# EV2459-J-00A

## 0.5A, 480kHz, 55V Step-Down Converter Evaluation Board

## DESCRIPTION

The EV2459-J-00A is an evaluation board for the MP2459, a fixed 480kHz frequency step-down switching regulator with an integrated high-side high voltage power MOSFET.

The board can provide the load current up to 0.6A. High power conversion efficiency over a wide load range is achieved by scaling down the switching frequency at light load condition. The 5V to 55V input range accommodates a variety of step-down applications.

The board provides compact arrangement of components. By switching at 480kHz, smaller value inductor and input/output capacitor can be used to lower down cost and save board space.

## FEATURES

- Compact Arrangement of Components
- Wide Operating Input Range
- 0.5A Output Current
- Up to 90% Efficiency

## APPLICATIONS

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



## ELECTRICAL SPECIFICATIONS

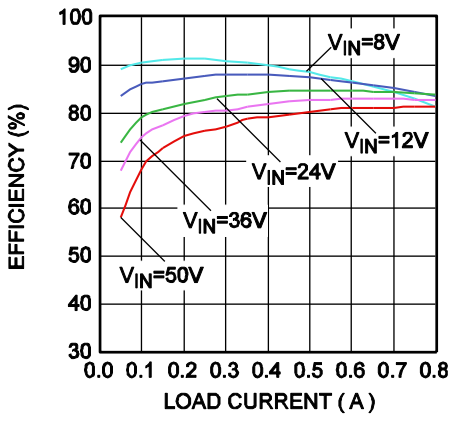
| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | 7-50 | V |
| Output Voltage | $V_{OUT}$ | 5 | V |
| Output Current | $I_{OUT}$ | 0-0.5 | A |

