



The Future of Analog IC Technology®

# EV4603-S-00A

## Buck-Boost White LED Driver For TV Backlighting Applications

### DESCRIPTION

The EV4603-S-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MP4603ES for TV backlighting applications. MP4603 is an integrated Buck-Boost white LED driver which is suitable for TV and big panel backlighting applications with MPS patented pending technology.

With a 12V input  $V_{IN}$  and a high voltage source  $V_{INH}$ , EV4603-S-00A can deliver a regulated voltage ( $V_{INH}$  to  $V_{INH}+63V$ ) to drive a LED string over 350V. The LED current is regulated to about 120mA. The EV4603-S-00A can be synchronized. Several EV4603-S-00As can be used together to drive a TV panel

### ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	12±10%	V
LED Current	$I_{LED}$	120	mA
Switching Frequency	$f_s$	200	kHz
Over Voltage Protection	$V_{OVP}$	-63	V

### FEATURES

- Novel Power Leverage Control Technology
- Unique Step-up/down Operation
- Up to 99.5% Efficiency
- 0.5Ω Internal Power MOSFET Switch
- Switching Frequency Synchronization
- Over 1:1000 Dimming Ratio
- Separated Analog and PWM Dimming
- ±5% 200mV Reference Voltage
- 10μA Shutdown Mode
- Cycle-by-Cycle Over Current Protection
- Thermal Shutdown Protection
- LED String Open and Short Protection
- FAULT Output at LED Protection
- Output Short Circuit Protection

### APPLICATIONS

- TV Backlighting
- Large LCD Panels Backlighting

All MPS parts are lead-free and adhere to the RoHS directive. For MPS green status, please visit MPS website under Products, Quality Assurance page "MPS" and "The Future of Analog IC Technology", are Registered Trademarks of Monolithic Power Systems, Inc.

