High-Power Step-Down LED Driver Supports Wide Range of PWM Dimming Interfaces

1 Description

The iW3638 is a high-performance second-stage buck LED driver optimized to supply constant-current to LEDs directly from DC power supplies typically below 100V. The controller supports a non-isolated buck-converter topology to post-regulate from an off-line AC/DC converter, minimizing low frequency output ripple current and eliminating virtually all flicker in the system. It uses Dialog's ***PrimAccurate***™ advanced sensing technology to achieve excellent output current regulation without the need for direct voltage and current feedback components. It also eliminates the need for external loop compensation while maintaining stability across all operating conditions.

The iW3638 offers a 1% to 100% dimming range and provides a dedicated PWM dimming input pin that supports a wide variety of dimming application interfaces such as wireless modules, MCUs or 0-10V interfaces. In addition, the iW3638 accepts a secondary dimming input pin to allow maximum output current configuration.

Dialog's innovative proprietary technology maximizes the iW3638 performance in an SOIC-8 package. It provides maximum design flexibility by providing two multi-function pins to configure IC functions such as the dimming curve and minimum dimming level. Additionally, the iW3638 features a soft-off function before entering into light-off mode, where the device remains alive with minimal standby power consumption.

2 Features

- Supports wide DC input voltage with tight output current regulation (±3%)
- Enhanced MOSFET driver supports output power up to 90W or above in an SOIC-8 package
- Dual dimming interfaces
- Low standby power
- Supports 0-10V dimming with the iW339 series interface controllers
- Wide dimming range 1% - 100%
- Configurable minimum dimming setting: dim-to-off, 1%, 5% or 10%
- Wide V_{CC} operating range from 7.5V to 30V
- Fast dimming transient response
- Built-in over-temperature protection or by external NTC
- Configurable dimming curve: linear or logarithmic
- Built-in soft-start achieves fast and smooth start-up for all different operating conditions
- Built-in single-point fault protection features: output open, output over-voltage, output short and input voltage under-voltage protections
- Light-off mode with soft-off feature

3 Applications

- 0-10V dimmable LED drivers
- Dimmable commercial T8
- External and fixture driver lighting applications
- Wireless and intelligent LED lighting

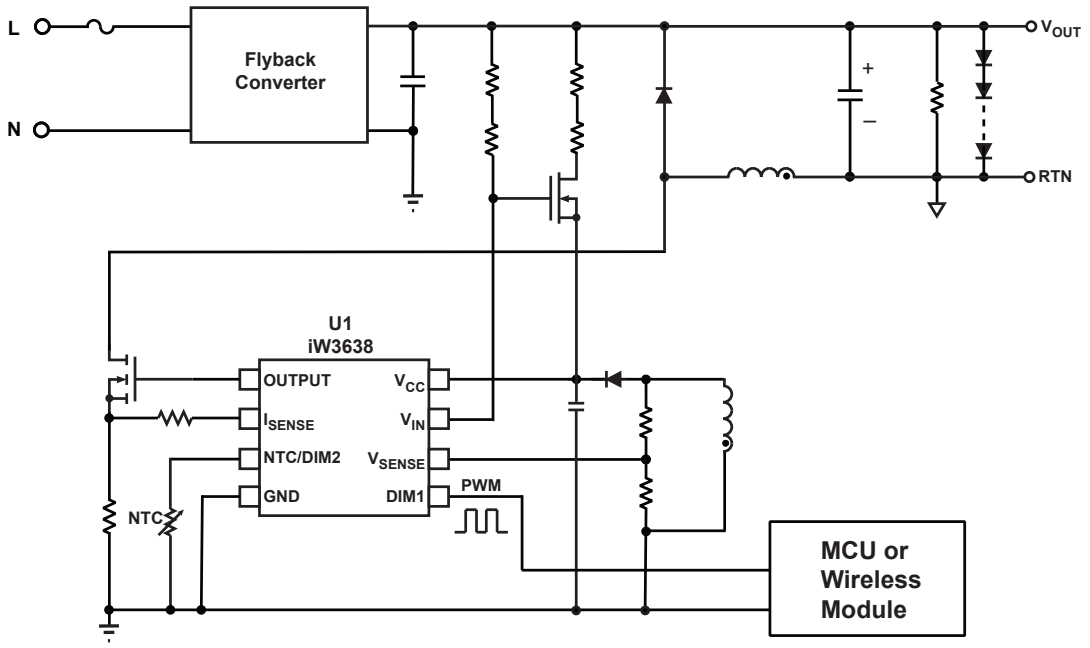


Figure 3.1 : iW3638 Typical Application Circuit (Wireless Dimming with NTC Derating Using Depletion-mode FET as Active Start-up Device)

