



**ANALOG
DEVICES**

Evaluation Board for 4-, 5-, 6-Channel, Muxed Input Line Inversion LCD Gamma Buffers

EVAL-ADD8504/ADD8505/ADD8506

FEATURES

- Socket for evaluating [ADD8504](#), [ADD8505](#), or [ADD8506](#)
- Sockets for implementing gamma resistors
- External drive capability
- Simulates panel behavior
 - Sockets for capacitive loads
 - Sockets for resistive loads
- Breadboard area

PACKAGE CONTENTS

Data sheets

[ADD8504/ADD8505/ADD8506](#) data sheet

EVAL-ADD8504/ADD8505/ADD8506 evaluation
board data sheet

CD including

Electronic version of [ADD8504/ADD8505/ADD8506](#) data
sheet

Electronic version of EVAL-ADD8505/ADD8505/ADD8506
evaluation board data sheet

Excel®-based spreadsheet for resistor and power
calculations

Five [ADD8504](#) devices

Five [ADD8505](#) devices

Five [ADD8506](#) devices

GENERAL DESCRIPTION

The ADD8504/ADD8505/ADD8506 evaluation board simplifies evaluation of the [ADD8504/ADD8505/ADD8506](#) under various conditions. This evaluation kit includes a gamma voltage calculator, labeled ADD8504-05-06 Gamma Voltage Calculator.xls, on the ADD8504/ADD8505/ADD8506 evaluation board kit CD to assist in determining required external components to implement the desired gamma voltages.

This documentation is for the ADD8504/ADD8505/ADD8506 evaluation board only; for specific information regarding the [ADD8504/ADD8505/ADD8506](#) muxed input line inversion LCD gamma buffers, please refer to the datasheet.

EVALUATION BOARD

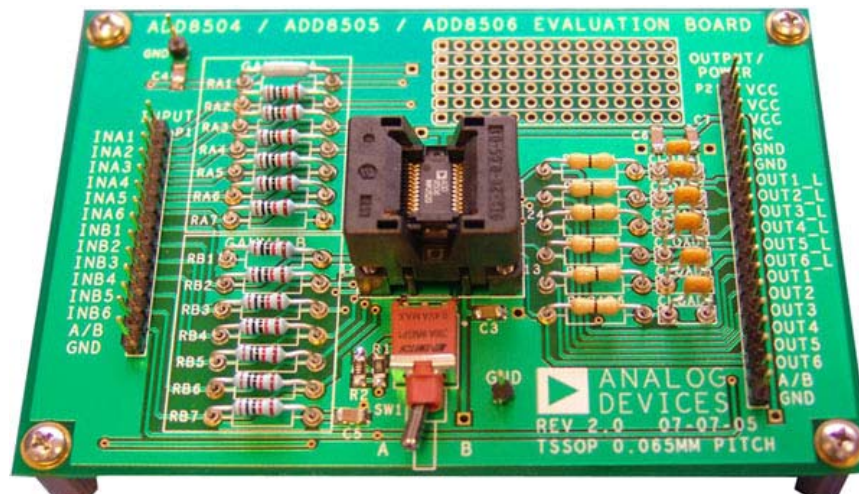


Figure 1. ADD8504/ADD8505/ADD8506 Evaluation Board

Rev. 0

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REVISION HISTORY

2/06—Revision 0: Initial Version

SETTING UP THE EVALUATION BOARD

To begin using the ADD8504/ADD8505/ADD8506 evaluation board:

1. Use existing, or modify, Gamma Resistor RA1 to Gamma Resistor RA7, and Gamma Resistor RB1 to Gamma Resistor RB7 in Block 2 (see Figure 4).
2. Install the ADD8504/ADD8505/ADD8506 in the socket in Block 3, see Figure 4. Read the Part Placement in Socket section for proper part placement and refer to Figure 4 for the ADD8504/ADD8505/ADD8506 evaluation board layout.
3. Connect a +5 V power supply to at least one of the three pins labeled VCC, and connect ground to at least one of the three pins labeled GND in Block 5 (see Figure 4).

If the above list is complete, the user can probe the input and output voltages. To switch between the two gamma resistor strings, connect a switching signal to Pin A/B or toggle the hardware switch (SW1) between Position A and Position B (refer to Figure 4).

