The Future of Analog IC Technology

EV3394S-S-00A

4 strings 120mA White LED Driver Evaluation Board

DESCRIPTION

The EV3394S-S-00A is an evaluation board for the MP3394SGS, a step-up converter designed for liquid-crystal displays that employ an array of LEDs as the light source. It can drive up to 4 strings LEDs in parallel with 200mA/string maximum current.

The MP3394S uses external power MOSFET and internal current mode, fixed frequency architecture and includes current ballast in each string terminal, which achieves 2.5% current regulation accuracy between strings. Low feedback voltage at each LED string help reduce power loss and improve efficiency.

The MP3394S has multiple features to protect the converter from fault conditions, including under-voltage lockout, current limiting, over voltage, short LED, open LED and thermal shut-down protection.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8 – 28	V
LEDs #		4 LED string 12 LEDs/string	
LED Current	I_{LED}	120/string	mA

FEATURES

- 4 String, Max 200mA/String WLED Driver
- 8V to 28V Input Voltage Range
- 2.5% Current Matching Accuracy Between Strings
- Programmable Switching Frequency
- PWM or DC Input Burst PWM Dimming
- Open and Short LED Protection
- Programmable Over-Voltage Protection
- Cascading Capability with a Single Power Source
- Under Voltage Lockout
- Thermal Shutdown

APPLICATIONS

- Notebook PC
- LCD Monitor
- LCD TV
- Handy Terminals Display
- Automotive Systems and Tablet Computer

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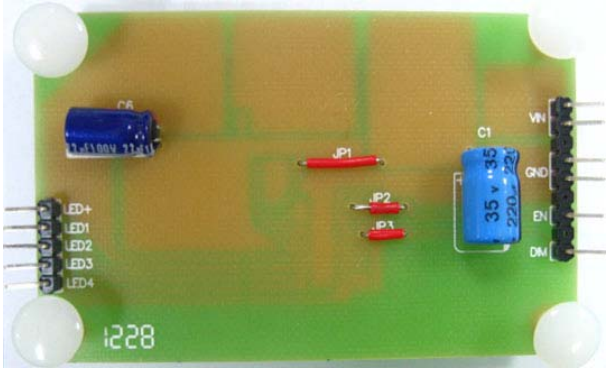
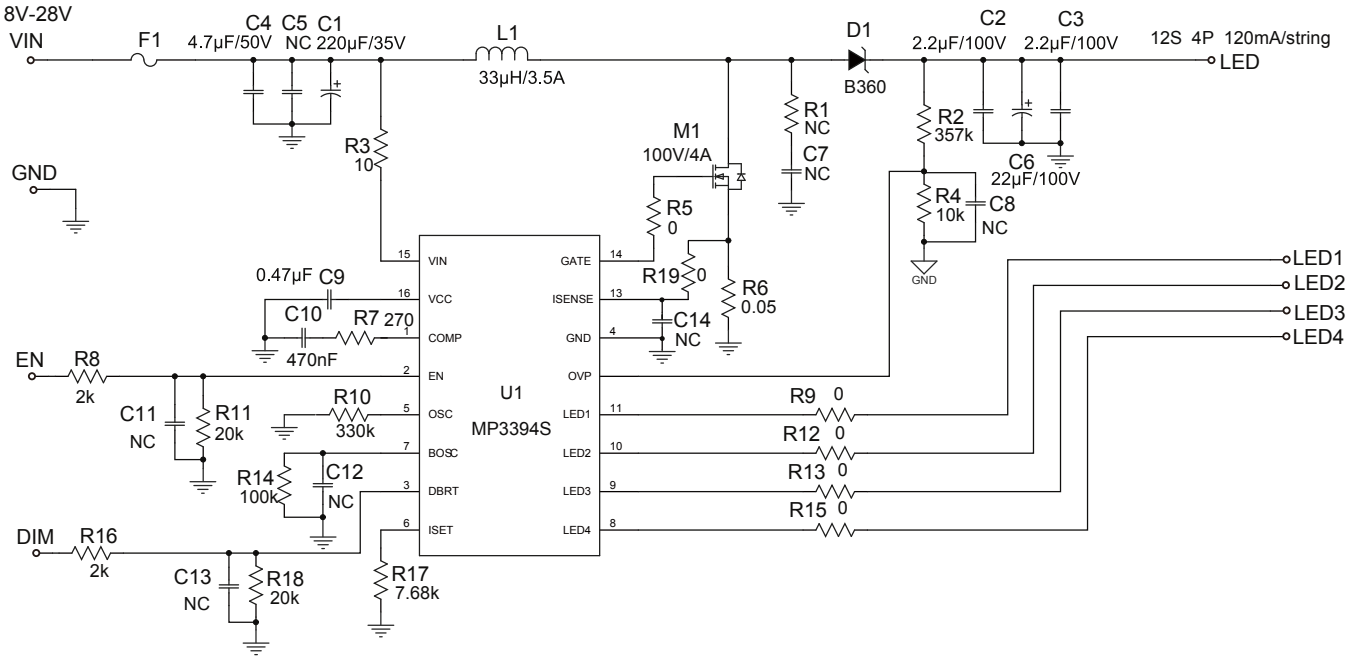
EV3394S-S-00A EVALUATION BOARD