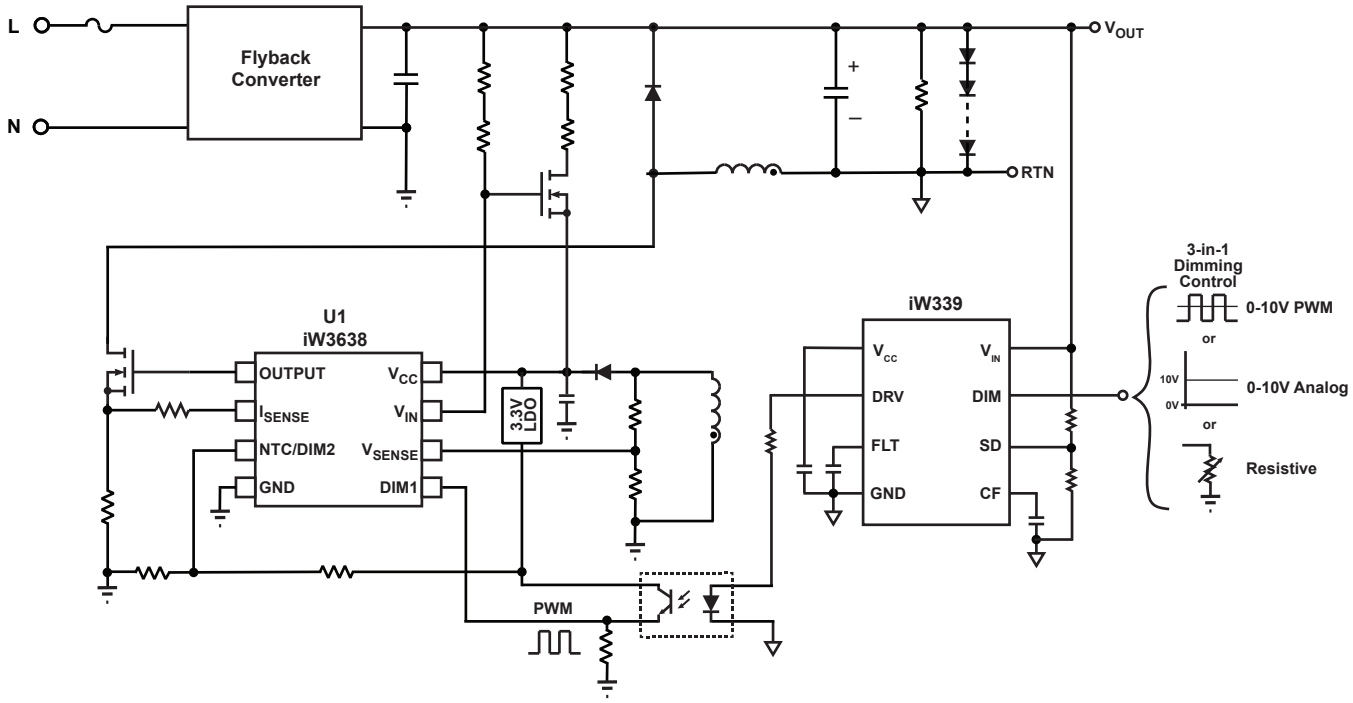


Figure 3.2 : iW3638 Typical Application Circuit (3-in-1 Dimming with Maximum Current Modulated by the Voltage at NTC/ DIM2 Pin and Using Enhancement-mode FET as Active Start-up Device)

