

## Description

The GM9910B is a PWM high efficiency control LED driver IC. It allows efficient operation of High Brightness (HB) LEDs from voltage sources ranging from 10VDC up to 500VDC, this feature allows GM9910B can work from a wide range of input voltages without the need for an external low voltage supply.

By using a single resistor, the switching frequency to control the external MOSFET can be fixed up to 300KHz. GM9910B is constant current LED driver, which enhance the reliability. The output current can be programmed between a few milliamps and up to more than 1.0A.

GM9910B uses a rugged high voltage junction isolated process that can withstand an input voltage surge of up to 500V. Output current to an 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 GM9910B. The GM9910B 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.

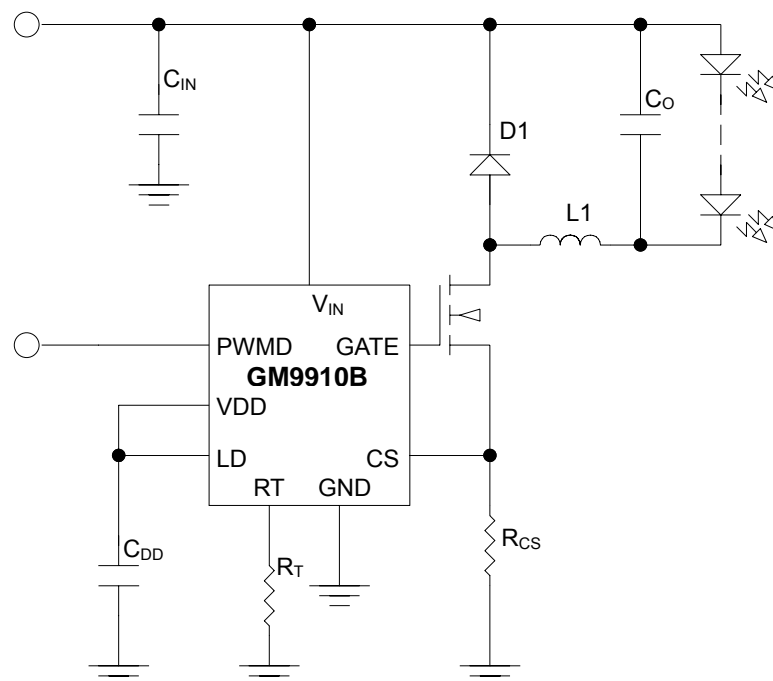
## Features

- ◆ > 90% efficiency
- ◆ Wide input range – 10V to 500V
- ◆ Constant current LED driver
- ◆ Applications from a few mA to more than 1A
- ◆ LED string from one to hundreds of diodes
- ◆ PWM low frequency dimming via enable pin
- ◆ Input voltage surge rating up to 500V

