

### General Description

The MAX77887 evaluation kit (EV kit) is a fully assembled and tested printed circuit board (PCB) that demonstrates the MAX77887 nano power buck-boost converter. The IC has an input range of 1.8V to 5.5V, with a switching current limit of 400mA.

The IC has two hardware control pins, SEL1 and SEL2. The resistor connected at SEL1 ( $R_{SEL1}$ ) selects a predefined output voltage level between 1.8V to 5.2V. The resistor at SEL2 ( $R_{SEL2}$ ) allows to configure the two different switching current limit levels (ILIM), and 16 input voltage monitoring threshold levels.

The EV kit is compatible with the MAX77887 WLP IC (MAX77887AEWL+T) and equipped with test points and jumpers for testing most of the functionality of the device. There are probing sockets on critical nodes (OUT, LX1, and LX2) for precise measurements.

### Features

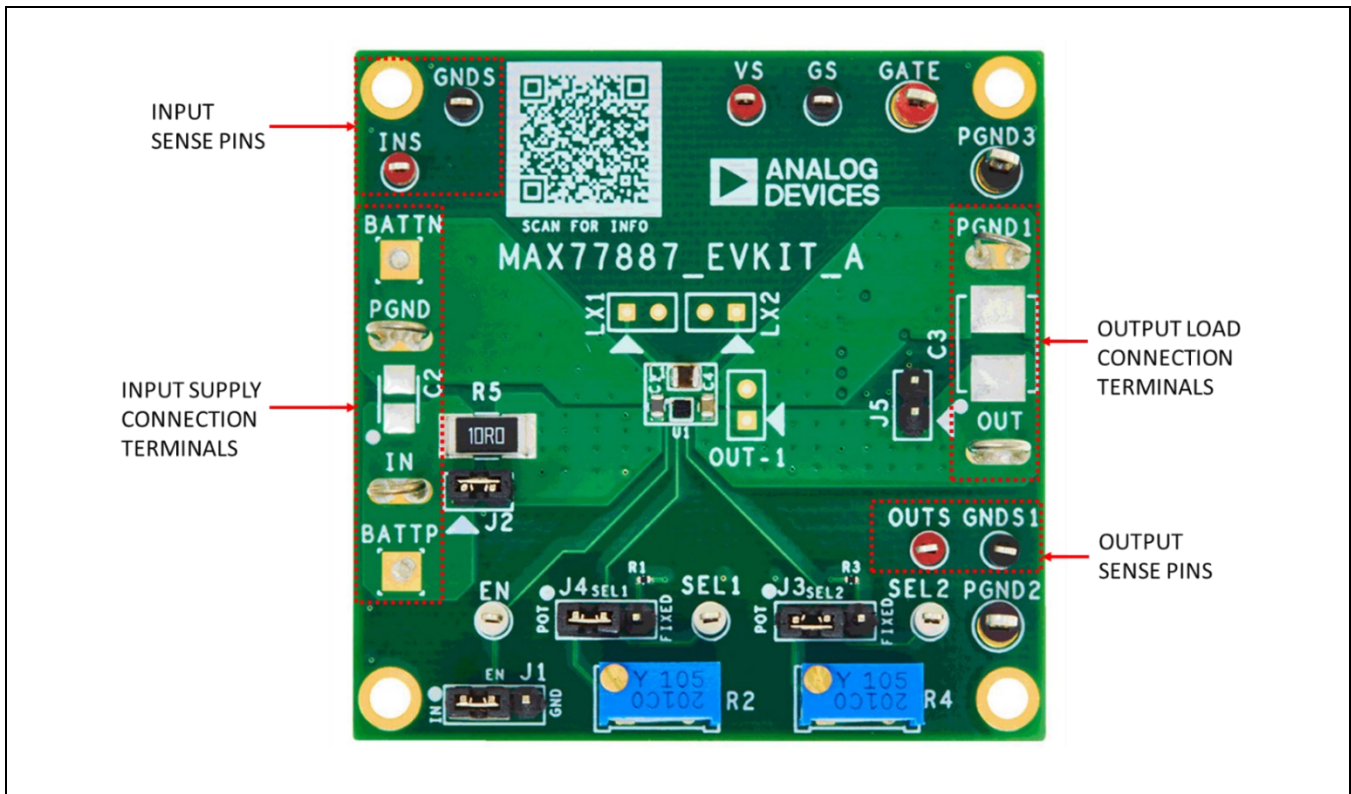
- Output Voltage (OUT1) Adjustable Using  $R_{SEL1}$
- Test Points for INS and OUTS
- Switching Current Limit, Input Voltage Monitor Levels
- Sense Sockets for High-Accuracy Measurements

