

MAX40200 Evaluation Kit

Evaluates: MAX40200 “Ideal-Diode” in a 4-Bump WLP

General Description

The MAX40200 evaluation kit (EV kit) provides a proven design to evaluate the MAX40200 “ideal-diode”. This EV kit demonstrates the MAX40200 in a tiny, space-saving 4-bump wafer-level package (WLP). The MAX40200 is also available in a 5-pin SOT23 (MAX40200AUK+), which is not compatible with this EV kit.

The MAX40200 EV kit PCB comes with two MAX40200ANS+ devices installed. The MAX40200 device is a current-switch, which drops so little voltage as to approximate an “ideal diode”.

The MAX40200 parts are available in a tiny 0.73mm x 0.73mm 4-bump WLP with a 0.35mm bump pitch and is only 0.5mm high. It operates over the extended -40°C to +125° C temperature range.

Features

- Drops Less Than 45mV at 500mA
- Less than 2μA Leakage When Reverse-Biased
- Supply Voltage Range: Between 1.5V and 5.5V
- Low Supply Quiescent Current: 7μA (typ), 18μA (max)
- Thermally Self-Protecting
- Tiny 0.73mm x 0.73mm 4-bump WLP
- -40°C to +125°C Temperature Range
- Evaluates MAX40200ANS+
- Accommodates Easy-to-Use Components
- Proven PCB Layout
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

Quick Start

Required Equipment

- MAX40200 EV kit
- +6V DC power supply
- Electronic load capable of sinking 1A (e.g., HP6060B)
- Precision voltmeter

Procedure

The EV kit is fully assembled and tested. Follow the below instructions to verify board operation. **Caution: Do not turn on the power supply or the electronic load until all the connections are complete.**

1. Connect the positive terminal of the 3.3V supply to the VCC pad. Connect the negative terminal of the 3.3V supply to the GND pad.
2. Connect the electronic load's positive terminal to the OUT pad and the negative terminal to the GND pad and set to 500mA sink.
3. Connect the voltmeter across the VCC and OUT pads.
4. Verify all the shunts are in default positions, as shown in [Table 1](#).
5. Do not install J3.
6. Turn on the power supplies.
7. Turn on the electronic load and verify that the current flowing is equal to the set value of 500mA.
8. Verify that the forward voltage or ($V_{DD} - V_{OUT}$) voltmeter reading is approximately close to 50mV.
9. Turn off the electronic load.
10. Set the electronic load to sink 100mA.
11. Turn on the electronic load.
12. Verify that the forward voltage or ($V_{DD} - V_{OUT}$) voltmeter reading is close to approximately 23mV.

Table 1. Jumper Functions (J1 – J3)

JUMPER LABEL	DEFAULT POSITION	FUNCTION
J1	1-2*	Enables U1
	2-3	Disables U1
J2	1-2*	Enables U2
	2-3	Disables U2
J3	Not Installed*	Devices U1 and U2 Enable operates independently
	Installed (Note 1)	Connects Enable (EN) input of U1 and U2 together. User-supplied enable input signal

*When installing J3, remove J1 and J2 from the EV kit.

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Detailed Description of Hardware (or Software)

The MAX40200 EV kit provides a proven design to evaluate the MAX40200 4-bump, space-saving, “ideal-diode.” The device blocks reverse voltages and passes current when forward-biased, just as a normal diode would. The device, when forward-biased and enabled, conducts with as little as 45mV of voltage drop while carrying currents as high as 500mA. At higher currents (up to 1A), the voltage drop increases linearly. The MAX40200 protects itself, and any down-stream circuitry, from overtemperature conditions.

When disabled (EN = low), the MAX40200 can block voltages up to 6V in either direction, making it suitable for most low-voltage portable electronic devices. The low (1µA typ.) supply current is independent of the load current. The MAX40200 operates from supplies within the range of 1.5V and 5.5V.