PART PLACEMENT IN SOCKET

The ADD8504/ADD8505/ADD8506 have 16, 20, and 24 pins, respectively. To properly place the part in the socket refer to Figure 2.

ADD8504

The ADD8504 uses Socket Pin 3 to Socket Pin 10, and Socket Pin 15 to Socket Pin 22. Only Input/Output 2 through Input/Output 5 are used on the evaluation board. Power and ground pins are unaffected. Refer to the ADD8504/ADD8505/ADD8506 data sheet for proper pin designations for the ADD8504.

ADD8505

The ADD8505 uses Socket Pin 1 to Socket Pin 10, and Socket Pin 15 to Socket Pin 24. Only Input/Output 1 through Input/Output 5 are used on the evaluation board. Power and ground pins are unaffected. Refer to the ADD8504/ADD8505/ADD8506 data sheet for proper pin designations for the ADD8505.

ADD8506

The ADD8506 fills the socket and uses all input/output pins of the evaluation board.

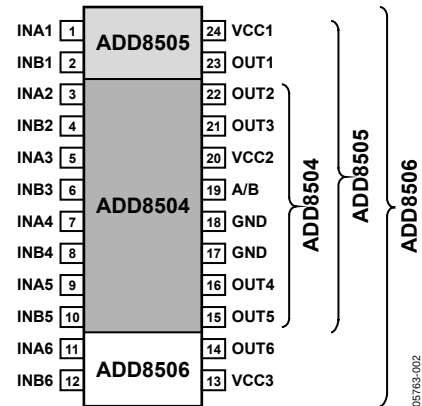


Figure 2. Part Placement in Socket

FACTORY SETTINGS

The ADD8504/ADD8505/ADD8506 evaluation board is pre-configured with one 20 k Ω resistor and thirteen 10 k Ω resistors filling the two gamma resistor strings, for a total of 14 resistors labeled RA1 to RA7 and RB1 to RB7 as shown in Figure 4. The 20 k Ω resistor is labeled RA1 and serves to differentiate the two resistor strings to make the outputs change significantly; output voltages are listed in Table 1.

The board is shipped with an ADD8506 in the TSSOP socket. All six output load resistors are jumpered (0 Ω resistors), and all six output load capacitors are 1 nF.

Table 1. Factory Settings¹

OUTPUT PIN	GAMMA A	GAMMA B
OUT1_L	3.750 V	0.714 V
OUT2_L	3.125 V	1.429 V
OUT3_L	2.500 V	2.143 V
OUT4_L	1.875 V	2.857 V
OUT5_L	1.250 V	3.571 V
OUT6_L	0.625 V	4.286 V

¹ Ideal voltages may differ slightly ($\pm 2\%$).

SWITCHING

The ADD8504/ADD8505/ADD8506 evaluation board can be switched by driving the A/B pin of Block 1 with a 0 V to 5 V clock. A 5 V input on the A/B pin selects GAMMA A; a 0 V input selects GAMMA B. The user can also switch manually using hardware Switch SW1. Switch Position A selects GAMMA A (RA1 to RA7), and switch Position B selects GAMMA B (RB1 to RB7), see Figure 3.

GAMMA RESISTOR STRINGS

The ADD8504/ADD8505/ADD8506 evaluation board includes two external gamma resistor strings consisting of seven resistors each to produce the necessary tap point voltages. This board has been preconfigured (refer to the Factory Settings section for details) as follows: GAMMA A consists of Resistor RA1 to Resistor RA7, and GAMMA B consists of Resistor RB1 to Resistor RB7 (see Figure 3).

The user can change the resistor values to produce the desired voltages. Included with the ADD8504/ADD8505/ADD8506 evaluation board kit is the gamma voltage calculator that allows the user to specify the desired voltages and automatically calculate the necessary resistor values. In addition, the calculator allows the user to specify resistances and calculate voltages. The gamma voltage calculator expedites the evaluation process. It is located on the ADD8504/ADD8505/ADD8506 evaluation board kit CD labeled ADD8504-05-06 Gamma Voltage Calculator.xls.

