MAX40201 Evaluation Kit

Evaluates: MAX40201

General Description

The MAX40201 evaluation kit (EV kit) provides a proven design to evaluate the MAX40201 dual-channel, high-precision, high-voltage, current-sense amplifier. This EV kit demonstrates the MAX40201 in an ultra-small, 1.3mm x 2mm, 8-bump wafer-level package (WLP).

The EV kit PCB comes with a MAX40201WAWA+ installed, which is the 200V/V gain version. Other gain options are available. Contact the factory for the pin-compatible MAX40201TAWA+ (G = 25V/V), MAX40201FAWA+ (G = 50V/V), and MAX40201HAWA+ (G = 100V/V).

EV Kit Contents

- MAX40201 EV Kit Board

Features

- Precision Real-Time Current Monitoring
- 0V to +76V Input Common-Mode Range
- Proven PCB Layout
- Fully Assembled and Tested

***Ordering Information* appears at end of data sheet.**

Quick Start

Required Equipment

The following items are required for operation:

- MAX40201 EV kit
- +3.3V, 1A DC power supply
- +5V, 3A DC power supply
- An electronic load capable of sinking 3A (i.e., HP6060B)
- Two digital voltmeters

Procedure

The MAX40201 EV kit is fully assembled and tested. Follow the steps below to verify the board operation. **Caution: Do not turn on power supply or the electronic load until all connections are made**.

1) Connect the positive terminal of the +3.3V supply to the VDD test point and the negative terminal of the supply to the nearest GND test point.
2) Connect the positive terminal of the +5V supply to the VSENSE+ test point and the negative terminal of the supply to the nearest GND test point.
3) Set the electronic load to sink 250mA.
4) Connect the positive terminal of the electronic load to the VSENSE- test point and the negative terminal of the supply to the nearest GND test point.
5) Connect the first voltmeter between test points RS1+ and RS1- to measure V_{SENSE1}.
6) Connect the second voltmeter between VOUT1 and the nearest GND test points.
7) Turn on the power supplies.
8) Enable the electronic load.
9) Verify that the first voltmeter displays 12.5mV and the second voltmeter displays 2.5V.
10) Repeat the steps for the second current sense amplifier using the VSENSE2+ and VSENSE2- test points as the inputs and VOUT2 test point as the output.

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Detailed Description of Hardware

The MAX40201 EV kit provides a proven design to evaluate the MAX40201 high-side, dual-channel, current-sense amplifier, which offers precision accuracy specifications of input offset voltage (V_{OS}) less than 10µV (max) and gain error less than 0.1% (max).

Applying the V_{RS+} Supply and the Load

The EV kit is installed with a MAX40201WAWA+, which has a 200V/V gain. The current-sense resistors (R_{SENSE}) value is 0.05Ω with ±0.5% tolerance. The V_{OUT} for each channel given by:

$$V_{OUT} = I_{LOAD} \times R_{SENSE} \times A_V$$

where A_V is the gain and I_{LOAD} is the current load applied to the device. Normal operating V_{RS+} and V_{RS-} range is 0V to 76V.

Ordering Information

PART	TYPE
MAX40201EVKIT#	EV Kit

#Denotes RoHS-compliant.

