



Features

- Switch mode controller for single switch LED drivers
- Enhanced drop-in replacement to the An9910
- Open loop peak current controller
- Internal 8.0V to 450V linear regulator
- Constant frequency or constant off-time operation
- Linear and PWM dimming capability
- Requires few external components for operation

Applications

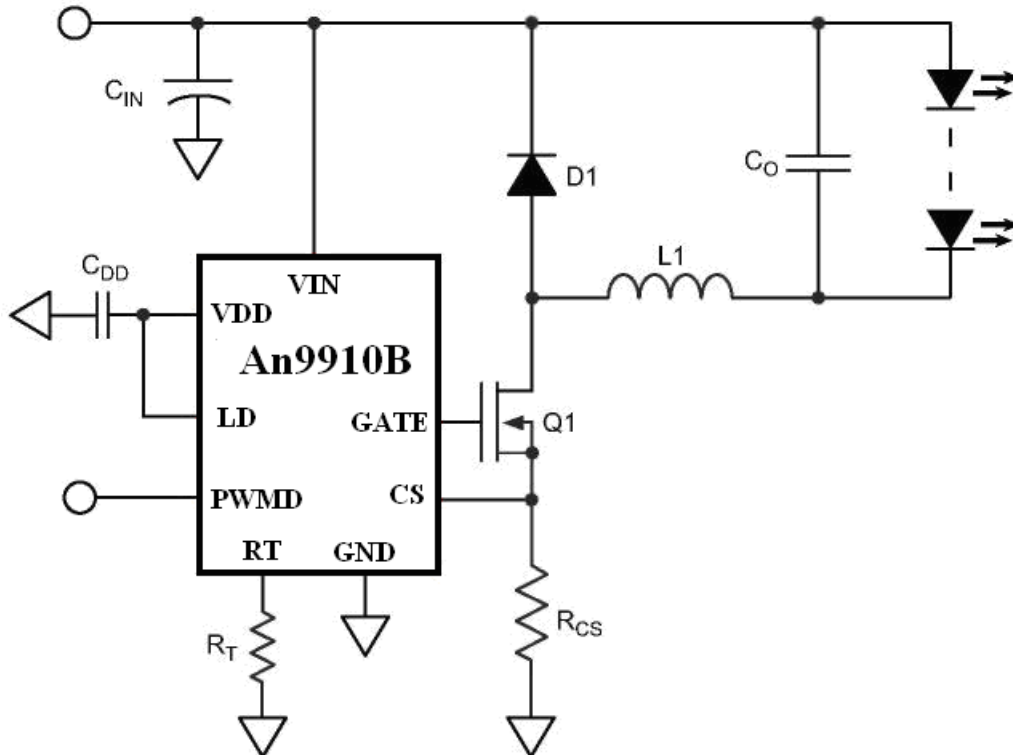
- DC/DC or AC/DC LED Driver applications
- RGB Backlighting LED Driver
- Back Lighting of Flat Panel Displays
- General purpose constant current source
- Signage and Decorative LED Lighting
- Chargers

General Description

The An9910B is an open loop current mode control LED driver IC. The An9910B can be programmed to operate in either a constant frequency or constant off-time mode. It includes an 8 – 450V linear regulator which allows it to work from a wide range of input voltages without the need for an external low voltage supply. The An9910B includes a 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. It also includes a 0 – 250mV linear dimming input which can be used for linear dimming of the LED current.

The An9910B is ideally suited for buck LED drivers. Since the An9910B operates in open loop current mode control, the controller achieves good output current regulation without the need for any loop compensation. PWM dimming response is limited only by the rate of rise and fall of the inductor current, enabling very fast rise and fall times. The An9910B requires only three external components (apart from the power stage) to produce a controlled LED current making it an ideal solution for low cost LED drivers.

Typical Application Circuit





Absolute Maximum Ratings

V_{IN} to GND.....	-0.5V to +470V
CS, LD, PWM_D, GATE, RT to GND.....	-0.3V to (V _{DD} + 0.3V)
V_{DD} to GND.....	12V
Continuous Power Dissipation ($T_A = +25^\circ\text{C}$)	
8-Pin SO.....	630mW
16-Pin SO.....	1300mW
Junction Temperature Range.....	-40°C to +150°C
Storage Temperature Range	-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 (The specifications are at $T_A = 25^\circ\text{C}$. $V_{IN} = 12\text{V}$, unless otherwise noted.)

