

DESCRIPTION

The EV1909-TL-00A is an evaluation board designed to demonstrate the capabilities of the MP1909, a high-frequency, half-bridge, N-channel power MOSFET gate driver. Its high-side (HS) and low-side (LS) driver channels are controlled via a signal input. If the enable (EN) pin is pulled low, both the HS and LS outputs are disabled.

Internal dead time (DT) control reduces switching power losses and prevents shoot-through. The integrated bootstrap (BST) diode reduces the external component count.

Full protection features include under-voltage lockout (UVLO) protection and thermal shutdown.

The MP1909 is available in an SOT583-8 (1.6mmx2.1mm) package.

ELECTRICAL SPECIFICATIONS

| Parameter | Symbol | Value | Units |
|-------------------------|----------|-----------|-------|
| Driver voltage | V_{CC} | 4.5 to 12 | V |
| Input voltage | V_{IN} | 0 to 30 | V |
| PWM duty | Duty | 10 | % |
| PWM switching frequency | f_{sw} | 200 | kHz |

FEATURES

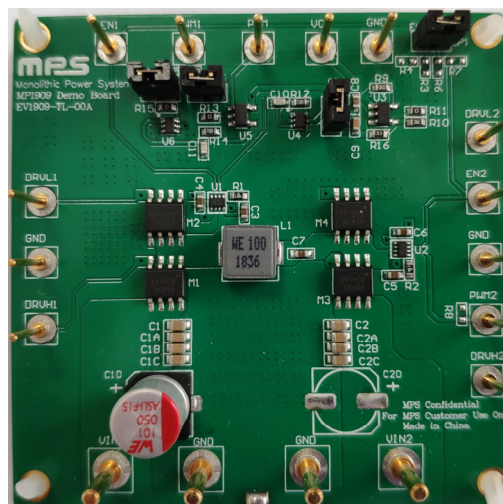
- 4.5V to 12V Driver Voltage (V_{CC})
- Up to 50V Bootstrap (BST) Voltage (V_{BST})
- Integrated BST diode
- Up to 2.2MHz Switching Frequency (f_{sw})
- One Pulse-Width Modulation (PWM) Signal Generates Both Drive Signals
- Low Quiescent Current (I_Q)
- Supports Up to 100% Duty Cycles
- Under-Voltage Lockout (UVLO) Protection for Both the High-Side (HS) and Low-Side (LS) Driver Channels
- Available in an SOT583-8 (1.6mmx2.1mm) Package

APPLICATIONS

- Wireless Charging
- E-Cigarettes
- Drones
- Avionics DC/DC Converters
- Active-Clamp Forward Converters

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EV1909-TL-00A EVALUATION BOARD



LxW (64mmx64mm)

| Board Number | MPS IC Number |
|---------------|---------------|
| EV1909-TL-00A | MP1909GTL |

QUICK START GUIDE

The evaluation board has an H-bridge configuration.

1. Connect the jumpers to the JP1, JP2, JP3, and JP4 jumper points.
2. Preset the driver power supply between 4.5V and 12V.
3. Connect the driver power supply terminals to:
 - a. Positive (+): VCC
 - b. Negative (-): GND
4. Preset the input power supply between 0V and 30V.
5. Connect the input power supply terminals to:
 - a. Positive (+): VIN1/VIN2
 - b. Negative (-): GND
6. Preset the EN power supply between 1.6V and 5V.
7. Connect the EN power supply terminals to:
 - a. Positive (+): EN1 or EN2
 - b. Negative (-): GND
8. To use the function generator, set f_{sw} to 200kHz, the PWM logic high to 3.3V, the PWM logic low to 0V, and the duty cycle to 10%. The rising and falling edge slew rates should be as fast as possible.
9. Connect the function generator output terminals to:
 - a. Positive (+): PWM
 - b. Negative (-): GND
10. Turn on the function generator output.
11. Turn on the EN power supply.
12. Turn on the driver power supply.
13. Check that the PWM1, PWM2, DRVH, and DRVL signals are correct. The PWM1 and PWM2 logics should be inverted.
14. If all of the signals are correct, turn on the input power supply. The board should start up automatically.
15. To shut down the board, first turn off the input power supply, then the driver's power supply.

