

General Description

The ADM33051E evaluation kit (EV kit) is a fully assembled and tested board that demonstrates the functionality of the ADM33051E. The ADM33051E is a CAN FD transceiver with $\pm 60V$ fault protection, $\pm 20kV$ ESD human body model (HBM) for interface pins, variable slew rate, and $\pm 25V$ extended common-mode range.

Features and Benefits

- Easy Evaluation of ADM33051E
- Power/Ground Through Header and Screw Terminal Connections
- Screw Terminal Block for CAN Signals
- Test Points for Measuring All Signals
- Resistors and TVS Footprints for External Protection Devices
- Proven PCB Layout
- Fully Assembled and Tested

[Ordering Information](#) appears at end of data sheet.

Quick Start

Required Equipment

- ADM33051E EV kit
- 3.3V/500mA DC power supply
- Signal/function generator that can generate a 1MHz square wave signal
- Oscilloscope

Procedure

The EV kit is fully assembled and tested. To verify the board operation, do the following steps:

1. Verify J2 jumper setting is in the default position, as shown in [Table 1](#).
2. With the +3.3V power supply disabled, connect the positive terminal to the V_{CC} test point. Connect the negative terminal to one of the GND test points.
3. Set the function generator to output a 1MHz square wave between 0V to 3.3V.
4. Connect the positive terminal of the function generator to the TXD testpoint and connect the negative terminal to any GND test point on the board.
5. Turn on the +3.3V DC power supply and then enable the function generator output.
6. Connect an oscilloscope probe to RXD and verify that the signal matches the TXD input of a 1MHz, 3.3V square wave.

EV Kit Photo

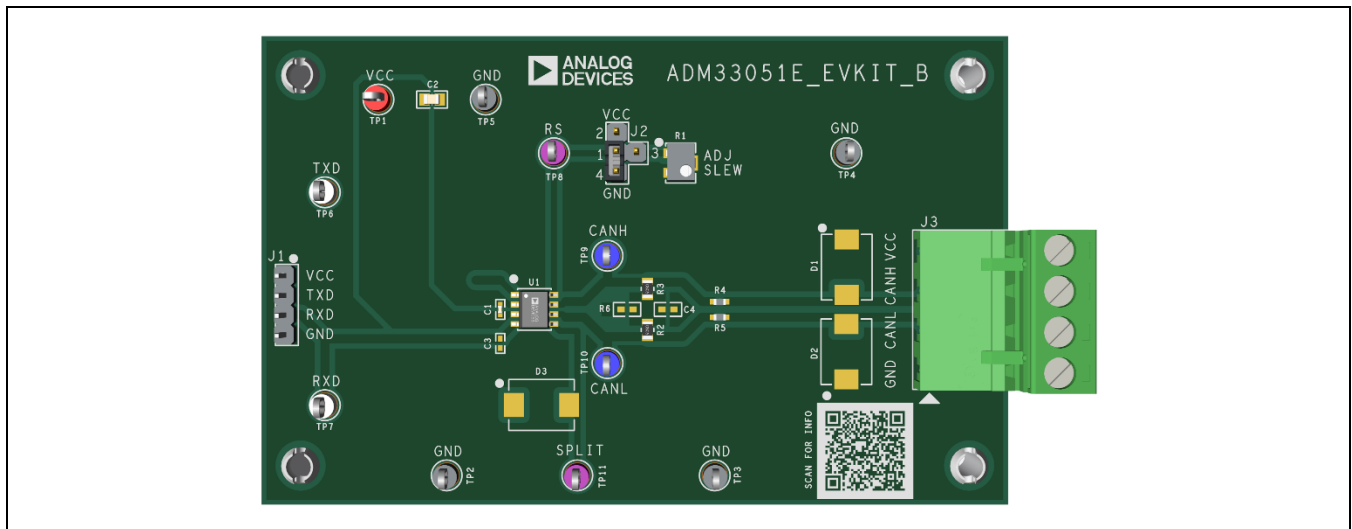


Table 1. ADM33051E EV Kit Jumper Connection Description

JUMPER	SHUNT POSITION	FEATURE
J2	1-2	RS = V _{CC} , part is in low power shutdown state
	1-3	RS is connected to variable resistor (slew rate control)
	1-4	RS = GND, high slew rate set

Default option is bold.

