

MAXM17900 Evaluation Kit

Evaluates: MAXM17900 5V Output-Voltage Application

General Description

The MAXM17900 evaluation kit (EV kit) is a demonstration circuit of the MAXM17900 ultra-small, high efficiency, current mode, synchronous step-down DC-DC switching power module. The EV kit operates over an input-voltage of 10V to 21V and provides up to 100mA load current with a 5V output voltage. The EV kit is programmed to switch at a frequency of 600kHz. The module is simple to use and easily configurable with minimal external components. It features cycle-by-cycle peak current-limit protection, undervoltage lockout (EN/UVLO), and thermal shutdown.

The EV kit comes with the compact 10-pin 2.6mm x 3mm x 1.5mm micro-SLIC package MAXM17900 module installed, and is rated to operate over the full industrial/automotive -40°C to +125°C temperature range. For full specifications, features and benefits of the IC, refer to the [MAXM17900 data sheet](#).

Features

- Wide 10V to 21V Input
- $\pm 1.75\%$ Feedback Voltage Accuracy
- Output: 5V, 100mA
- Internally Compensated
- All Ceramic Capacitors and Ultra-Compact Solution
- Fixed-Frequency PWM
- Shutdown Current as Low as 1.2 μ A (typ)
- Programmable Soft-Start and Prebias Startup
- Open-Drain Power Good Output (RESET pin)
- Programmable EN/UVLO Threshold
- Hiccup Overcurrent Protection (OCP)
- Overtemperature Protection (OTP)
- -40°C to +125°C Industrial/Automotive Temperature Range

Quick Start

Recommended Equipment

- MAXM17900EVKIT#, MAXM17900 evaluation kit
- 24V DC power supply
- Dummy load capable of sinking 100mA
- Digital voltmeter (DVM)
- 100MHz dual-trace oscilloscope

Procedure

The MAXM17900 EV kit is fully assembled and tested. Please follow the steps below to verify the board operation. **Caution: Do not turn on the power supply until all connections are completed.**

- 1) Set the power supply at a voltage between 10V and 21V. Disable the power supply.
- 2) Connect the positive and negative terminals of the power supply to VIN and GND PCB pads, respectively.
- 3) Connect the positive and negative terminals of the 100mA load to VOUT and GND PCB pads respectively, and set the load to 0A.
- 4) Connect the DVM across the VOUT PCB pad and the GND PCB pad closest to VOUT PCB pad.
- 5) Verify that there is a 0 Ω resistor on the R5 to connect EN/UVLO to VIN (see [MAXM17900 EV Kit Schematic](#) for details).
- 6) Enable the input power supply.
- 7) Verify the DVM across output display 5V.
- 8) Increase the load up to 100mA to verify the output voltage is 5V using DVM.

[Ordering Information](#) appears at end of data sheet.

Detailed Description of Hardware

The MAXM17900 EV kit is a proven circuit to demonstrate the high-voltage, high-efficiency, and compact solution size of the MAXM17900 synchronous step-down DC-DC power module. The output voltage is preset to 5V to operate from 10V to 21V input and provides up to 100mA load current. The optimal frequency is set at 600kHz to maximize efficiency and minimize component size. The EV kit includes two test points, TP1 for monitoring the $\overline{\text{RESET}}$ and TP2 for measuring the EN/UVLO voltage.

Soft-Start Input (SS)

The module offers a fixed 5.1ms internal soft-start when the SS pin is left unconnected. When adjustable soft-start time is required, connect a capacitor from SS to GND to program the soft-start time. The minimum soft-start time is related to the output capacitance (C_{OUT}) and the output voltage (V_{OUT}) by the following equation:

$$t_{\text{SS}} > 0.05 \times C_{\text{OUT}} \times V_{\text{OUT}}$$

where t_{SS} is in milliseconds and C_{OUT} is in μF .

Soft-start time (t_{SS}) is related to the capacitor connected at SS (C_3) by the following equation:

$$C_3 = 6.25 \times t_{\text{SS}}$$

where t_{SS} is in ms and C_3 is in nF.

