

iW1691 Product Brief

Digital PWM Current-Mode Controller for Quasi-Resonant Operation

iWatt

1.0 Features

- Primary-side feedback eliminates opto-isolators and simplifies design
- Quasi-resonant operation for highest overall efficiency
- **EZ-EMI**® design to easily meet global EMI standards
- Up to 130 kHz switching frequency enables small adapter size
- Built-in cable drop compensation
- Very tight 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 primary-side feedback
- Low start-up current (10 μ A typical)
- Built-in soft start
- Built-in short circuit protection and output overvoltage protection
- Optional AC line under/overvoltage protection
- PFM operation at light load
- Current sense resistor short protection
- Overtemperature Protection

2.0 Description

The iW1691 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 operates in quasi-resonant mode at heavy load 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 iW1691 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 much faster than traditional solutions, resulting in improved dynamic load response. The built-in current limit function enables optimized transformer design in universal off-line applications over a wide input voltage range.

The ultra-low operating current at light load ensures that the iW1691 is ideal for applications targeting the newest regulatory standards for average efficiency and standby power.

3.0 Applications

- AC/DC adapter/chargers for cell phones, PDAs, digital still cameras
- AC/DC adapters for consumer electronics

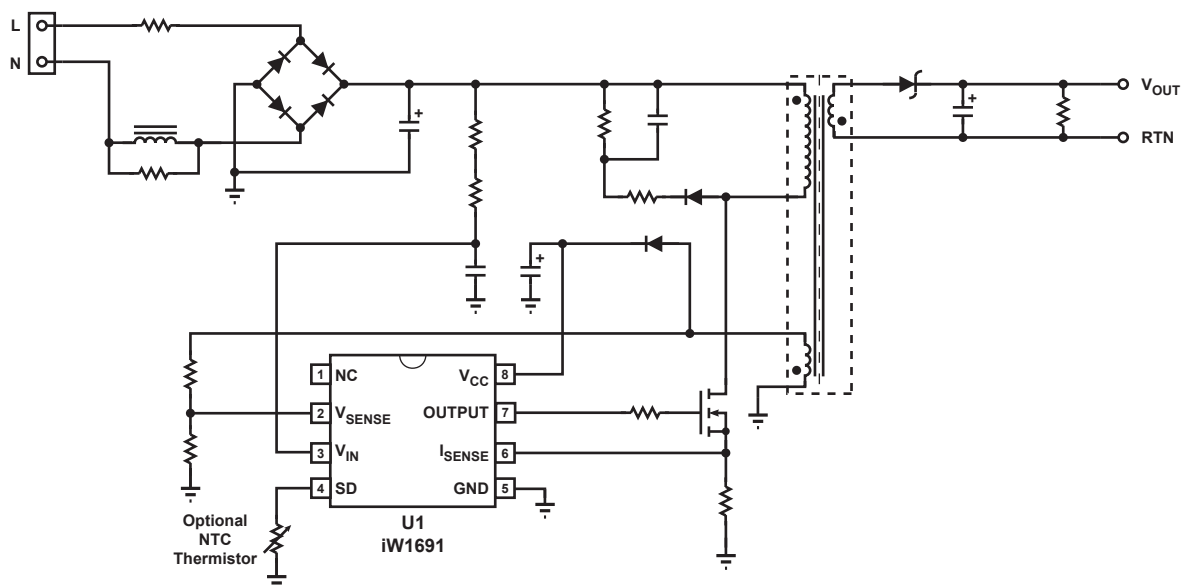


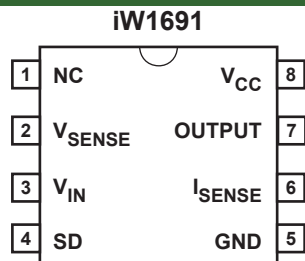
Figure 3.1 : Typical Application Circuit

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4.0 Pinout Description



Pin #	Name	Type	Pin Description
1	NC	-	No connection.
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	SD	Analog Input	External shutdown control. Connect to ground through a resistor if not used.
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 MOSFET switch.
8	V _{CC}	Power Input	Power supply for control logic and voltage sense for power-on reset circuitry.

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 8, I _{CC} = 20mA 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
V _{SENSE} input (pin 2, I _{Vsense} ≤ 10 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
SD input (pin 4)		-0.3 to 18	V
Power dissipation at T _A ≤ 25°C	P _D	526	mW
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}	160	°C/W
ESD rating per JEDEC JESD22-A114		2,000	V
Latch-Up test per JEDEC 78		±100	mA

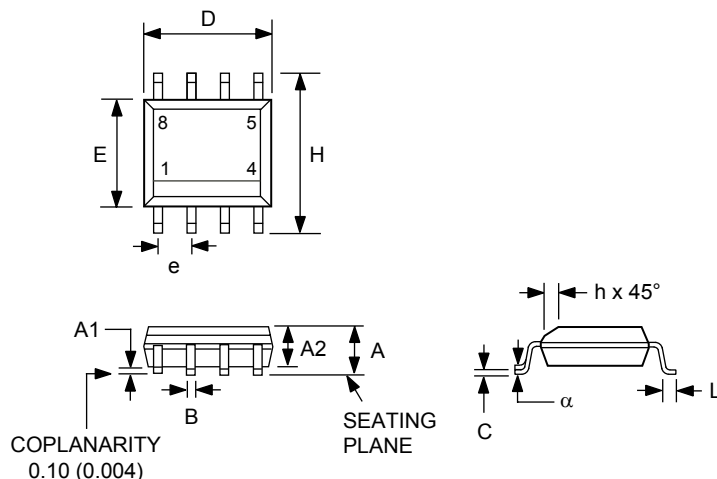
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6.0 Physical Dimensions

8-Lead Small Outline (SOIC) Package



Symbol	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.0040	0.010	0.10	0.25
A2	0.049	0.059	1.25	1.50
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
D	0.189	0.197	4.80	5.00
E	0.150	0.157	3.80	4.00
e	0.050 BSC		1.27 BSC	
H	0.228	0.244	5.80	6.20
h	0.10	0.020	0.25	0.50
L	0.016	0.049	0.4	1.25
α	0°	8°		

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 E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25 mm per side. D and E1 dimensions are determined at datum H.

The package top may be smaller than the package bottom. Dimensions 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.

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7.0 Ordering Information

Part Number	Options	Package	Description
iW1691-00	Cable Comp = 0 mV, $V_{\text{SENSE}(\min)} = 1.38 \text{ V}$, $f_{\text{SW}(\text{MAX})} = 140 \text{ kHz}$	SOIC-8	Tape & Reel ¹
iW1691-01	Cable Comp = 0 mV, $V_{\text{SENSE}(\min)} = 1.515 \text{ V}$, OTP/OVP latch, Output Low Protection latch, $f_{\text{SW}(\text{MAX})} = 140 \text{ kHz}$	SOIC-8	Tape & Reel ¹
iW1691-03	Cable Comp = 0 mV, $V_{\text{SENSE}(\min)} = 1.515 \text{ V}$, OTP/OVP latch, $f_{\text{SW}(\text{MAX})} = 140 \text{ kHz}$	SOIC-8	Tape & Reel ¹
iW1691-04	Cable Comp = 300 mV, CC Delay = 30 μs , $V_{\text{SENSE}(\min)} = 1.48 \text{ V}$, $f_{\text{SW}(\text{MAX})} = 140 \text{ kHz}$	SOIC-8	Tape & Reel ¹

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

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iWatt semiconductors are typically used in power supplies in which high voltages are present during operation. High-voltage safety precautions should be observed in design and operation to minimize the chance of injury.