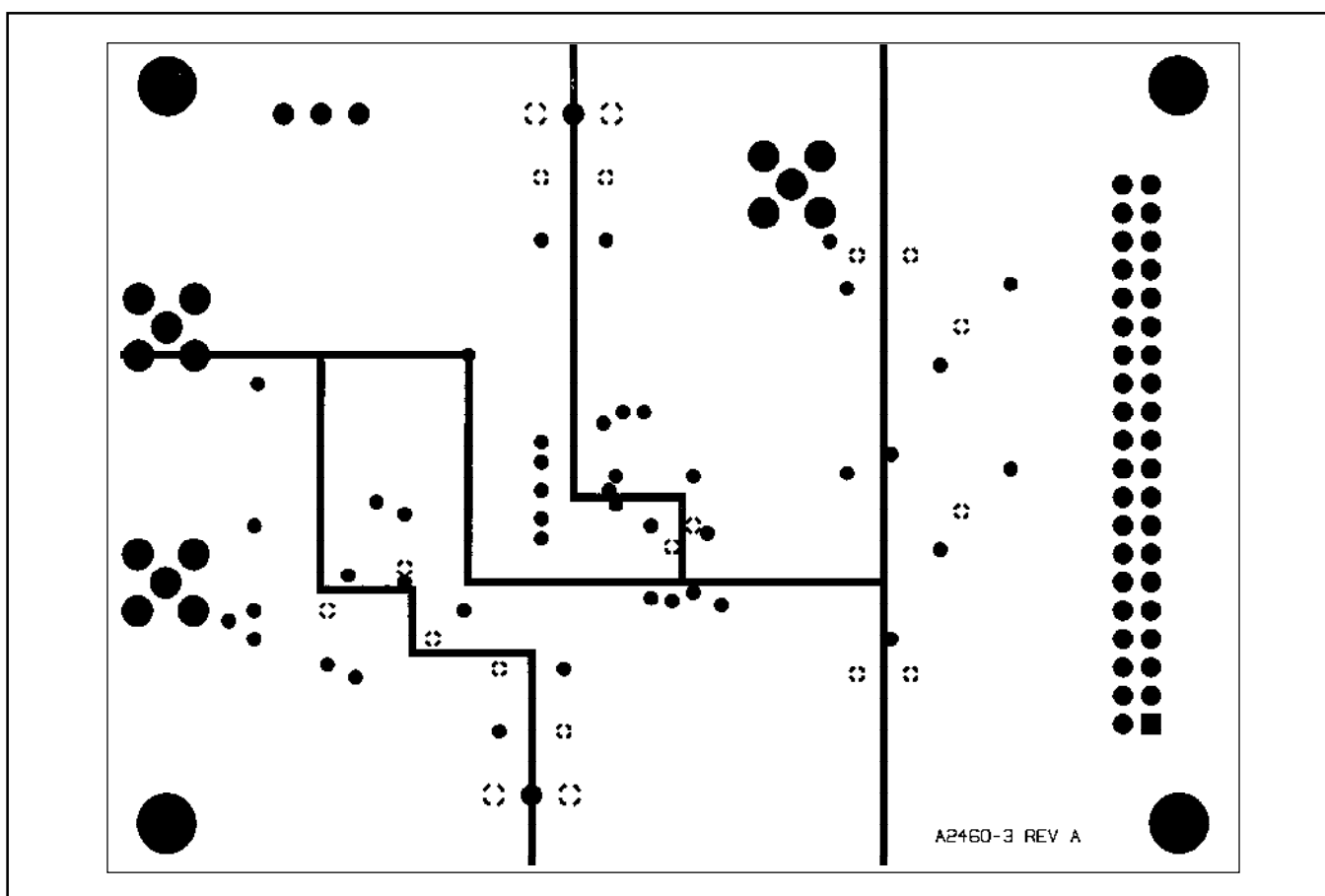


FIGURE 4. Power Plane.

