



AW1001

Up to 6MHz High Power Constant Current LED Driver with High Power Supply Ripple Rejection

Description

The AW1001 is a high-brightness LED driver IC. It operates at high efficiency from 4V to 18V, and the output driving current up to 1A. The AW1001 features 5V/10mA on-chip regulator for other IC power supply. The device requires only 5 external components while delivering an LED current with $\pm 5\%$ accuracy.

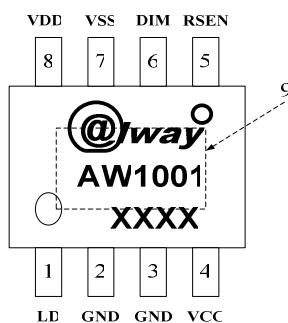
Applications

- High Power LED Driver
- Architectural, Industrial, and Ambient Lighting
- Lighting such as MR16, AR111 or other LED Lighting

Feature

- Only 5 external components required
- High-Side Current Sense
- Dedicated Dimming Control Input
- 20kHz Maximum Dimming Frequency
- Up to 6MHz Switching Frequency
- 5V, 10mA On-Chip Regulator to Power External Circuit
- ESD Protection HBM 3KV
- $\pm 5\%$ LED Current Accuracy
- Adjustable Constant LED Current
- High Efficiency
- 4V~18V Wide Operation Voltage Range
- Output Driving Current Up to 1A
- -25°C to $+125^{\circ}\text{C}$ Operating Temperature Range
- SOP8 with Thermal Pad Power Package

Pin Configuration



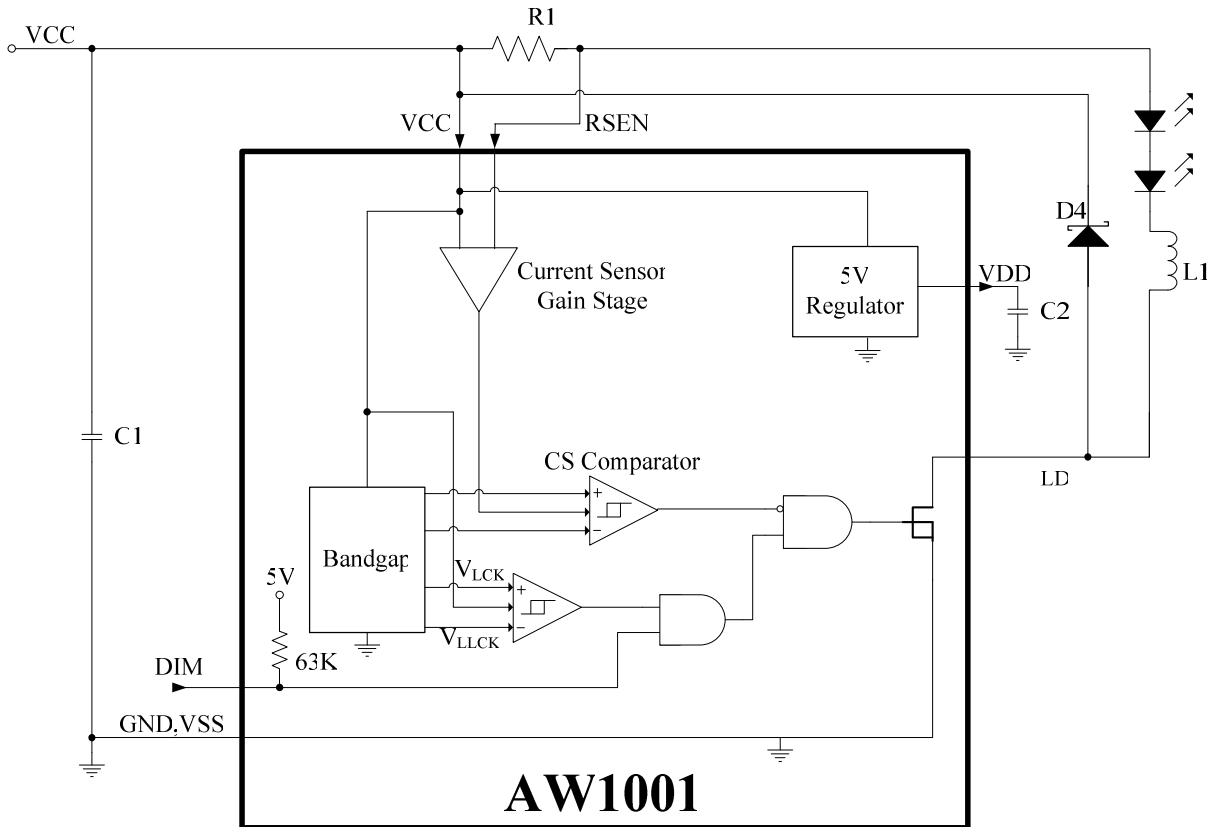
Pin	Name	Function
1	LD	Driver Output
2	GND	Ground
3	GND	Ground
4	VCC	Supply Voltage Input
5	RSEN	Current-Sense Input
6	DIM	Logic-Level Dimming input
7	VSS	Ground
8	VDD	5 Voltage Regulator Output
9	GND	Thermal PAD with Ground



