

40V 3A Boost LED Constant Current Driver

■ General Description

The LN2140 regulator is fixed frequency PWM boost LED constant current driver, capable of driving series 1W/3W LED units with excellent line and load regulation.

The LN2140 regulator includes internal frequency compensation and fixed-frequency oscillator. An over current protection function is built inside. So the regulator requires a minimum number of external components to work. The PWM control circuit is able to adjust the duty ratio linearly from 0 to 90%. The LN2140 is available in SOP8 packages.

■ Package

- SOP8

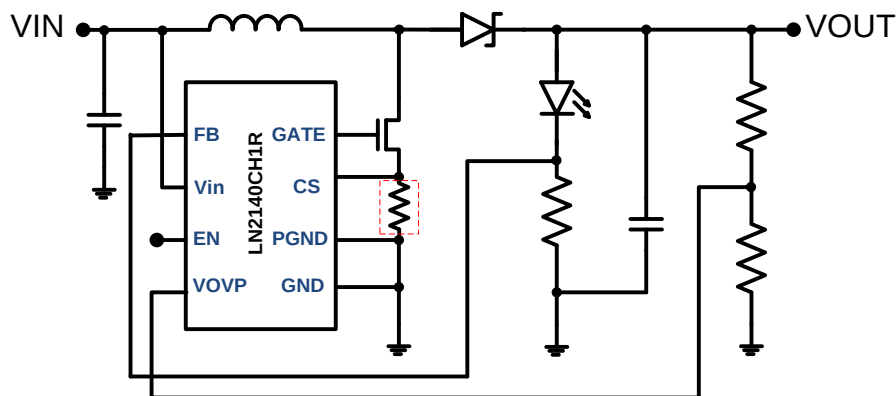
■ Application Information

■ Features

- EN shutdown with PWM dimming function
- Internal optimize power mosfet
- Soft-start function
- Thermal shutdown function
- Current limit and short protect function
- Pb-Free Package

■ Application

- LED Lighting
- Boost constant current driver
- Monitor LED Back lighting

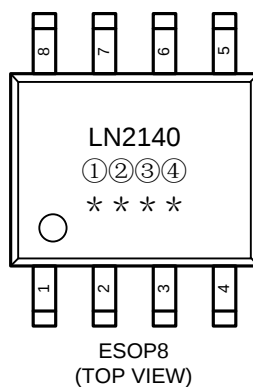


■ Ordering Information

LN2140 ①②③④

标号	描述	标记	描述
①	Product Type	C	LED Controller
②	Power Voltage	H	High power voltage input
③	CS Type	1	Integrated CS RES
④	Device Orientation:	R	Standard Feed
		L	Reverse Feed

■ Marking Information



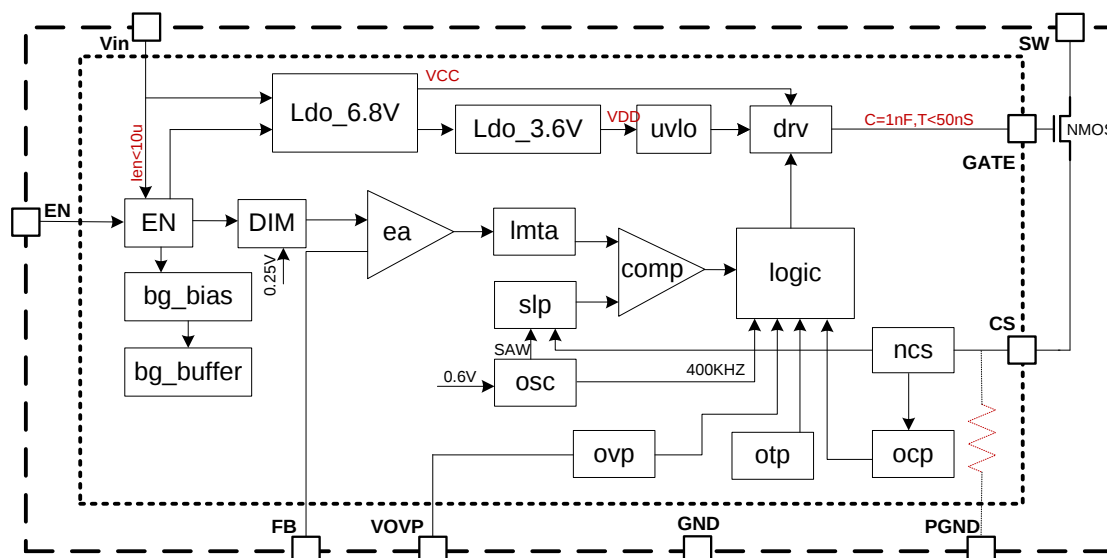
标号	标记	描述
①	C	LED Controller
②	H	High power voltage input
③	1	Integrated CS RES
④	R	

