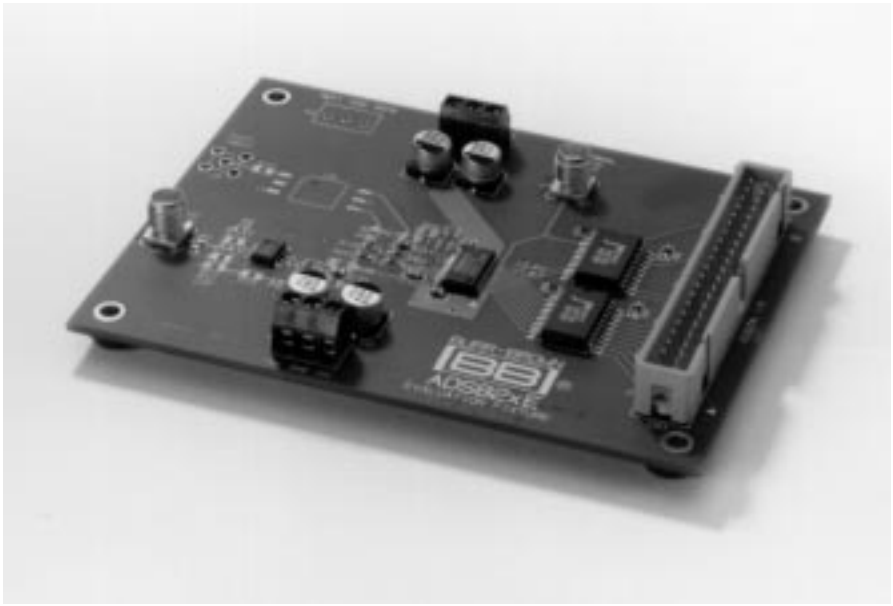
BURR - BROWN®

DEM-ADS82xE

EVALUATION FIXTURE



FEATURES

- **PROVIDES FAST AND EASY PERFORMANCE TESTING FOR ADS822/823/824**
- **AC- OR DC-COUPLED INPUTS**
- **SINGLE-ENDED OR DIFFERENTIAL INPUT CONFIGURATION**
- **EXTERNAL REFERENCE OPTION**

DESCRIPTION

The DEM-ADS82xE evaluation fixture is designed for ease of use when evaluating the 10-bit high speed analog-to-digital converter ADS822, ADS823 and ADS824. The three converter feature different sampling rates, 40Msps, 60Msps and 70Msps respectively, and each model is available by its individual demonstration board. Because of its flexible design the user can evaluate the converter in many different configurations: either with dc-coupled or ac-coupled input, single-ended or differential inputs. The data output of the ADS82x converter are decoupled from the connector by CMOS octal logic buffers.

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LI-509A Printed in U.S.A. December, 1999

INITIAL CONFIGURATION

By using solder switches and resistor placements the demonstration board, DEM-ADS82xE, 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 demo board comes with following factory set configuration:

- OPA681 is set for a non-inverting configuration with a gain of +2V/V ($R_9 = R_{10} = 402\Omega$). R_8, R_{12}, R_{13}, R_{15}, C_{37} are not assembled.
- With capacitor C_{39} 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 JP3 is closed.
- The full-scale input range is set to 2Vp-p. The solder switch JP4 is open.
- The required common-mode voltage to bias the input of the ADS82x is derived from the internal top- and bottom references by R_{19} and R_{20} and applied to the signal input of the ADS82x, pin 25 (U1).
- The bias for the complementary input of ADS82x is developed in a similar fashion using R_{22} and R_{23}.

POWER SUPPLY

The evaluation board typically operates with a ±5V power supply. This ±5V supply, applied at connector P1, is the supply for the analog front end and is separated from the converter supply. The ADS82x 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_9 and install R_8. The level shifting voltage is derived from the +5V supply and applied to the non-inverting input. To generate the correct DC-voltage calculate appropriate values for resistors R_{12} and R_{13} an close solder switch JP8. Note that in this configuration the input impedance to he board is also determined by the input resistor, R_8, and an appropriate termination resistor (R_7) value should be selected.

