



The Future of Analog IC Technology®

EV3378E-F-00A

4-Channel WLED Controller With High-Efficiency Buck Converter Evaluation Board

PRELIMINARY SPECIFICATIONS SUBJECT TO CHANGE

DESCRIPTION

The MP3378E is a one-chip solution specially designed for monitor applications. The MP3378E includes a step-up WLED controller with four current channels for backlighting, and a high efficiency buck converter for internal bus voltage or standby power.

The 4-string WLED controller drives an external MOSFET to boost up the output voltage from the input supply. It regulates the current in each LED string to the programmed value set by an external current setting resistor. It supports both analog and PWM dimming independently to meet special dimming mode request. Full protection features for the WLED controller include OCP, OTP, UVP, OVP, LED short/open protection, inductor/diode short protection.

The high-efficiency buck converter operates in the current mode operation with a built-in MOSFET and a built-in synchronous rectifier. It offers a very compact solution to achieve excellent load and line regulation. Full protection features for the buck converter include OCP and thermal shutdown.

The MP3378E is available in a TSSOP-28EP package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	8– 24	V
LEDs #		4 LED strings 10 LEDs/string	
LED Current	I_{LED}	120/string	mA
I_{OUT} Current (buck)	I_{OUT}	2	A

FEATURES

WLED Driver:

- 4-String, Max 350mA/String, WLED Controller
- Up to 24V Input Voltage Range
- 2.5% Current Matching Accuracy
- Programmable Switching Frequency
- PWM and Analog Dimming Mode
- LED Open and Short Protection
- Programmable Over-Voltage Protection
- Recoverable Thermal Shutdown Protection
- Over-Current Protection
- Over-Temperature Protection
- Inductor/Diode short Protection

Buck Converter:

- 144mΩ/58mΩ Low $R_{DS(on)}$ Internal Power MOSFETs
- Low Quiescent Current
- Fixed 235kHz Switching Frequency
- Frequency Sync from 250kHz to 2MHz External Clock
- Internal Soft Start
- OCP and Hiccup Mode
- Over-Temperature Protection
- Output Adjustable from 0.8V

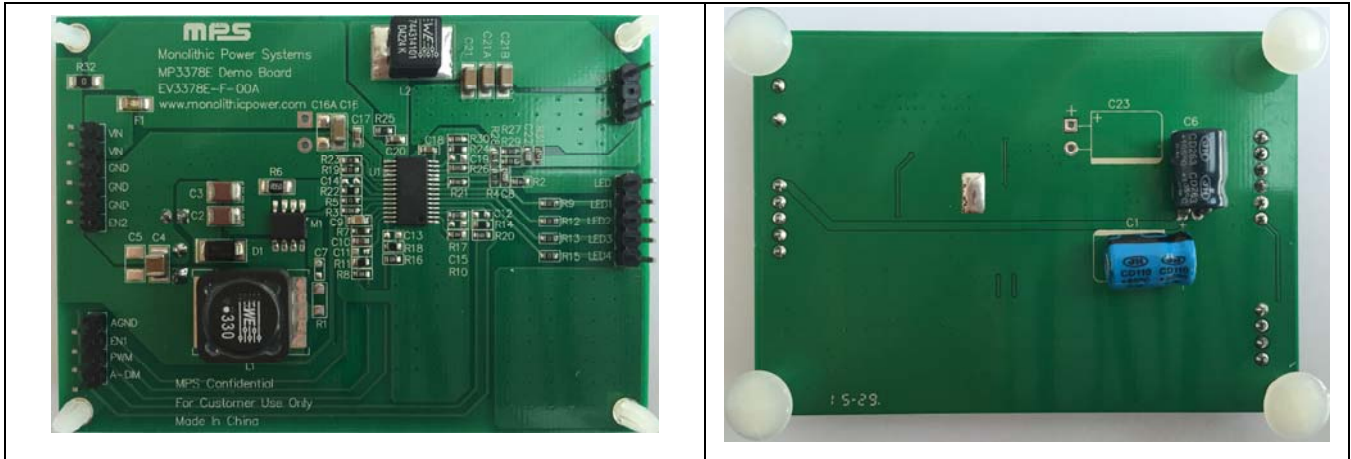
APPLICATIONS

- Desktop LCD Flat Panel Displays
- Flat Panel Video Displays
- 2D/3D LCD TVs and Monitors

