Off-Line Digital Green-Mode Quasi-Resonant PWM Controller

1 Description

The iW1679 is a high performance AC/DC power supply controller that 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 and key built-in protection features, while minimizing the external component count, simplifying EMI design, and lowering the total bill of material cost. The iW1679 removes the need for a secondary feedback circuit while achieving excellent line and load regulation. It also eliminates the need for loop compensation components while maintaining stability over all operating conditions. The pulse-by-pulse waveform analysis allows for fast dynamic load response for both one-time and repetitive load transients. The built-in power limit function enables optimized transformer design for a wide input voltage range.

Dialog's innovative proprietary technology ensures that power supplies built with the iW1679 can achieve both the highest average efficiency and less than 30mW no-load power consumption, and have fast dynamic load response in typical 5V/2A applications. The active start-up scheme enables the shortest possible start-up time without sacrificing no-load power loss.

2 Features

- No-load power consumption < 20mW at $230V_{AC}$ with typical application circuit (5-star rating)
- Optimized for 5V/2A AC/DC adapters/chargers with < 30mW no-load power consumption at $230V_{AC}$ and fast dynamic load response for both one-time and repetitive load transients
- Direct drive of low-cost BJT power switch
- Very tight constant voltage and constant current regulation over entire operating range
- ***PrimAccurate***™ primary-side feedback eliminates opto-isolators and simplifies design
- **EZ-EMI®** design enhances manufacturability
- Intrinsically low common mode noise
- Optimized 72kHz maximum PWM switching frequency achieves best size and efficiency
- Adaptive multi-mode PWM/PFM control improves efficiency
- Quasi-resonant operation for highest overall efficiency
- Dynamic base current control
- No external loop compensation components required
- Complies with EPA 2.0/CoC Ver5/DoE energy-efficiency specifications with ample margin
- Built-in protections for output short-circuit, output low impedance, and output overvoltage
- Built-in over-temperature protection (OTP)
- No audible noise over entire operating range

3 Applications

- Compact AC/DC adapters/chargers for media tablets and smart phones
- AC/DC adapters for consumer electronics

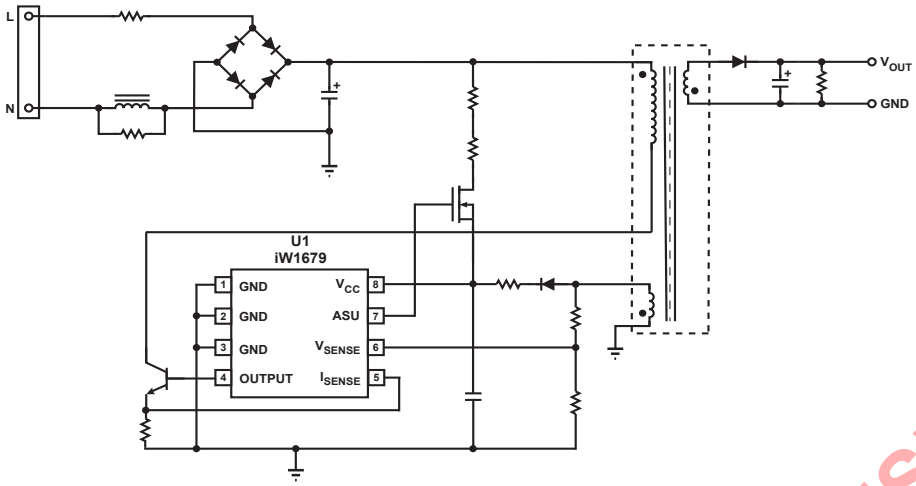


Figure 3.1 : iW1679 Typical Application Circuit
(Achieving < 30mW No-load Power Consumption. Using Depletion Mode NFET as Active Start-up Device)

