

Ultra-Low No-Load Power Digital Quasi-Resonant PWM Controller

1.0 Features

- Highest efficiency and ultra-low no-load power consumption with secondary-side synchronous rectification ($> 88\%$ full-load efficiency at $230V_{AC}$ in typical $5V2.4A$ power supplies with $< 15mW$ no-load power consumption)
- Fast dynamic load response (DLR) with secondary-side load transient detection
- Tight constant-voltage and constant-current regulation across line and load range with primary-side feedback and control
- Intelligent low power management achieves ultra-low operating current ($\sim 250\mu A$) at no-load
- Proprietary optimized $89kHz$ maximum constant frequency PWM switching with quasi-resonant operation achieves best size, efficiency, and common mode noise
- User-configurable 5-level cable drop compensation
- EZ-EMI® design enhances manufacturability
- Adaptive multi-mode PWM/PFM control improves efficiency
- Built-in single-point fault protection against output short-circuit, output over-voltage, and output over-current
- User-configurable external shutdown control
- On-chip internal over-temperature protection
- No audible noise over entire operating range

2.0 Description

The iW1766C1 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 to provide high efficiency along with a number of key built-in protection features, while minimizing the external component count, simplifying the EMI design, and lowering the total bill of material cost. The iW1766C1 can achieve tight constant voltage and tight constant current regulation without traditional secondary-feedback circuit. It also eliminates the need for loop compensation components while maintaining stability over all operating conditions.

The iW1766C1 is optimized to work with Dialog's iW671 digital synchronous rectifier to reduce power supply output ripple and achieve the highest average active efficiency and less than $15mW$ no-load power consumption in a typical $5V2.4A$ power supply. The iW671 integrates an adaptive voltage position monitor to detect the flyback converter output voltage undershoot, enabling ultra-fast dynamic load response (DLR) for faster recovery from standby. The $10mW$ no-load consumption can be achieved if it is a paired iW628.

3.0 Applications

- High power density AC/DC adapter/chargers for media tablets and smart phones
- AC/DC adapters for consumer electronics
- Optimized for universal input AC/DC adapters ($10 - 15W$)

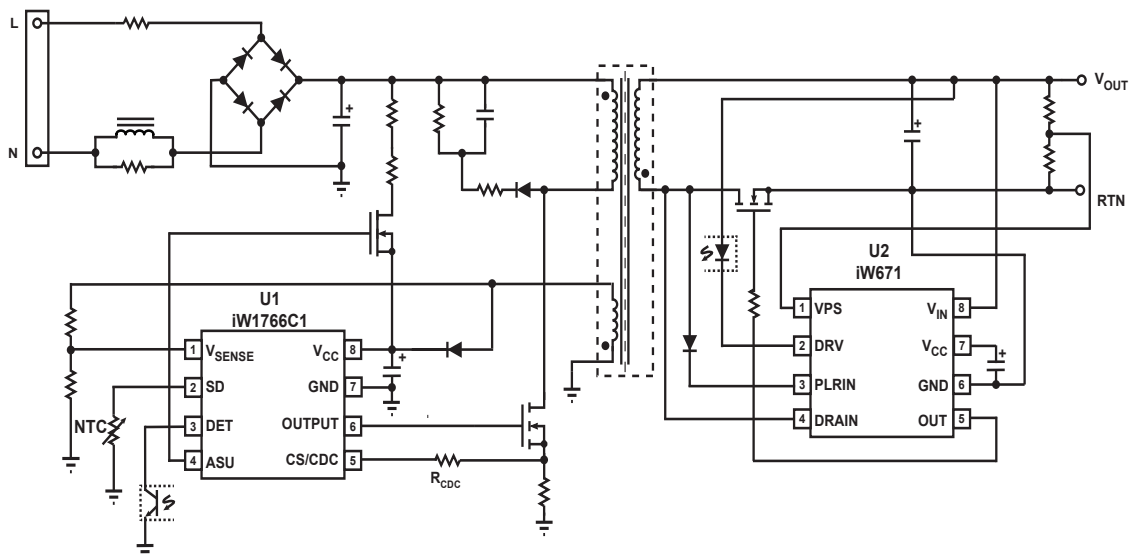


Figure 3.1: iW1766C1 Typical Application Circuit (Using iW671 as Secondary-Side Synchronous Rectification and Load Transient Detection Device) (Achieving $< 15mW$ No-Load Power Consumption in Ultra-Compact $5V2.4A$ Adapter Designs with Fast Dynamic Load Response)

