

# iW3614 Product Brief

## AC/DC Digital Power Controller for High Power Factor Dimmable LED Drivers

**iWatt**

### 1.0 Features

- Isolated AC/DC offline 100 V<sub>ac</sub> / 230 V<sub>ac</sub> LED driver
- Up to 15 W output power
- Meets harmonic requirements, high power factor (0.94 typical) without dimmer
- Line frequency ranges from 45 Hz to 66 Hz
- Intelligent wall dimmer detection
  - » Leading-edge dimmer
  - » Trailing-edge dimmer
  - » No-dimmer detected
  - » Unsupported dimmer
- Hybrid dimming scheme
- Wide dimming range from 1% up to 100%
- No visible flicker
- Resonant control to achieve high efficiency, 85% without dimmer
- Temperature compensated LED current
- Small size design
  - » small size input bulk capacitor
  - » small size output capacitor
  - » smallest transformer
- Primary-side sensing eliminates the need for opto-isolator feedback and simplifies design
- Tight LED current regulation  $\pm 5\%$
- Fast start-up, typically 10  $\mu$ A start-up current
- Hot-plug LED module support
- Multiple protection features:
  - » LED open circuit protection
  - » Single-fault protection
  - » Over-current protection
  - » LED short circuit protection
  - » Current sense resistor short circuit protection
  - » Over-temperature protection

### 2.0 Description

The iW3614 is a high performance AC/DC offline power supply controller for dimmable LED luminaires, which uses advanced digital control technology to detect the dimmer type and phase. The dimmer conduction phase controls the LED brightness. The LED brightness is modulated by PWM-dimming. iW3614's unique digital control technology eliminates visible flicker.

iW3614 can operate with all dimmer schemes including: leading-edge dimmer, trailing-edge dimmer, as well as other dimmer configurations such as R-type, R-C type or R-L type. When a dimmer is not present, the controller can automatically detect that there is no dimmer.

iW3614 operates in quasi-resonant mode to provide high efficiency. The iW3614 provides a number of key built-in features. The iW3614 uses iWatt's advanced primary-side sensing technology to achieve excellent line and load regulation without secondary feedback circuitry. In addition, iW3614's pulse-by-pulse waveform analysis technology allows accurate LED current regulation. The iW3614 maintains stability over all operating conditions without the need for loop compensation components. Therefore, the iW3614 minimizes external component count, simplifies EMI design and lowers overall bill of materials cost.

