



# MAX14550E Evaluation Kit

## General Description

The MAX14550E evaluation kit (EV kit) provides a proven design to evaluate the MAX14550E USB host charger identification analog switch. The Hi-Speed USB transmission lines (D+ and D-) have 90Ω differential impedance traces to meet Hi-Speed USB specs. The MAX14550E EV kit comes with a MAX14550EETB+ installed.

## Features

- ◆ Hi-Speed USB (480Mbps)
- ◆ 90Ω Differential Traces for USB 2.0
- ◆ USB Powered
- ◆ Test Points for Easy Evaluation
- ◆ Proven PCB Layout
- ◆ Fully Assembled and Tested

## Ordering Information

PART	TYPE
MAX14550EEVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1, C3, C4, C6-C9	7	0.1μF ±10%, 16V X7R ceramic capacitors (0603) Murata GRM188R71C104K
C2, C5, C10	3	10μF ±20%, 6.3V X5R ceramic capacitors (0603) Murata GRM188R60J106M
D1, D2	2	Green LEDs (0603)
JU1, JU2, JU5, JU6	4	3-pin headers
JU3, JU4	2	2-pin headers
JU7	0	Not installed, 2-pin header
P1	1	USB type-A, right-angle PC-mount receptacle
P2	1	USB type-B, right-angle PC-mount receptacle
R1, R2	0	Not installed, resistors (0603)
R3	1	75kΩ ±1% resistor (0603)

DESIGNATION	QTY	DESCRIPTION
R4, R6	2	49.9kΩ ±1% resistors (0603)
R5	1	43.2kΩ ±1% resistor (0603)
R7, R8	2	0Ω ±5% resistors (0603)
R9, R10	2	470Ω ±5% resistors (0603)
TP1, TP3, TP5	3	Red multipurpose test points
TP2, TP4, TP6	3	Black multipurpose test points
TP7, TP8, TP9	0	Not installed, miniature test points
U1	1	Host USB charger switch (10 TDFN-EP*) Maxim MAX14550EETB+
—	1	USB high-speed A-to-B cables, 5ft
—	1	USB A-to-micro-B cable, 1m
—	6	Shunts
—	1	PCB: MAX14550E EVALUATION KIT+

\*EP = Exposed pad.

## Component Supplier

SUPPLIER	PHONE	WEBSITE
Murata Electronics North America	770-436-1300	www.murata-northamerica.com

**Note:** Indicate that you are using the MAX14550E when contacting this component supplier.



# MAX14550E Evaluation Kit

## Quick Start

### Required Equipment

- MAX14550E EV kit
- 5V, 10mA power supply
- Digital multimeter (DMM)

### Procedure

The MAX14550E EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Verify that all jumpers (JU1–JU6) are in their default positions, as shown in Table 1.
- 2) Connect the positive terminal of the 5V supply to TP1 (+5V) and the GND terminal to TP2 (GND). Do not apply power between TP1 and TP2 if a USB type-B cable is plugged into P2 coming from the PC.
- 3) Set the DMM as an ohmmeter and verify that the connection between DP (JU7, D+) and TDP (TP7) is less than  $10\Omega$ . Repeat for DM (JU7, D-) and TDM (TP8). The default condition for the MAX14550E is CB0 = CB1 = 1 (USB traffic active).
- 4) Set the shunt on JU5 to the 2-3 position (CB0 = 0, CB1 = 1).
- 5) Under this setting, DP and DM are shorted to each other. Measure the resistance across JU7. A resistance less than  $100\Omega$  represents a short between DP and DM.
- 6) Set the shunt on JU5 to the 1-2 position and set the shunt on JU6 to the 2-3 position (CB0 = 1, CB1 = 0).
- 7) Under this setting, RDP is shorted to DP and RDM is shorted to DM (JU3 should be open by default). DP and DM are connected to external resistor-dividers through RDP and RDM, respectively. Verify that the voltage between RDP and DP is the same. Also verify that the voltage between RDM and DM is the same.
- 8) Change the shunt on JU3 to the closed position. Shorting RDP to GND causes the MAX14550E to connect DP and DM to the internal resistor-dividers. The voltage on DP and DM is similar to the voltage on RDP and RDM when JU3 is open, because the external resistor-dividers are closely matched to the internal voltage-dividers.

**Table 1. MAX14550E EV Kit Jumper Description (JU1–JU6)**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2*	Connects VCC to +5V from VBUS on P2. When the USB cable is plugged into the PC, VBUS voltage appears on TP1.
	2-3	Connects VCC to TP3 (EXTVCC). Apply an external 5V supply between TP3 and TP4.
JU2	1-2*	Selects VCC as charging source for P1
	2-3	Selects TP5 (EXTCHG) as the charging source for P1. Apply the external 5V supply between TP5 and TP6.
JU3	Open*	External voltage-divider is used
	Closed	Internal voltage-divider is used
JU4	Open	RDM test point
	Closed*	Normal operation
JU5	1-2*	CB0 is connected to VCC (CB0 = 1)
	2-3	CB0 is connected to GND (CB0 = 0)
JU6	1-2*	CB1 is connected to VCC (CB1 = 1)
	2-3	CB1 is connected to GND (CB1 = 0)

\*Default position.

