# EV4459DQT-00A

**1.5A, 4MHz, 36V Step-Down Converter**

The Future of Analog IC Technology

## DESCRIPTION

The EV4459DQT-00A is an evaluation board for the MP4459, a high frequency step-down switching regulator with an integrated internal high-side high voltage power MOSFET. The IC provides 1.5A 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 MP4459 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 | $I_{OUT}$ | 1.5 | A |

## EV4459DQT-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 |
|---|---|
| EV4459DQT-00A | MP4459DQT |


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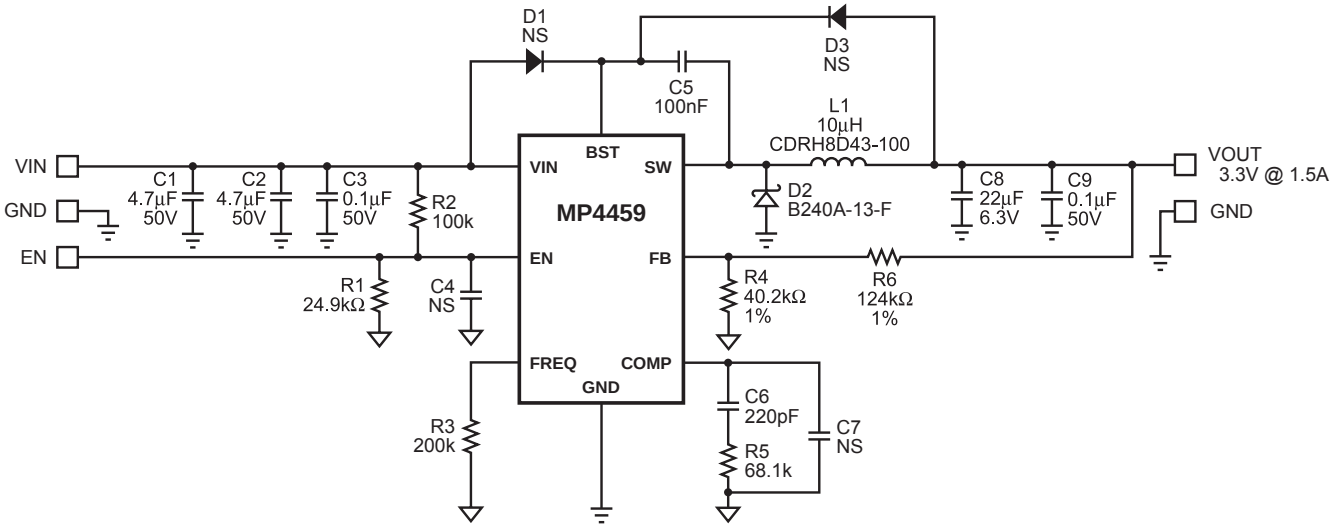
## EVALUATION BOARD SCHEMATIC




## EV4459DQT-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer P/N |
|---|---|---|---|---|---|---|
| 2 | C1, C2 | 4.7uF | Ceramic Cap, 50V, X7R | 1210 | Murata | GRM32ER71H475KA88L |
| 2 | C3, C9 | 0.1uF | Ceramic Cap, 50V, X7R | 805 | TDK | C2012X7R1H104K |
| 2 | C4, C7 | | Do Not Stuff | | | |
| 1 | C5 | 100nF | Ceramic Cap, 50V, X7R | 603 | TDK | C1608X7R1H104K |
| 1 | C6 | 220pF | Ceramic Cap, 50V, C0G | 603 | TDK | C1608C0G1H221J |
| 1 | C8 | 22uF | Ceramic Cap, 6.3V, X5R | 1210 | TDK | C3225X5R0J226M |
| 2 | D1, D3 | | Do Not Stuff | | | |
| 1 | D2 | | Diode Schottky, 40V, 2A | SMA | Diodes Inc | B240A-13-F |
| 1 | R1 | 24.9k | Film Res, 1% | 603 | Panasonic | ERJ-3EKF2492V |
| 1 | R2 | 100k | Film Res, 5% | 603 | Panasonic | ERJ-3GEYJ104V |
| 1 | R3 | 200k | Film Res, 5% | 603 | Panasonic | ERJ-3GEYJ204V |
| 1 | R4 | 40.2k | Film Res, 1% | 603 | Panasonic | ERJ-3EKF4022V |
| 1 | R5 | 68.1k | Film Res, 1% | 603 | Panasonic | ERJ-3EKF6812V |
| 1 | R6 | 124k | Film Res, 1% | 603 | Panasonic | ERJ-3EKF1243V |
| 1 | L1 | 10uH | Inductor, 4.0A | SMD | Sumida | CDRH8D43-100 |
| 1 | U1 | | Step-Down Regulator | QFN10 | MPS | MP4459DQT |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## PRINTED CIRCUIT BOARD LAYOUT

