iW1696 Product Brief

Low-Power Off-line Digital Green-Mode PWM Controller

1.0 Features

- Primary-side feedback eliminates opto-isolators and simplifies design
- Adaptive multi-mode PWM/PFM control improves efficiency
- Quasi-resonant operation for highest overall efficiency
- ***EZ-EMI*** ® design to easily meet global EMI standards
- Direct drive of low-cost BJT switch
- Dynamic base current control
- Very tight constant voltage and constant current regulation with primary-side-only feedback.
- No external compensation components required
- Complies with EPA 2.0 energy-efficiency specifications with ample margin
- Able to meet < 30 mW no load power consumption
- Low start-up current (10 µA typical)
- Built-in soft start
- Built-in short circuit protection and output overvoltage protection
- Built-in current sense resistor short protection
- No audible noise over entire operation range

2.0 Description

The iW1696 is a high performance AC/DC power supply controller which uses digital control technology to build peak current mode PWM flyback power supplies. The device directly drives a power BJT and operates in quasi-resonant mode to provide high efficiency along with a number of key built-in protection features while minimizing the external component count, simplifying EMI design and lowering the total bill of material cost. The iW1696 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 overall operating conditions. Pulse-by-pulse waveform analysis allows for a loop response that is much faster than traditional solutions, resulting in improved 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 iW1696 is ideal for applications targeting the newest regulatory standards for average efficiency.

3.0 Applications

- Low power AC/DC adapter/chargers for cell phones, PDAs, digital still cameras
- Linear AC/DC replacement

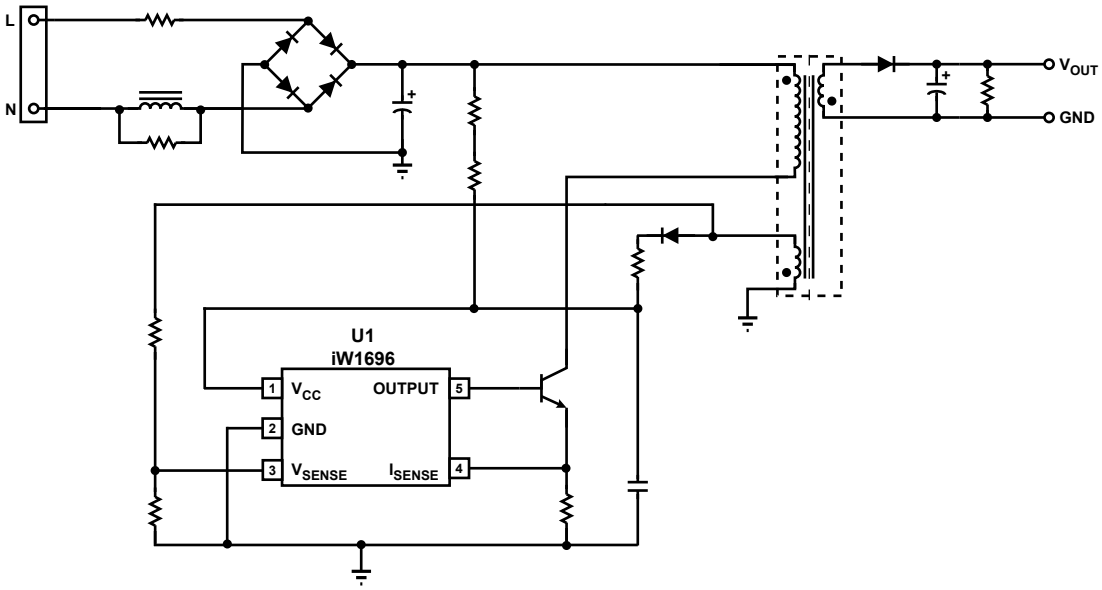
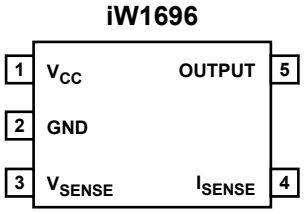


Figure 3.1: iW1696 Typical Application Circuit

4.0 Pinout Description



Pin #	Name	Type	Pin Description
1	V_{CC}	Power Input	Power supply for control logic.
2	GND	Ground	Ground.
3	V_{SENSE}	Analog Input	Auxiliary voltage sense (used for primary regulation).
4	I_{SENSE}	Analog Input	Primary current sense. Used for cycle-by-cycle peak current control and limit.
5	OUTPUT	Output	Base drive for BJT.