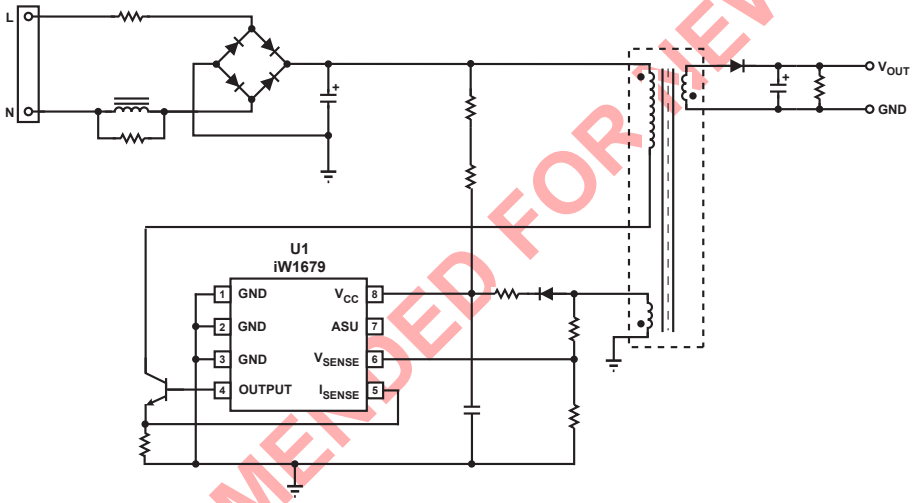


Figure 3.2: iW1679 Typical Application Circuit
(Achieving < 50mW No-load Power Consumption. Alternative Circuit without Using Active Start-up Device)

4 Pinout Description

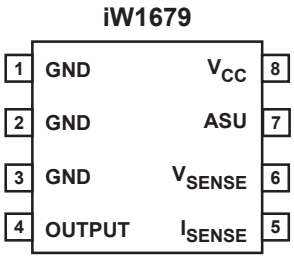


Figure 4.1 : 8-Lead SOIC Package

Pin #	Name	Type	Pin Description
1	GND	Ground	Ground.
2	GND	Ground	Ground.
3	GND	Ground	Ground.
4	OUTPUT	Output	Base drive for BJT.
5	I_{SENSE}	Analog Input	Primary current sense. It is used for cycle-by-cycle peak current control and limit.
6	V_{SENSE}	Analog Input	Auxiliary voltage sense. It is used for primary regulation.
7	ASU	Output	Control signal for active start-up device (BJT or Depletion NFET).
8	V_{CC}	Power Input	IC power supply.

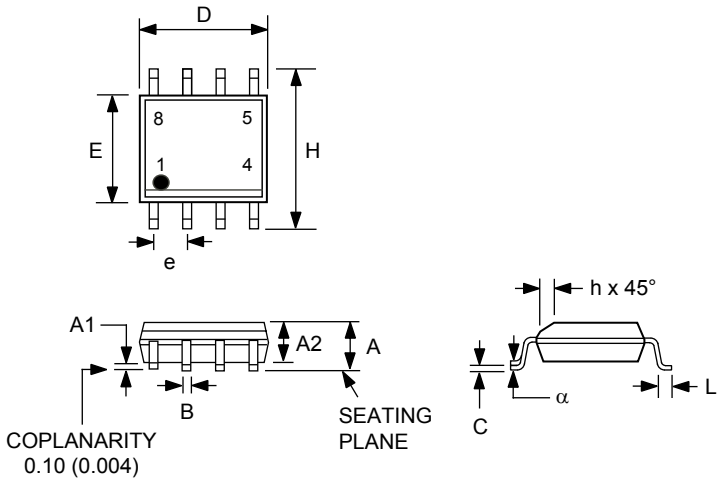
5 Absolute Maximum Ratings

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.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 8, I_{CC} = 20mA max)	V_{CC}	-0.3 to 25.0	V
Continuous DC supply current at V_{CC} pin (V_{CC} = 15V)	I_{CC}	25	mA
ASU output (pin 7)		-0.3 to 19.0	V
Output (pin 4)		-0.3 to 4.0	V
V_{SENSE} input (pin 6, I_{Vsense} ≤ 10mA)		-0.7 to 4.0	V
I_{SENSE} input (pin 5)		-0.3 to 4.0	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}	135	°C/W
ESD rating per JEDEC JESD22-A114		±2,000	V
Latch-up test per JESD78D		±100	mA

6 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°		

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 < 260˚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.

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.

7 Ordering Information

Part Number	Options	Package	Description
iW1679-35	Cable Comp = 150mV, CC shutdown voltage = 3V	SOIC-8	Tape & Reel[1]

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

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