

Offline Digital Quasi-Resonant PWM Controller Optimized for 9V+ Applications with Option for Input OVP

1 Description

The iW1702 is a high performance, digital AC/DC power supply controller for high-power, peak current mode flyback converters. The device integrates a programmable light load mode of operation allowing the power supply designer to optimize for no-load power consumption and dynamic load response. It operates in quasi-resonant mode to provide high efficiency at heavy loads and minimizes the external component count while simplifying EMI design and lowering the total bill of material cost.

Dialog's **PrimAccurate™** primary-side sensing technology allows the iW1702 to eliminate the need for secondary-side feedback while achieving excellent line and load regulation. This proprietary digital control technology also eliminates the need for loop compensation components while maintaining stability over all operations. 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.

Dialog's innovative proprietary technology ensures that power supplies built with the iW1702 can achieve both the highest average active efficiency and less than 75mW no-load power consumption. Active start-up circuitry enables fast, yet smooth start-up into large capacitive loads at output voltages of 9V, 12V or higher, making it ideal for networking and monitor adaptor applications.

The iW1702 offers a full range of fault protection circuits including internal and external over-voltage protection (OVP). The external OVP feature can monitor either the input voltage or output voltage. The -0x/0xB and -3x/3xB options offer a supplemental output OVP, while the -1x/1xB options can monitor the input voltage, even during start-up, to protect from an over-voltage event on the input.

2 Features

- iW1702-0x/0xB and iW1702-3x/3xB options: external supplemental output over-voltage protection, optimized for 9V+ output voltages
- iW1702-1x/1xB options: external input over-voltage protection, supports 5V+ output voltages
- Adaptively controlled soft-start enables fast and smooth start-up into large capacitive loads (from 330µF to 6,000µF) at 9V+ output voltages
- Internal single-point fault protections against output short-circuit, output over-voltage and output over-current
- User-configurable light-load operation mode for optimized dynamic load response and no-load power consumption
- < 75mW no-load power consumption at 230V_{AC} with fast dynamic load response in typical 12V, 2A 24W compact adapter/charger
- **PrimAccurate™** Primary-side feedback eliminates optocouplers and simplifies design
- Proprietary optimized 79kHz maximum PWM switching frequency with quasi-resonant operation achieves best size, efficiency and common mode noise
- **EZ-EMI™** design enhances manufacturability
- Adaptive multi-mode PWM/PFM control improves efficiency
- User-configurable 5-level cable drop compensation provides design flexibility in iW1702-0x/0xB and iW1702-3x/3xB options
- Tight constant-voltage and constant current regulation across line and load range
- **SmartDefender™** smart hiccup technology helps to address issues of soft shorts in cables and connectors by effectively reducing the average output power at fault conditions without latch
- Optional on-chip internal over-temperature protection
- No audible noise over entire operating range
- Space-saving SOT-23 package

3 Applications

- Power adapters for network devices and monitors
- Universal AC/DC adapters (5 – 45W)

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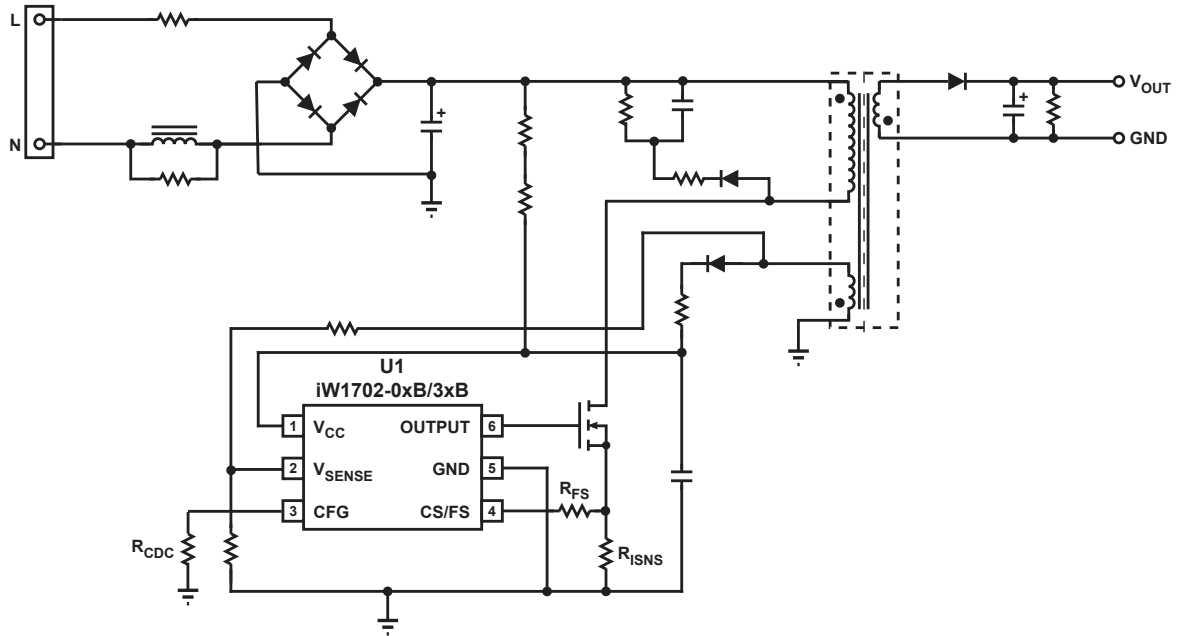


