Off-line LED Driver Controller Supports Wide Range of PWM Dimming Interfaces

1 Description

The iW3637 is a high-performance AC/DC power controller optimized for non-isolated buck or isolated flyback converter applications to step-down a high-voltage DC input to drive LEDs in SSL lighting applications. A converter designed with the iW3637 can work with a DC input voltage from a front-end, off-line boost converter to minimize low frequency output ripple current, and virtually eliminate 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 or current feedback components. It also eliminates the need for external loop compensation while maintaining stability across all operating conditions.

The iW3637 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 iW3637 accepts a secondary PWM input to allow maximum output current configuration.

Dialog's innovative proprietary technology maximizes the iW3637 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 iW3637 features a soft-off function before entering into light-off mode, where the device remains alive with minimal standby power consumption.

2 Features

- Supports buck and flyback topologies with input from front-end off-line boost converter or rectified AC input
- Enhanced MOSFET driver supports output power up to 150W in an SOIC-8 package
- ***PrimAccurate***™ sensing achieves tight output current regulation (±3%)
- Independent maximum load current setting interface
- Low standby power
- Wide dimming range 1% - 100%
- Configurable minimum dimming setting: dim-to-off, 1%, 5% or 10%
- Configurable 72kHz or 90kHz PWM switching frequency with quasi-resonant operation
- Wide V_{CC} operating range from 7.5V to 30V
- Fast dimming transient response
- Built-in over-temperature protection with temperature-current derating
- External NTC-based over-temperature protection (iW3637-02 only)
- Configurable dimming curve: linear or logarithm
- Built-in soft-start
- Active start-up scheme enables fast start-up
- Fault protection: 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

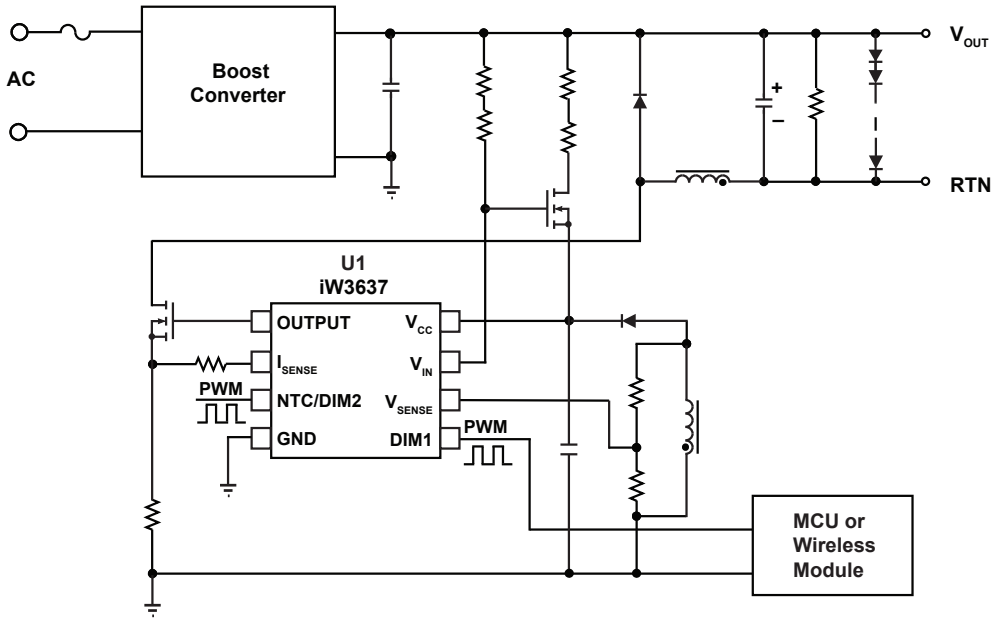


Figure 3.1 : iW3637 Typical Application Circuit with Input Connected from Boost Converter (Using Enhancement-mode FET as Active Start-up Device).