## EV2459-J-00A EVALUATION BOARD

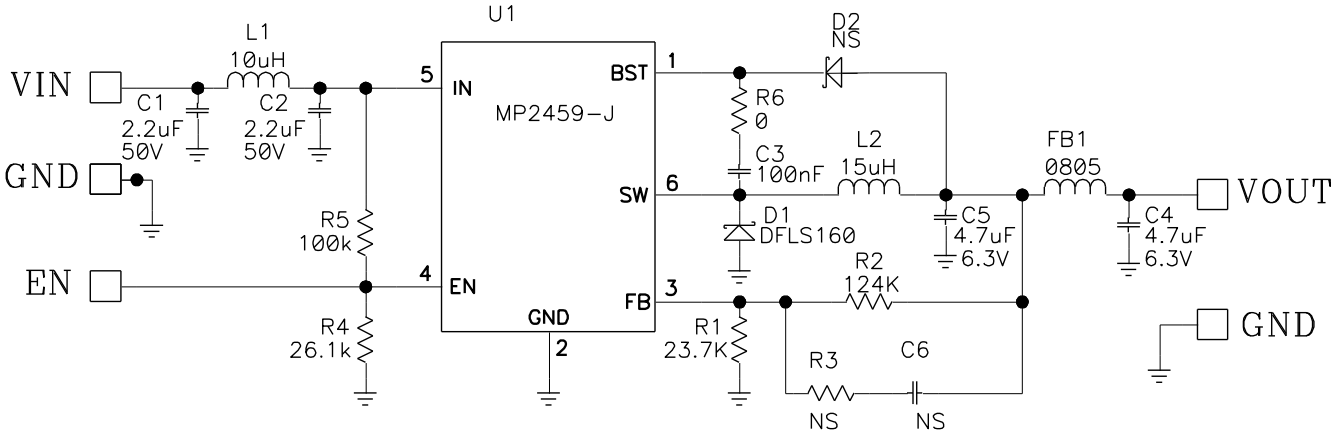

**(L x W x H) 1.8" x 1.8" x 0.039"**
**4.6cm x 4.8cm x 0.1cm**

| Board Number | MPS IC Number |
|---|---|
| EV2459-J-00A | MP2459-J |

**Load Efficiecny**



## EVALUATION BOARD SCHEMATIC



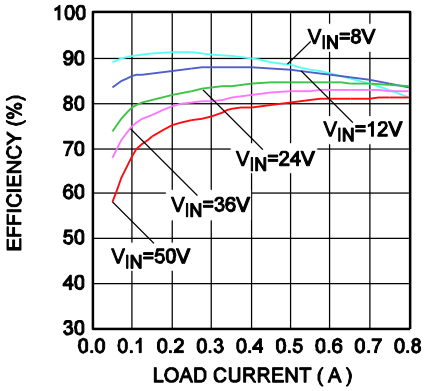

## EV2459-J-00A BILL OF MATERIALS

| Qty | Reference | Value | Description | Package | Manufacturer | Manufacturer P/N |
|---|---|---|---|---|---|---|
| 2 | C1, C2 | 2.2µF | Ceramic Cap., 50V, 10%, X7R | 1206 | muRata | GRM31CR71H225KA88L |
| 1 | C3 | 0.1µF | Ceramic Cap., 50V, 10%, X7R | 0603 | muRata | GCJ188R71H104KA12D |
| 2 | C4, C5 | 4.7µF | Ceramic Cap., 6.3V, 10%, X5R | 0603 | muRata | GRM188R60J475KE19D |
| 1 | C6 | NS | Ceramic Cap., 25V, 10%, X7R | 0603 | muRata | |
| 1 | D1 | DFLS160 | Schottky Rect., 60V,1A | SMA | Diodes Inc | DFLS160 |
| 1 | D2, | NS | | | | |
| 1 | L2 | 15µH | Inductor, Idc=0.7A | SMD 4x4mm | TDK | VLCF4020T-150MR68 |
| 1 | L1 | 10µH | Inductor, Idc=0.7A | SMD 4x4mm | TDK | VLCF4020T-100MR85 |
| 1 | FB1 | | Magnetic Bead; 3A | 0805 | Wurth | 74279206 |
| 1 | R1 | 23.7kΩ | Film Res., 1% | 0603 | Yageo | RC0603FR-0723K7KL |
| 1 | R2 | 124kΩ | Film Res., 1% | 0603 | Yageo | RC0603FR-07124KL |
| 1 | R3 | NS | Film Res., 5% | 0603 | Yageo | RC0603JR-070RL |
| 1 | R6 | 0 | Film Res., 5% | 0603 | Yageo | RC0603JR-070RL |
| 1 | R4 | 26.1kΩ | Film Res., 1% | 0603 | Yageo | RC0603FR-0726K1KL |
| 1 | R5 | 100kΩ | Film Res., 1% | 0603 | Yageo | RC0603FR-07100KL |
| 1 | U1 | MP2459 | Buck DC-DC | TSOP6 | MPS | MP2459_R0 |
| 4 | VIN,GND,VOUT,GND | | Power Test Point | 2.3mm | HZ | China market |
| 1 | EN, GND | | 3x2.54mm Test Point | 3x2.54mm | Sullins | PCC03SAAN |

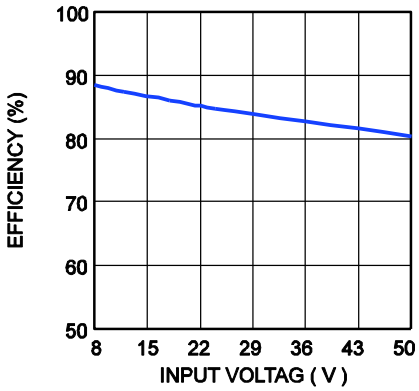
## EVB TEST RESULTS

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$=12V, $V_{OUT}$=5V, L2=15μH, $I_{OUT}$=0.5A, $T_A$=25ºC, unless otherwise noted.**

