



# EVQ3367-R-01A

## 6-Channel, Maximum 150mA/Ch Boost WLED Driver with 15000:1 Dimming Ratio and I<sup>2</sup>C Evaluation Board

### DESCRIPTION

The EVQ3367-R-01A is an evaluation board designed for the MPQ3367, a step-up converter with six channel current sources. It is designed to drive the white LED arrays as backlighting for small- or medium-sized LCD panels.

The device uses peak current mode as its PWM control architecture to regulate the boost converter. Six channel current sources are applied to the LED cathode to adjust the LED brightness. The MPQ3367 regulates the current in each LED string to the value set by an external current-setting resistor, with 2.5% current regulation accuracy between strings.

A low on resistance MOSFET and headroom voltage are provided to improve efficiency. The MPQ3367 has a standard I<sup>2</sup>C digital interface for easy use. The switching frequency can be configured via a resistor, I<sup>2</sup>C interface, or external clock.

The MPQ3367 provides analog, PWM, and mix dimming mode with a PWM input. The dimming mode can be selected with the I<sup>2</sup>C interface or the MIX/AD pin. The device also has a phase shift function to eliminate noise during PWM dimming.

Protection features that guarantee safe operation include over-current protection (OCP), over-voltage protection (OVP), over-temperature protection (OTP), LED short and open protection. The LED current also automatically decreases at high temperatures.

The MPQ3367 is available in QFN-24 (4mmx4mm) and TSSOP-28EP packages.

### ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input voltage	V <sub>IN</sub>	12	V
Output voltage	V <sub>LED</sub>	<50	V
LED number	-	6 strings	-
LED current/ string	I <sub>LED</sub>	50	mA

### FEATURES

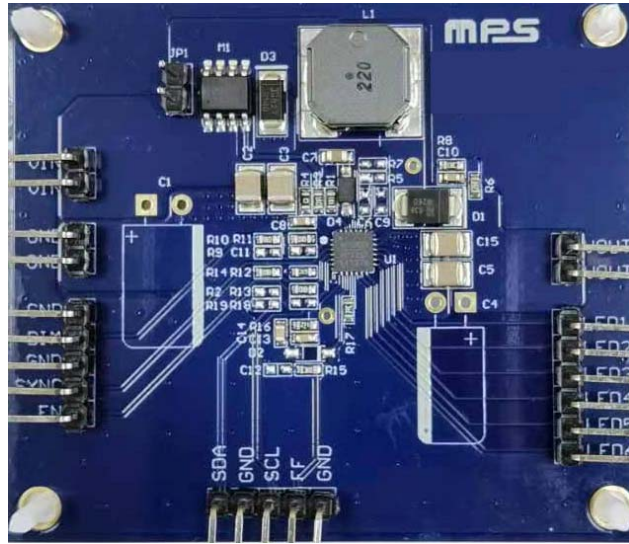
- 3.5V to 36V Input Voltage Range
- 6 Channels with Maximum 150mA per Channel
- Internal 100mΩ, 50V MOSFET
- Configurable Switching Frequency Up to 2.2MHz
- External Sync SW Function
- Multi-Dimming Operation Mode through the PWM Input, including:
  - Direct PWM Dimming
  - Analog Dimming
  - Mixed Dimming with 25% or 12.5% Transfer Point
- 15000:1 Dimming Ratio in PWM Dimming when f<sub>PWM</sub> ≤ 200Hz
- 200:1 Dimming Ratio during Analog Dimming through the PWM Dimming Signal Input
- Excellent EMI Performance
- Frequency Spread Spectrum
- I<sup>2</sup>C Interface
- Phase Shift Function for PWM Dimming
- 2.5% Current Matching
- Cycle-by-Cycle Current Limiting
- Disconnect VOUT from VIN
- LED Current Auto-Decrement at High Temperatures
- LED Short/Open, OTP, OCP, and Inductor Short Protections
- Configurable LED Short and OVP Thresholds
- Fault Indicator Signal Output
- Available in QFN-24 (4mmx4mm) and TSSOP-28EP Packages

