EVQ4491M-RE-00A

2.5A, 36V, Frequency Selectable Step-Down Converter with Single USB Charging Port

The Future of Analog IC Technology

DESCRIPTION

The EVQ4491M-RE-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MPQ4491M. MPQ4491M integrates a monolithic step-down switch mode converter and one USB current limit switch with charging port identification circuit. It achieves 2.5A continuous output current over a wide input supply range with excellent load and line regulation.

The output of USB switch is current limited. MPQ4491M provides a USB Dedicate Charging Port (DCP) which supports Battery Charging Specification 1.2 (BC1.2), the Divider Mode, and 1.2V/1.2V Mode without the need of outside user interaction.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	7-36	V
Output Voltage	V_{USB}	5	V
Switching Frequency	Fs	250	kHz
Output Current	I_{USB}	2.5	A

FEATURES

- EMI Reduction Technique
- 14V Typical Operating Input Voltage
- 36V Max. Operating Input Voltage
- Fixed 5V Output Voltage with Line Drop Compensation
- Accurate Output Current Limit
- 350kHz/250kHz/150kHz Frequency Selectable
- Programmable Line Drop Compensation
- Supporting DCP schemes for BC1.2, Divider Mode, and 1.2V/1.2V Mode

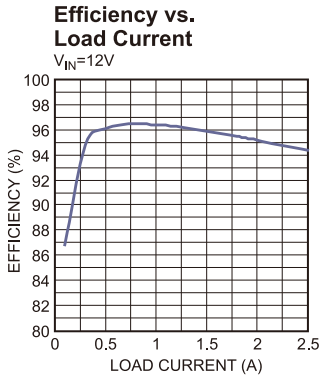
APPLICATIONS

- USB Dedicated Charging Port (DCP)
- Automotive Cigarette Lighter Adapters
- Power Supply for Linear Chargers

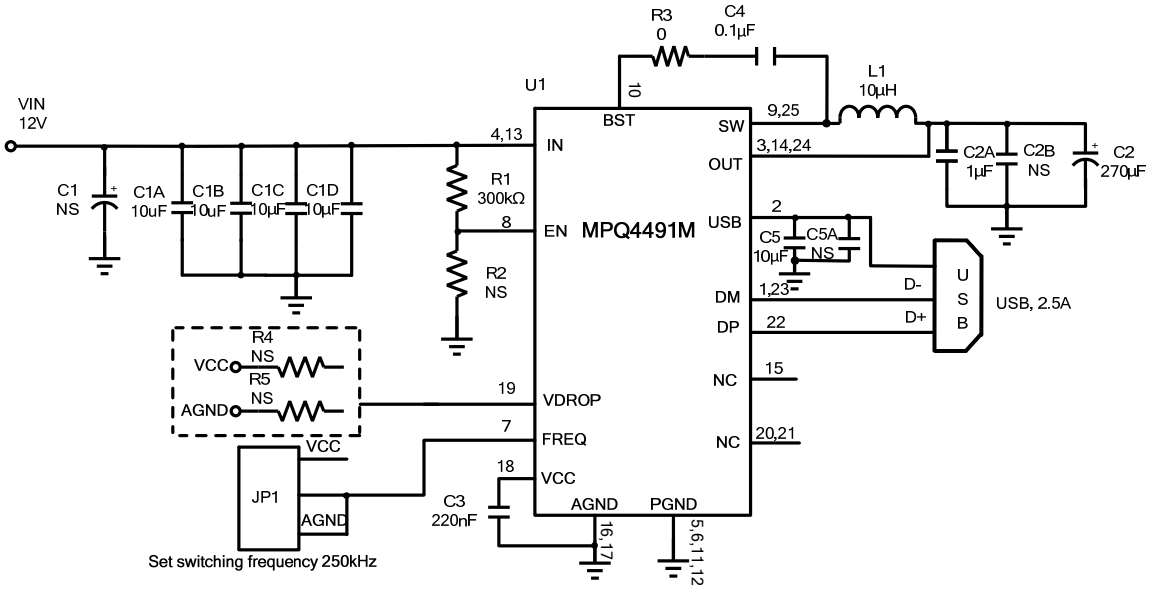
EVQ4491M-RE-00A EVALUATION BOARD

(L x W x H) 6.5cm x 6cm x 1.7cm

Board Number	MPS IC Number
EVQ4491M-RE-00A	MPQ4491MGRE-AEC1 (QFN-25)