**** Represents the assembly lot No.

■ Functional Pin Description

Pin Name	Pin No.	Pin Function
EN	1	Chip Enable and PWM dimming
VIN	2	Power Input
FB	3	Feedback voltage
VOVP	4	Output over voltage sample
GATE	5	Power MOSFET driver
CS	6	Power MOSFET current sample
PGND	7	Power GND
GND	8	GND

■ Function Block Diagram



■ Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Supply Voltage	VDD	VSS-0.3~VSS+40	V
Enable Voltage	SD	VSS-0.3~VSS+6.	
Power Dissipation	PD@TA=25℃ SOP8	-	W
Package Thermal Resistance	SOP8	-	℃/W
Lead Temperature	-	260	℃
Ambient Temperature	Topa	-40~+85	
Storage Temperature	Tstr	-65~+125	
ESD Susceptibility	HBM	4000	V

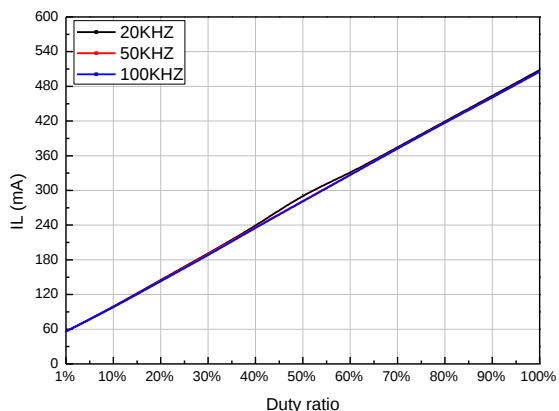
■ Electrical Characteristics

($V_{EN} = V_{DD} = 3.6V$, Gain=24dB, $R_L = 8\Omega$, $T_A = 25^\circ C$, unless otherwise specification)

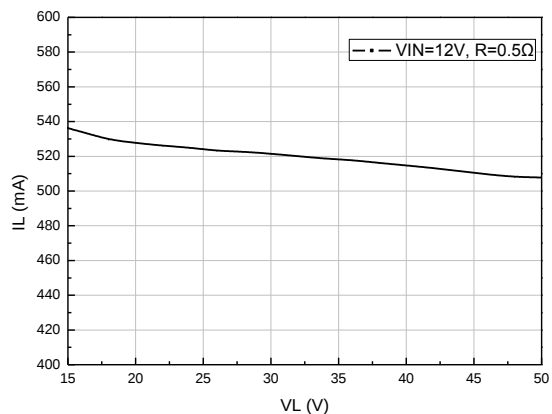
Boost LED Constant Current Driver					
Parameters	Test Condition	Min	Typ	Max	Unit
Input operation voltage	-	6.5	-	32	V
Under Voltage Lockout	-	-	5.5	-	V
UVLO Hysteresis	-	-	0.2	-	V
Shutdown supply current	-	-	20	-	μA
Oscillator frequency	-	-	400	-	KHz
PFM switching duty ratio	-	-	15	-	%
Switch current limit	$V_{FB} = 0V$	-	4	-	A
EA reference	-	-	0.26	-	V
CS resistance	-	-	50	-	$m\Omega$
EN pin threshold	High (Regulator ON)	-	-	1.4	V
	LOW (Regulator OFF)	0.8	-	-	V
Max. duty cycle	$V_{FB} = 0V$	-	80	-	%
Gate Ton	1nF	-	40	-	nS
Gate Toff	1nF	-	40	-	nS
Thermal shutdown	-	-	160	-	$^\circ C$
OTP hysteresis	-	-	25	-	$^\circ C$
PWM dimming frequency	Small duty cycle is recommended to use more than 30 KHZ frequency	20	-	100	KHZ