Figure 3.1 : iW1702 Typical Application Circuit (Achieving < 75mW No-Load Power Consumption in 12V, 2A 24W Adapter Design).

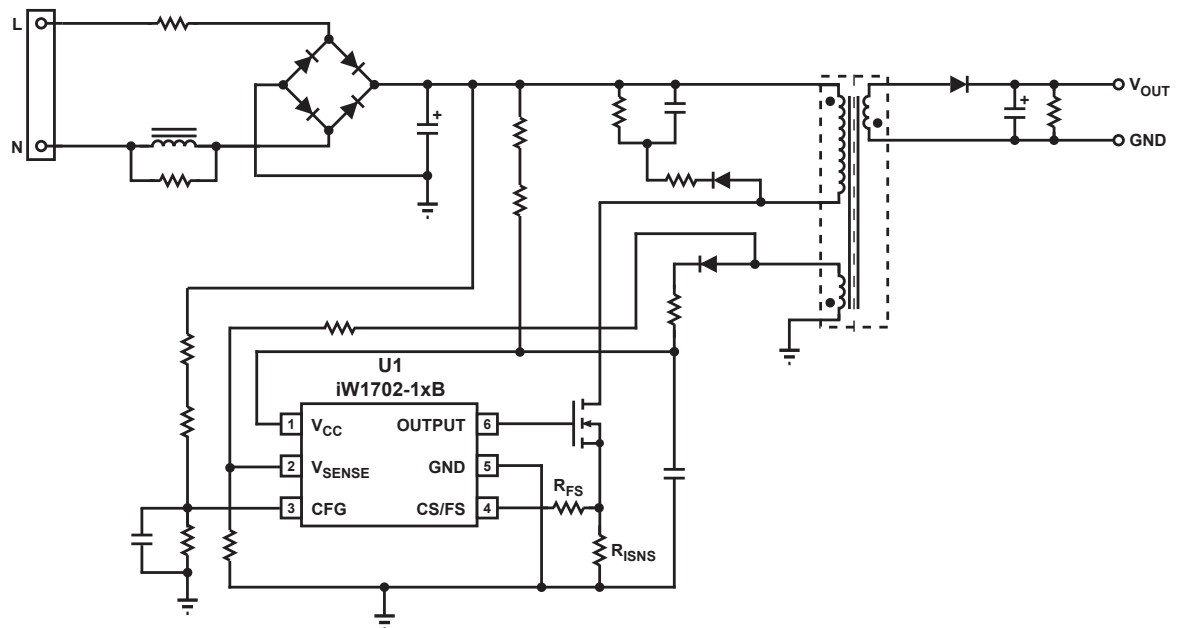


Figure 3.2 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection.

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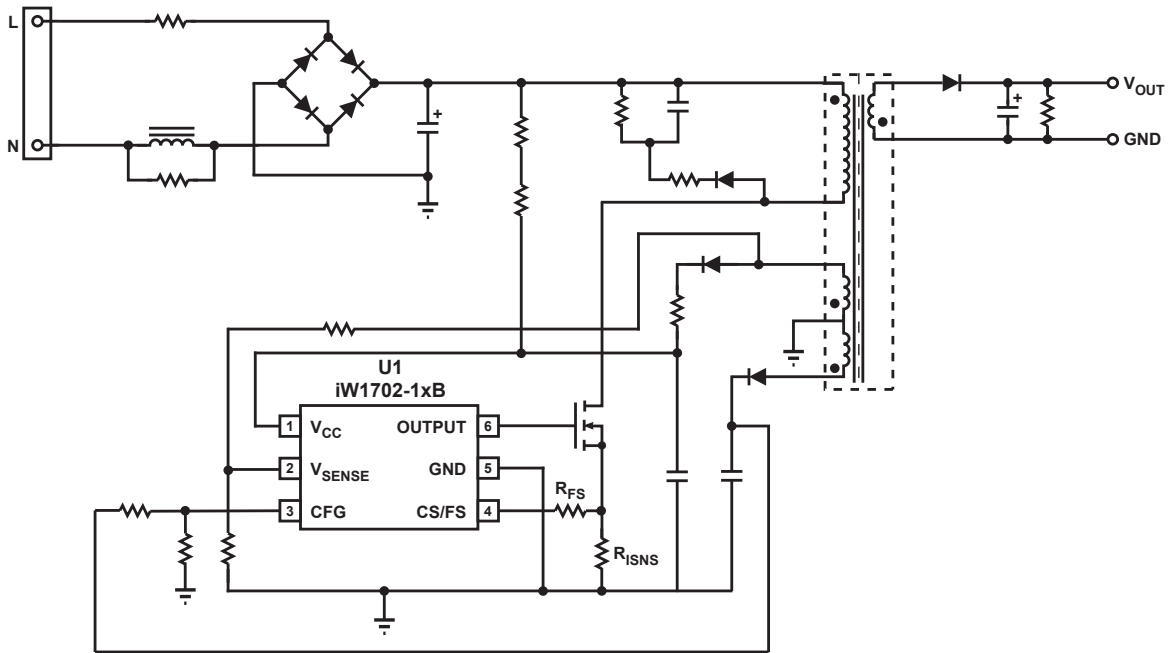