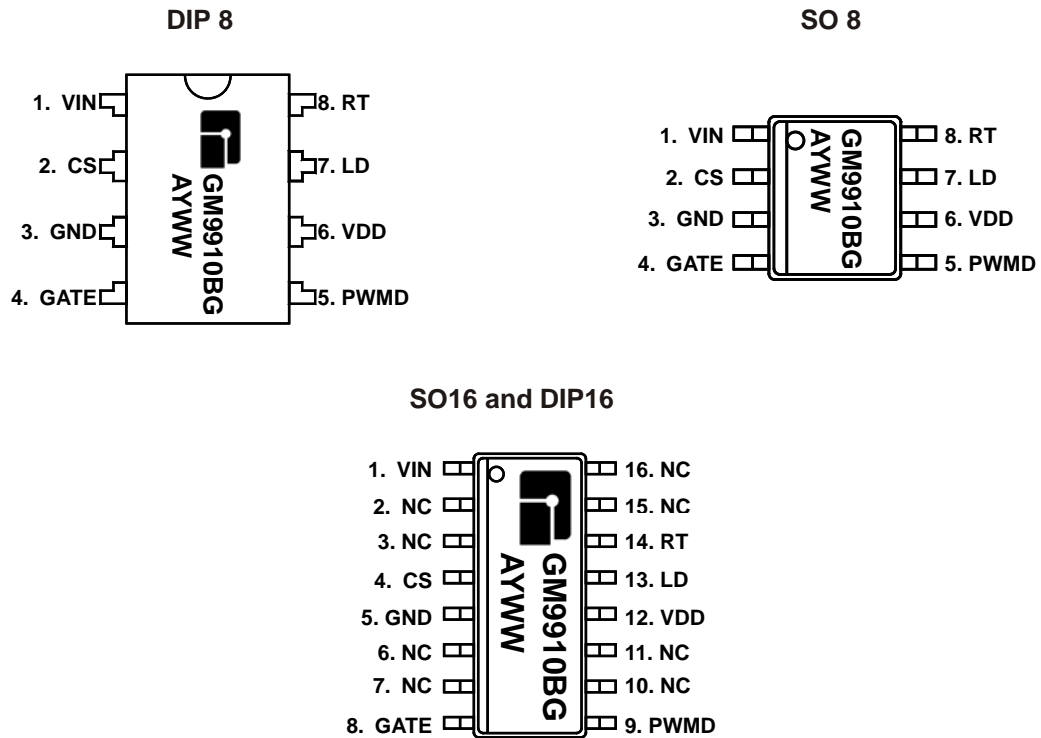
## Applications

- AC/DC or DC/DC LED Driver Applications
- RGB Backlighting LED Driver
- Back Lighting of Flat Panel Displays
- General Purpose Constant Current Source