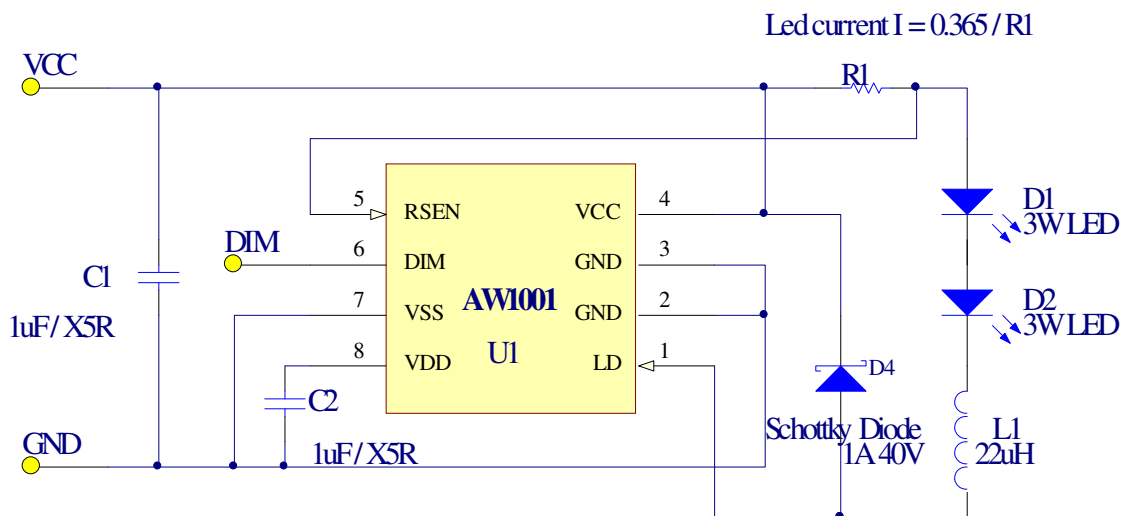
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Block Diagram



Typical Application Circuit





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Absolute Maximum Ratings

RSEN, LD to GND	-0.3V~+24V	Operation temperature range.....	-40°C~+125 °C
VDD, DIM to VSS & GND.....	-0.3V~+7V	Junction temperature.....	+150 °C
RSEN to VCC.....	-18V~+18V	Storage temperature range.....	-65 °C~+150 °C
Pin to Pin ESD rating (HBM).....	3KV	Lead temperature (Soldering, 10s).....	+300 °C
VDD, DIM , VCC, RSEN to GND & VSS maximum current.....	20mA		

