BSC74K9910B

UNIVERSAL HIGH BRIGHTNESS LED DRIVER

GENERAL DESCRIPTION

The BSC74K9910B is a PWM high efficiency control LED driver IC. The device is manufactured using a rugged high voltage junction isolated process that can withstand an input voltage surge of up to 500V. It allows efficient operation of High Brightness (HB) LEDs from $10V_{DC}$ up to $500V_{DC}$ Voltage Source.

The switching frequency to control the external MOSFET can be selected up to 300KHz by using a single resistor.

Output current to an LED string can be programmed to any value between zero and upto the maximum by applying an external control voltage at the linear dimming control input of the BSC74K9910B.

The device integrates 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

PIN CONFIGURATION

Pin Configuration (Top View)

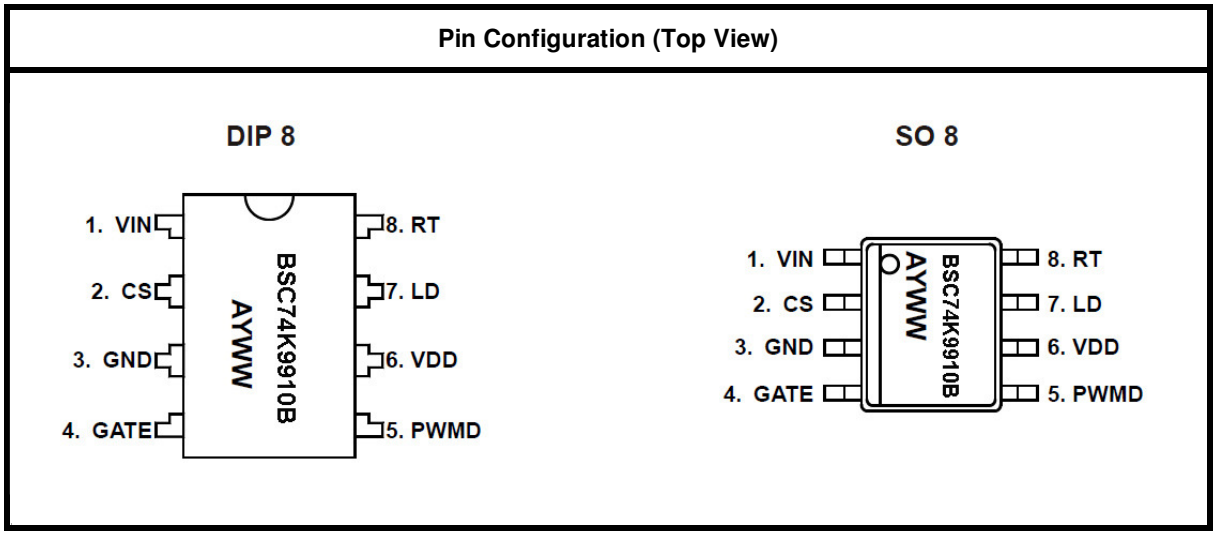


Figure 1 Pin Configuration

PIN DESCRIPTION

No.	Pin	Description
1	V_{IN}	Input Voltage of a 10.0 – 500V linear regulator
2	CS	This pin is the current sense pin used to sense the FET current by an external sense resistor. When the voltage on this pin exceeds the lower of either the internal 250mV or the voltage at the LD pin, the GATE output goes low.
3	GND	Ground
4	GATE	This pin is the output GATE driver for THE external N-channel power MOSFET.
5	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	V_{DD}	Power supply pin for all internal circuits, It must be bypassed with a low ESR capacitor to GND (≥ 0.1μF).
7	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	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.