To change the input full-scale range from 2Vp-p to 1Vp-p close solder switch JP4.

Transformer Coupled

The demonstration 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 prepare the board:

- Remove resistors R_{19}, R_{20} and R_{22}, R_{23}.
- Remove C_{41} and replace with a 47pF capacitor.
- Remove R_{16}, C_{39} (C_{38}).
- Install R_{18} and R_{21}, typically 22Ω.
- 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 depending on the selected transformer model.
- Install R_{17}. Consider to use a 0.1µF 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 evaluation board DEM-ADS82xE requires an external clock applied at SMA connector J1. This input represents a 50Ω input to the source. In order to preserve the specified performance of the ADS82x converter the clock source should feature a very low jitter. This is particularly important if the converter is to be evaluated in an undersampling condition.

EXTERNAL REFERENCE

The ADS82x converter can be operated with an external reference. For this solder switch JP3 must be opened disabling the internal references. Close solder switches JP5 and JP6 and apply the external reference voltage at connector P3. Refer to the A/D converter data sheet for the recommended reference voltage ranges.

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

DIGITAL OUTPUT DRIVER SUPPLY, VDRV

The ADS82x converter feature a dedicated supply pin for the output logic drivers, VDRV, which is not internally connected to the other supply pins. This allows the ADS82x to be interfaced to either +3V or +5V logic. On the evaluation board the VDRV supply available at connector P2 is shorted to the analog +5V supply with the 0Ω resistor, R_{25}.

DATA OUTPUT

The data output is provided at CMOS logic levels. The ADS82x converter use straight offset binary coding. The data output pins of the converter are buffered from the I/O connector, CN1, by two CMOS octal buffer (FCT541).