Table 2. ADM33051E EV Kit Test Points Description

REFERENCE DESIGNATOR	SIGNAL
TP1	V _{CC}
TP2	GND
TP3	GND
TP4	GND
TP5	GND
TP6	TXD
TP7	RXD
TP8	RS
TP9	CANH
TP10	CANL
TP11	SPLIT

Table 3. ADM33051E EV Kit Terminal Blocks Description

REFERENCE DESIGNATOR	PIN NUMBER	SIGNAL
J3	1	GND
	2	CANL
	3	CANH
	4	V _{CC}

Table 4. ADM33051E EV Kit Header Description

REFERENCE DESIGNATOR	PIN NUMBER	SIGNAL
J1	1	V _{CC}
	2	TXD
	3	RXD
	4	GND

Detailed Description of Hardware

The ADM33051E EV kit is a fully assembled and tested circuit board for evaluating the ADM33051E. The ADM33051E CAN FD transceiver features $\pm 60\text{V}$ fault protection and $\pm 20\text{kV}$ ESD HBM protection on the CAN bus pins. The EV kit operates with a single $+3.3\text{V}$ supply.

Decoupling Capacitors

The ADM33051E EV kit provides three options to connect power to the EV kit. A 3.3V supply can be connected to test points V_{CC} (TP1) and GND on the top of board, to pins 4 (V_{CC}) and 1 (GND) on header J1, or wired into the terminal block J3. A $0.1\mu\text{F}$ decoupling capacitor is next to V_{CC} pin of the CAN transceiver (U1). The EV kit also includes a $22\mu\text{F}$ ceramic capacitor in case of unfiltered supplies.

Correspondingly labeled test points allow monitoring of the power supply to the board and probe reference to ground.

Input/Output Connections

Digital I/O signals (TXD and RXD) are connected via a 4-pin header J1 on the left of the board, allowing wire connections to bench equipment or a UART.

Connections to a CAN bus (CANH and CANL) are made via screw terminal blocks on the right of the board.

Test points are available on the board and appropriately labeled for all digital and bus I/O signals.

SPLIT Pin and On-Board Termination

The ADM33051E EV kit is shipped with two 60.4Ω high-power thick film resistors between CANH and CANL lines for a total of 120Ω termination. To use a split termination without the SPLIT pin, install a 4.7nF split termination capacitor on the C4 footprint.

The ADM33051E SPLIT pin provides 1.95V output voltage to the center of the split termination for suppressing common-mode voltage disruptions. To use split termination with SPLIT pin, install a 0Ω jumper resistor on R6 and a 4.7nF decoupling capacitor on C4. R6 connects the midpoint of the 120Ω termination to the SPLIT pin on the IC.

External Protection

The ADM33051E CAN FD transceiver includes a $\pm 20\text{kV}$ ESD HBM protection for interface bus pins.

This EV kit provides options for external protection beyond the device's built-in protection. Users may swap out the 0Ω series resistors (R4 and R5) for other protection devices and/or install TVS diodes on the pads (D1 to D3).

TVS diode such as SM30T47CAY provides extra protection for applications that need to achieve high-voltage transient requirement, such as IEC 61000-4-x tests. With the recommended TVS diode, the ADM33051E survives $\pm 10\text{kV}$ contact discharge, $\pm 15\text{kV}$ air gap discharge, $\pm 2\text{kV}$ EFT and $\pm 2\text{kV}$ surge testings. The diode clamps the voltage on the interface lines (CANH, CANL, SPLIT) to below their absolute maximum value, preventing damage to the part.

Lab Connection

A simple functionality test can be done with a single board, but more can be used if connecting in a bus. For a single board, a signal generator is connected to TXD and allows verification of the bus signals (CANH and CANL) and the receiver output (RXD).