## Typical Application Circuit

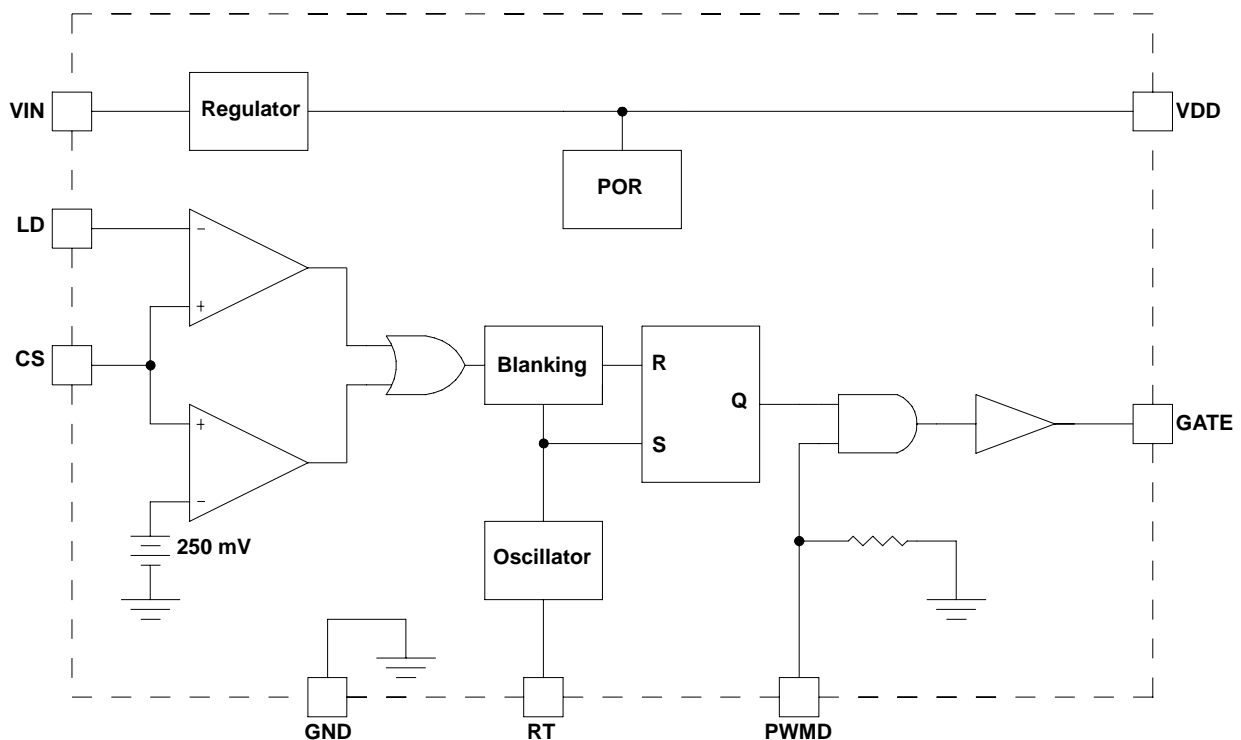


## Marking Information and Pin Configurations (Top View)



G: Green Product  
A: Assembly / Test site code  
Y: Year  
WW: Week

### Block Diagram



### Pin Descriptions

Pin #		Function	Description
8 pin	16 pin		
1	1	VIN	This pin is the input of an 10.0 - 500V linear regulator.
2	4	CS	This pin is the current sense pin used to sense the FET current by an external sense resistor. When this pin exceeds the lower of either the internal 250mV or the voltage at the LD pin, the GATE output goes low.
3	5	GND	This pin must be electrically connected to the ground of the power train.
4	8	GATE	This pin is the output GATE driver for THE external N-channel power MOSFET.
5	9	PWMD	This is the PWM dimming input of the IC. When this pin is pulled to GND, the GATE driver is turned off. When the pin is pulled high, the GATE driver operates normally.
6	12	VDD	Power supply pin for all internal circuits, It must be bypassed with a low ESR capacitor to GND ( $\geq 0.1\mu\text{F}$ ).
7	13	LD	This pin is the linear dimming input and sets the current sense threshold as long as the voltage at the pin is less than 250mV (typ).
8	14	RT	This pin sets the oscillator frequency. When a resistor is connected between RT and GND, the HV9910B operates in constant frequency mode. When the resistor is connected between RT and GATE, the IC operates in constant off-time mode.
	2, 3, 6, 7, 10, 11, 15, 16	NC	No connection

## Ordering Information

Ordering Number	Package	Shipping
GM9910BD8TG	DIP-8	60 Units / Tube
GM9910BS8TG	SOP-8	100 Units / Tube
GM9910BS8RG	SOP-8	2,500 Units / Reel
GM9910BS16TG	SO16	50 Units / Tube
GM9910BS16RG	SO16	2500 Units / Reel
GM9910BD16TG	DIP16	25 Units / Tube

## Absolute Maximum Ratings

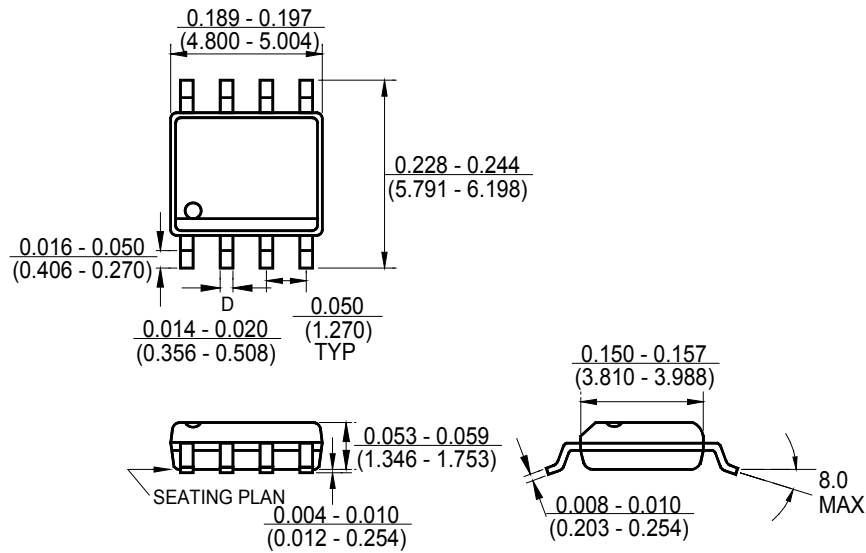
PARAMETER	RATINGS
VIN to GND	-0.5V to + 500V
CS	-0.3V to VDD + 0.3V
LD, PWMD to GND	-0.3V to VDD - 0.3V
GATE to GND	-0.3V to VDD + 0.3V
Operating Temperature Range	- 40°C to + 85°C
Junction Temperature	+125°C
Continuous Power Dissipation (T <sub>A</sub> = 25°C)	
DIP 8	900mW
SO 8	630mW
SO 16	1300mW
Storage Temperature	- 65°C to + 150°C