### 3.0 Applications

- Dimmable LED luminaires
- Optimized for 5 W to 15 W output power



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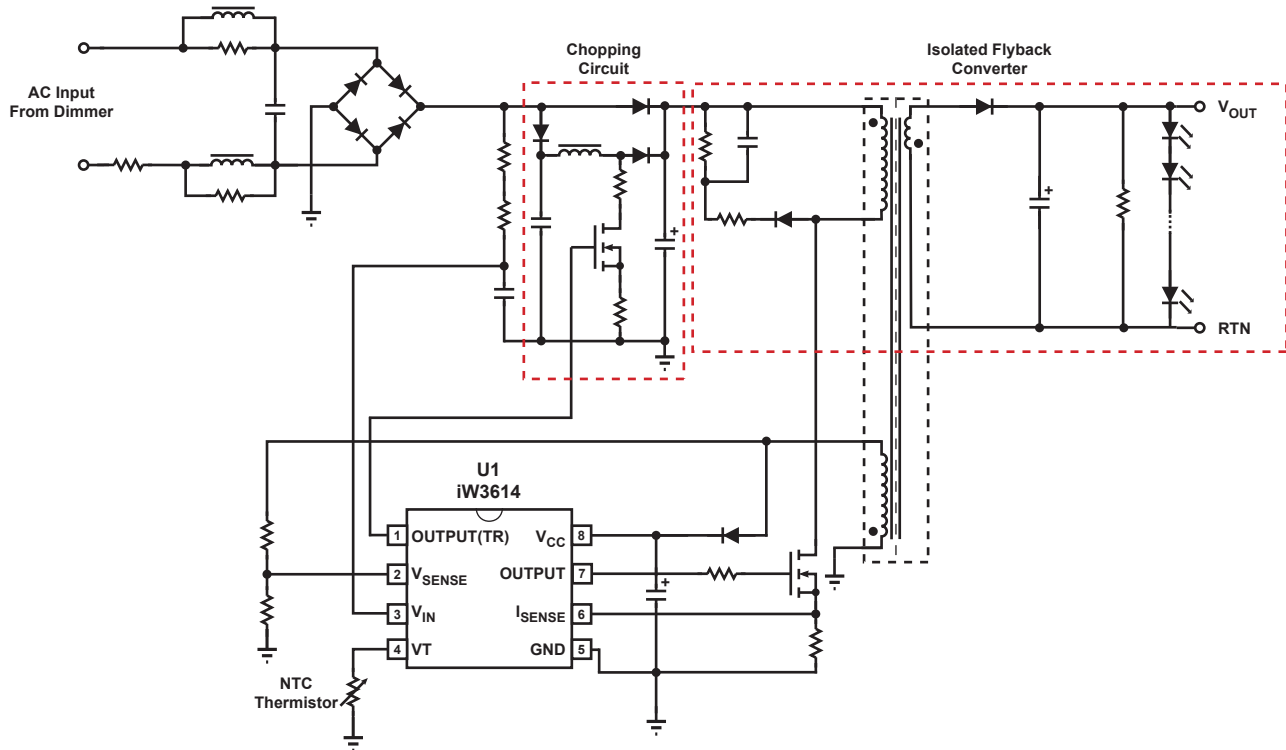
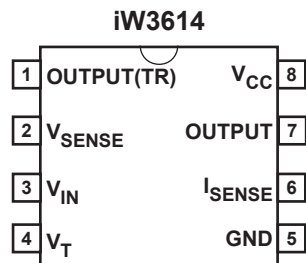


Figure 3.1 : Typical Application Circuit

### 4.0 Pinout Description



Pin #	Name	Type	Pin Description
1	OUTPUT(TR)	Output	Gate drive for chopping MOSFET switch.
2	$V_{SENSE}$	Analog Input	Auxiliary voltage sense (used for primary side regulation).
3	$V_{IN}$	Analog Input	Rectified AC line average voltage sense.
4	$V_T$	Analog Input	External shutdown control.
5	GND	Ground	Ground.
6	$I_{SENSE}$	Analog Input	Primary current sense (used for cycle-by-cycle peak current control and limit).
7	OUTPUT	Output	Gate drive for external main MOSFET switch.
8	$V_{CC}$	Power Input	Power supply for control logic and voltage sense for power-on reset circuitry.

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### 5.0 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to iW3614 Datasheet for more information.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 8, $I_{CC} = 20\text{mA max}$ )	$V_{CC}$	-0.3 to 18	V
DC supply current at $V_{CC}$ pin	$I_{CC}$	20	mA
Output (pin 7)		-0.3 to 18	V
Output(TR) (pin 1)		-0.3 to 18	V
$V_{SENSE}$ input (pin 2, $I_{Vsense} \leq 10\text{ mA}$ )		-0.7 to 4.0	V
$V_{IN}$ input (pin 3)		-0.3 to 18	V
$I_{SENSE}$ input (pin 6)		-0.3 to 4.0	V
$V_T$ input (pin 4)		-0.3 to 4.0	V
Power dissipation at $T_A \leq 25^\circ\text{C}$	$P_D$	526	mW
Maximum junction temperature	$T_{J\text{MAX}}$	125	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-65 to 150	$^\circ\text{C}$
Lead temperature during IR reflow for $\leq 15$ seconds	$T_{LEAD}$	260	$^\circ\text{C}$
Thermal Resistance Junction-to-PCB Board Surface Temperature	$\psi_{JB}$ (Note 1)	70	$^\circ\text{C/W}$
ESD rating per JEDEC JESD22-A114		2,000	V
Latch-Up test per JEDEC 78		$\pm 100$	mA

#### Notes:

Note 1.  $\psi_{JB}$  [Psi Junction to Board] provides an estimation of the die junction temperature relative to the PCB [Board] surface temperature. This data is measured at the ground pin (pin 5) without using any thermal adhesives. See iW3614 Datasheet for more information.