### EV4603-S-00A EVALUATION BOARD

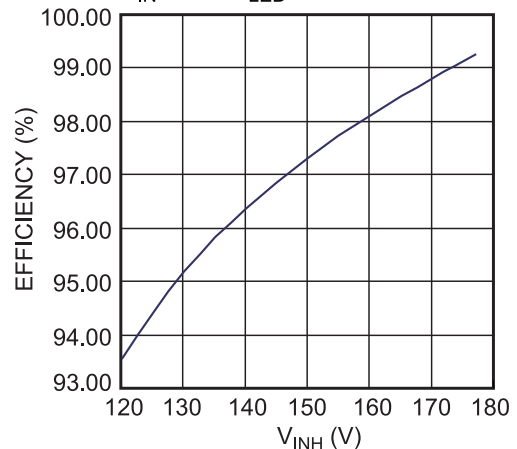


(L x W x H) 5cm x 4.6cm x 4.5mm

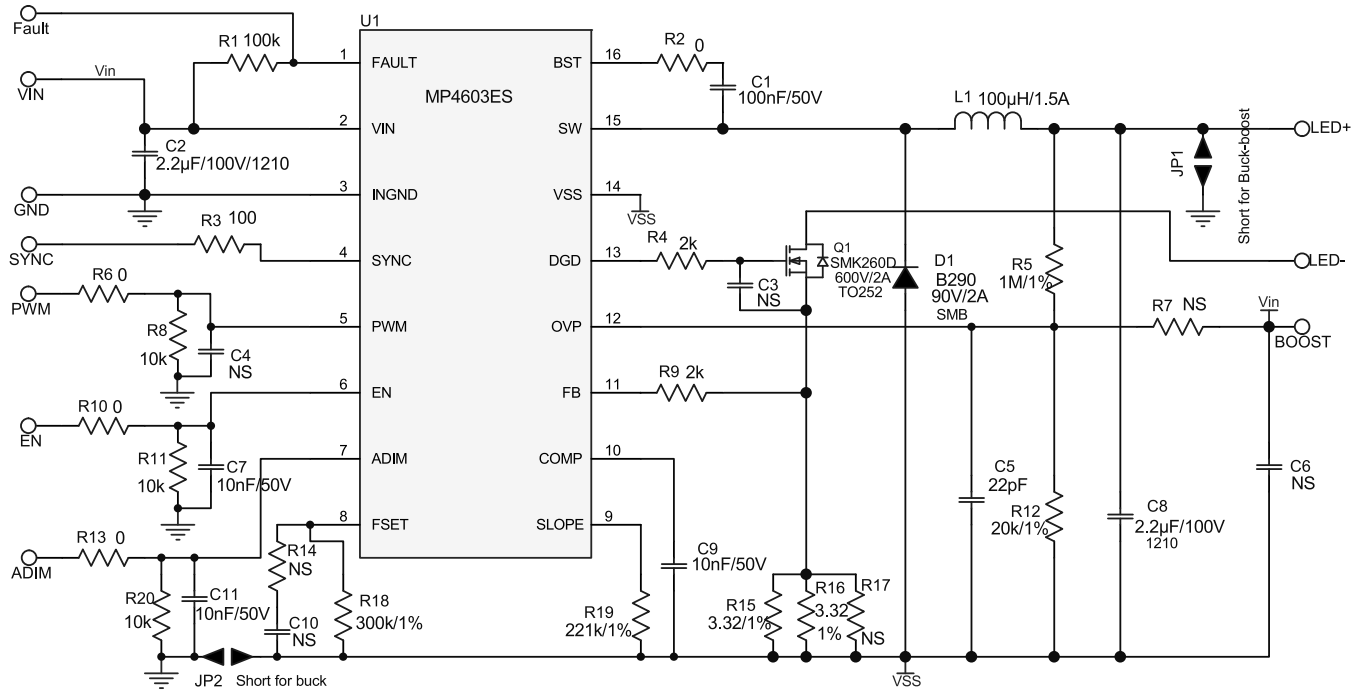
Board Number	MPS IC Number
EV4603ES-00A	MP4603ES