### Check List

- MAX77887 Evaluation Kit
- Adjustable DC Power Supply
- Digital Multi-meters (x4)
- Electronic Load

Ordering Information appears at end of data sheet.

### EV Kit Photo



### EV Kit Specifications and Default Configurations

EV kit specifications shown in [Table 1](#) summarize important parameters to get started with the EV kit. [Table 2](#) shows default jumper positions and the implications.

**Table 1. EV Kit Specifications**

SPECIFICATION	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range		1.9		5.5	V
Output Voltage Range		1.8		5.2	V
Default Output Voltage	$R_{SEL1} = 634k\Omega$		5.0		V
Default ILIM	$R_{SEL2} = 133k\Omega$		400		mA
Default $V_{INMON}$	$R_{SEL2} = 133k\Omega$		2.2		V

**Table 2. Default Jumper Positions**

JUMPER	NODE OR FUNCTION	SHUNT POSITION	JUMPER POSITION
J1	EN	1-2*	Connects EN to IN
		2-3	Connects EN to GND
J2	VIN	1-2*	Bypasses the 10Ω resistor between the Input Supply and the IN pin that emulates battery resistance
J3	SEL2	1-2	Connects SEL2 to R2 (potentiometer)
		2-3*	Connects SEL2 to fixed resistance (133kΩ)
J4	SEL1	1-2	Connects SEL1 to R4 (potentiometer)
		2-3*	Connects SEL1 to fixed resistance (634kΩ)
J5	On-Board E-LOAD	1-2	Connects OUT to the DRAIN pin of the on-board E-LOAD

\*Default jumper positions

### Quick Start Procedure

A Typical Application circuit is shown in [Figure 1](#).