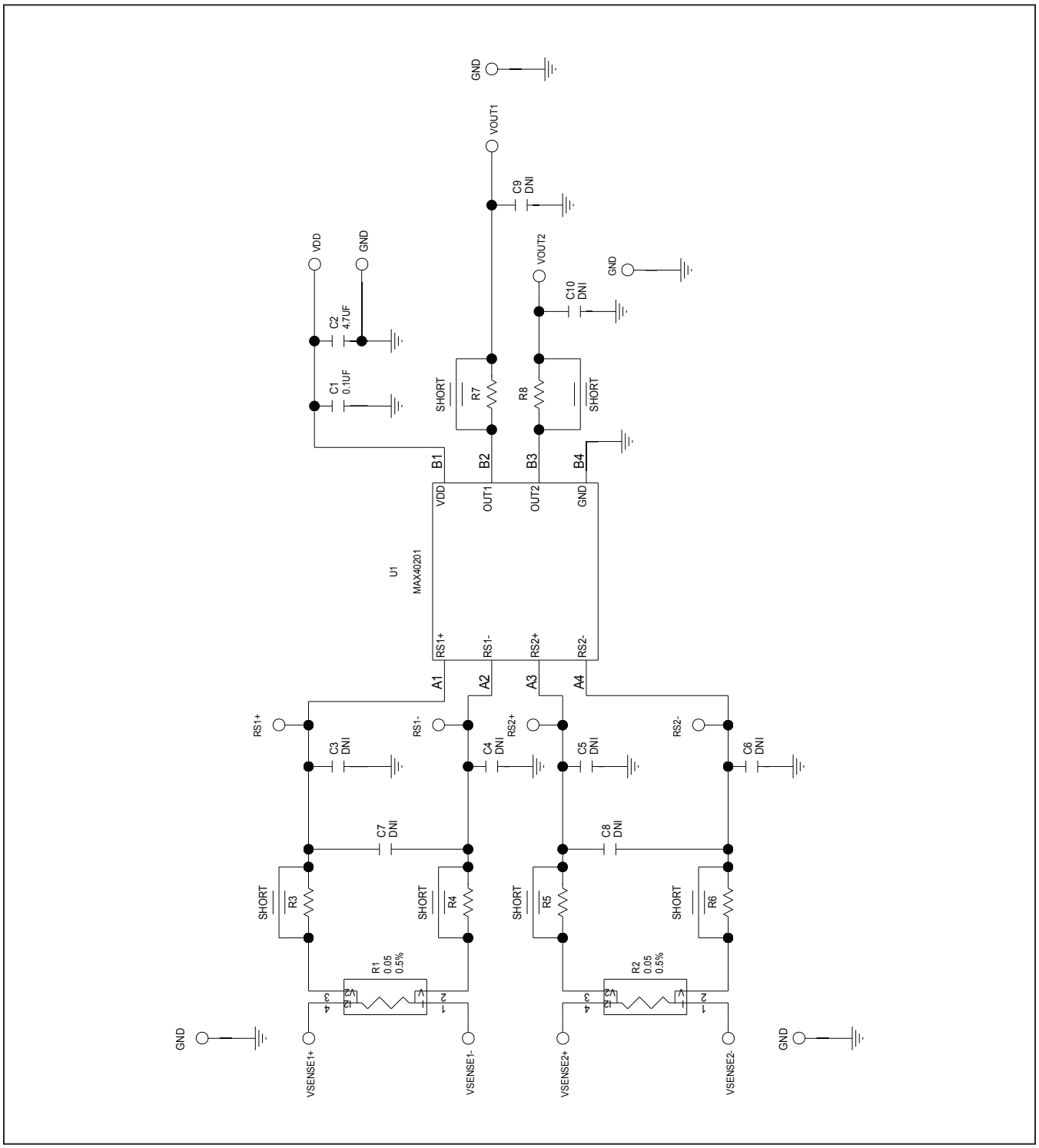
Measuring the Load Current

The load current is measured as a voltage drop (V_{SENSE}) across an external sense resistor. This voltage is then amplified by the current-sense amplifier and presented at its VOUT_ pin. Like all differential amplifiers, the output voltage has two components of error (an offset error and a gain error). The offset error affects accuracy at low currents and a gain error affects accuracy at large currents. Both errors affect accuracy at intermediate currents. By minimizing both offset and gain errors, accuracy can be optimized over a wide dynamic range.