Electrical Characteristics

(VCC=12V, V_{DIM}=VCC, C1=1uF, R1=0.51)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
Power supply voltage	V _{VCC}		4	12	18	V
Maximum regulator current switching frequency	f _{sw}		0.4	3.33	6	MHz
Ground current	I _{GND}	LD open	2.5	3.5	5	mA
Supply current	I _{VCC}	LD open, RSEN=VCC-0.4	2.5	3.5	5	mA
Under voltage lockout	V _{LCK}		3.9	4	4.1	V
Above voltage leave-lockout	V _{LLCK}		3.3	3.4	3.5	V
Sense voltage threshold high	V _{RSENH}			VCC-310		mV
Sense voltage threshold low	V _{RSENL}			VCC-410		mV
Propagation delay to output switch on	t _{DPSON}			25		ns
Propagation delay to output switch off	t _{DPSOFF}			20		ns
Current-sense input current	I _{RSEN}				1	uA
Current-sense threshold hysteresis	I _{SHYS}			50	70	mV
Maximum dimming frequency	f _{DIM}			10	20	KHz



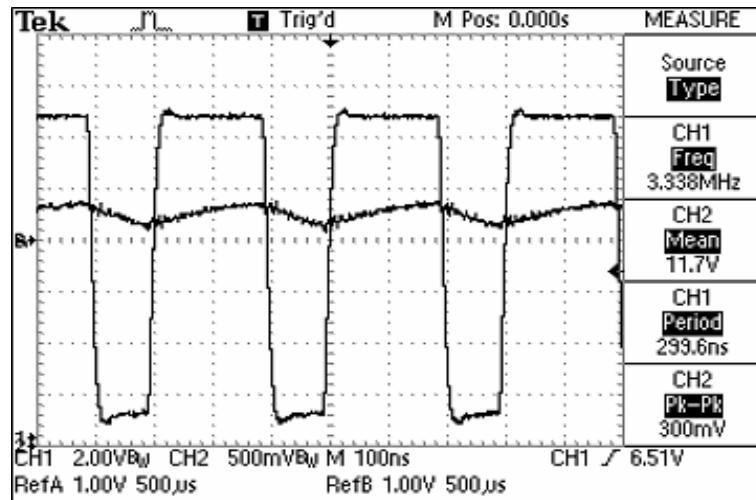
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DIM input voltage high	V_{DIMH}		VDD-VDDx0.25			V
DIM input voltage low	V_{DIML}		VDDx0.25			V
DIM turn on switch delay	t_{DIMSON}		25			ns
DIM turn off switch delay	$t_{DIMSOFF}$		25			ns
DIM pin to VDD leakage	I_{DIMVDD}	Internal pull high	10			uA
DIM pin to VSS leakage	I_{DIMVSS}		1			uA
Internal 5V regulator voltage	V_{VDD}		4.75	5	5.25	V
Internal 5V regulator output current	I_{VDD}		7.5	10	12.5	mA
Internal 5V regulator start-up time	t_{REGSP}		50		1000	us

Typical Operation Waveforms

L1=6.8uH driving 3W LEDs (Current= 700mA) at 27 °C.



