DESCRIPTION

The A9910 is a PWM high-efficiency LED driver control IC. It allows efficient operation of high-brightness (HB) LEDs from voltage sources ranging from 10VDC up to 600VDC. The A9910 controls an external MOSFET at fixed switching frequencies up to 300kHz. The frequency can be programmed using a single resistor. The LED string is driven at a constant current rather than a constant voltage, thus providing a constant light output and an enhanced reliability. The output current can be programmed between a few milliamps and up to more than 1.0A. The A9910 uses a rugged high-voltage junction isolated process that can withstand an input voltage surge up to 600V. The output current to a LED string can be programmed to any value between zero and its maximum value by applying an external control voltage at the linear dimming control input of the A9910. The A9910 provides a low-frequency PWM dimming input that can accept an external control signal with a duty ratio of 0-100% and a frequency of up to a few kilohertz.

The A9910 is available in SOP8 package.

ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ: 2,500pcs/Reel	M8	A9910M8R
		A9910M8VR
Note	R: Tape & Reel V: Halogen free Package	
AiT provides all RoHS products		

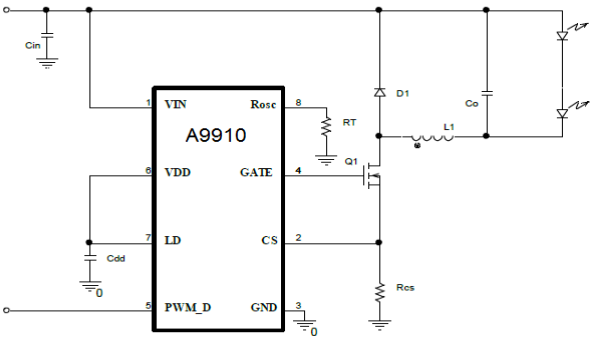
FEATURES

- >90% efficiency
- 10V to 600V input range
- Constant-current LED driver
- Applications from a few mA to more than 1A output
- LED string from one to hundreds of diodes
- Linear and PWM dimming capability
- Input voltage surge ratings up to 600V
- Available in SOP8 Package

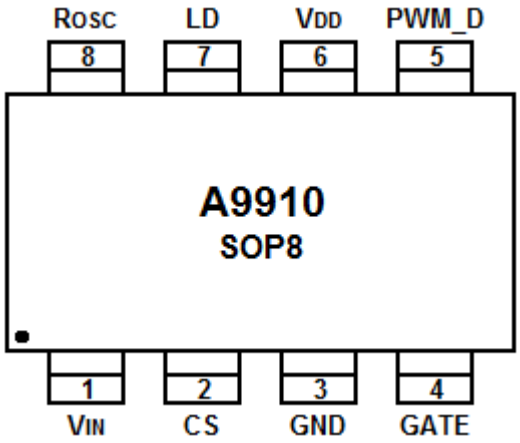
APPLICATION

- DC/DC or AC/DC LED driver applications
- RGB backlighting LED driver
- Backlighting of flat panel displays
- General-purpose constant current source
- Signage and decorative LED lighting
- Automotive
- Chargers

TYPICAL APPLICATION



PIN DESCRIPTION



Top View

Pin #	Symbol	Function
1	V_{IN}	Power Supply
2	CS	Senses LED string current.
3	GND	Ground
4	GATE	Drives the gate of the external MOSFET
5	PWM_D	Low Frequency PWM Dimming pin
6	V_{DD}	Internally regulated supply voltage
7	LD	Linear Dimming by changing the current limit threshold at current sense comparator-
8	R_{OSC}	Oscillator control

ABSOLUTE MAXIMUM RATINGS

V_{IN} to GND	-0.5V ~ +600V
CS, LD, PWM_D, GATE to GND	-0.3V ~ V_{DD}+0.3V
Continuous power dissipation (T_A = +25°C)[NOTE1]	
SOP8(derate 6.3mW/°C above +25°C)	630mW
Operating Temperature Range	-40°C ~ +85°C
Junction Temperature	+125°C
Storage Temperature Range	-65°C ~ +150°C

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: Also limited by package power dissipation limit, whichever is lower.

