MAP9000

High Voltage AC LED Driver

General Description

The MAP9000 is LED Driver which has high input voltage ranged from 90V to 270V.

It can drive several series LEDs from rectified AC voltage.

The MAP9000 can achieve min 90% efficiency, 0.95 or higher power factor and low total harmonic distortion less than 20%.

The MAP9000 has higher LED current drive capability up to 240mA and the current can be adjustable with external resistors.

The MAP9000 is available in 6X6mm QFN 12Leads with Halogen-free (fully RoHS compliant).

For more information, please contact local Magnachip sales office in world-wide or visit Magnachip's website.

RoHS Compliant
HALOGEN-FREE

Features

- Triac dimming (110Vac/120Vac only)
- Flicker-free
- EMI improvement
- Power variation: ±15%
- Constant output power control
- Higher power factor : > 0.95
- Higher light efficiency : > 90%
- Lower total harmonic distortion : < 20%
- Higher current drive capability
  - Up to 240mA
- 6X6mm QFN 12Leads

Applications

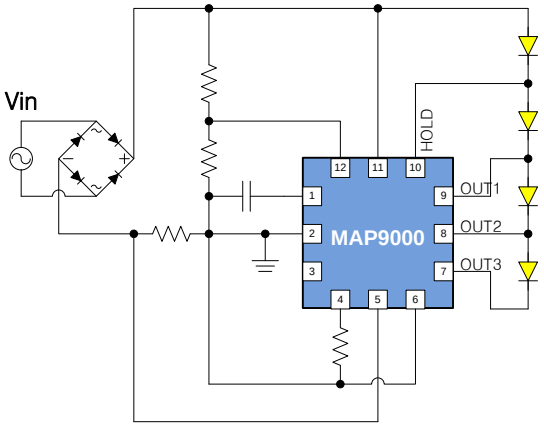
- AC LED Driver
- Lighting equipment
- LED Driver Power Supplies

Ordering Information

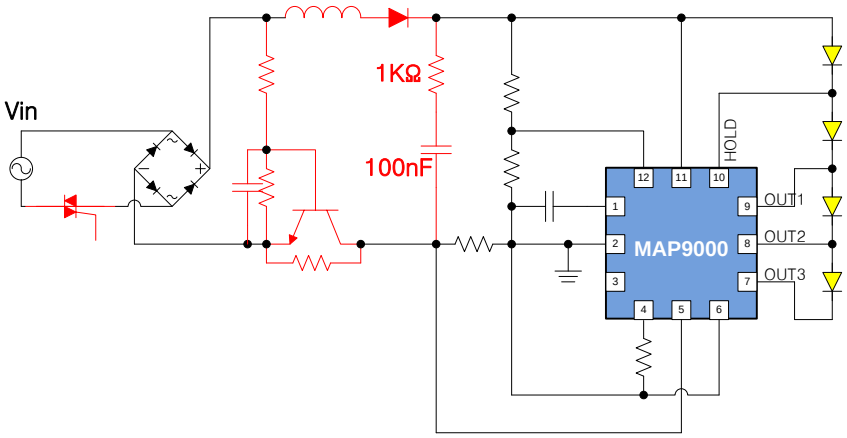
Part Number	Top Marking	Ambient Temperature Range	Package	RoHS Status
MAP9000QNRH	MAP9000	-30℃ to +85℃	6X6mm QFN 12Leads	Halogen Free

