

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 Renesas' **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.

Renesas' 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 ($\pm 3\%$)
- 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

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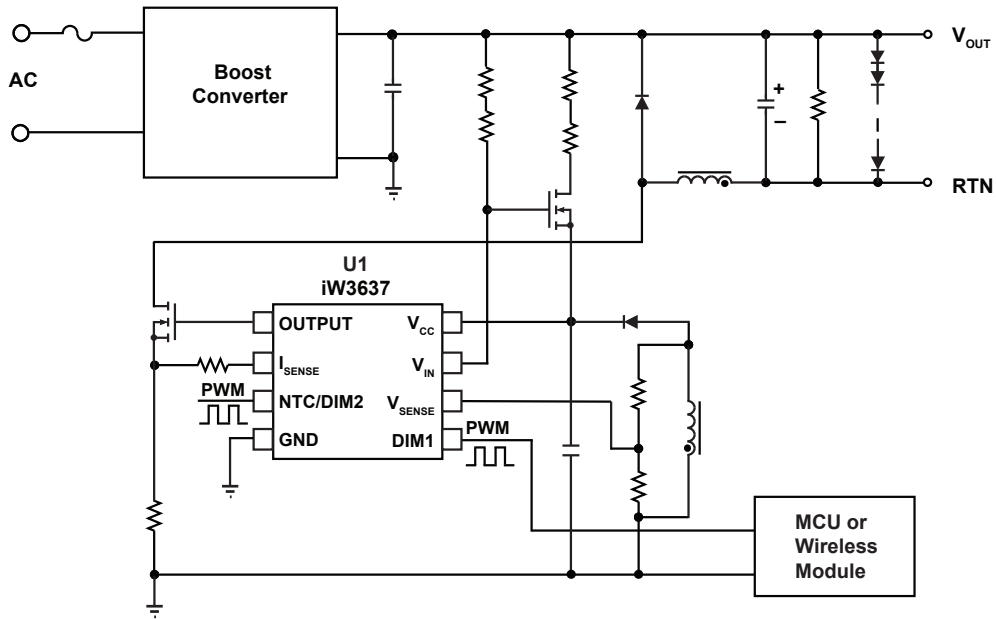


Figure 3.1 : iW3637 Typical Application Circuit with Input Connected from Boost Converter (Using Enhancement-mode FET as Active Start-up Device).

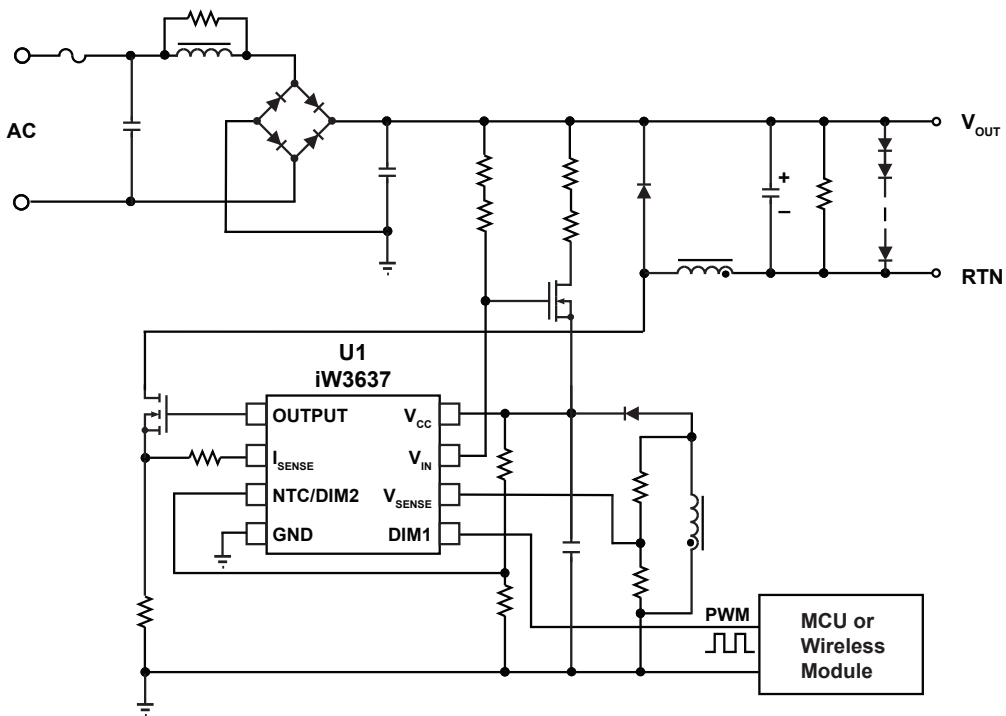


Figure 3.2 : iW3637 Typical Application Circuit with Input Connected to Rectified AC (Using Depletion-mode FET as Active Start-up Device)