EVALUATION BOARD SCHEMATIC

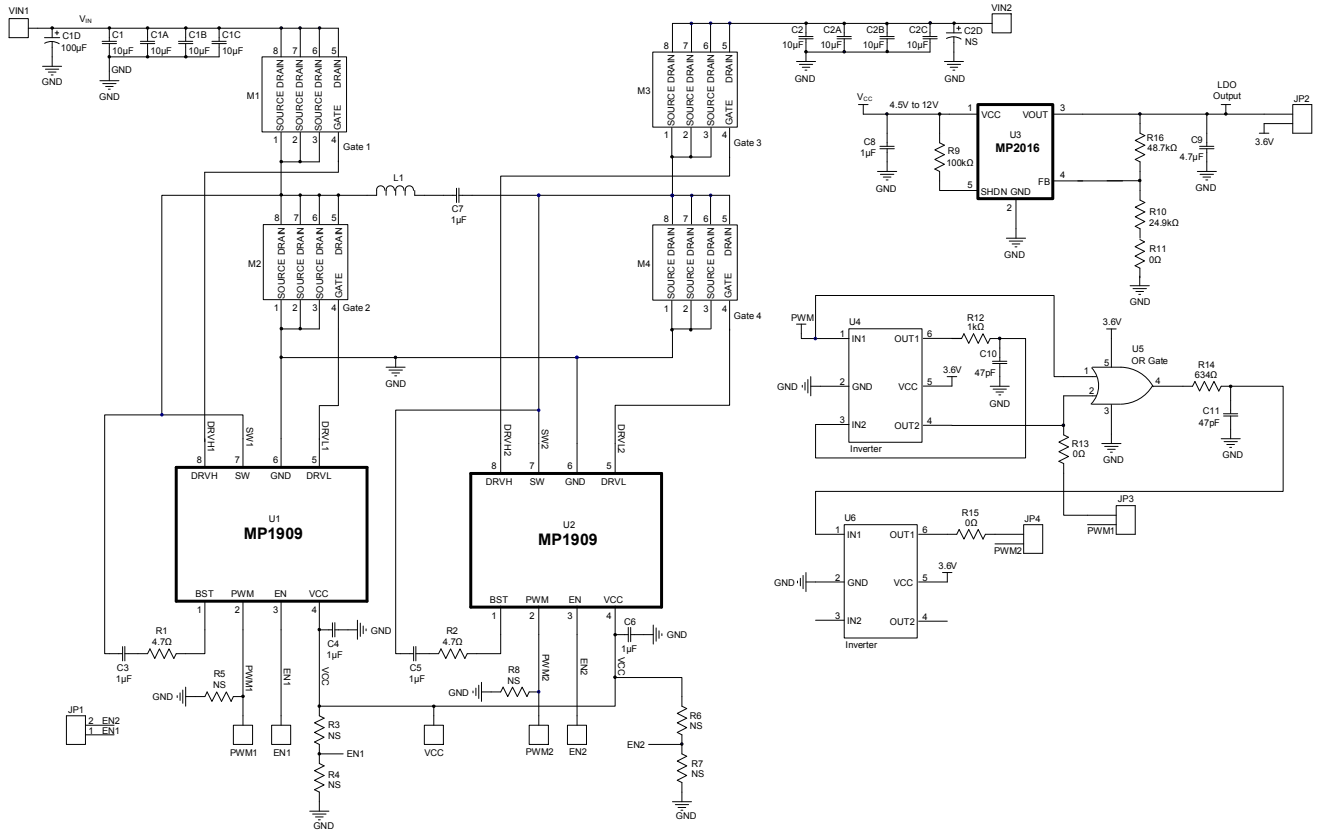


Figure 1: Evaluation Board Schematic

EV1909-TL-00A BILL OF MATERIALS

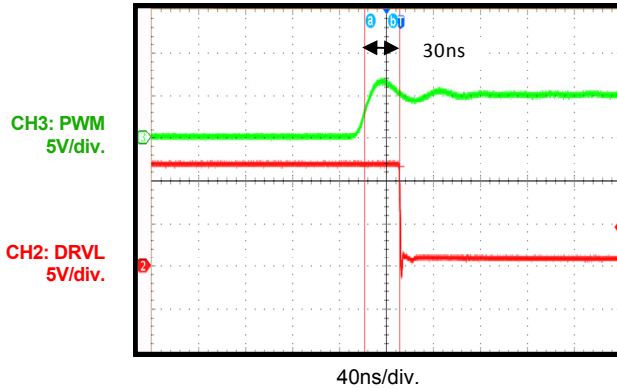
| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer PN |
|-----|--------------------------------------|----------------|---|----------|------------------|--------------------|
| 8 | C1, C1A, C1B, C1C, C2, C2A, C2B, C2C | 10 μ F | Ceramic capacitor, 50V, X5R | 0805 | Murata | GRM21BR61H106KE43L |
| 1 | C1D | 100 μ F | Aluminum polymer capacitor | SMD | Würth | 865080653016 |
| 6 | C3, C4, C5, C6, C7, C8 | 1 μ F | Ceramic capacitor, 25V, X7R | 0603 | Würth | 885012206076 |
| 1 | C9 | 4.7 μ F | Ceramic capacitor, 16V, X5R | 0603 | Murata | GRM188R61C475KE11D |
| 2 | C10, C11 | 47pF | Ceramic capacitor, 50V, C0G | 0603 | Murata | GRM1885C1H470JA01D |
| 2 | R1, R2 | 4.7 Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-074R7L |
| 0 | R3, R4, R5, R6, R7, R8, C2D | NS | | | | |
| 1 | R9 | 100k Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-07100KL |