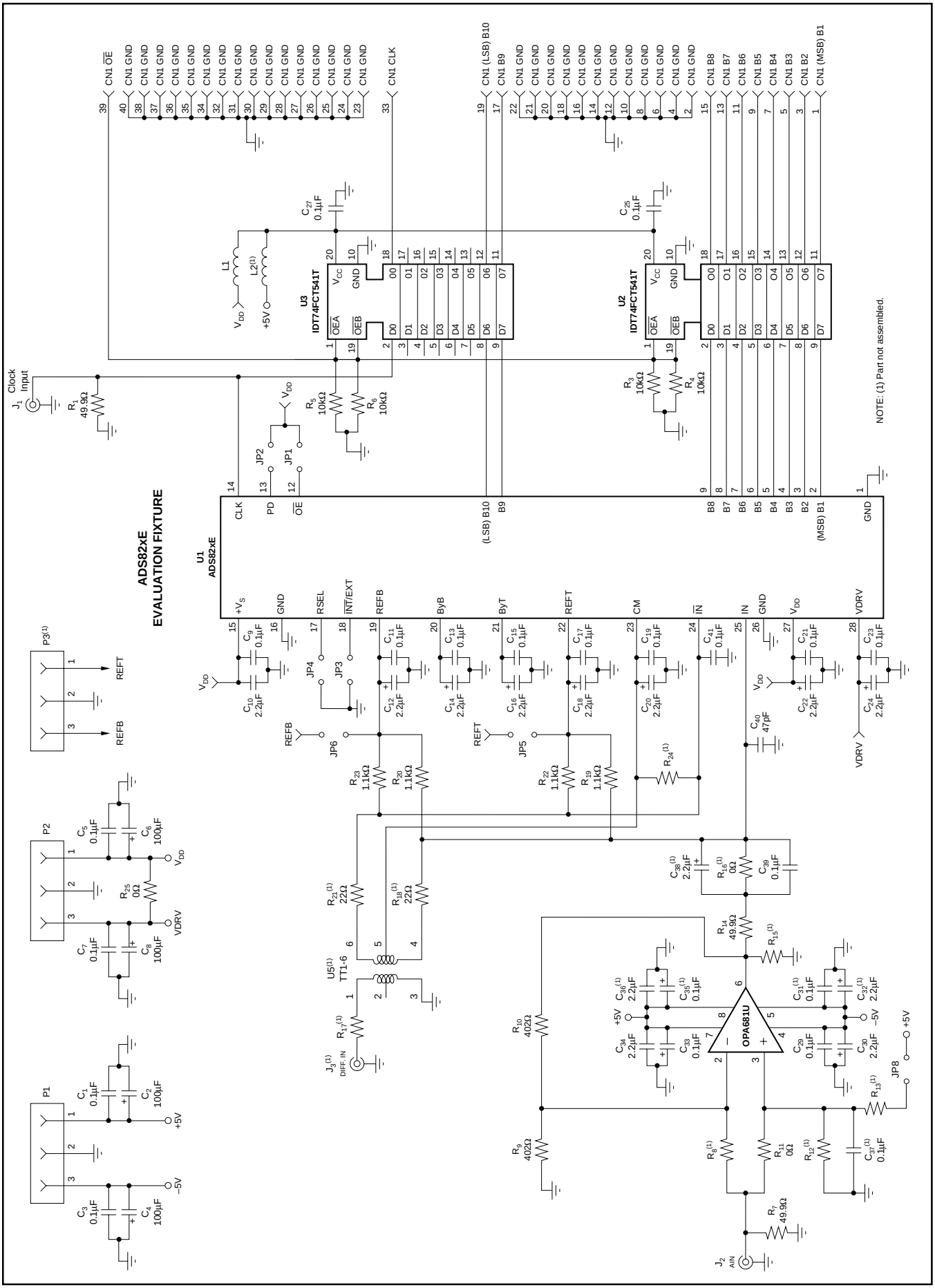

FIGURE 1. Circuit Schematic DEM-ADS82xE.

PC-BOARD LAYOUT

The DEM-ADS82xE 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 analog-to-digital converter is treated like an analog component. Therefore the demo board has one consistent ground plane. Keep in mind that this approach may not necessarily yield optimum performance results when designing the ADS82x 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.

