



EV3318-C-00A

3-Channel, Step-Up White LED Driver with I²C Interface Evaluation Board

DESCRIPTION

The EV3318-C-00A is an evaluation board for the MP3318, a white LED step-up driver with a 2.7V to 5.5V input voltage range and 3-channel current sinks. The MP3318 uses peak current control mode to regulate the LED current set by an internal register.

The MP3318 integrates a 250mΩ, 42V MOSFET with a 38V maximum LED voltage output. The IC has the ability to drive LEDs in series for >5" liquid crystal display (LCD) panel applications.

The MP3318 features linear and exponential analog dimming with 11-bit, ultra-high resolution that regulates the dimming current. The IC's automatic switching frequency function optimizes efficiency.

In addition, the MP3318 offers LED open protection, LED short protection, cycle-by-cycle current limit protection, over-voltage protection (OVP), and thermal shutdown. The I²C interface can set the internal register to program the MP3318 for flexible applications, such as dimming mode, LED current ramp, and featured protection functions.

The MP3318 is available in an ultra-small WLCSP-12 (1.3mmx1.7mm) package.

ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|--------------------|-------------------|------------|-------|
| Input voltage | V _{IN} | 2.7 to 5.5 | V |
| Output voltage | V _{LED+} | <38 | V |
| Number of LEDs | | 3 strings | |
| LED current/string | I _{LED} | 25 | mA |

FEATURES

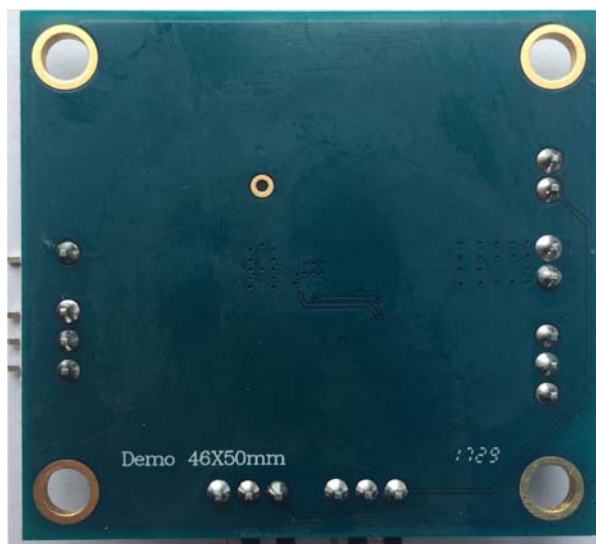
- 2.7 to 5.5V Input Voltage
- 42V, 250mΩ Internal MOSFET
- 3-Channel Current Sink with Enable (EN) Bits for Every Channel
- Up to 25mA LED Current in Backlight Mode
- Linear and Exponential Analog Dimming
- Up to 50mA LED Current in Flash Mode
- 11-Bit Dimming Resolution
- Excellent LED Current Accuracy
- Excellent LED String Current Matching
- 500kHz or 1MHz Switching Frequency with Optional -12% Shift
- 250kΩ, 500kΩ, or 1MΩ Automatic Switching Frequency
- 1.2MΩ High-Speed I²C Interface
- Internal Soft Start to Reduce Inrush Current
- 0.75A, 1A, 1.25A, or 1.5A Current Limit Protection
- 17V, 23V, 30V, or 38V LED Open Protection
- 2V, 3V, or 5V LED Short Protection
- Available in a WLCSP-12 (1.3mmx1.7mm) Package

APPLICATIONS

- Smartphones
- Tablets
- GPS Receivers
- Liquid Crystal Displays (LCDs) with Single-Cell Lithium-Ion Batteries

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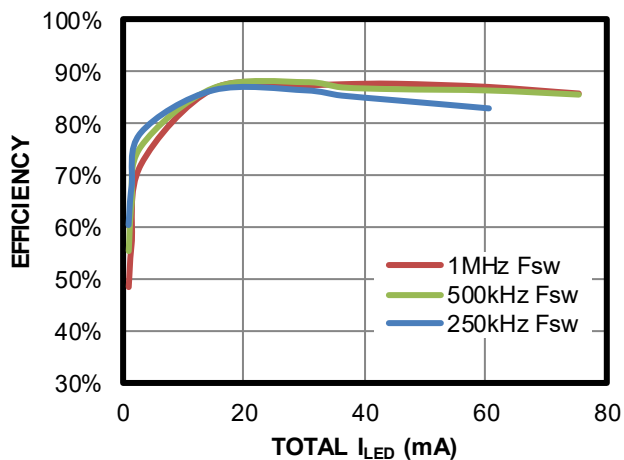
EV3318-C-00A EVALUATION BOARD



