EV2341-TL-00A

High-Efficiency, Synchronous Step-Down LED Driver Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EV2341-TL-00A Evaluation Board is designed to demonstrate the capabilities of MP2341GTL. The MP2341 is a 24V monolithic synchronous step-down white LED driver with a built-in power MOSFET and rectifier. It achieves up to 2A continue output current with excellent load and line regulation in a tiny SOT583 package. Peak current mode operation provides fast transient response and eases loop stabilization.

The EV2341-TL-00A is typically designed for driving 2 WLEDs in series ($5.9V_{TYP}$) LED load with 2A current at wide 8V to 24V input range.

The EV2341-TL-00A has high performances in efficiency, line/load regulation, deep dimming range with both analog and PWM mode. Fault condition protection includes cycle-by-cycle peak current limiting, output short circuit protection, open LED protection and thermal shutdown.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8 to 24	V
Output Voltage	V_{OUT}	5.9	V
LED Current	I_{LED}	2	A

FEATURES

- 8V to 24V Wide Input Range
- 125mΩ/75mΩ Low-$R_{DS(ON)}$ Internal Power MOSFETs
- 100mV Feedback Voltage
- Up to 95% Efficiency
- Fixed 1MHz Switching Frequency
- Analog Dimming by DC voltage through EN/DIM
- Analog Dimming by PWM signal through PDIM
- PWM Dimming by PWM signal through EN/DIM
- 50:1 Dimming Ratio by Analog Dimming
- 1000:1 Dimming Ratio by PWM Dimming
- LED Open Protection
- Over-Current Protection and Hiccup
- Over Voltage Protection with Auto Recovery
- Thermal Shutdown

APPLICATIONS

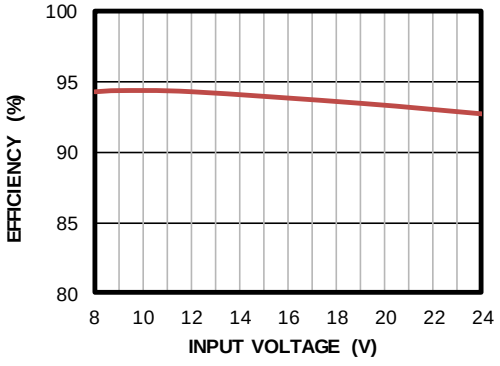
- Infrared LED Driver
- General LED Driver
- Flashlight
- Handheld Computers Backlight

EV2341-TL-00A EVALUATION BOARD

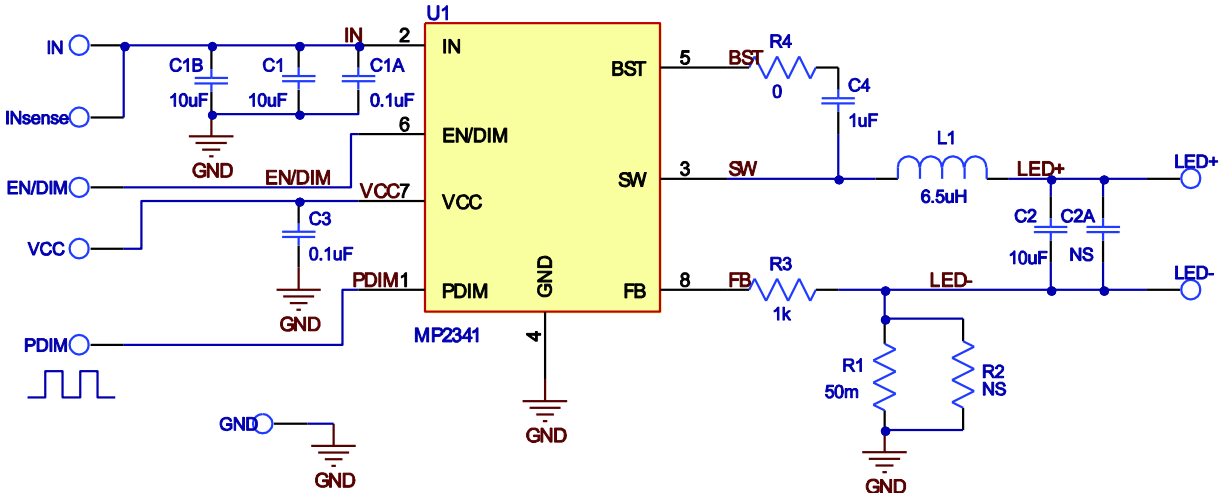
(L x W x H) 46mm x 46mm x 6mm	
Board Number	**MPS IC Number**
EV2341-TL-00A	MP2341GTL

