

### DESCRIPTION

The EV28163-Q-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MP28163.

The MP28163 is a highly efficient, low quiescent current Buck-Boost converter, which operates from input voltage above, below and equal to the output voltage. The device provides power solution for products powered by a one-cell Lithium-Ion or multi-cell alkaline battery applications where the output voltage is within battery voltage rang.

The MP28163 operates with input voltage from 2V to 5.5V to provide adjustable output voltage (1.5V to 5V), and is available in QFN10-3x3mm package.

### ELECTRICAL SPECIFICATION

| Parameter      | Symbol    | Value   | Units |
|----------------|-----------|---------|-------|
| Supply Voltage | $V_{IN}$  | 2 – 5.5 | V     |
| Output Voltage | $V_{OUT}$ | 3.3     | V     |
| Output Current | $I_{OUT}$ | 0 – OCP | A     |

### FEATURES

- High efficiency up to 95%.
- Load disconnect during shutdown
- Input voltage range: 2V to 5.5V
- adjustable output voltage from 1.5V to 5V
- 1MHz switching frequency
- Pulse skipping mode at light load
- Typical 80uA quiescent current
- Internal loop compensation for fast response
- Internal soft start
- OTP, hiccup SCP
- Available in small QFN10-3x3 package

### APPLICATIONS

- Battery-powered products
- Portable instruments
- Tablet PCs
- POS systems

All MPS parts are lead-free and adhere to the RoHS directive. For MPS green status, please visit MPS website under Products, Quality Assurance page.

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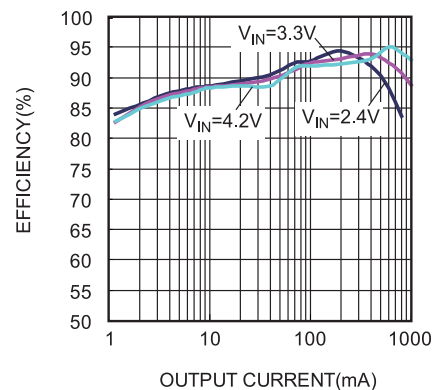
### EV28163-Q-00A EVALUATION BOARD



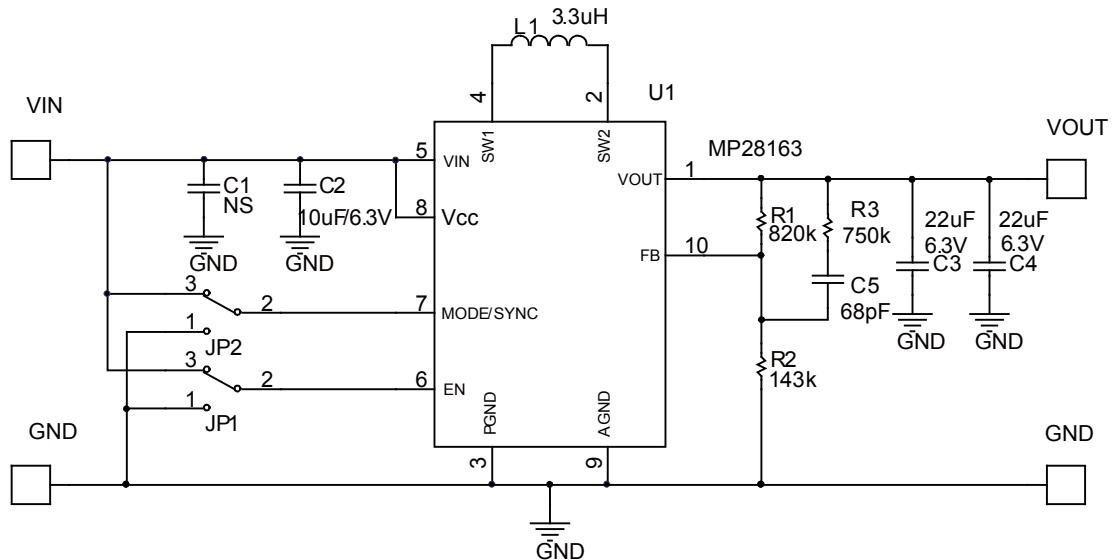
(L × W × H) 5.08cm × 5.08cm × 1.3cm

| Board Number  | MPS IC Number |
|---------------|---------------|
| EV28163-Q-00A | MP28163GQ     |