(LxW) 4.6cmx5cm

| Board Number | MPS IC Number |
|--------------|---------------|
| EV3318-C-00A | MP3318GC |

Efficiency vs. I_{LED}



QUICK START GUIDE

1. Provide a voltage source between 2.7V and 5.5V from the VIN terminal to GND.
2. Connect the LED string terminals to:
 - a) Positive (+): LED+
 - b) Negative (-): LED1/2/3
3. To turn on the MP3318, drive the EN pin high.
4. Add a 50Hz to 50kHz PWM pulse to the PWM terminal. Choose a PWM frequency based on the sample frequency.
5. Connect the EVB's SCL, SDA, and GND pins to the SCL, SDA, and GND pins of a programmable kit with an I²C interface.
6. Write the registers and turn on the MP3318 by setting the EN bit (register 0x10, bit[0]) to 1.

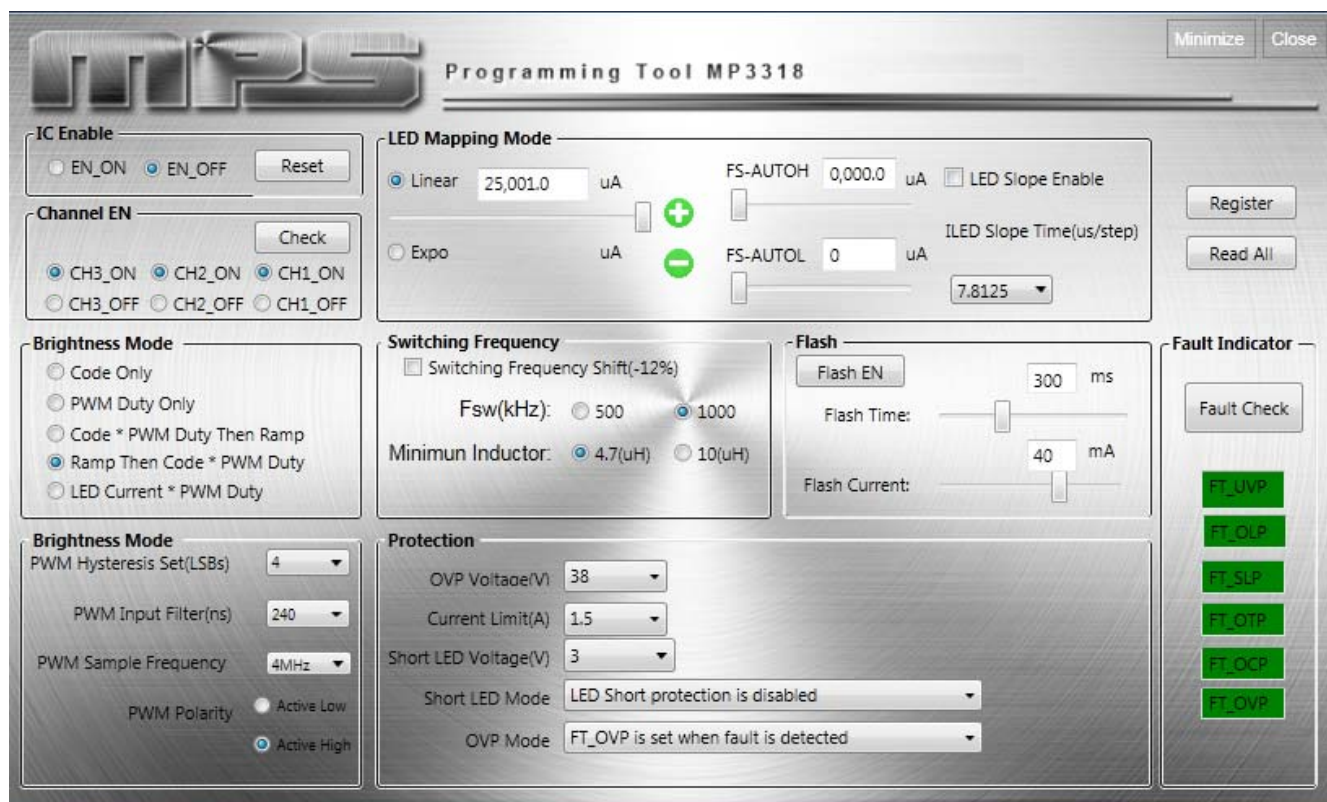


Figure 1: MP3318 MPS GUI Software

