

## DESCRIPTION

The EV3398A-S-00A is an evaluation board for the MP3398A, a step-up converter designed for liquid-crystal displays that employ an array of LEDs as the light source. It can drive up to 4 strings LEDs in parallel with 350mA/string maximum current.

The MP3398A uses current mode, fixed switching frequency architecture. The frequency is programmable by an external frequency setting resistor. MP3398A drives an external MOSFET to boost up the output voltage from a 5V to 28V input supply. It regulates the current in each LED string to the programmed value set by an external current setting resistor.

The MP3398A can support both analog and PWM dimming independently to meet the special dimming mode request. In addition, rich protection modes are also integrated including OCP, OTP, UVP, OVP, LED short/open protection, inductor/diode short protection.

The MP3398A is available in SOIC16, TSSOP16 and SOIC20 packages.

## ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	8 – 28	V
LEDs #		4 LED string 12 LEDs/string	
LED Current	$I_{LED}$	120/string	mA

## FEATURES

- 4-String, Max 350mA/String at 10% DPWM
- 5V to 28V Input Voltage Range
- 2.5% Current Matching Accuracy Between Strings
- Programmable Switching Frequency
- PWM and Analog Dimming Mode
- Cascading Capability with a Single Power Source
- LED Open and Short LED Protection
- Programmable Over-Voltage Protection
- Recoverable thermal Shutdown Protection
- Over Current Protection
- Inductor/Diode short Protection
- Under-Voltage Lockout
- SOIC16, TSSOP16 and SOIC20 Packages