(L x W x H) 7.8cm x 4.9cm x 1.0cm

Board Number	MPS IC Number
EV3394S-S-00A	MP3394SGS

EVALUATION BOARD SCHEMATIC



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EV3394S-S-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C11	220µF	Electrolytic Capacitor, 35V			
2	C2,C3	2.2µF	Ceramic Capacitor, 100V, X7R	1210	Murata	GRM32ER71H225KA88L
1	C4	4.7µF	Ceramic Capacitor, 50V, X7R	1210	Murata	GRM32ER71H475KA88L
1	C5	NC		1210		
1	C6	22µF	Electrolytic Capacitor, 100V			
6	C7,C8, C11~C14	NC		0603		
1	C9	0.47µF	Ceramic Capacitor, 50V, X7R	0603	Murata	GRM1885C1H474JA01D
1	C10	470nF	Ceramic Capacitor, 50V, X7R	0603	Murata	GRM188R71H474KA93D
1	D1		Diode Schottky, 60V, 3A	SMA	Diodes Inc	B360
1	F1	0Ω	Fuse, 2A, 63V	1206	Cooper	3216FF2-R
1	L1	33µH	Inductor, 3.5A	SMD		
		47µH	Inductor, 3.5A	SMD		
1	M1		N- channel MOSFET	SO8		AM4490N
1	R1	NC		0603		
1	R2	357kΩ	Resistor, 1%	0603	Yageo	RC0603FR-07357KL
1	R3	10Ω	Resistor, 1%	0603	Yageo	RC0603FR-0710RL
1	R4	10kΩ	Resistor, 1%	0603	Yageo	RC0603FR-0710KL
6	R5, R9, R12,R13, R15,R19	0Ω	Resistor, 1%	0603	Yageo	
1	R6	0.05Ω	Current Resistor, 1%	1206		
1	R7	270Ω	Resistor, 1%	0603	Yageo	RC0603FR07270RL
2	R8, R16	2kΩ	Resistor, 1%	0603	Yageo	RC0603FR-072KL
1	R10	330kΩ	Resistor, 1%	0603	Yageo	RC0603FR-07330KL
2	R11, R18	20kΩ	Resistor, 1%	0603	Yageo	RC0603FR-0720KL
1	R14	100kΩ	Resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R17	7.68kΩ	Resistor, 1%	0603	Yageo	RC0603FR-077K68L
1	U1		LED Driver IC	SOIC16	MPS	MP3394SGS

