EV1909-TL-00A

30V, High-Frequency Half-Bridge Gate Driver Evaluation Board

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

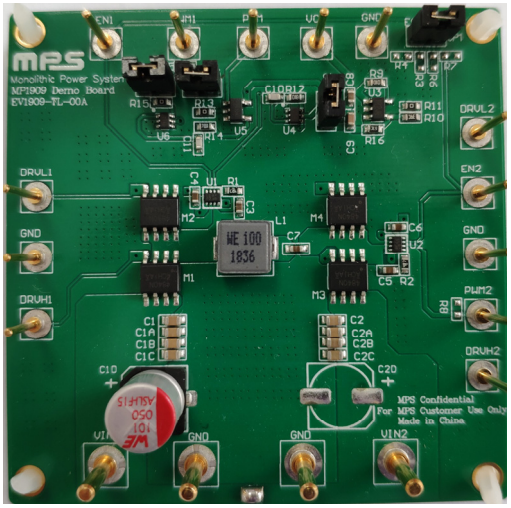
FEATURES

- 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

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

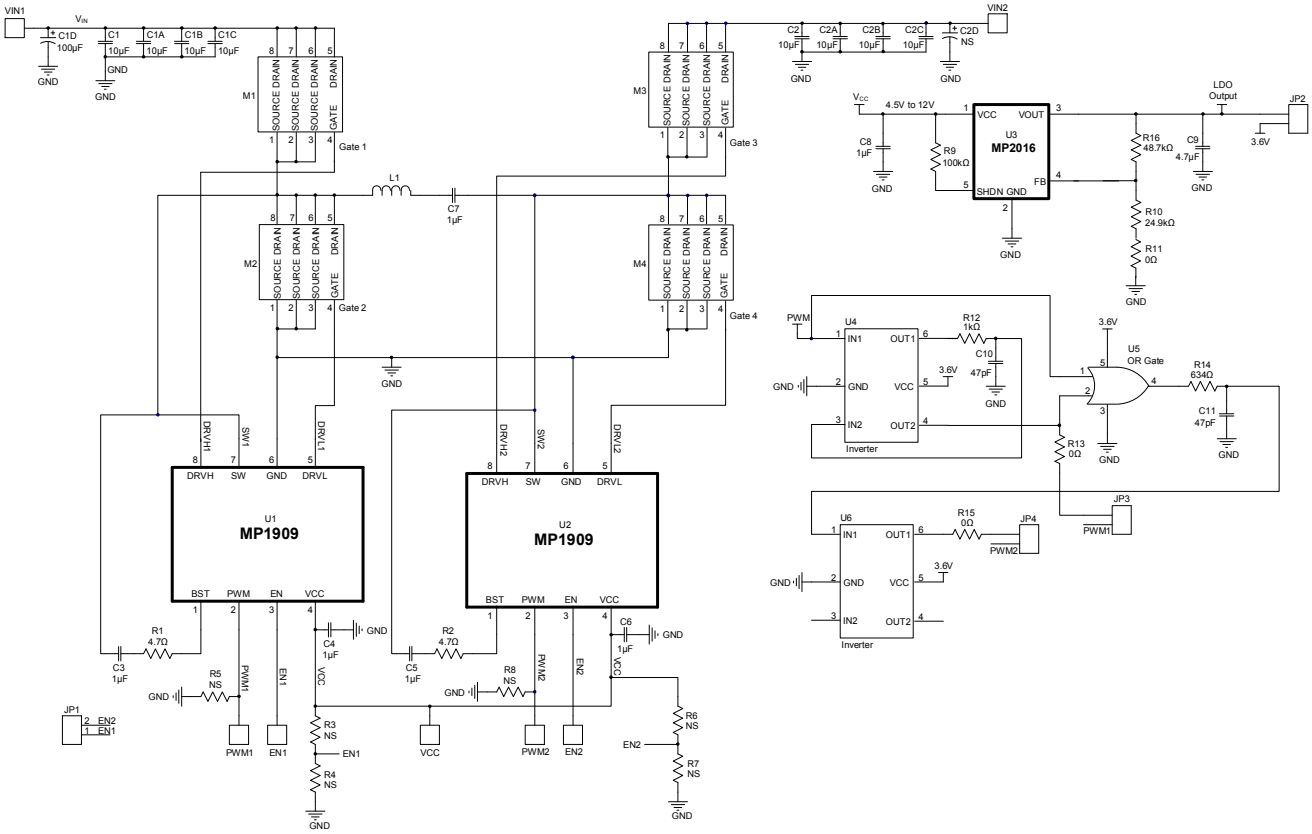


Figure 1: Evaluation Board Schematic

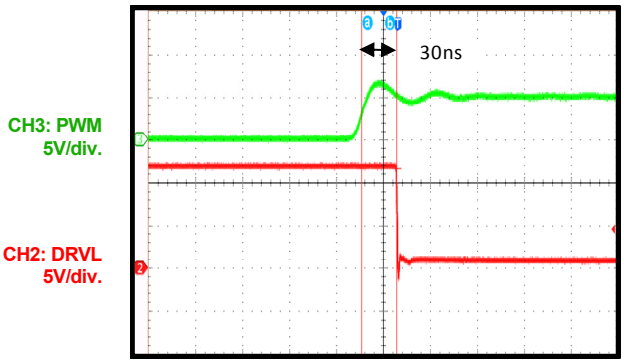
EV1909-TL-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
8	C1, C1A, C1B, C1C, C2, C2A, C2B, C2C	10µF	Ceramic capacitor, 50V, X5R	0805	Murata	GRM21BR61H106KE43L
1	C1D	100µF	Aluminum polymer capacitor	SMD	Wurth	865080653016
6	C3, C4, C5, C6, C7, C8	1µF	Ceramic capacitor, 25V, X7R	0603	Wurth	885012206076
1	C9	4.7µF	Ceramic capacitor, 16V, X5R	0603	Murata	GRM188R61C475KE11D