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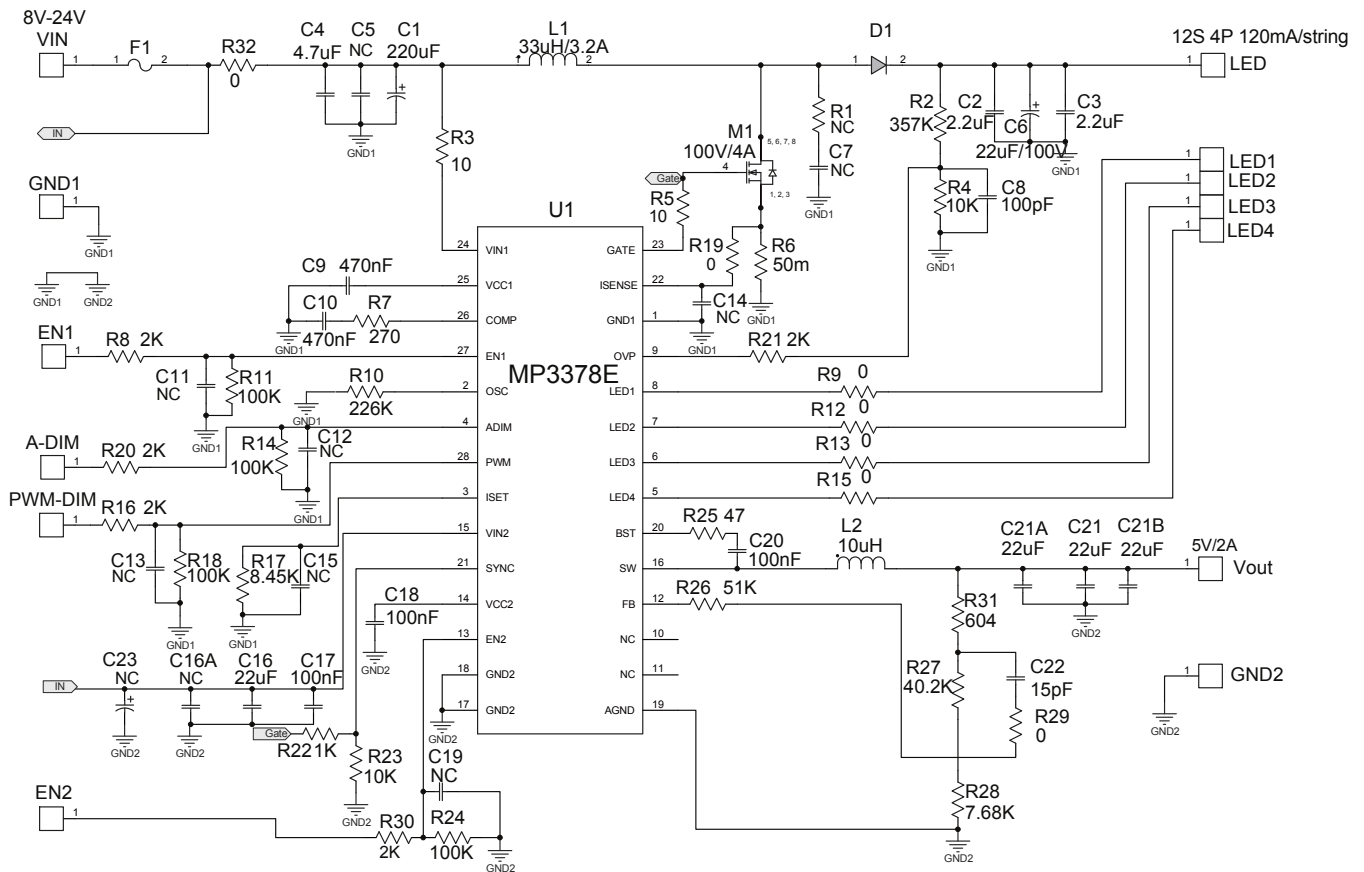
EV3378E-F-00A EVALUATION BOARD