EVALUATION BOARD SCHEMATIC

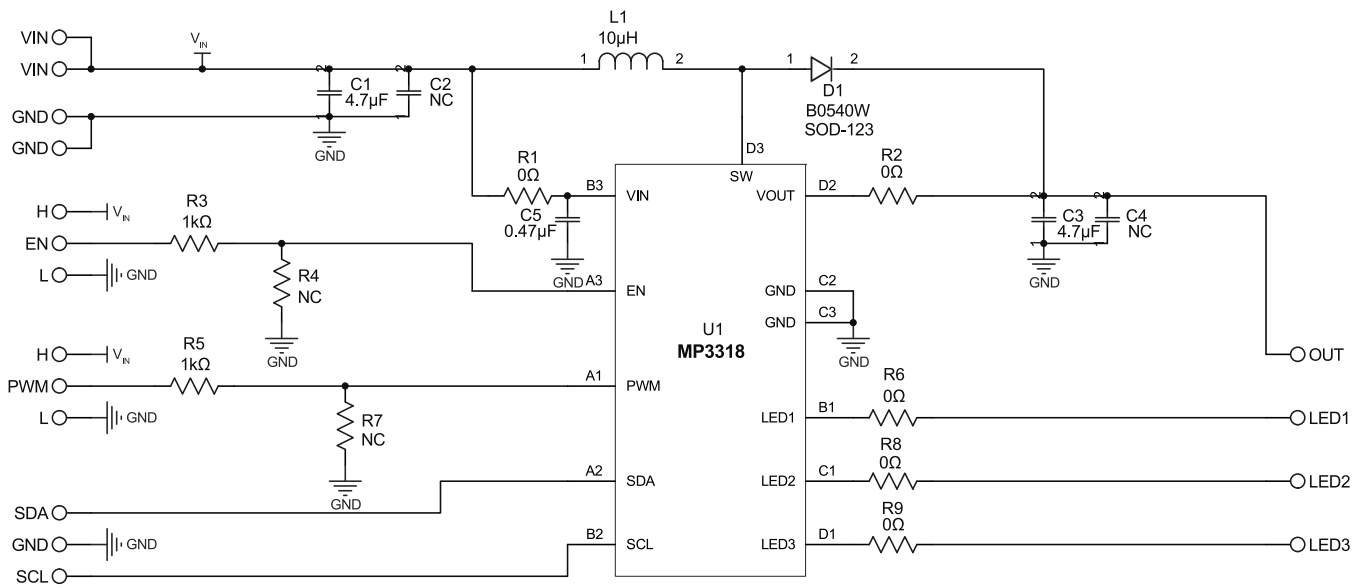


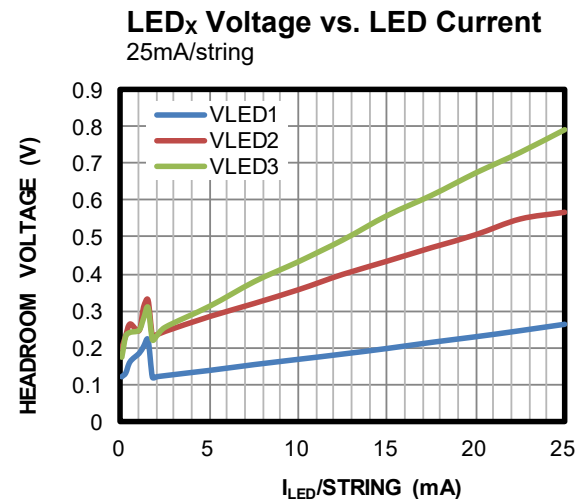
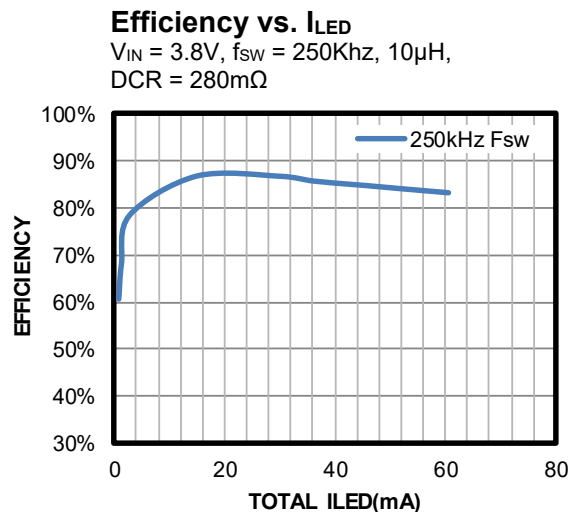
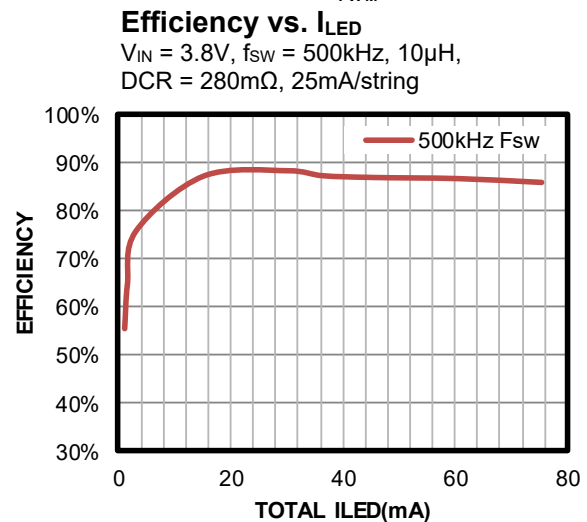
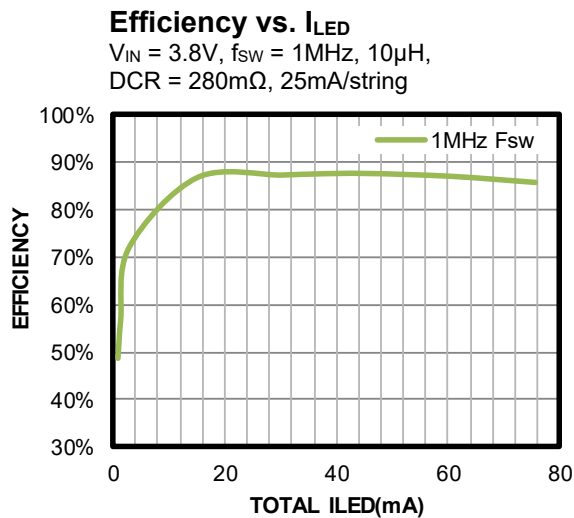
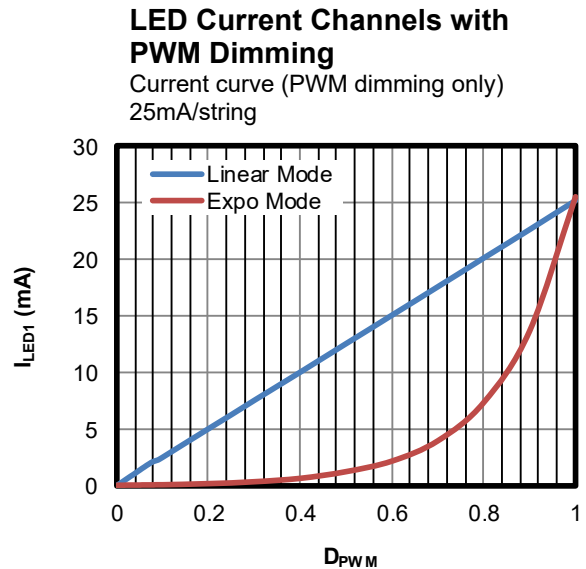
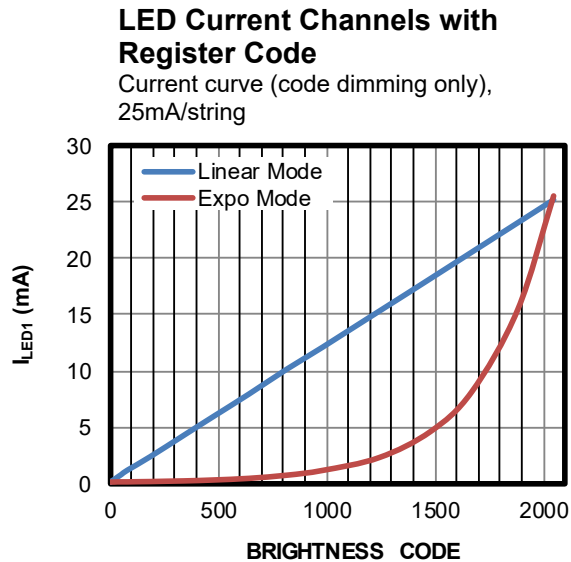
Figure 2: Typical Application Schematic with 3 strings (7 LEDs/string, 20mA/String)