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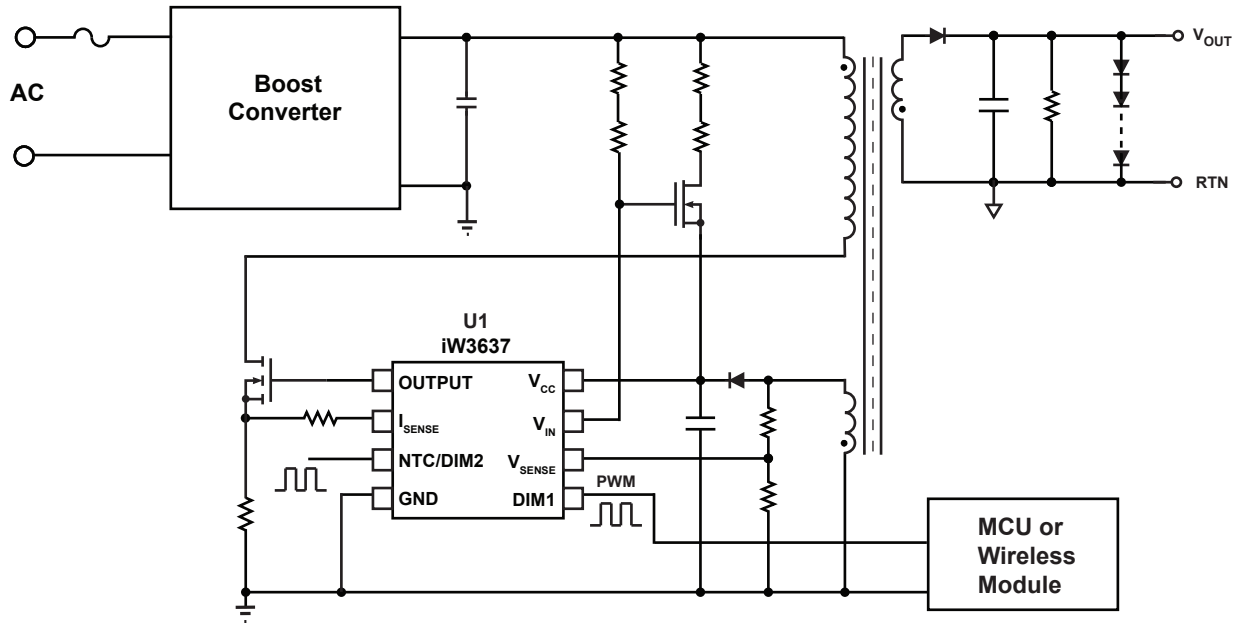


Figure 3.3 : iW3637 Typical Application Circuit with Input Connected from Boost Converter (Configured in the Flyback Topology and Using Depletion-mode FET as Active Start-up Device).

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4 Pinout Description

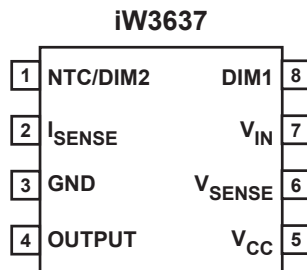


Figure 4.1 : 8-Lead SOIC-8 Package

| 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. |

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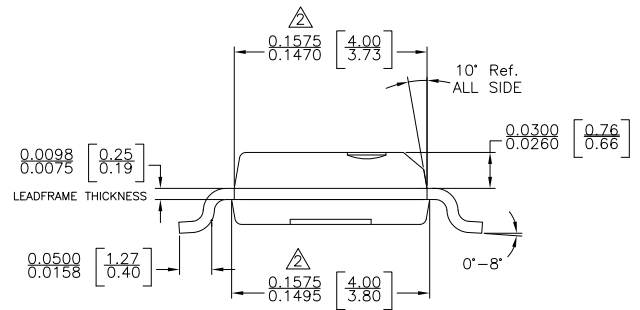
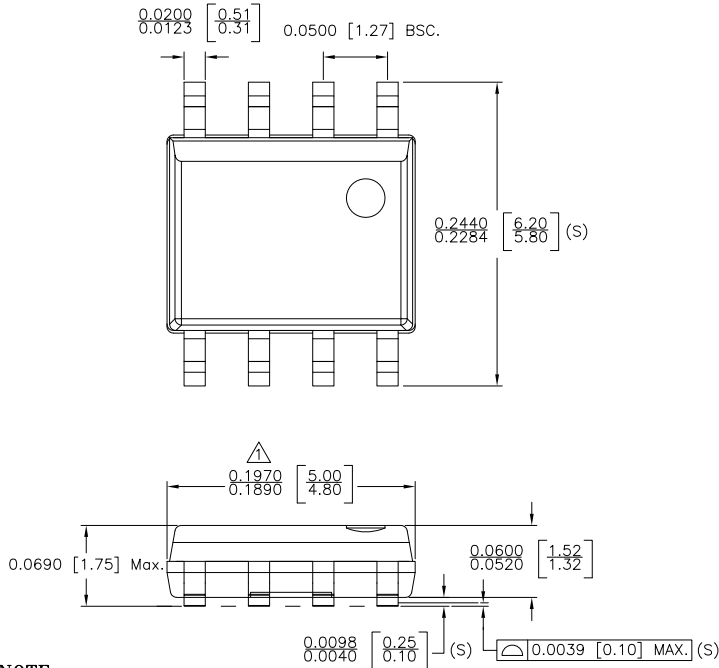
5 Absolute Maximum Ratings

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, $I_{CC} = 20\text{mA max}$) | 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, $I_{VSENSE} \leq 10\text{mA}$) | | -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 |
| Thermal resistance junction-to-case | θ_{JC} | 45 | °C/W |
| ESD rating per JEDEC JS-001-2017 | | $\pm 2,000$ | V |
| Latch-up test per JESD78E | | ± 100 | mA |

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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 |

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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 |
| iW3637-03A | Buck Topology | Analog 0-1.8V | Enabled | No Delay | 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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