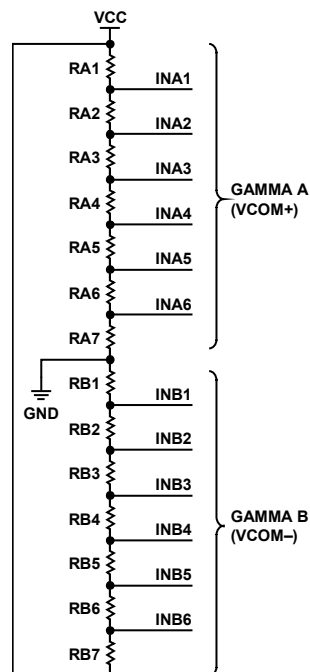


Figure 3. Gamma Resistor String Schematic

OUTPUT LOAD SOCKETS

Sockets are provided on the evaluation board for a series resistance and capacitive load to ground for each of the six gamma buffer outputs. The sockets are labeled RLOAD1 to RLOAD6 and CLOAD1 to CLOAD6; they are located in Block 4 on the evaluation board (see Figure 4). These loads are optional and are for customer evaluation purposes only. If no load is desired, neither resistor nor capacitor should be added.

As shipped from the factory, all six output load resistors are jumpered (0 Ω resistors). All six output load capacitors are 1 nF.

