MAX38886 Evaluation Kit

Evaluates: MAX38886

General Description

The MAX38886 evaluation kit (EV kit) evaluates the MAX38886 IC. The MAX38886 is a super cap backup regulator designed to transfer power between a super cap and a system supply rail. When the main battery is present and above the minimum system supply voltage, the regulator charges the super cap at up to a 500mA rate. Once the super cap is charged, the circuit draws only 3µA of current while it maintains the super cap in its ready state. When the main battery is removed, the regulator prevents the system from dropping below the minimum operating voltage, discharging the super cap at up to a 2.5A peak inductor current. Multiple MAX38886 ICs can be connected in parallel for higher current applications. The MAX38886 is externally programmable for minimum and maximum super cap voltage, minimum system voltage, and maximum charge and discharge currents. The internal DC-DC converter requires only a 1µH inductor and a 22µF capacitor.

Features

- 2.99V to 3.36V System Output Voltage Range
- 0.5V to 2.71V Super Cap Voltage Range
- 2.5A Peak Discharge Current
- Resistor-Adjustable Voltage and Current Thresholds
- Proven 2-Layer, 2oz Copper PCB Layout
- Compact Solution Size
- Fully Assembled and Tested

MAX38886 EV Kit Files

FILE	DESCRIPTION
MAX38886 EV BOM	EV Kit Bill of Material
MAX38886 EV PCB Layout	EV Kit Layout
MAX38886 EV Schematic	EV Kit Schematic

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

Quick Start

Required Equipment

- MAX38886 EV kit
- 5V, 3A DC power supply
- One digital multimeter (DMM)

Procedure

The EV kit is fully assembled and tested. Use the following steps to verify board operation:

Caution: Do not turn on power supply until all connections are completed.

1) Verify that a shunt is installed onto pins 1 and 2 and jumper JU1 (EV kit enabled).
2) Verify that jumper JU2 is opened (No load is connected across VSYS and PGND).
3) Set the power supply output to 3.4V, and disable the power supply.
4) Connect the power supply between the VSYS and PGND terminal posts.
5) Connect the DMM between the VSC and PGND terminal posts.
6) Enable the power supply and verify that the super cap voltage at VSC is ramping up and stops at about 2.7V.
7) Disable and disconnect the power supply from the VSYS and PGND terminal posts.
8) Verify that VSYS drops to about 3V and VSC drops to about 2.5V.
9) Install jumper JU2. This connects a 51Ω load across VSYS and PGND.
10) Verify that VSYS remains at 3V while VSC is ramping down toward 0.5V.
11) Verify that VSYS is 0V when VSC drops below 0.5V.

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Detailed Description of Hardware

The MAX38886 EV kit provides a flexible circuit to evaluate the super cap backup regulator. External components allow a wide range of system and super cap voltages as well as charging and discharging currents.

EN

The MAX38886 EV kit provides a jumper (JU1) to enable or disable the MAX38886. See Table 1 for JU1 jumper settings.

VSYS Load

The MAX38886 EV kit provides a jumper (JU2) to connect a 51Ω resistive load across VSYS and PGND to simulate a discharging scenario during test. See Table 2 for JU2 jumper settings.

Charge Mode

When the main battery is present and is above the minimum system supply voltage, the regulator charges the super cap at up to a 500mA rate. The MAX38886 EV kit minimum system supply voltage is set to 3.36V by resistors R5 and R6 with V_{FBS} = 0.56V.

Table 1. EN (JU1)

JU1 SHUNT POSITION	DESCRIPTION
1-2*	Enabled. EN = VSYS
2-3	Disabled. EN = PGND
Not Installed	Enabled. EN = VSYS (through resistor R9)

**Default position*

Table 2. VSYS Load (JU2)

JU2 SHUNT POSITION	DESCRIPTION
Installed	Test Mode: A 51Ω resistive load is connected across VSYS and PGND.
Not Installed*	Normal operating mode

**Default position*

Ready Mode

Once the super cap is charged to its maximum voltage of 2.7V, the circuit draws only 3µA of current while it maintains the super cap in its ready state. The MAX38886 EV kit maximum super cap voltage is set to 2.7V by resistors R1 and R2 with V_{FBCH} = 0.5V.

Discharge Mode

When the main battery is removed, the regulator discharges the super cap at up to a 2.5A peak inductor current to prevent the system from dropping below the minimum operating voltage. The MAX38886 EV kit minimum operating voltage is set to 2.99V by resistors R5 and R6 with V_{FBS} = 0.5V.

Charge/Discharge Current Configuration

The MAX38886 EV kit provides a resistor (R4) to configure the charge/discharge current rate for the super cap.