ABSOLUTE MAXIMUM RATINGS[1]

Parameter	Symbol	Ratings	Unit
Maximum Supply Voltage	V_{IN}	-0.5 to 500	V
Maximum Voltage on Pin CS	V_{CS}	-0.3 to V_{DD} + 0.3	V
Maximum Voltage on Pin LD and PWMD	V_{LD}, V_{PWMD}	-0.3 to V_{DD} - 0.3	V
Maximum Voltage on Pin GATE	V_{GATE}	-0.3 to V_{DD} + 0.3	V
Operating Temperature Range		-40 to +85	°C
Maximum junction temperature[2]	T_J	+125	°C
Thermal Resistance TO-252 5L	θ_{JA}	95	°C/W
Storage Junction Temperature	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering 10 secondes)		260	°C

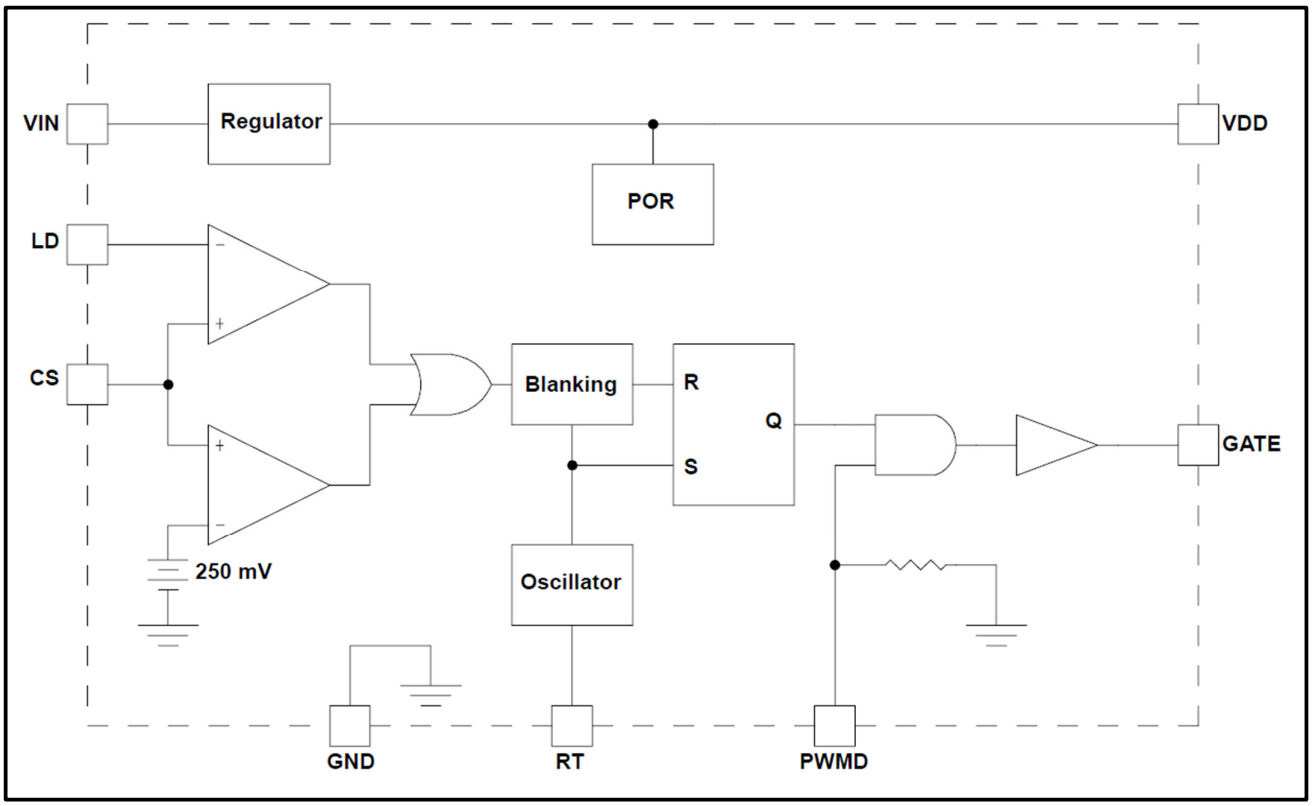
Note 1: Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: T_A = 25°C)