CH1: LD pin waveform, CH2: RSEN pin waveform

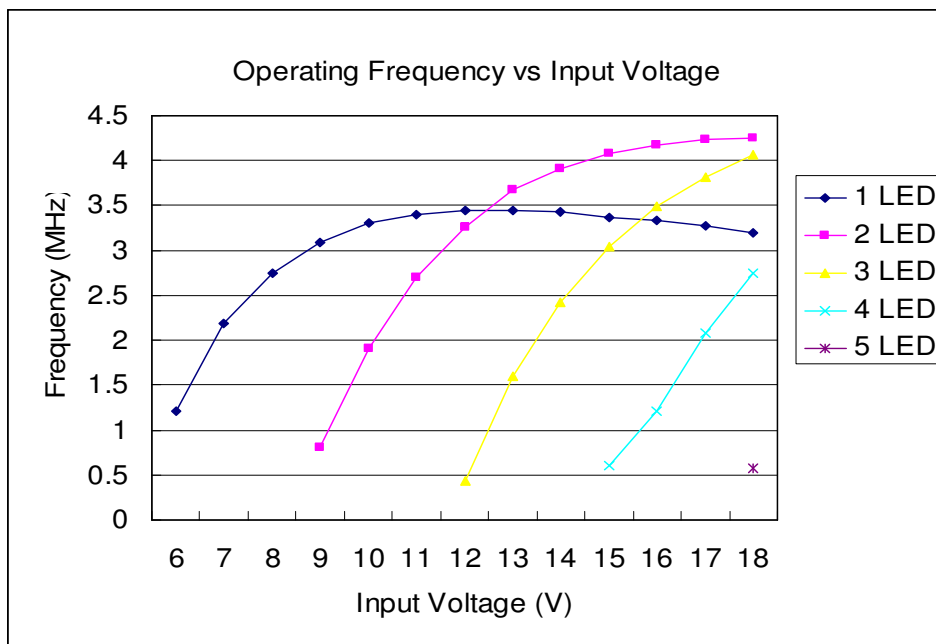
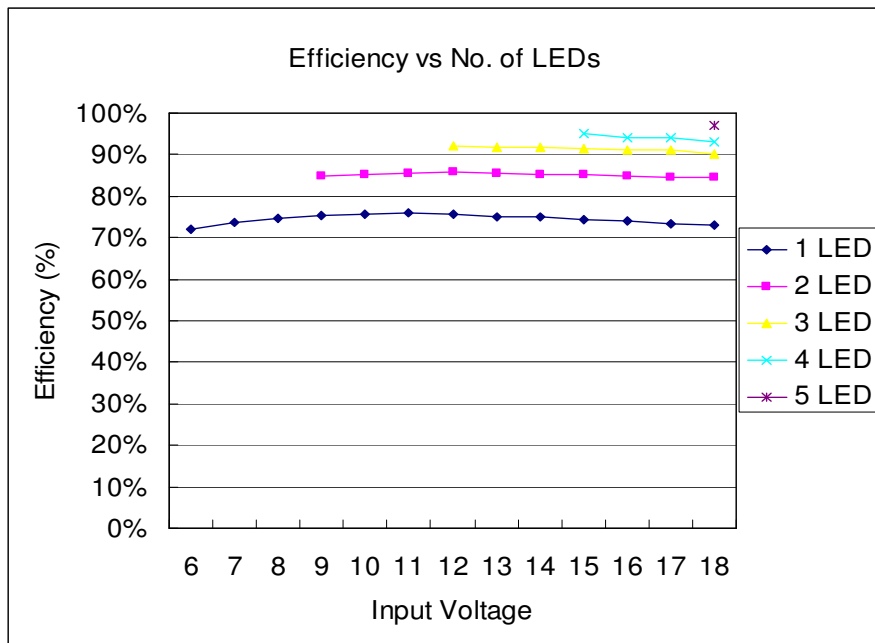


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Typical Operating Conditions