Figure 3.3 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection Using Transformer Winding.

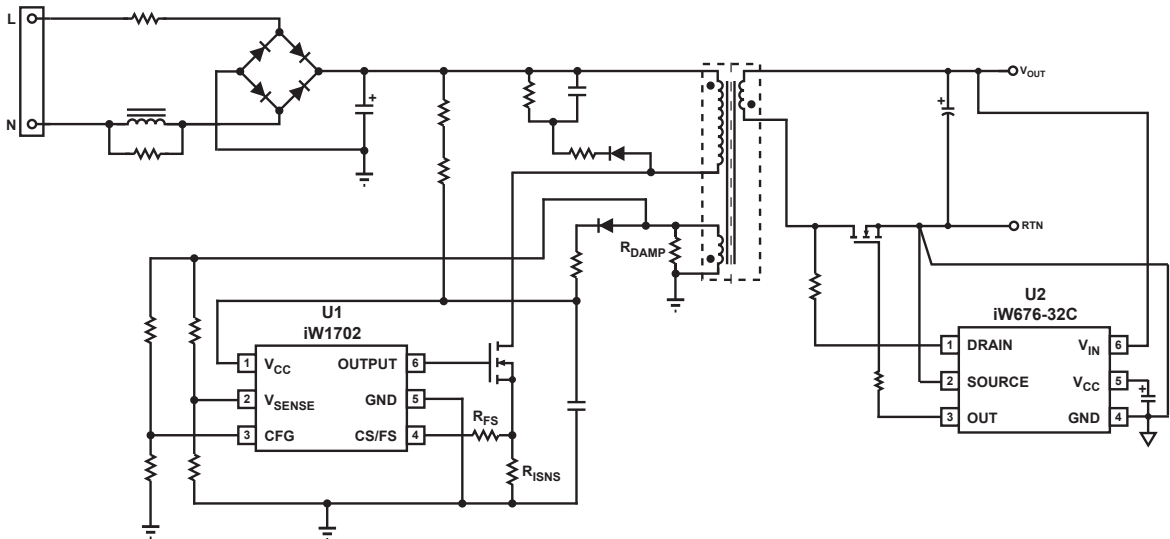


Figure 3.4 : iW1702 Typical Application Circuit with Supplement Output Over-Voltage Protection and iW676-32C Secondary Synchronous Rectifier Controller with Active Voltage Positioning.

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4 Pinout Description

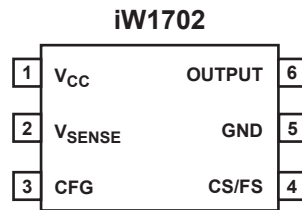


Figure 4.1 : 6-Lead SOT23 Package

Pin Number	Pin Name	Type	Pin Description
1	V _{CC}	Power Input	IC power supply.
2	V _{SENSE}	Analog Input	Auxiliary voltage sense. It is used for primary-side regulation and detection of secondary-side load transient signal.
3	CFG	Analog Input	In iW1702-0x/0xB and iW1702-3x/3xB options, it is used for external cable drop compensation (CDC) configuration and supplemental output over-voltage protection (OVP). In iW1702-1x/1xB options, it is dedicated to input OVP.
4	CS/FS	Analog Input	Primary-side current sense and minimum switching frequency configuration. It is used for cycle-by-cycle peak-current control and limit in primary-side CV/CC regulation. It is also used for minimum switching frequency configuration.
5	GND	Ground	Ground.
6	OUTPUT	Output	Gate drive for the external MOSFET switch.