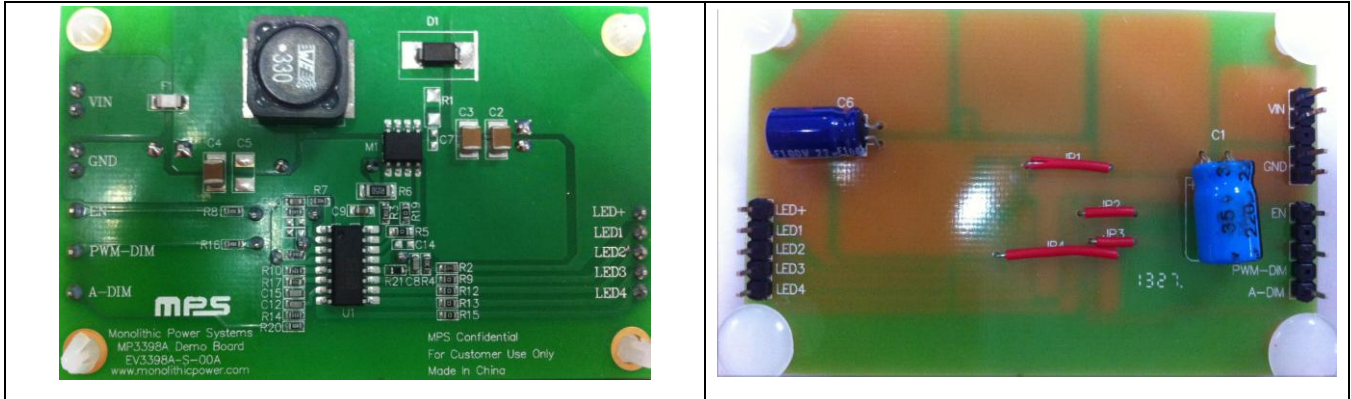
## APPLICATIONS

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

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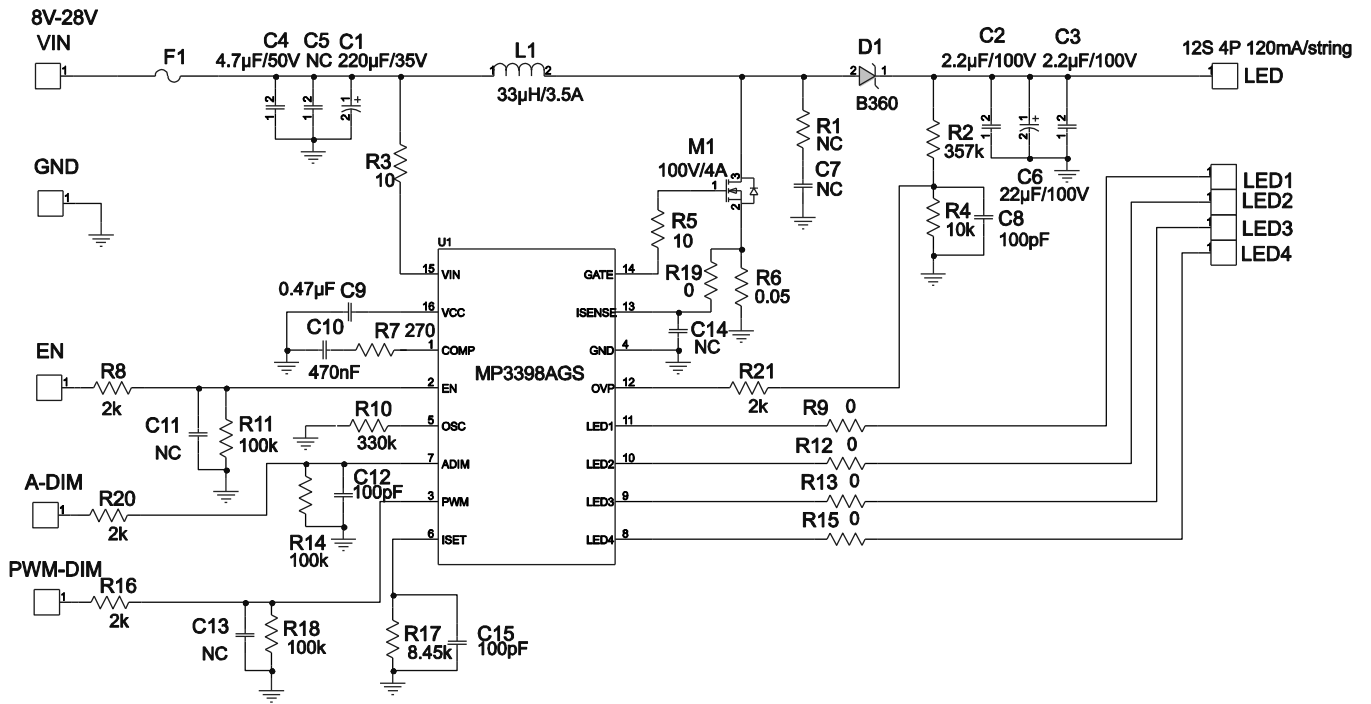
### EV3398A-S-00A EVALUATION BOARD



(L x W x H) 7.8cm x 4.9cm x 1.0cm

Board Number	MPS IC Number
EV3398A-S-00A	MP3398AGS

### EVALUATION BOARD SCHEMATIC



**EV3398A-S-00A BILL OF MATERIALS**

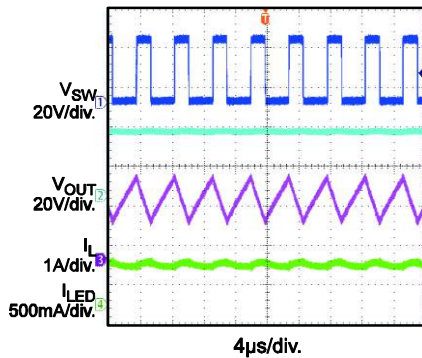
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	220 $\mu$ F	Electrolytic Capacitor, 35V			
2	C2,C3	2.2 $\mu$ F	Ceramic Capacitor, 100V, X7R	1210	Murata	GRM32ER72A225KA35L
1	C4	4.7 $\mu$ F	Ceramic Capacitor, 50V, X7R	1210	Murata	GRM32ER71H475KA88L
1	C5	NC		1210		
1	C6	22 $\mu$ F	Electrolytic Capacitor, 100V			
4	C7,C11, C13,C14	NC		0603		
3	C8,C15, C12	100pF	Ceramic Capacitor,50V, COG	0603	Murata	GRM1885C1H101JA01D
2	C9,C10	470nF	Ceramic Capacitor, 16V, X7R	0603	Murata	GRM18R7C474KA88D
1	D1		Diode Schottky, 60V, 3A	SMA	Diodes Inc	B360
1	F1	0 $\Omega$	Fuse, 2A, 63V	1206	Cooper	3216FF2-R
1	L1	33 $\mu$ H	Inductor,3.2A	SMD	Würth	744770133
1	M1		N- channel MOSFET	SO8	Analog Power	AM4490N
1	R1	NC		0603		
1	R2	357k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07357KL
1	R3, R5	10 $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-0710RL
1	R4	10k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-0710KL
6	R9,R12, R13, R15,R19	0 $\Omega$	Resistor, 1%	0603	Yageo	RC0603JR-070RL
1	R7	200 $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07200RL
1	R6	0.05 $\Omega$	Current Resistor, 1%	1206	Yageo	RC1206FR-070R05L
3	R8,R16, R20,R21	2k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-072KL
1	R10	330k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07330KL
3	R11,R14, R18	100k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R17	8.45k $\Omega$	Resistor, 1%	0603	Yageo	RC0603FR-078K45L
1	U1		LED Driver IC	SOIC16	MPS	MP3398AGS R5