Efficiency vs. Output Current  
MODE=LOW



## EVALUATION BOARD SCHEMATIC



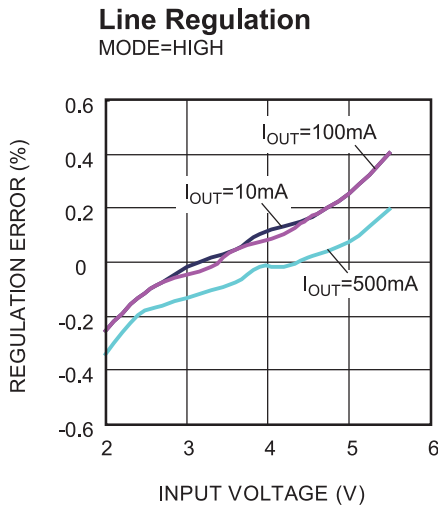
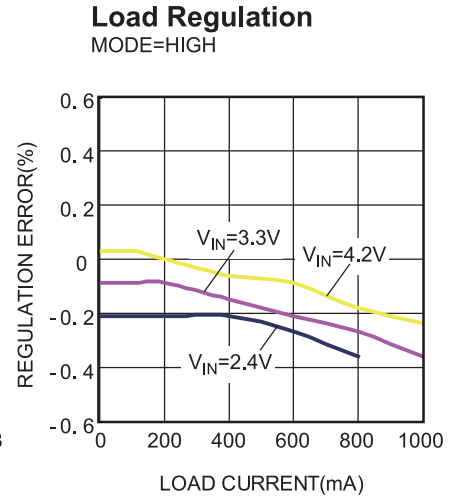
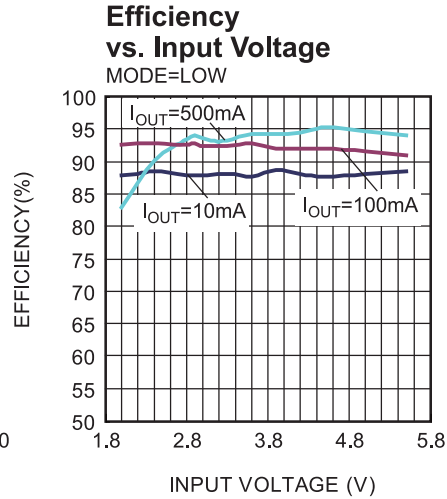
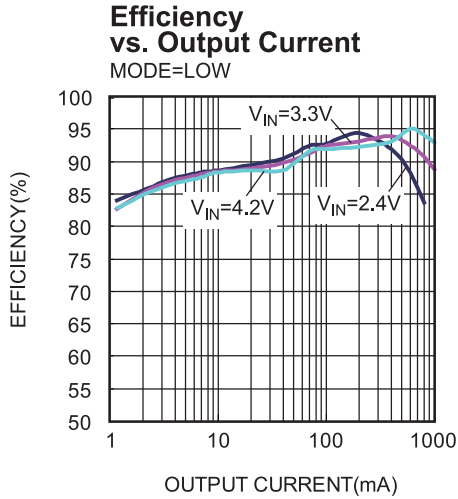
## EV28163-Q-00A BILL OF MATERIALS