Parameter	Condition	Symbol	Value			Unit
			Min	Typ	Max	
Input DC supply voltage range	DC Input Voltage	V_{INDC}	10		500	V
Shut-Down mode supply current	Pin PWMD to GND, V_{IN} = 8V	I_{INSD}	0.5		1	mA
Internally regulated voltage	V_{IN} = 10 to 500V, I_{DD}(ext)=0, pin GATE is open	V_{DD}	7	7.5	8	V
Maximum V_{DD} voltage	When an external voltage applied to pin V_{DD}	V_{DDMAX}			10	V
V_{DD} current available for external circuitry	V_{IN} = 10–100V	I_{DDMAX}			1	mA
V_{DD} under voltage lockout threshold	V_{IN} rising	UVLO	6.45	6.7	6.95	V
V_{DD} under voltage lockout hysteresis	V_{IN} falling	ΔUVLO		500		mV
Pin PWMD input low voltage	V_{IN} = 10–100V	V_{PWMD}(lo)			1	V
Pin PWMD input high voltage	V_{IN} = 10–100V	V_{PWMD}(ligh)	2.4			V
Pin PWMD pull-down resistance	Pin PWMD = 5V	R_{PWMD}	50	100	150	Ω
Current sense pull-in threshold	T_A = -40°C to +85°C	V_{CS}(hi)	243.5	250	257.5	mV
GATE high output voltage	I_{OUT} = 10mA	V_{GATE}(hi)	V_{DD}-0.3		V_{DD}	mV
GATE low output voltage	I_{OUT} = -10mA	V_{GATE}(low)	0		0.3	mV
Oscillator frequency	R_T = 1.00MΩ	f_{OSC}	20	25	30	kHz
	R_T = 226KΩ		80	100	120	
Maximum Oscillator PWM Duty Cycle	fPWMhf = 25kHz, at GATE, CS to GND.	D_{MAX}hf			100	%
Linear Dimming pin voltage range	T_A ≤ 85°C, V_{IN} = 12V	V_{LD}	0		250	mV
Current sense blanking interval	V_{CS} = 0.55V_{LD}, V_{LD} = V_{DD}	t_{BLANK}	150	215	280	ns
Delay from CS trip to GATE lo	V_{IN} = 12V, V_{LD} = 0.15, V_{CS} = 0 to 0.22V after t_{BLANK}	t_{DELAY}			300	ns
GATE output rise time	C_{GATE} = 500pF	t_{RISE}	30		50	ns
GATE output fall time	C_{GATE} = 500pF	t_{FALL}	30		50	ns
Thermal Shutdown Temperature		T_{TST}		150		°C
Thermal Shutdown Hysteresis		T_{HYST}		40		°C

