



DEM-ADS7815U EVALUATION FIXTURE

FEATURES

- COMPUTER INTERFACE
- STAND-ALONE CAPABILITY
- BREADBOARD AREAS
- INPUT RANGE EASILY CONFIGURED FOR APPLICATION

DESCRIPTION

The DEM-ADS7815U evaluation fixture is designed for quick evaluation of Burr-Brown's ADS7814 and ADS7815 in the 28-pin SOIC package. Breadboard areas are provided with optional bipolar power supply connections to assist in the evaluation of various driver amplifiers or multiplexed input circuits. Additionally, the demonstration fixture has flexibility in its clocking circuit to allow for various fixed conversion rates. To further enhance the clocking network, an external off board clock can be connected through the BNC connector, P3. The DEM-ADS7815U has been designed to accommodate stand-alone operation, as well as interfacing to Burr-Brown's DEM-CIB (Universal PC interface board).

GETTING STARTED

For quick, first time evaluations, it is recommended that the board be powered with $\pm 5V$ supplies to P4. P4 provides power to all the components on DEM-ADS7815U. The breadboard power connector, P5, provides power to the breadboard busses, $+V_S$ and $-V_S$. For first time evaluations, P5 should not be used. The ground connection of both power connectors are tied together with the single ground plane.

The factory set position of the jumpers are shown below.

J1 = C, F

J5 = Not Installed

J2 = Installed

J6 = A

J3 = Installed

J7 = B

J4 = A

With this jumper configuration the analog input signal path is configured to use P2 for the signal source with

APPLICATIONS

- TRANSDUCER INTERFACE
- MULTIPLEXED DAS

a gain of $+2V/V$ to the converter. The voltage reference to the chip is generated by Burr-Brown's REF1004-2.5 (U6) and buffered with the operational amplifier, U2. Additionally, the on board oscillator chip is used to generate a clock frequency of 25kHz to the DUT. Finally, the edge-triggered, D-type flip-flop array, U7 and U8 are enabled by tying \overline{OE} to GND.

With this jumper configuration the digital portion of the circuit sets the DUT in a continuous conversion mode with the parallel digital output available on the connector P1, pins 1 through 31.

DEM-ADS7815U BOARD DESCRIPTION

All of the jumper functions for the DEM-ADS7815U are shown in Table I. These jumpers affect the circuit's analog front-end, reference circuit, clocking circuit, and the digital interface to the connector, P1.

JUMPER NAME	JUMPER FUNCTION
J1, J2, J5	Used to configure the input analog source to the driver amplifier (U1). See Table II.
J3, J4	Used to configure the clock generation circuit. See Table IV.
J6	Used to configure reference voltage input. See Table III.
J7	Enable/Disable for the DUT parallel digital output to P1. Position B manually enables the edge-triggered D-type flip-flops. Position A manually configures the output of the flip-flops into high impedance. When the DEM-CIB computer interface board is used, J7 should not be installed.

TABLE I. Description of Jumpers on DEM-ADS7815U Demonstration Fixture.

ANALOG INPUT CONFIGURATIONS

Analog Source Options: J1, J2, J5, and P2—The input of the A/D converter (DUT) can be driven by the high speed voltage feedback amplifier, OPA642 (U1) or by breadboard circuitry. The functions of the jumpers are summarized in Table II.