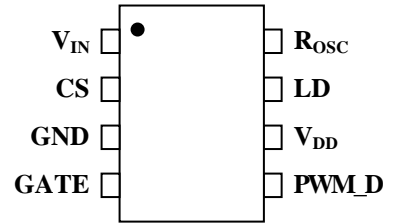
Symbol	Description	Min	Typ	Max	Units	Conditions
V_{INDC}	Input DC supply voltage range	8.0		450	V	DC input voltage
I_{INSD}	Shut-Down mode supply current		0.5	1	mA	Pin PWM_D to GND
V_{DD}	Internally regulated voltage	7.25	7.5	7.75	V	$V_{IN} = 8\text{V}$, $I_{DD(ext)} = 0$, 500pF at Gate; $R_T = 226\text{k}\Omega$, PWM_D = V_{DD}
$\Delta V_{DD,line}$	Line Regulation of V_{DD}	0	-	1	V	$V_{IN} = 8 - 450\text{V}$, $I_{DD(ext)} = 0$, 500pF at GATE; $R_T = 226\text{k}\Omega$, PWM_D = V_{DD}
$\Delta V_{DD,load}$	Load Regulation of V_{DD}	0	-	100	mV	$I_{DD(ext)} = 0 - 1\text{mA}$, 500pF at GATE; $R_T = 226\text{k}\Omega$, PWM_D = V_{DD}
UVLO	V_{DD} undervoltage lockout threshold	6.45	6.7	6.95	V	V_{DD} rising
ΔUVLO	V_{DD} undervoltage lockout hysteresis		500		mV	V_{DD} falling
$I_{IN,MAX}$	Current that the regulator can supply before IC goes into UVLO	5	-	-	mA	$V_{IN} = 8\text{V}$
$V_{EN(lo)}$	Pin PWM_D input low voltage			0.8	V	$V_{IN} = 8-450\text{V}$
$V_{EN(hi)}$	Pin PWM_D input high voltage	2.0			V	$V_{IN} = 8-450\text{V}$
R_{EN}	Pin PWM_D pull-down resistance at PWM_D	50	100	150	k Ω	$V_{EN} = 5\text{V}$
$V_{CS,TH}$	Current sense pull-in threshold voltage	225	250	275	mV	$-40^\circ\text{C} < T_A < +85^\circ\text{C}$
		213	250	287		$T_A < +125^\circ\text{C}$
V_{OFFSET}	Offset voltage for LD comparator	-12	-	12	mV	---
T_{BLANK}	Current sense blanking interval	150	215	280	ns	$0 < T_A < +85^\circ\text{C}$, $V_{LD} = V_{DD}$, $V_{CS} = V_{CS,TH} + 50\text{mV}$ after T_{BLANK}
		145	215	315		$-40^\circ\text{C} < T_A < +125^\circ\text{C}$, $V_{LD} = V_{DD}$, $V_{CS} = V_{CS,TH} + 50\text{mV}$ after T_{BLANK}
t_{DELAY}	Delay to output	-	80	150	ns	$V_{LD} = V_{DD}$, $V_{CS} = V_{CS,TH} + 50\text{mV}$ after T_{BLANK}
f _{OSC}	Oscillator frequency	20	25	30	kHz	$R_T = 1.00\text{M}\Omega$
		80	100	120		$R_T = 226\text{k}\Omega$
I_{SOURCE}	Gate sourcing current	0.165	-	-	A	$V_{GATE} = 0\text{V}$, $V_{DD} = 7.5\text{V}$
I_{SINK}	Gate sinking current	0.165	-	-	A	$V_{GATE} = V_{DD}$, $V_{DD} = 7.5\text{V}$
t_{RISE}	GATE output rise time	-	30	50	ns	$C_{GATE} = 500\text{pF}$, $V_{DD} = 7.5\text{V}$
t_{FALL}	GATE output fall time	-	30	50	ns	$C_{GATE} = 500\text{pF}$, $V_{DD} = 7.5\text{V}$



Pinout

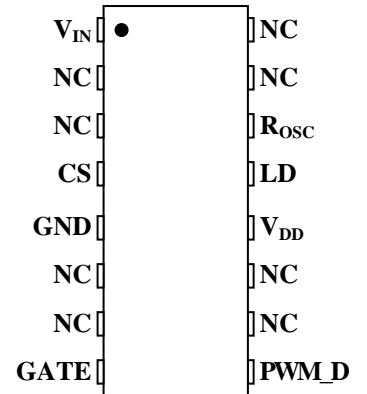
Name	SO-16	SO-8 DIP-8	Description
V _{IN}	1	1	This pin is the input of an 8V - 450V linear regulator. Input voltage 8V to 450V DC
CS	4	2	Senses LED string current
GND	5	3	Device ground
GATE	8	4	Drives the gate of the external MOSFET
PWM_D	9	5	Low Frequency PWM Dimming pin, also Enable input. Internal 100kΩ pull-down to GND
V _{DD}	12	6	Internally regulated supply voltage. 7.5V nominal. Can supply up to 1mA for external circuitry. A sufficient storage capacitor is used to provide storage when the rectified AC input is near the zero crossings.
LD	13	7	Linear Dimming by changing the current limit threshold at current sense comparator
RT	14	8	Oscillator control. A resistor connected between this pin and ground sets the PWM frequency.

Connects (NC) are not internally connected and may be used for pass-thru PCB traces



8-Pin DIP/SOIC

No



16-Pin SOIC