EVALUATION BOARD SCHEMATIC



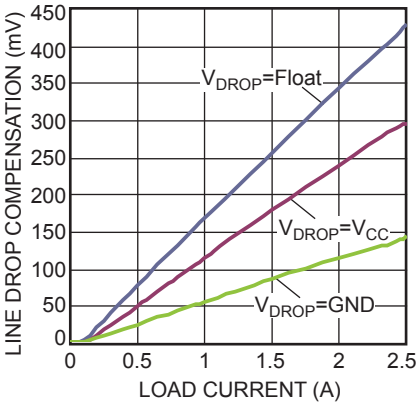
EVQ4491M-RE-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
0	C1, C5A	NS				
4	C1A, C1B, C1C, C1D	10µF	Ceramic Capacitor, 50V, X5R	0805	Murata	GRM21BR61H106KE43L
1	C2	270µF	Polymer Capacitor,6.3V	DIP	Chemi-Con	APSK6R3ELL271ME08S
1	C2A	1µF	Ceramic Capacitor, 16V, X7R	0603	Murata	GRM188R71C105KA12D
1	C3	0.22µF	Ceramic Capacitor, 16V, X7R	0603	Murata	GRM188R71C224KA01D
1	C4	0.1µF	Ceramic Capacitor, 16V, X7R	0603	Murata	GRM188R71C104KA01D
1	C5	10µF	Ceramic Capacitor, 6.3V, X5R	0603	Murata	GRM188R60J106ME47D
1	R1	300kΩ	Resistor, 1%	0603	Royal	RL0603FR-07300KL
1	R3	0	Resistor, 1%	0603	Royal	RL0603FR-070KL
0	R2,R4,R5	NS				
1	L1	10µH	Inductor, DCR 16mΩ	SMT	Wurth	7443251000
1	USB	USB	Single USB port	Tray	Wurth	61400416021
1	JP1	Jumper	Jumper	DIP	Any	
1	U1	MPQ4491M	Step Converter	QFN25 (4mmx4mm)	MPS	MPQ4491MGRE-AEC1

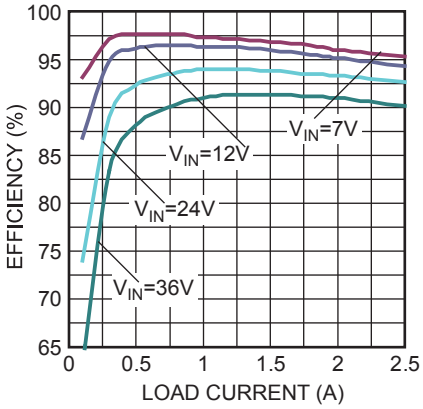
TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 12V, V_{OUT} = 5V, L =10µH, fs=250kHz , T_A = 25°C, unless otherwise noted.

Line Drop Compensation vs. Load Current

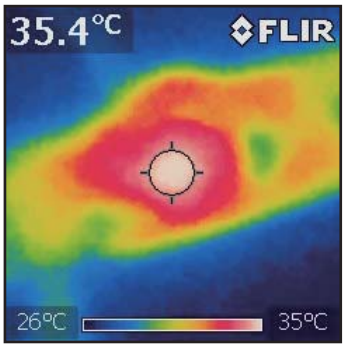


Efficiency vs. Load Current



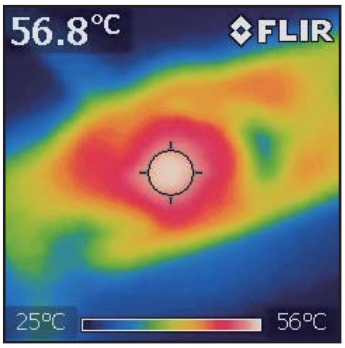
Thermal Test

T_A=25°C, No Airflow
V_{IN}=12V, USB_I_{OUT}=1.1A



Thermal Test

T_A=25°C, No Airflow
V_{IN}=12V, USB_I_{OUT}=2.5A

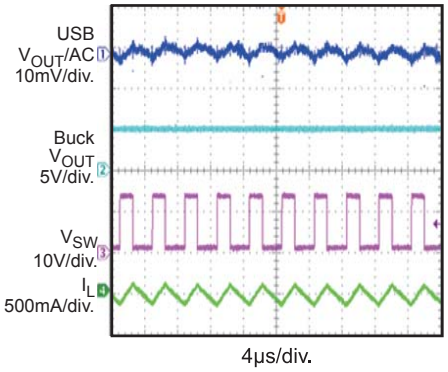


TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 12V, V_{OUT} = 5V, L =10µH, fs=250kHz, T_A = 25°C, unless otherwise noted.