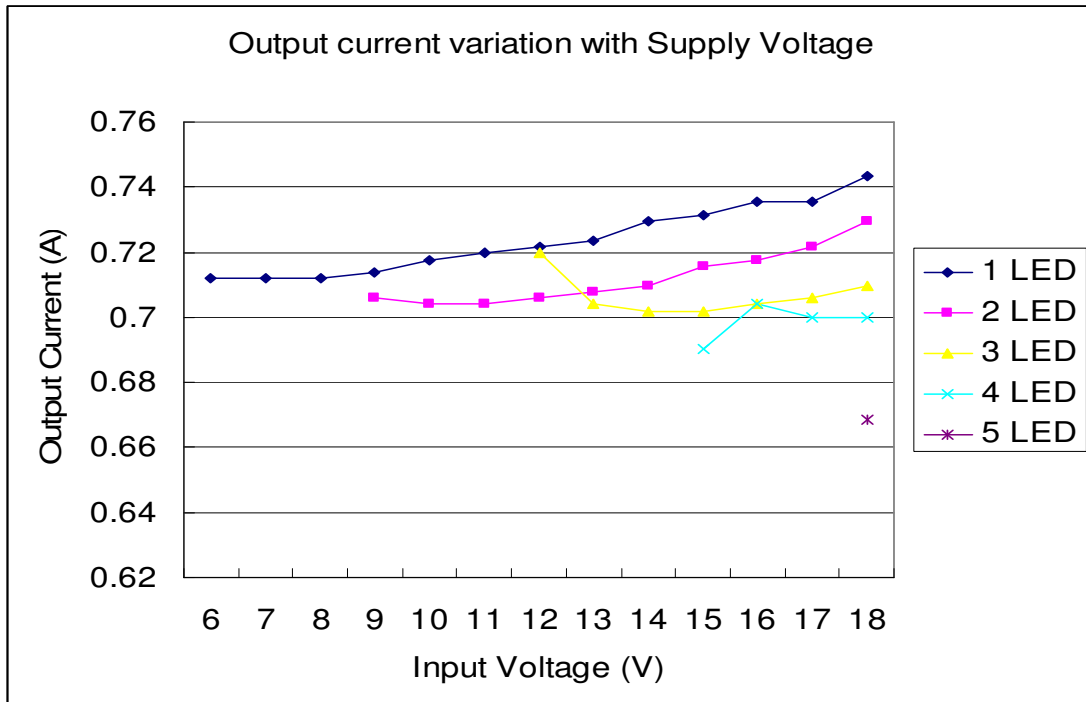
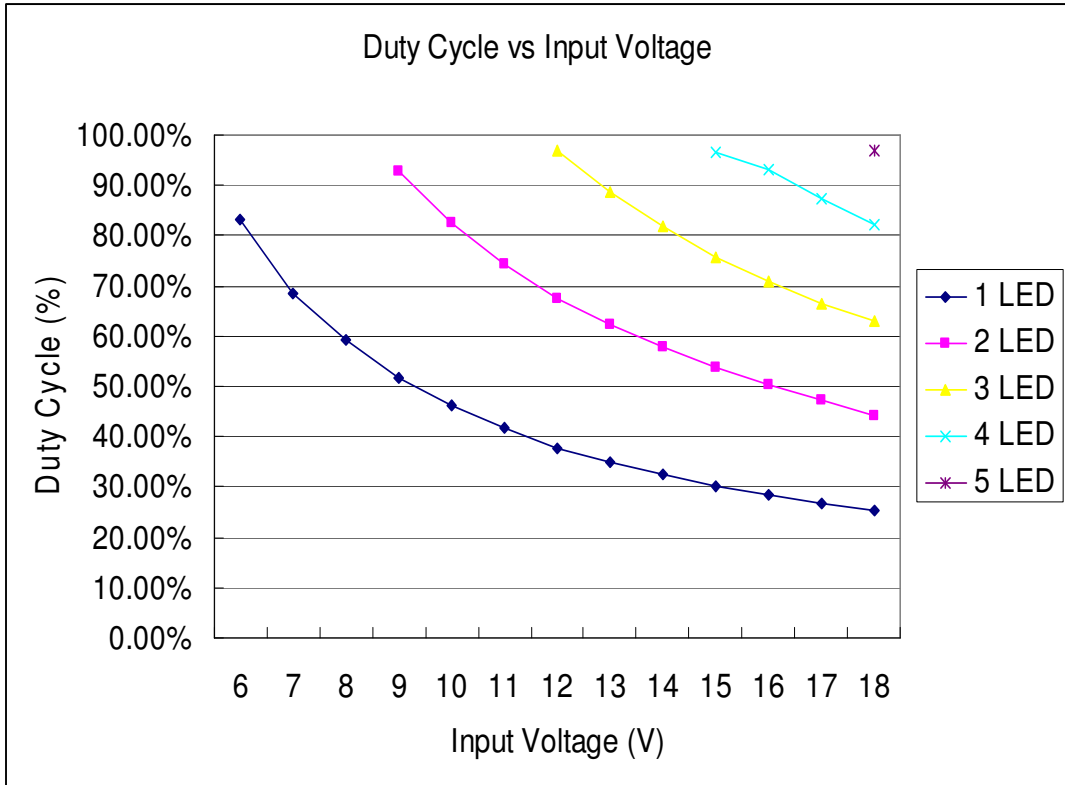
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