# MAX14550E Evaluation Kit

Evaluates: MAX14550E

## Detailed Description of Hardware

The MAX14550E EV kit provides a proven layout to evaluate the MAX14550E USB host charger identification analog switch. The D+ and D- lines have 90Ω differential impedance to meet USB 2.0 signal-integrity specifications. The MAX14550E is powered by VBUS by default. Jumpers and shunts are on the EV kit to separate VBUS from VCC and the charger voltage. VBUS can be limited to 100mA or 500mA due to USB current-limit specs, but when the host acts as a stand-alone charger, the charging current can be much greater. Change the shunt on JU1 to the 2-3 position to power VCC externally from a 5V regulated supply. VCC is by default the charger voltage. The charger voltage can be isolated from VCC by changing the shunt on JU2 to the 2-3 position. Green LEDs on the EV kit indicate power at each USB connector.

## Control Settings for CB0 and CB1 (JU5, JU6)

JU5 and JU6 correspond to CB0 and CB1, respectively. Table 2 shows the different MAX14550E states. The external resistor-divider on RDP/RDM is connected to DP/DM if JU3 is open. When JU3 is closed, DP and DM are connected to the internal resistor-divider.

### Autodetection

Autodetection chooses between the charger detection states. The first state causes D+ and D- to be shorted to each other (CB0 = 0, CB1 = 1). The second state causes D+ and D- to be connected to an internal or external resistor-divider from VBUS (CB0 = 1, CB1 = 0). Autodetection chooses one of these two states depending on the voltage on DM.

**Table 2. Digital Inputs States**

CB0	CB1	DP/DM	COMMENT	INTERNAL RESISTOR-DIVIDER STATE IF NO EXTERNAL DIVIDER IS PRESENT
0	0	Autodetection circuit active	—	Connected
0	1	Shorted together	Auto mode disabled	Not connected
1	0	Connected to resistor-dividers	Auto mode disabled	Connected
1	1	Connected to TDP/TDM	USB traffic active	Not connected