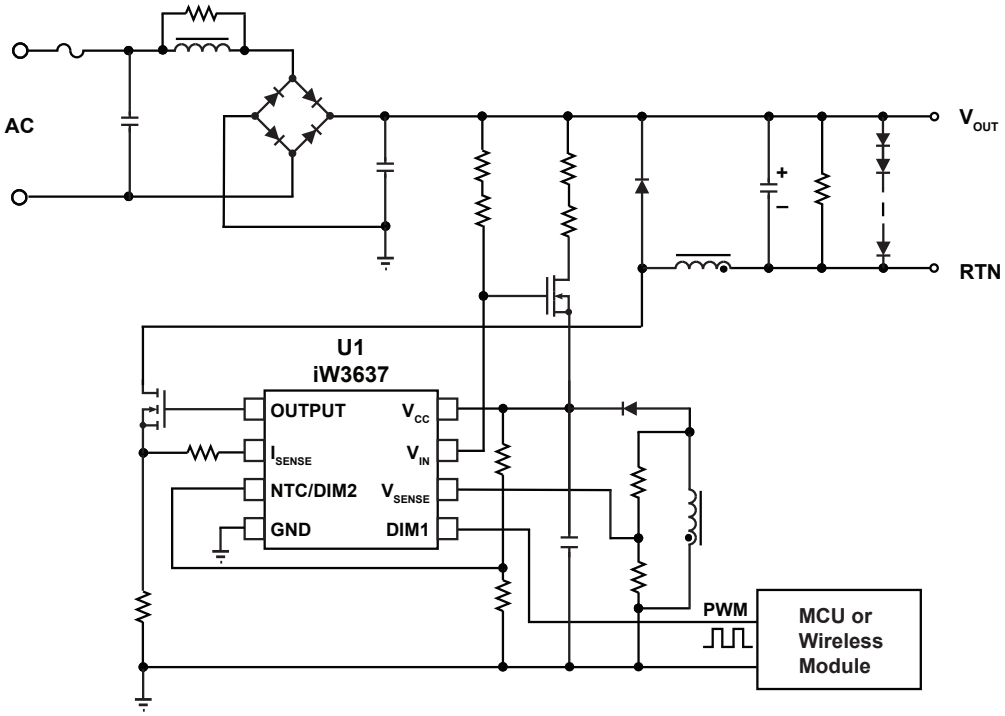


Figure 3.2 : iW3637 Typical Application Circuit with Input Connected to Rectified AC (Using Depletion-mode FET as Active Start-up Device)

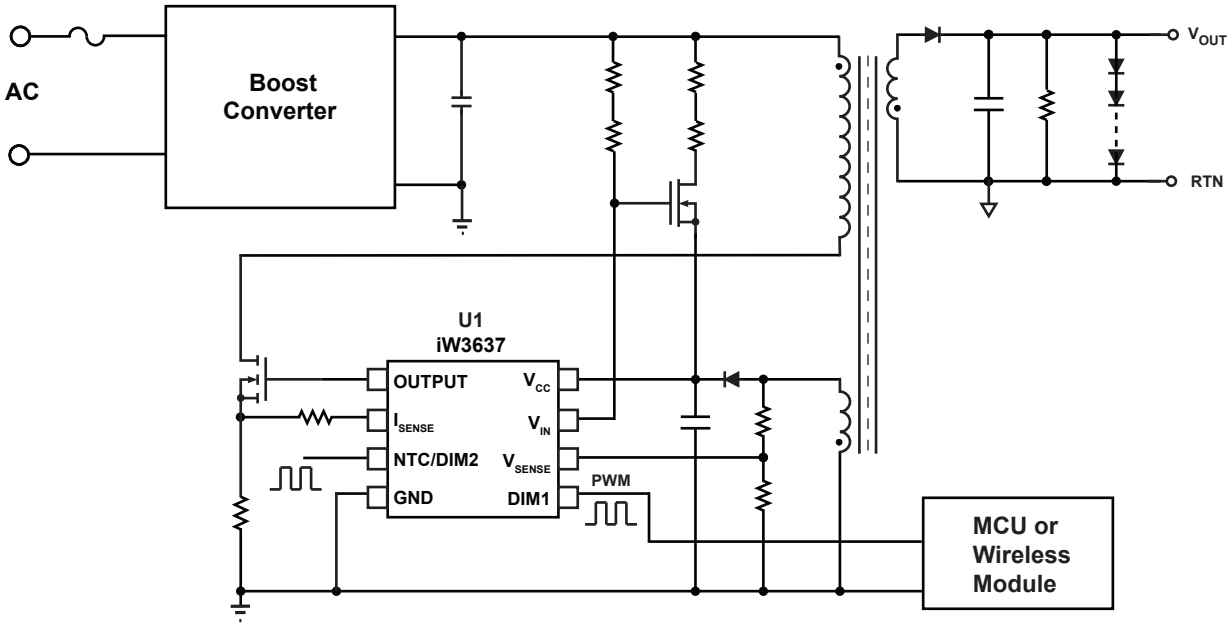


Figure 3.3 : iW3637 Typical Application Circuit with Input Connected from Boost Converter (Configured in the Flyback Topology and Using Depletion-mode FET as Active Start-up Device).

