



The Future of Analog IC Technology®

# EV23701-QEU-00A

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

### DESCRIPTION

The EV23701-QEU-00A Evaluation Board is designed to demonstrate the capabilities of MP23701. The MP23701 is a 24V monolithic synchronous step-down 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 UTQFN8(1.5mm\*2.5mm) package. Peak current mode operation provides fast transient response and eases loop stabilization.

The EV23701-QEU-00A is typically designed for driving 1-2 WLEDs in series LED load with 1A LED current at wide 4.2V to 24V input range.

The EV23701-QEU-00A has high performances in efficiency, line/load regulation and deep analog dimming. Fault condition protection includes cycle-by-cycle peak current limiting, output short circuit protection, open LED protection, NTC thermal protection and thermal shutdown.

### ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	4.2 to 24	V
Output Voltage	$V_{OUT}$	3-6	V
LED Current	$I_{LED}$	1	A

### FEATURES

- 4.2V to 24V Wide Input Range
- Synchronous Step-Down Converter
- 100mΩ Internal High-side Power MOSFET
- 80mΩ Internal Low-side Synchronous Rectifier
- Peak Current Mode Control
- 1A Continue Output Current
- 100mV Feedback Voltage
- Up to 95% Efficiency
- Fixed 1.5MHz Switching Frequency
- Analog Dimming
- Cycle-by-Cycle Current Limit
- Inherent LED Open Protection
- Output Short Circuit Protection
- NTC Thermal Protection
- Thermal Shutdown
- Auto-Restart Function

### APPLICATIONS

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

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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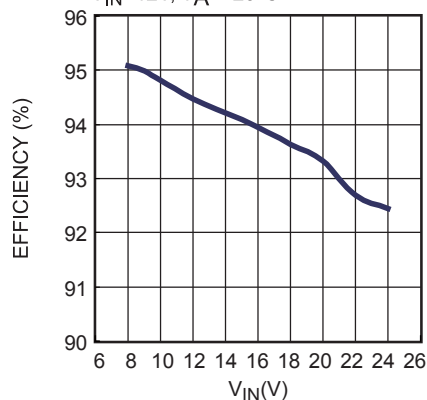
### EV23701-QEU-00A EVALUATION BOARD



<b>(L x W ) 50mm x 50mm</b>	
<b>Board Number</b>	<b>MPS IC Number</b>
EV23701-QEU-00A	MP23701GQEU