EV3318-C-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer P/N |
|-----|--------------------------|-------------|---------------------------------------|-------------------------------|--------------|--------------------|
| 1 | C1 | 4.7 μ F | Ceramic capacitor, 16V, X5R, 0805 | 0805 | Murata | GRM21BR61C475KA88L |
| 1 | C3 | 2.2 μ F | Ceramic capacitor, 50V, X7R, 1206 | 1206 | Murata | GJ8319R61H225K |
| 1 | C5 | 470nF | Ceramic capacitor, 16V, X7R, 0603 | 0603 | Murata | GRM188R71C474KA88D |
| 1 | C2 | NC | Ceramic capacitor, 0805 | 0805 | | |
| 1 | C4 | NC | Ceramic capacitor, 1206 | 1206 | | |
| 1 | L1 | 10 μ H | Inductor, 10 μ H, 65.6m, 2.47A | SMD | Cooper | DR73-100-R |
| 1 | D1 | B0540W | Diode, B0540, 0.5A, 40V | SOD-123 | Diodes Inc. | B0540W |
| 5 | R1, R2, R6, R8, R9 | 0 Ω | Resistor, 5% | 0603 | Yageo | RTT03000JTP |
| 2 | R3, R5 | 1k Ω | Resistor, 5% | 0603 | Yageo | RC0603FR-071KL |
| 2 | R4, R7 | NC | Resistor, 5% | 0603 | | |
| 1 | U1 | MP3318 | White LED step-up driver | WLCSP-12 (1.3mmx 1.7mm) | MPS | MP3318GC |

EVB TEST RESULTS

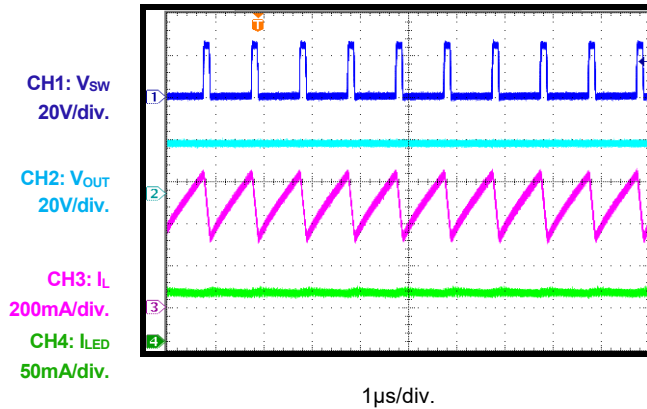
Performance waveforms are tested on the evaluation board. $V_{IN} = 3.6V$, 8 LEDs/string, 3 strings, $I_{LED}/ch = 20mA$, $L = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.



EVB TEST RESULTS (continued)

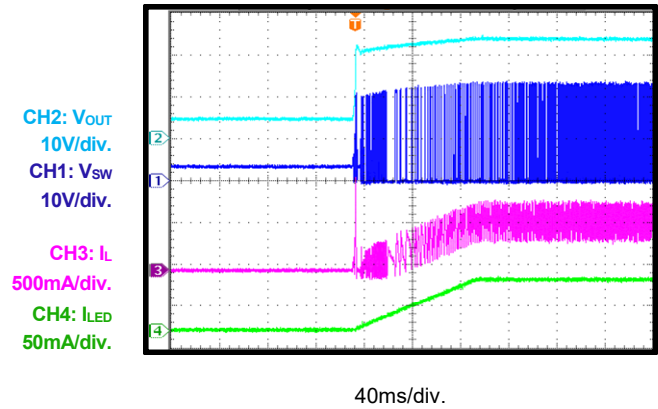
Performance waveforms are tested on the evaluation board. $V_{IN} = 3.6V$, 8 LEDs/string, 3 strings, $I_{LED}/ch = 20mA$, $L = 10\mu H$, $T_A = 25^{\circ}C$, unless otherwise noted.