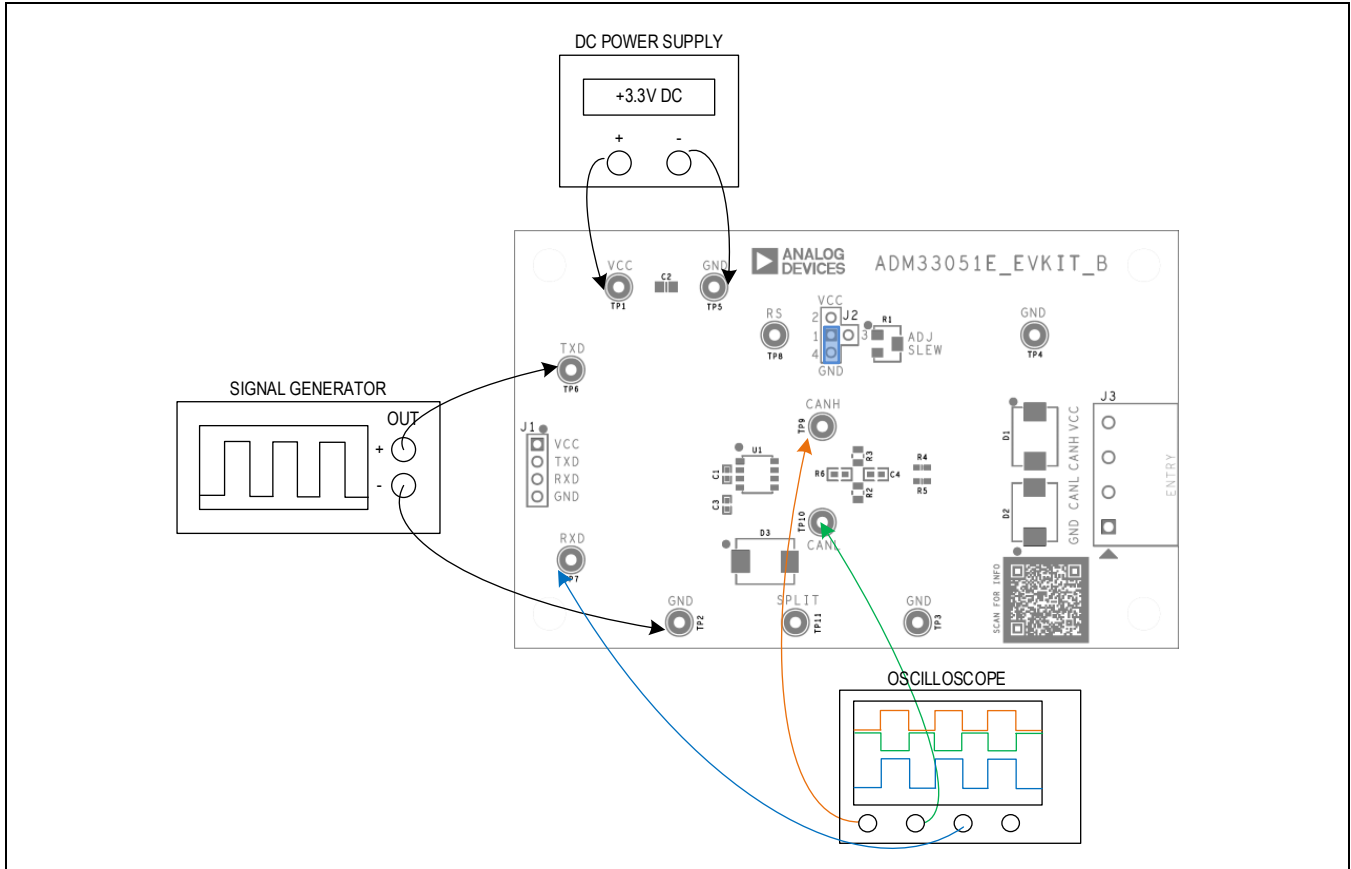


Figure 1. EV Kit Connection Diagram

Ordering Information

PART	TYPE
ADM33051EEVKIT#	EV Kit

#Denotes RoHS-compliant.