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

$V_{IN}=12V, T_A = 25^{\circ}C$



EVALUATION BOARD SCHEMATIC

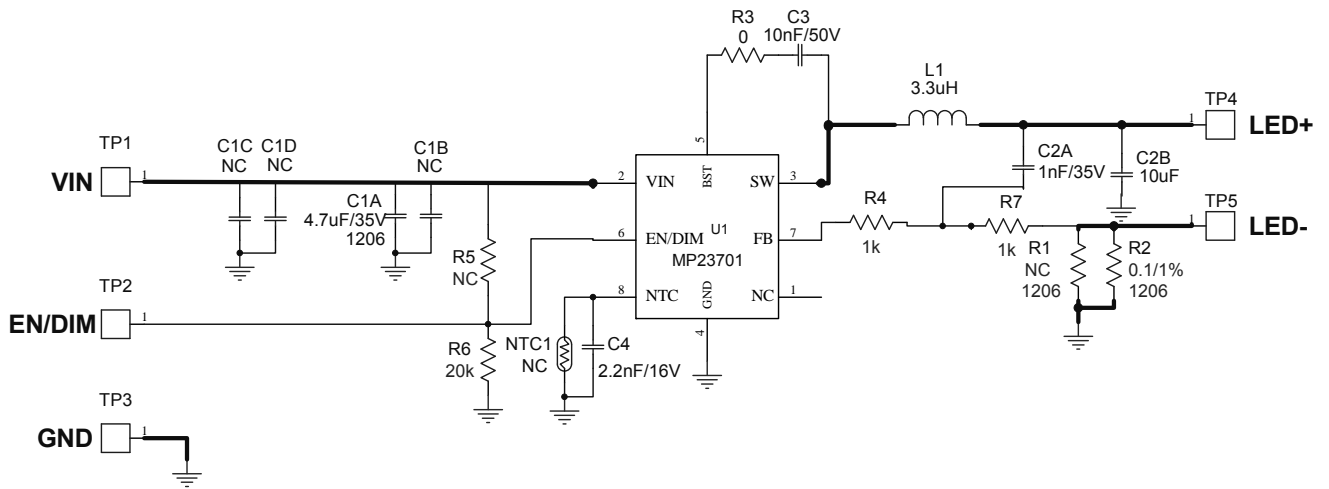


Figure 1 - Schematic

**EV2410-JE-00A BILL OF MATERIALS**

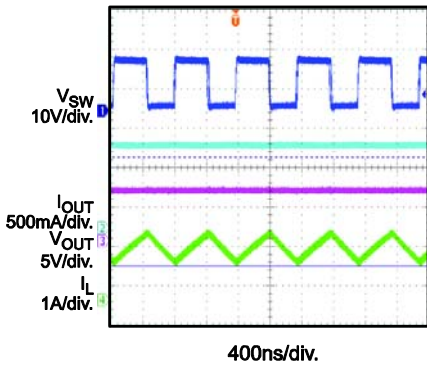
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer_P/N
1	C1A	4.7 $\mu$ F/35V	Ceramic Cap, 35V, X7R	1206	Taiyo Yuden	GMK316A7475KL-T
4	C1B,C1C C1D,	NC				
1	C2A	1nF/50V	Ceramic Cap, 50V, X7R	0603	muRata	GRM033R71H102KA12D
1	C2B	10 $\mu$ F/35V	Ceramic Cap, 35V, X7R	1210	muRata	GRM32ER7YA106KA12L
1	C3	10nF/50V	Ceramic Cap, 50V, X7R	0603	muRata	GRM188R71H103KA01D
1	C4	2.2nF/16V	Ceramic Cap, 16V, X7R	0603	muRata	GRM188R71C222KA01D
1	L1	3.3 $\mu$ H	Inductor, 3.3 $\mu$ H, 4.4A	SMD	TDK	RLF7030-3R3M4R1(非标)
1	NTC1	NC				
1	R1	100m $\Omega$	Thick Film Chip RES, 1%	1206	CYNTEC	RL1632H-R100-FN
1	R2	NC				
1	R3	0 $\Omega$	Thick Film Chip RES, 1%	0603	Yageo	RC0603FR-070RL
2	R4,R7	1k $\Omega$	Thick Film Chip RES, 1%	0603	Yageo	RC0603FR-071KL
1	R5	NC				
1	R6	20k $\Omega$	Thick Film Chip RES, 1%	0603	Yageo	RC0603FR-0720KL
1	U1	MP23701	Sync Step-down LED Driver	UTQFN8	MPS	MP23701GQEU-Z

### EVB TEST RESULTS

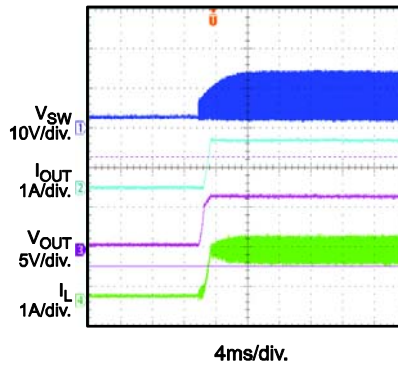
Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ , 2 WLEDs in series,  $V_{OUT} = 6V$ ,  $I_{LED} = 1A$ ,  $L = 3.3\mu H$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