iW1766C1 Product Summary

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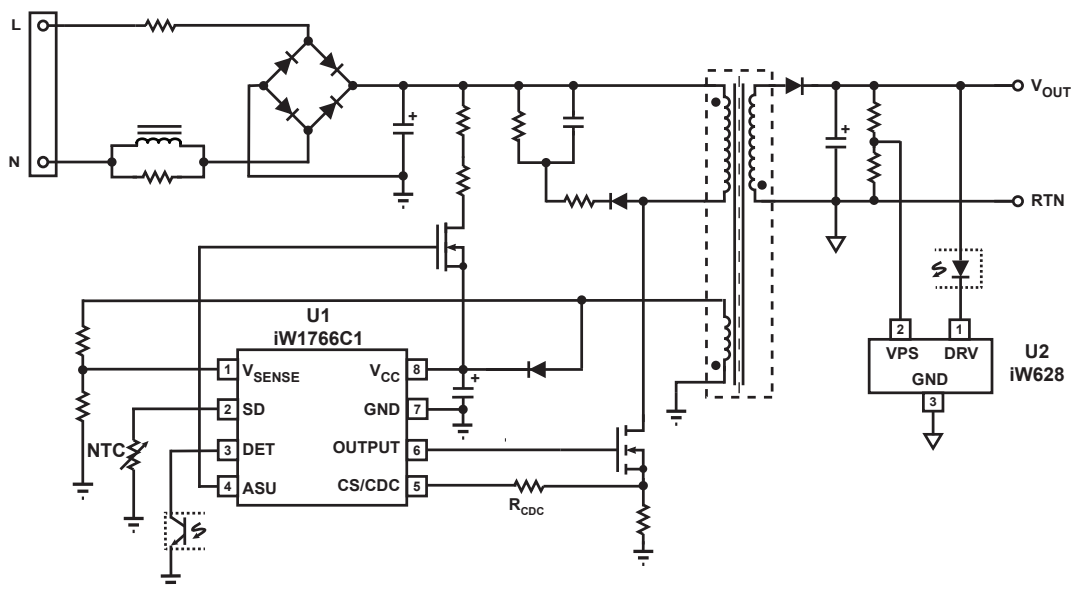


Figure 3.2: iW1766C1 Typical Application Circuit (Using iW628 as Secondary-Side Load Transient Detection Device) (Achieving < 10mW No-Load Power Consumption in Typical 5V2A Adapter Designs with Fast Dynamic Load Response)

