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EV4458DQT-00A

1A, 4MHz, 36V Step-Down Converter

DESCRIPTION

The EV4458DQT-00A is an evaluation board for the MP4458, a high frequency step-down switching regulator with an integrated internal high-side high voltage power MOSFET. The IC provides 1A output with current mode control for fast loop response and easy compensation.

High power conversion efficiency over a wide load range is achieved by scaling down the switching frequency at light load condition to reduce the switching and gate driving losses.

The frequency foldback helps prevent inductor current runaway during startup and thermal shutdown provides reliable, fault tolerant operation.

By switching at 4MHz, the MP4458 prevents EMI (Electromagnetic Interference) noise problems, such as those found in AM radio and ADSL applications.

FEATURES

- Wide Operating Input Range
- Up to 4MHz Programmable Switching Frequency
- Precision Current Limit without a Current Sensing Resistor
- Up to 95% Efficiency
- Fully Assembled and Tested

APPLICATIONS

- High Voltage Power Conversion
- Automotive Systems
- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems

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ELECTRICAL SPECIFICATIONS

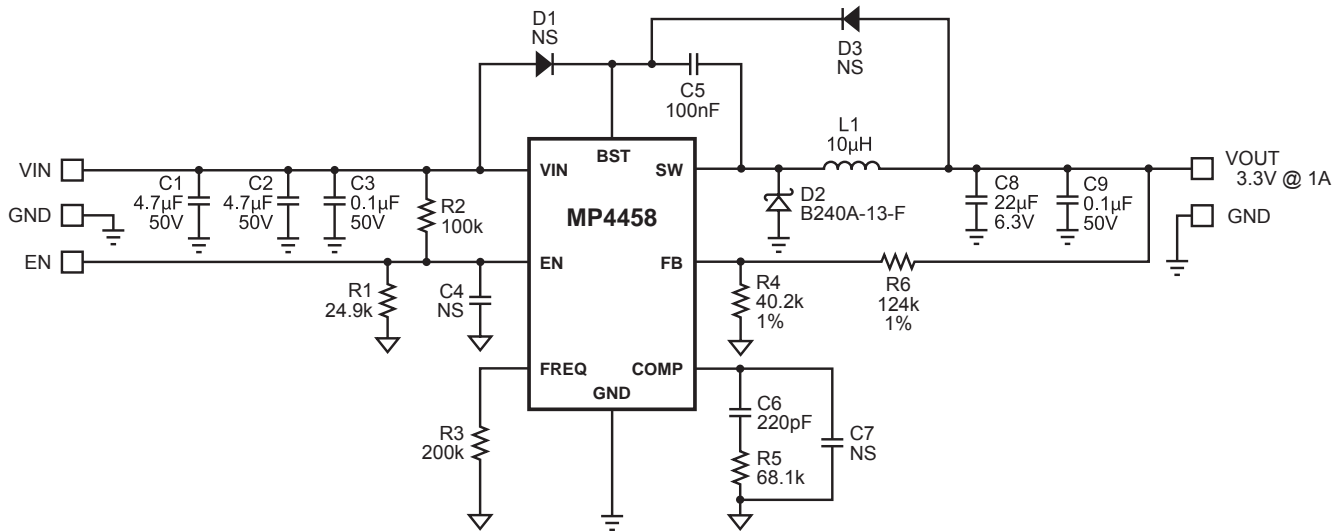
Parameter	Symbol	Value	Units
Input Voltage	V _{IN}	36 Max	V
Output Voltage	V _{OUT}	3.3	V
Output Current	I _{OUT}	1	A

EV4458DQT-00A EVALUATION BOARD



(L x W x H) 1.8" x 1.8" x 0.4"
4.6cm x 4.6cm x 1.0cm

Board Number	MPS IC Number
EV4458DQT-00A	MP4458DQT

EVALUATION BOARD SCHEMATIC

EV4458DQT-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	4.7 μ F	Ceramic Cap. 50V, X7R	1210	muRata	GRM32ER71H475K
1	C3	0.1 μ F	Ceramic Cap. 50V, X7R	0805	muRata	GRM21AR71H104K
2	C5, C9	0.1 μ F	Ceramic Cap. 16V, X7R	0603	muRata	GRM188R71C104K
1	C6	220pF	Ceramic Cap. 50V, COG	0603	muRata	GRM188R71H221K
1	C8	22 μ F	Ceramic Cap. 6.3V, X5R	1210	muRata	GRM32ER60J226K
2	C4, C7		Do Not Stuff			
2	D1, D3		Do Not Stuff			
1	D2		Diode Schottky, 40V, 2A	SMA	Diodes Inc	B240-13-F
1	R1	24.9k Ω	Film Resistor, 1%	0603	Panasonic	ERJ-3EKF2492V
1	R2	100k Ω	Film Resistor, 5%	0603	Panasonic	ERJ-3GEYJ104V
1	R3	200k Ω	Film Resistor, 5%	0603	Panasonic	ERJ-3GEYJ204V
1	R4	40.2k Ω	Film Resistor, 1%	0603	Panasonic	ERJ-3EKF4022V
1	R5	68.1k Ω	Film Resistor, 1%	0603	Panasonic	ERJ-3EKF1243V
1	R6	124k Ω	Film Resistor, 1%	0603	Panasonic	ERJ-3EKF1243V
1	L1	10 μ H	Inductor, Is=4A, R _{DC} =32m Ω	SMD	Cooper Bussmann Inc.	SD8350-100-R
1	U1	MP4458DQT	Step-Down Regulator	QFN10	Monolithic Power Systems Inc.	MP4458DQT