### Efficiency vs. $V_{INH}$

$V_{IN}=12V, V_{LED}=179V$



## EVALUATION BOARD SCHEMATIC

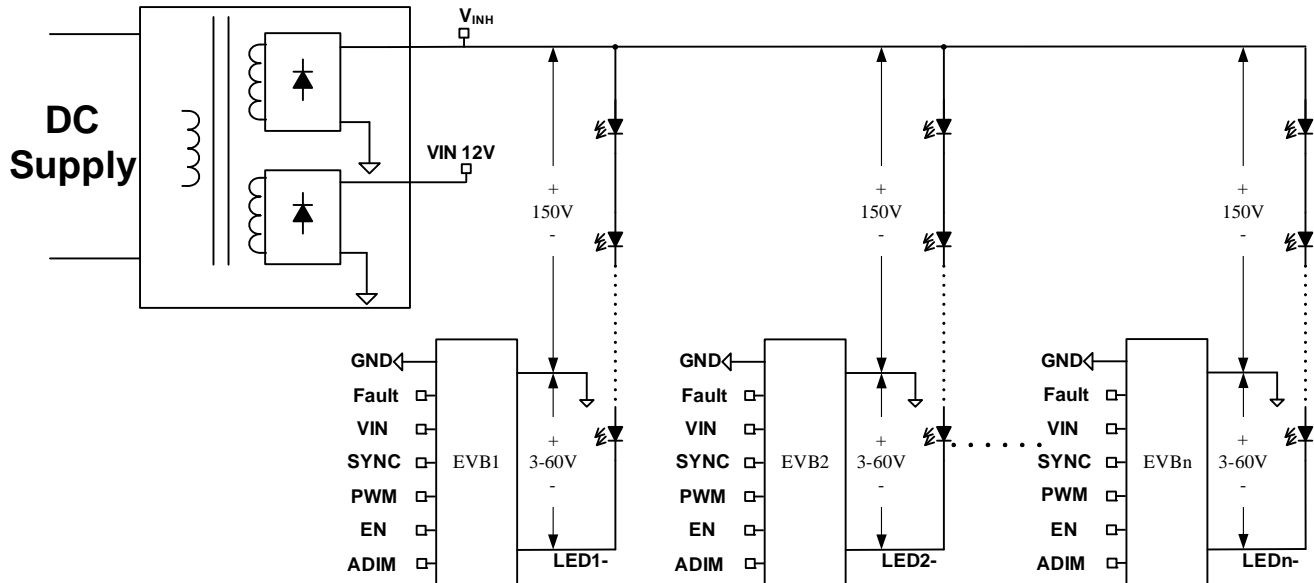


## EV4603-S-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	100nF	Ceramic Capacitor;50V;X7R;0603	0603	muRata	GRM188R71H103KA01D
2	C2, C8	2.2µF	Ceramic Capacitor;100V;X7R;1210	1210	muRata	GRM32ER72A225KA35L
4	C3, C4, C6, C10	NS				
1	C5	22pF	Ceramic Capacitor;50V;COG;0603	0603	muRata	GRM1885C1H220JA01D
3	C7, C9, C11	10nF	Ceramic Capacitor;50V;X7R;0603	0603	muRata	GRM188R71H104KA93D
1	D1	B290	Schottky Diode;90V;2A	SMB	Diodes	B290
3	JP3, JP4, JP5	Jump Wire	Jump Wire			Jump Wire
1	L1	100µH	Inductor;100uH;250mOhm ;1.5A	SMD	Würth	7447715101
1	Q1	SMK0260D	N-Channel Mosfet;600V, 2A	DPAK(T O-252)	AUK	SMK0260D
1	R1	100k	Film Resistor;1%	0603	Yageo	RC0603FR-07100KL
4	R2, R6, R10, R13	0	Film Resistor;5%	0603	Yageo	RC0603JR-070RL

**EV4603ES-00A BILL OF MATERIALS (continued)**

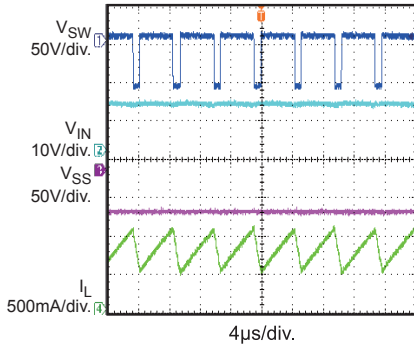
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	R3	100	Film Resistor;1%	0603	Yageo	RC0603FR-07100RL
2	R4, R9	2k	Film Resistor;1%	0603	Yageo	RC0603FR-072KL
1	R5	1M	Film Resistor;1%	0603	Yageo	RC0603FR-071ML
3	R7, R14, R17	NS				
4	R8, R11, R20	10k	Film Resistor;1%	0603	Yageo	RC0603FR-0710KL
1	R12	20k	Film Resistor;1%	0603	Yageo	RC0603FR-0720KL
2	R15, R16	3.32	Film Resistor;1%	0603	Yageo	RC0603FR-073R32L
1	R18	300k	Film Resistor;1%	0603	Yageo	RC0603FR-07300KL
1	R19	221k	Film Resistor;1%	0603	Yageo	RC0603FR-07221KL
1	U1	MP4603ES	MP4603ES	SOIC16	MPS	MP4603ES

**EXAMPLE OF TV BACKLIGHT DRIVE WITH SEVERAL EV4603-S-00A**


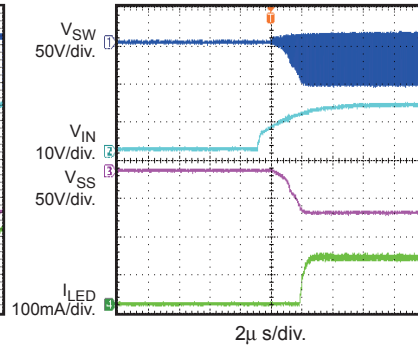
### EVB TEST RESULTS

Performance waveforms are tested on the evaluation board (JP1 Short, JP2 Open).  
 $V_{IN} = 12V$ ,  $V_{INH}=125V$ ,  $V_{LED}=180V$ ,  $I_{LED} = 120mA$ ,  $T_A = 20^\circ C$ , unless otherwise noted.