■ Typical Operating Characteristics

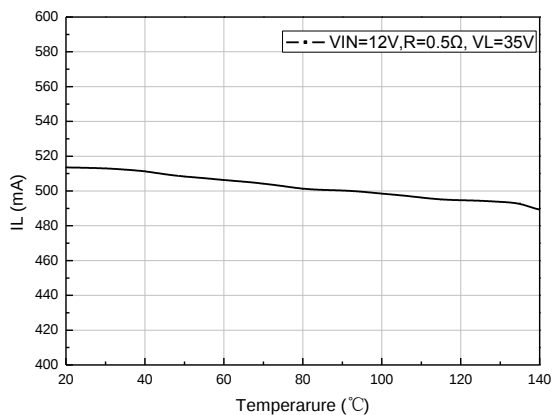
1. CE the Dimming



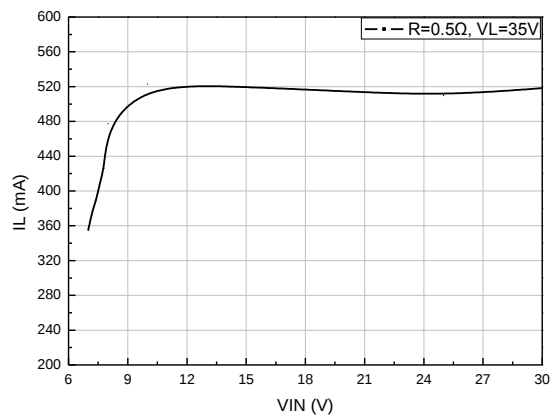
2. Load Regulation



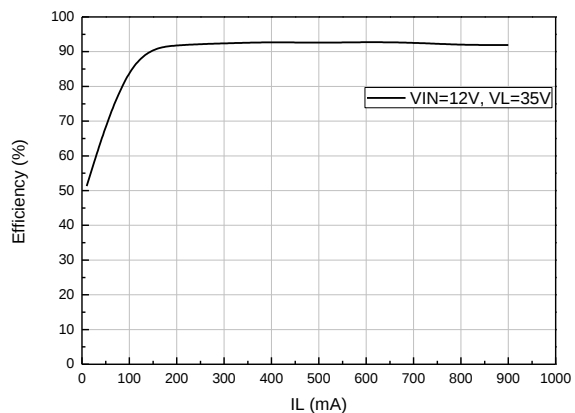
3. Current Temperature Curve



4. The linear stability



5. Efficiency



6. Working Frequency

($V_{in}=12V, R_{FB}=0.5\Omega, V_L=35V$)



7. Minimum Conduction Time

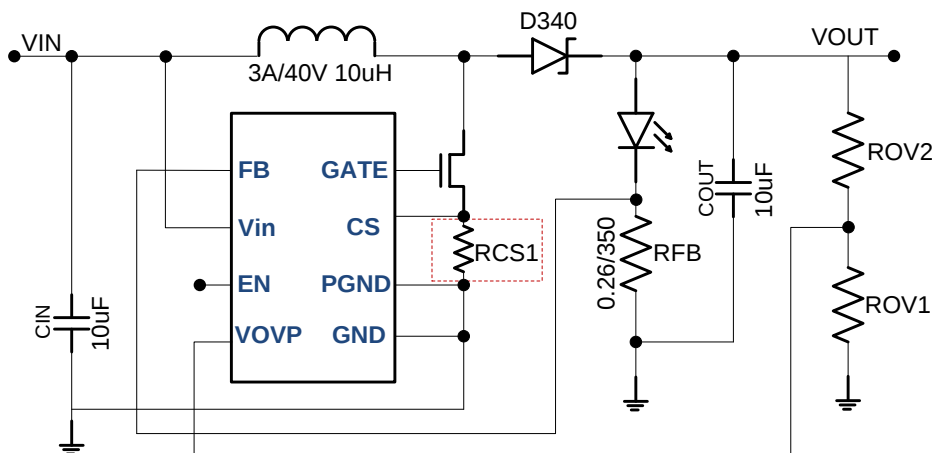
($V_{in}=12V, R_{FB}=0.5\Omega, I_L=5mA$)



■ Application Information

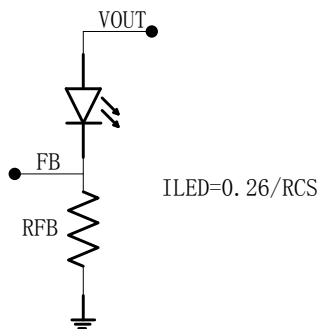
The LN2140 uses a constant-frequency current-mode boost converter architecture to control the LED current by regulating the feedback voltage. Please refer to the functional block diagram for an explanation of LN2140 operation.

The LN2140 integrate a 50mΩ metal resistor (RCS) to sample current of MOSFET. If application using ILED>500mA, make sure to adding another resistor (RCS1) from CS pin to PGND pin.



Picture 1

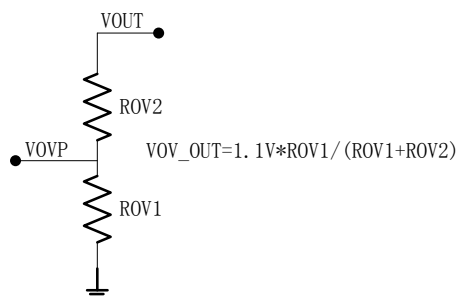
The beginning of each cycle turns on the Power MOSFET. A slope compensation ramp is added to the output of the current sense amplifier and the result is fed into the positive input of the comparator (COMP). When this voltage goes above the output voltage of the error amplifier, the Power MOSFET is turned off. The voltage at the output of the EA block amplifies the difference between the reference voltage and the feedback voltage (FB), so that FB voltage can be regulated to the reference voltage. The LED current can be set by reference picture 2.