(L x W x H) 5.9cm x 8.4cm x 2cm

Board Number	MPS IC Number
EV3378E-F-00A	MP3378EGF

EVALUATION BOARD SCHEMATIC



EV3378E-F-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	220 μ F	Electrolytic Capacitor; 35V;Electrolytic;DIP	DIP	江海	CD110-35V220
2	C2, C3	2.2 μ F	Ceramic Capacitor; 100V;X7R;1210;	1210	muRata	GRM32ER72A225KA35L
1	C4	4.7 μ F	Ceramic Capacitor; 50V;X7R	1210	TDK	C3225X7R1H475K
1	C6	22 μ F /100V	22 μ ;100V	DIP	江海	CD263-100V22'
1	C8	100pF	Ceramic Capacitor; 50V;C0G;0603;	0603	muRata	GRM1885C1H101JA01D
1	C9	470nF	Ceramic Capacitor; 16V;X7R	0805	muRata	GRM21BR61C474KA01L
1	C10	470nF	Ceramic Capacitor; 16V;X7R;0603;	0603	TDK	C1608X7R1C474K
1	C16	22 μ F	Ceramic Capacitor; 25V;X5R;	1206	muRata	GRM31CR61E226KE15
3	C17, C18, C20	100nF	Ceramic Capacitor; 25V;X7R;0603;	0603	muRata	GRM188R71E104KA01D
3	C21, C21A, C21B	22 μ F	Ceramic Capacitor; 6.3V;X5R;1206	1206	TDK	C3216X5R0J226M
1	C22	15pF	Ceramic Capacitor; 50V;C0G;0603;	0603	TDK	C1608C0G1H150J
1	C5	NC		1210		
6	C7, C11, C12, C13, C14, C15, C19	NC		0603		
1	C16A	NC		1206		
1	C23	NC		DIP		
1	D1	B160	Schottky Diode;60V;1A;	SMA	Diodes	B160
1	F1	042900 5.WRM	Fuse;24V;5A;	1206	littlefuse	0429005.WRM
1	L1	33 μ H /3.5A	Inductor;33 μ H; 33m;3.5A	SMD	Würth	744314101
1	L2	10 μ H	Inductor;10 μ H; 36m;3.2A	SMD	TMP	SPC-08045-100GP
1	M1	AM449 0N	N-Channel Mosfet; 100V;92;12.5;5.2	SO-8	Analog Power	AM4490N

EV3378E-F-00A BILL OF MATERIALS (continued)