ANALOG INPUT FUNCTION	J1	J2	J5
Non-inverting input from P2 ($G = 1 + R_2/R_1$).	C, F	Installed	Open
Buffered input from P2 ($G = +1$).	C	Installed	Open
Non-inverting input from P2 ($G = 1 + R_2/R_1$) with offset adjust enabled.	C, F	Installed	Installed
Inverting input from P2 ($G = -R_2/R_1$).	B, D	Installed	Open
Inverting input from P2 ($G = -R_2/R_1$) with offset adjust enabled.	B, D	Installed	Installed
Non-inverting input from breadboard IN bus through U1 ($G = 1 + R_2/R_1$).	A, C, F	Installed	Open
Non-inverting input from breadboard IN bus through U1 ($G = +1$).	A, C	Installed	Open
Non-inverting input from breadboard IN bus through U1 ($G = 1 + R_2/R_1$) with offset adjust enabled.	A, C, F	Installed	Installed
Inverting input from breadboard IN bus through U1 ($G = 1 + R_2/R_1$).	A, B, D	Installed	Open
Inverting input from breadboard IN bus through U1 ($G = 1 + R_2/R_1$) with offset adjust enabled.	A, B, D	Installed	Installed
Input from breadboard AIN bus, to input of DUT.	D	Open	Open

TABLE II. The Jumper Settings for (J1, J2, and J5) are Used to Interface the DUT with the Analog Portion of the Demonstration Fixture, ie., the Amplifiers and the Breadboard Areas.

EXTERNAL VOLTAGE REFERENCE OPTIONS

Precision Voltage Reference—The ADS7814 and ADS7815 require an external voltage reference for proper operation. The DEM-ADS7815U board supplies that reference through U6, a 2.5V reference and U2, an operational amplifier that is used as a low impedance buffer to the reference pin of the DUT. If the on board reference is used in the evaluation, position A of J6 shorted with a jumper top, as shown in Table III.

Adjustable Voltage Reference—An adjustable reference is provided with the inclusion of the potentiometer, R_6 , and the jumper J6. The primary function of this portion of the circuit is to provide gain adjustment capability. The correct jumper configuration for this option is summarized in Table III.

J6 CONFIGURATION	DESCRIPTION
A	Applies the on board reference (U6 and U2) to the reference pin of the DUT, 2.5V nominal.
A, B	Applies the on board reference (U6 and U2) to the reference pin of the DUT. Also allows for gain adjustment by using the potentiometer, R_6 , 2.5V nominal.
No Jumper Installed	This configuration is used if the user is taking advantage of the breadboard area to design a custom reference circuit.

TABLE III. Function of the Voltage Reference Jumper, J6.

User Designed Voltage Reference—The breadboard section includes a REF bus to allow for the integration of user designed voltage reference. When this option is used, it is recommended that J6 does not have a jumper installed.

CLOCK NETWORK AND DIGITAL INTERFACE

Clock Network: J3, J4 and P3—The clock network includes U3 (10MHz oscillator) and U4 and U10 (clock divide network). The 10MHz signal from U3 is divided by 40 and finally buffered by U5. J3 provides power to U3, U4, and U10. To utilize the on board clock, J4 must have a jumper top in position A (see Table IV). If an external clock is used, the BNC connector P3 can be used along with a reconfiguration of J4.

CLOCK OPTION	J4	J3
External Clock (P3)	Connected	No Jumper
On Board Clock	No Jumper	Connected

TABLE IV. Jumper Configuration of Clock Options on the DEM-ADS7815U Demonstration Fixture.

External Digital Interface—All critical digital lines are connected to the 25 x 2 pin connector, P1 (see Table V). The quad 2-input NAND Gate, U5 is used to insure that the proper timing of R/C, \overline{BUSY} and \overline{CS} are applied to the converter. For more details concerning the timing of the ADS7814 and ADS7815, refer to their respective product data sheets.

The P1 connector is designed to interface to Burr-Brown's Computer Interface Board, DEM-CIB. The DEM-CIB and accompanying Windows compatible program allows the performance of the ADS7814 and ADS7815 to be evaluated directly from a PC.

Additionally, the user of the DEM-ADS7815U can use the board in a stand-alone mode, using P1 as the interface connection to a user designed interface.