### APPLICATIONS

- Tablets/Notebooks
- Automotive Displays

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**EVQ3367-R-01A EVALUATION BOARD**



**Top**



**Bottom**

**LxW (6.35cmx5.25cm)**

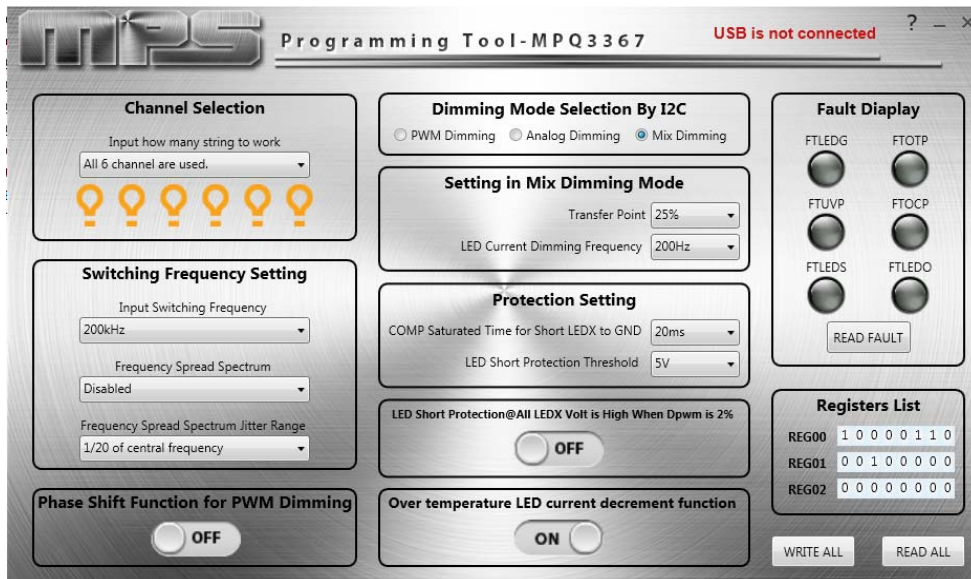
Board Number	MPS IC Number
EVQ3367-R-01A	MPQ3367GRE

## QUICK START GUIDE

1. Provide a voltage source (3.5V to 36V) between the VIN terminal and GND on the evaluation board.
2. Connect the LED load (6 strings) terminals to:
  - a. Positive (+): LED+
  - b. Negative (-): LED1–6 pins
3. Drive the EN pin high to turn the MPQ3367 on; drive the EN pin low to turn the device off.
4. Apply a 100Hz to 20kHz PWM pulse to the PWM terminal.

If using the I<sup>2</sup>C to set the IC functions, follow the steps below:

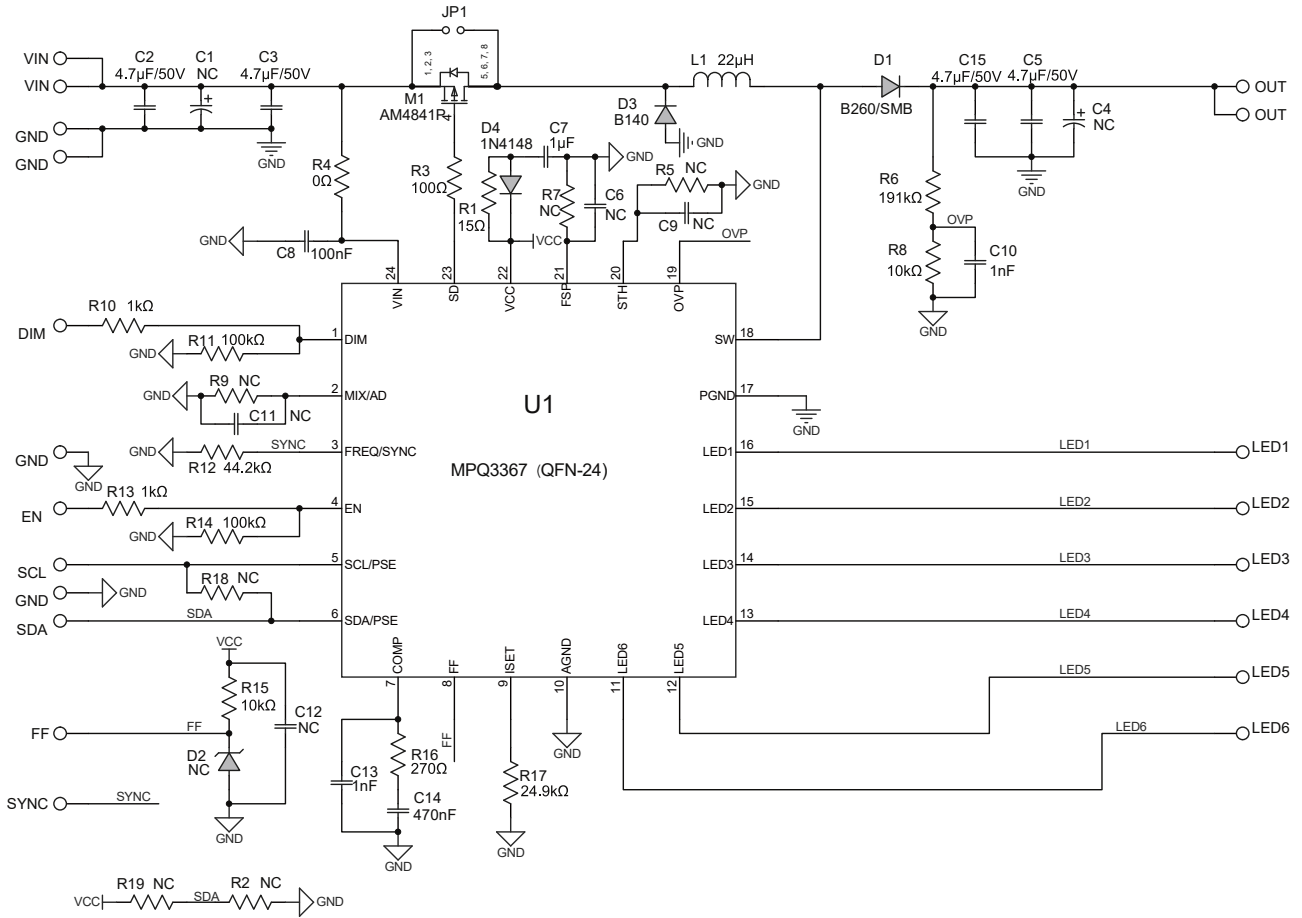
1. Connect the SCL, SDA, and GND pins of the evaluation board to their respective pin locations on the I<sup>2</sup>C kit.
2. Write to and read the registers using the steps below:
  - a. Ensure that the I<sup>2</sup>C kit can communicate with the computer. If the message “USB is not connected” appears on the GUI, then the I<sup>2</sup>C kit cannot communicate with the computer (see Figure 1). Otherwise, the GUI and I<sup>2</sup>C kit are able to communicate.



**Figure 1: MPQ3367 GUI Interface**

- b. Use the interface to adjust the parameters.
- c. After setting the parameters, click “WRITE ALL” to send the data to the IC.
- d. To check that the data has been written to the IC, click the “READ ALL” button.

