

iW1766 Product Brief

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



1.0 Features

- Ultra-low no-load power consumption with lowest system cost ($< 10\text{mW}$ at 230V_{AC} in typical $5\text{V}/2\text{A}$ 10W power supplies)
- Fast dynamic response 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 ($\sim 250\mu\text{A}$) 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 provides design flexibility
- **EZ-EMI**® design enhances manufacturability
- Adaptive multi-mode PWM/PFM control improves efficiency
- No external loop compensation components required
- Built-in single-point fault protections against output short-circuit, output over-voltage, and output over-current
- Dedicated pin for user-configurable external shutdown control
- On-chip internal over-temperature protection
- No audible noise over entire operating range

2.0 Description

The iW1766 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 iW1766 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.



With the combination of primary-side control and simple adaptive secondary-side load transient detection, the iW1766 ensures power supplies built with this device can achieve both the highest average active efficiency and less than 10mW no-load power consumption, while maintaining fast dynamic load response with secondary-side detection circuit, such as the iW628.

3.0 Applications

- Compact AC/DC adapter/chargers for media tablets and smart phones
- AC/DC adapters for consumer electronics
- Optimized for universal input AC/DC adapters ($10 - 12\text{W}$)

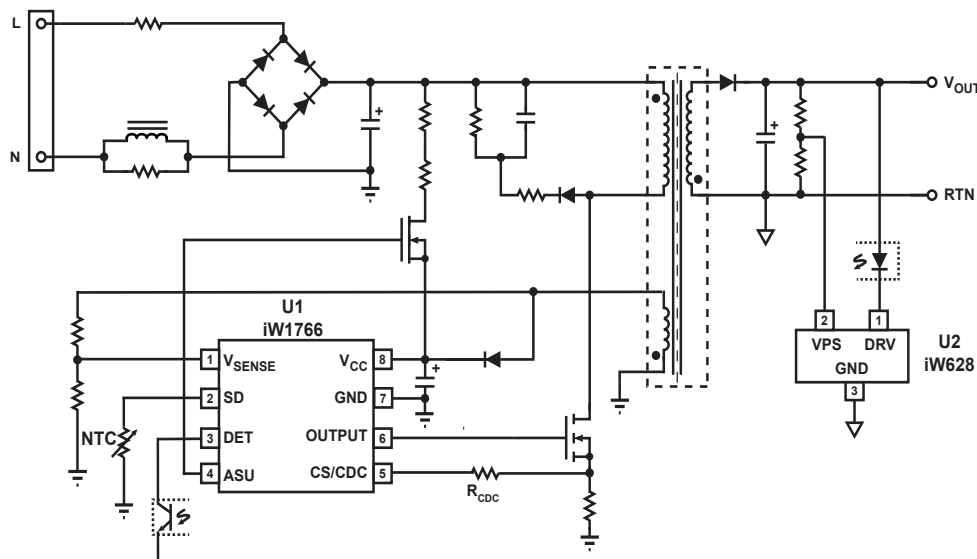


Figure 3.1: iW1766 Typical Application Circuit (Using iW628 as Secondary-Side Detection Device)
(Achieving $< 10\text{mW}$ No-Load Power Consumption in $5\text{V}/2\text{A}$ 10W Adapter Designs with Fast Dynamic Load Response)