Typical Application

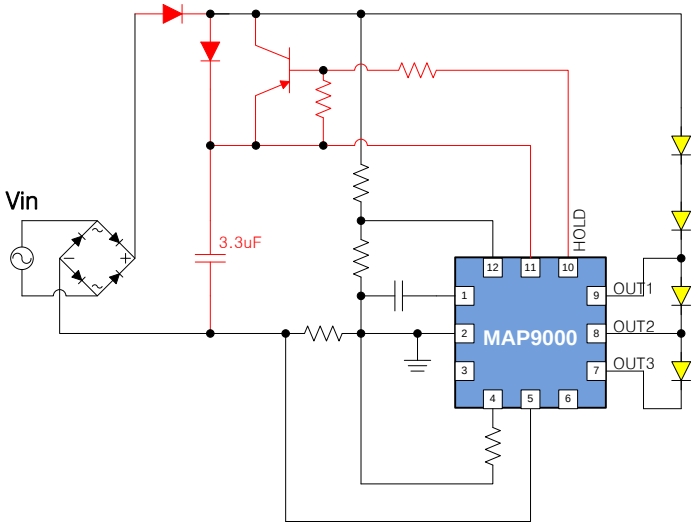
- AC Direct



- Triac Dimming (110Vac/120Vac only)

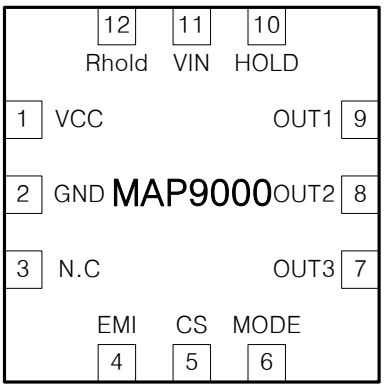


- Flicker-free



Pin Configuration & Description

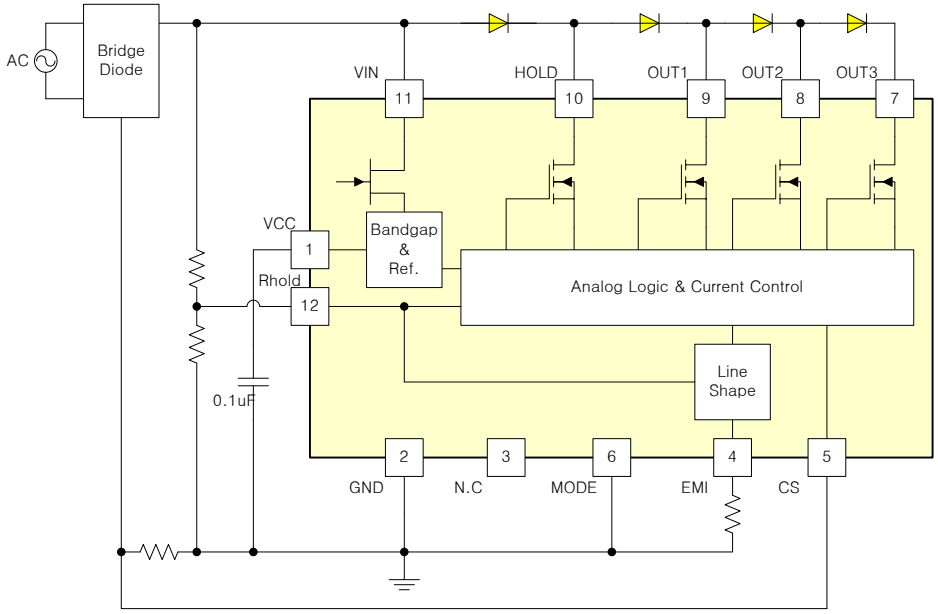
- Pin Configuration



- Pin Description

Pin		Descriptions
1	VCC	VCC
2	GND	Ground
3	N.C	No Connection
4	EMI	EMI improvement
5	CS	Current sensing
6	MODE	Flicker-free mode
7	OUT3	Output – 3
8	OUT2	Output – 2
9	OUT1	Output – 1
10	HOLD	Holding-up current
11	VIN	VCC charging
12	Rhold	HOLD turn-on voltage

Functional Block Diagram



Absolute Maximum Ratings

PARAMETER		VALUE	UNIT
VIN		700	V
HOLD, OUT1, OUT2, OUT3		-0.3 ~ 700	V
EMI		-0.3 ~ 6	V
VCC, Rhold, MODE		20	V
Operating Temperature Range		-40 ~ 125	℃
Junction Temperature Range		-40 ~ 150	℃
Storage Temperature Range		-65 ~ 150	℃
Lead temperature(soldering, 10sec)		260	℃
ESD Susceptibility	HBM (All Pins), (Note 1)	±2000	V
	MM (All Pins), (Note 2)	±200	V
	CDM (All Pins), (Note 3)	±1000	V