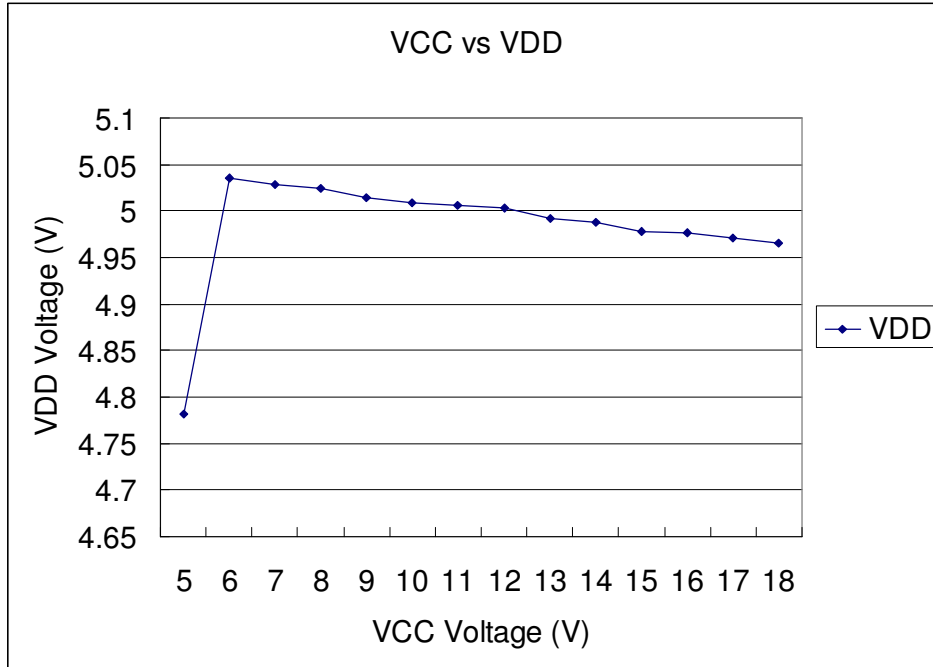
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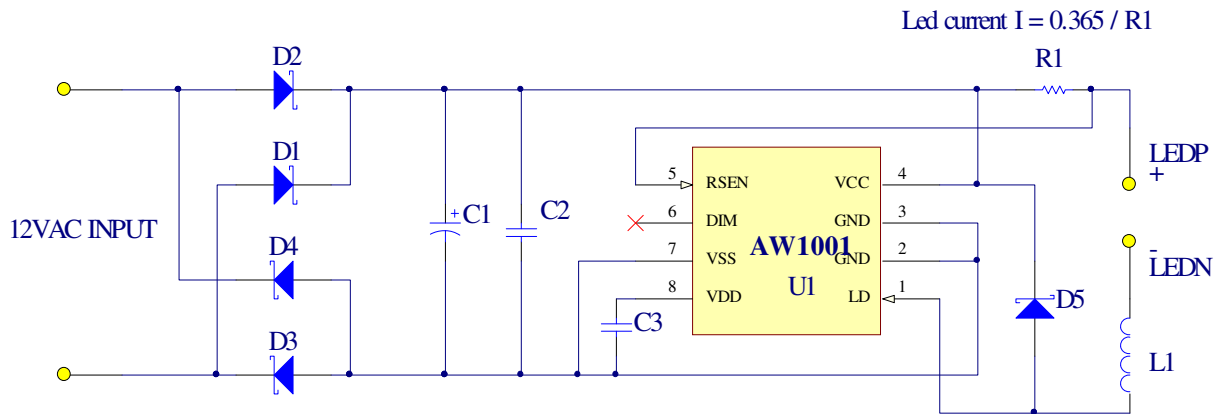