EVALUATION BOARD LAYOUT

FUNCTIONAL BLOCKS

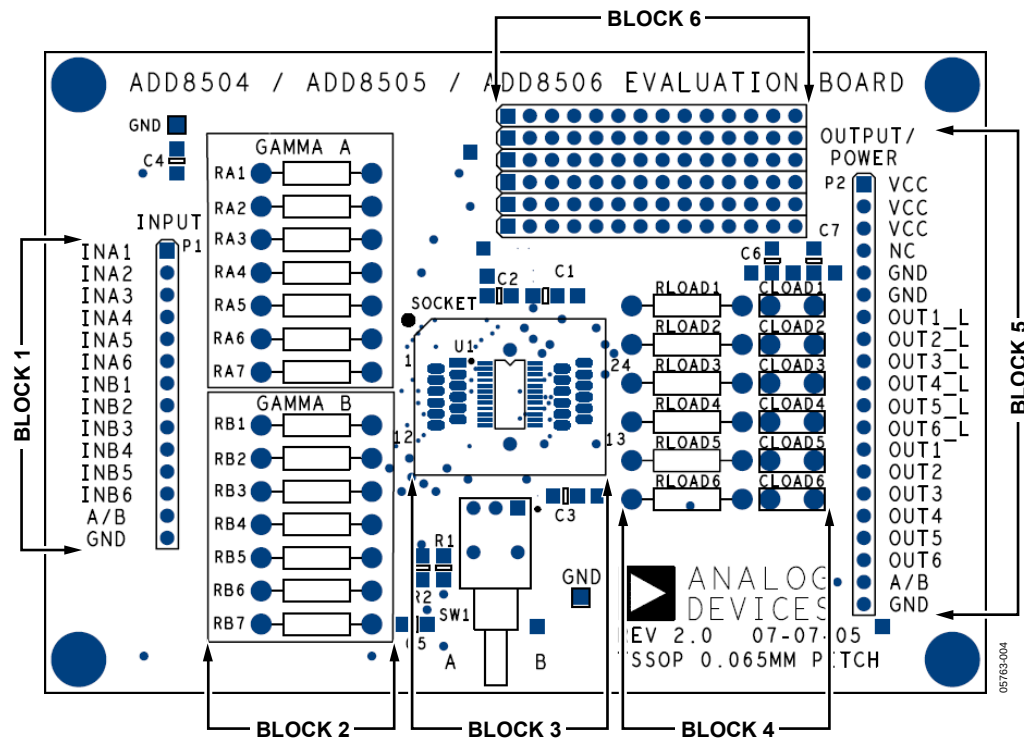


Figure 4. Evaluation Board Layout

Table 2. Evaluation Board Functional Block Descriptions

Block	Block Descriptions
Block 1	Input and Monitoring Pins. Block 1 allows the user to force gamma voltages, drive Gamma Resistor Switch A/B, or monitor input voltages.
Block 2	Gamma Resistor Strings. Block 2 allows the user to select the resistors to set the desired gamma voltages. Use the gamma voltage calculator to make these calculations; it can be found on the ADD8504/ADD8505/ADD8506 evaluation board kit CD labeled ADD8504-05-06 Gamma Voltage Calculator.xls.
Block 3	Part/Socket. This block area accepts a 16-, 20-, or 24-lead TSSOP IC footprint or socket. Read the Part Placement in Socket section for details (socket part# OTS-24(28)-0.65-01).
Block 4	Load. This block allows the user to set load conditions using resistors and capacitors.
Block 5	Output and Power Pins. Connect power to at least one pin labeled VCC and connect ground to at least one pin labeled GND. Multiple VCC and GND pins are for convenience only. The other pins are for probing the output voltages. The _L outputs are loaded outputs.
Block 6	Breadboard Area. This block area is not electrically wired to the evaluation board. It provides an area to place extra components.