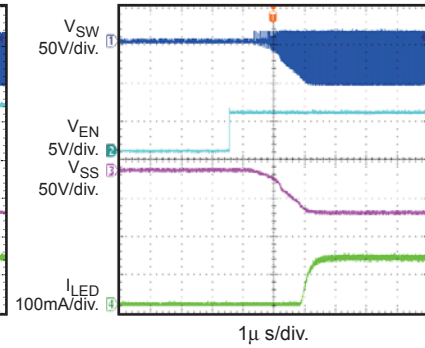
Steady State



VIN Start

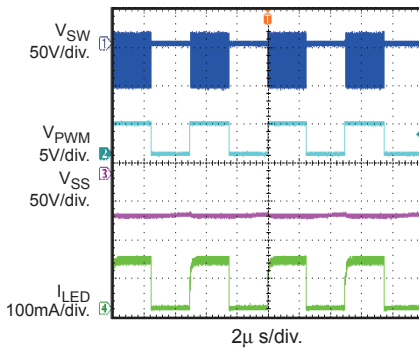


EN Start

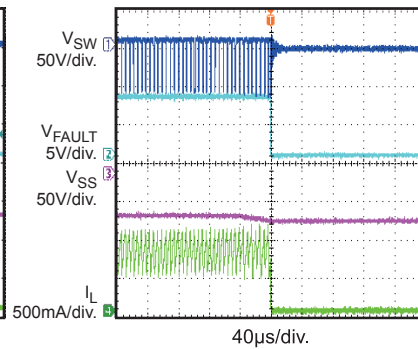


PWM Dimming

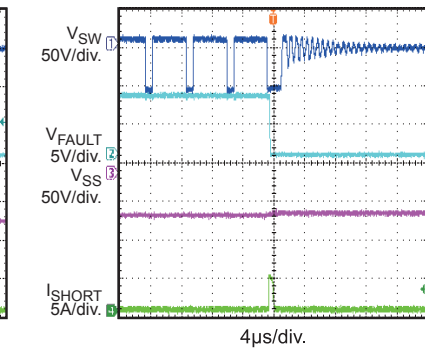
$F_{PWM}=200Hz$ ,  $D_{PWM}=50\%$



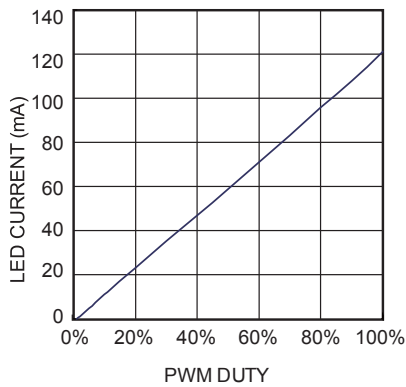
Open LED Load @ Working



