

# iW1688

## Low-Power Off-line Digital PWM Controller



### 1.0 Features

- Primary-side feedback eliminates opto-isolators and simplifies design
- Multi-mode operation for highest overall efficiency
- $\pm 4\%$  typical output voltage regulation
- No external compensation components required
- Complies with CEC/EPA no load power consumption and average efficiency regulations
- Built-in output constant-current control with foldback
- Low start-up current (8  $\mu\text{A}$  typical)
- Built-in soft start
- Built-in short circuit protection
- AC line under/overvoltage and output overvoltage protection
- Fixed 40 kHz switching frequency

### 2.0 Description

The iW1688 is a high performance power supply controller which uses digital control technology to build sensorless peak current mode PWM flyback power supplies. The device provides high efficiency along with a number of key built-in protection features while minimizing the external component count and bill of material cost. The iW1688 removes the need for secondary feedback circuitry while achieving excellent line and load regulation. It also eliminates the need for loop compensation components while maintaining stability over all operating conditions. Pulse-by-pulse waveform analysis allows for a loop response that is typically much faster than traditional solutions, resulting in significantly better dynamic load response. The built-in power limit function enables optimized transformer design in universal off-line applications and allows for a wide input voltage range.

The ultra-low start-up power and operating current at light load ensure that the iW1688 is ideal for applications targeting the newest Agency standards for average efficiency and standby power.

### 3.0 Applications

- Low power AC/DC adapter/chargers for cell phones, PDAs, digital still cameras - (up to 20W)
- Standby supplies for televisions, DVDs, set-top boxes and other consumer electronics

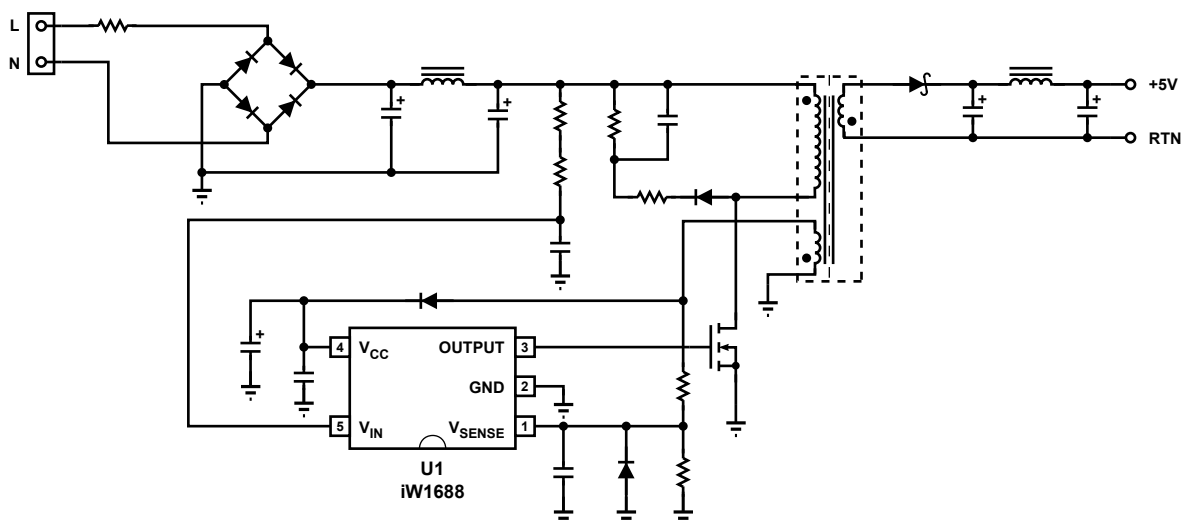


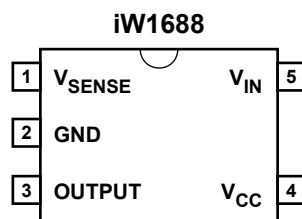
Figure 2.0.1 iW1688 Typical Application Circuit

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### 4.0 Pinout Description



Pin #	Name	Type	Pin Description
1	$V_{SENSE}$	Input	Voltage sense input from the auxiliary winding.
2	GND	Ground	Analog signal and power ground connection.
3	OUTPUT	Output	Gate drive output for the external power MOSFET switch.
4	$V_{CC}$	Input	Supply voltage.
5	$V_{IN}$	Input	Average AC line voltage sense, rectified and attenuated. This pin also serves as the supply for the IC during start-up.

### 5.0 Absolute Maximum Ratings

Absolute maximum ratings are the parameteic values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to Electrical Characteristics in Section 6.0.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 4, $I_{CC} = 20\text{mA max}$ )	$V_{CC}$	-0.3 to 18	V
DC supply current at $V_{CC}$ pin	$I_{CC}$	20	mA
Low voltage output (pin 3)		-0.3 to 18	V
$V_{SENSE}$ input (pin 1)		-0.3 to 4.0	V
$V_{IN}$ input (pin 5)		-0.3 to 18	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-Ambient	$\theta_{JA}$	190	$^\circ\text{C/W}$
ESD rating per JEDEC JESD22-A114 (HBM)		2,000	V
Latch-Up test per JEDEC 78		$\pm 100$	mA

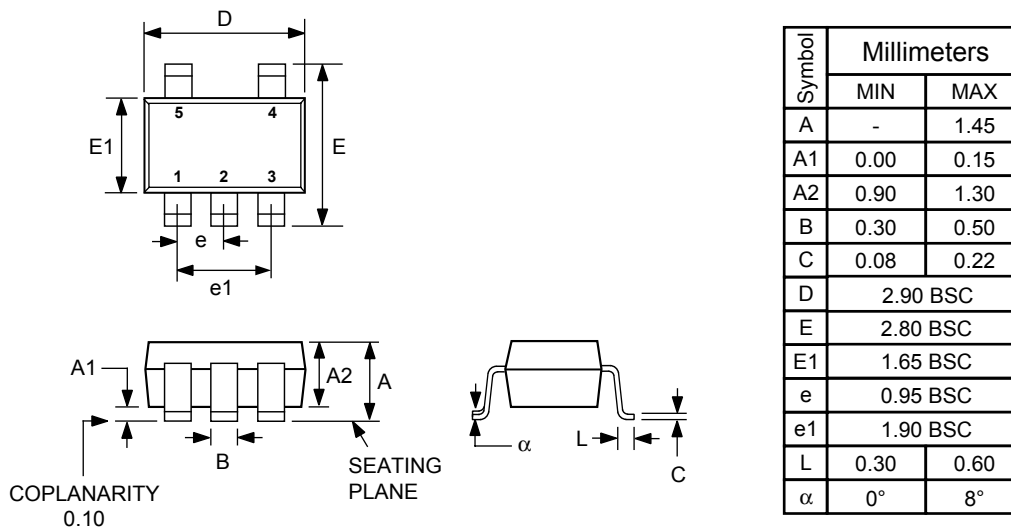
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### 12.0 Physical Dimensions

#### 5-Lead Small Outline Transistor Package



JEDEC Registered Outline: Drawing # MO-178, Variation AA  
Controlling dimensions are in millimeters

Figure 12.0.1. Physical dimensions, 5-lead SOT-23 package

### 13.0 Ordering Information

Part Number	Package	Operating Temp. Range	Description
iW1688-05ST-TR	SOT-23-5	$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$	iW1688 PWM Controller -Tape & Reel <sup>1</sup>

Note 1: Tape & Reel packing quantity is 3,000 units.

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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 *pulseTrain*™ technology, the industry's first truly digital approach to power system regulation, is revolutionizing power supply design.

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