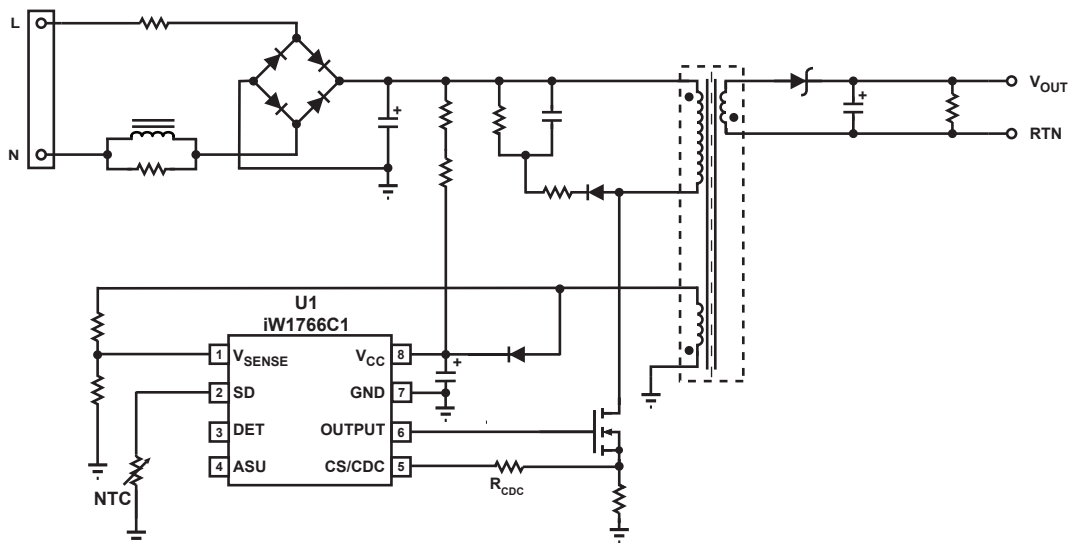


Figure 3.3: iW1766C1 Typical Application Circuit

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4.0 Pinout Description

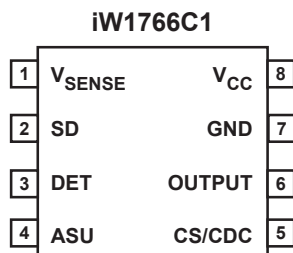


Figure 4.1: 8 Lead SOIC-8 Package

Pin #	Name	Type	Pin Description
1	V _{SENSE}	Analog Input	Auxiliary voltage sense. Used for primary-side regulation.
2	SD	Analog Input	External shutdown control. Can be configured for external over-temperature protection (OTP) by connecting an NTC resistor from this pin to Ground.
3	DET	Analog Input	Detection signal. Used for secondary-side under-voltage detection.
4	ASU	Output	Control signal. Used for active start-up device (BJT or depletion mode N-FET).
5	CS/CDC	Analog Input	Primary-side current sense and external cable drop compensation (CDC). Used for cycle-by-cycle peak-current control and limit in primary-side CV/CC regulation. Also used for CDC configuration.
6	OUTPUT	Output	Gate drive for external MOSFET switch.
7	GND	Ground	Ground.
8	V _{CC}	Power Input	IC power supply.

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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.

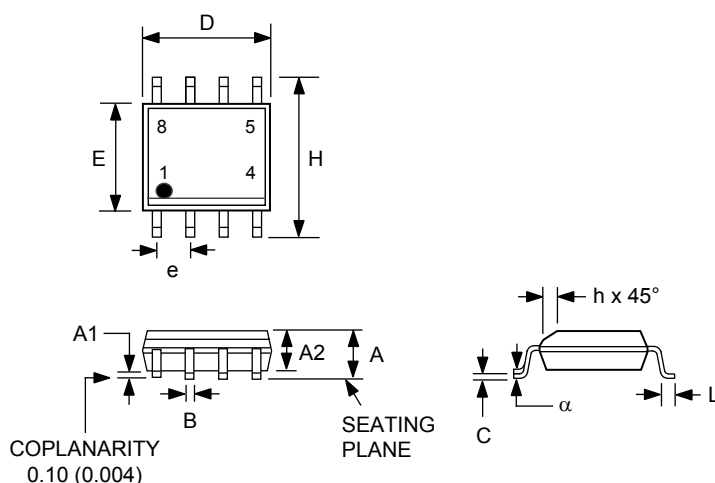
Parameter	Symbol	Value	Units
DC supply voltage range (pin 8, $I_{CC} = 20\text{mA}$ max)	V_{CC}	-0.3 to 25.0	V
Continuous DC supply current at V_{CC} pin ($V_{CC} = 15\text{V}$)	I_{CC}	20	mA
ASU output (pin 4)		-0.3 to 19.0	V
OUTPUT (pin 6)		-0.3 to 20.0	V
V_{SENSE} input (pin 1, $I_{Vsense} \leq 10\text{mA}$)		-0.7 to 4.0	V
CS/CDC input (pin 5)		-0.3 to 4.0	V
SD (pin 2)		-0.3 to 4.0	V
DET (pin 3)		-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}	160	°C/W
ESD rating per JEDEC JESD22-A114		$\pm 2,000$	V
Latch-up test per JESD78A		± 100	mA

iW1766C1 Product Summary

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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°		

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.

7.0 Ordering Information

Part Number	Options	Package	Description
iW1766C1-00	No OVP/OTP latch, $V_{IPK(LOW)} = 0.23V$, 2.5V CC shutdown voltage	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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