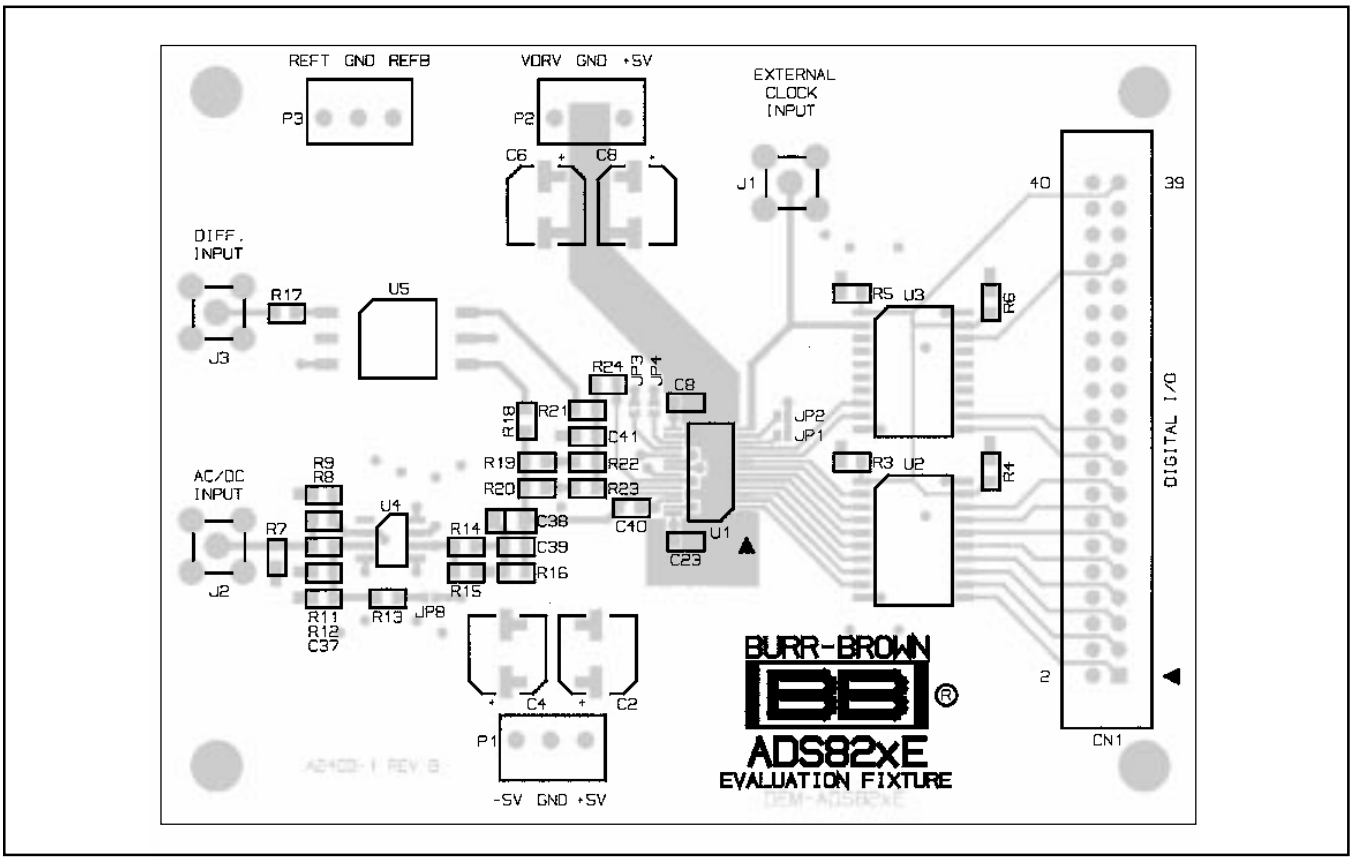

FIGURE 2. Top Layer (Component Side) with Silk-Screen.

ORDERING INFORMATION

PRODUCT	ANALOG-TO-DIGITAL CONVERTER
DEM-ADS822E	ADS822E, 10-Bit 40Msps
DEM-ADS823E	ADS823E, 10-Bit 60Msps
DEM-ADS824E	ADS824E, 10-Bit 70Msps