2	C10, C11	47pF	Ceramic capacitor, 50V, C0G	0603	Murata	GRM1885C1H470JA01D
2	R1, R2	4.7Ω	Film resolution, 1%	0603	Yageo	RC0603FR-074R7L
0	R3, R4, R5, R6, R7, R8, C2D	NS				
1	R9	100kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-07100KL
1	R10	24.9kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-0724K9L
1	R12	1kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-071KL
3	R11, R13, R15	0Ω	Film resolution, 1%	0603	Yageo	RC0603FR-070RL
1	R14	634Ω	Film resolution, 1%	0603	Yageo	RC0603FR-07634RL
1	R16	48.7kΩ	Film resolution, 1%	0603	Yageo	RC0603FR-0748K7L
4	M1, M2, M3, M4	27mΩ	N-channel MOSFET, 40V	SO-8	Analog Power	AM4840N
1	L1	10µH	Inductor, I_{SAT} = 8A	SMD	Wurth	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

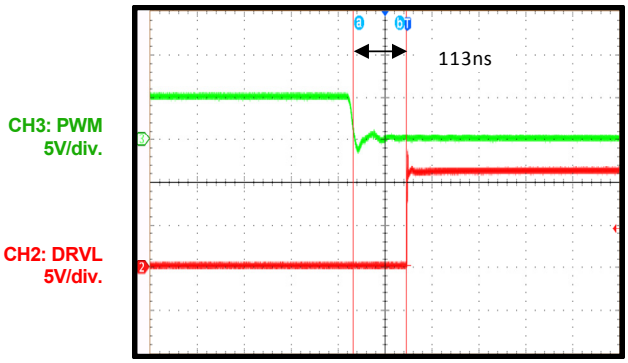
V_{CC} = 12V, V_{SW} = 0V, T_A = 25°C, unless otherwise noted.