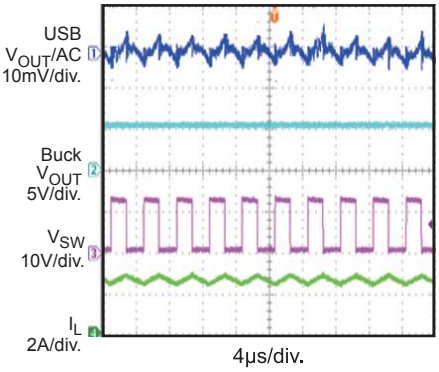
Output Ripple

V_{IN} = 12V, USB_I_{OUT} = 0A



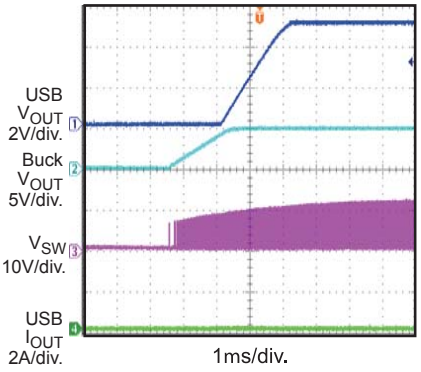
Output Ripple

V_{IN} = 12V, USB_I_{OUT} = 2.5A



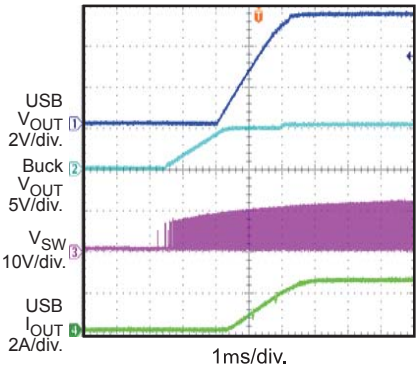
Power Startup

V_{IN} = 12V, USB_I_{OUT} = 0A



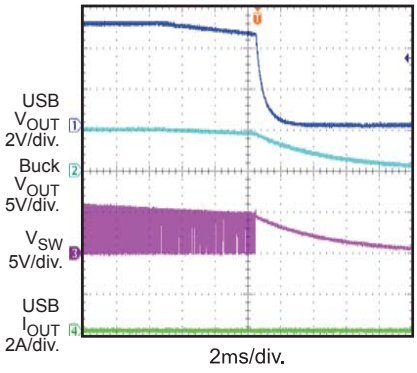
Power Startup

V_{IN} = 12V, USB_I_{OUT} = 2.5A, CRL Load



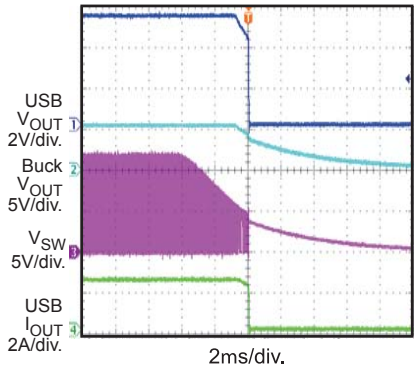
Power Shutdown

V_{IN} = 12V, USB_I_{OUT} = 0A



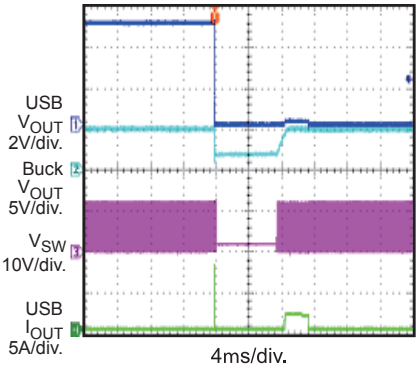
Power Shutdown

V_{IN} = 12V, USB_I_{OUT} = 2.5A, CRL Load



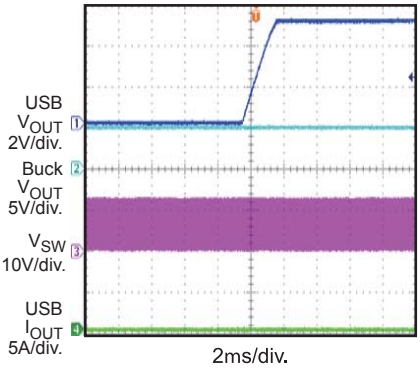
USB Short Current Protection Entry

V_{IN} = 12V, USB_I_{OUT} = 0A

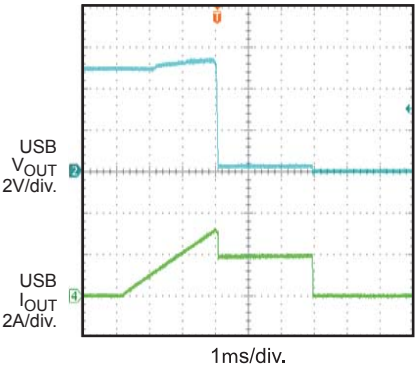


USB Short Current Protection Recovery