FUNCTIONAL BLOCK DIARGAM



TYPICAL APPLICATION CIRCUIT

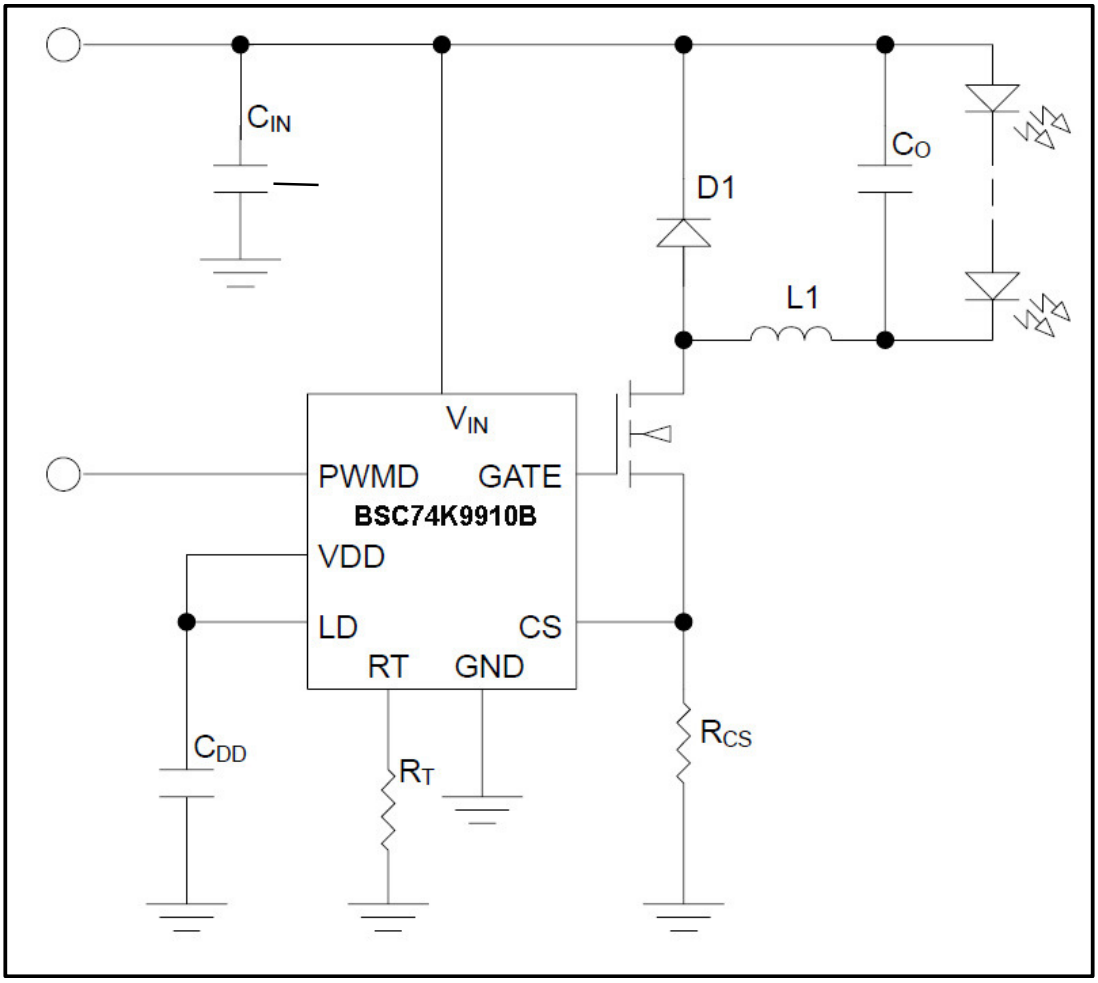
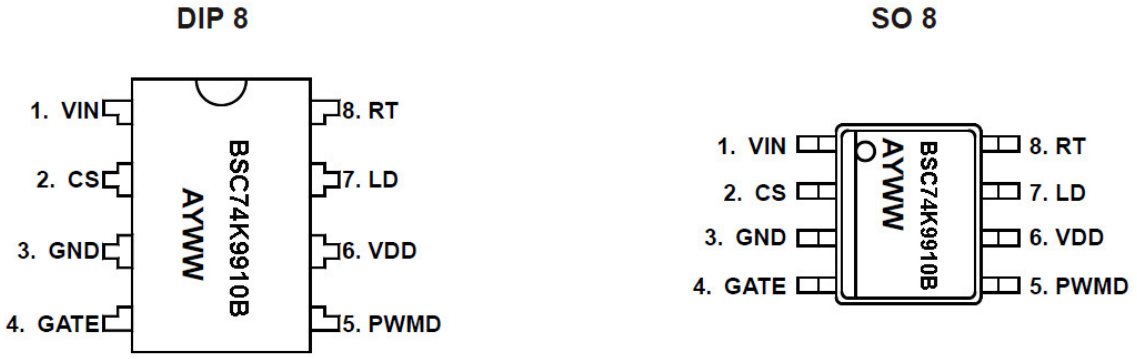


Figure 2 Typical Application Circuit

DEVICE MARKING

Device Marking (Top View)



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

PRODUCT ORDERING INFORMATION

BSC	74K	9910B	S8	R	G
BRAVE Semiconductor Corporation	LED Driver Product Family	Circuit Type	Device Package S8: SOP 8 D8: DIP 8	Shipping Type R: Tape & Reel T: Tube	G: Green

Note:
Green products:

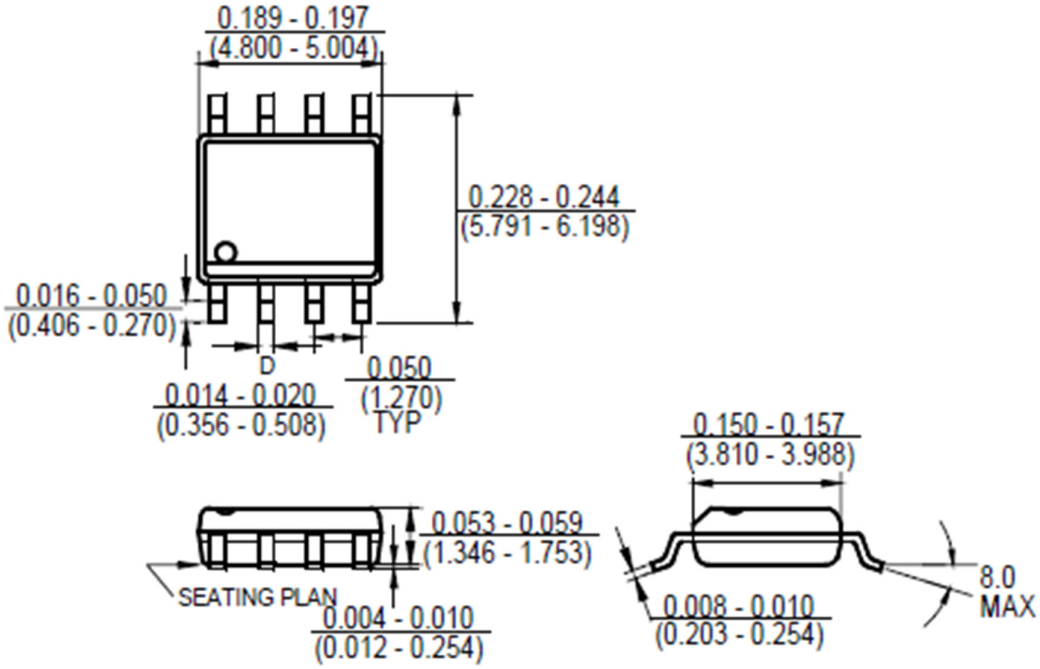
- Lead-free (RoHS compliant)
- Halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight)

ORDERING INFORMATION
Industrial Range: -40°C To +125°C

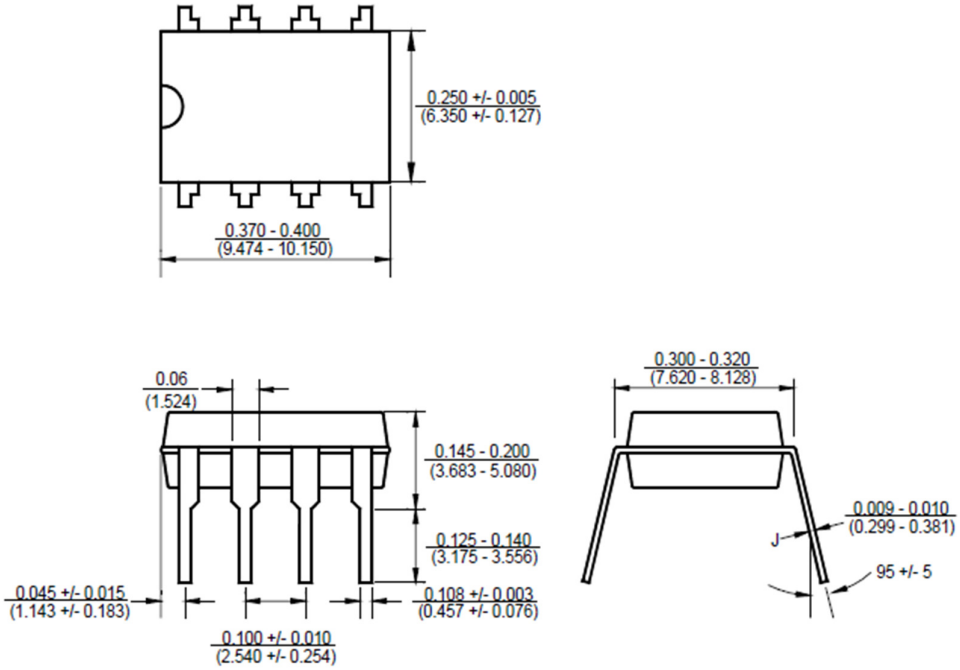
Order Part No.	Package	QTY
BSC74K9910BD8TG	DIP-8	60 Unit / Tube
BSC74K9910BS8TG	SOP-8	100 Units / Tube
BSC74K9910BS8RG	SOP-8	2500 Units / Reel

PACKAGE INFORMATION

Package Outline Dimensions – SOP-8



Package Outline Dimensions – DIP-8



REVISION HISTORY

Revision	Detail Information	Date
A	Initial Release	2021.09.03