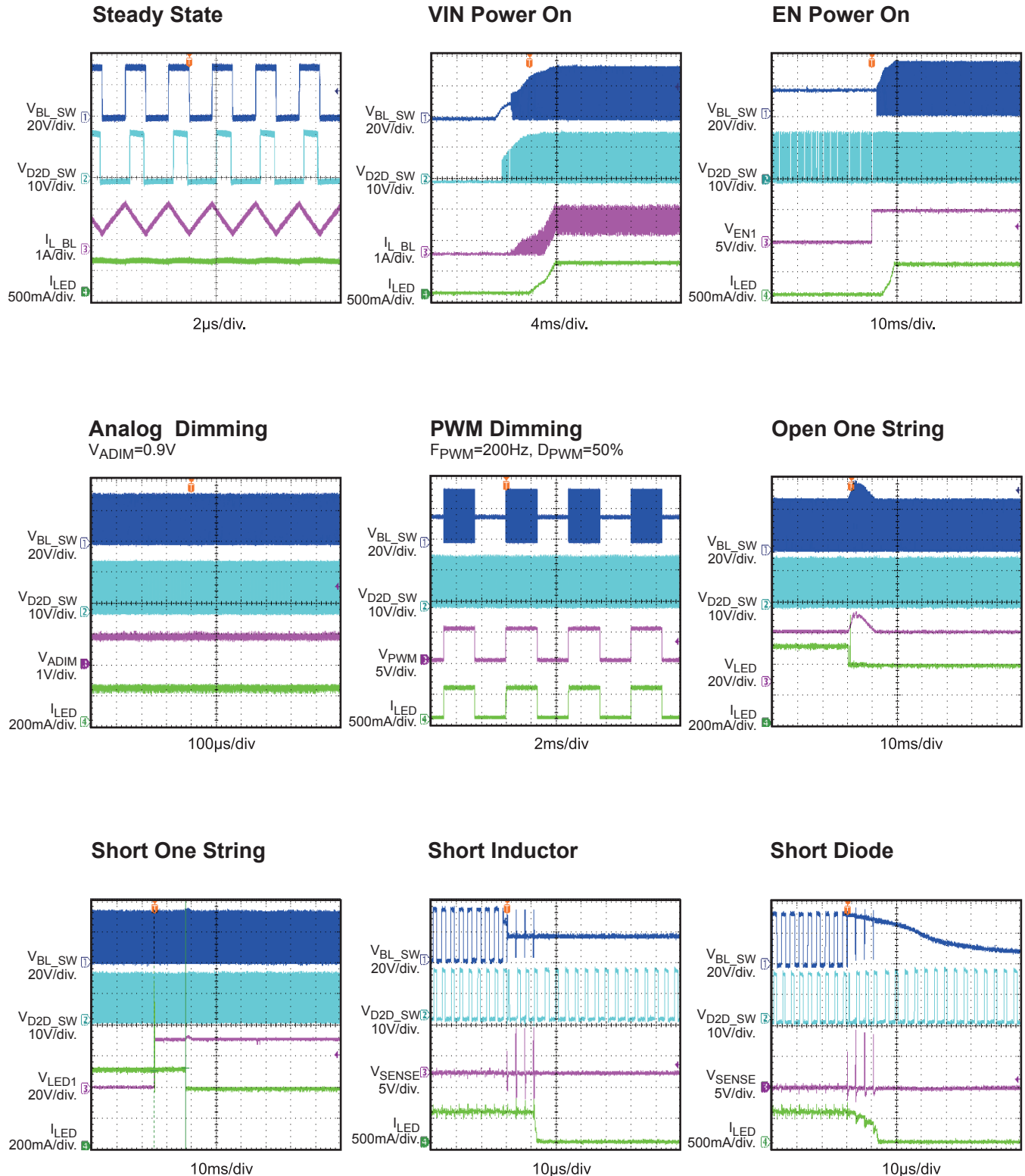
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	R2	357k	Film Resistor;1%	0603	Yageo	RC0603FR-07357KL
1	R3	10	Film Resistor;1%;	0603	Yageo	RC0603FR-0710RL
2	R4, R23	10k	Resistor;1%	0603	Yageo	RC0603FR-0710KL
7	R5, R9, R12, R13, R15, R19, R29	0	Film Res., 1%	0603	Yageo	RC0603FR-070RL
1	R6	50m	Film Resistor;1%;	1206	Yageo	RL1206FR-070R05L
1	R7	270	Film Resistor;1%	0603	Yageo	RC0603FR-07270RL
4	R8, R16, R20, R21, R30	2k	Film Resistor;1%;	0603	Yageo	RC0603FR-072KL
1	R10	226k	Film Resistor;1%	0603	Yageo	RC0603FR-07226KL
3	R11, R14, R18,R24	100k	Film Resistor;1%;	0603	Yageo	RC0603FR-07100KL
1	R17	8.45k	Film Resistor;1%	0603	Yageo	RC0603FR-078K45L
1	R22	1k	Film Resistor;1%	0603	Yageo	RC0603FR-071KL
1	R25	47	Film Resistor;1%;	0603	Yageo	RC0603FR-0747RL
1	R26	51k	Film Resistor;1%	0603	SYN- TON- TECH	RC0603FR-0751KL
1	R27	40.2k	Film Resistor;1%;	0603	Yageo	RC0603FR-0740K2L
1	R28	7.68k	Film Resistor;1%	0603	Yageo	RC0603FR-077K68L
1	R31	604	Film Resistor;1%	0603	Yageo	RC0603FR-07604RL
1	R32	0	Resistor;1%;1/4W;	1206	Yageo	RC1206FR-070RL
1	R1	NC	Film Res., 1%	0603		
1	U1		MP3378E'	TSSOP 28EP	MPS	

EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

WLED Controller Section:

$V_{IN} = 16V$, 10 LEDs in series, 4 strings parallel, 120mA/string, $T_A = 25^\circ C$, unless otherwise noted.