PRINTED CIRCUIT BOARD LAYOUT

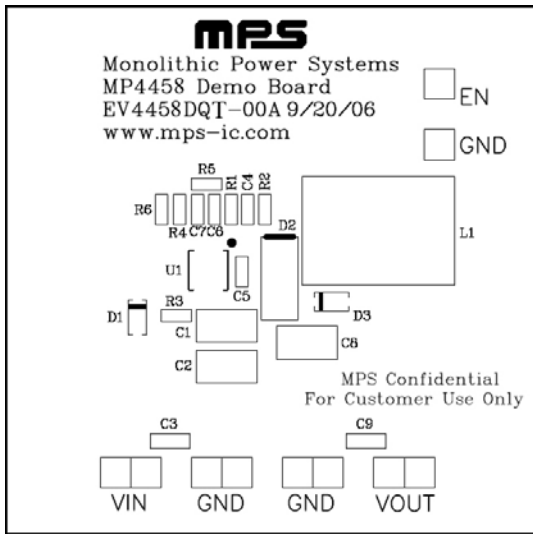


Figure 1—Top Silk Layer

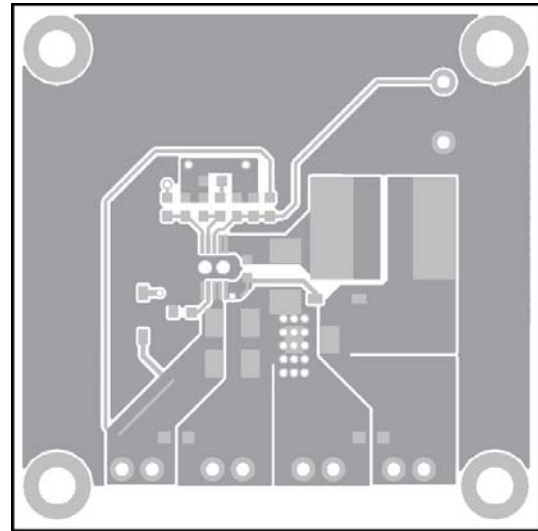


Figure 2—Top Layer

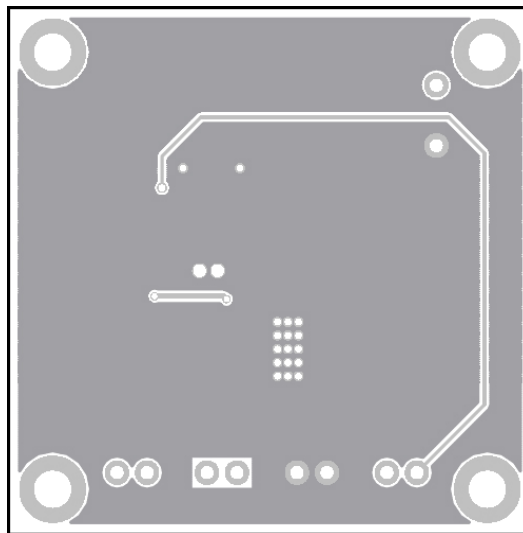


Figure 3—Bottom Layer

QUICK START GUIDE

1. Connect the positive terminal of the load to VOUT pins, and the negative terminal of the load to GND pins.
2. Preset the power supply output to 12V and turn off the power supply.
3. Connect the positive terminal of the power supply output to the VIN pin and the negative terminal of the power supply output to the GND pin.
4. Turn on the power supply. The EV4458DQT-00A will automatically start up.
5. To use the Enable function, apply a digital input to the EN pin. Drive EN higher than 1.6V to turn on the regulator or less than 1.2V to turn it off.
6. An input under-voltage lockout (UVLO) function is implemented by the addition of a resistor divider (R1 and R2). The EN threshold is 1.2V (falling edge), so the input UVLO threshold is:

$$UVLO = 1.2V \times \left(1 + \frac{R2}{R1}\right)$$

The UVLO threshold is preset to 6V on this board.

7. To change the switching frequency, adjust the value of R3:

$$f_s(\text{KHz}) = \frac{70000}{R3^{0.93}}$$

The switching frequency on the board is preset to 500KHz.

Please note that an external bootstrap diode from a 5V supply to the BST pin is necessary to boost gate drive voltage if the switching frequency is above 2MHz. This is because the charge time is reduced at such high switching frequencies.

8. To adjust the output voltage, change the values of R4 and R6. For $V_{FB}=0.8V$, $R4=40.2k\Omega$, R1 can be determined by:

$$R1 = 50.25 \times (V_{OUT} - 0.8) \text{ (k}\Omega\text{)}$$

Please follow the application information on the MP4458 datasheet to recalculate/select compensation values, the inductor value and the output capacitor value if the output voltage needs to be reprogrammed.

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