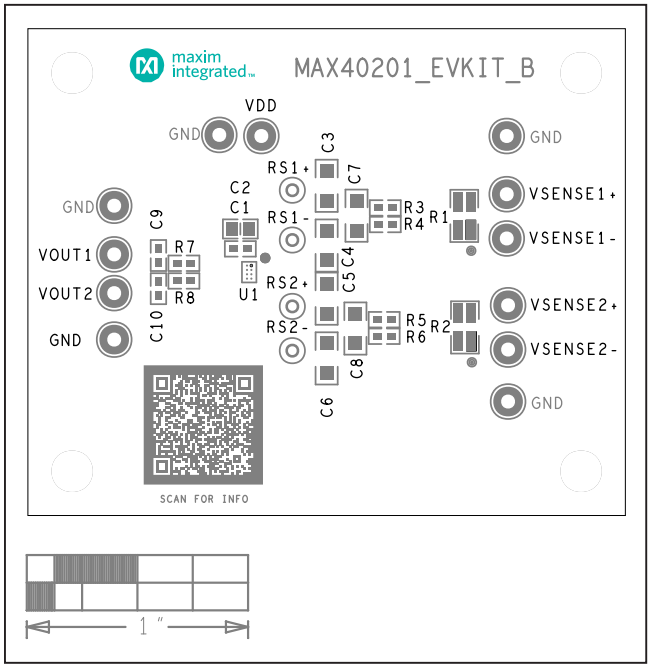
MAX40201 EV Kit Bill of Materials

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C1	-	1	C0603C104K4RAC; GCM188R71C104KA37; C1608X7R1C104K; GRM188R71C104KA01; C0603X7R160-104KNE; VJ0603Y104KXJCW1BC; 0603YC104KAT4A; 885012206046	KEMET;MURATA;TDK; MURATA; VENKEL LTD; VISHAY DALE;AVX; WURTH ELECTRONICS INC;TDK	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 16V;X7R; CERAMIC;
2	C2	-	1	0805YC475KAT2A; GCM21BR71C475KA73; CGA4J3X7R1C475K125AE; GRM21BR71C475KE51	AVX;MURATA;TDK; MURATA	4.7UF	CAP; SMT (0805); 4.7UF; 10%; 16V;X7R; CERAMIC
3	GND, TP1-TP4	-	5	5011	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
4	R1, R2	-	2	LVK12R050DE	OHMITE MFG CO.	0.05	RESISTOR; 1206; 0.05 OHM; 0.5%; 50PPM; 0.5W; METAL FILM
5	RS1+, RS1-, RS2+, RS2-	-	4	5000	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
6	SPACER1-SPACER4	-	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
7	U1	-	1	MAX40201WAWA+	MAXIM	MAX40201WAWA+	IC; AMP; DUAL-CHANNEL; 0V TO 76V CURRENT-SENSE AMPLIFIER; 200V/V; WLP8
8	VDD, VOUT1, VOUT2, VSENSE1+, VSENSE1-, VSENSE2+, VSENSE2-	-	7	5010	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;
9	PCB	-	1	MAX40201	MAXIM	PCB	PCB:MAX40201
10	C3-C8	DNP	0	C1206C102K1RAC	KEMET	1000PF	CAP; SMT (1206); 1000PF; 10%; 100V; X7R; CERAMIC
11	C9, C10	DNP	0	C0603C181K5GAC	KEMET	180PF	CAP; SMT (0603); 180PF; 10%; 50V; C0G; CERAMIC
12	R3-R8	DNP	0	CRCW060300000ZS; MCR03EZPJ000; ERJ-3GEY0R00; CR0603AJ/-000ELF	VISHAY;ROHM SEMICONDUCTOR; PANASONIC;BOURNS	0	RES; SMT (0603); 0; JUMPER; JUMPER; 0.1000W
TOTAL			26				

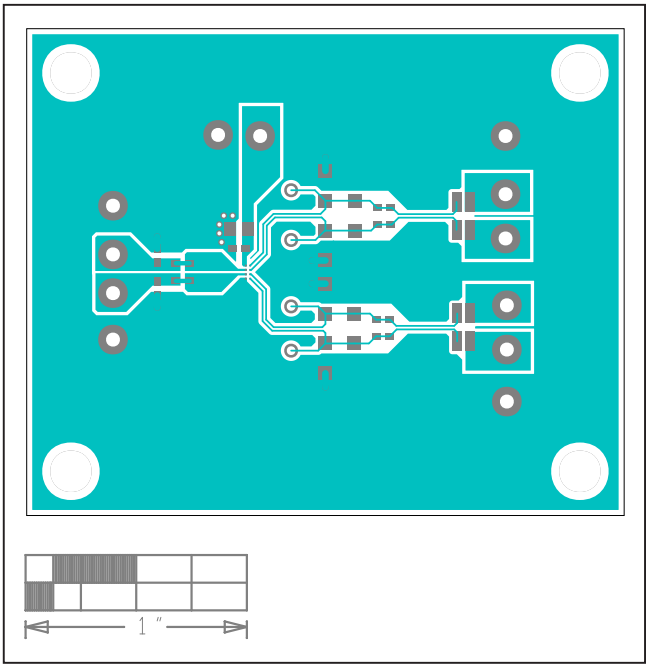
MAX40201 EV Kit Schematic



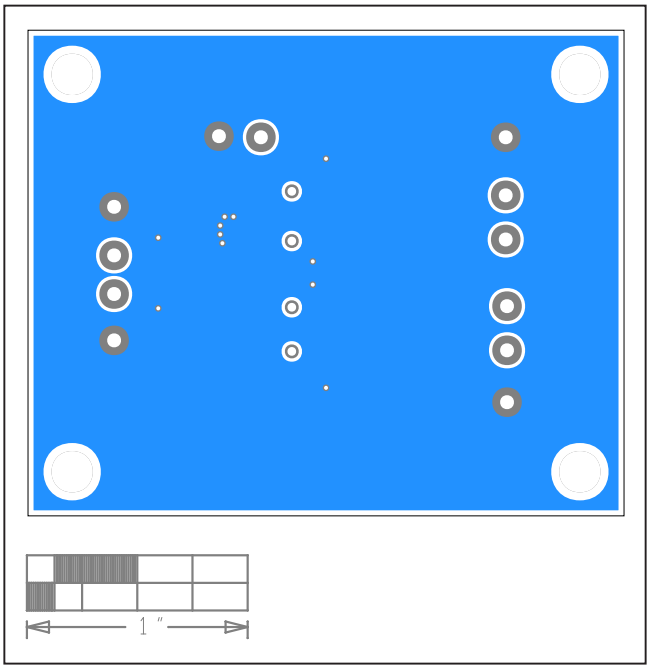
MAX40201 EV Kit PCB Layouts



MAX40201 EV Kit Component Placement Guide—Top Silkscreen



MAX40201 EV Kit PCB Layout—Top



MAX40201 EV Kit PCB Layout—Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/17	Initial release	—
1	10/20	Updated *General Description*, *Procedure, and Detailed Description of Hardware* sections, replaced BOM, schematic, and PCB Layouts	1–4