| Qty | RefDes   | Value   | Description                       | Manufacturer | Manufacturer P/N   | Package   |
|-----|----------|---------|-----------------------------------|--------------|--------------------|-----------|
| 1   | C1       | NS      |                                   |              |                    | 0805      |
| 1   | C2       | 10uF    | 6.3V X7R ceramic capacitor        | muRata       | GRM21BR60J106KE19D | 0805      |
| 2   | C3, C4   | 22uF    | 6.3V X5R ceramic capacitor        | muRata       | GRM21BR60J226ME39L | 0805      |
| 1   | C5       | 68pF    | 50V, X7R ceramic Capacitor        | muRata       | GRM188R71H680KL    | 0603      |
| 2   | JP1, JP2 |         | 3 pins header                     |              |                    | DI        |
| 1   | L1       | 3.3uH   | 9mOhm, 8A inductor                | Würth        | 744314330          | SMD       |
| 1   | R1       | 820k    | Film resistor, 1%                 | YAGEO        | RC0603FR-07820KL   | 0603      |
| 1   | R2       | 143k    | Film resistor, 1%                 | YAGEO        | RC0603FR-07143KL   | 0603      |
| 1   | R3       | 750k    | Film resistor, 5%                 | YAGEO        | RC0603JR-07750KL   | 0603      |
| 1   | U1       | MP28163 | 2~5.5V, 2.6A buck-boost converter | MPS          | MP28163GQ          | QFN10-3*3 |

## EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

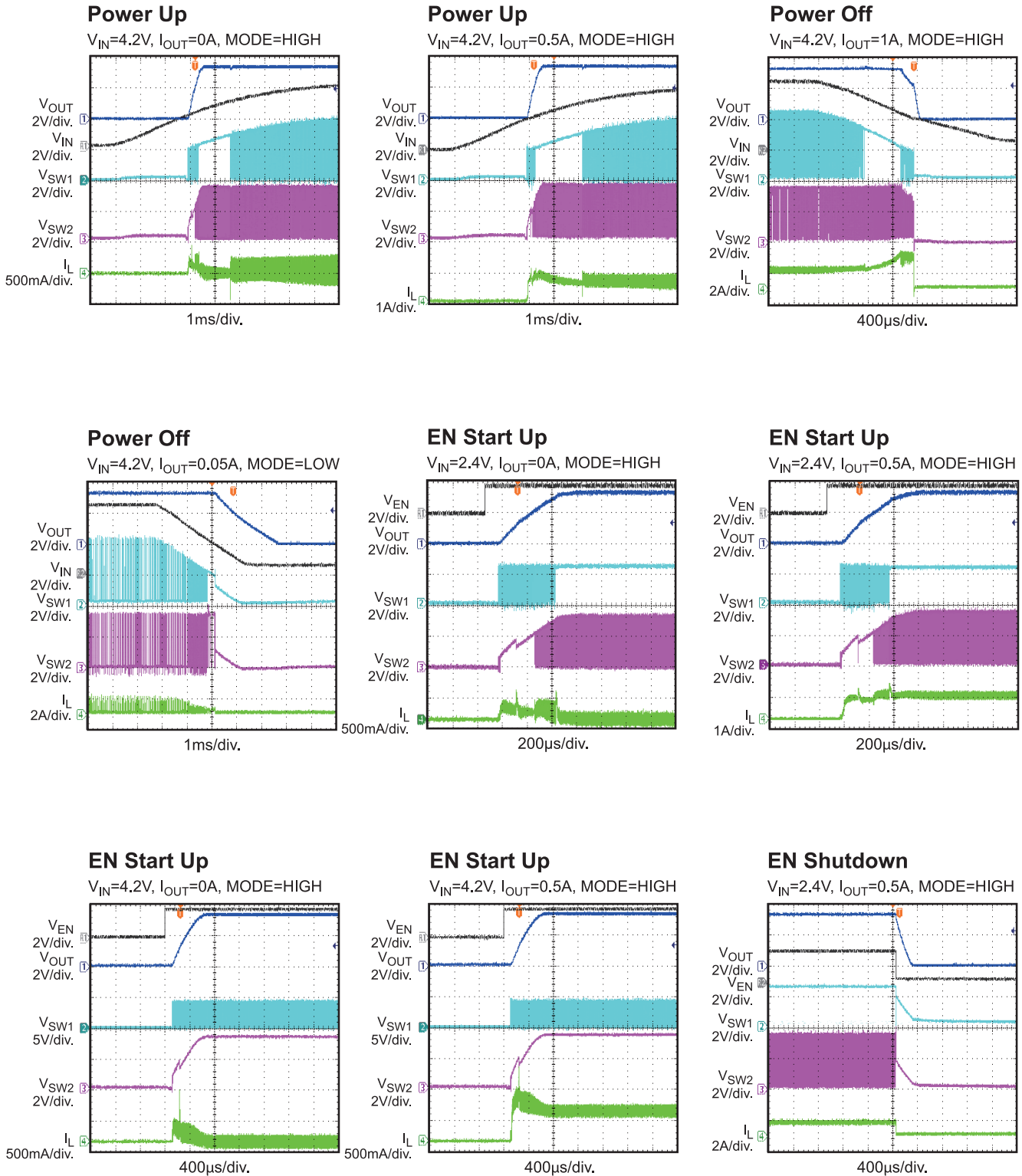
$V_{IN} = 3.3V$ ,  $V_{OUT} = 3.3V$ ,  $L = 3.3\mu H$ ,  $C_{OUT} = 2 \times 22\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.



## EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board.

$V_{IN} = 3.3V$ ,  $V_{OUT} = 3.3V$ ,  $L = 3.3\mu H$ ,  $C_{OUT} = 2 \times 22\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.



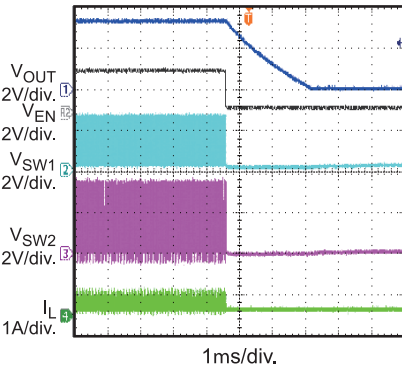
## EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board.

$V_{IN} = 3.3V$ ,  $V_{OUT} = 3.3V$ ,  $L = 3.3\mu H$ ,  $C_{OUT} = 2 \times 22\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

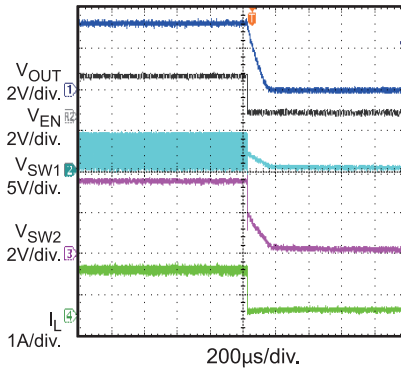
### EN Shutdown

$V_{IN} = 2.4V$ ,  $I_{OUT} = 0.05A$ , MODE=LOW



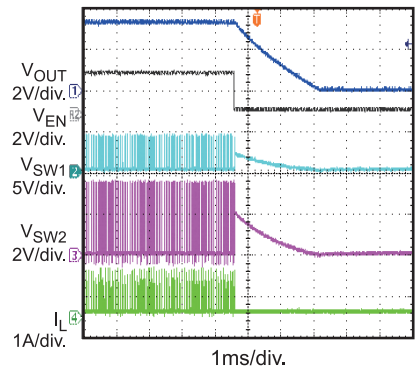
### EN Shutdown

$V_{IN} = 4.2V$ ,  $I_{OUT} = 1A$ , MODE=HIGH



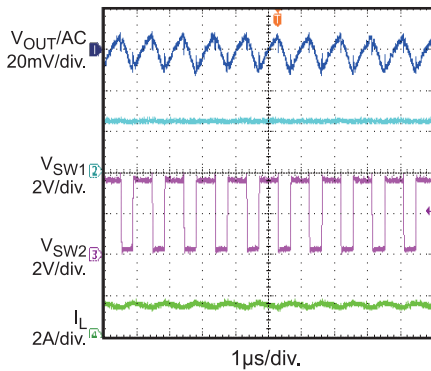
### EN Shutdown

$V_{IN} = 4.2V$ ,  $I_{OUT} = 0.05A$ , MODE=LOW



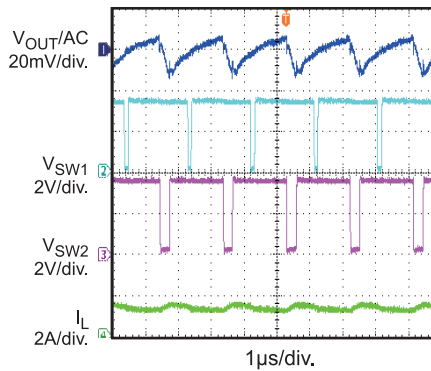