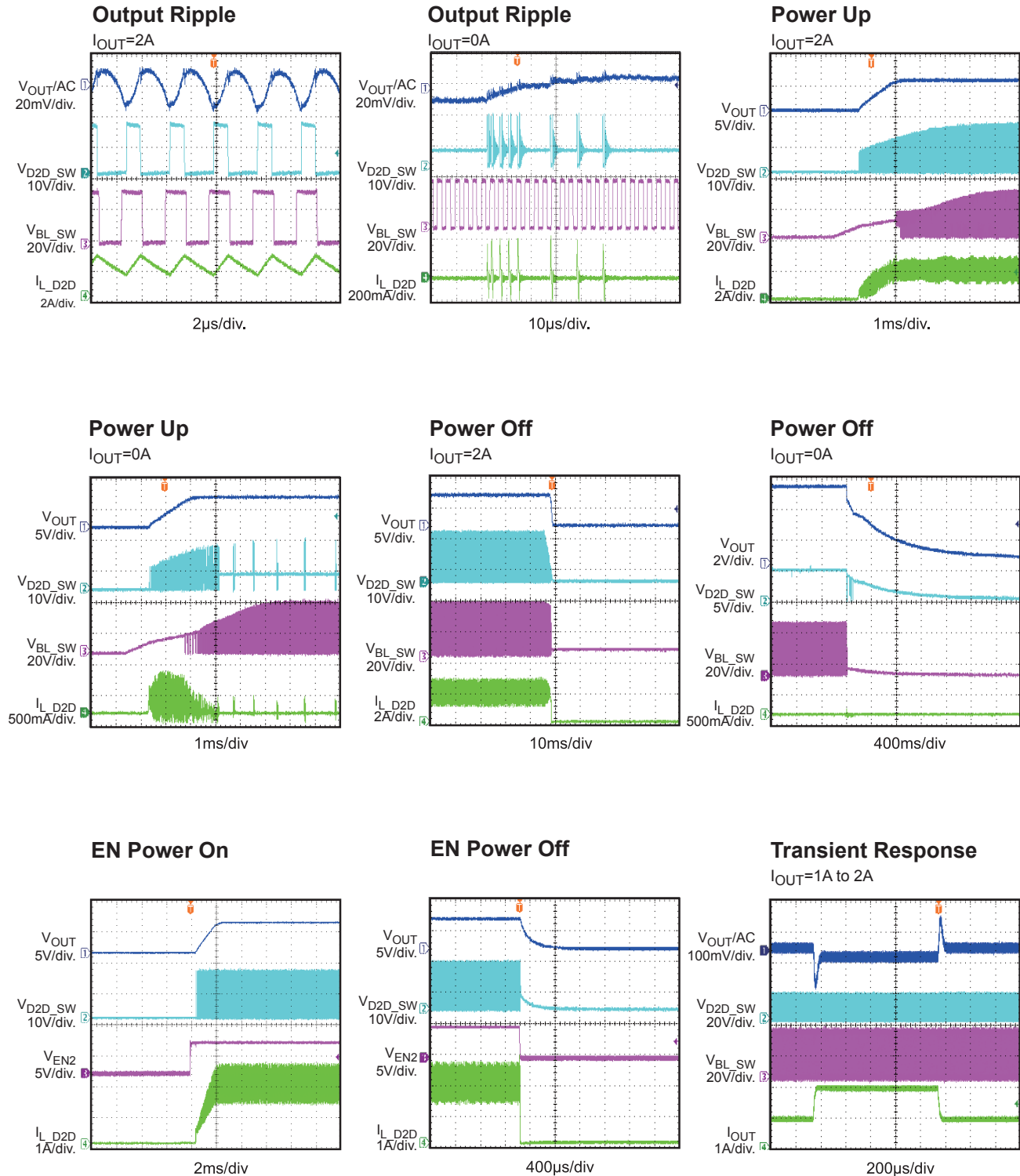


EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

Buck Converter Section:

$V_{IN} = 16V$, $V_{OUT} = 5V$, $L_2 = 10\mu H$, $T_A = 25^\circ C$, unless otherwise noted.