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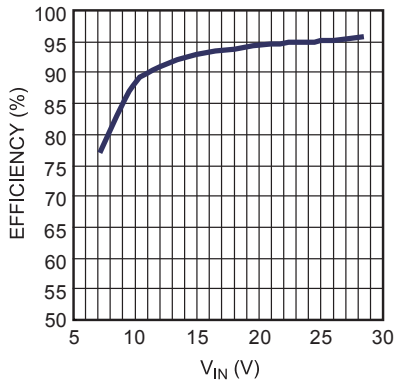
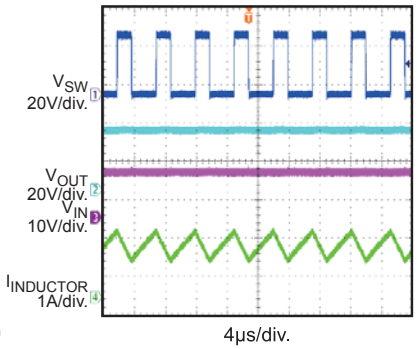
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 12V, 10LEDs in series 4 strings, 120mA/string, unless otherwise noted.

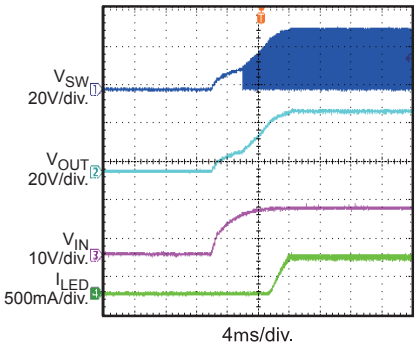
Efficiency vs. V_{IN}



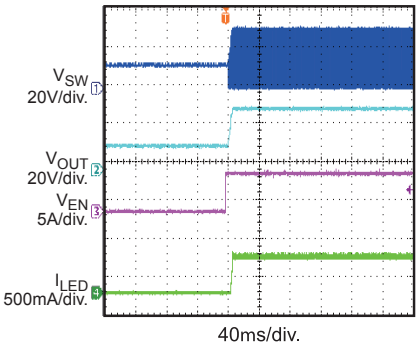
Steady State



V_{IN} Power On

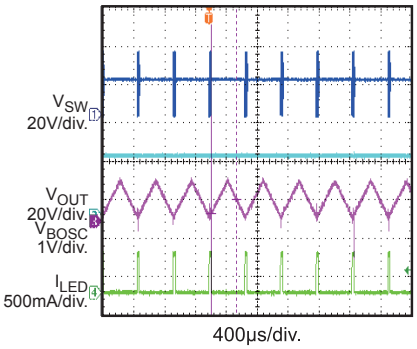


EN Power On



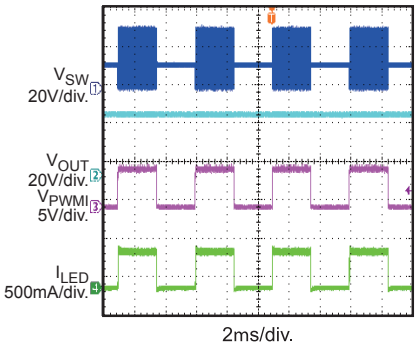
DC Burst Dimming

V_{DIM} = 0.3V, C_{BOSC} = 1.5nF



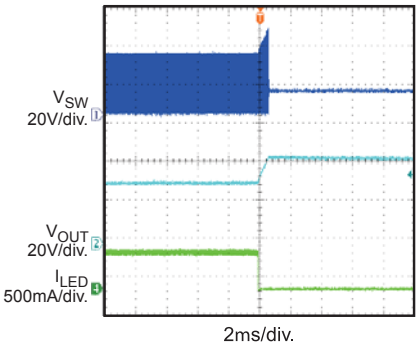
External PWM Dimming

f_{PWM} = 200Hz, D_{PWM} = 50%



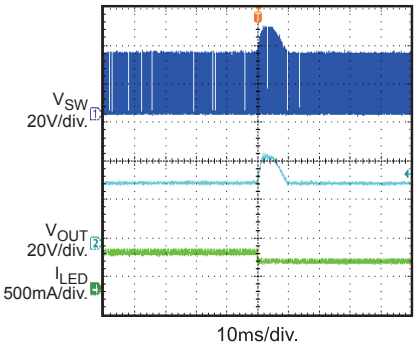
Open LED Protection

Open all LED string at working



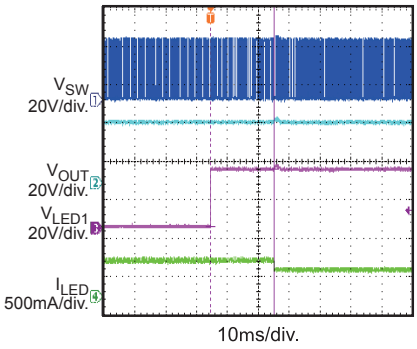
Open LED Protection

Open one LED string at working



Short LED Protection

Short V_{OUT} to LEDx at working