Steady State



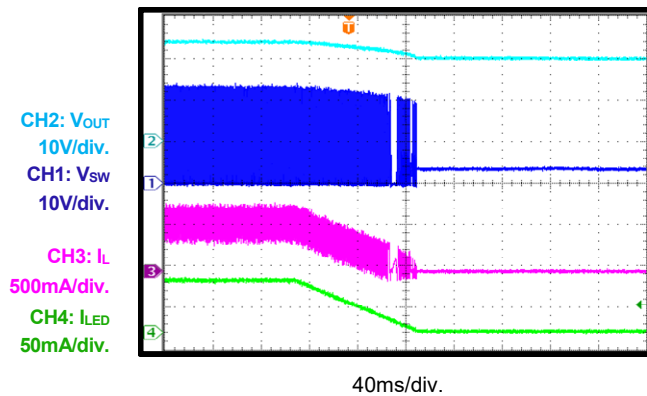
EN Bit On

62.5 μ s/step



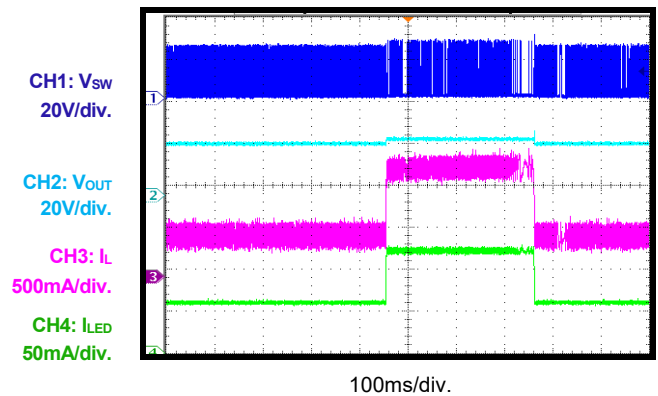
En Bit Off

62.5 μ s/step



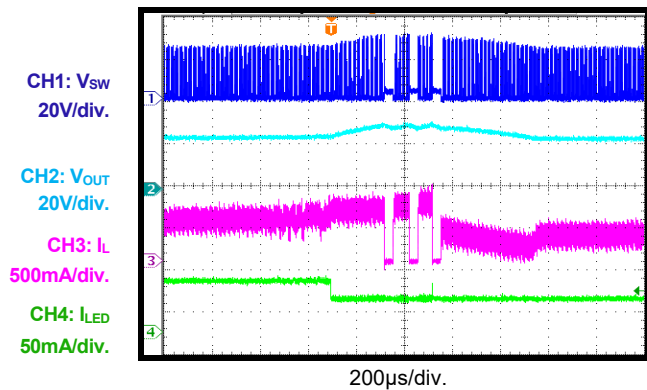
Flash Mode

Flash time = 300ms, flash current = 40mA/ch



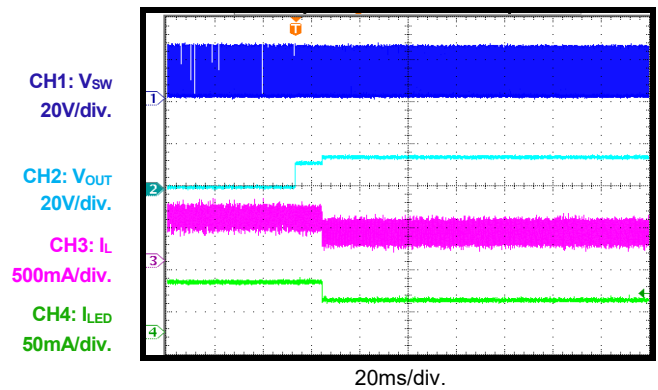
Open LED Protection (Marked Off)