The peak discharge current is set by connecting R4 between the ISET and GND pins.

$$I_{DISCHARGE} = 2.5A \times (20k\Omega/R4)$$

The super cap charging current is internally set to 1/5 of the discharge current.

$$I_{CHARGE} = 0.5A \times (20k\Omega/R4)$$

Choose a value of R4 between 20kΩ to 100kΩ to ensure accurate current compliance.

Component Suppliers

SUPPLIER	WEBSITE
AVX	www.avx.com
Kemet	www.kemet.com
Murata/TOKO	www.murata.com
Wurth Electronics	www.we-online.com

***Note:** Indicate that you are using the MAX38886 when contacting these component suppliers.*

Ordering Information

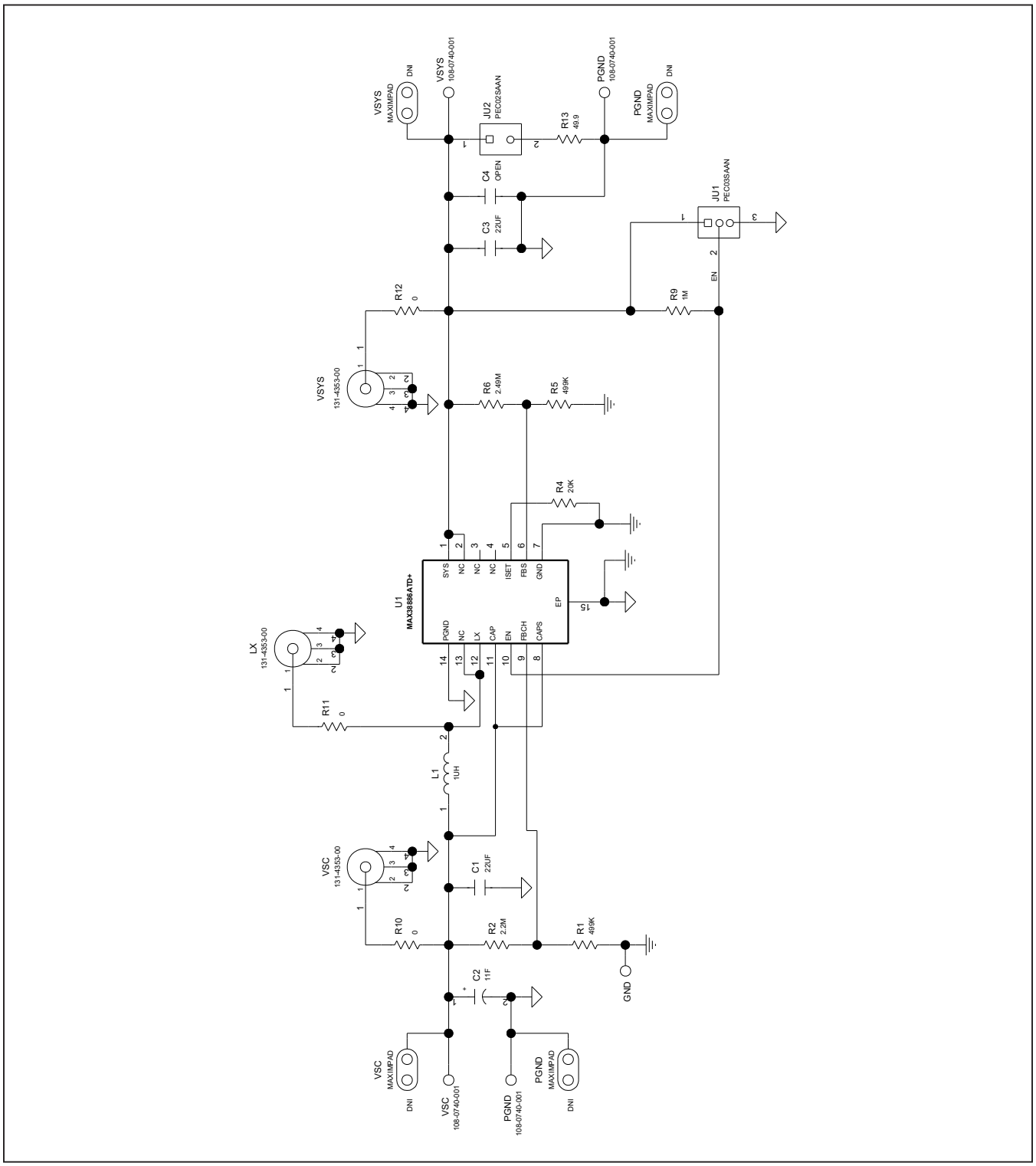
PART	TYPE
MAX38886EVKIT#	EV Kit

#Denotes RoHS compliance.