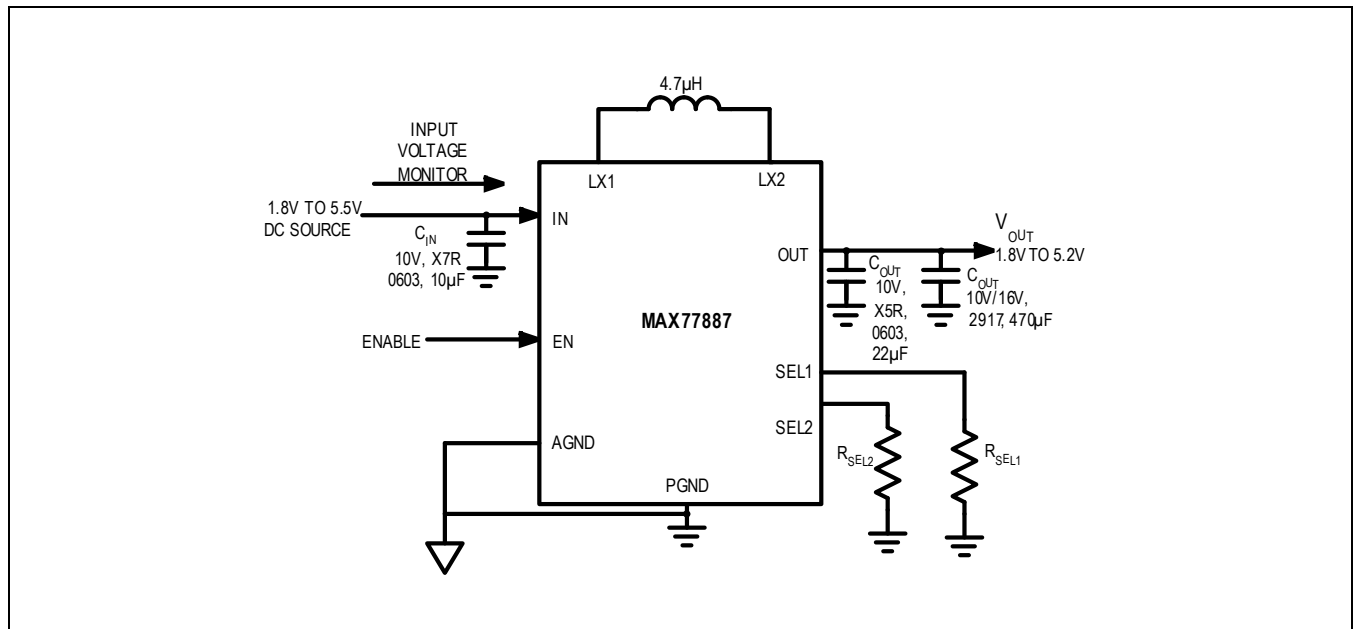


Figure 1. MAX77887 Typical Application Circuit

The EV kit is fully assembled and tested. Follow the steps below to verify board operation. Use twisted wires of appropriate gauges as short as possible to connect the load and power sources.

1. Identify the connections and test points in the [EV Kit Photo](#). Ensure that the EV kit has the correct jumper settings, as shown in [Table 2](#).
2. Connect a DVM to the INS and GNDS pins to measure the input voltage.
3. Connect a DVM to the OUTS and GNDS1 pins to measure the output voltage.
4. Set SEL1 to fixed resistance by changing the J4 position to 2-3 (OUT = 5V). Set SEL2 to fixed resistance by changing the J3 position to 2-3 (400mA ILIM, 2.2V  $V_{INMON}$ ). See [Table 1](#) and [Table 2](#) of this data sheet for selecting the  $R_{SEL1}$  and  $R_{SEL2}$  values.
5. Set the power supply to 3.7V (100mA current limit) across the IN and PGND terminals of the EV kit. Turn on the power supply.
6. Now that the EV kit is confirmed working, increase the current limit on the power supply connected across IN and PGND. To evaluate the loaded performance of the MAX77887, apply voltage to the GATE terminal of the onboard MOSFET to emulate load at the output.

The next step of the procedure is used to evaluate MAX77887's  $V_{INMON}$  functionality. Since  $R_{SEL2}$  is set to 133k $\Omega$ ,  $V_{INMON}$  is enabled with a default value of 2.2V. See [Table 3](#) in the [SEL Pin Configuration](#) section of this data sheet for more information on how to select  $R_{SEL2}$  values. If the evaluation of the  $V_{INMON}$  function is not required, skip the following steps.

7. Turn off the power supply connected between IN and PGND.
8. Set  $R_{SEL2}$  to the default value (2.2V  $V_{INMON}$  threshold level) by placing the jumper J1 in position 2-3. See the [SEL Pin Configuration](#) section for selecting  $V_{INMON}$  levels based on  $R_{SEL2}$  values.
9. Install jumper J2 to connect the battery resistance, R5 (10 $\Omega$ ) between VIN and IN.
10. Connect the jumper J5 to enable the on-board E-LOAD. Apply 2.35V at the GATE terminal to turn ON the E-LOAD FET.
11. Connect scope probes at LX1, LX2, OUT-1, and INS test points.
12. Set the power supply to 2.5V (100mA current limit) across the IN and PGND of the EV kit. Turn on the power supply.
13. Increase the load on the E-LOAD by increasing the GATE voltage till the input voltage drops to the default  $V_{INMON}$  threshold level (2.2V).
14. Observe the switching activity at LX1, LX2, and OUT-1 on the oscilloscope.

This concludes the Quick Start Procedure. Users are now encouraged to further evaluate the device for different input, output voltages, and load conditions.