Efficiency vs. VIN

2 WLEDs in series, V_{OUT}=5.9V, L = 6.5µH, ILED=2A



EVALUATION BOARD SCHEMATIC



EV2341-TL-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufactur	Manufacturer _P/N
2	C1, C1B	10µF	Ceramic Cap., 35V,X5R	0805	Murata	GRM21BR61E106KA43L
1	C1A	0.1µF	Ceramic Cap., 50V,X7R	0603	Murata	GRM188R71H104KA93D
0	C2A	NS				
1	C2	10µF	Ceramic Cap., 16V,X5R	0805	Murata	GRM21BR61C106KE15L
1	C3	0.1µF	Ceramic Cap., 16V,X7R	0603	Murata	GRM188R71C104KA01D
1	C4	1µF	Ceramic Cap., 16V,X7R	0603	Murata	GRM188R71C105KE15D
1	R1	50mΩ	Sense resistor, 1W	1206	YAGEO	PE1206FRF470R05L
0	R2	NS				
1	R3	1KΩ	Film Res,1%,0603,1K	0603	YAGEO	RC0603FR-071KL
1	R4	0Ω	Film Res,1%,0603,0R	0603	YAGEO	RC0603JR-070RL
1	L1	6.5µH	Inductor, R_{DC}=21.5mΩ, Isat=6A	7x7x5mm	Wurth	744314650
		6.8µH	Inductor, R_{DC}=31mΩ, Isat=4.3A	6x6x4.5mm	Sunlord	SWPA6045S6R8MT
1	U1	MP2341	24V, 2A LED driver	SOT583	MPS	MP2341GTL

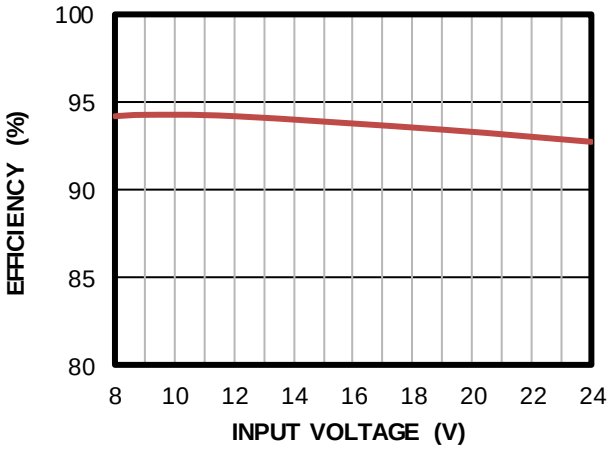
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

V_{IN} = 12V, 2 WLEDs in series, V_{OUT}=5.9V, L = 6.5µH, T_A = +25°C, unless otherwise noted.