P1 PIN NUMBER	PIN DESCRIPTION
All Even Pins	Ground
Odd Pins 1 - 31	U7 and U8 external buffer output of the parallel digital output from the DUT.
35	Enable/Disable for the DUT parallel digital output to P1. When P1-35 is LOW the edge-triggered D-type flip-flops are enabled. When P2-35 is HIGH, the flip-flops are placed into a high impedance mode. When the DEM-CIB Computer Interface Board is used, J7 should not be installed.
39	\overline{CS} (Chip Select), connected to UX9 (DUT) pin 13
43	\overline{BUSY} , connected to UX9 (DUT) pin 26

TABLE V. External Digital Interface Connector, P1 Pin Description.

PART IDENTIFIER	QUANTITY	PART NUMBER	DESCRIPTION
DUT	1	ADS7815U	16-Bit, High Speed, SAR, A/D Converter
DUT (socket)	1	SOP-28B-SMT-TT	SMT SOP Socket, 28-Pin, 0.375 Row Spacing, Body and Frame, Robinson Nugent
DUT (removal tool)	1	SOP-28B-REMTTOOL	Frame Removal Tool for the DUT socket, Robinson Nugent
U3	1	CTX114-ND ⁽¹⁾	Clock Oscillator, 10MHz, Digi-Key (CTS)
U3 (socket)	1	1107741	14-Pin Oscillator Socket, Aries
U1, U2	2	OPA642U ⁽³⁾	High Speed, Single, Voltage Feedback, Operational Amplifier, Burr-Brown
U4	1	74AC11074D ⁽¹⁾	Dual, D-Type Flip-Flop, SOIC, TI
U5	1	SN74HC00D ⁽¹⁾	NAND Gate, Quad, 2 Input, SOIC, TI
U6	1	REF1004C-2.5 ⁽²⁾	2.5V Reference, Burr-Brown
U7, U8	2	74HC574D ⁽¹⁾	Latch, Octal D-Type, 3-State Output, TI
U10	1	74HC390D ⁽¹⁾	Counter, Decade, Dual, 4-Bit, TI
C ₁ - C ₄ , C ₆ , C ₁₀ , C ₁₂ , C ₁₇ , C ₁₈ , C ₂₀ - C ₂₃	13	C1206C104K5RAC ⁽¹⁾	Capacitor, 0.01µF, 50V, 10%, chip-ceramic X7R
C ₅	1	CK05BX104K ⁽¹⁾	Capacitor, 0.1µF, 10%, Ceramic X7R
C ₇	1	CD5FC101503 ⁽¹⁾	Capacitor, Dipped Mica, 100pF, CDE
C ₈ , C ₉ , C ₁₃ - C ₁₆	6	T491C225K025AS ⁽¹⁾	Capacitor, 2.2µF, 25V, 10%, Tantalum Chip-Molded
C ₁₁ , C ₁₉	2	T491C106K025AS ⁽¹⁾	Capacitor, 10µF, 20V, 10%, Tantalum Chip-Molded
C ₂₄	1	T491C105K020AS ⁽¹⁾	Capacitor, 1µF, 25V, 10%, Tantalum Chip-Molded
J1	1	TSW-106-07-T-D ⁽¹⁾	Jumper, 2 x 6, Terminal Strip, SAMTEC
J2, J3, J5	3	TSW-101-07-T-D ⁽¹⁾	Jumper, 1 x 2, Terminal Strip, SAMTEC
J4, J6, J7	3	TSW-102-07-T-D ⁽¹⁾	Jumper, 2 x 2, Terminal Strip, SAMTEC
P1	1	IDH-50LP-SR3-TG ⁽¹⁾	Right Angle, Header 25 x 2 Robinson Nugent
P2, P3	2	KC-79-274-M06 ⁽¹⁾	Connector BNC, PCB Mount, KING
P4, P5	2	ED300/3	Terminal Block, 3 Pin, ON-SHORE Technology
R ₁	1	RN55C75R0F ⁽¹⁾	Resistor, 75Ω, 0.125W, 1%, Metal-Film
R ₂ , R ₁₅	2	CRCW120675R0F ⁽¹⁾	Resistor, 75Ω, 0.125W, 1%, Chip-Thick-Film
R ₃ , R ₉	2	CRCW120610R0F ⁽¹⁾	Resistor, 710Ω, 0.125W, 1%, Chip-Thick-Film
R ₄ , R ₇ , R ₈	3	CRCW12064992F ⁽¹⁾	Resistor, 49.9kΩ, 0.125W, 1%, Chip-Thick-Film
R ₅ , R ₆	2	ST5W104CT-ND ⁽¹⁾	Resistor, 100kΩ, 1/4W, 14 turn Potentiometer
R ₁₀	1	RN55C49R9F ⁽¹⁾	Resistor, 49.9Ω, 0.125W, 1%, Metal Film
R ₁₁ , R ₁₂	2	4816P-1-101-ND ⁽¹⁾	Resistor Network, 100Ω, Digi-Key (Bourns)
R ₁₃ , R ₁₄	2	CRCW12061000F ⁽¹⁾	Resistor, 100Ω, 0.125W, 1%, Chip-Thick-Film
R ₁₆ , R ₁₇ , R ₁₉	3	CRCW12061002F ⁽¹⁾	Resistor, 10kΩ, 0.125W, 1%, Chip-Thick-Film
R ₁₈	1	CRCW12061621F ⁽¹⁾	Resistor, 1.62kΩ, 0.125W, 1%, Chip-Thick-Film
Jumper Tops	9	SNT-100-BK-T-H	Jumper Tops, Samtec
Rubber Feet	5	SJ5523-O-ND	Bumpers, 3M
	1	A2207	Bare Board Number