Theory of Operation

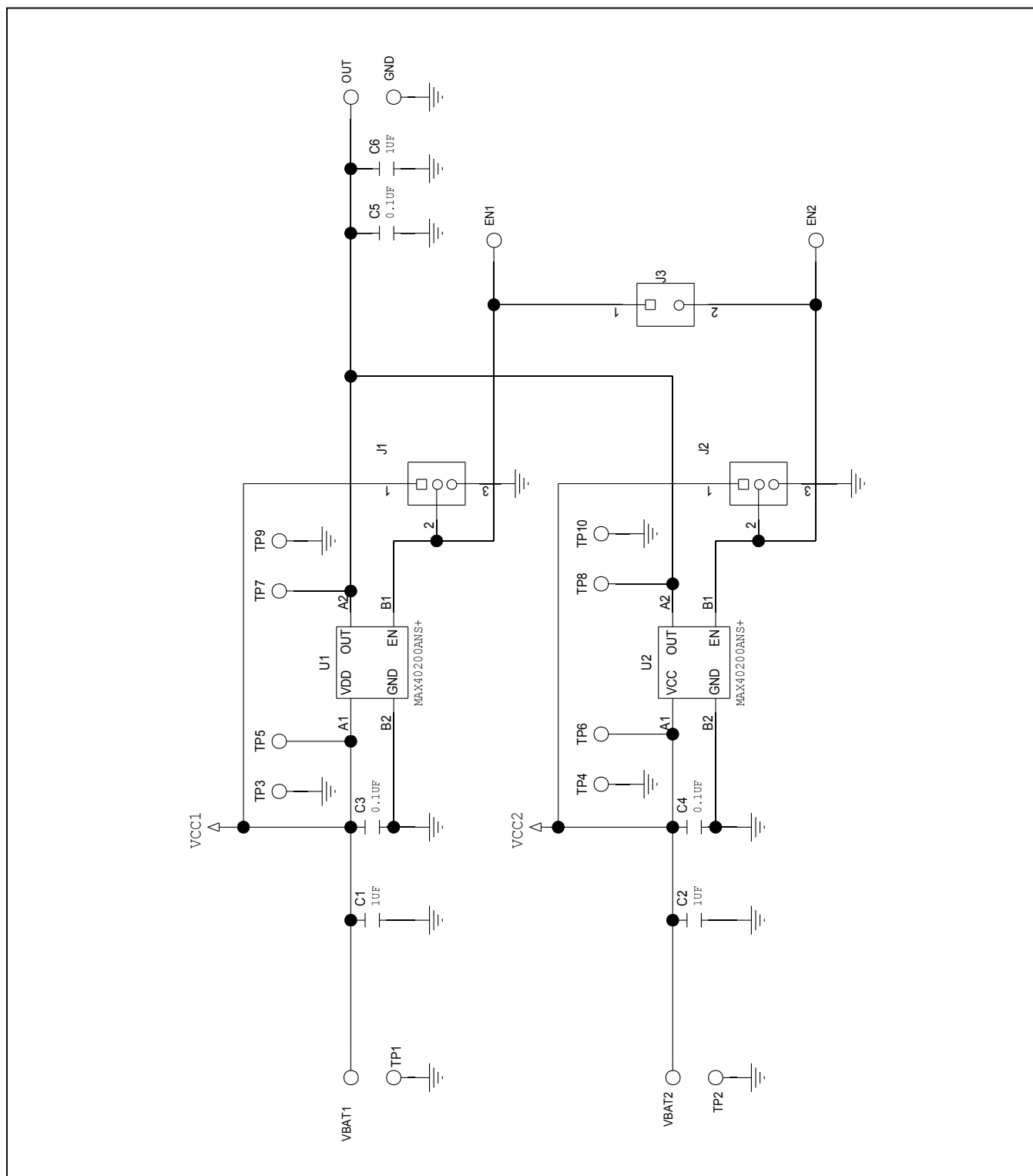
The two “ideal-diode” devices may be used independently or together. The PCB circuit mimics a typical wall adaptor/battery-charging circuit having different V_{CC1} and V_{CC2} . They are connected to the common output, which is where the load is situated.

When used independently or together, enable inputs EN1 and EN2 turns the device on or off. The device that is turned on conducts current to the load. The device that is turned off does not conduct current to the load from its associated V_{CC} input.

MAX40200 EV Kit Bill of Materials

ITEM	REF DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	C1, C2	-	2	GRM188R71E105KA12D; CGA3E1X7R1E105K	MURATA	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; MODEL=GRM SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
2	C3, C4	-	2	C1608X7R1E104K080AA	TDK	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=C SERIES; TG=-55 DEGC TO +125 DEGC; TC=X7R	
3	C5	-	1	C0805C104K5RAC; GRM21BR71H104K	KEMET	0.1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 0.1UF; 50V; TOL=10%; MODEL=; TG=-55 DEGC TO +125 DEGC; TC=X7R	
4	C6	-	1	08053C105JAT2A	AVX	1UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 1UF; 25V; TOL=5%; MODEL=X7R; TG=-55 DEGC TO +85 DEGC; TC=+/-	
5	EN1, EN2, OUT, TP5-TP8, VBAT1, VBAT2	-	9	5005	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
6	GND, TP1-TP4, TP9, TP10	-	7	5006	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;	
7	J1, J2	-	2	PBC03SAAN	SULLINS	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC	
8	J3	-	1	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS; -65 DEGC TO +125 DEGC	
9	U1,U2	-	2	MAX40200ANS+	MAXIM	MAX40200ANS+	EVKIT PART-IC; SWTC; IDEAL DIODE; OZ34; PACKAGE OUTLINE: 21-0744; PACKAGE CODE: N40C0-1; WLP4	
10	PCB	-	1	MAX	MAXIM	PCB	PCB Board:MAX40200 EVALUATION KIT	