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

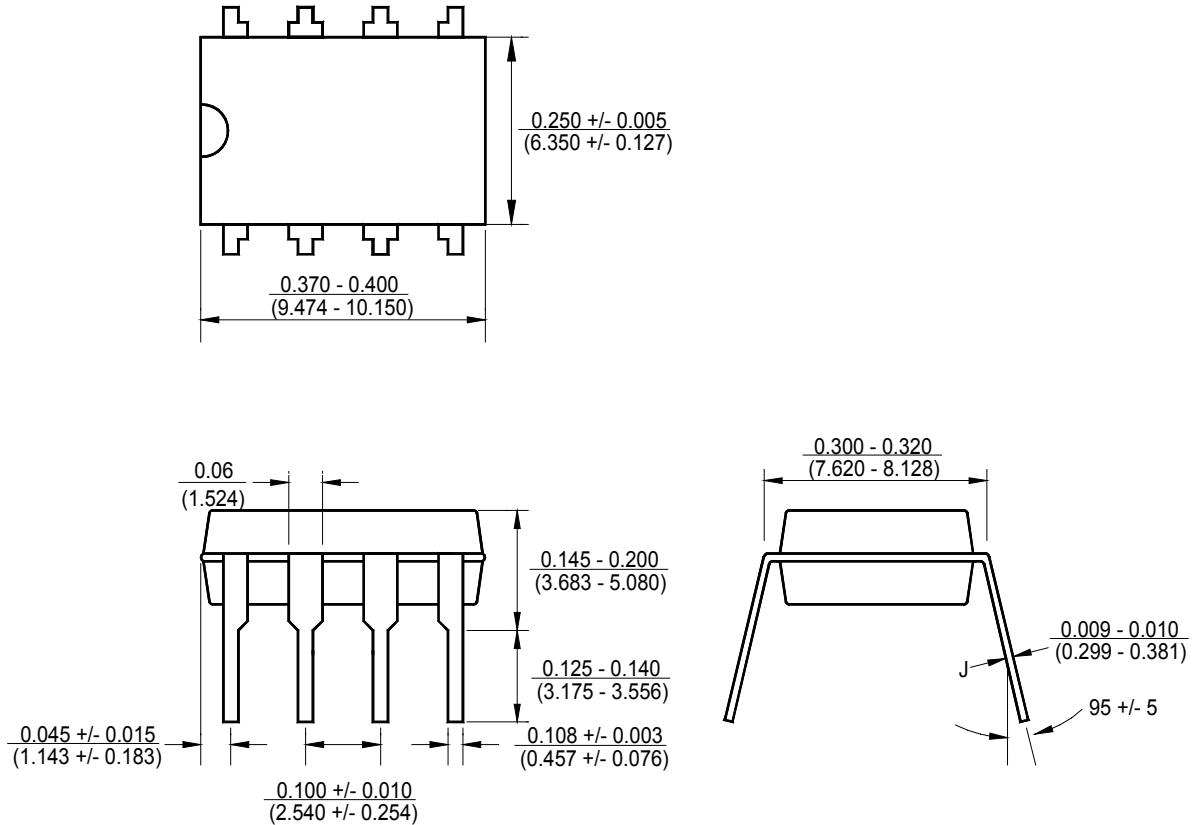
## Electrical Characteristics (T<sub>A</sub> = 25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input DC supply voltage range	V <sub>INDC</sub>	DC Input Voltage	10		500	V
Shut-Down mode supply current	I <sub>NSD</sub>	Pin PWM to GND, VIN = 8V	0.5		1.0	mA
Internally regulated voltage	VDD	VIN = 10 to 500V, IDD(ext)=0, pin GATE is open	7.0	7.5	8.0	V
Maximum VDD voltage	VDD <sub>max</sub>	When an external voltage applied to pin VDD			10	V
VDD current available for external circuitry	IDD(ext)	VIN = 10–100V			1.0	mA
VDD under voltage lockout threshold	UVLO	VIN rising	6.45	6.7	6.95	V
VDD under voltage lockout hysteresis	ΔUVLO	VIN falling		500		mV
Pin PWM input low voltage	VEN(lo)	VIN = 10–500V			1.0	V
Pin PWM input high voltage	VEN(hi)	VIN = 10–500V	2.4			V
Pin PWM pull-down resistance	REN	Pin PWM = 5V	50	100	150	kΩ
Current sense pull-in threshold	VCS(hi)	T <sub>A</sub> = -40°C to +85°C	243.5	250	257.5	mV
GATE high output voltage	VGATE(hi)	I <sub>OUT</sub> = 10mA	VDD-0.3		VDD	V
GATE low output voltage	VGATE(lo)	I <sub>OUT</sub> = -10mA	0		0.3	V
Oscillator frequency	f <sub>OSC</sub>	R <sub>T</sub> = 1.00MΩ	20	25	30	kHz
		R <sub>T</sub> = 226kΩ	80	100	120	
Maximum Oscillator PWM Duty Cycle	D <sub>MAXhf</sub>	f <sub>PWMhf</sub> = 25kHz, at GATE, CS to GND.			100%	
Linear Dimming pin voltage range	VLD	T <sub>A</sub> ≤ 85°C, VIN = 12V	0		250	mV
Current sense blanking interval	t <sub>BLANK</sub>	VCS = 0.55VLD, VLD = VDD	150	215	280	ns
Delay from CS trip to GATE lo	t <sub>DELAY</sub>	VIN = 12V, VLD = 0.15, VCS = 0 to 0.22V after t <sub>BLANK</sub>			300	ns
GATE output rise time	t <sub>RISE</sub>	C <sub>GATE</sub> = 500pF	30		50	ns
GATE output fall time	t <sub>FALL</sub>	C <sub>GATE</sub> = 500pF	30		50	ns
Thermal Shutdown Temperature	T <sub>TST</sub>			150		°C
Thermal Shutdown Hysteresis	T <sub>HYS</sub>			40		°C