EVAL-ADD8504/ADD8505/ADD8506

EVALUATION BOARD LAYERS

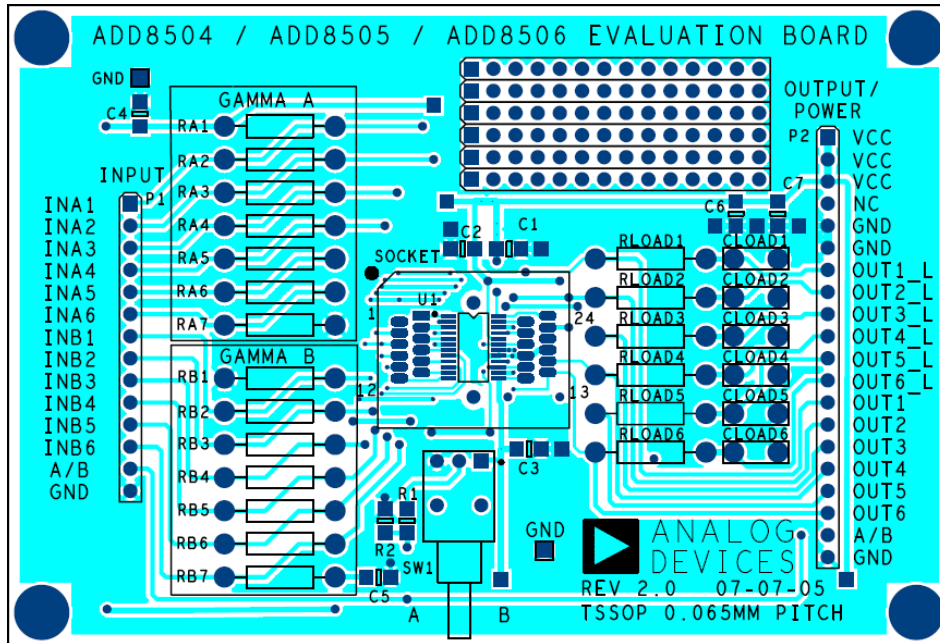


Figure 5. Evaluation Board Layout—Top Layer

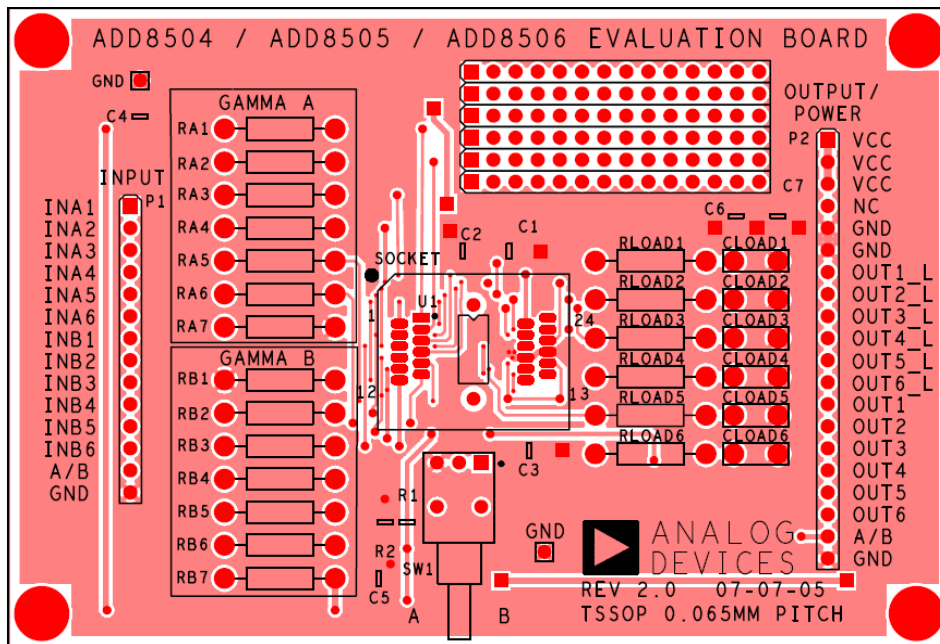


Figure 6. Evaluation Board Layout—Bottom Layer

Table 3. Evaluation Board Layer Descriptions

Layer	Description
Blue (Top)	Top-of-board metal traces and ground plane. See Figure 5.
Red (Bottom)	Bottom-of-board metal traces and ground plane. (Note: Top-view shown in Figure 6. Silk screen text is shown for orientation purposes; text does not appear on bottom of board.)

