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)

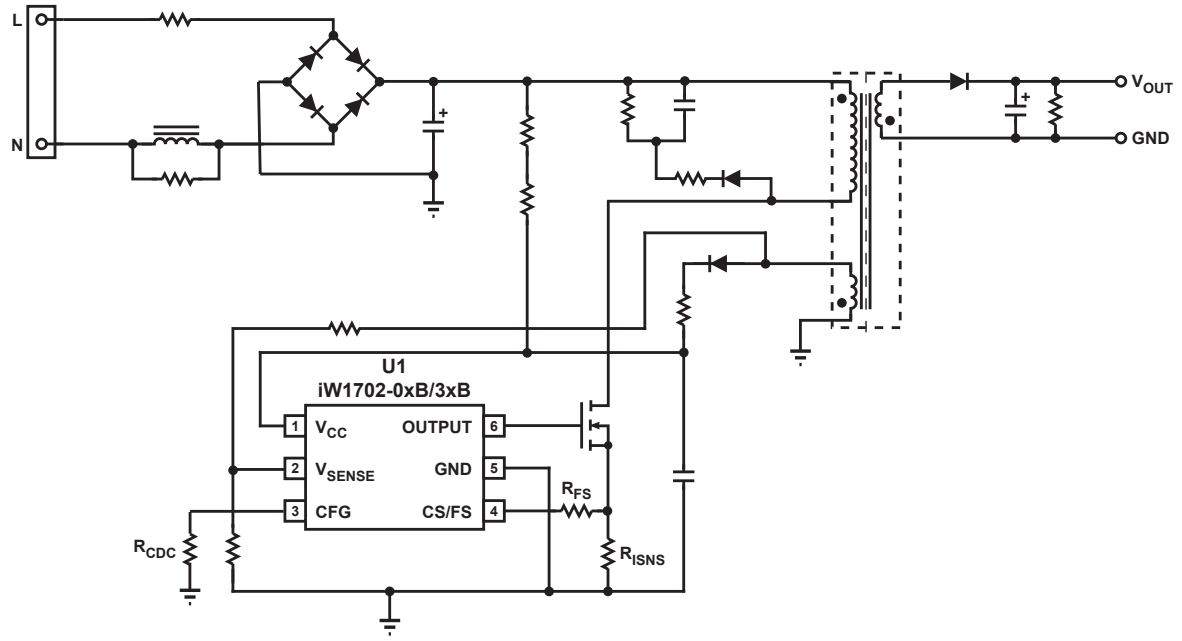


Figure 3.1 : iW1702 Typical Application Circuit
(Achieving < 75mW No-Load Power Consumption in 12V, 2A 24W Adapter Design).

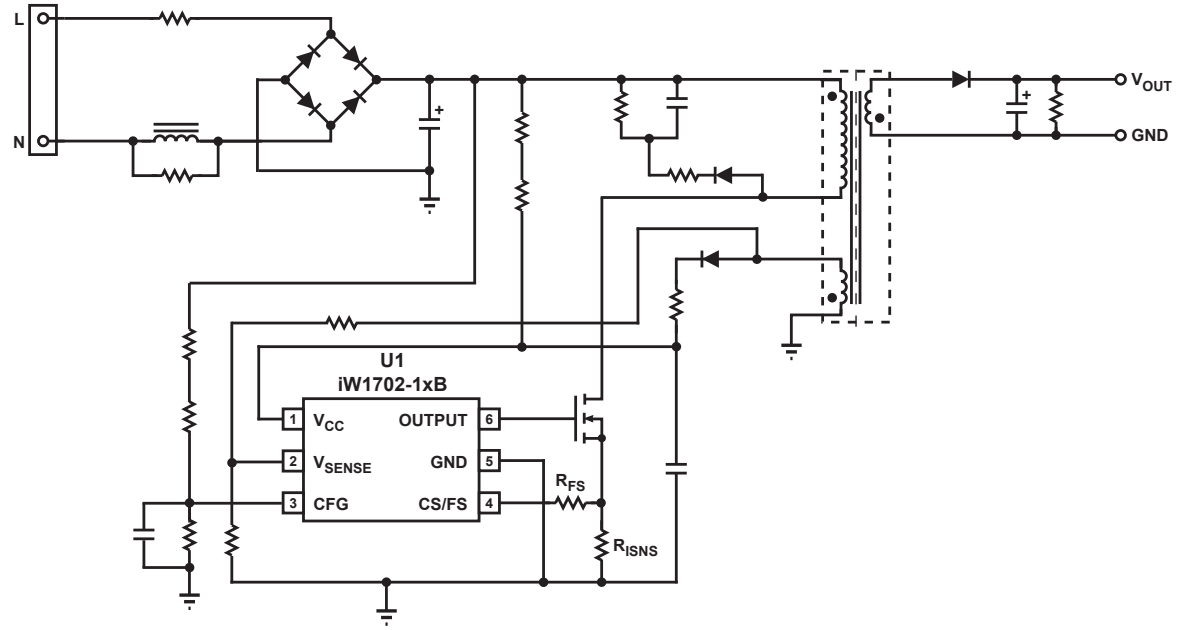


Figure 3.2 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection.

