

## DESCRIPTION

The EVQ3386-R-00A is an evaluation board for the MPQ3386-R, a step-up converter designed for large liquid-crystal displays that employ an array of LEDs as the light source. It can drive up to 6 strings in parallel and 10 LEDs per string.

The MPQ3386 uses internal switch current mode, fixed frequency architecture and includes current ballast in each string terminal, which achieves 3% current regulation accuracy between strings. Low feedback voltage at each LED string help reduce power loss and improve efficiency.

The MPQ3386 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.

The MPQ3386 is available in small QFN24 (4mmx 4mm) package.

## ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	4.5 – 25	V
LEDs #		6 string parallel and 10 LEDs each string	
LED Current	$I_{LED}$	20/string	mA

## FEATURES

- 4.5V to 25V Input Voltage Range
- Up to 89% Efficiency
- Programmable Over Voltage Protection
- Drives up to 6 Strings Parallel and 10 LEDs in Series.
- 3% Current Regulation Accuracy Between Strings
- Selectable Switching Frequency: 1.25MHz and 625kHz
- Open and Short LED Load Protection
- Thermal Shutdown

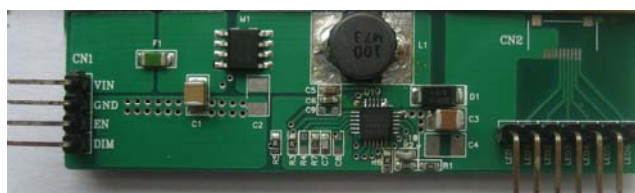
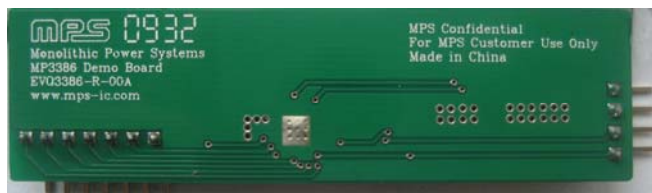
## APPLICATIONS

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

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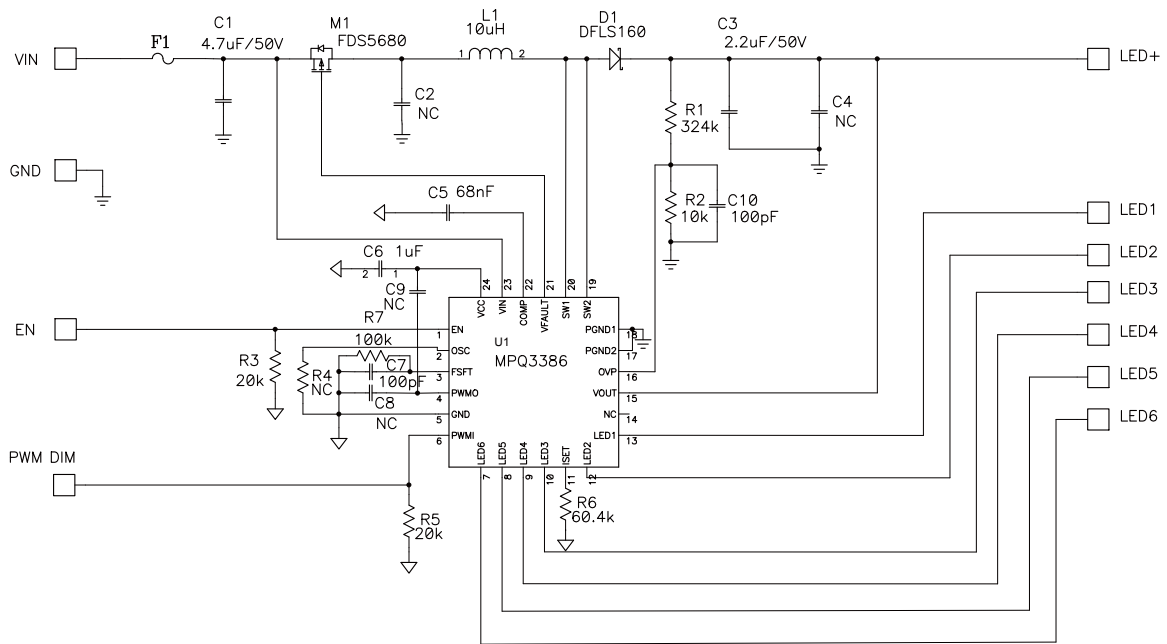
## EVQ3386-R-00A EVALUATION BOARD