| 1 | R10 | 24.9k Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-0724K9L |
| 1 | R12 | 1k Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-071KL |
| 3 | R11, R13, R15 | 0 Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-070RL |
| 1 | R14 | 634 Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-07634RL |
| 1 | R16 | 48.7k Ω | Film resolution, 1% | 0603 | Yageo | RC0603FR-0748K7L |
| 4 | M1, M2, M3, M4 | 27m Ω | N-channel MOSFET, 40V | SO-8 | Analog Power | AM4840N |
| 1 | L1 | 10 μ H | Inductor, I _{SAT} = 8A | SMD | Würth | 74437349100 |
| 4 | JP1, JP2, JP3, JP4 | 2.54mm | 2-pin jumper | DIP2 | Any | |
| 2 | U1, U2 | MP1909 | High-frequency half-bridge gate driver, 30V | SOT583-8 | MPS | MP1909GTL |
| 1 | U3 | MP2016 | Low-power linear regulator, 42V, 30mA | TSOT23-5 | MPS | MP2016DJ |
| 2 | U4, U6 | 5.5V | Dual-input inverter | SC70 | ON Semiconductor | NC7WZ14P6X |
| 1 | U5 | 6V | Dual-input OR gate | SOT23-5 | ON Semiconductor | NC7S32M5 |

EVB TEST RESULTS

$V_{CC} = 12V$, $V_{sw} = 0V$, $T_A = 25^\circ C$, unless otherwise noted.