## EVB TEST RESULTS

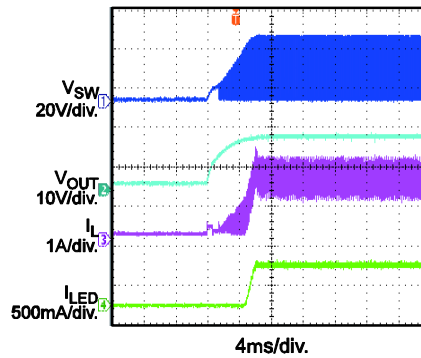
Performance waveforms are tested on the evaluation board.

$V_{IN} = 12V$ ,  $V_{OUT} = 30V$ ,  $L = 33\mu H$ ,  $I_{LED} = 120mA/$ String, 4 strings,  $T_A = 25^\circ C$ , unless otherwise noted.

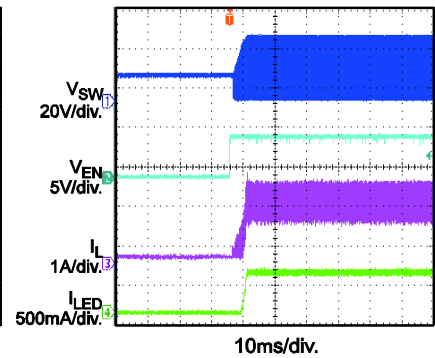
### Steady State



### $V_{IN}$ Power On

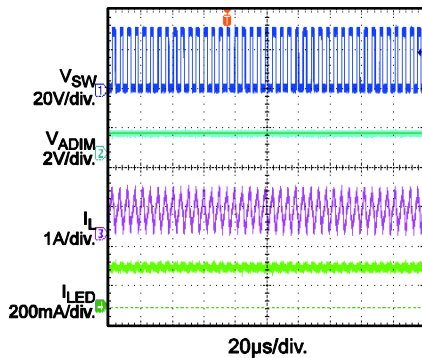


### EN Power On



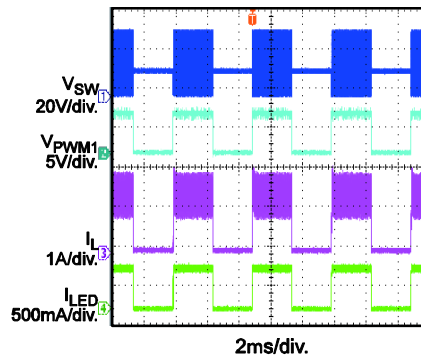
### Analog Dimming

$V_{DIM} = 0.9V$



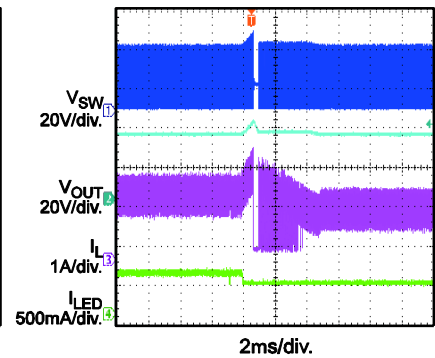
### PWM Dimming

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



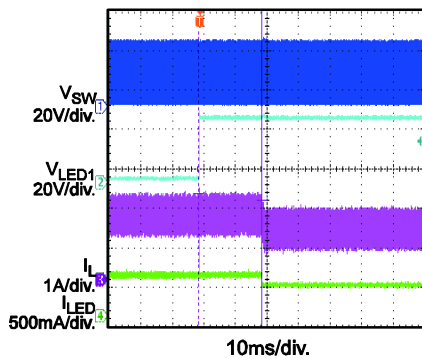
### Open LED Protection

Open One LED String at Working

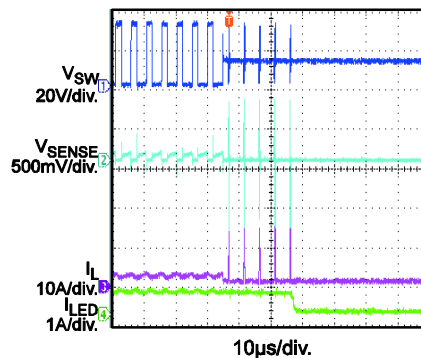


### Short LED Protection

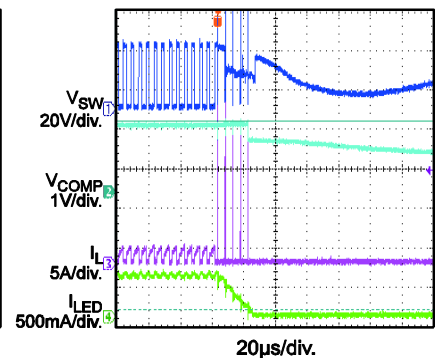
Short  $V_{OUT}$  to LEDx at Working