Note 1: ESD tested per JESD22A-114.
Note 2: ESD tested per JESD22A-115.
Note 3: ESD tested per JESD22C-101E

Thermal Resistance

PARAMETER		VALUE	UNIT
Thermal Resistance (θJA) , (Note4)	6X6mm QFN 12Leads	63	℃/W
Thermal Resistance (θJT) , (Note5)		8.7	℃/W

Note 4: Multi-layer PCB based on JEDEC standard (JESD51-7)
Note 5: Metal PCB based on Seoul Semiconductor

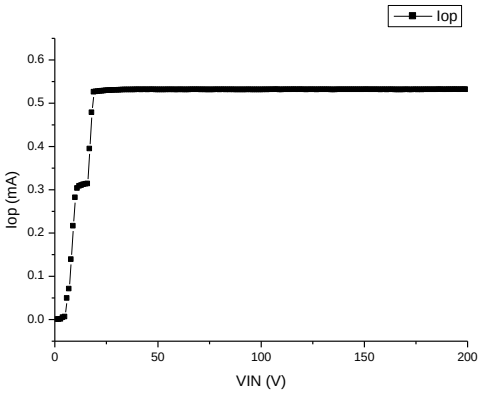
Electrical Characteristics

Ta = 25℃, CS Resistance = 6.8Ω unless otherwise specified

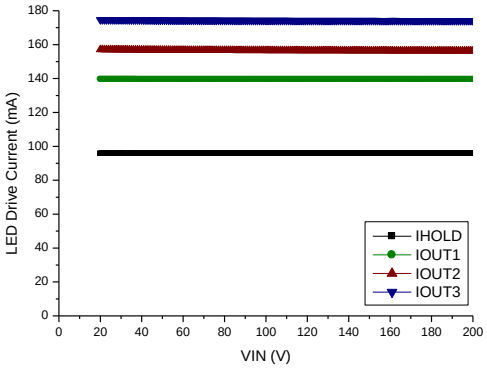
SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
Supply						
V_{VIN}	Input voltage range	Note 6	50		700	V
V_{VCC}	Operating voltage		-	15	-	V
I_{VCC}	Input Current		300	600	900	uA
V_{UVLO}	Under Voltage Lockout	UVLO_H	-	12	-	V
		UVLO_L	-	10	-	V
Driver Section						
V_{RHOLD}	Rhold reference voltage	V_{VIN} = 200V, V_{GND} = 0V		5.2		V
$I_{D\ Leak}$	Driver Leakage current	V_{VIN} = 200V, V_{GND} = 0V, HOLD & OUT1 ~ 3 = 700V	-	-	10	uA
I_{HOLD}	HOLD current	V_{VIN} =200V, HOLD = 40V MODE = 0V, Rhold = 0V	80	85	90	mA
I_{OUT1}	Driver 1 current	V_{VIN} =200V, OUT1 = 40V Rhold = 0V	125	130	135	mA
I_{OUT2}	Driver 2 current	V_{VIN} =200V, OUT2 = 40V Rhold = 0V	155	160	165	mA
I_{OUT3}	Driver 3 current	V_{VIN} =200V, OUT3 = 40V Rhold = 0V	180	185	190	mA

Note 6: Stress beyond the maximum ratings listed above may incur permanent damage to the device. Operating above the recommended conditions for extended time may stress the device and affect device reliability. Also the device may not operate normally above the recommended operating conditions. These are stress ratings only.