NOTES: (1) Vendor substitutions allowed providing specifications in description portion of table are met. (2) REF1004-2.5C from Burr-Brown is allowed as substitution. (3) OPA642UB from Burr-Brown is allowed as substitution.

TABLE VI. Parts List for the DEM-ADS7815U.

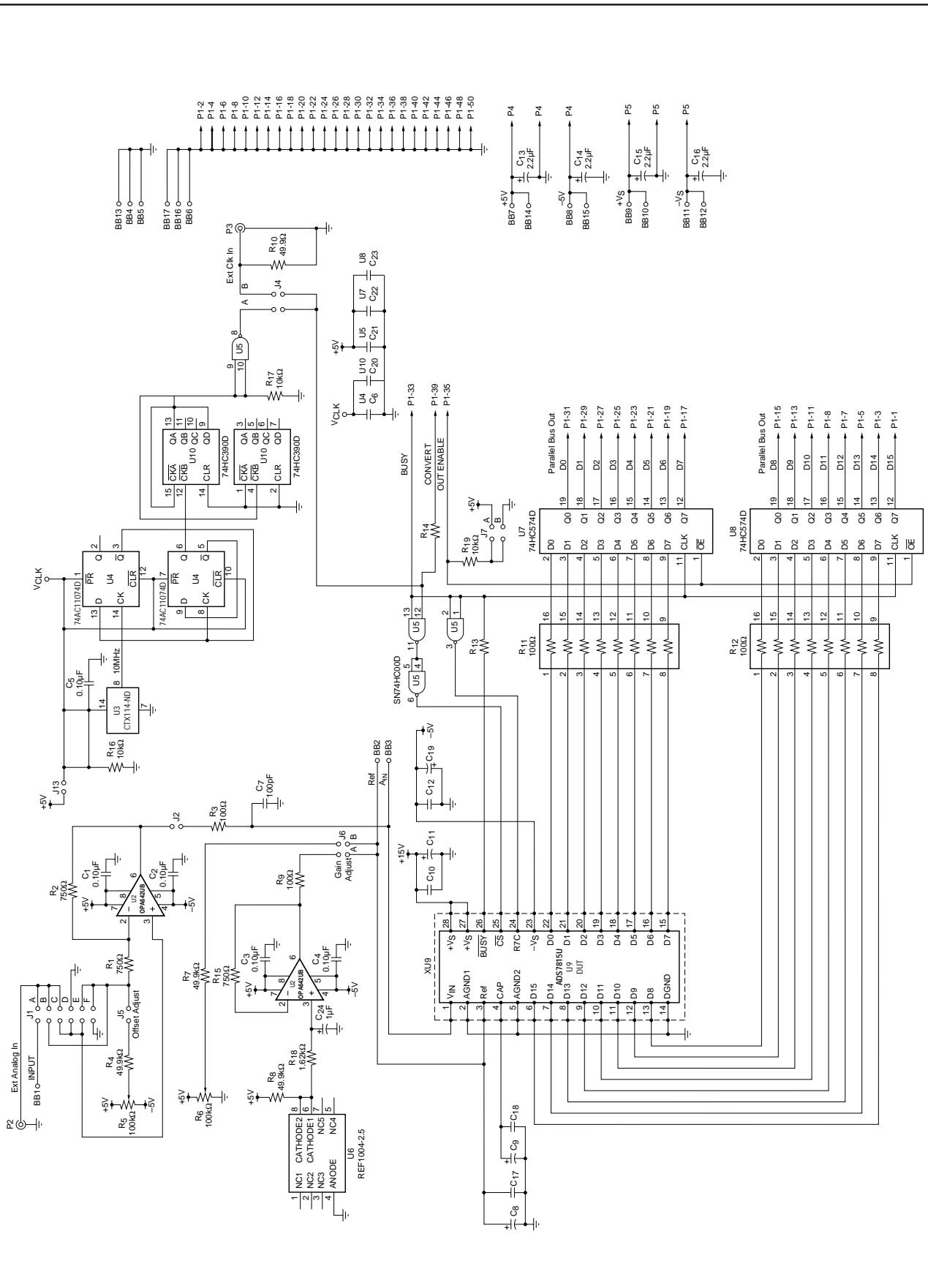


FIGURE 1. Circuit Diagram of the DEM-ADS7815U Demonstration Fixture.