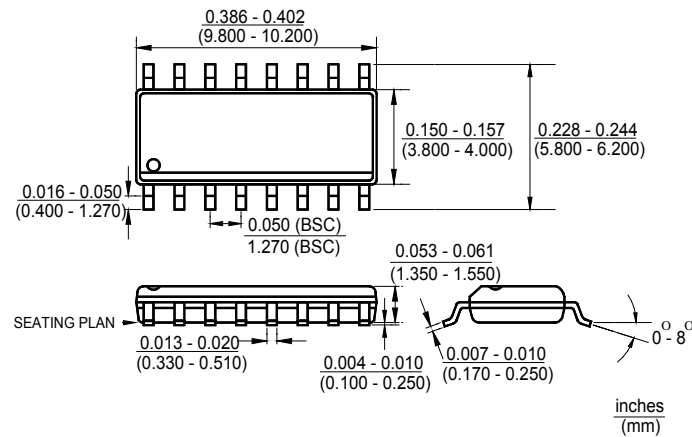
## Package Outline Dimensions – SO 8



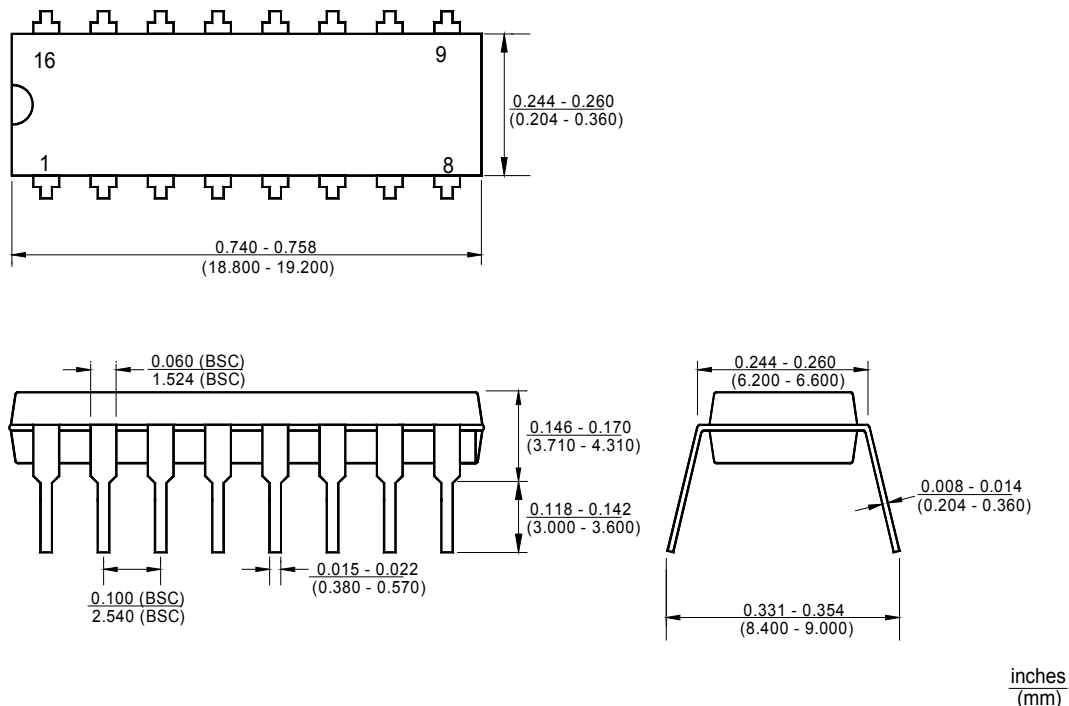
## Package Outline Dimensions – DIP 8



## Package Outline Dimensions – SO 16



## Package Outline Dimensions – DIP 16



## Ordering Number

<u>GM</u>	<u>9910B</u>	<u>S8</u>	<u>R</u>	<u>G</u>
APM Gamma Micro	Circuit Type	Package Type D16: DIP 16 S16: SO 16 D8: DIP 8 S8: SO 8	Shipping Type R: Taping & Reel T: Tube	Blank: Pb-free G: Green

Note:

### Pb-free products:

- ◆ RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- ◆ Suitable for use in SnPb or Pb-free soldering processes with 100% matte tin (Sn) plating.

### Green products:

- ◆ Lead-free (RoHS compliant)
- ◆ Halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)