$V_{OVP} = 30V$, 1 string open



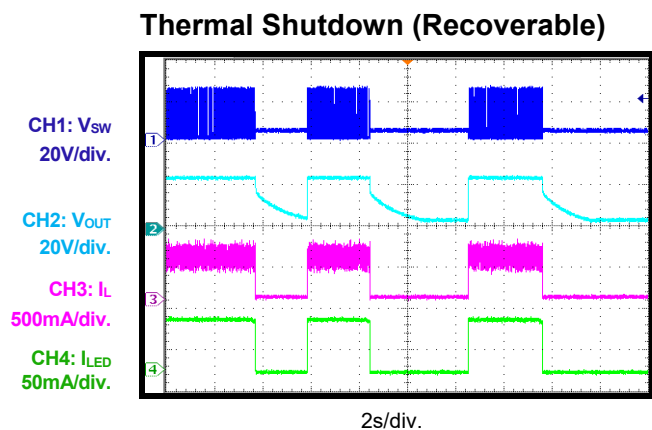
Short LED Protection (Marked Off)

1 string short



EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board. $V_{IN} = 3.6V$, 8 LEDs/string, 3 strings, $I_{LED}/ch = 20mA$, $L = 10\mu H$, $T_A = 25^{\circ}C$, unless otherwise noted.



PCB LAYOUT

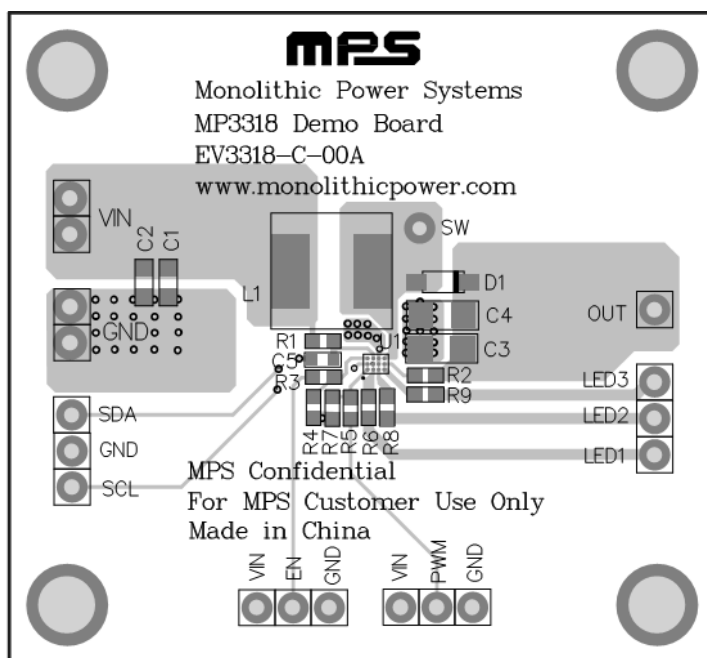


Figure 3: Top Layer

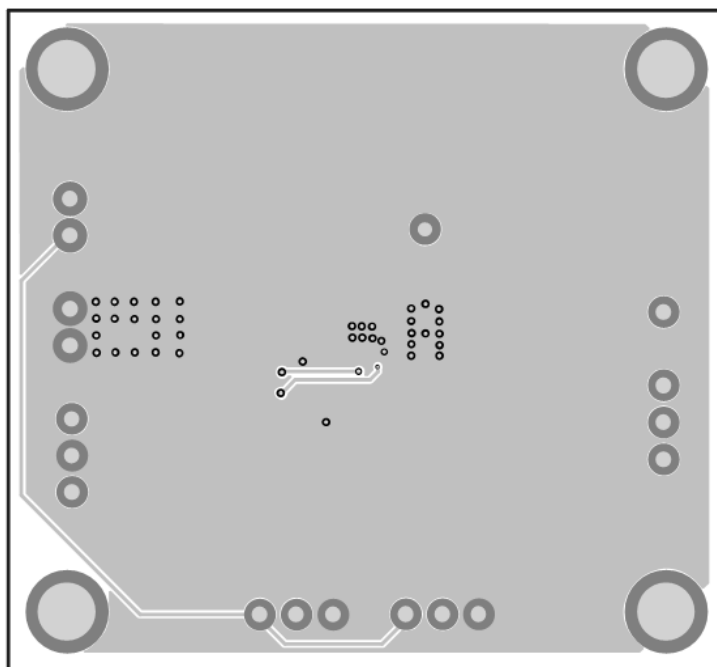


Figure 4: Bottom Layer

REVISION HISTORY

| Revision # | Revision Date | Description | Pages Updated |
|------------|---------------|-----------------|---------------|
| 1.0 | 1/18/2021 | Initial Release | - |

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