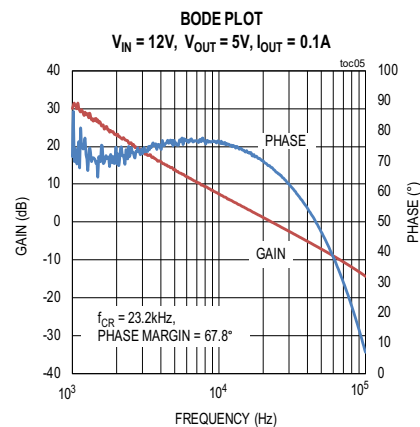
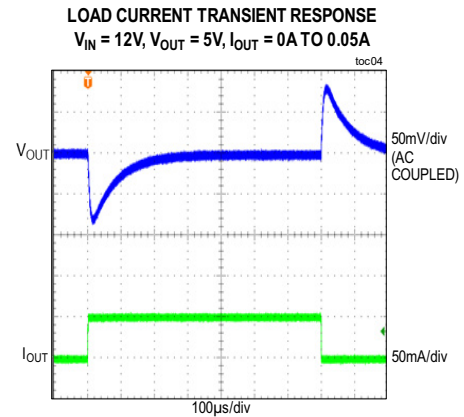
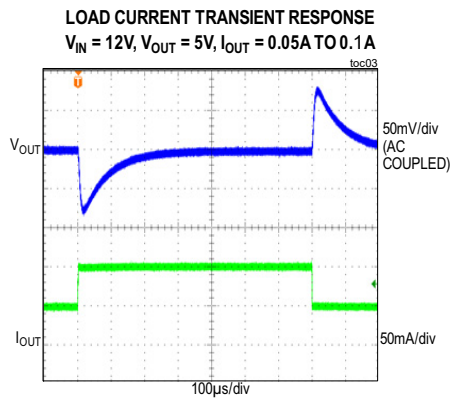
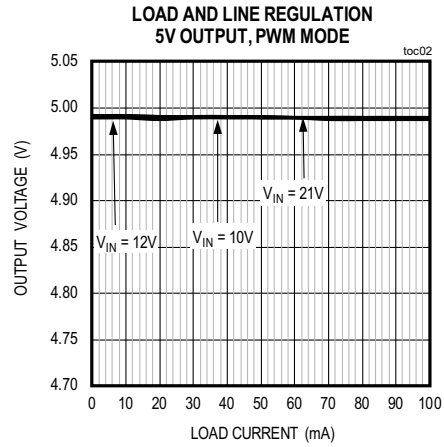
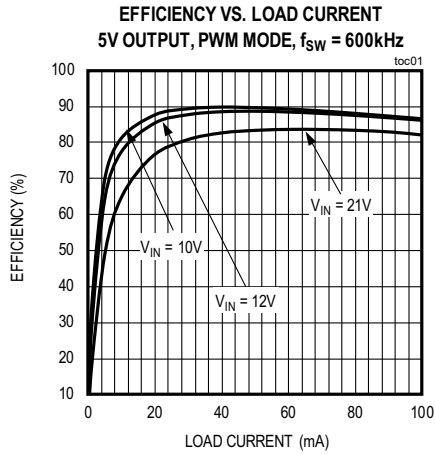
External Synchronization (RT/SYNC)

The RT/SYNC pin can be used to synchronize module's internal oscillator to an external system clock. Refer to the *External Synchronization* section in the **MAXM17900 data sheet** for additional information on configuring the external clock synchronization.

Reset Output ($\overline{\text{RESET}}$)

The module includes an open-drain $\overline{\text{RESET}}$ output to monitor output voltage. $\overline{\text{RESET}}$ should be pulled up with an external resistor to the desired external power supply less than or equal to 5.5V. $\overline{\text{RESET}}$ goes high-impedance 2ms after the output rises above 95% of its nominal set value and pulls low when the output voltage falls below 92% of the set nominal output voltage. $\overline{\text{RESET}}$ asserts low during the hiccup timeout period. In this EV kit, R7 resistor can be used to pull up the $\overline{\text{RESET}}$ to the output voltage.