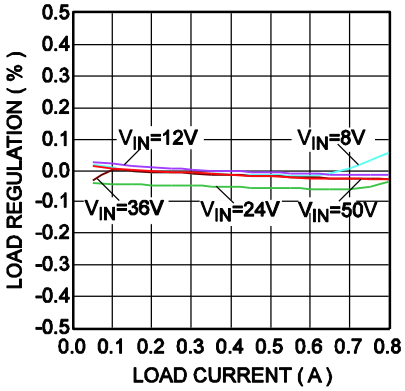
### Load Efficiecny



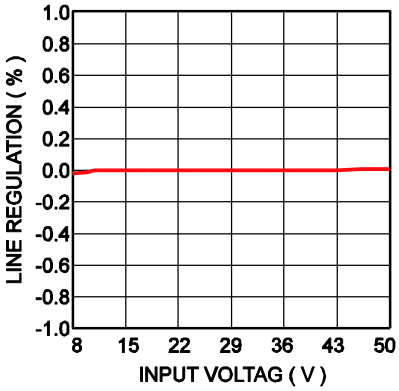

### Line Efficiency



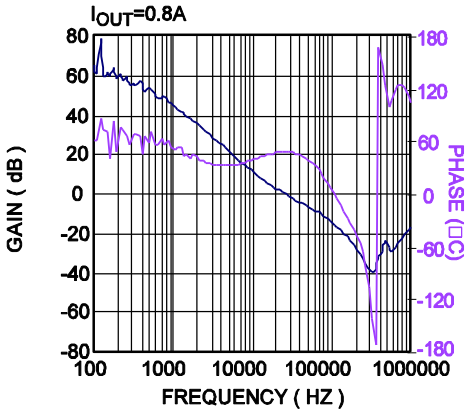

### Load Regulation



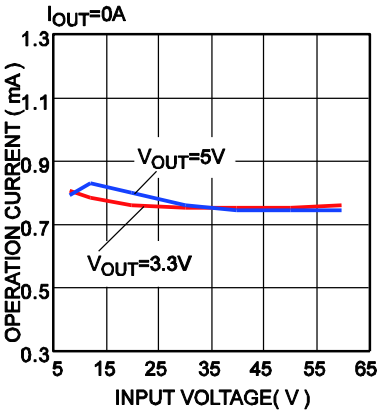

### Line Regulation



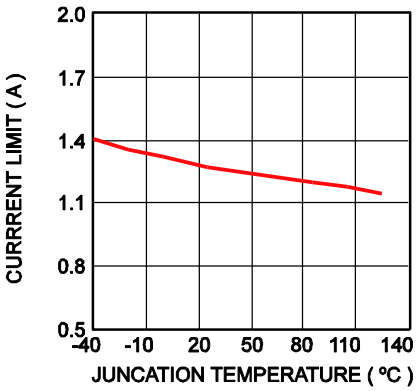

### Bandwidth



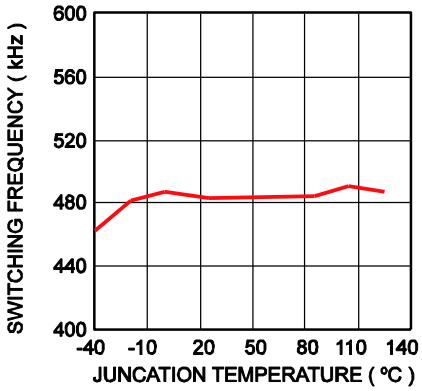

### Operation Current



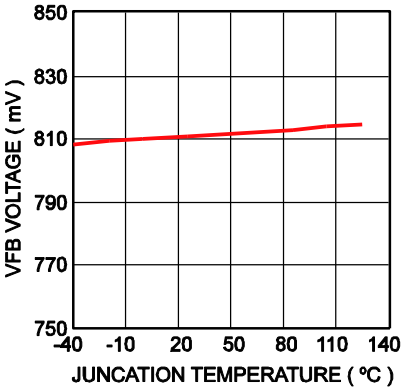

### Current Limit vs. $T_J$




### Frequency vs. $T_J$



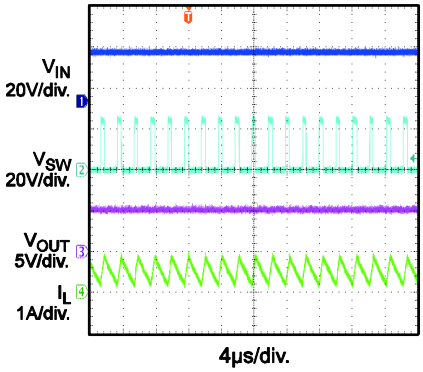

### Feedback Voltage vs. $T_J$



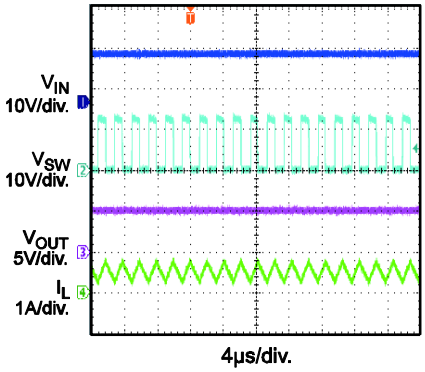
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$=12V, $V_{OUT}$=5V, L2=15µH, $I_{OUT}$=0.5A, $T_A$=25ºC, unless otherwise noted.**