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PRINTED CIRCUIT BOARD LAYOUT

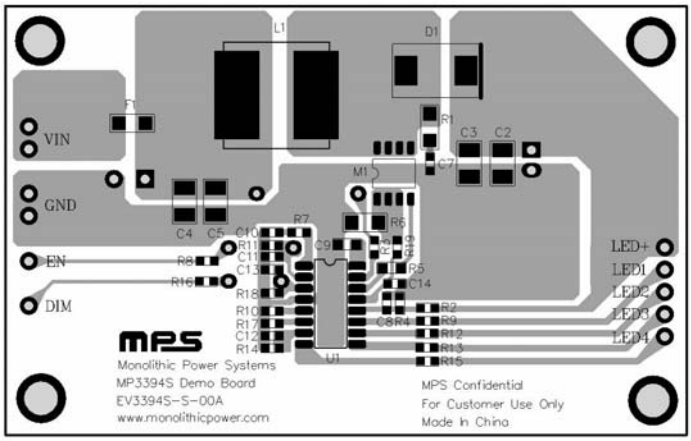

Figure 1—Top Layer

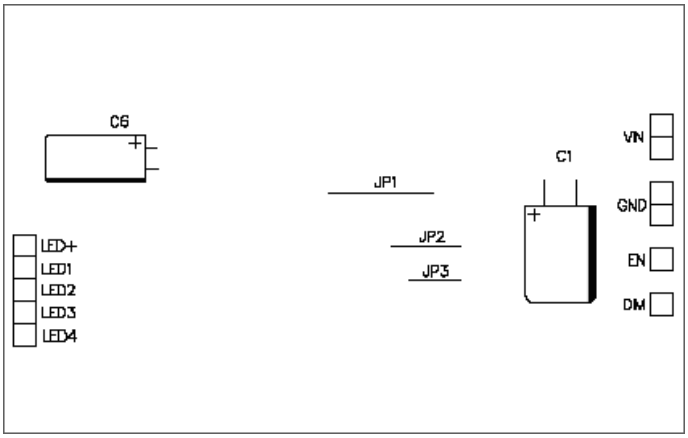

Figure 2—Bottom Layer

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QUICK START GUIDE

1. Connect the positive and negative terminals of the load panel (12 white LEDs in series, 4 stings) to the LED+ and LED1~4 pins on the EV board, respectively.
2. Connect the positive and negative terminals of the power supply (8V ~ 28V) to the VIN and GND pins on the EV board, respectively.
3. Drive EN pin high (5V) to enable the MP3394.
4. For PWM dimming, apply a PWM rectangular waveform with a minimum voltage less than 0.5V and a maximum greater than 1.2V on DIM pin. The frequency of the PWM signal is recommended between 100Hz to 20kHz.

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