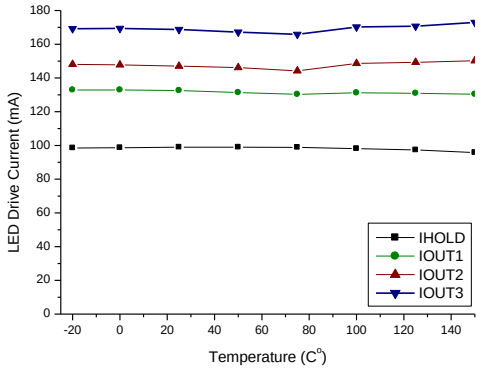
Typical Operating Characteristics



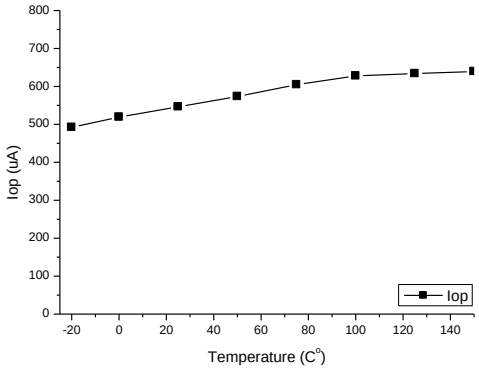
Operate Current Vs. Input Voltage



LED Drive current Vs. Input Voltage



Operate Current Vs. temperature

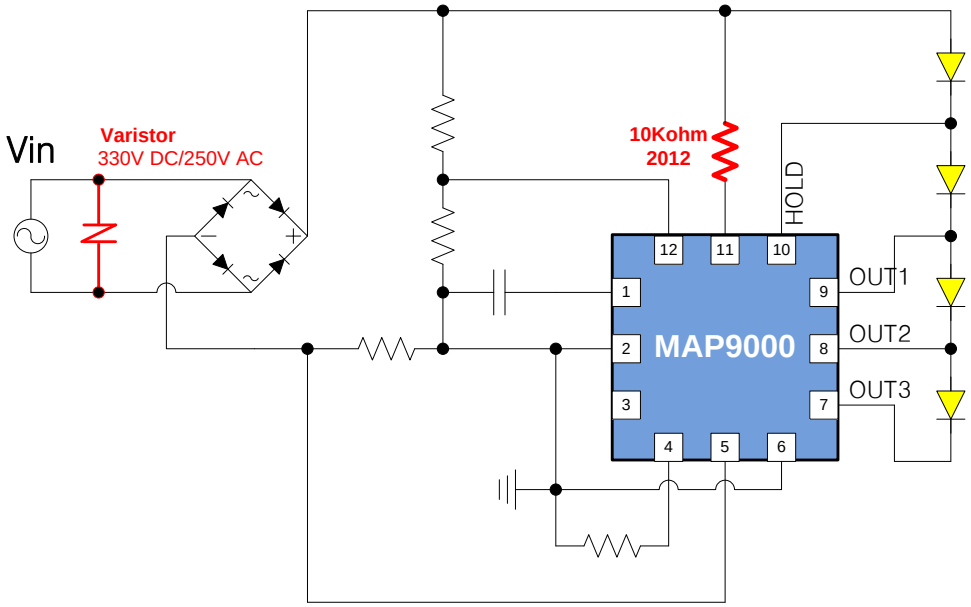


LED Drive current Vs. temperature

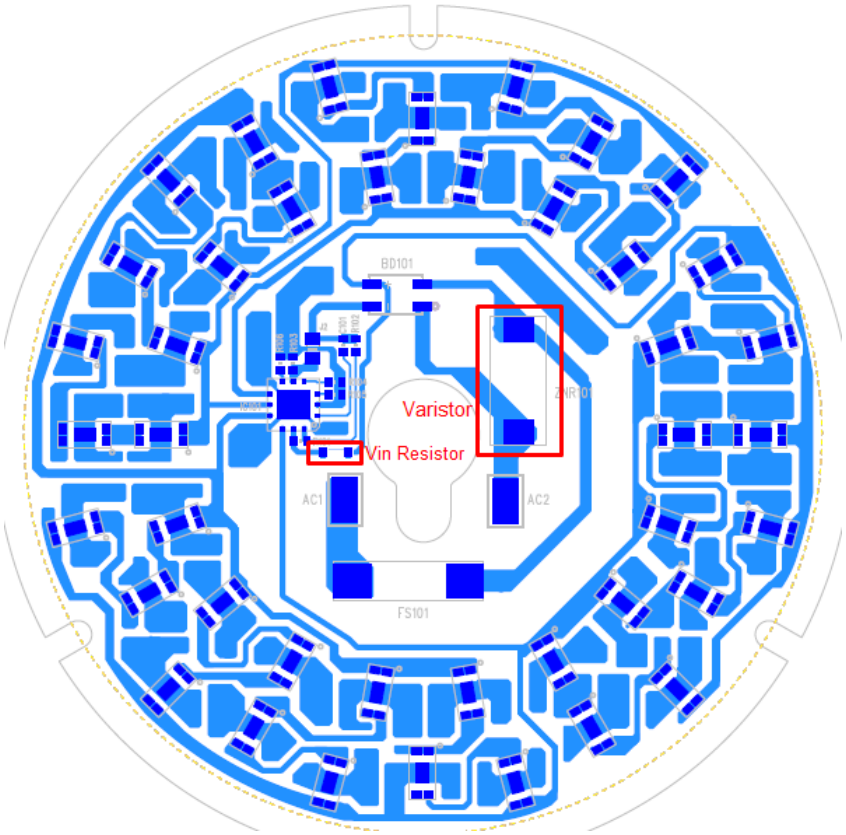
Recommended Surge Protection Circuit

1. Circuit Diagram

The surge test using our demo-board and pass 0.5KV surge voltage.