ADM33051E EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	DESCRIPTION
1	1759035	-	1	1757035	Phoenix Contact	Connector, female, wire mount, green PCB terminal block, right angle, 4-pins
2	C1	-	1	GCM155L81E104KE02	Murata	Ceramic capacitor, SMT, 0.1µF, 10%, 25V, X8L, 0402
3	C2	-	1	GRM21BZ71A226ME15, GMC21X7R226M10NT	Murata, Cal-Chip Electronics, Inc.	Ceramic capacitor, SMT, 22µF, 20%, 10V, X7R, 0805
4	J1, J2	-	2	PEC04SAAN	Sullins Connector Solutions	Connectors, male, through hole, breakaway, straight, 4-pins
5	J3	-	1	1759033	Phoenix Contact	Connector, male, through hole, green PCB terminal block, right angle, 4-pins
6	R1	-	1	SM-42TW104	Nidec Components Corp.	Resistor, SMT-J lead, 100kΩ, 10%, ±100ppm/°C, 0.25W
7	R2, R3	-	2	SDR10EZPF60R4	Rohm Semiconductor	Resistors, SMT, 60.4Ω, 1%, ±100ppm/°C, 0.6600W, 0805
8	R4, R5	-	2	RC1608J000CS, CR0603-J/-000ELF, RC0603JR-070RL	Samsung Electronics, Bourns, Yageo PH	Resistors, SMT, 0Ω, 5%, jumper, 0.1000W, 0603
9	SHUNT1	-	1	S1100-B, SX1100-B, STC02SYAN	Kycon, Kycon, Sullins Connector Solutions	Test point, jumper, straight, total length = 0.24in, black insulation = PBT, phosphor bronze contact = gold plated
10	SPACER1 to SPACER4	-	4	9032	Keystone	Round-thru hole spacers, machine fabricated, no thread, M3.5, 5/8in, nylon
11	TP1	-	1	5010	Keystone	Test point, pin dia = 0.125in, total length = 0.445in, board hole = 0.063in, red, phosphor bronze wire silver plate finish
12	TP2 to TP5	-	4	5011	Keystone	Test points, pin dia = 0.125in, total length = 0.445in, board hole = 0.063in, black, phosphor bronze wire silver plate finish
13	TP6, TP7	-	2	5012	Keystone	Test points, pin dia = 0.125in, total length = 0.445in, board hole = 0.063in, white, phosphor bronze wire silver plate finish
14	TP8, TP11	-	2	5129	Keystone	Test points, pin dia = 0.125in, total length = 0.445in, board hole = 0.063in, purple, phosphor bronze wire silver plate finish
15	TP9, TP10	-	2	5127	Keystone	Test points, pin dia = 0.125in, total length = 0.445in, board hole = 0.063in, blue, phosphor bronze wire silver plate finish
16	U1	-	1	ADM33051E	Analog Devices, Inc.	EV kit part – IC, ADM33051EBRZ, SOIC8 package
17	PCB	-	1	MAXADM33051E	Analog Devices, Inc.	PCB, MAXADM33051E