4 Pinout Description

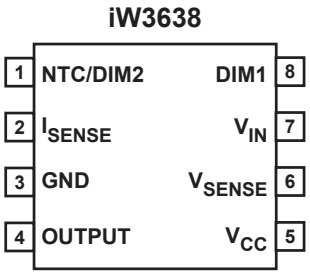


Figure 4.1 : 8-Lead SOIC-8 Package

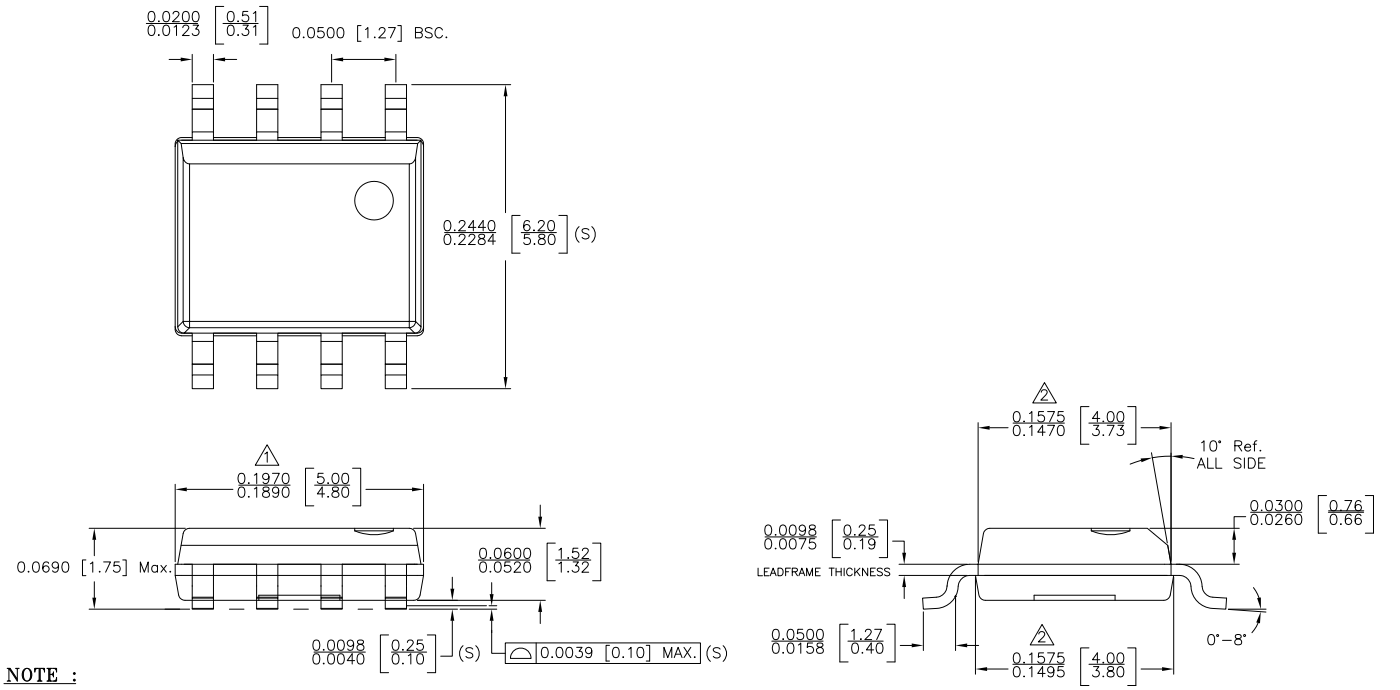
Pin Number	Pin Name	Type	Pin Description
1	NTC/DIM2	Digital Input / Analog In/Out	Used for external temperature sensing via an NTC resistor, or to provide a second dimming interface via an analog signal (0-1.8V).
2	I_{SENSE}	Analog Input	Provides switch current sense for cycle-by-cycle peak current control and limit during normal operation, and serves as a configuration pin during startup.
3	GND	Ground	Ground.
4	OUTPUT	Output	Gate drive for external MOSFET switch.
5	V_{CC}	Power	IC power supply.
6	V_{SENSE}	Analog Input	Provides output voltage sense during normal operation, and serves as a configuration pin during startup.
7	V_{IN}	Analog Input	Control active start-up devices and sense input bus voltage.
8	DIM1	Digital Input	PWM dimming input detection.

5 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 5, I_{CC} = 10mA max)	V_{CC}	-0.3 to 31	V
Continuous DC supply current at V_{CC} pin	I_{CC}	20	mA
V_{IN} (pin 7)		-0.3 to 31	V
OUTPUT (pin 4)		-0.3 to 31	V
V_{SENSE} input (pin 6, I_{VSENSE} ≤ 10mA)		-0.3 to 7	V
I_{SENSE} input (pin 2)		-0.3 to 7	V
NTC/DIM2 (pin 1)		-0.3 to 7	V
DIM1 (pin 8)		-0.3 to 7	V
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-65 to 150	°C
Thermal resistance junction-to-ambient	θ_{JA}	170	°C/W
ESD rating per JEDEC JESD22-A114		±2,000	V
Latch-up test per JESD78D		±100	mA

6 Physical Dimensions



NOTE :

1. DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
2. DOES NOT INCLUDE INTER–LEAD FLASH OR PROTRUSIONS. INTER–LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .010 INCH PER SIDE.
3. THIS PART IS COMPLIANT WITH JEDEC SPECIFICATION MS–012.
4. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC.(S)
5. CONTROLLING DIMENSIONS IN INCHES. [mm]

STATUS: RELEASED	SCALE: DO NOT SCALE
TERMINAL FINISH: 100% Sn or NiPdAu (PPF)	
TITLE: 8 SOIC PACKAGE OUTLINE	
REV: A	REVISION NOTE: NEW DRAWING — DATE: 02–MAR–2015

7 Ordering Information

Part no.	Options	Package	Description
iW3638-02	NTC DIM2 interface	SOIC-8	Tape & Reel[1]
iW3638-03	Analog DIM2 interface	SOIC-8	Tape & Reel[1]

Note 1: Tape and reel packing quantity is 2,500/reel. Minimum ordering quantity is 2,500.

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