## EV Kit Hardware

### SEL Pin Configuration

MAX77887 has two hardware configurable pins (SEL1 and SEL2) to configure the part's features. A resistor tied between SEL1, and ground ( $R_{SEL1}$ ) is used to select the output voltage level (OUT). A resistor tied between SEL2 and ground ( $R_{SEL2}$ ) is used to select the switching current limit and the input voltage monitoring threshold level. See [Table 3](#) and [Table 4](#) for more details.

**Table 3.  $R_{SEL1}$  Selection Guide**

$R_{SEL1}$ (k $\Omega$ )	OUT (V)	$R_{SEL1}$ (k $\Omega$ )	OUT (V)
Short	3.3	66.5	3.4
4.99	1.8	80.6	3.6
5.90	1.9	95.3	3.7
7.15	2.0	113	3.8

RSEL1 (kΩ)	OUT (V)	RSEL1 (kΩ)	OUT (V)
8.45	2.1	133	3.9
10.0	2.2	162	4.0
11.8	2.3	191	4.1
14.0	2.4	226	4.2
16.9	2.5	267	4.3
20.0	2.6	324	4.4
23.7	2.7	383	4.5
28.0	2.8	453	4.6
34.0	2.9	536	4.7
40.2	3.0	634	5.0
47.5	3.1	768	5.1
56.2	3.2	909/OPEN	5.2

Table 4. RSEL2 Selection Guide

RSEL2 (kΩ)	V <sub>INMON</sub> (V)	ILIM (mA)	RSEL2 (kΩ)	V <sub>INMON</sub> (V)	ILIM (mA)
Short	1.8	200	66.5	1.8	400
4.99	1.9	200	80.6	1.9	400
5.90	2.0	200	95.3	2.0	400
7.15	2.1	200	113	2.1	400
8.45	2.2	200	133	2.2	400
10.0	2.3	200	162	2.3	400
11.8	2.4	200	191	2.4	400
14.0	2.5	200	226	2.5	400
16.9	2.6	200	267	2.6	400
20.0	2.7	200	324	2.7	400
23.7	2.8	200	383	2.8	400
28.0	2.9	200	453	2.9	400
34.0	3.0	200	536	3.0	400
40.2	3.1	200	634	3.1	400
47.5	3.2	200	768	3.2	400
56.2	3.4	200	909/OPEN	3.4	400

### Test Points and Critical Node Measurement (OUT-1, LX1, LX2)

The EV kit comes with holes on the board for measuring the critical nodes OUT-1, LX1, and LX2. Use these probing holes to eliminate as much noise as possible when measuring the critical nodes. To ensure best results, use a very short ground wire from the ground sleeve of the scope probe to the GND side of the probing hole, and use the bare tip of the probe directly to the signal side of the probing hole. Following these guidelines gives the most accurate results when measuring parameters like output voltage ripple, switching waveforms, and load transient response.

Table 5. Usage of Critical Test Points

LOAD TRANSIENT, OUTPUT RIPPLE	LOAD REGULATION, LINE REGULATION, VOUT ACCURACY	EFFICIENCY		SWITCHING NODE
		OUTPUT VOLTAGE	INPUT VOLTAGE	LX
OUT-1	OUTS and INS	OUTS	INS	LX1 and LX2