ELECTRICAL CHARACTERISTICS

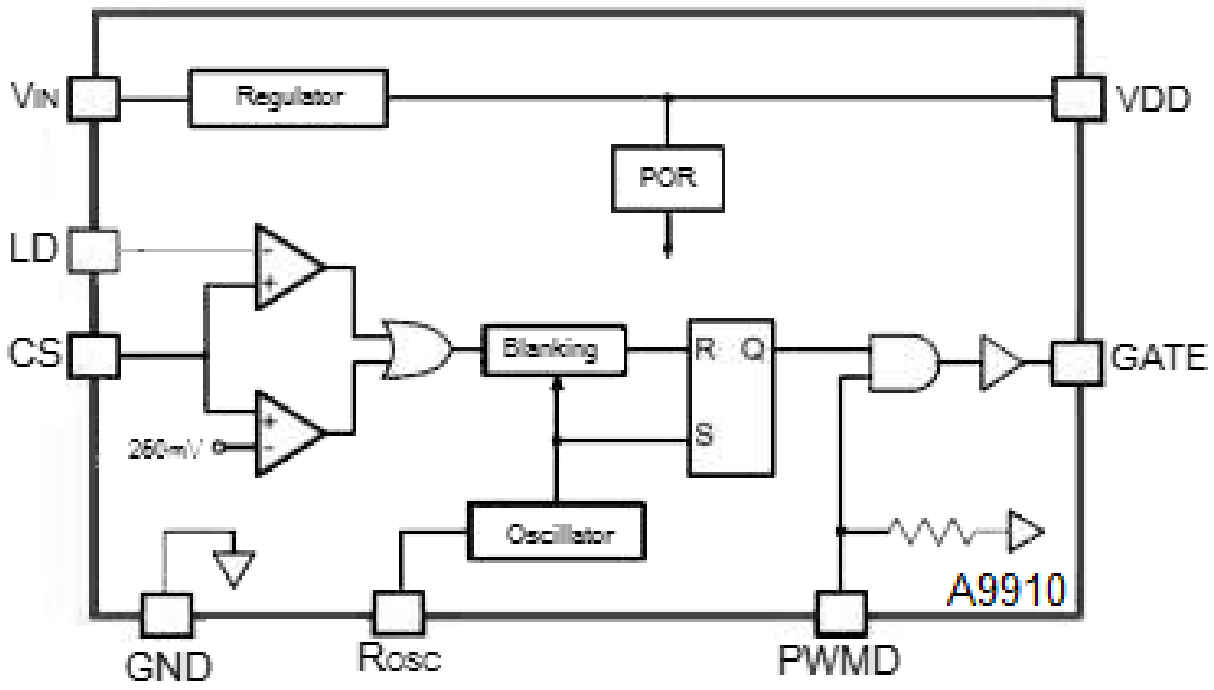
T_A = +25°C, unless noted otherwise

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input DC supply voltage range	V_{INDC}NOTE1	DC input voltage	10.0	-	600	V
Shut-down mode supply current	I_{INSD}	Pin PWM_D to GND, V_{IN}=8V	0.5	-	1	mA
Internally regulated voltage	V_{DD}	V_{IN} = 10 to 600V, $I_{DD(ext)}$=0, pin Gate open	7.0	7.5	8.0	V
Load regulation of V_{DD}	$\Delta V_{DD, load}$	$I_{DD(ext)}$ = 0 to 1.0mA, 500pF at GATE; R_{OSC} = 226kΩ, PWM_D= V_{DD}	0	-	100	mV
Maximal pin V_{DD} voltage	$V_{DD,max}$	When an external voltage is applied to pin V_{DD}	-	-	10.0	V
V_{DD} current available for external circuitry	$I_{DD(ext)}$	V_{IN} = 10 to 100V	-	-	0.7	mA
V_{DD} undervoltage lockout threshold	UVLO	V_{IN} rising	6.45	6.7	6.95	V
V_{DD} undervoltage lockout hysteresis	ΔUVLO	V_{IN} falling	-	500	-	mV
Pin PWM_D input low voltage	$V_{EN(lo)}$	V_{IN} = 10 to 600V	-	-	0.8	V
Pin PWM_D input high voltage	$V_{EN(hi)}$	V_{IN} = 10 to 600V	2.0	-	-	V
Pin PWM_D pull-down resistance	R_{EN}	V_{EN} = 5V	50	100	150	kΩ
Current sense pull-in threshold voltage	$V_{CS(hi)}$	T_A = -40 C to +85 C	225	250	275	mV
GATE high output voltage	$V_{GATE(hi)}$	I_{OUT} = 10mA	V_{DD}-0.3	-	V_{DD}	V
GATE low output voltage	$V_{GATE(lo)}$	I_{OUT} = -10mA	0	-	0.3	V
Oscillator frequency	f_{OSC}	R_{OSC} = 1.00MΩ R_{OSC} = 226kΩ	20 80	25 100	30 120	kHz