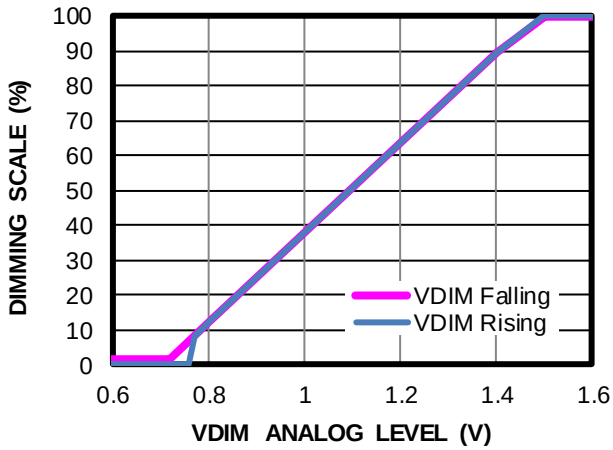
Efficiency vs. VIN

V_{OUT}=5.9V



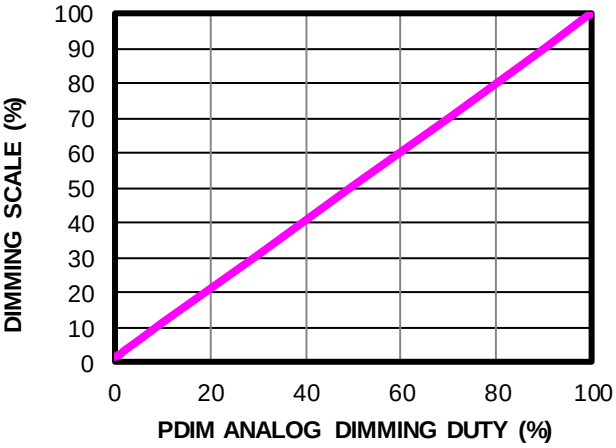
Analog Dimming Curve

Ramp up/down EN/DIM voltage



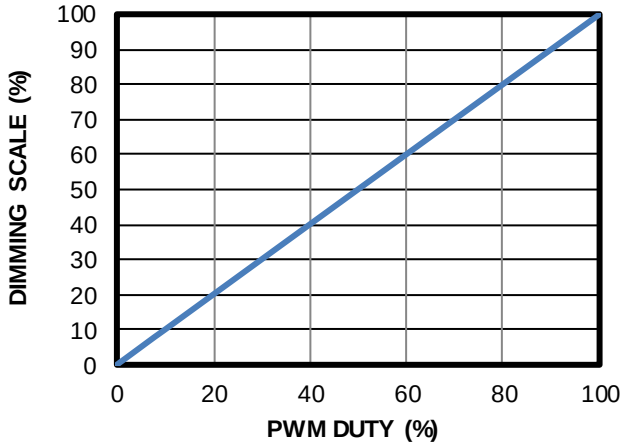
Analog Dimming Curve

PDIM frequency=20kHz



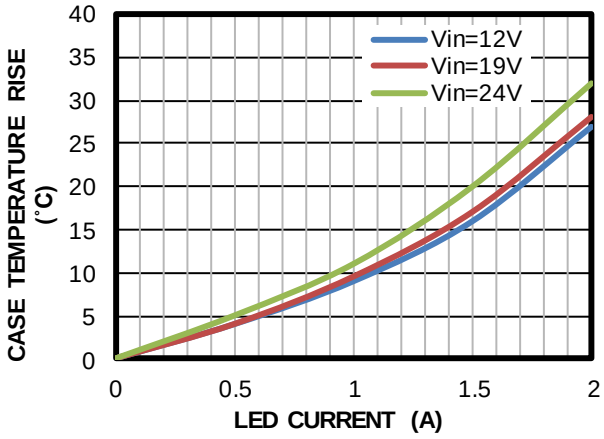
PWM Dimming Curve

EN/DIM frequency=200Hz



Thermal Test

V_{OUT}=5.9V

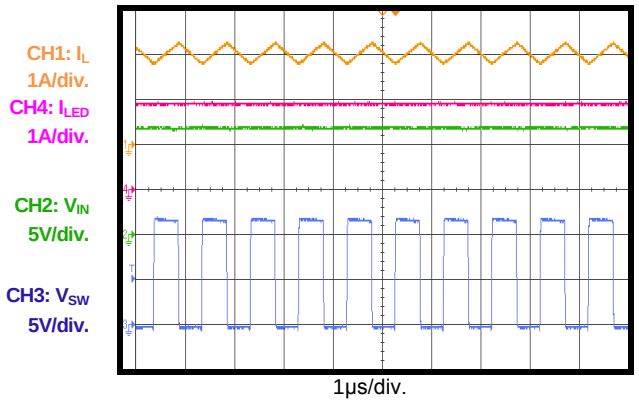


EVB TEST RESULTS *(continued)*

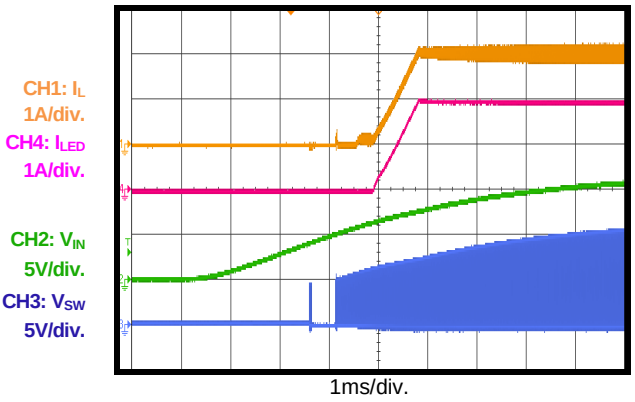
Performance waveforms are tested on the evaluation board.