### Ordering Information

PART	TYPE
MAX77887EVKIT#	EV Kit

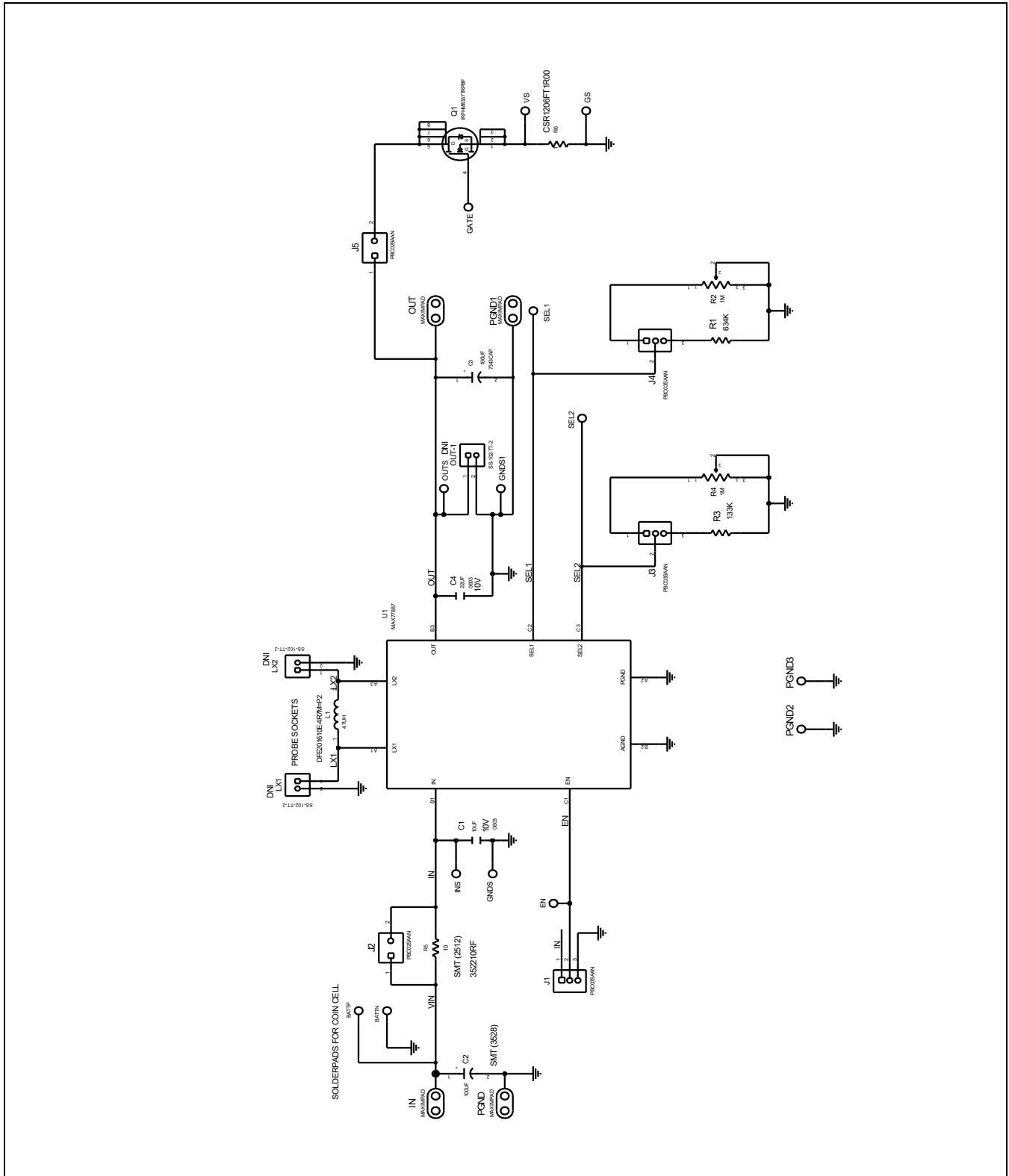
#Denotes RoHS-compliant.