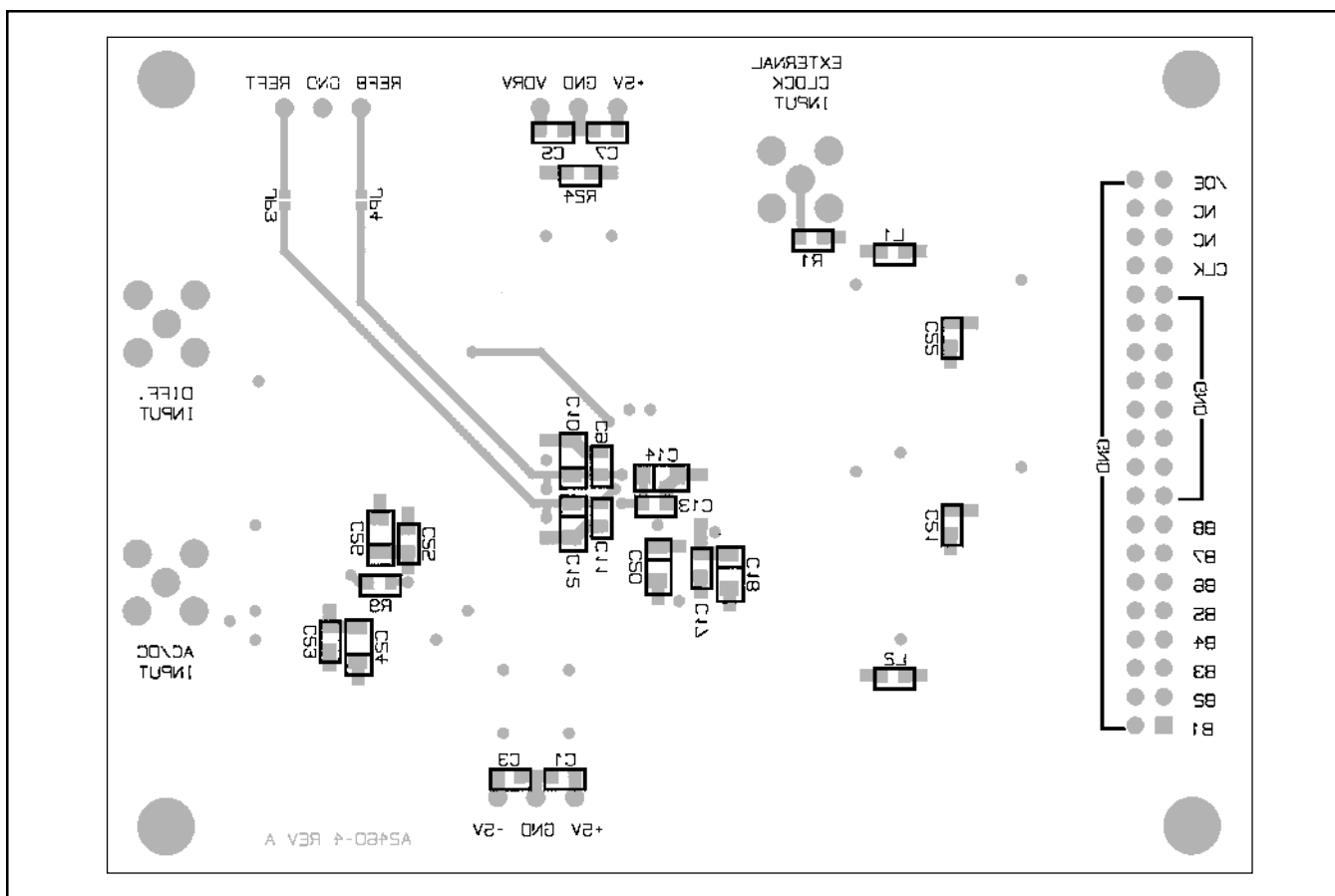


FIGURE 5. Bottom Layer with Silk-Screen.

COMPONENT LIST

REFERENCE	QTY	COMPONENT	DESCRIPTION	MANUFACTURER
U1	1	ADS830E or ADS831E	High-Speed ADC, 20-Pin SSOP	Texas Instruments
U2, U3	2	74FCT541	5V Octal Buffer, SO-20	IDT
U4	1	OPA681U	Wideband, Single Op Amp, SO-8	Texas Instruments
R10, 25, L1	3	CRCW0805ZEROF	0Ω, MF 0805 Chip Resistor, 1%	Dale
R14	1	CRCW080524R9F	24.9Ω, MF 0805 Chip Resistor, 1%	Dale
R1, 6	3	CRCW080549R9F	49.9Ω, MF 0805 Chip Resistor, 1%	Dale
R8, 9	2	CRCW08054020F	402Ω, MF 0805 Chip Resistor, 1%	Dale
R20, 21, 22, 23	4	CRCW08054751F	1.62kΩ, MF 0805 Chip Resistor, 1%	Dale
R2, 4	2	CRCW08051002F	10kΩ, MF 0805 Chip Resistor, 1%	Dale
R3, 5, 7, 11, 12, 13, 15, 16, 17, 18, 19, 25	12		Open, Use Depends on Configuration	
C2, 4, 6, 8	4	ECE-V1CA101P	100μF/16V, Surface Mount Polar. Alu Cap.	Panasonic (Digi-Key)
C10, 12, 14, 18, 20, 24, 26	7	TAJR225006	2.2μF/10V, 3216 Tantalum Capacitor	AVX
C1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 22, 23, 25, 28	15	08055C104KAT	0.1μF/50V X7R 0805 Ceramic Capacitor	AVX
C16	1	08055C470KAT	47pF/50V NP0 0805 Ceramic Capacitor	AVX
C27, 29	2		Open, Use Depends on Configuration	—
P1, P2	2	ED555/3DS	20 x 2 Dual-Row Shrouded Header	On-Shore Technology
CN1	1	IDH-40LP-S3-TG		Robinson-Nugent
J1, J2	2	142-0701-201	Straight SMA PCB Connector	EF Johnson
	4	1-SJ5003-0-N	Rubber Feet, Black, 0.44 x 0.2	Digi-Key
	1	PCB A2460	PC Board A2460, Rev. A	Texas Instruments

EVM IMPORTANT NOTICE

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation kit being sold by TI is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not considered by TI to be fit for commercial use. As such, the goods being provided may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety measures typically found in the end product incorporating the goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may not meet the technical requirements of the directive.

Should this evaluation kit not meet the specifications indicated in the EVM User's Guide, the kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Please be aware that the products received may not be regulatory compliant or agency certified (FCC, UL, CE, etc.). Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive**.

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein**.

Please read the EVM User's Guide and, specifically, the EVM Warnings and Restrictions notice in the EVM User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact the TI application engineer.

Persons handling the product must have electronics training and observe good laboratory practice standards.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265

Copyright • 2001, Texas Instruments Incorporated

EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 0V to 5V and the output voltage range of -5V and +5V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +60°C. The EVM is designed to operate properly with certain components above +70°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265

Copyright • 2001, Texas Instruments Incorporated

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
Low Power Wireless	www.ti.com/lpw

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2007, Texas Instruments Incorporated