**EVALUATION BOARD SCHEMATIC**



**Figure 2: Evaluation Board Schematic**

**EVQ3367-R-01A BILL OF MATERIALS**

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	C1	NC	Electrolytic capacitor, 100µF/50V	DIP		
4	C2, C3 C5, C15	4.7µF/50V	Ceramic capacitor, 50V, X7R	1210	Murata	GRM32ER71H475KA88L
1	C4	NC	Electrolytic capacitor, 22µF/50V	DIP		
1	C7	1µF/25V	Ceramic capacitor, 25V, X7R	0805	Murata	GRM216R61E105KA12D
1	C8	100nF/50V	Ceramic capacitor, 50V, X7R	0603	TDK	C1608X7R1H104K
4	C6, C9, C11, C12	NC		0603		
2	C10, C13	1nF/10V	Ceramic capacitor, 16V, X7R	0603	Murata	GRM188R71102KA01D
1	C14	470nF/10V	Ceramic capacitor, 16V, X7R	0603	TDK	C1608X7R1C474K
1	D1	B260	Schottky diode, 60V, 2A	SMB	Diodes Inc.	B260
1	D2	NC	Zener diode, 3.3V	SOD-123		
1	D3	B140	Schottky diode, 40V, 1A	SMA	Diodes Inc.	B140
1	D4	1N4148W	Diode, 75V, 0.15A	SOD-123	Diodes Inc.	1N4148W
1	JP1	NC	Connector, 2.54mm 180°	CONN/DIP		
1	L1	22µH	Inductor, 22µH, 68.1mΩ, I <sub>SAT</sub> = 4.2A	SMD	Murata	1274AS-H-220M=P3
1	M1	AM4841P	P-channel MOSFET, -40V/9A	MOS/SO8	Analog Power	AM4841P
1	R1	15Ω	Film resistor, 1%	RES/0603	Yageo	RC0603FR-0715RL
6	R2, R5, R7, R9, R18, R19	NC	Film resistor, 1%	RES/0603		
1	R3	100Ω	Film resistor, 1%	RES/0603	Yageo	RC0603FR-07100RL
1	R4	0Ω	Film resistor, 1%	RES/0603	Yageo	RC0603FR-070RL
1	R6	191kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-07191KL
2	R8, R15	10kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-0710KL
2	R10, R13	1kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-071KL
2	R11, R14	100kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-07100KL
1	R12	44.2kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-0744K2L
1	R16	270Ω	Film resistor, 1%	RES/0603	Yageo	RC0603FR-07270RL
1	R17	24.9kΩ	Film resistor, 1%	RES/0603	Yageo	RC0603FR-0724K9L
1	U1	MPQ3367	6-channel LED driver	QFN-24 (4mmx4mm)	MPS	MPQ3367GR

## PCB LAYOUT

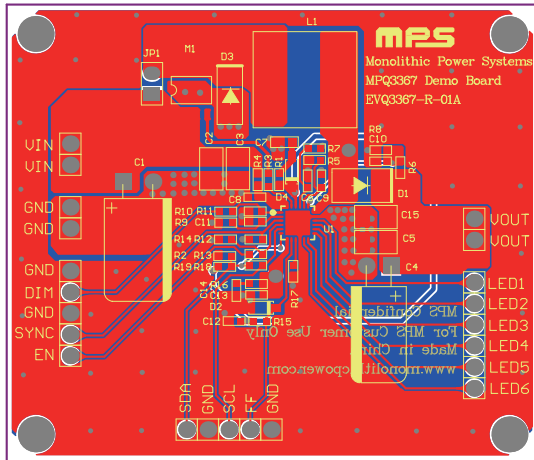


Figure 3: Top Layer

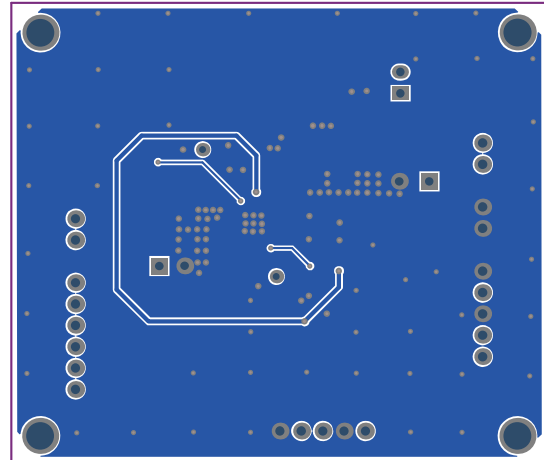


Figure 4: Bottom Layer