Turn-Off Propagation Delay
PWM rising to DRVL falling



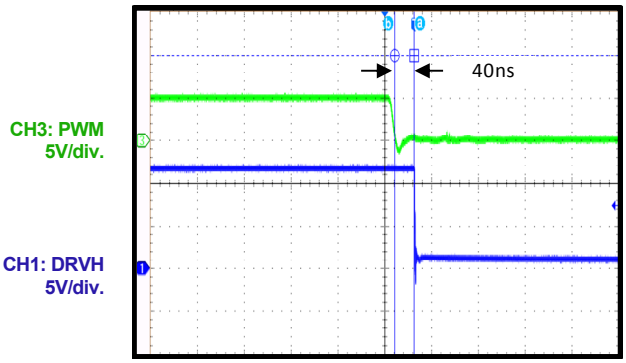
40ns/div.

Turn-On Propagation Delay
PWM falling to DRVL rising



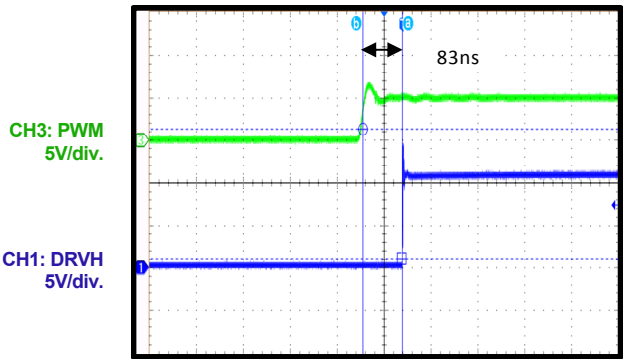
100ns/div.

Turn-Off Propagation Delay
PWM falling to DRVH falling



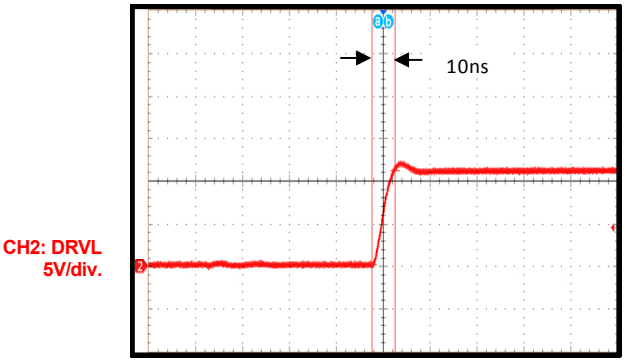
100ns/div.

Turn-On Propagation Delay
PWM rising to DRVH rising



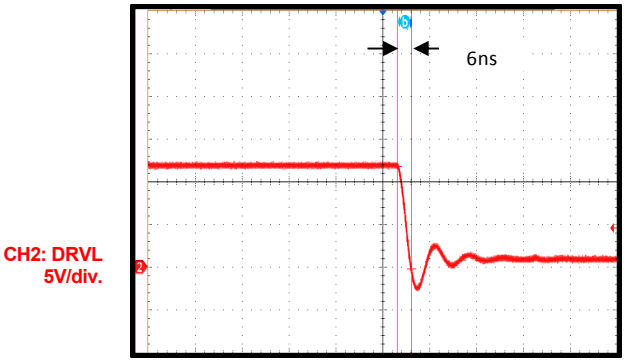
100ns/div.

DRVL Rising
C_{LOAD} = 1nF



20ns/div.

DRVL Falling
C_{LOAD} = 1nF



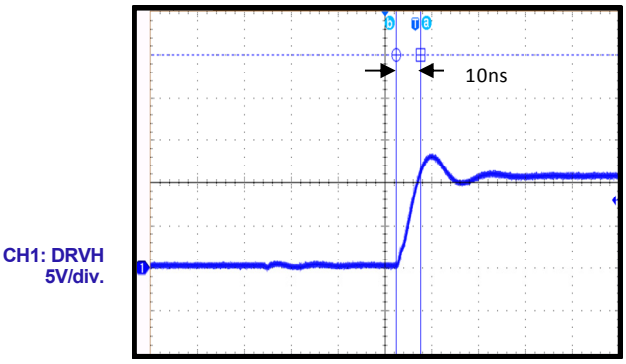
20ns/div.

EVB TEST RESULTS *(continued)*

V_{CC} = 12V, V_{SW} = 0V, T_A = 25°C, unless otherwise noted.