# MAX14550E Evaluation Kit

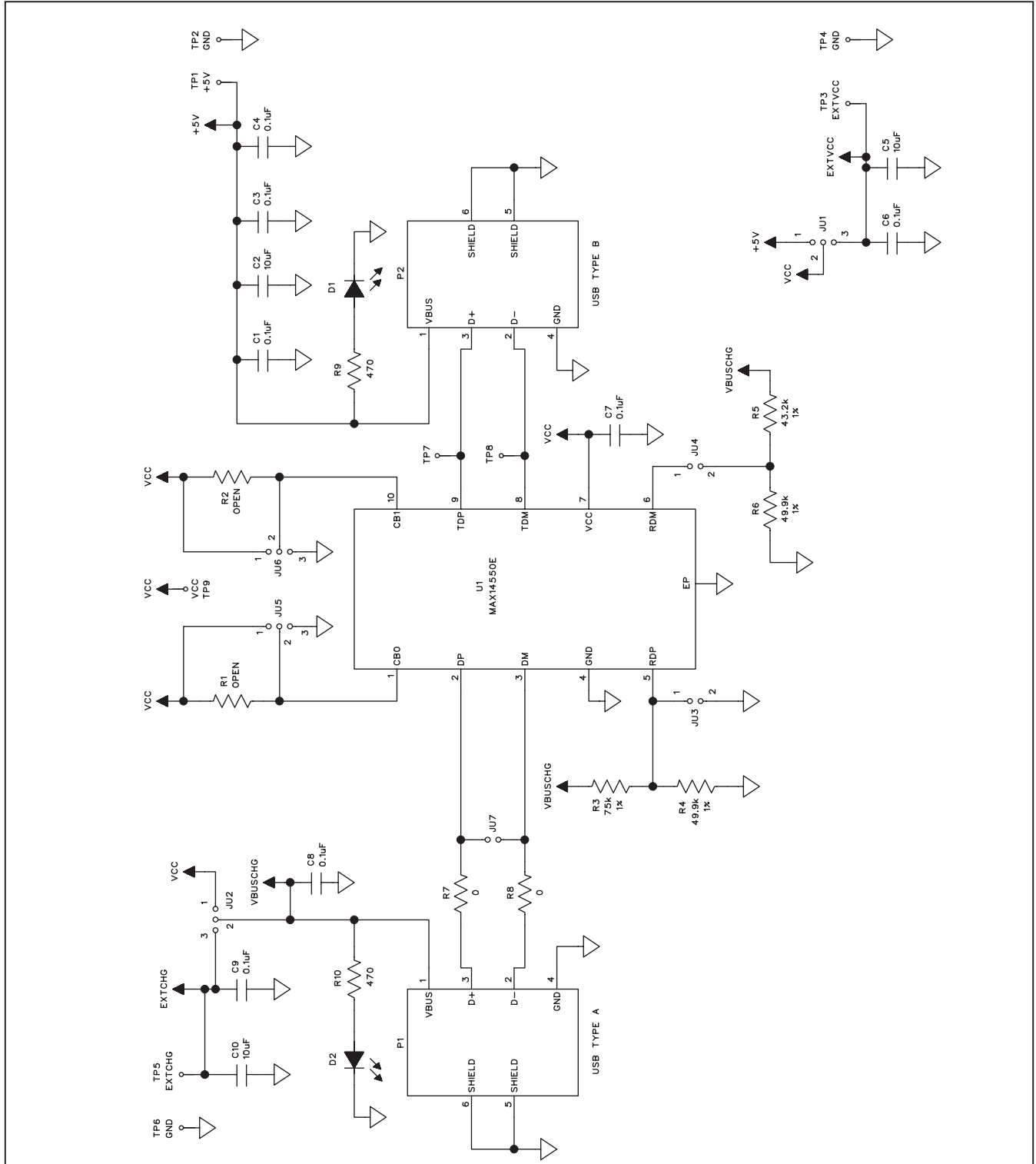


Figure 1. MAX14550E EV Kit Schematic

# MAX14550E Evaluation Kit

Evaluates: MAX14550E

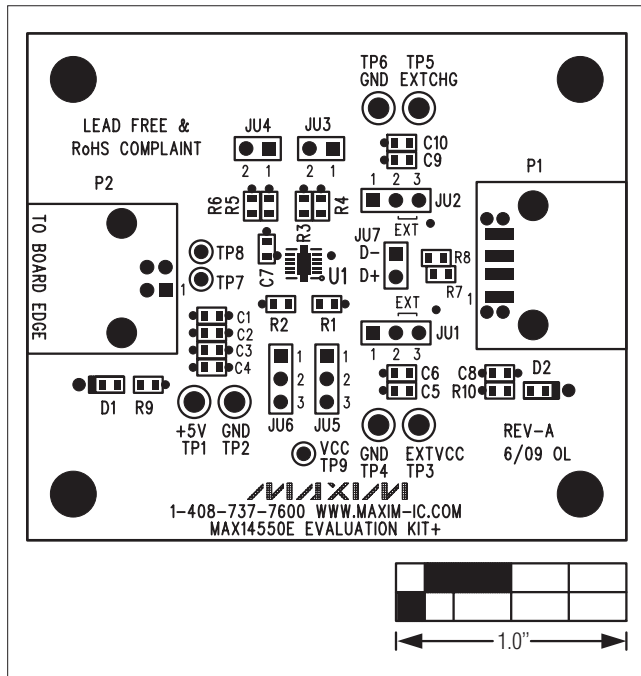


Figure 2. MAX14550E EV Kit Component Placement Guide—Component Side

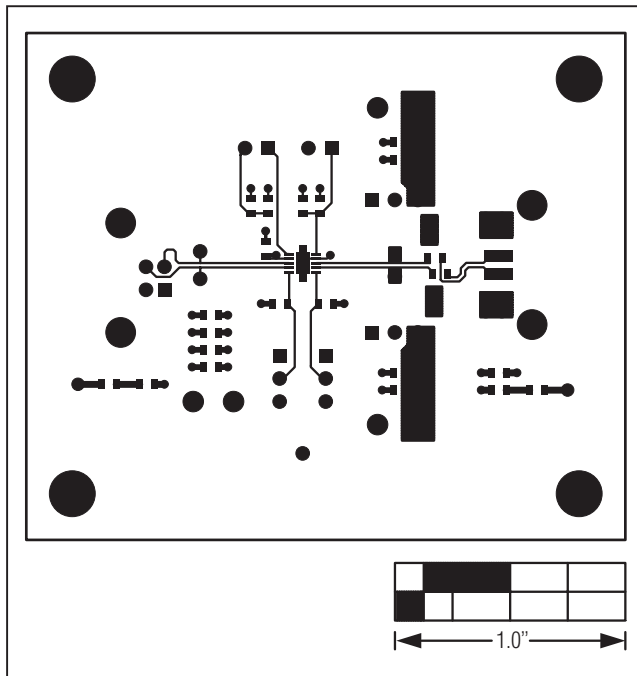


Figure 3. MAX14550E EV Kit PCB Layout—Component Side