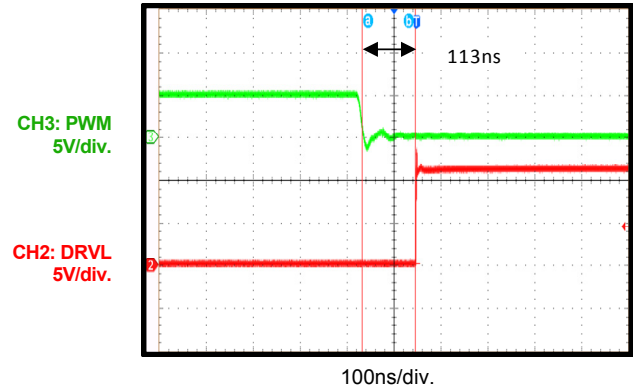
Turn-Off Propagation Delay

PWM rising to DRVL falling



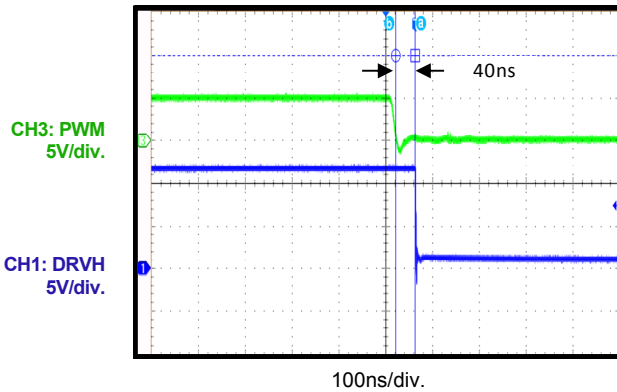
Turn-On Propagation Delay

PWM falling to DRVL rising



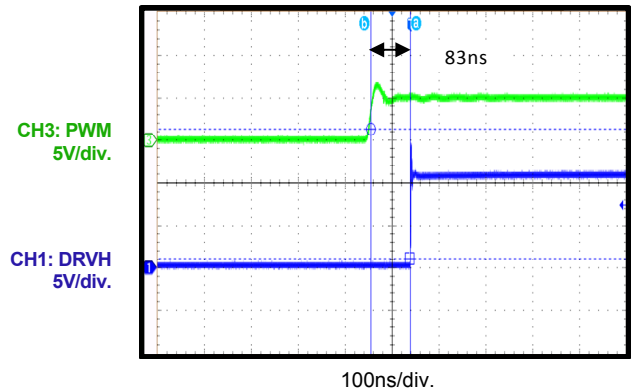
Turn-Off Propagation Delay

PWM falling to DRVH falling



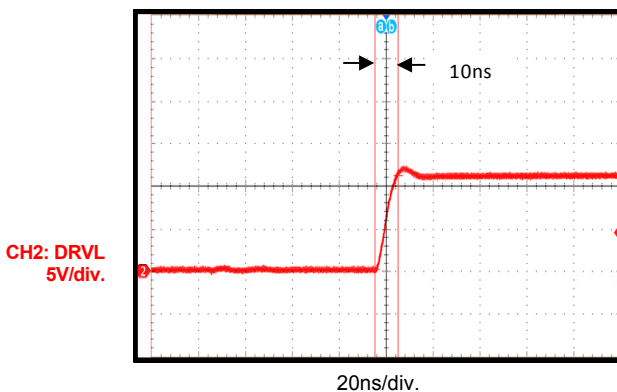
Turn-On Propagation Delay

PWM rising to DRVH rising



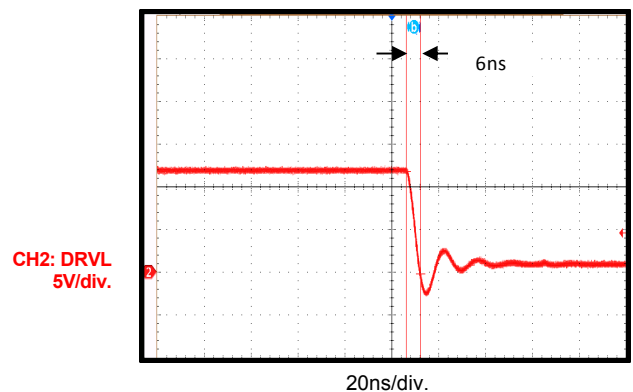
DRVL Rising

$C_{LOAD} = 1nF$



DRVL Falling

$C_{LOAD} = 1nF$

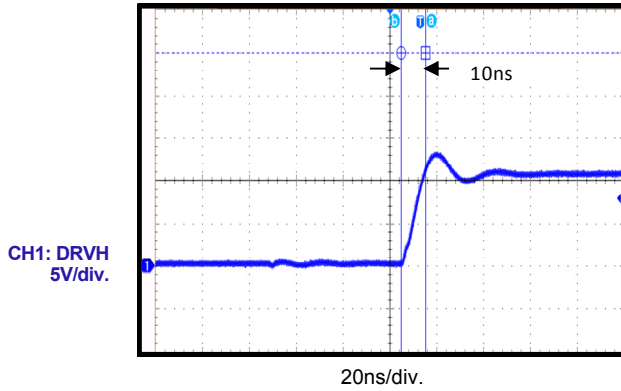


EVB TEST RESULTS (continued)

$V_{CC} = 12V$, $V_{SW} = 0V$, $T_A = 25^\circ C$, unless otherwise noted.