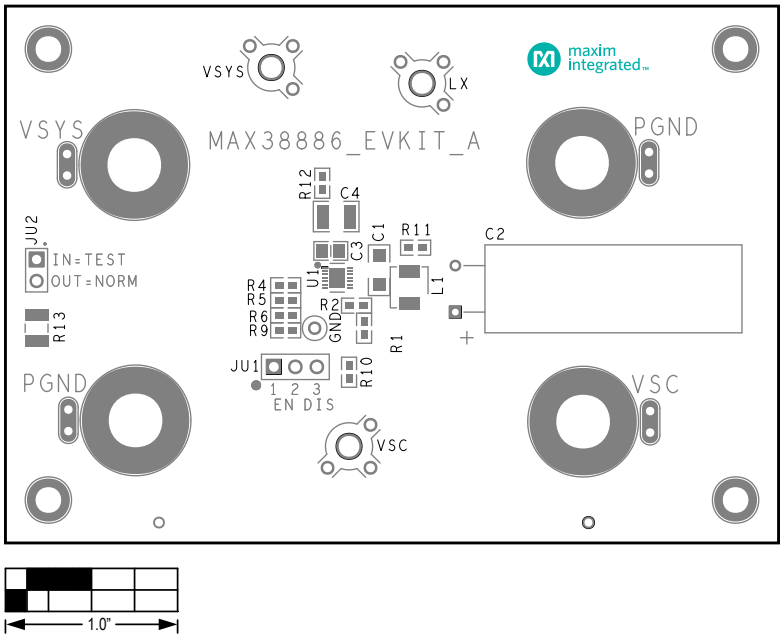
MAX38886 EV Kit Bill of Materials

ITEM	QTY	REF DES	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	1	C1	20-0022U-CA10	GRM31CR71A226ME15	MURATA	22UF	CAPACITOR; SMT (1206); CERAMIC CHIP; 22UF; 10V; TOL=20%; TG=-55 DEGC TO +125 DEGC; TC=X7R
2	1	C2	20-00011-DA38	SCCS30B116SRBA1	AVX	11F	CAP; THROUGH HOLE-RADIAL LEAD; 11F; +30%/-10%; 2.7V; ALUMINUM-ELECTROLYTIC; NOTE:PURCHASE DIRECT FROM THE MANUFACTURER
3	1	C3	20-0022U-K7	C0805C226M9PAC; GRM21BR60J226ME39; JMK212BJ226MG; CL21A226MQCLQN; 885012107005	KEMET;MURATA;TAIYO YUDEN; SAMSUNG EL;WURTH ELECTRONIK	22UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 22UF; 6.3V; TOL=20%; TG=-55 DEGC TO +85 DEGC; TC=X5R
4	1	GND	02-TPMINI5001-00	5001	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST
5	1	JU1	01-PEC03SAAN3P-21	PEC03SAAN	SULLINS	PEC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS
6	1	JU2	01-PEC02SAAN2P-21	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
7	1	L1	50-0001U-0VF	74437324010	WURTH ELECTRONICS INC	1UH	INDUCTOR; SMT; SHIELDED; 1UH; 20%; 5.00A
8	3	LX, VSC, VSYS	01-131435300-10	131-4353-00	TEKTRONICS	131-4353-00	CONNECTOR; WIREMOUNT; CIRCUIT BOARD TEST POINT MINIATURE PROBE; STRAIGHT; 4PINS
9	4	PGND, TP1-TP3	01-10807400011P-80	108-0740-001	CINCH CONNECTIVITY SOLUTIONS JOHNSON	108-0740-001	CONNECTOR; MALE; PANELMOUNT; BANANA JACK; STRAIGHT; 1PIN
10	2	R1, R5	80-0499K-24	CRCW0603499KFK; ERJ-3EKF4993; RC0603FR-07499KL	VISHAY DALE;PANASONIC; YAGEO	499K	RESISTOR; 0603; 499K OHM; 1%; 100PPM; 0.10W; THICK FILM
11	1	R2	80-002M2-24	CRCW06032M20FK	VISHAY DALE	2.2M	RESISTOR, 0603, 2.2M OHM, 1%, 100PPM, 0.10W, THICK FILM
12	1	R4	80-0020K-24	MCR03EZPFX2002; ERJ-3EKF2002; CR0603-FX-2002ELF; CRCW060320K0FK	ROHM;PANASONIC;BOURNS; VISHAY DALE	20K	RESISTOR; 0603; 20K OHM; 1%; 100PPM; 0.10W; THICK FILM
13	1	R6	80-02M49-24C	RMCF0603FT2M49	STACKPOLE ELECTRONICS INC.	2.49M	RES; SMT (0603); 2.49M; 1%; +/-200PPM/DEGC; 0.10W
14	1	R9	80-0001M-24	CRCW06031M00FK; MCR03EZPFX1004	VISHAY DALE;ROHM	1M	RESISTOR, 0603, 1M OHM, 1%, 100PPM, 0.10W, THICK FILM
15	3	R10-R12	80-0000R-AA6	CRCW0603000Z0	VISHAY DALE	0	RESISTOR; 0603; 0 OHM; 0%; JUMPER; 0.1W; THICK FILM
16	1	R13	80-049R9-I8	ERJ-14NF49R9	PANASONIC	49.9	RESISTOR; 1210; 49.9 OHM; 1%; 100PPM; 0.5W; THICK FILM
17	2	SU1, SU2	02-JMPFS1100B-00	S1100-B;SX1100-B; STC02SYAN	KYCON;KYCON; SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT;PHOSPHOR BRONZE CONTACT=GOLD PLATED
18	1	U1	00-SAMPLE-01	MAX38886ATD+	MAXIM	MAX38886ATD+	EVKIT PART - IC; REG; 2.5V-5.0V; 0.5A/2.5A REVERSIBLE BUCK/BOOST REGULATOR FOR BACKUP POWER APPLICATIONS; TDFN14-EP; PACKAGE OUTLINE DRAWING: 21-0137; LAND PATTERN NUMBER: 90-0063; PACKAGE CODE: T1433+2C
TOTAL	27						