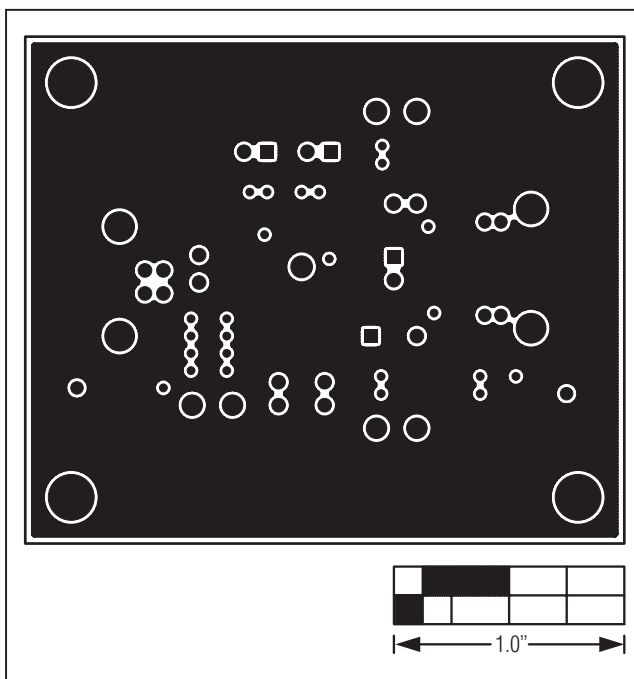


Figure 4. MAX14550E EV Kit PCB Layout—GND Layer 2

# MAX14550E Evaluation Kit

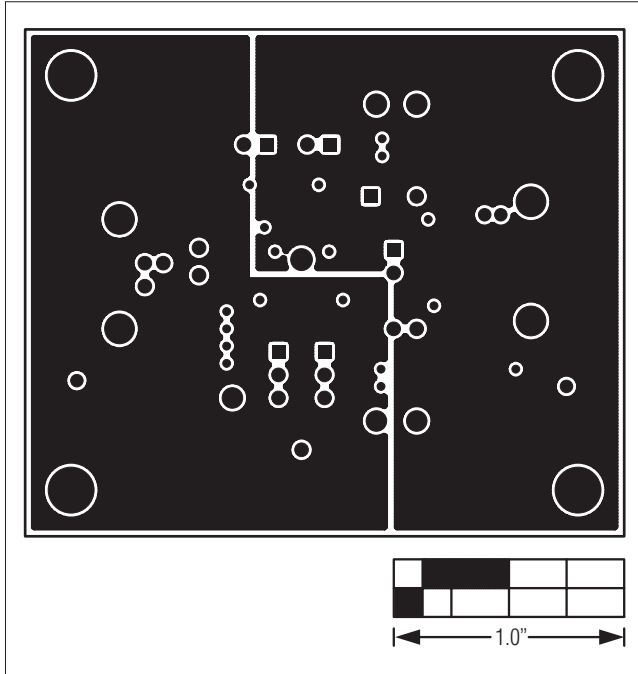


Figure 5. MAX14550E EV Kit PCB Layout—VCC Layer 3

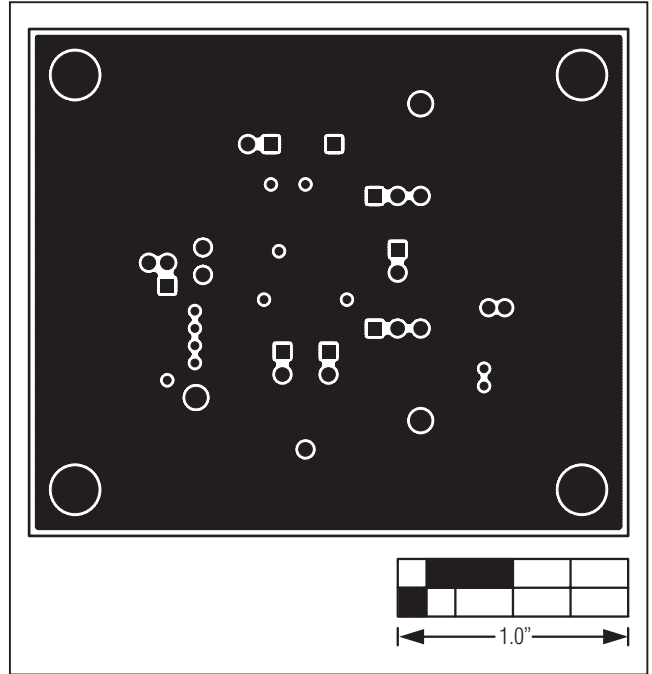


Figure 6. MAX14550E EV Kit PCB Layout—Solder Side

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