(L x W x H) 7.3cm x 2.0cm x 1.0cm

Board Number	MPS IC Number
EVQ3386-R-00A	MPQ3386-R

EVALUATION BOARD SCHEMATIC



**EVQ3386-R-00A BILL OF MATERIALS**

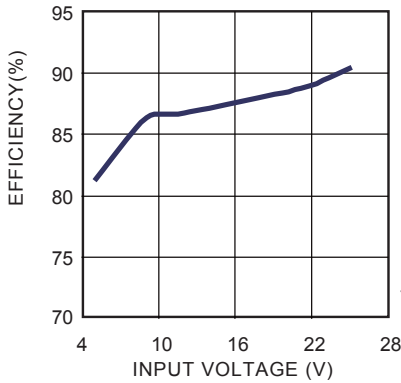
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	4.7 $\mu$ F	Ceramic Capacitor, 50V, X7R	1210	Murata	GRM32ER71H475KA88L
2	C2, C4	NC		1210		
1	C3	2.2 $\mu$ F	Ceramic Capacitor, 50V, X7R	1210	TDK	C3225X7R1H225
1	C5	68nF	Ceramic Capacitor, 50V, X7R	0603	Murata	GRM188R71H683KA93D
1	C6	1 $\mu$ F	Ceramic Capacitor, 16V, X5R	0603	Murata	GRM188R71C105KA12D
2	C7, C10	100pF	Ceramic Capacitor, 50V, COG	0603	Murata	GRM1885C1H101JA01D
2	C8, C9	NC		0603		
1	D1		Diode Schottky, 60V, 1A	SMA	Diodes Inc	DFLS160-F
1	F1		Fuse, 2A, 63V	1206	Cooper Bussman	3216FF2-R
1	L1	10 $\mu$ H	Inductor, 2.5A	SMD	SUMIDA	CDRH8D28NP-100NC
		10 $\mu$ H	Inductor, 2.47A	SMD	Cooper	DR73-100
1	M1		P- channel MOSFET	SO8	Fairchild Semiconductor	FDS5680
1	R1	324k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07324KL
1	R2	10k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-0710KL
2	R3, R5	20k $\Omega$	Resistor, 5%	0603	Yageo	RC0603JR-0720KL
1	R4	NC		0603		
1	R6	60.4k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-0760K4L
1	R7	100k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	U1		LED Driver IC	QFN24	MPS	MPQ3386-R

## EVB TEST RESULTS

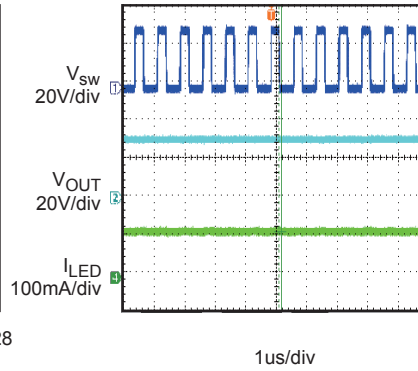
Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ , 10 LEDs in series, 6 strings parallel, 20mA/string, unless otherwise noted.