### Short Inductor Protection



### Short Diode Protection



## PRINTED CIRCUIT BOARD LAYOUT

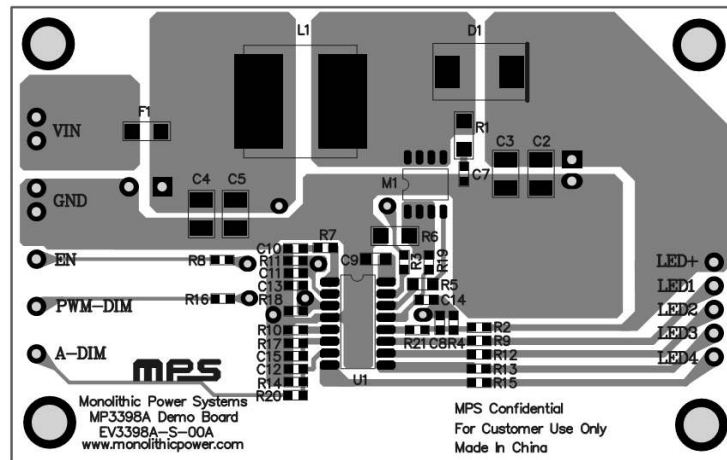


Figure 1—Top Layer

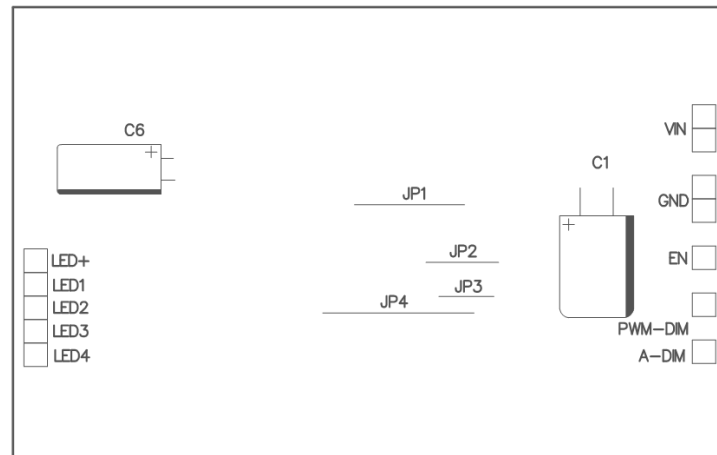


Figure 2—Bottom Layer

## QUICK START GUIDE

1. Connect the positive and negative terminals of the load panel (12 white LEDs in series, 4 strings) to the LED+ and LED1~4 pins on the EV board, respectively.
2. Connect the positive and negative terminals of the power supply (8V ~ 28V) to the VIN and GND pins on the EV board, respectively.
3. Drive EN pin high (5V) to enable the MP3398A.
4. For PWM dimming, apply a PWM rectangular waveform with a minimum voltage less than 0.5V and a maximum greater than 1.5V on PWM pin. The frequency of the PWM signal is recommended between 200Hz to 2kHz.
5. For analog dimming, apply 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 >20kHz.

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