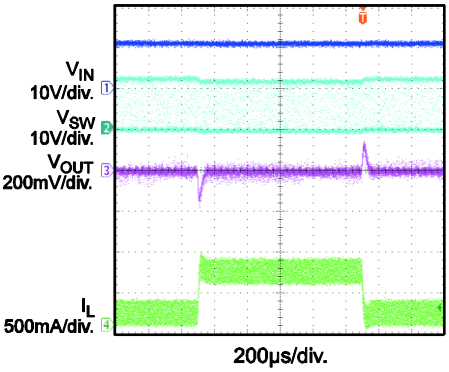
### Steady State
$V_{IN}$=24V



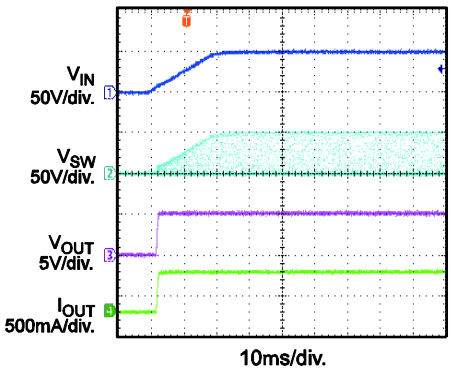

### Steady State



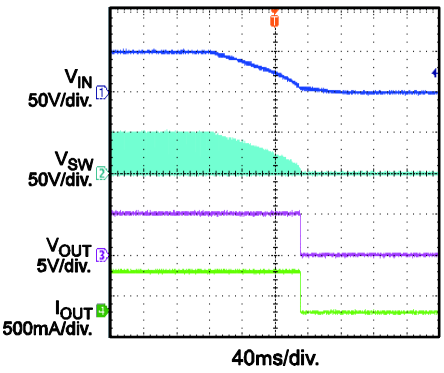

### Load Transient
$I_{OUT}$=0.2A To 0.7A



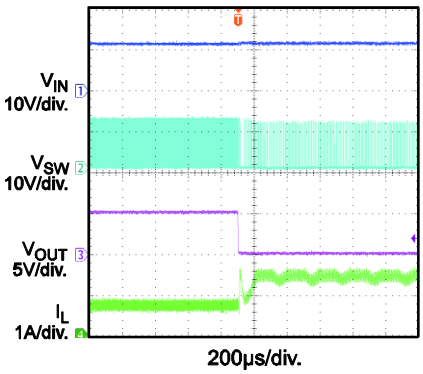

### Power Ramp Up
$V_{IN}$=50V



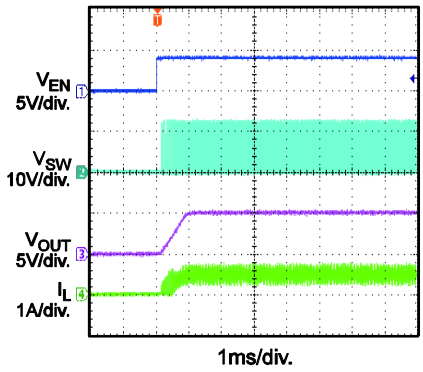

### Power Ramp Down
$V_{IN}$=50V



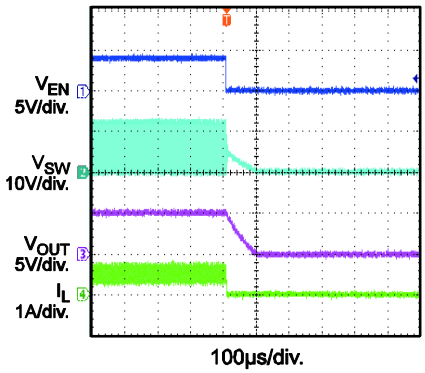

### Short Output
$I_{OUT}$=0.65A



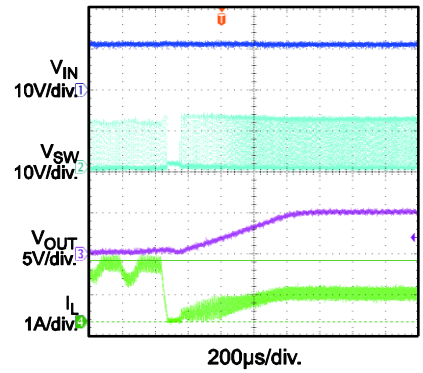

### Enable On




### Enable Off



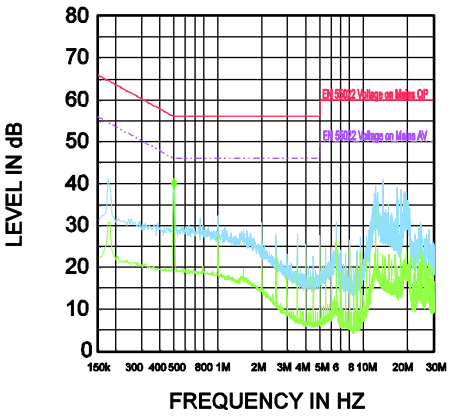

### Short Output Recovery
$I_{OUT}$=0.65A



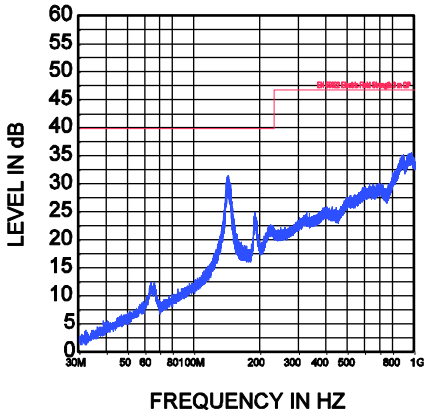
## EVB TEST RESULTS *(continued)*

**Performance waveforms are tested on the evaluation board.**
**$V_{IN}$=12V, $V_{OUT}$=5V, L2=15µH, $I_{OUT}$=0.5A, $T_A$=25ºC, unless otherwise noted.**