## MAX77887 EV Kit Bill of Materials

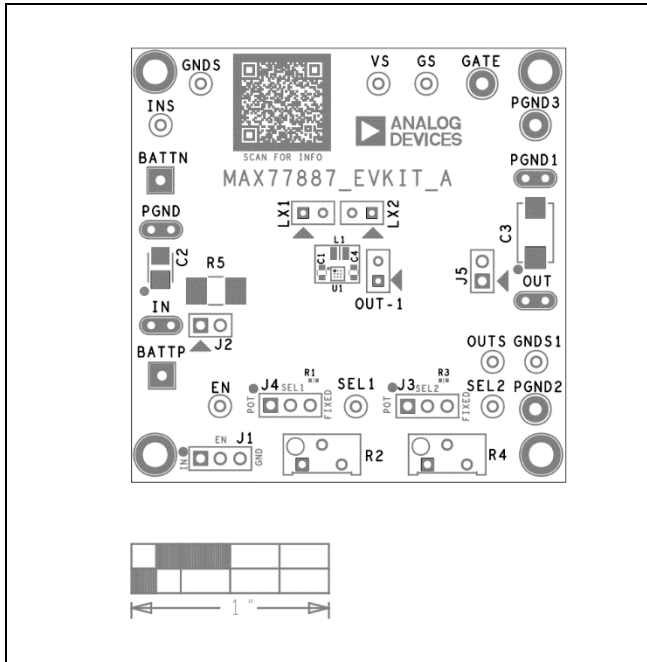
PART	QTY	MFG PART #	MANUFACTURER	DESCRIPTION
C1	1	GRM188Z71A106KA73	MURATA	CAP; SMT (0603); 10UF; 10%; 10V; X7R; CERAMIC
C2	1	TR3B107M010C1400; TPSB107M010R0400	VISHAY; AVX	CAP; SMT (3528); 100UF; 20%; 10V; TANTALUM
C3	1	T495D107K010ATE100	KEMET	CAP; SMT (7343-31); 100UF; 10%; 10V; TANTALUM
C4	1	C1608X5R1A226M080AC; GRM188R61A226ME15; CL10A226MPCNUBE; CL10A226MPMNUB; GRM187R61A226ME15	TDK; MURATA; SAMSUNG; SAMSUNG; MURATA	CAP; SMT (0603); 22UF; 20%; 10V; X5R; CERAMIC
EN, SEL1, SEL2	3	5002	KEYSTONE	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER
GATE	1	5010	KEYSTONE	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL
GNDS, GNDS1, GS	3	5001	KEYSTONE	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH
IN, OUT, PGND, PGND1	4	9020 BUSS	WEICO WIRE	EVK KIT PARTS; MAXIM PAD; WIRE; NATURAL; SOLID; WEICO WIRE; SOFT DRAWN BUS TYPE-S; 20AWG
INS, OUTS, VS	3	5000	KEYSTONE	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH
J1, J3, J4	3	PBC03SAAN	SULLINS	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC
J2, J5	2	PBC02SAAN	SULLINS ELECTRONICS CORP.	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
L1	1	DFE201610E-4R7M=P2	MURATA ELECTRONICS	4.7 $\mu$ H SHIELDED DRUM CORE, WIREWOUND INDUCTOR 1.1 A 288mOHM MAX 0806 (2016 METRIC)
PGND2, PGND3	2	5011	KEYSTONE	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH
Q1	1	IRFHM8337TRPBF	INTERNATIONAL RECTIFIER	TRAN; HEXFET POWER MOSFET; NCH; PQFN8; PD-(2.8W); I-(18A); V-(30V)
R1	1	CRCW0402634KFK	VISHAY DALE	RES; SMT (0402); 634K; 1%; +/-100PPM/DEGC; 0.0630W
R2, R4	2	3296Y-1-105LF	BOURNS	RES; THROUGH HOLE-RADIAL LEAD; 1M; 10%; +/-100PPM/DEGC; 0.5W
R3	1	RK73H1ETTP1333F; CRCW0402133KFK	KOA SPEER; VISHAY DALE	RES; SMT (0402); 133K; 1%; +/-100PPM/DEGC; 0.0630W
R5	1	352210RF	TE CONNECTIVITY	RES; SMT (2512); 10; 1%; +/-400PPM/DEGC; 3W
R6	1	CSR1206FT1R00	STACKPOLE ELECTRONICS INC.	RES; SMT (1206); 1; 1%; +/-100PPM/DEGC; 0.5000W

PART	QTY	MFG PART #	MANUFACTURER	DESCRIPTION
U1	1	MAX77887EWL+	ANALOG DEVICES	EVKIT PART - IC; NANO POWER BUCK-BOOST WITH INPUT VOLTAGE MONITOR; PACKAGE OUTLINE DRAWING: 21-100672; PACKAGE CODE: W91T1+1
PCB	1	MAX77887	ANALOG DEVICES	PCB:MAX77887
EV_KIT_BOX1	4	NPC02SXON-RC	SULLINS ELECTRONICS CORP.	CONNECTOR; FEMALE; MINI SHUNT; 0.100IN CC; OPEN TOP; JUMPER; STRAIGHT; 2PINS
LX1, LX2, OUT-1	0	SS-102-TT-2	SAMTEC	DNP; IC-SOCKET; SIP; STRAIGHT; PRECISION MACHINED SOCKET STRIP; OPEN FRAME; 2PINS; 100MIL