iW1766 Product Brief

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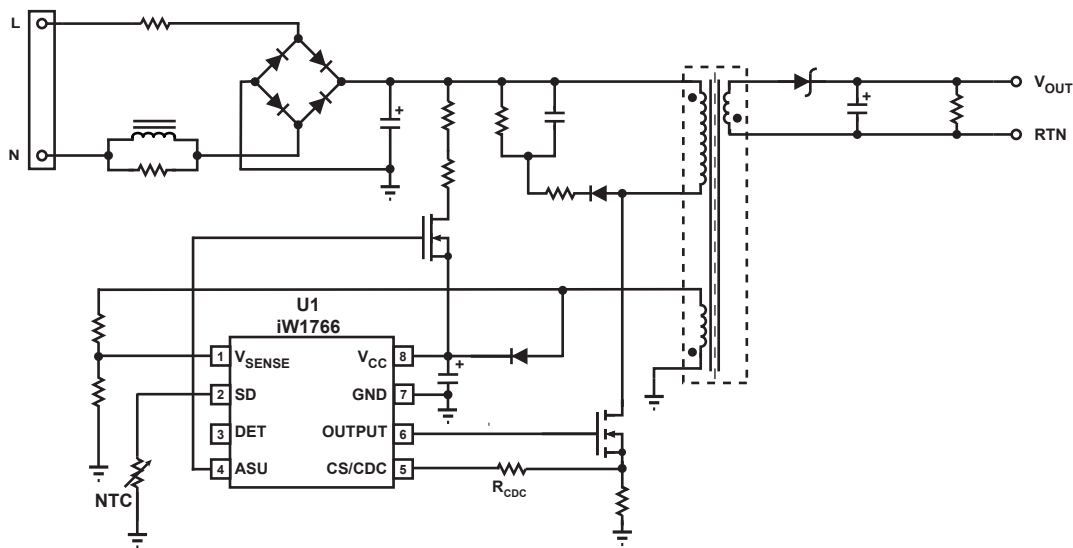


Figure 3.2: iW1766 Typical Application Circuit (Using Depletion Mode N-FET as Active Start-up Device)

4.0 Pinout Description

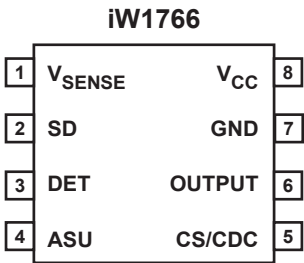


Figure 4.1: 8 Lead SO-8 Package

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.

iW1766 Product Brief

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



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, $I_{V_{sense}} \leq 10\text{mA}$)		-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		2,000	V
Latch-up test per JEDEC 78		± 100	mA

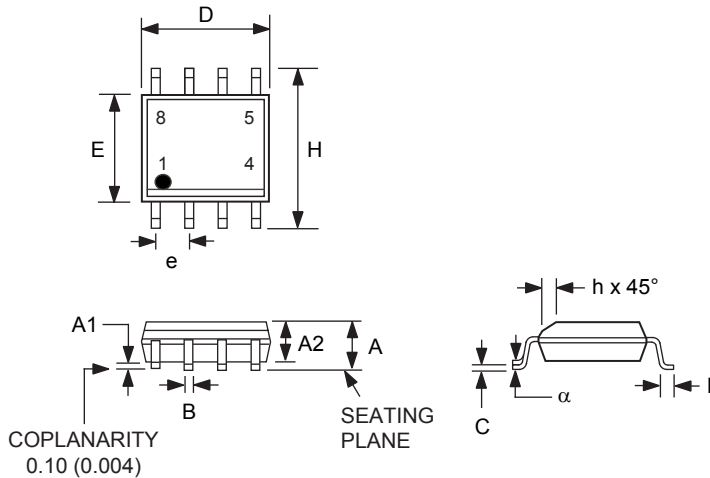
iW1766 Product Brief

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



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 < 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.

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
iW1766-00	No OVP/OTP latch, $V_{IPK(LOW)} = 0.23V$	SOIC-8	Tape & Reel ¹
iW1766-01	OVP/OTP/latch, $V_{IPK(LOW)} = 0.23V$	SOIC-8	Tape & Reel ¹
iW1766-02	No OVP/OTP latch, $V_{IPK(LOW)} = 0.28V$	SOIC-8	Tape & Reel ¹
iW1766-03	OVP/OTP/latch, $V_{IPK(LOW)} = 0.28V$	SOIC-8	Tape & Reel ¹

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

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