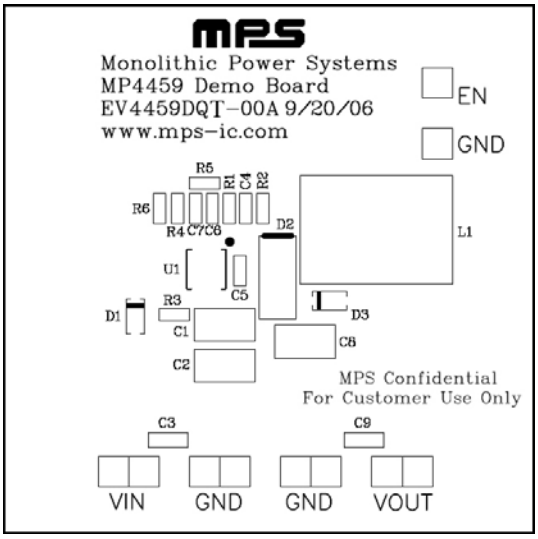


**Figure 1—Top Silk Layer**

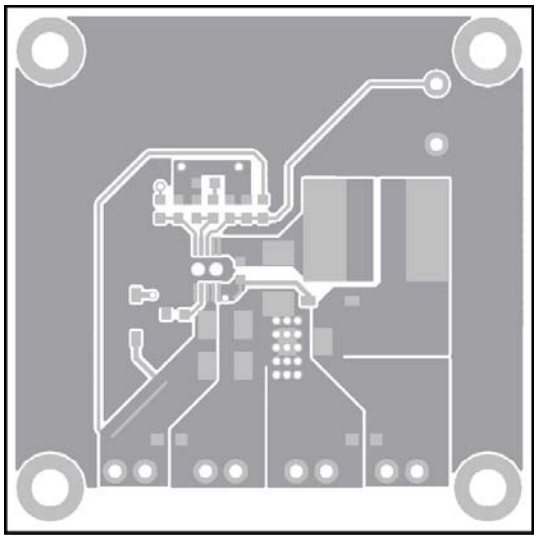

**Figure 2—Top Layer**

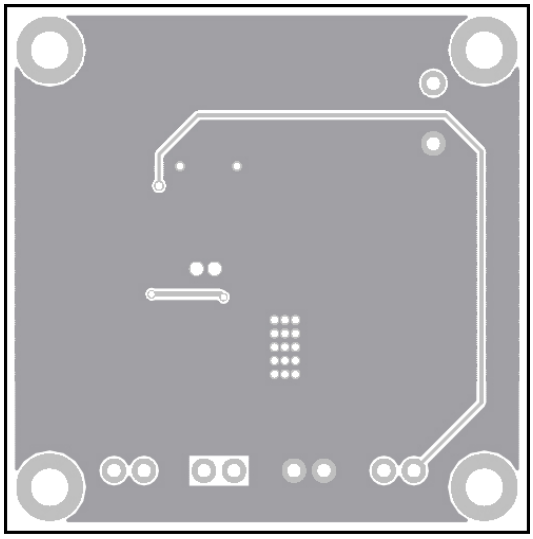

**Figure 3—Bottom Layer**


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## 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 EV4459DQT-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:

   $$f_S(KHz) = \frac{70000}{R3(k\Omega)0.93}$$

   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, $V_{FB}$=0.8V. or R2=40.2kΩ, change R1 using the equation:

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

   Please follow the application information on the MP4459 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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