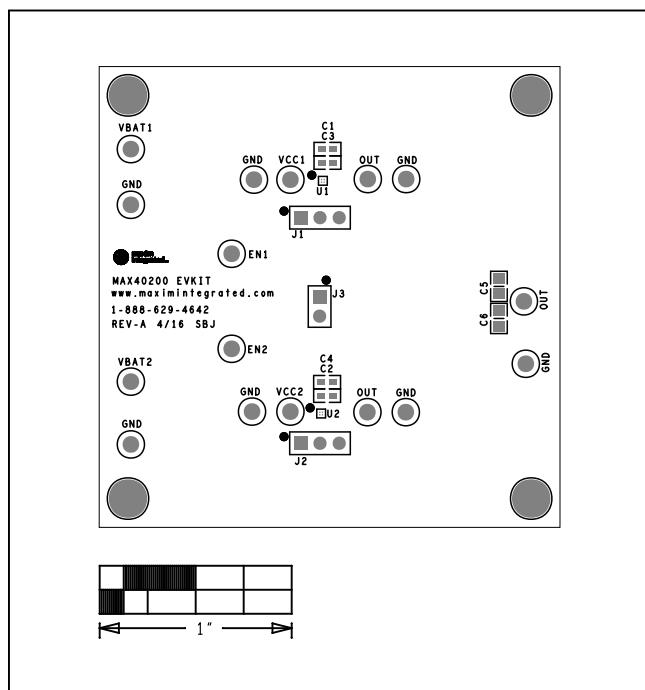
MAX40200 EV Kit Schematic



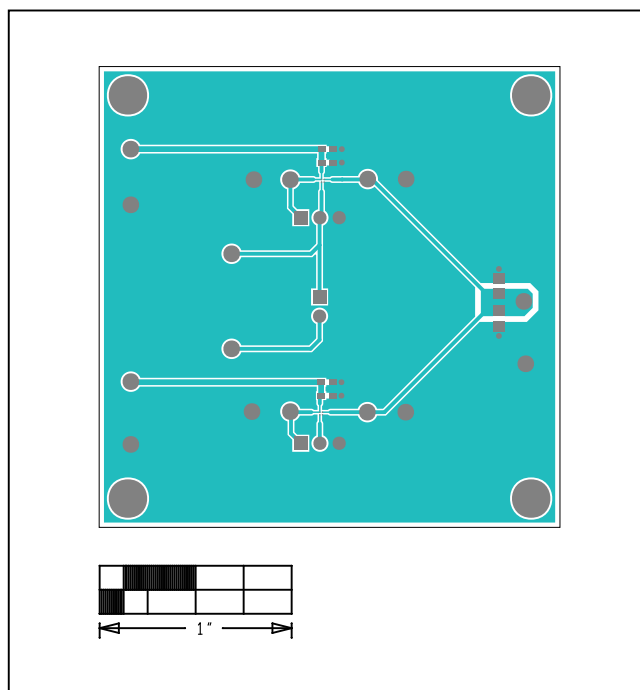
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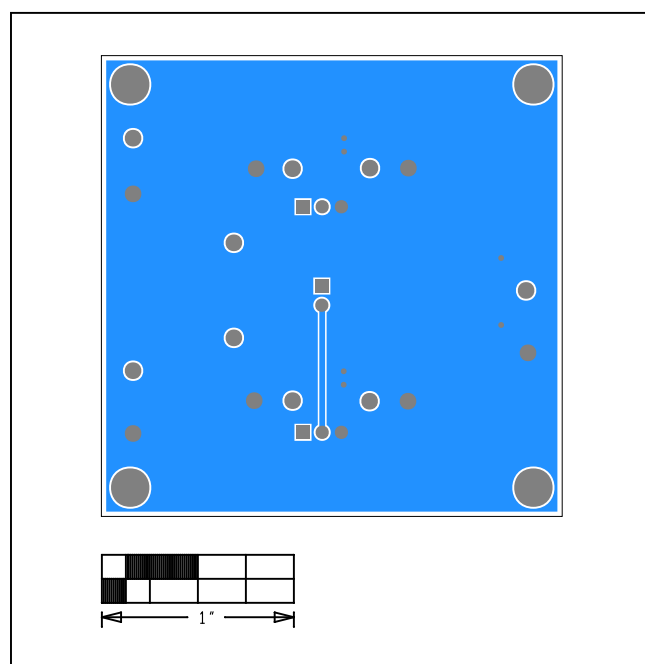
MAX40200 EV Kit PCB Layout



MAX40200 EV Kit—Top Silkscreen



MAX40200 EV Kit—Top



MAX40200 EV Kit—Bottom

Ordering Information

PART	TYPE
MAX40200EVKIT#	EV Kit

#Denotes RoHS compliant.

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/16	Initial release	—

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[MAX40200LABS#](#)