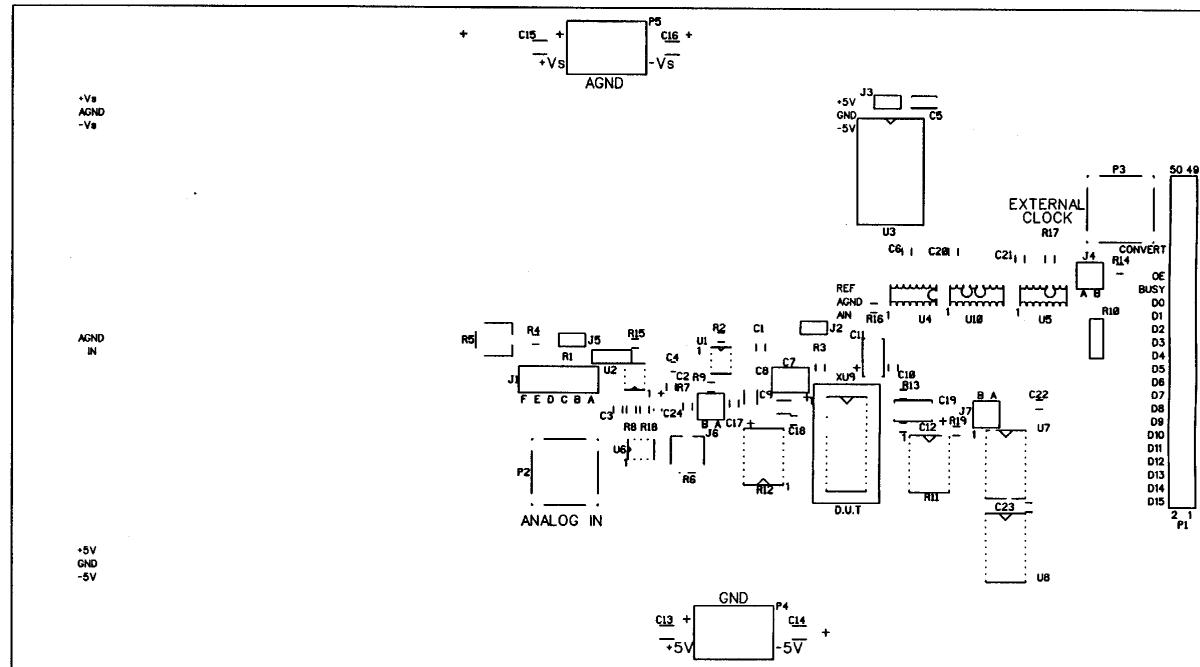


FIGURE 2. Silkscreen of the DEM-ADS7815U Demonstration Fixture.