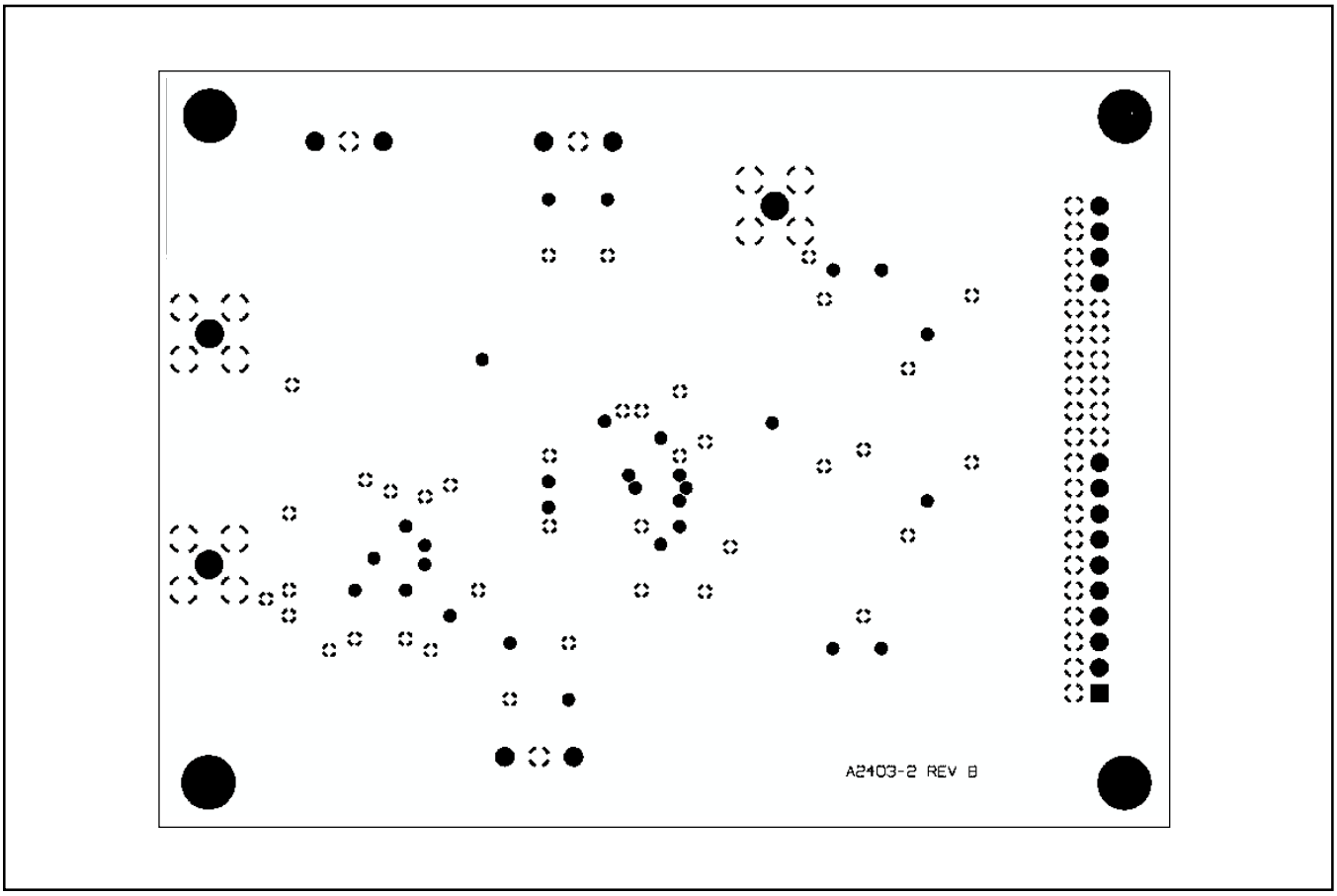

FIGURE 3. Ground Plane.