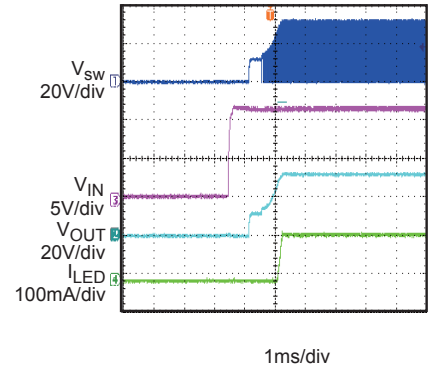
Efficiency vs. Input Voltage



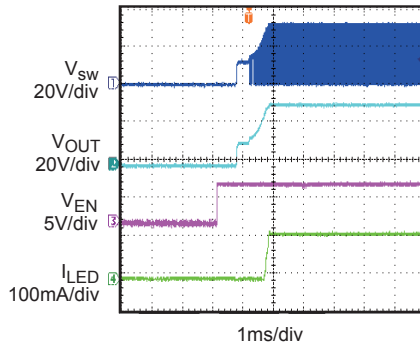
Steady State



Vin Startup

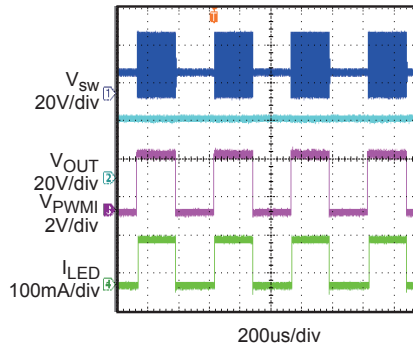


Ven Startup



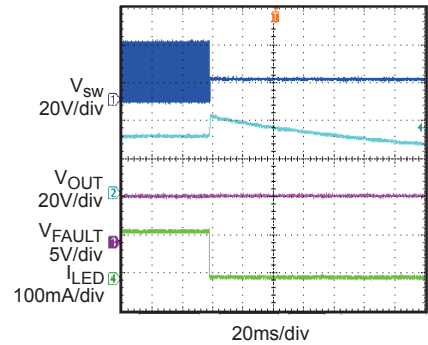
PWM Dimming

$f_{PWM} = 2kHz$ ,  $D_{PWM} = 50\%$



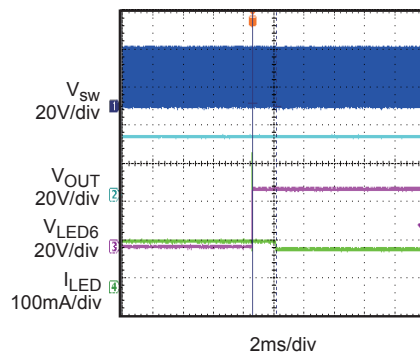
Open LED Protection

open all LED strings at working



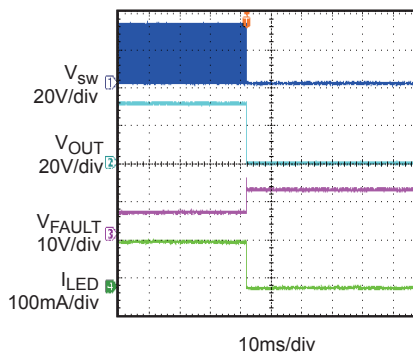
Short LED Protecton

short Vout to LEDx at working

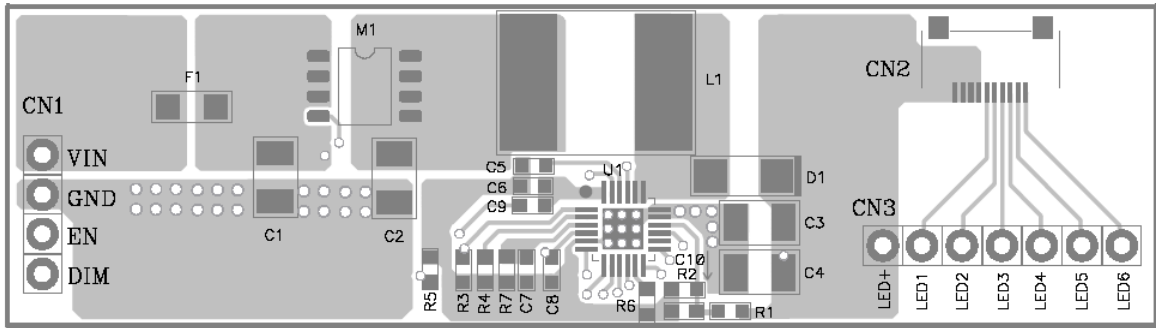


Short LED Protection

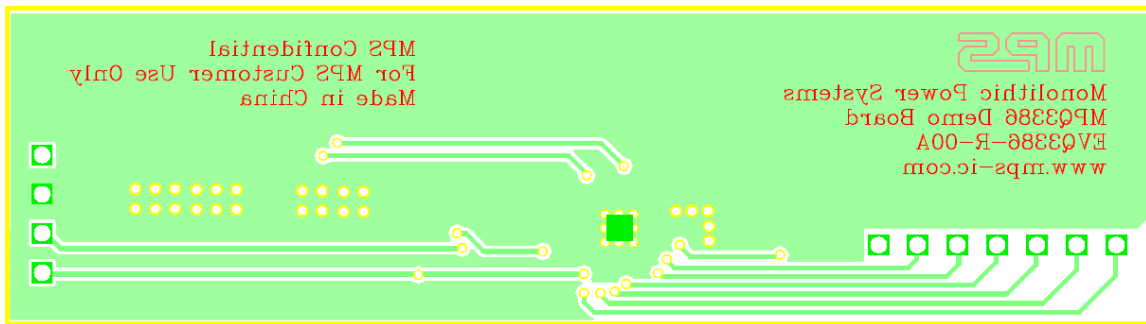
short Vout to GND at working



**PRINTED CIRCUIT BOARD LAYOUT**



**Figure 1—Top Layer**



**Figure 2—Bottom Layer**

## QUICK START GUIDE

1. Connect the positive and negative terminals of the load panel (10 white LEDs in series, 6 strings paralleled) to the LED+ and LED1~6 pins on the EV board, respectively.
2. Connect the positive and negative terminals of the power supply (4.5V ~ 25V) to the VIN and GND pins on the EV board, respectively.
3. Drive EN pin high ( $2.5V < V_{EN} < 5V$ ) to enable the MPQ3386.
4. For PWM dimming, apply a PWM rectangular waveform with a minimum voltage less than 0.8V and a maximum greater than 1.5V on PWM DIM pin. The frequency of the PWM signal is recommended between 200Hz to 2kHz.

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