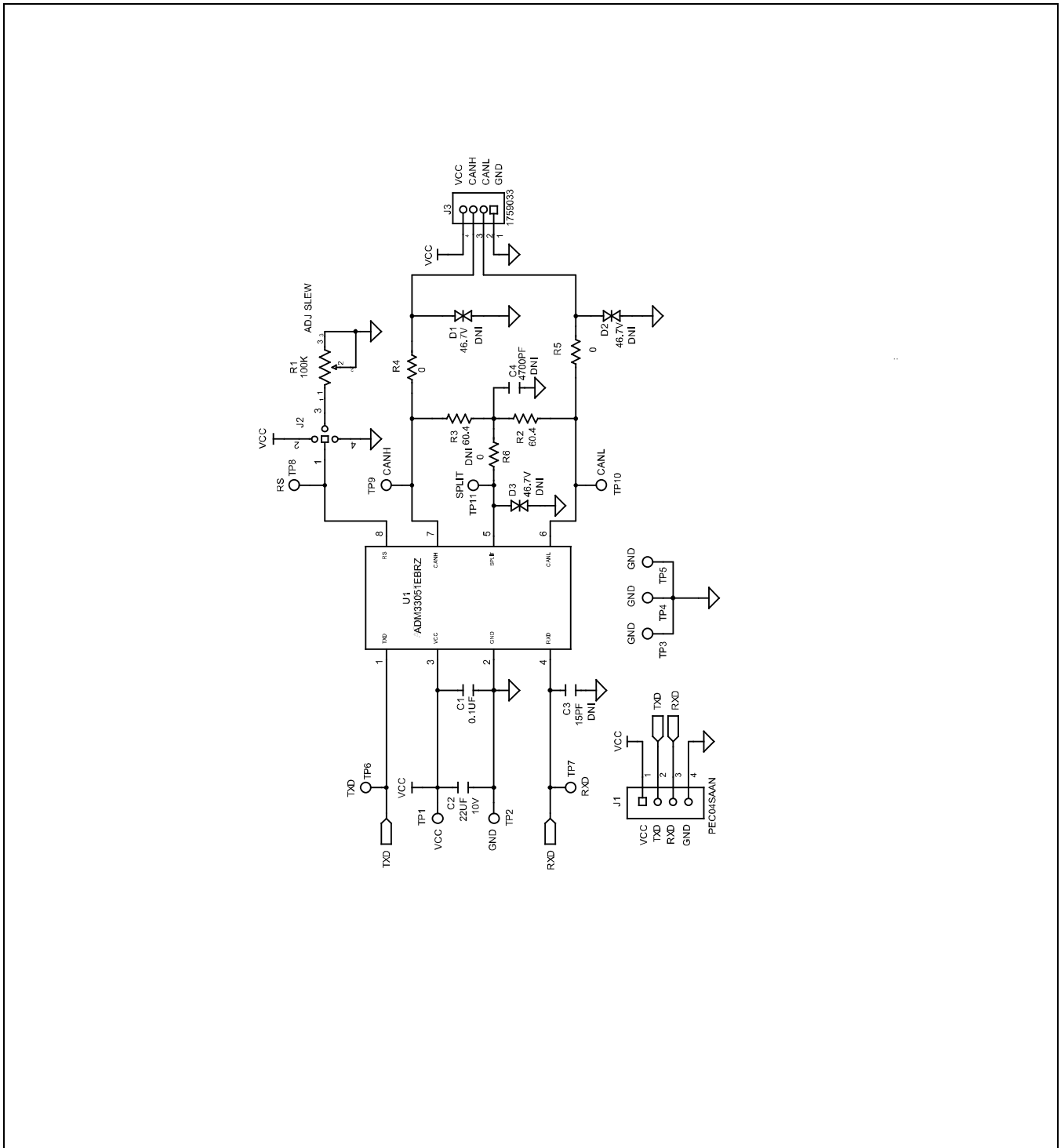
ADM33051E EV Kit Bill of Materials (continued)

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	DESCRIPTION
18	C3	DNP	0	GRM1555C1H150FA01, GJM1555C1H150FB01	Murata, Murata	Ceramic capacitor, SMT, 15pF, 1%, 50V, COG, 0402
19	C4	DNP	0	C0603X472J1GAC, CGA3E1C0G2A472J080AC	Kemet, TDK	Ceramic capacitor, SMT, 4700pF, 5%, 100V, COG, 0603
20	D1 to D3	DNP	0	SM30T47CAY	ST Microelectronics	TVS diodes, SMC (DO-214AB), $V_{RM} = 46.7V$, $I_{PP} = 0.2\mu A$
21	R6	DNP	0	RC1608J000CS, CR0603- J/-000ELF, RC0603JR- 070RL	Samsung Electronics, Bourns, Yageo PH	Resistor, SMT, 0 Ω , 5%, jumper, 0.1000W, 0603