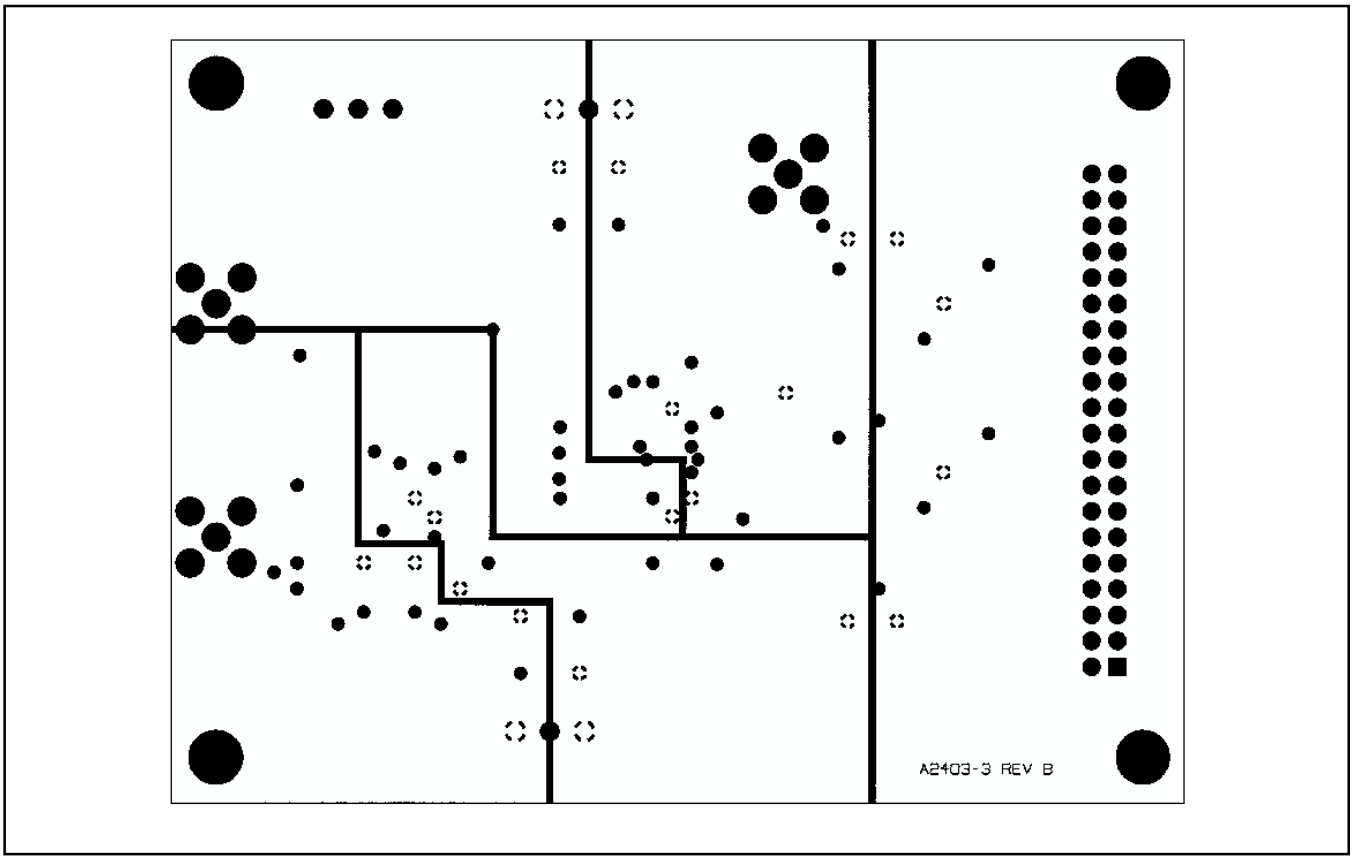

FIGURE 4. Power Plane.