### Steady State

$V_{IN} = 2.4V$ ,  $I_{OUT} = 0.8A$ , MODE=HIGH



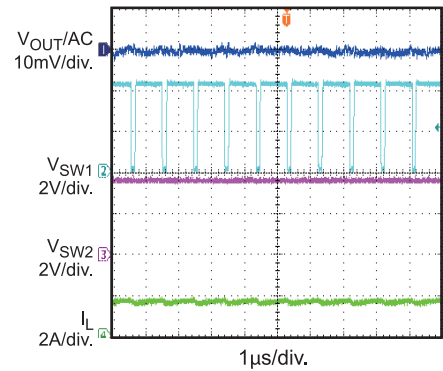
### Steady State

$V_{IN} = 3.3V$ ,  $I_{OUT} = 1A$ , MODE=HIGH



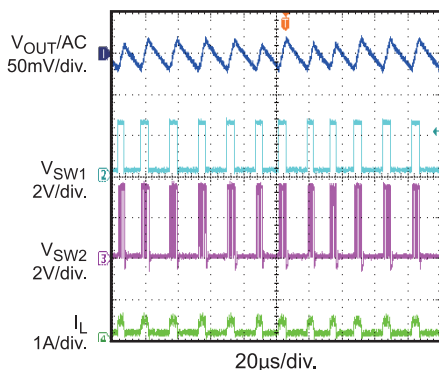
### Steady State

$V_{IN} = 4.2V$ ,  $I_{OUT} = 1.5A$ , MODE=HIGH



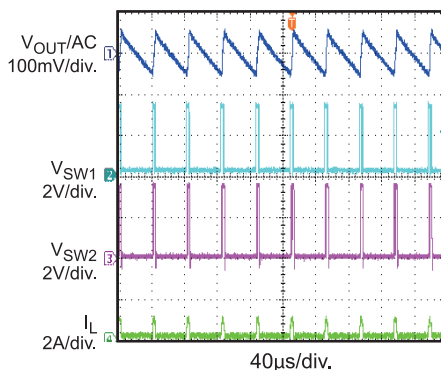
### Steady State

$V_{IN} = 2.4V$ ,  $I_{OUT} = 0.05A$ , MODE=LOW



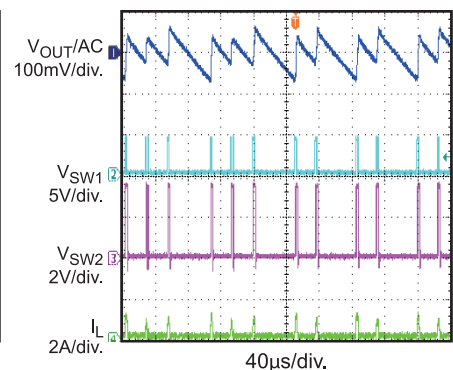
### Steady State

$V_{IN} = 3.3V$ ,  $I_{OUT} = 0.05A$ , MODE=LOW



### Steady State

$V_{IN} = 4.2V$ ,  $I_{OUT} = 0.05A$ , MODE=LOW



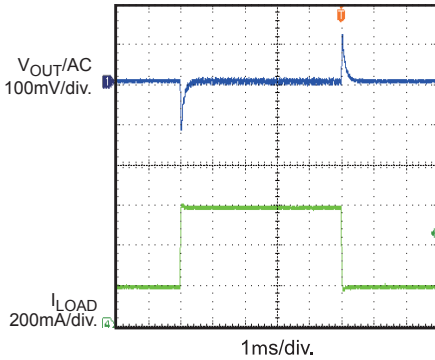
## EVB TEST RESULTS (continued)

Performance waveforms are tested on the evaluation board.

$V_{IN} = 3.3V$ ,  $V_{OUT} = 3.3V$ ,  $L = 3.3\mu H$ ,  $C_{OUT}=2x22\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