EV Kit Performance Report



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MAXM17900 EV Kit Bill of Materials

S.NO	Designation	Value	QTY	Description	Manufacturer Part number	Manufacturer
1	C1	2.2UF	1	(0805); CERAMIC CHIP; 2.2UF; 50V; TOL=10%;TC=X7R	C2012X7R1H225K	TDK
2	C2	10UF	1	(0805); CERAMIC CHIP; 10UF; 6.3V; TOL=10%;TC=X7R	GRM21BR70J106K; C2012X7R0J106K125AB	MURATA/TDK
3	C5	22UF	1	ALUMINUM-ELECTROLYTIC; 22UF; 50V; TOL=20%; TG=-40 DEGC TO +85 DEGC	EEE1HA220WAP	PANASONIC
4	R1	261K	1	RESISTOR; 0402; 261K OHM; 1%; 100PPM; 0.063W; METAL FILM	CRCW0402261KFK	VISHAY DALE
5	R2	49.9K	1	RESISTOR; 0402; 49.9K; 1%; 100PPM; 0.0625W; THICK FILM	CRCW040249K9FK; 9C04021A4992FLHF3	VISHAY DALE
6	R3	69.8K	1	RESISTOR; 0402; 69.8K OHM; 1%; 100PPM; 0.10W; THICK FILM	ERJ-2RKF6982X	PANASONIC
7	R5	0R	1	RESISTOR; 0402; 0 OHM; 0%; JUMPER; 0.10W; THICK FILM	ERJ-2GE0R00X	PANASONIC
8	U1		1	COMPACT HIGH VOLTAGE, HIGH-EFFICIENCY STEP-DOWN POWER MODULE, 10-pin, 2.6mm x 3mm x 1.6 mm micro-SLIC package	MAXM17900AMB+	MAXIM
9	C4	OPEN	0	1206	N/A	N/A
10	R6, R7	OPEN	0	0402	N/A	N/A
11	C3	OPEN	0	0402	N/A	N/A