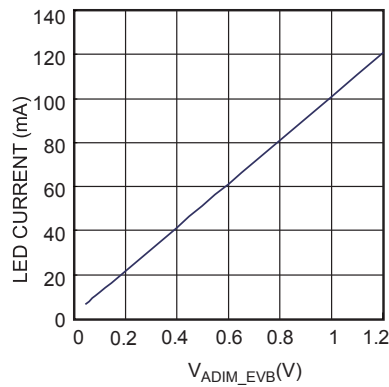
Short LED- to GND @ Working



PWM Dimming Curve



Analog Dimming Curve



PRINTED CIRCUIT BOARD LAYOUT

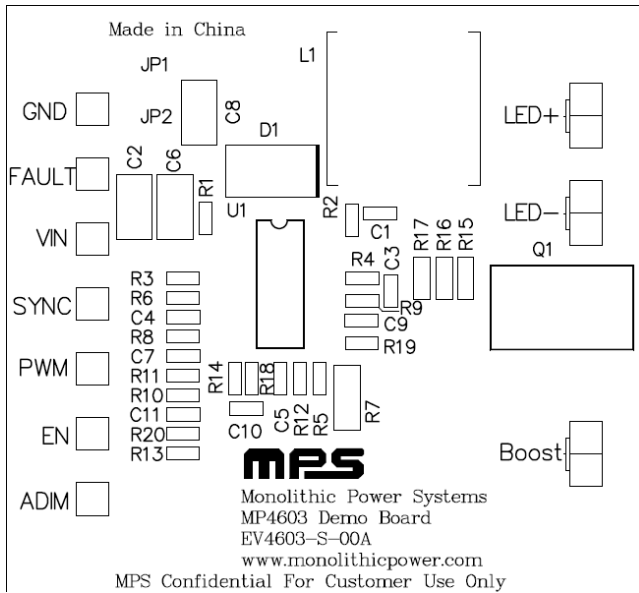


Figure 1—Top Silk Layer

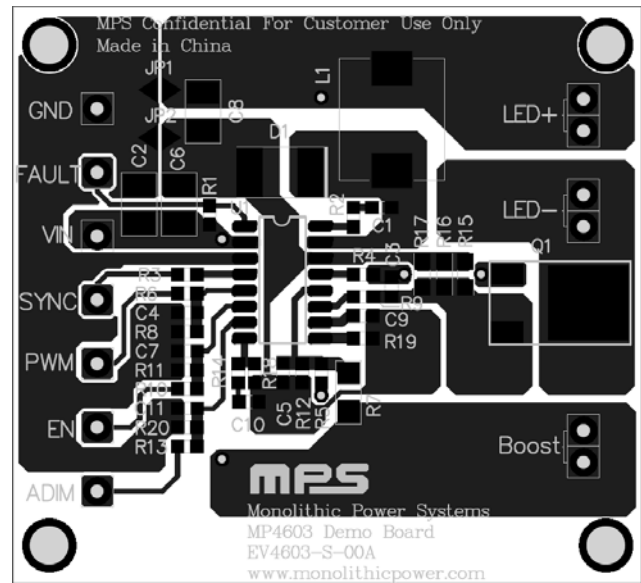


Figure 2—Top Layer

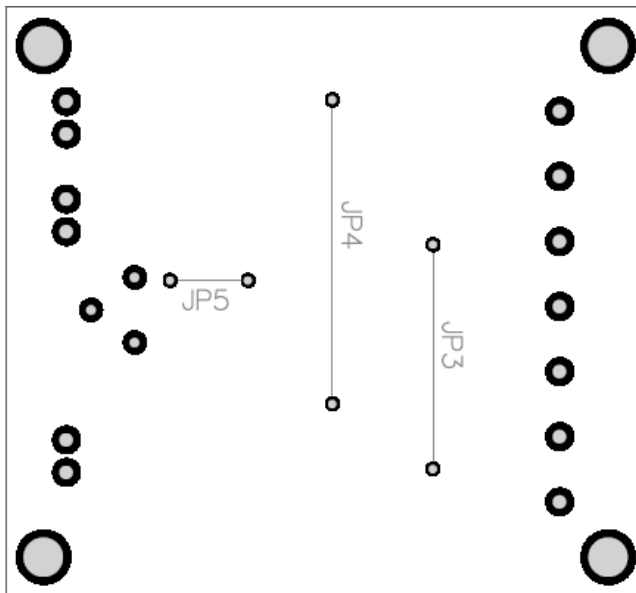


Figure 3—Bottom Layer