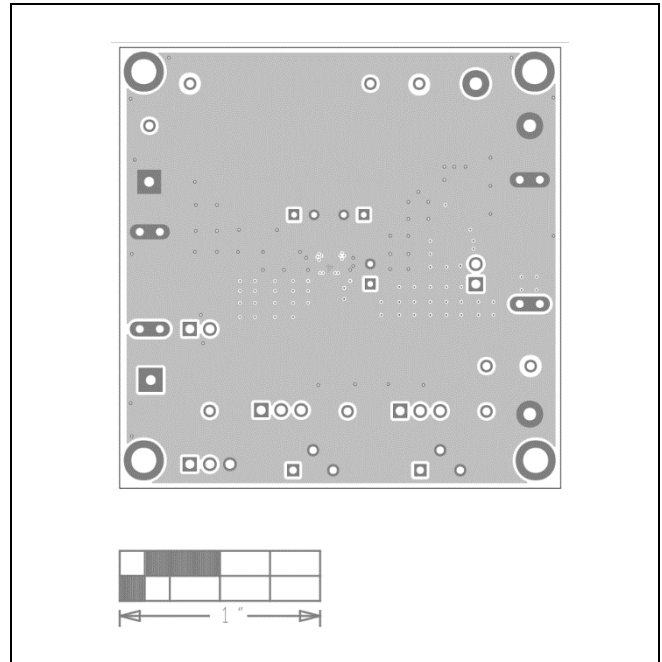
MAX7787 EV Kit Schematic



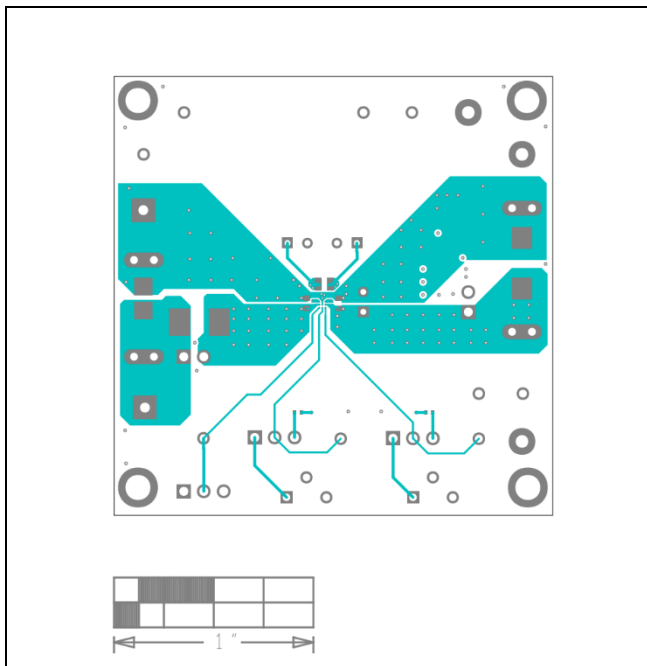
MAX77887 EV Kit PCB Layout



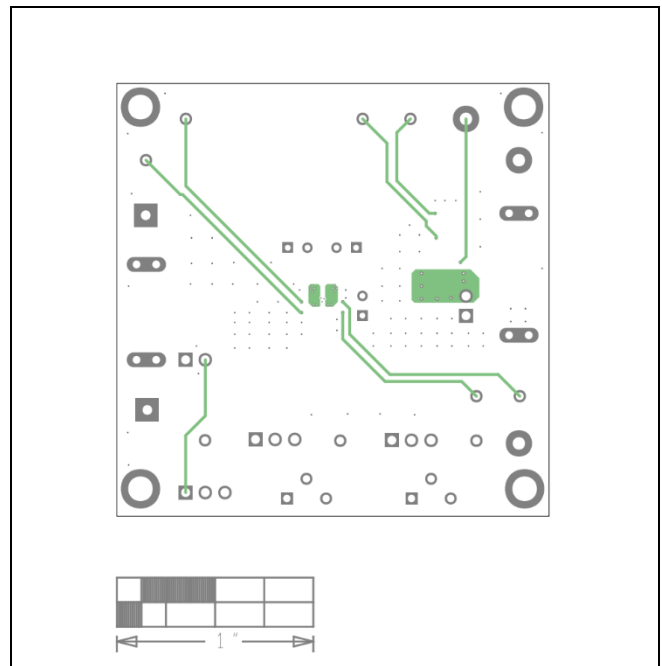
MAX77887 EV Kit Component Placement Guide—Top Silkscreen