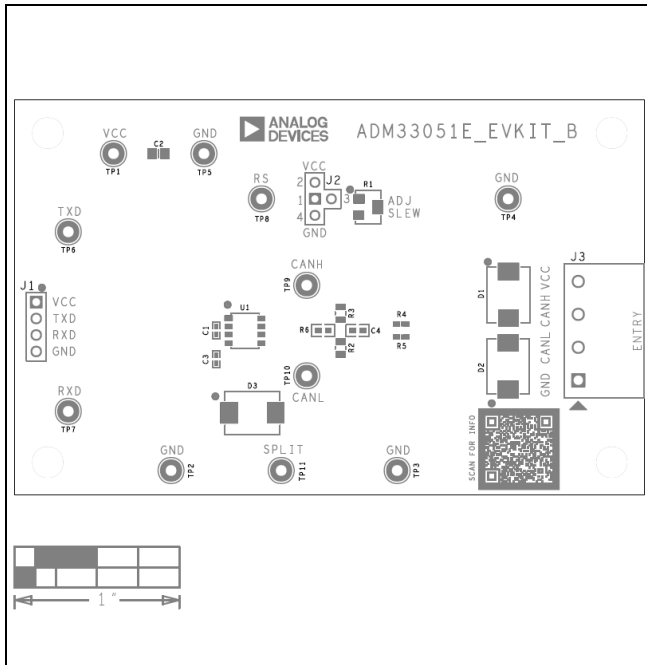
DNI means do not install.

DNP means do not procure.