**Conduction EMI**




**Radiation EMI**



## PRINTED CIRCUIT BOARD LAYOUT

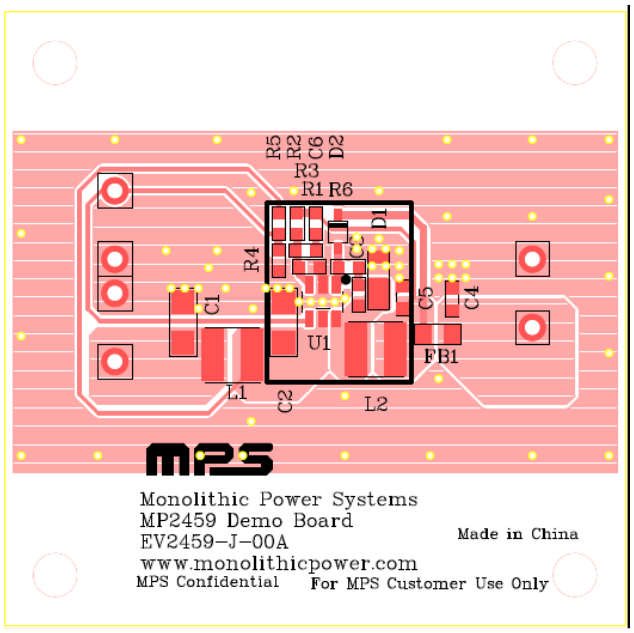



Figure 1—Top Silk Layer

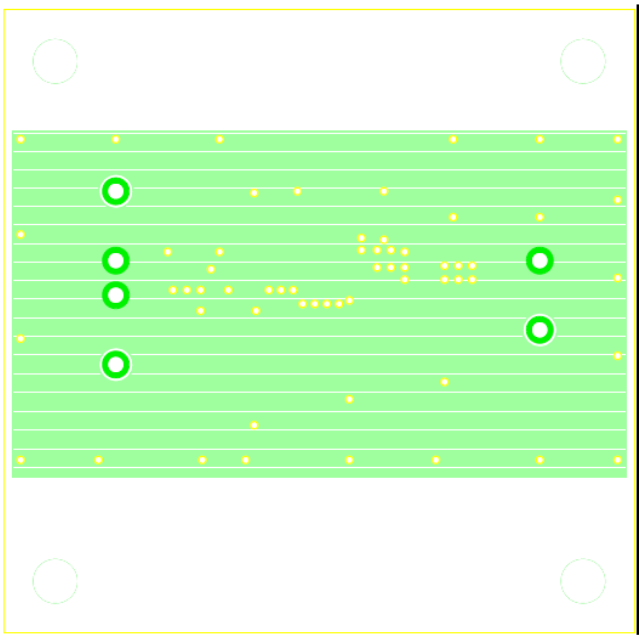


Figure 2—Bottom Layer

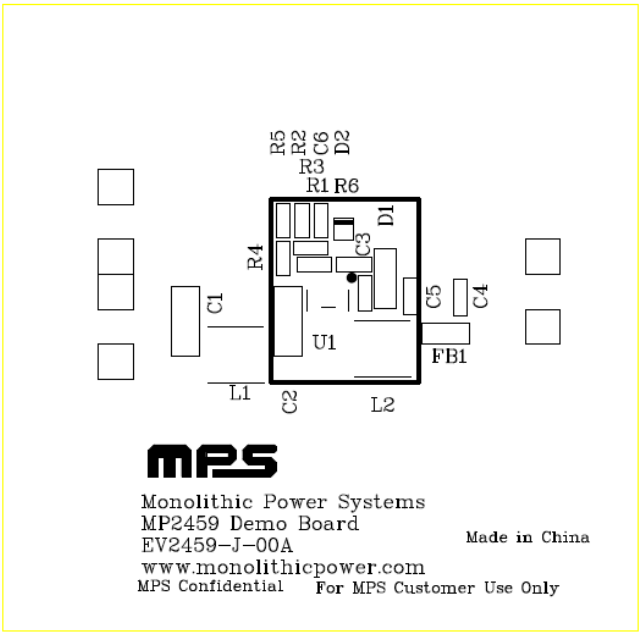



Figure 3—Top Silk

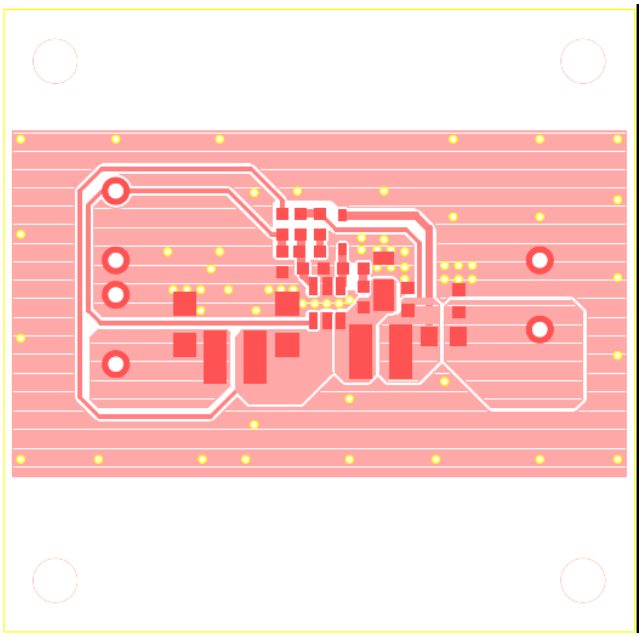


Figure 4- Top Layer

## QUICK START GUIDE

1. Connect the positive terminal of the load to VOUT pin, and the negative terminal of the load to GND pins.
2. Preset the power supply output to 7-50V 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 board will automatically start up.
5. To adjust the output voltage, change the values of R1 and R2. Generally, Choose R2 around 124kΩ for optimal transient response. For $V_{FB}$=0.812V, R2=124kΩ, R1 can be determined by:

$$R1 = \frac{R2}{\frac{V_{OUT}}{0.812V} - 1}$$

Please follow the application information on the MP2459 datasheet to recalculate/select compensation values, the inductor value and the output capacitor value if the output voltage needs to be reprogrammed.