PRINTED CIRCUIT BOARD LAYOUT

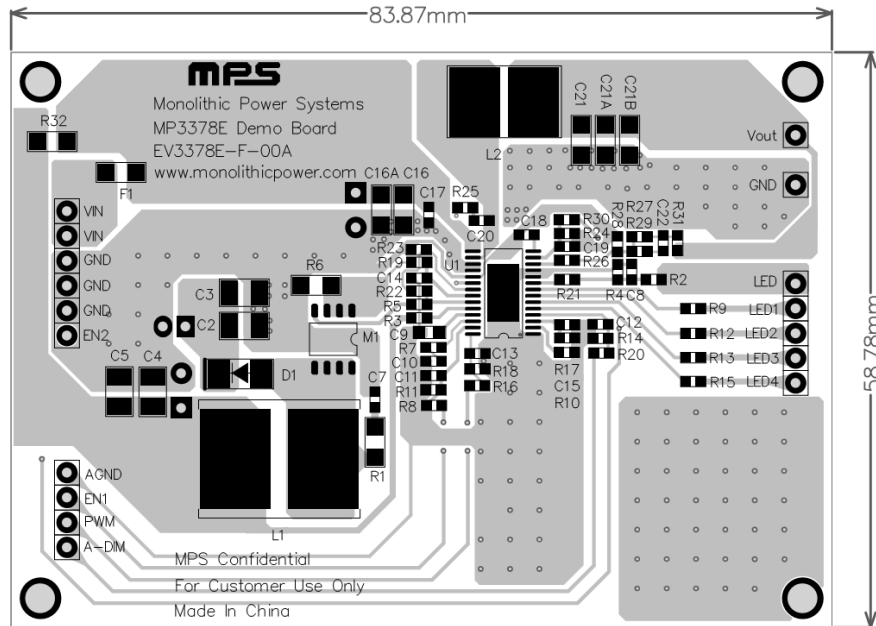


Figure 1—Top Layer

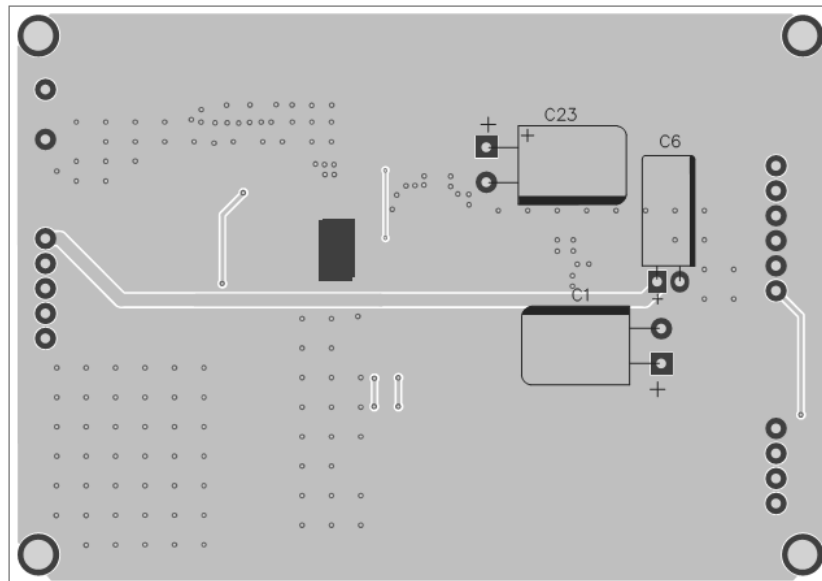


Figure 2—Bottom Layer

QUICK START GUIDE

1. For boost LED driver, connect the positive and negative terminals of the load panel (10 white LEDs in series, 4 strings) to the LED+ and LED-1~4 pins on the EV board, respectively;
For buck converter, connect the load between Vout to GND.
2. Connect the positive and negative terminals of the power supply (8V ~ 24V) to the VIN and GND pins on the EV board, respectively.
3. Drive EN1 pin high (5V) to enable the Boost and EN2 pin high to enable the Buck.
4. For PWM dimming, apply a PWM rectangular waveform with a minimum voltage less than 0.4V and a maximum greater than 1.5V on PWM pin (if using PWM pin, need pull ADIM pin to high level). The frequency of the PWM signal is recommended between 200Hz to 2kHz.
5. For analog dimming, apply a DC waveform with a voltage between 0.4 and 1.5V on ADIM pin or a PWM rectangular waveform with a minimum voltage less than 0.4V and a maximum greater than 1.5V on ADIM pin, The frequency of the PWM signal is recommended $\geq 20\text{kHz}$.

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