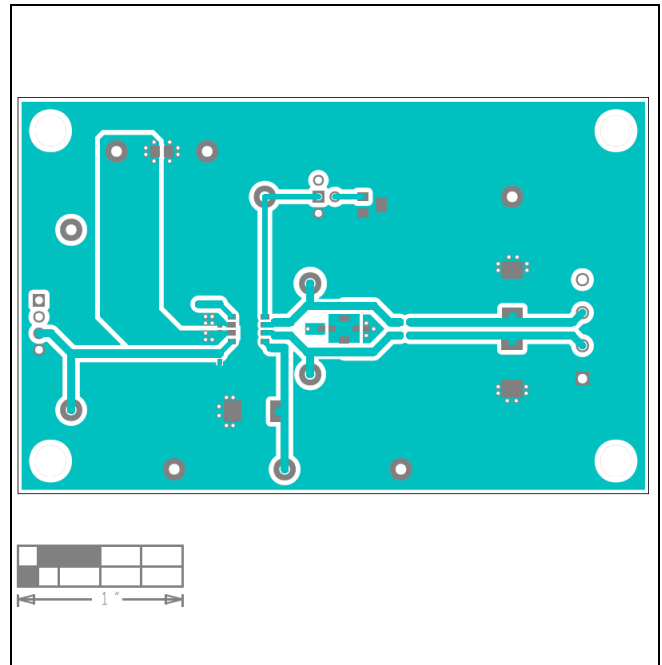
ADM33051E EV Kit Schematic



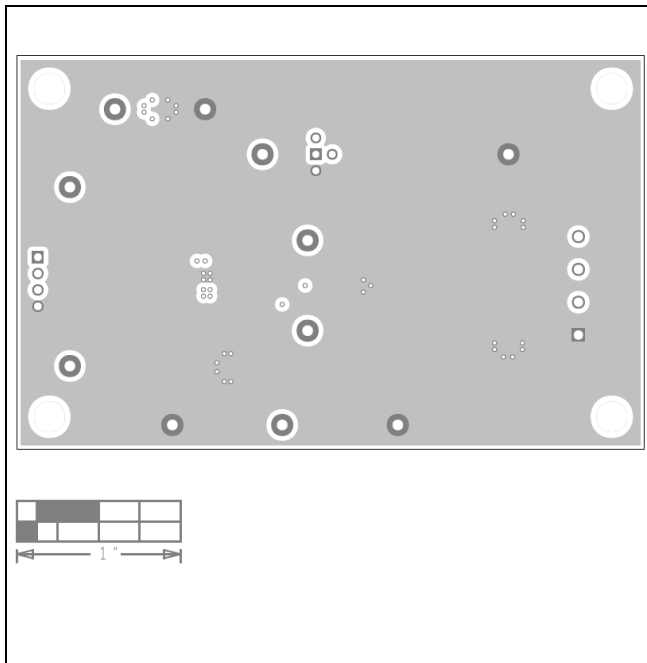
ADM33051E EV Kit PCB Layout



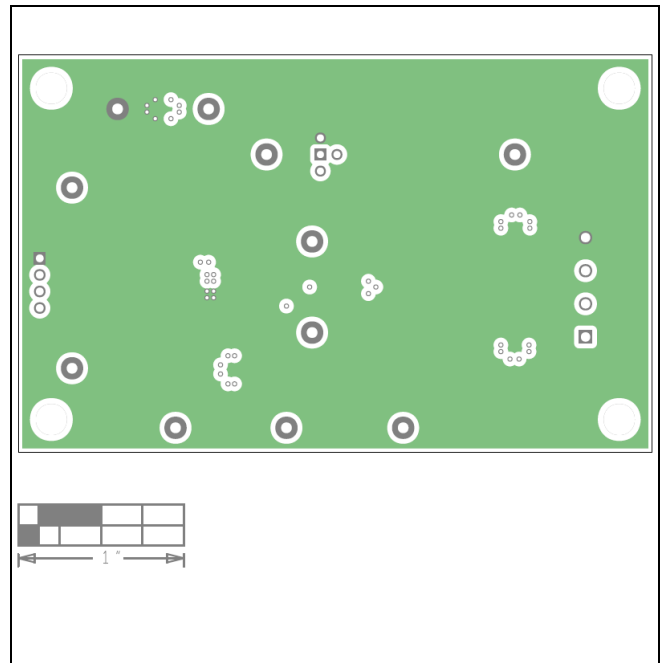
ADM33051E EV Kit Component Placement Guide—Top Silkscreen



ADM33051E EV Kit PCB Layout—Top Layer

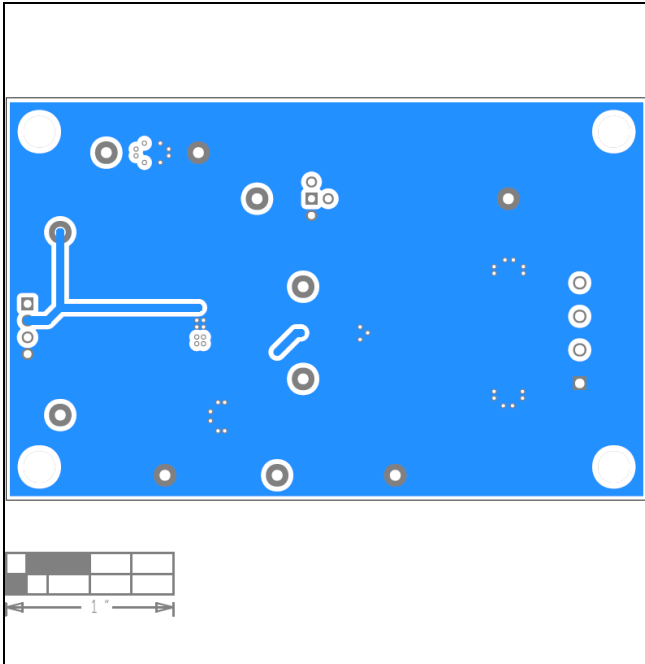


ADM33051E EV Kit PCB Layout—Layer 2 (GND Layer)



ADM33051E EV Kit PCB Layout—Layer 3 (VCC Layer)

ADM33051E EV Kit PCB Layout (continued)



ADM33051E EV Kit PCB Layout—Bottom Layer

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/26	Initial release	—

Notes

ALL INFORMATION CONTAINED HEREIN IS PROVIDED “AS IS” WITHOUT REPRESENTATION OR WARRANTY. NO RESPONSIBILITY IS ASSUMED BY ANALOG DEVICES FOR ITS USE, NOR FOR ANY INFRINGEMENTS OF PATENTS OR OTHER RIGHTS OF THIRD PARTIES THAT MAY RESULT FROM ITS USE. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE. NO LICENSE, EITHER EXPRESSED OR IMPLIED, IS GRANTED UNDER ANY ADI PATENT RIGHT, COPYRIGHT, MASK WORK RIGHT, OR ANY OTHER ADI INTELLECTUAL PROPERTY RIGHT RELATING TO ANY COMBINATION, MACHINE, OR PROCESS, IN WHICH ADI PRODUCTS OR SERVICES ARE USED. TRADEMARKS AND REGISTERED TRADEMARKS ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. ALL ANALOG DEVICES PRODUCTS CONTAINED HEREIN ARE SUBJECT TO RELEASE AND AVAILABILITY.