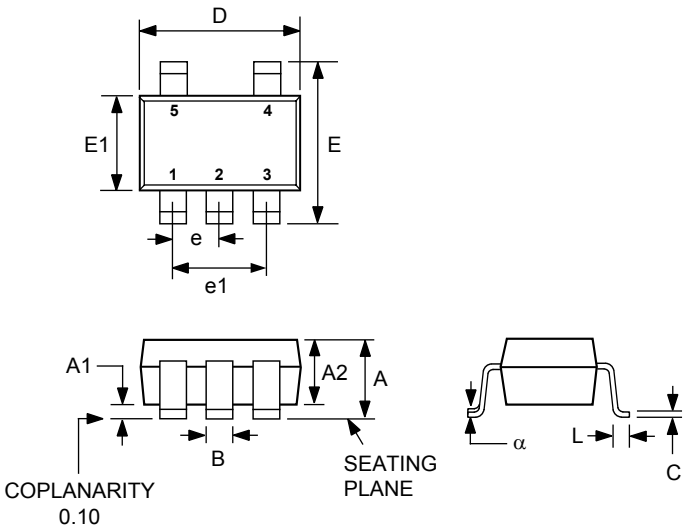
5.0 Absolute Maximum Ratings

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

Parameter	Symbol	Value	Units
DC supply voltage range (pin 1, I_{CC} = 20mA max)	V_{CC}	-0.3 to 18	V
Continuous DC supply current at V_{CC} pin (V_{CC} = 15 V)	I_{CC}	20	mA
Output (pin 5)		-0.3 to 4.0	V
V_{SENSE} input (pin 3, I_{Vsense} ≤ 10 mA)		-0.7 to 4.0	V
I_{SENSE} input (pin 4)		-0.3 to 4.0	V
Maximum junction temperature	$T_{J\ MAX}$	125	°C
Storage temperature	T_{STG}	–65 to 150	°C
Lead temperature during IR reflow for ≤ 15 seconds	T_{LEAD}	260	°C
Thermal Resistance Junction-to-Ambient	θ_{JA}	190	°C/W
ESD rating per JEDEC JESD22-A114		2,000	V
Latch-Up test per JEDEC 78		±100	mA

6.0 Physical Dimensions

5-Lead SOT Package



Symbol	Millimeters	
	MIN	MAX
A	-	1.45
A1	0.0	0.15
A2	0.90	1.30
B	0.30	0.50
C	0.08	0.22
D	2.90 BSC	
E	2.80 BSC	
E1	1.60 BSC	
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60
α	0°	8°

Figure 5.1: Physical dimensions, 5-lead SOT-23 package

Compliant to JEDEC Standard MO178

Controlling dimensions are in millimeters

This package is RoHS compliant, and conform to Halide free limits.

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; packages 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 0.25 mm per end. Dimension E1 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. Dimension D and E1 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	Options	Package	Description
iW1696-00	Cable Comp = 0 mV	SOT-23	Tape & Reel[1]
iW1696-01	Cable Comp = 300 mV	SOT-23	Tape & Reel[1]
iW1696-03	Cable Comp = 450 mV	SOT-23	Tape & Reel[1]
iW1696-04	Cable Comp = 150 mV	SOT-23	Tape & Reel[1]

Note 1: Tape & Reel packing quantity is 3,000 per reel. Minimum ordering quantity is 3,000.

Note 2: This product is RoHS compliant and Halide free.

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.

Trademark Information

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