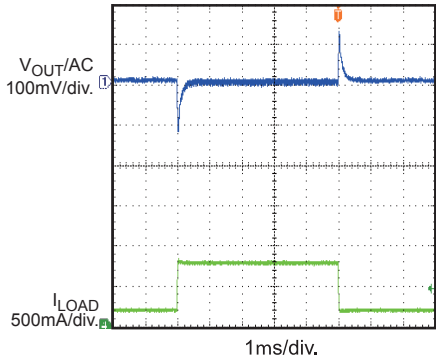
### Load Transient Response

$V_{IN}=2.4V$ ,  $I_{OUT}=0.2\rightarrow 0.6A@250mA/\mu s$ ,  
MODE=HIGH



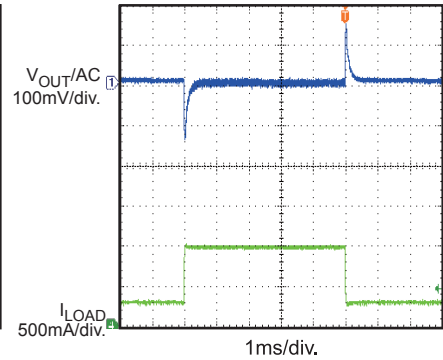
### Load Transient Response

$V_{IN}=3.3V$ ,  $I_{OUT}=0.2\rightarrow 0.8A@250mA/\mu s$ ,  
MODE=HIGH



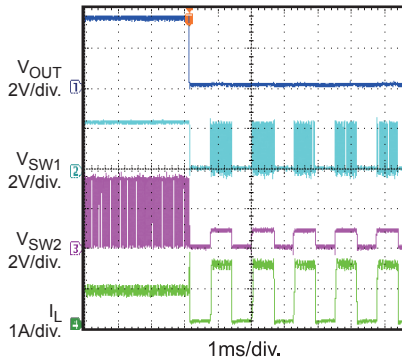
### Load Transient Response

$V_{IN}=4.2V$ ,  $I_{OUT}=0.3\rightarrow 1A@250mA/\mu s$ ,  
MODE=HIGH



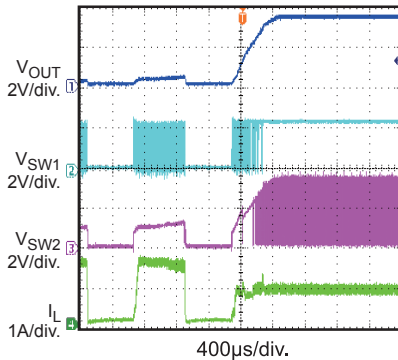
### SCP Entry

$V_{IN}=2.4V$ ,  $I_{OUT}=0.5A$ , MODE=HIGH