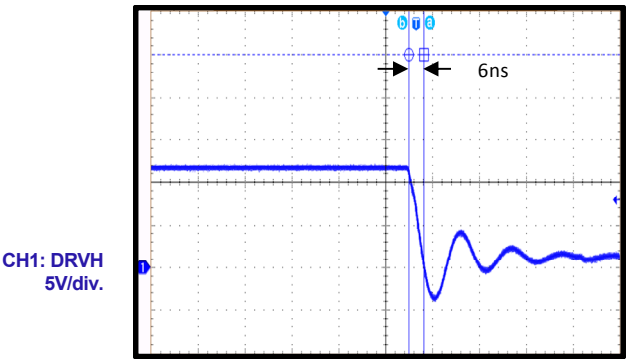
DRVH Rising

C_{LOAD} = 1nF



DRVH Falling

C_{LOAD} = 1nF



PCB LAYOUT

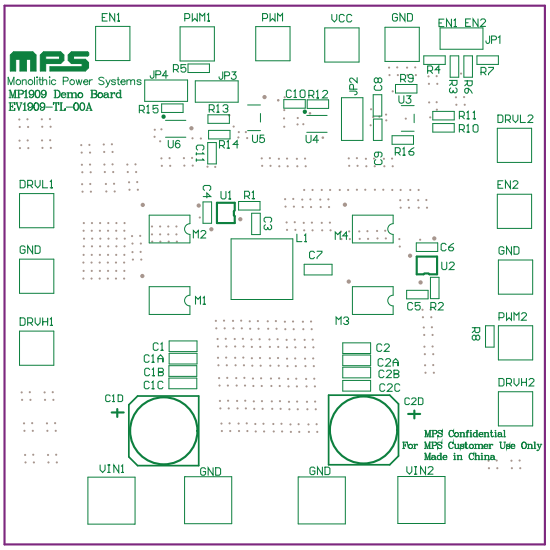


Figure 2: Top Silk

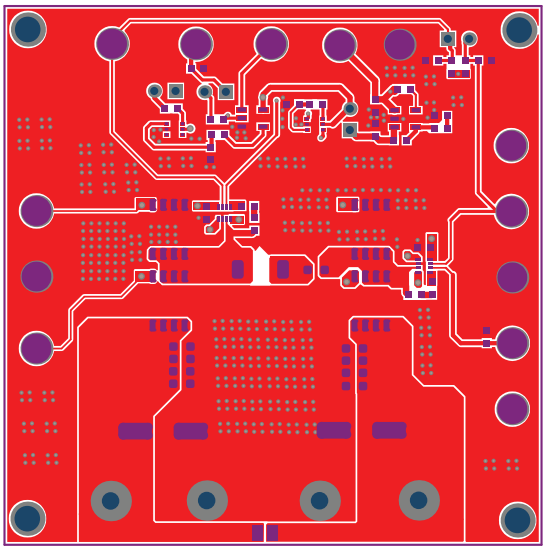


Figure 3: Top Layer

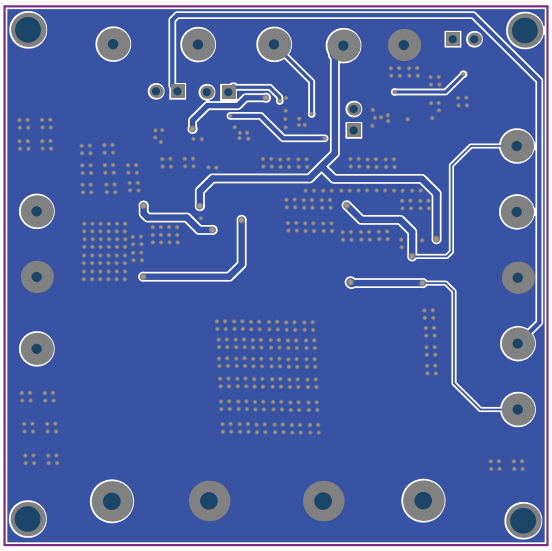


Figure 4: Bottom Layer