V_{IN} = 12V, 2 WLEDs in series, V_{OUT}=5.9V, L = 6.5µH, T_A = +25°C, unless otherwise noted.

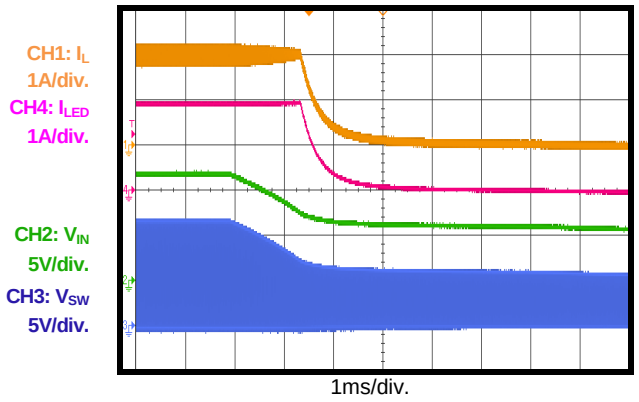
Steady State



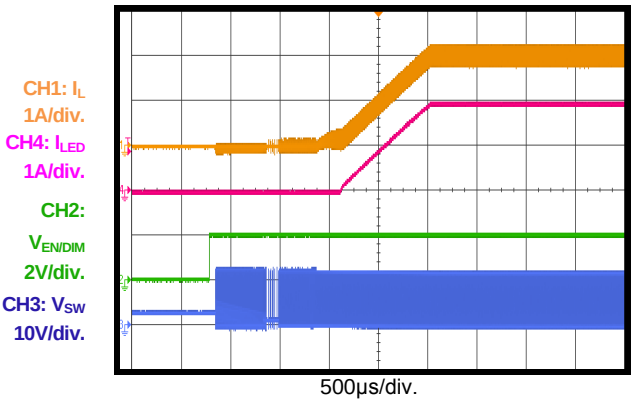
VIN Start-Up



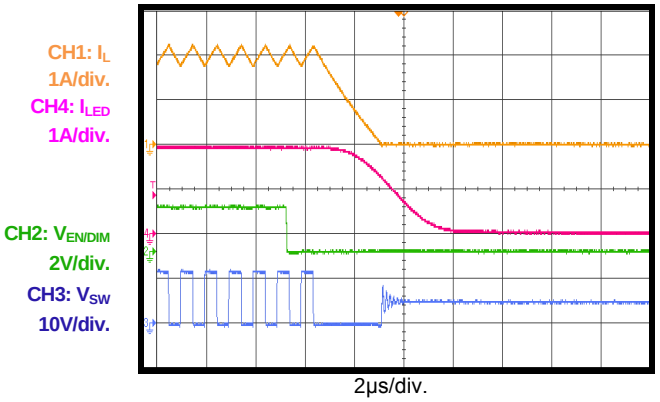
VIN Shutdown



EN Start-Up

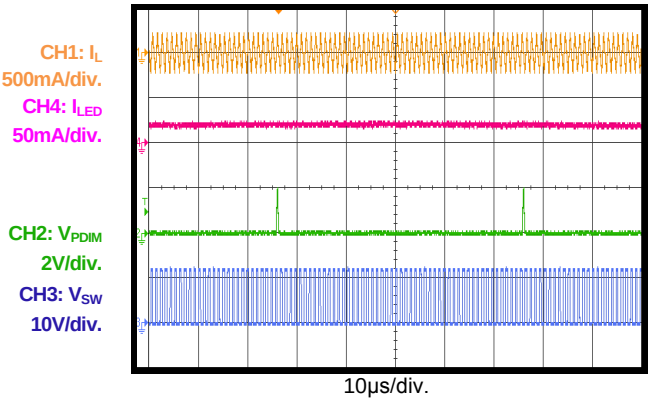


EN Shutdown



Minimum Analog Dimming

VPDIM=2V, Frequency=20kHz, Duty=0.63%, VFB=1mV



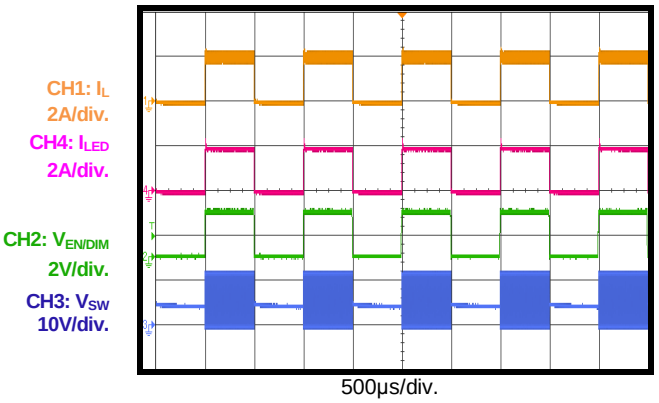
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

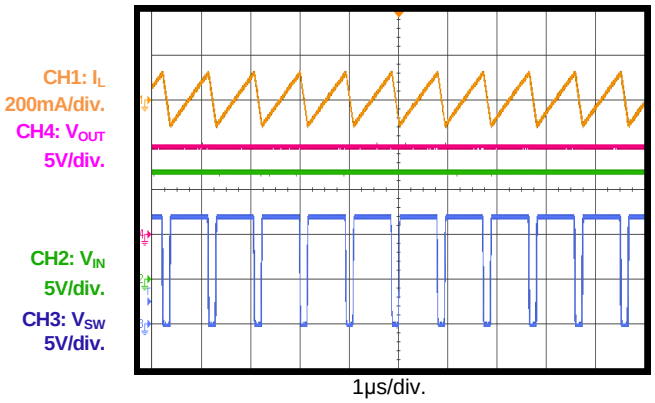
V_{IN} = 12V, 2 WLEDs in series, V_{OUT}=5.9V, L = 6.5µH, T_A = +25°C, unless otherwise noted.