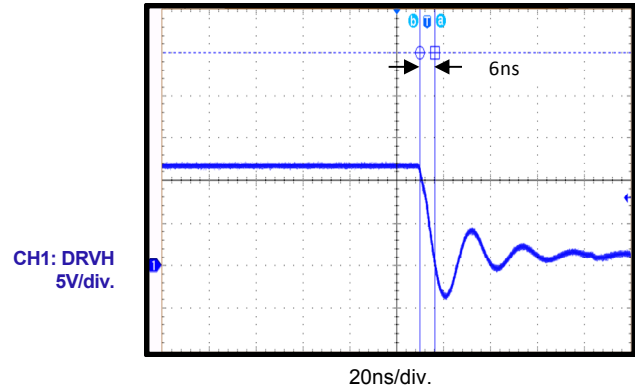
DRVH Rising

$C_{LOAD} = 1nF$



DRVH Falling

$C_{LOAD} = 1nF$



PCB LAYOUT

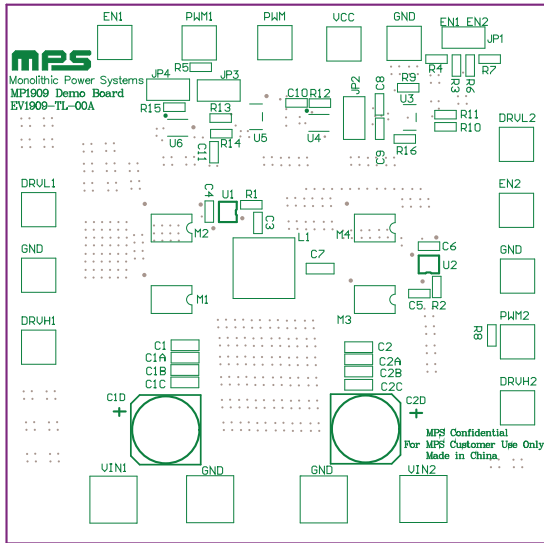


Figure 2: Top Silk

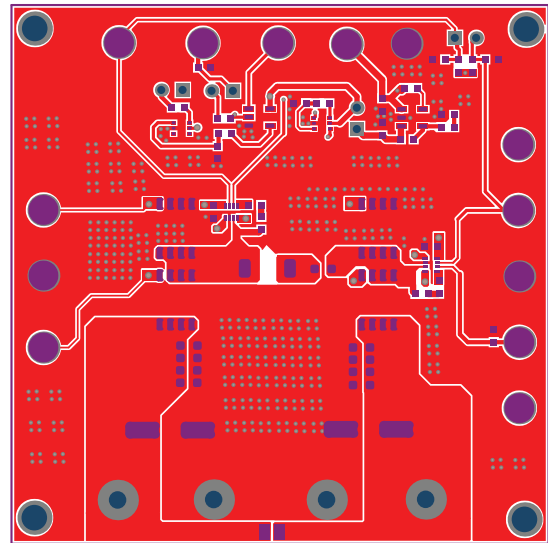


Figure 3: Top Layer

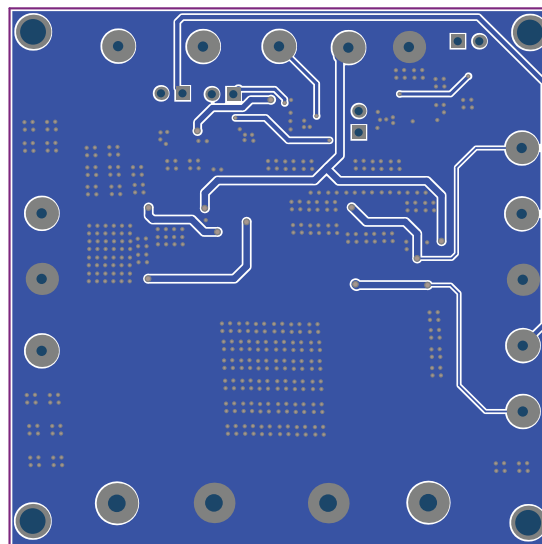


Figure 4: Bottom Layer



REVISION HISTORY

| Revision # | Revision Date | Description | Pages Updated |
|------------|---------------|---|---------------|
| 1.0 | 6/28/2019 | Initial Release | - |
| 1.1 | 1/4/2023 | Updated the Quick Start Guide section | 2 |
| | | Updated Figure 1 | 3 |
| | | Updated headers | 2–8 |
| | | Grammar and formatting updates; updated pagination; updated figure titles | All |

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