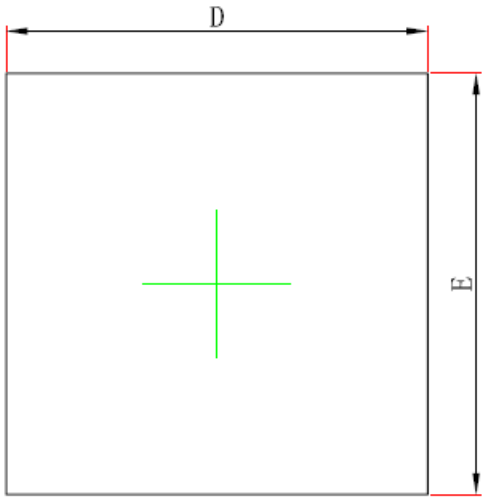


2. Demo-board layout

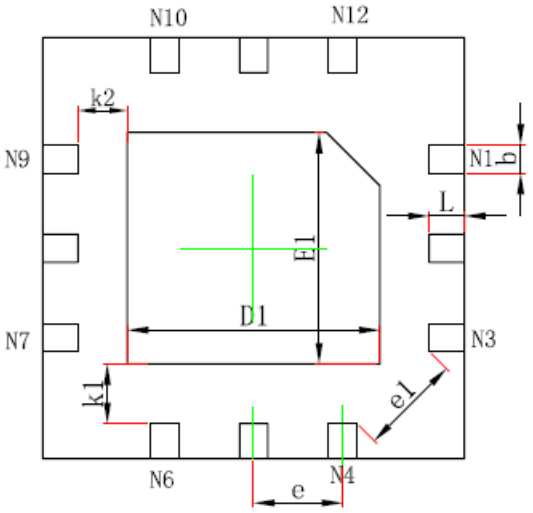


Physical Dimensions

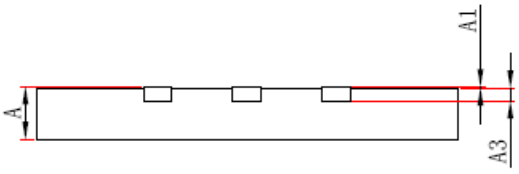
1) 6X6mm QFN 12leads



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	5.950	6.050	0.234	0.238
E	5.950	6.050	0.234	0.238
D1	3.500	3.700	0.138	0.146
E1	3.200	3.400	0.126	0.134
k1	0.850REF.		0.033REF.	
k2	0.700REF.		0.028REF.	
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
e1	1.457TYP.		0.057TYP.	
L	0.424	0.576	0.017	0.023