PWM Dimming

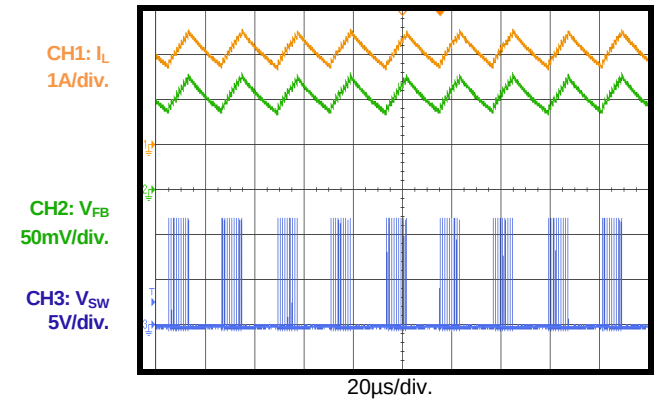
VEN/DIM=2V, Frequency=1kHz, Duty=50%



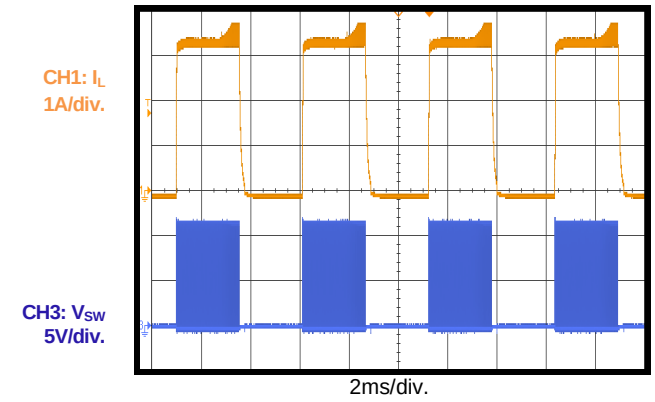
Open LED protection



Short LED+ to LED- Protection



Short LED+ to GND protection