EVALUATION BOARD SCHEMATIC AND COMPONENTS

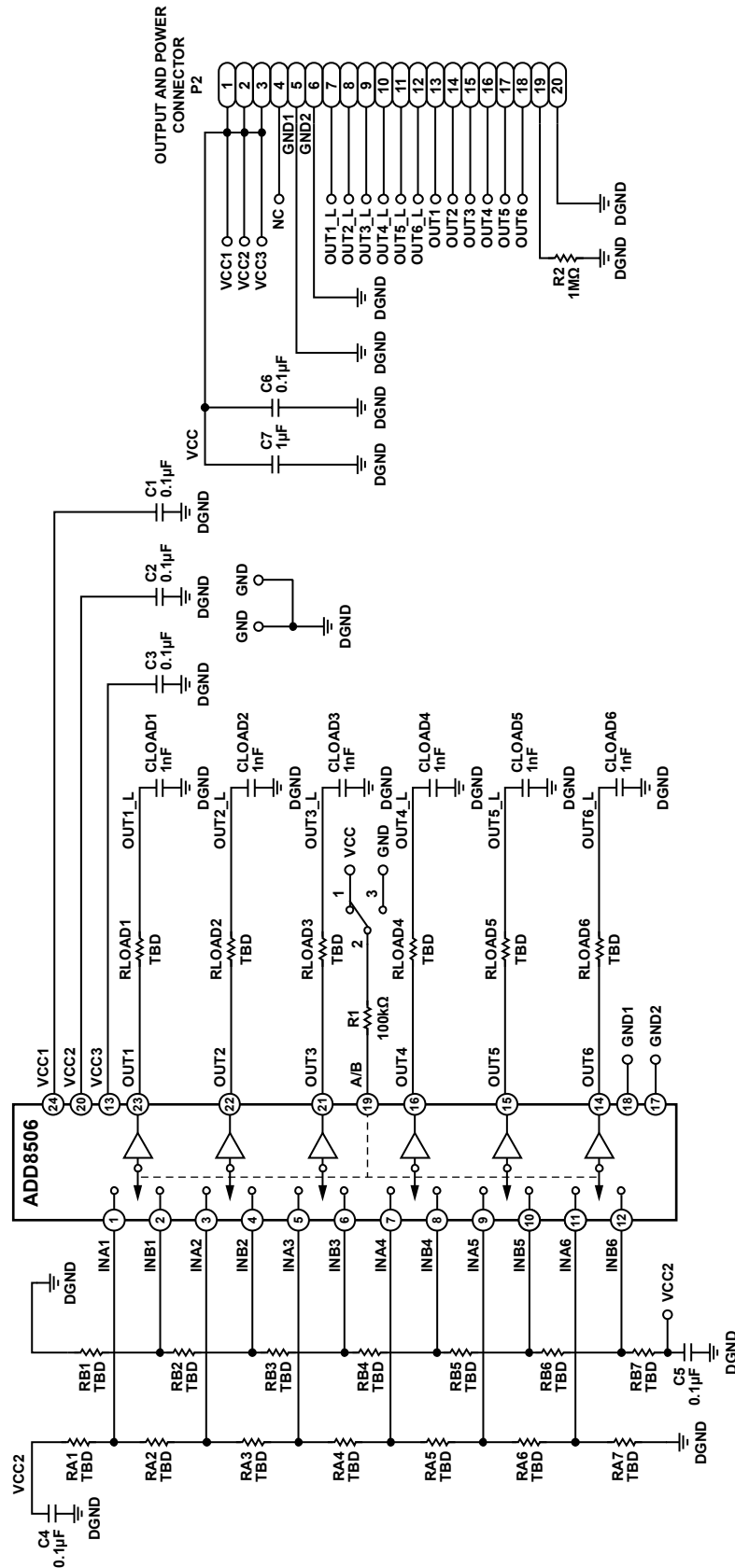


Figure 7. Evaluation Board Schematic

EVAL-ADD8504/ADD8505/ADD8506

Table 4. Evaluation Board Components and Pin Descriptions

Label	Description	Label	Description
A/B	Switch pin (resistor string select)	OUT5	Unloaded output probe pin for OUT5
C1	Power supply compensation capacitor (0.1 μ F)	OUT6	Unloaded output probe pin for OUT6
C2	Power supply compensation capacitor (0.1 μ F)	OUT1_L	Loaded output probe pin for OUT1
C3	Power supply compensation capacitor (0.1 μ F)	OUT2_L	Loaded output probe pin for OUT2
C4	Power supply compensation capacitor (0.1 μ F)	OUT3_L	Loaded output probe pin for OUT3
C5	Power supply compensation capacitor (0.1 μ F)	OUT4_L	Loaded output probe pin for OUT4
C6	Power supply compensation capacitor (0.1 μ F)	OUT5_L	Loaded output probe pin for OUT5
C7	Power supply compensation capacitor (1 μ F)	OUT6_L	Loaded output probe pin for OUT6
CLOAD1	Load capacitor for OUT1 (1 nF)	RA1	First resistor in Gamma String A
CLOAD2	Load capacitor for OUT2 (1 nF)	RA2	Second resistor in Gamma String A
CLOAD3	Load capacitor for OUT3 (1 nF)	RA3	Third resistor in Gamma String A
CLOAD4	Load capacitor for OUT4 (1 nF)	RA4	Fourth resistor in Gamma String A
CLOAD5	Load capacitor for OUT5 (1 nF)	RA5	Fifth resistor in Gamma String A
CLOAD6	Load capacitor for OUT6 (1 nF)	RA6	Sixth resistor in Gamma String A
GND	Ground	RA7	Seventh resistor in Gamma String A
INA1	Input/probe pin for INA1	RB1	First resistor in Gamma String B
INB1	Input/probe pin for INB1	RB2	Second resistor in Gamma String B
INA2	Input/probe pin for INA2	RB3	Third resistor in Gamma String B
INB2	Input/probe pin for INB2	RB4	Fourth resistor in Gamma String B
INA3	Input/probe pin for INA3	RB5	Fifth resistor in Gamma String B
INB3	Input/probe pin for INB3	RB6	Sixth resistor in Gamma String B
INA4	Input/probe pin for INA4	RB7	Seventh resistor in Gamma String B
INB4	Input/probe pin for INB4	RLOAD1	Load resistor for OUT1
INA5	Input/probe pin for INA5	RLOAD2	Load resistor for OUT2
INB5	Input/probe pin for INB5	RLOAD3	Load resistor for OUT3
INA6	Input/probe pin for INA6	RLOAD4	Load resistor for OUT4
INB6	Input/probe pin for INB6	RLOAD5	Load resistor for OUT5
NC	No connect	RLOAD6	Load resistor for OUT6
OUT1	Unloaded output probe pin for OUT1	R1	Pull-up/down resistor for A/B select (100 k Ω)
OUT2	Unloaded output probe pin for OUT2	R2	Pull-down resistor for A/B select (1 M Ω)
OUT3	Unloaded output probe pin for OUT3	SW1	MUX switch for GAMMA A and GAMMA B
OUT4	Unloaded output probe pin for OUT4	VCC	Power (+5 V)

ORDERING GUIDE

Model	Description
ADD8504-EVAL	Evaluation Kit
ADD8505-EVAL	Evaluation Kit
ADD8506-EVAL	Evaluation Kit

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