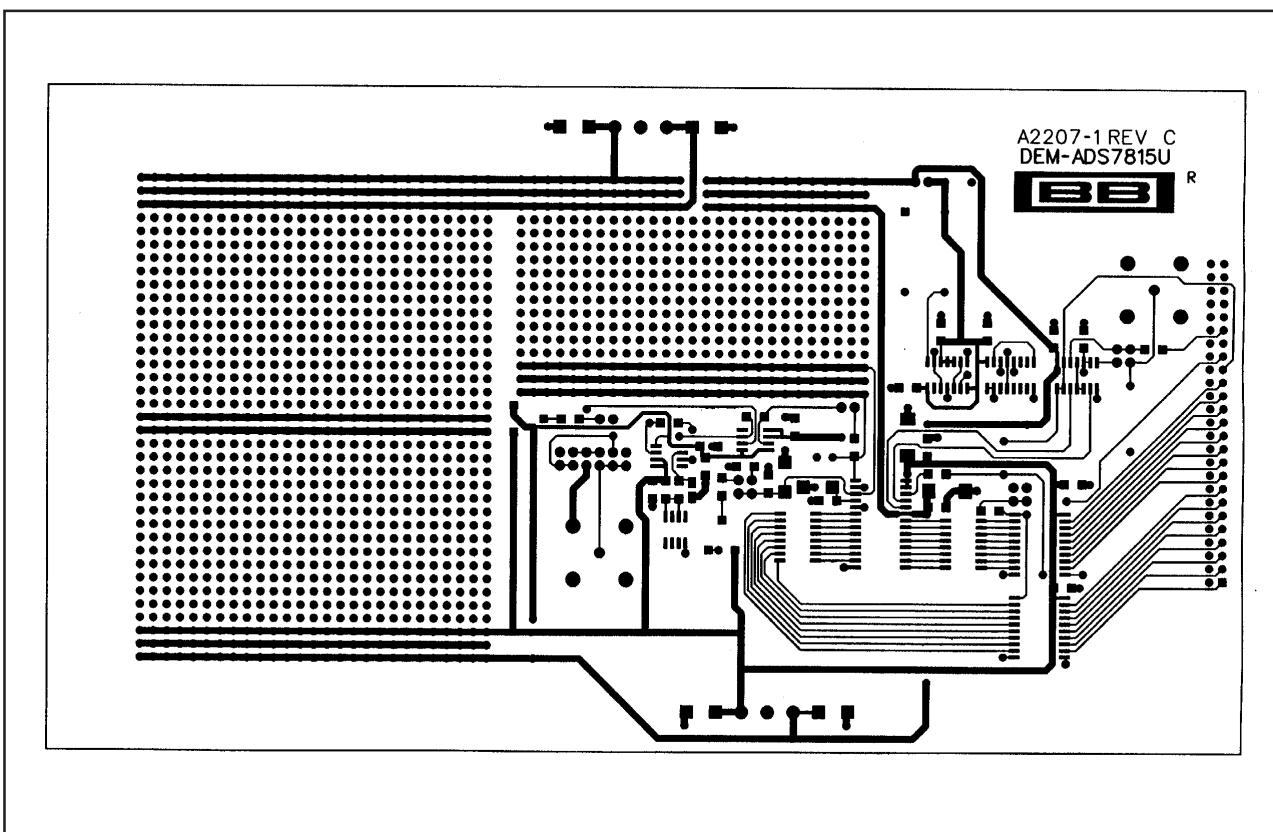


FIGURE 3. Component Side of the DEM-ADS7815U Demonstration Fixture.