PRINTED CIRCUIT BOARD LAYOUT

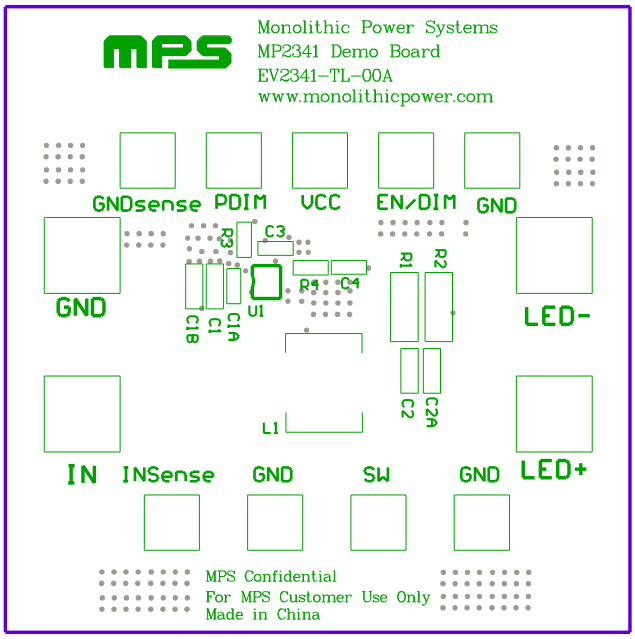


Figure 1 - Top Silk Layer

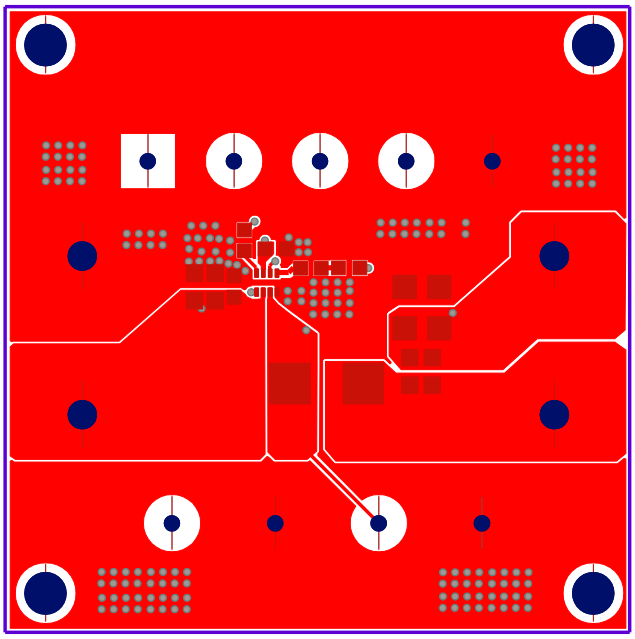


Figure 2 - Top Layer

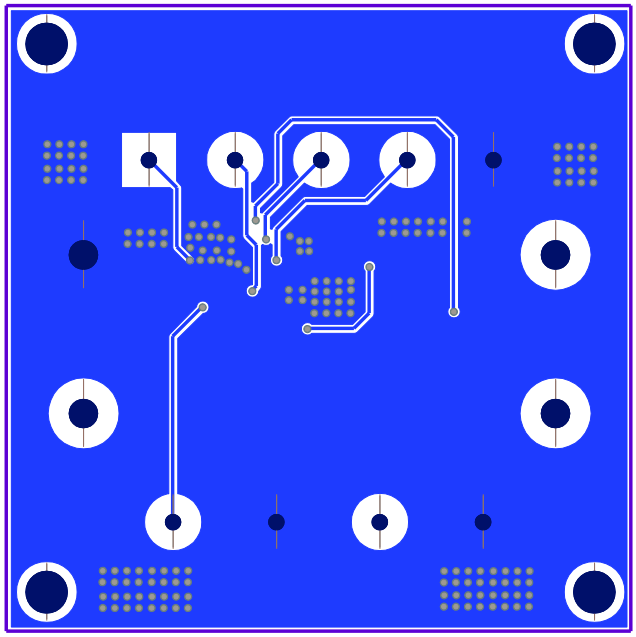


Figure 3 - Bottom Layer