Ordering Information

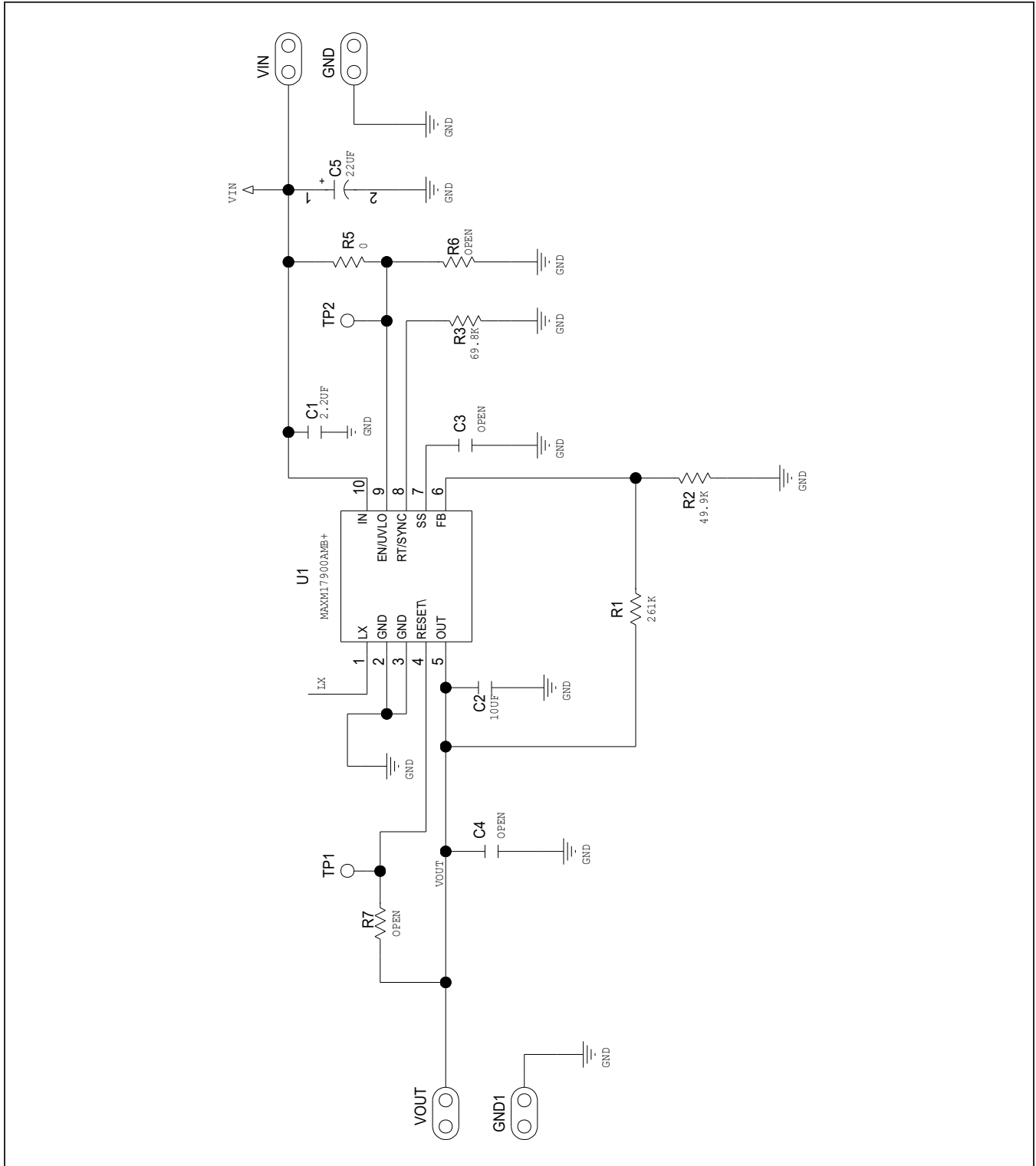
PART	TYPE
MAXM17900EVKIT#	EV KIT

#Denotes RoHS compliant.

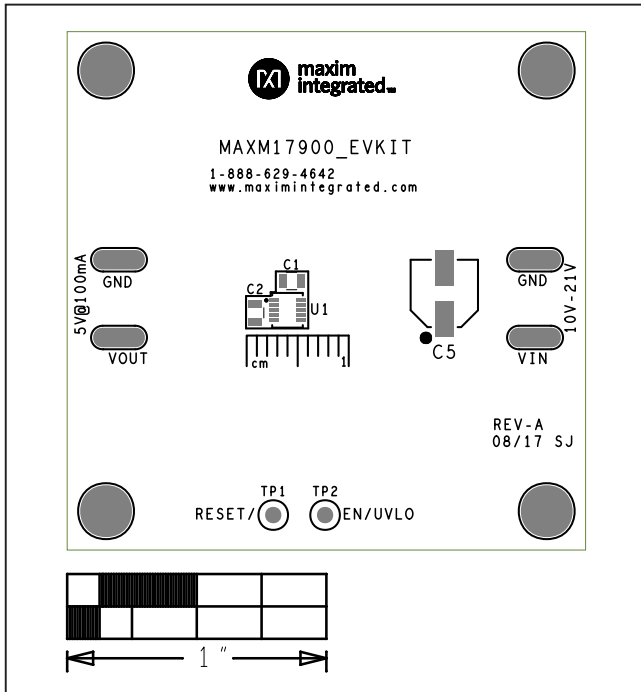
Component Suppliers

SUPPLIER	WEBSITE
Murata Americas	www.murata.com
Panasonic Corp.	www.panasonic.com