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### 6.0 Physical Dimensions

#### 8-Lead Small Outline (SOIC) Package

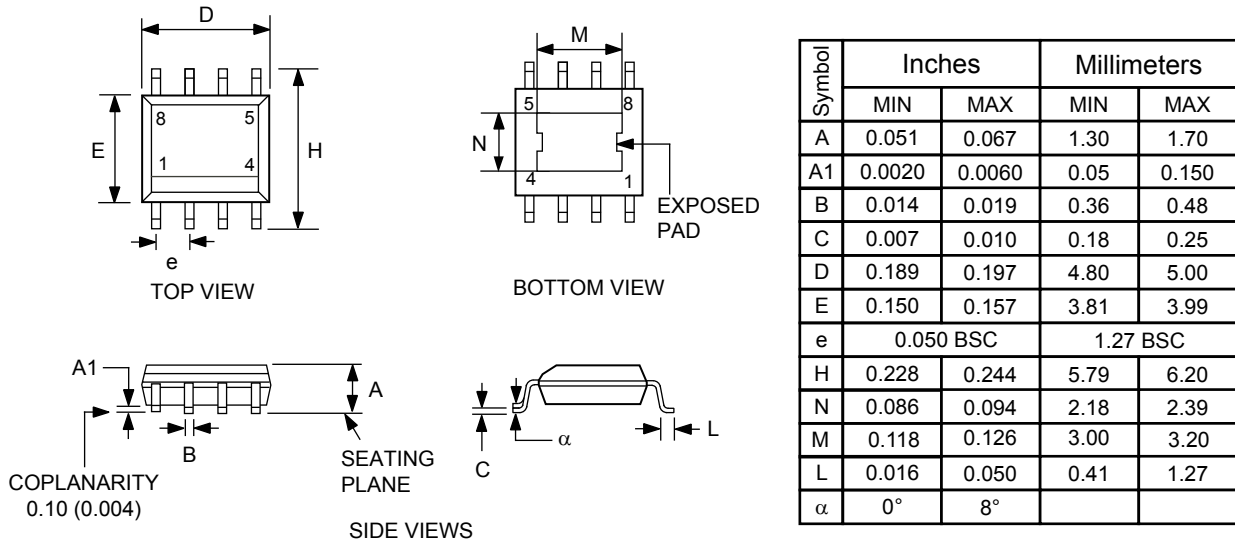


Figure 6.1 : Physical dimensions, 8-lead SOIC package

Compliant to JEDEC Standard MS12F

Controlling dimensions are in inches; millimeter dimensions are for reference only

This product is RoHS compliant and Halide free.

Soldering Temperature Resistance:

[a] Package is IPC/JEDEC Std 020D Moisture Sensitivity Level 1

[b] Package exceeds JEDEC Std No. 22-A111 for Solder Immersion Resistance; package can withstand 10 s immersion < 270°C

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per end. Dimension E does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25 mm per side.

The package top may be smaller than the package bottom. Dimensions D and E are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.

### 7.0 Ordering Information

Part Number	Package	Description
iW3614-00	SOIC-8 (exposed pad)	Tape & Reel <sup>1</sup>

Note 1: Tape & Reel packing quantity is 2,500/reel.

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### About iWatt

iWatt Inc. is a fabless semiconductor company that develops intelligent power management ICs for computer, communication, and consumer markets. The company's patented *pulse Train*<sup>™</sup> technology, the industry's first truly digital approach to power system regulation, is revolutionizing power supply design.

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