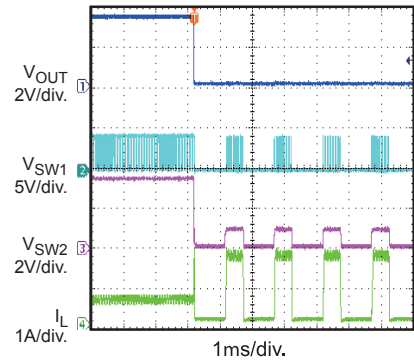
### SCP Recovery

$V_{IN}=2.4V$ ,  $I_{OUT}=0.5A$ , MODE=HIGH



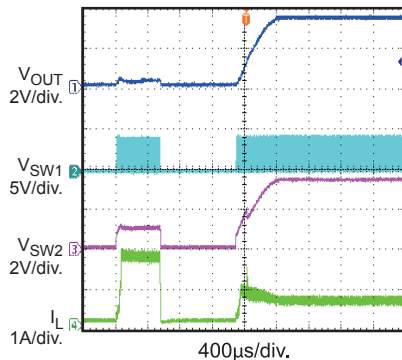
### SCP Entry

$V_{IN}=4.2V$ ,  $I_{OUT}=0.5A$ , MODE=HIGH

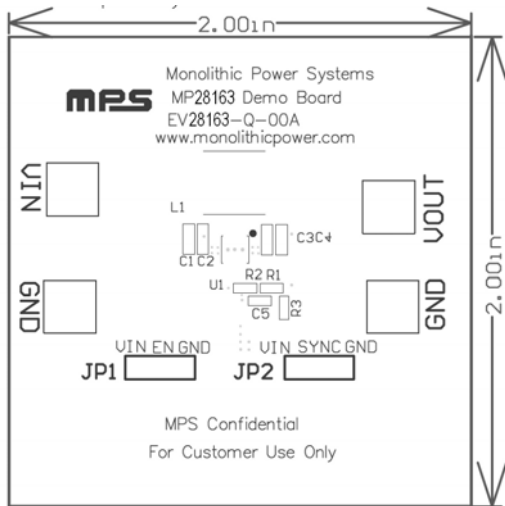


### SCP Recovery

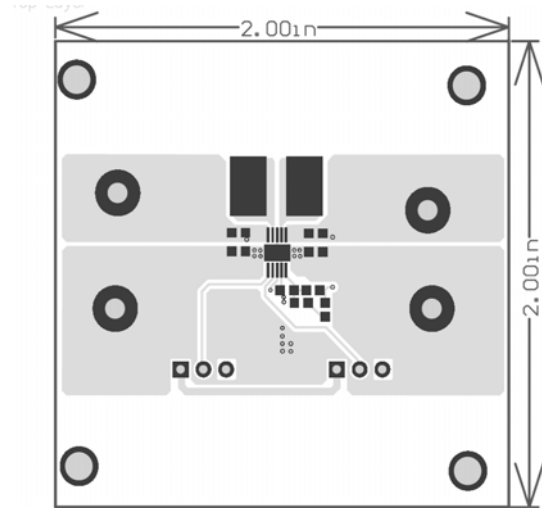
$V_{IN}=4.2V$ ,  $I_{OUT}=0.5A$ , MODE=HIGH



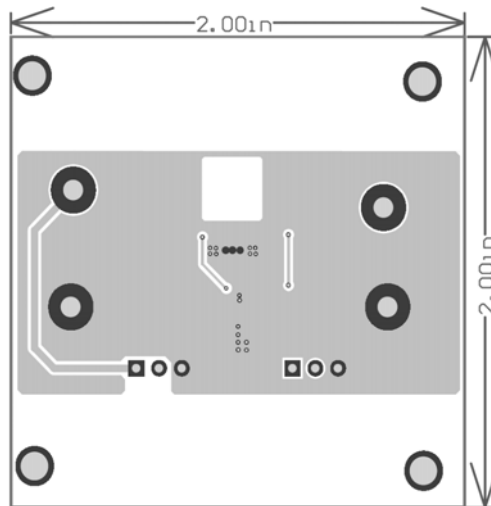
## PRINTED CIRCUIT BOARD LAYOUT



**Figure 1: Top Silkscreen Layer**



**Figure 2: Top Layer**



**Figure 3: Bottom Silkscreen Layer**