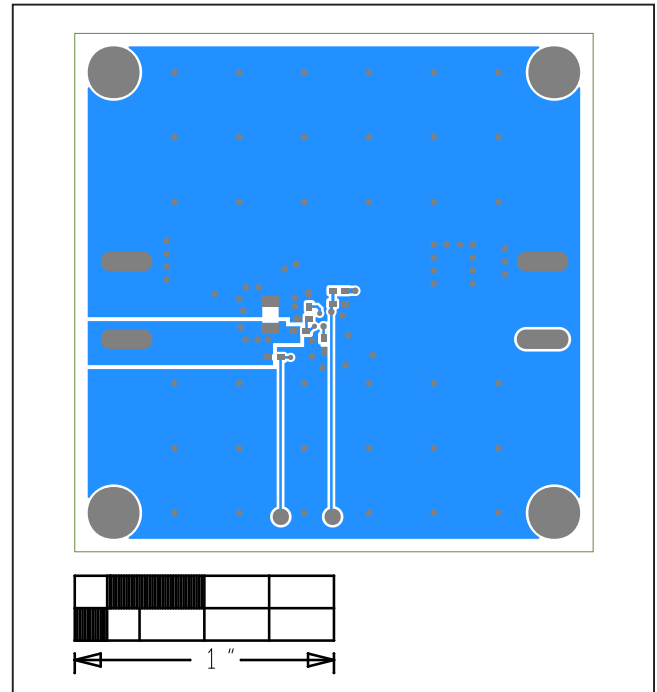
MAXM17900 EV Kit Schematic



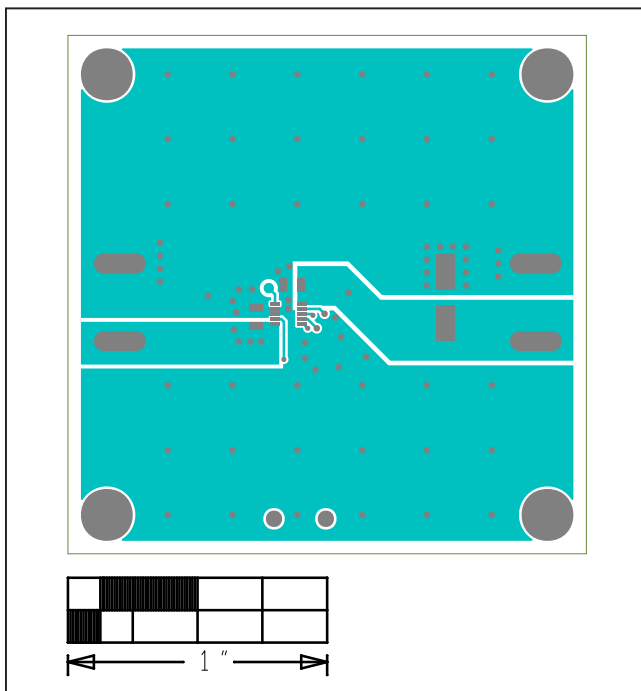
MAXM17900 EV Kit PCB Layouts



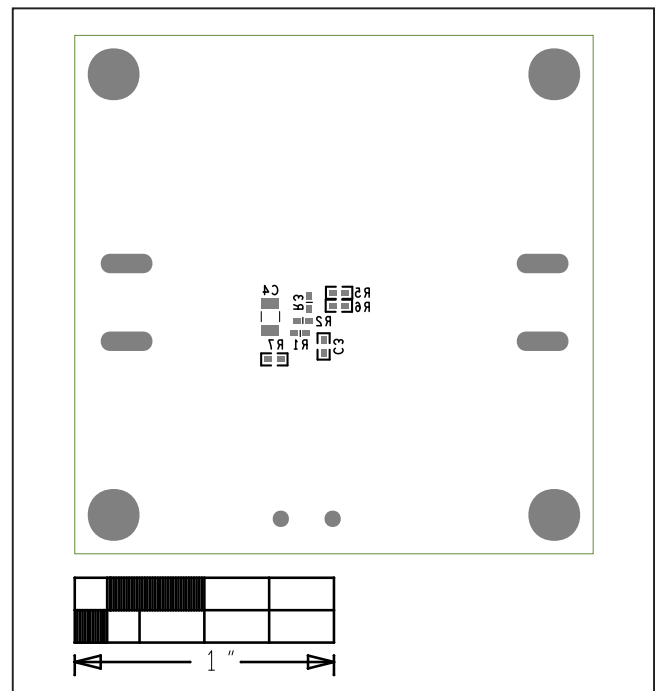
Silk Top



Top



Bottom



Silk Bottom

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/17	Initial release	—

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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