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Oscillator PWM Duty Cycle	$D_{MAX\ hf}$	$F_{PWM\ hf}$ = 25kHz, at GATE, CS to GND	-	-	100%	
Pin LD (Linear Dimming) voltage range	V_{LD}	T_A = <85°C, V_{IN} = 12V	0	-	250	mV
Current sense blanking interval	T_{BLANK}	V_{CS} = 0.55V_{LD}, V_{LD} = V_{DD}	150	215	280	ns
Delay from CS to GATE lo	t_{DELAY}	V_{IN} = 12V, V_{LD} = 0.15, V_{CS} = 0 to 0.22V after T_{BLANK}	-	-	300	ns
GATE output rise time	t_{RISE}	C_{GATE} = 500pF, V_{DD} = 7.5V	30	-	50	ns
GATE output fall time	t_{FALL}	C_{GATE} = 500pF, V_{DD} = 7.5V	30	-	50	ns

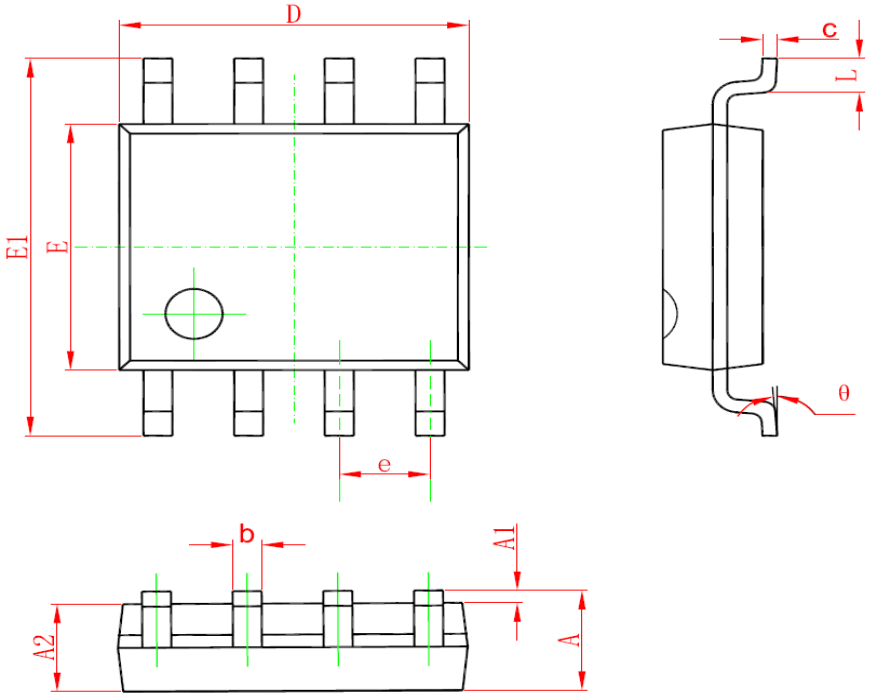
NOTE1: Also limited by package power dissipation limit, whichever is lower.

BLOCK DIAGRAM



PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270 BSC	
L	0.400	1.270
θ	0°	8°

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