Current Constant Linear LED Driver

General Description

The CN4215 is a universal purpose linear LED driver. The operating voltage as wide as 30V is well suited for all kinds of applications. Separated V_{DD} can be easily configured for high voltage input.

The CN4215 only need one current setting resistor. No capacitors are required. With a strong internal power transistor and 200mV low CS voltage, CN4215 can drive up to 150mA current with only 350mV total dropout. Careful design and fine trimming keeps current accuracy within \pm 5%.

PWM dimming can be as high as 1MHz, while still holding good dimming linearity. With a proprietary design, CN4215 is also compatible with simple two wire switched dimming up to 1KHz frequency. OTP function prevents CN4215from extreme conditions.

CN4215 is available in package SOT23-5

Features

- 30V operating voltage on VDD and LED pin
- 150mA output current
- Small Dropout Voltage on LED pin
 350mV@150mA (including 200mV CS voltage)
- Highly Accuracy:±5%
- Easily configurable for multi purposes
- Extreme simple application with only one setting resistor
- High dimming frequency up to 1MHz
- Over temperature protection
- SOT23-5 package

Application

- Isolated Offline LED lamps
- LED lighting
- Automotive LED driver
- Constant Current source and sink

Current limiting



Typical Application Circuit

PIN Description

PIN NO.	PIN Name	Description
1	CS	The feedback Input. Connect an external resistor between CS and GND pin to set the LED current.
2	GND	The Ground pin of this device.
3	DIM	The Dimming pin.
4	VDD	Supply Voltage pin
5	LED	The pin to connect LED cathod.

Electrical Characteristics and Recommended operating conditions

Characteristic	Symbol	Condition	Min.	Тур.	Max.	Unit
Supply Voltage	V_{DD}		5		30	V
Dropout Voltage between LED pin to GND pin	V_{LED}		10	11	12	V
Reference Voltage	V _{CS}	V _{DD} =9V, V _{SGND} =V _{LED} =0V	14	15	16	mV
LED Current	I _{LED}	V _{DD} =12V	18	20	21	mA
Bias Current	I _{DD}	V _{DD} =5V	24	25	26	uA

The operating temperature at 25 $^\circ\!\!\mathrm{C}$ unless otherwise noted,

Maxing Ratings

Item	Symbol	Value	Unit	
VDD,LED to SGND voltage	V _{DD}	-0.3 to 30	V	
All other pins		-0.3 to V_{DD}	V	
LED output current	I _{LED}	150	mA	
Power consumption	PD	300	mW	
Thormal Desistance	Θ _{JA}	165	°C 101	
	Θ ^{ıc}	75		
Operating Temperature	TJ	-40 to +120	°C	
Storage Temperature	Tstg	-55 to +150	°C	
Static electricity	ESD	Class 1C Class B		

Ordering information

Parts	Constant Current	Package	Min. Qty	
CN4215	1-150mA	SOT23-5	3000pcs	

Performance and characteristics











Application Information

SETTING LED CURRENT

LED current can be calculated from reference voltage and Rcs:

$$I_{\text{LED}} = \frac{V_{\text{CS}}}{R_{\text{CS}}} = \frac{0.2V}{R_{\text{CS}}}$$

So R_{CS} is set by:

$$\mathsf{R}_{\rm CS} = \frac{\mathsf{V}_{\rm CS}}{\mathsf{I}_{\rm LED}} = \frac{0.2\mathsf{V}}{\mathsf{I}_{\rm LED}}$$

Thermal Consideration

To pursue a small package, the SOT23-5 has limited heat dissipation capability. But the device is linear system and could generate a high power defined by:

$$P_D = (V_{DC} - V_{LED}) \times I_{LED}$$

Given the case of LED-driver application, VDC is 12V and 3 LEDs is series, the power consumed in the IC could be as high as:

$$P_D = (12V-9V) \times 0.2A = 0.6W$$

The SOT23-5 package can only withstand a power as high as 0.4W. So LED current set is very important to decrease the power and lower the temperature of the IC.

Thermal balance, Negative temperature characteristics

To avoid the lifetime decrease under high temperature, CN4215 employ a thermal balance control module. When the IC's temperature is higher than 120°C, the CN4215 will regulate the drive current to be lower and lower until the chip reach the thermal balance. And thus, CN4215 is well protected from extremely high temperature which could cause reliability issue.

Package







Symbol	Dimensions Ir	n Millimeters	Dimensions In Inches		
Symbol	Min.	Max.	Min.	Max.	
А	1.050	1.250	0.041	0.049	
A1	0.000	0.100	0.000	0.004	
A2	1.050	1.150	0.041	0.045	
b	0.300	0.500	0.012	0.020	
С	0.100	0.200	0.004	0.008	
D	2.820	3.020	0.111	0.119	
E1	1.500	1.700	0.059	0.067	
E	2.650	2.950 0.104		0.116	
е	0.950	(BSC)	0.037(BSC)		
e1	1.800	2.000	0.071	0.079	
L	0.300	0.600	0.012	0.024	
L1	0.600REF.		0.024REF.		
θ	0°	8°	0°	8°	