4 Pinout Description

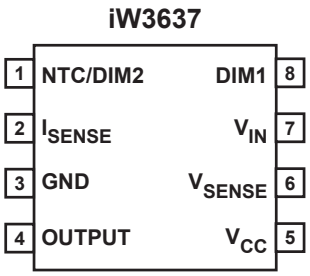


Figure 4.1 : 8-Lead SOIC-8 Package

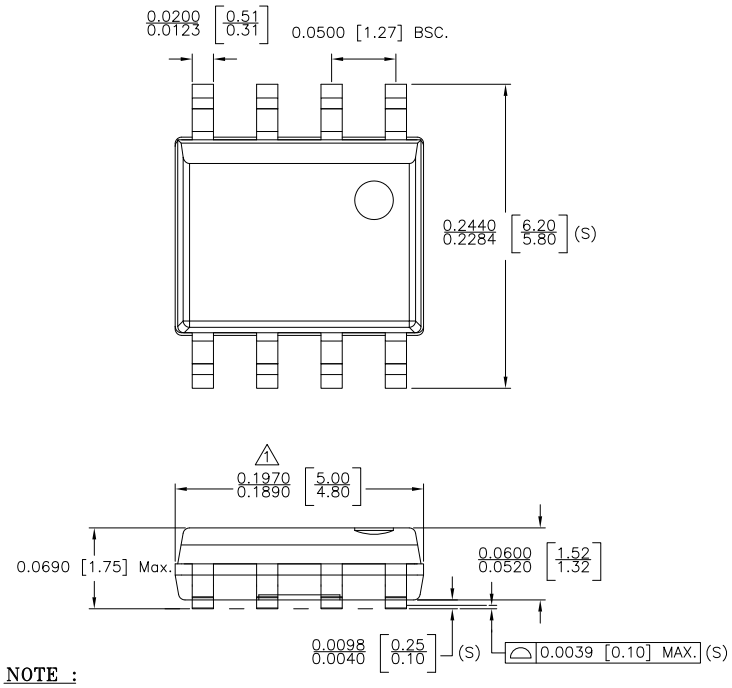
Pin Number	Pin Name	Type	Pin Description
1	NTC/DIM2	Digital Input	By product option (refer to section 11): PWM: provides maximum load current setting via PWM signal. Set this pin voltage above 1V (typical) DC voltage to bypass the function. Analog: provides a 2nd dimming interface via an analog signal (0-1.8V). NTC: used for external temperature sensing via an NTC resistor.
2	I_{SENSE}	Analog Input	Provides 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.

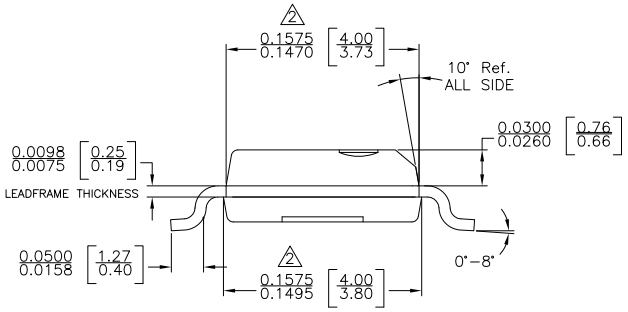
5 Absolute Maximum Ratings

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} = 20mA 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
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 JS-001-2017		±2,000	V
Latch-up test per JESD78E		±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
	Topology	DIM2	Internal OTP content	Light-off Delay Time		
iW3637-01	Buck Topology	Independent PWM Output Current Control	Enabled	100ms	SOIC-8	Tape & Reel[1]
iW3637-01A	Buck Topology	Independent PWM Output Current Control	Enabled	No Delay	SOIC-8	Tape & Reel[1]
iW3637-02	Buck Topology	NTC	Enabled	100ms	SOIC-8	Tape & Reel[1]
iW3637-03	Buck Topology	Analog 0-1.8V	Enabled	100ms	SOIC-8	Tape & Reel[1]
iW3637-05	Flyback Topology	Independent PWM Output Current Control	Enabled	100ms	SOIC-8	Tape & Reel[1]
iW3637-31	Buck Topology	Analog 0-1.8V	Disabled	100ms	SOIC-8	Tape & Reel[1]

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

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