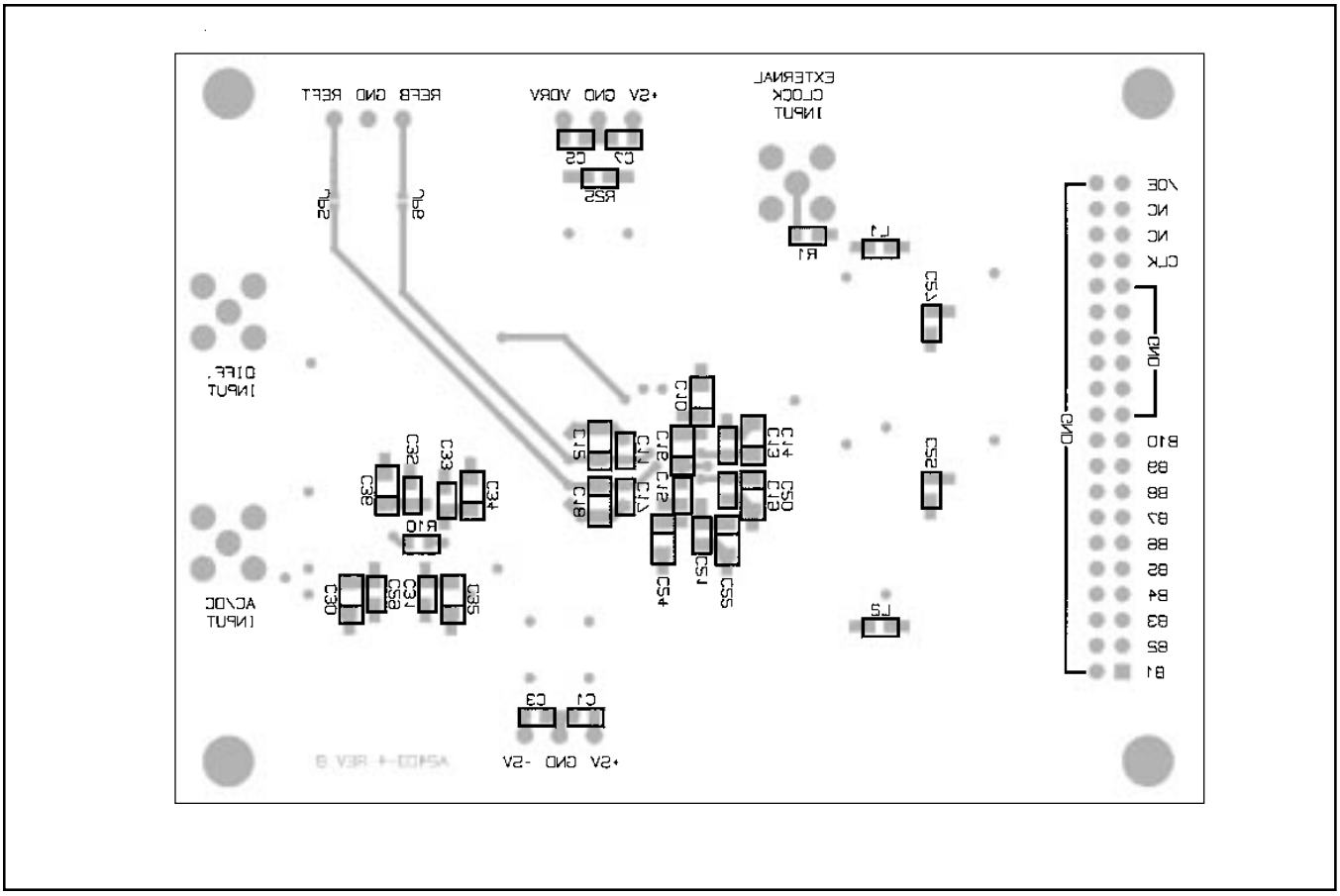

FIGURE 5. Bottom Layer with Silk-Screen.

COMPONENT LIST

REFERENCE	QTY	COMPONENT	DESCRIPTION	MANUFACTURER
U1	1	ADS82xE	High-Speed ADC, 28-Pin SSOP	Burr-Brown
U2, U3	2	74FCT541	5V Octal Buffer, 20-Pin SOIC	IDT
U4	1	OPA681U	Wideband, Single Op Amp, SO-8	Burr-Brown
R11, 25, L1	3	CRCW0805ZEROF	0Ω, MF 0805 Chip Resistor, 1%	Dale
R1, 7, 14	3	CRCW080549R9F	49.9Ω, MF 0805 Chip Resistor, 1%	Dale
R9, 10	2	CRCW08054020F	402Ω, MF 0805 Chip Resistor, 1%	Dale
R19, 20, 22, 23	4	CRCW08051101F	1.1kΩ, MF 0805 Chip Resistor, 1%	Dale
R3, 4, 5, 6	4	CRCW08051002F	10kΩ, MF 0805 Chip Resistor, 1%	Dale
R8, 12, 13, 15, 16, 17, 18, 21, 24	9		Open, Use Depends on Configuration	
C2, 4, 6, 8	4	ECE-V1CV101SR	100µF/16V, Surface Mount Polar. Alu Cap.	Panasonic (Digi-Key)
C10, 12, 14, 16, 18, 20, 22, 24, 30, 34	10	TAJR225006	2.2µF/10V, 3216 Tantalum Capacitor	AVX
C1, 3, 5, 7, 9, 11, 13, 15, 17, 19,				
21, 23, 25, 27, 29, 33, 39, 41	18	08055C104KAT	0.1µF/50V X7R 0805 Ceramic Capacitor	AVX
C40	1	08055C470KAT	47pF/50V NP0 0805 Ceramic Capacitor	AVX
C31, 32, 35, 36, 37, 38	6		Open, Use Depends on Configuration	—
P1, P2	2	ED555/3DS	3-Pin Term Block	On-Shore Technology
CN1	1	IDH-40LP-S3-TG	20 x 2 Dual-Row Shrouded Header	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 A2403	PC Board A2403, Rev. B	Burr-Brown