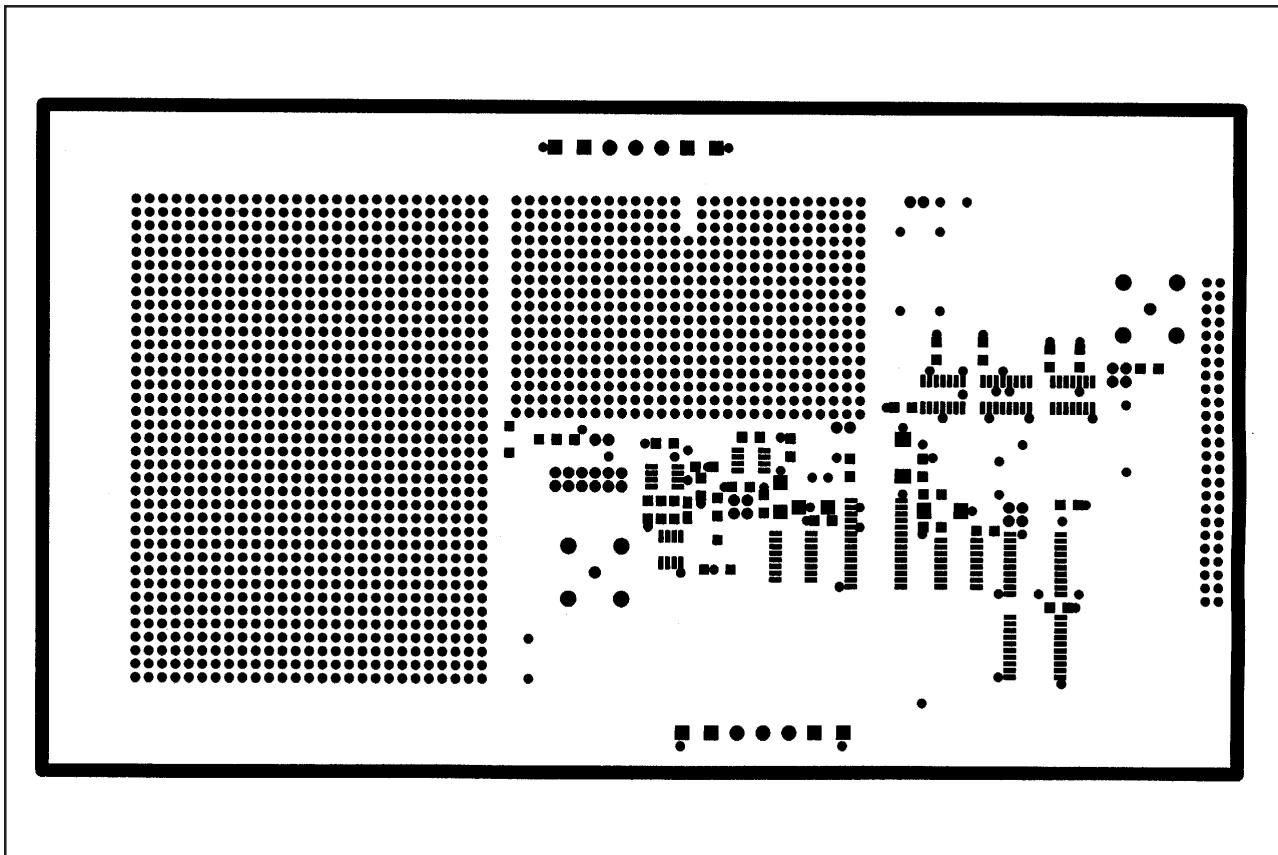


FIGURE 4. Top Soldermask of the DEM-ADS7815U Demonstration Fixture.