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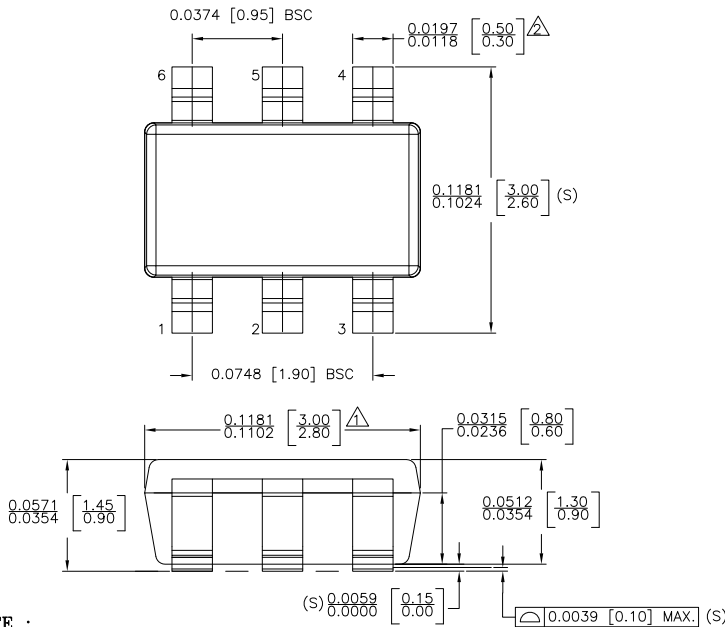
5 Absolute Maximum Ratings

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 1, $I_{CC} = 20\text{mA max}$)	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
OUTPUT (pin 6)		-0.3 to 20.0	V
V_{SENSE} input (pin 2, $I_{VSENSE} \leq 10\text{mA}$)		-0.7 to 4.0	V
CS/FS input (pin 4)		-0.3 to 4.0	V
CFG (pin 3, $I_{CFG} \leq 20\text{mA}$)		-0.8 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}	208	°C/W
ESD rating per JEDEC JS-001-2017		$\pm 2,000$	V
Latch-up test per JESD78E		± 100	mA

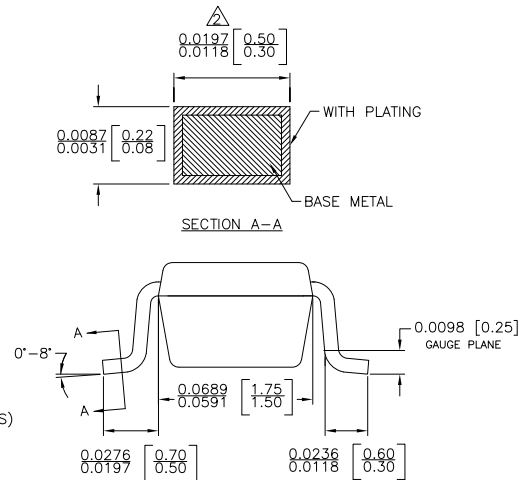
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6 Physical Dimensions



NOTE :

- △ DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.127 MM PER SIDE.
- △ DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.127 MM PER SIDE.
- 3. DIE IS FACING UP FOR MOLD. DIE IS FACING DOWN FOR TRIM/FORM.
- 4. THIS PART IS COMPLIANT WITH EIAJ SPECIFICATION SC74A AND JEDEC SPECIFICATION MO-178AB.
- 5. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC(S).
- 6. CONTROLLING DIMENSIONS IN INCHES. [mm]



STATUS: RELEASED		SCALE: DO NOT SCALE
TERMINAL FINISH: 100% Sn or NiPdAu (PPF)		
TITLE: 6 SOT23 PACKAGE OUTLINE		
REV: A	REVISION NOTE: NEW DRAWING	DATE: 02-MAR-2015

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7 Ordering Information

Part Number	Status	Options ¹				Package	Description
		External CFG Over-Voltage Protection Option	CC Shutdown Voltage at 5V Output ²	Latch Conditions	CDC		
iW1702-00	Not recommend for new design	Output	No CC Operation	No Latch	Yes	SOT-23	Tape & Reel ³
iW1702-31	Not recommend for new design	Output	0.75V	No Latch	Yes	SOT-23	Tape & Reel ³
iW1702-10	Not recommend for new design	Input	4V	No Latch	No	SOT-23	Tape & Reel ³
iW1702-00B	Active	Output	No CC Operation	No Latch	Yes	SOT-23	Tape & Reel ³
iW1702-31B	Active	Output	0.75V	No Latch	Yes	SOT-23	Tape & Reel ³
iW1702-10B	Active	Input	4V	No Latch	No	SOT-23	Tape & Reel ³

Note 1: For availability of additional options, please contact Marketing.

Note 2: Please refer to section 9.5 for CC shutdown voltage at different nominal output voltages.

Note 3: Tape and reel packing quantity is 3,000/reel. Minimum packing quantity is 3,000.

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