MAX77887 EV Kit PCB Layout—Layer 2



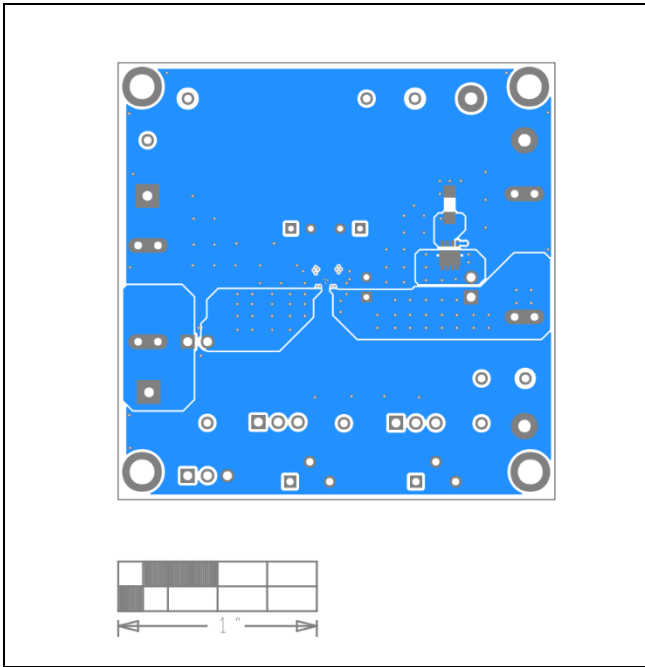
MAX77887 EV Kit PCB Layout—Top



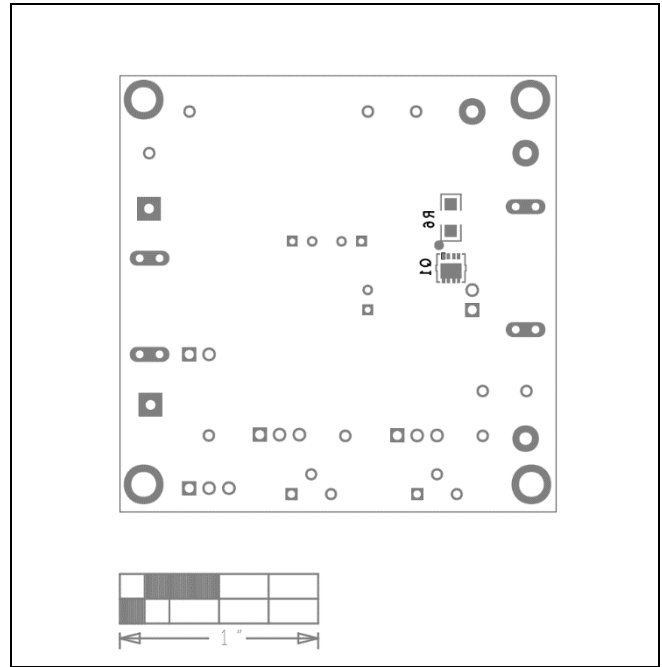
MAX77887 EV Kit PCB Layout—Layer 3



MAX77887 EV Kit PCB Layout  
(continued)



MAX77887 EV Kit PCB Layout—Bottom



MAX77887 EV Kit Component Placement Guide—Bottom  
Silkscreen

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/24	Initial release	—