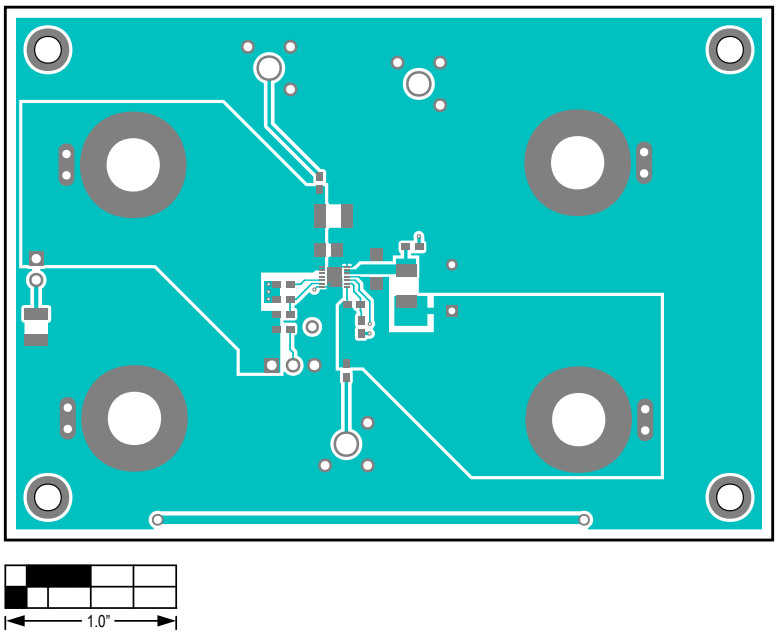
MAX38886 EV Kit Schematic Diagram



MAX38886 EV Kit PCB Layout Diagrams

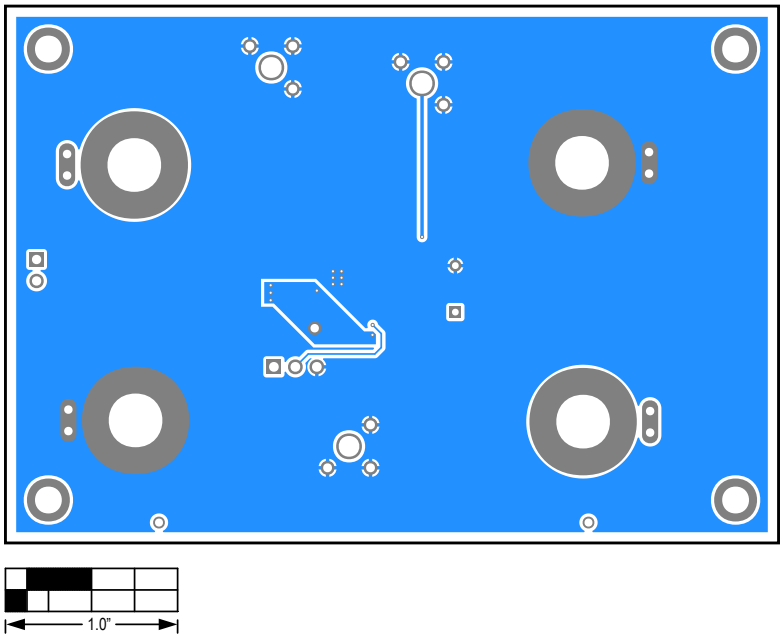


MAX38886 EV Kit Component Placement Guide—Top Silkscreen



MAX38886 EV Kit PCB Layout—Top Assembly

MAX38886 EV Kit PCB Layout Diagrams (continued)



MAX38886 EV Kit PCB Layout—Bottom View

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/20	Initial release	—

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