V_{IN} = 12V, USB_I_{OUT} = 0A



USB Over Current Protection



PRINTED CIRCUIT BOARD LAYOUT

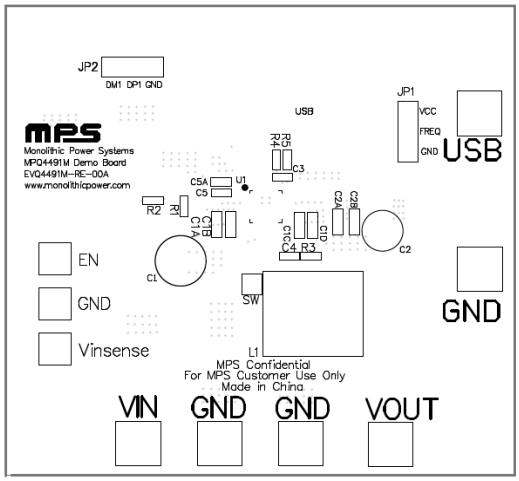


Figure 1—Top Silk Layer

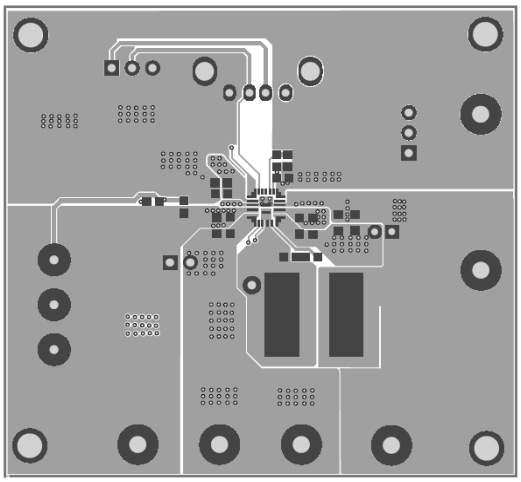


Figure 2—Top Layer

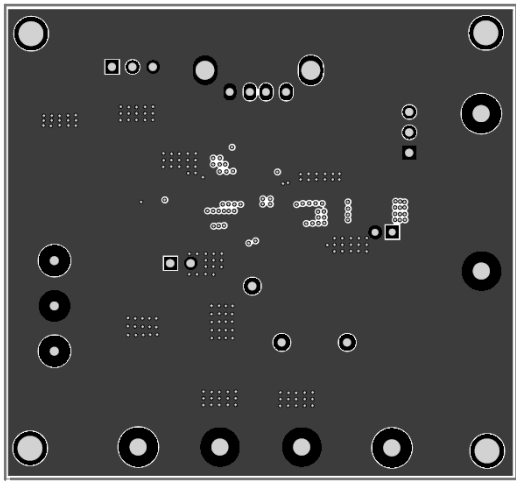


Figure 3—Mid 1 Layer

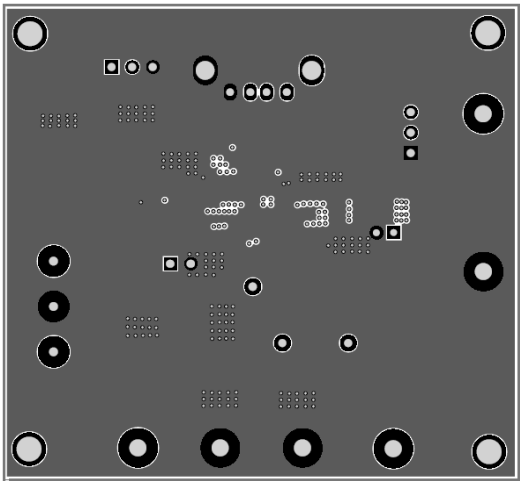


Figure 4—Mid 2 Layer

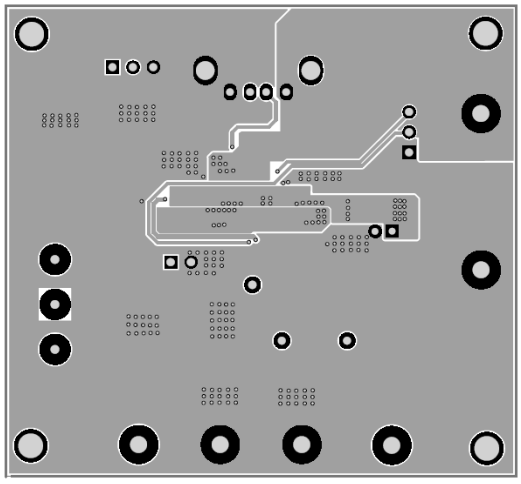


Figure 5—Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the USB and GND pins, respectively.
2. Preset the power supply output between 7V and 36V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The board will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 2V to turn on the regulator or less than 1V to turn it off.