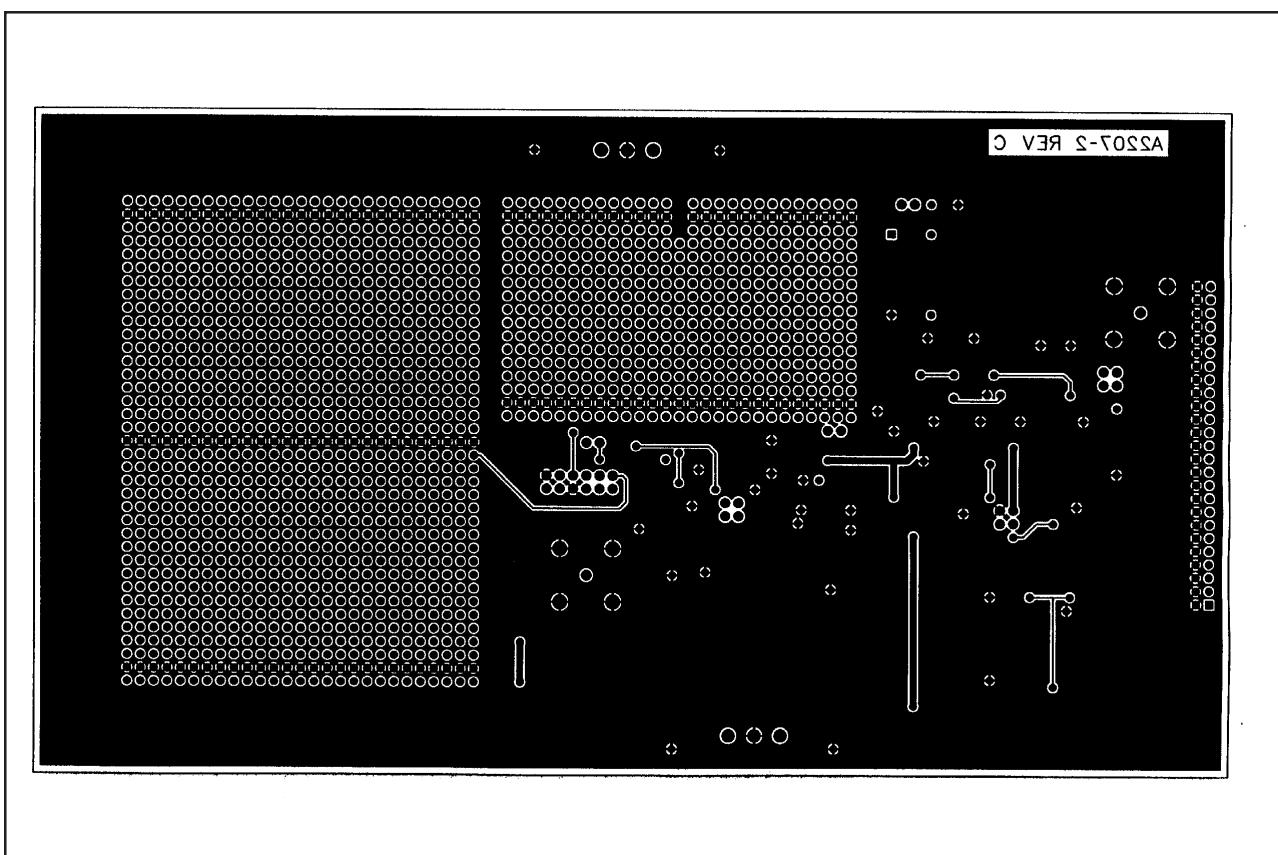


FIGURE 5. Ground Plane of the DEM-ADS7815U Demonstration Fixture.