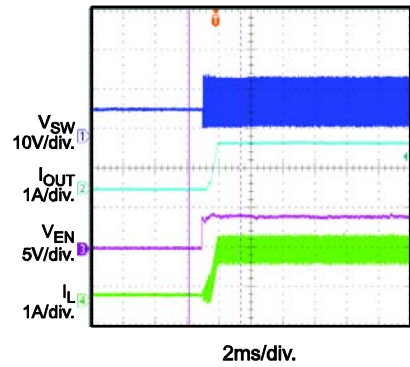
**Steady State**



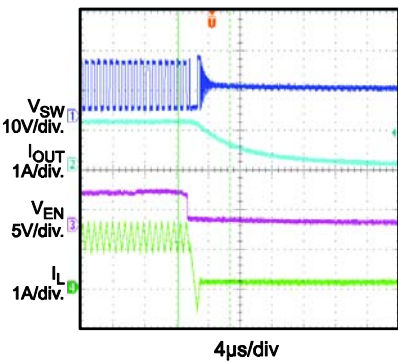
**V<sub>IN</sub> Start-Up**



**EN Start-Up**

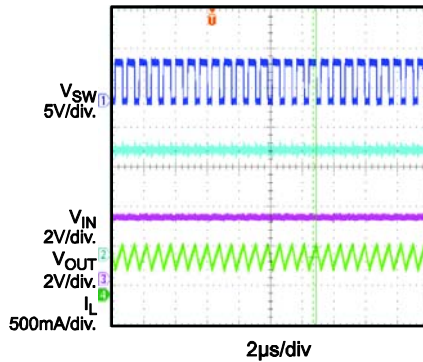


**EN Shutdown**



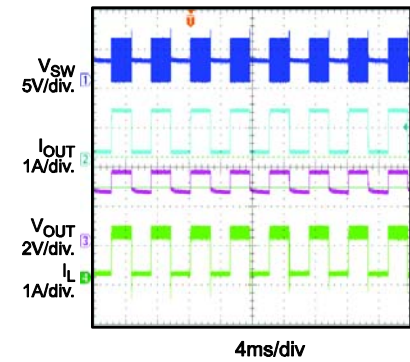
**Analog Dimming**

$V_{IN}=5V$ , 1WLED,  $V_{OUT}=3V$ ,  
 $I_{LED}=1A$ ,  $V_{DIM}=1V$

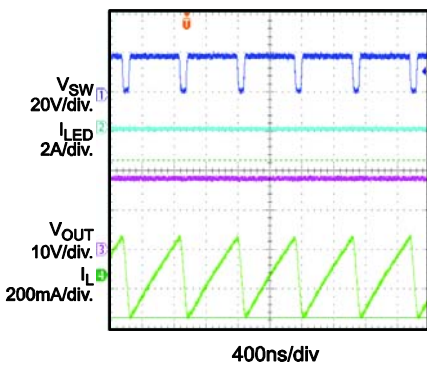


**PWM Dimming**

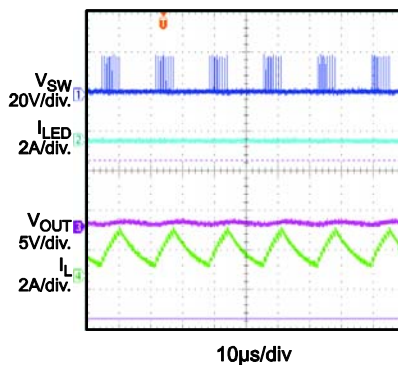
$V_{IN}=5V$ , 1WLED,  $V_{OUT}=3V$ ,  
 $I_{LED}=1A$ , 200Hz/D=50%



**Open LED Protection**

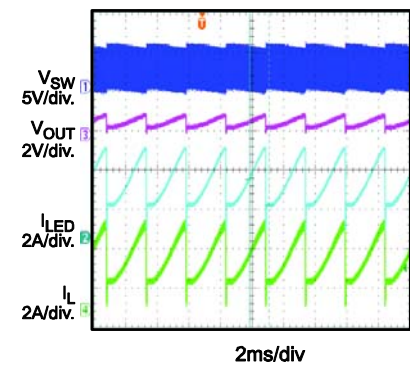


**Short LED+ to LED- Protection**

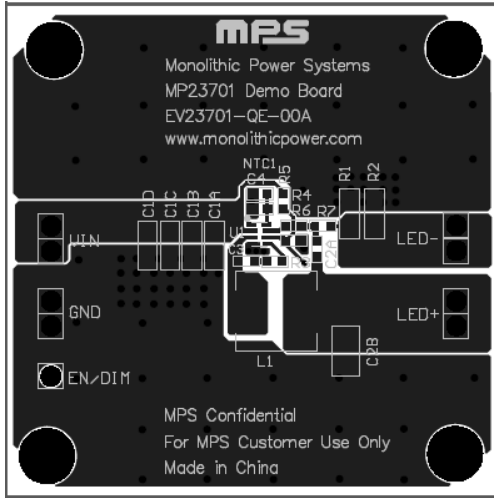


**Short LED+ to GND Protection**

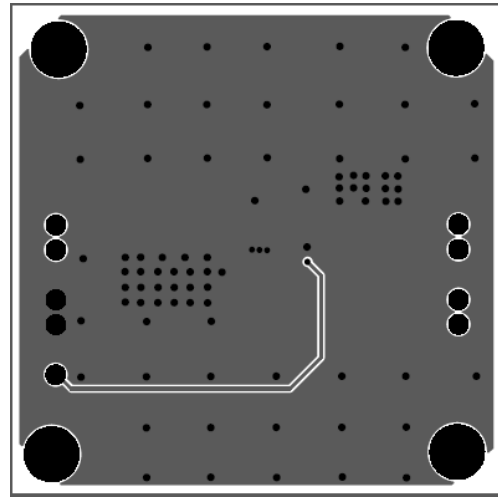
$V_{IN}=5V$ , 1WLED,  $V_{OUT}=3V$ ,  $I_{LED}=1A$



**PRINTED CIRCUIT BOARD LAYOUT (DOUBLE-SIDED)**



**Figure 2 - Top Layer**



**Figure 3 - Bottom Layer**