Picture 2

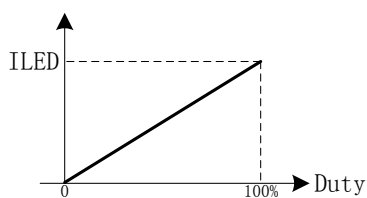
The LN2140 has built-in soft-start to limit the inrush current during startup and to limit the amount of overshoot on the output. Protection features in the LN2140 include cycle-by-cycle current limit protection and thermal shutdown.

The over-voltage protection (OVP) of LN2140 protects in the event where an LED fails open, which forces the feedback voltage to zero. This causes the boost converter to operate in maximum duty cycle mode, ramping up the output voltage, and the output voltage of LN2140 can be fixed by the dividing resistors. The OVP function will prevent the higher voltage to destroy Power mosfet and control chip. The voltage of OVP can be set by reference picture 3.



Picture 3

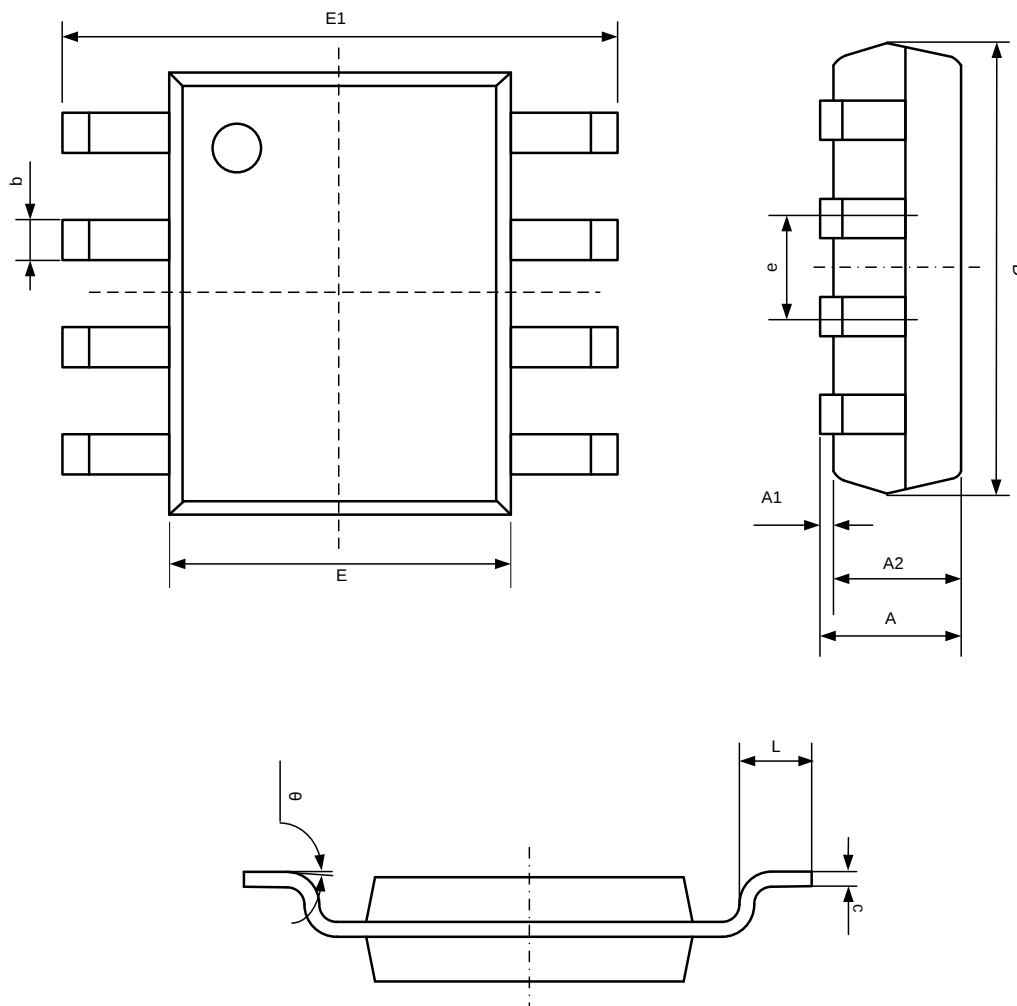
The EN pin has the shutdown function and PWM dimming function. The PWM dimming function uses the duty of input PWM signal to program the reference voltage. The LED current will follow to the duty of input PWM signal. When the EN voltage holds at the high voltage, the LED will fixed at the maximum current. The frequency range of input PWM signal is from 20kHz to 100kHz, and if use small duty(<5%) of input PWM signal to dim LED current, please make sure the frequency of PWM signal larger than 30kHz.



Picture 4

■ Package Information

● SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°