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MR16 LED Reference Design



AW1001 for 5W MR16 LED Lamp Driver Circuit

Designation	Description
D1-D5	2A 40V Schottky Diode
C1	Three 100uF/20V tantalum capacitors or one 330uF/25V electrolytic capacitor
C2, C3	1uF/25V 0603 X5R
L1	22uH, 1.5A Unshielded Power Inductor
R1	0.52Ω ± 1% 1206 Resistor
U1	AW1001

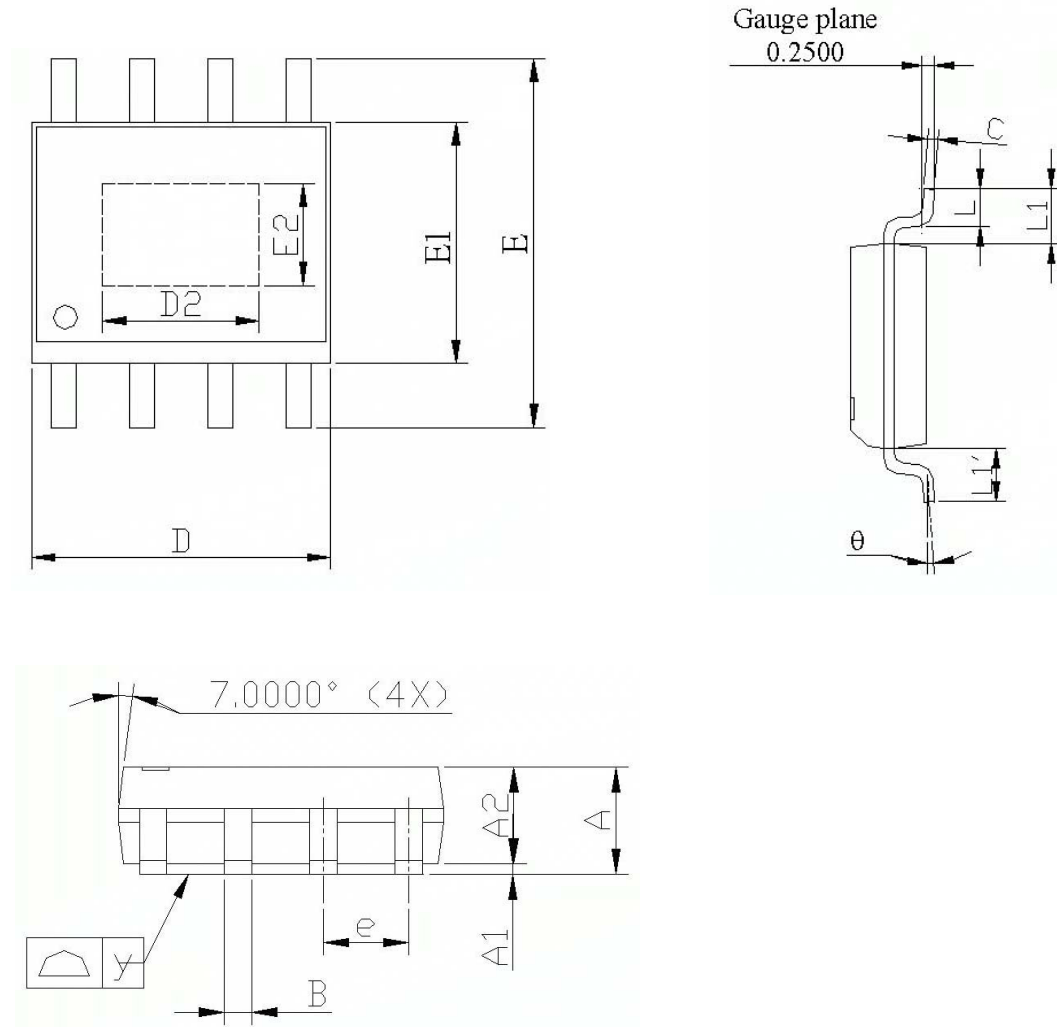
Parts List for the 5W MR16 LED Lamp Driver Circuit



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SOP8(Exposed Pad) Package Outline



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	1.50	1.60	0.055	0.059	0.063
A1	0.00	---	0.10	0.000	---	0.004
A2	---	1.45	---	---	0.057	---
B	0.33	---	0.51	0.013	---	0.020
C	0.19	---	0.25	0.007	---	0.010
D	4.80	---	5.00	0.189	---	0.197
D2	3.20	3.30	3.40	0.126	0.130	0.134



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E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.30	2.40	2.50	0.091	0.095	0.099
e	---	1.27	---	---	0.050	---
L	0.40	---	1.27	0.016	---	0.050
y	---	---	0.10	---	---	0.004
Θ	0°	---	8°	0°	---	8°
L1-L1'	---	----	0.12	---	---	0.005
L1	1.04REF			0.041REF		