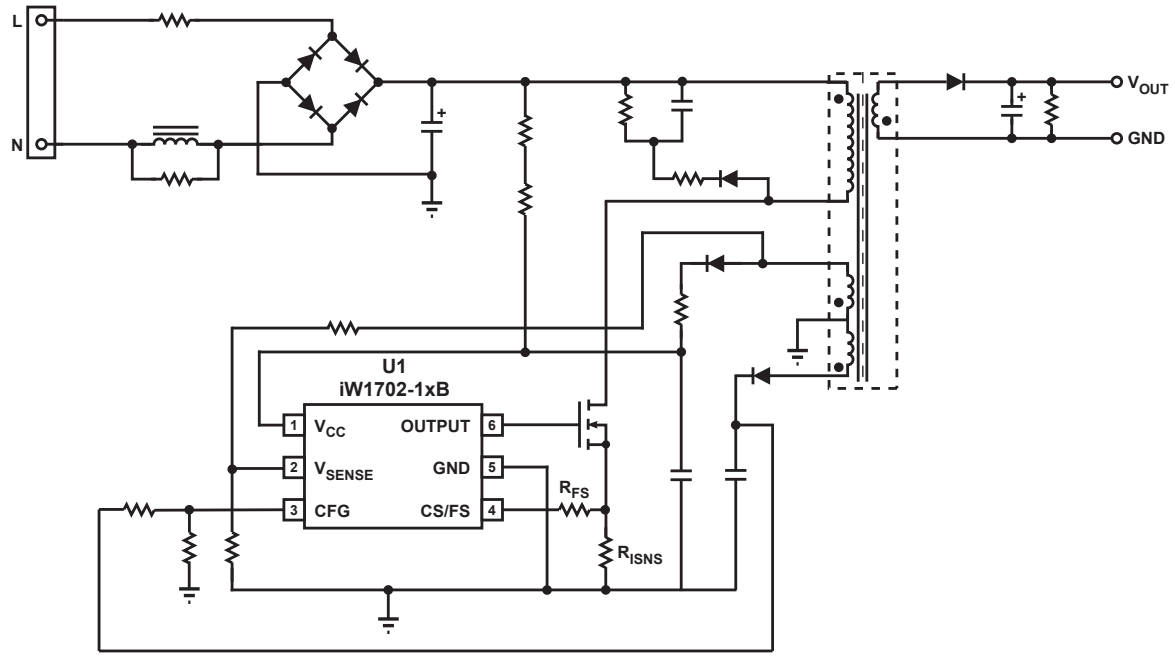


Figure 3.3 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection Using Transformer Winding.

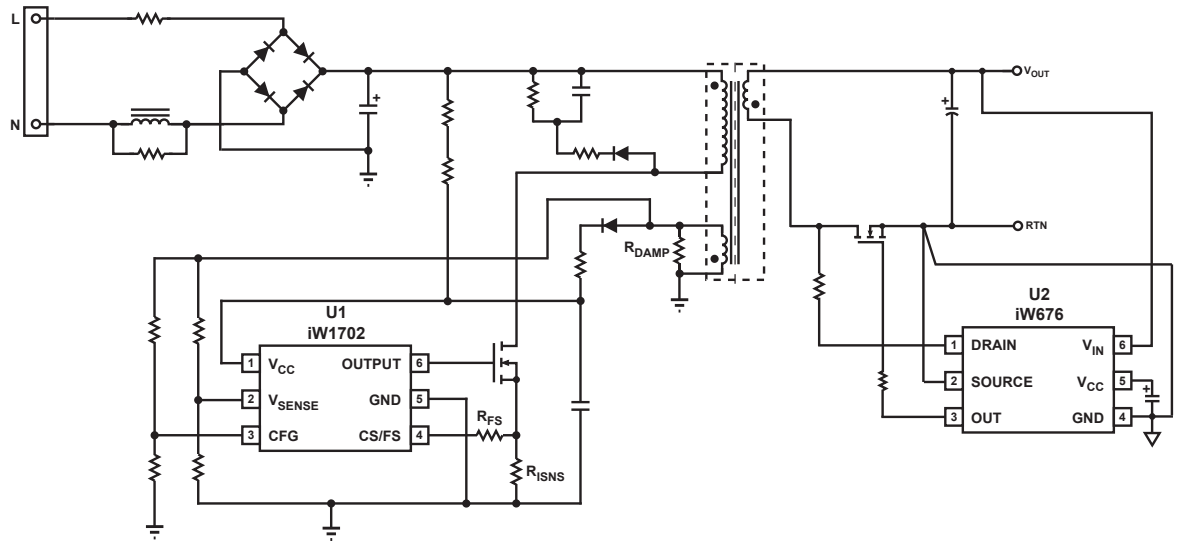


Figure 3.4 : iW1702 Typical Application Circuit with Supplement Output Over-Voltage Protection and iW676-32C Secondary Synchronous Rectifier Controller with Active Voltage Positioning.

4 Pinout Description

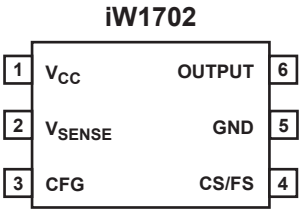


Figure 4.1 : 6-Lead SOT23 Package

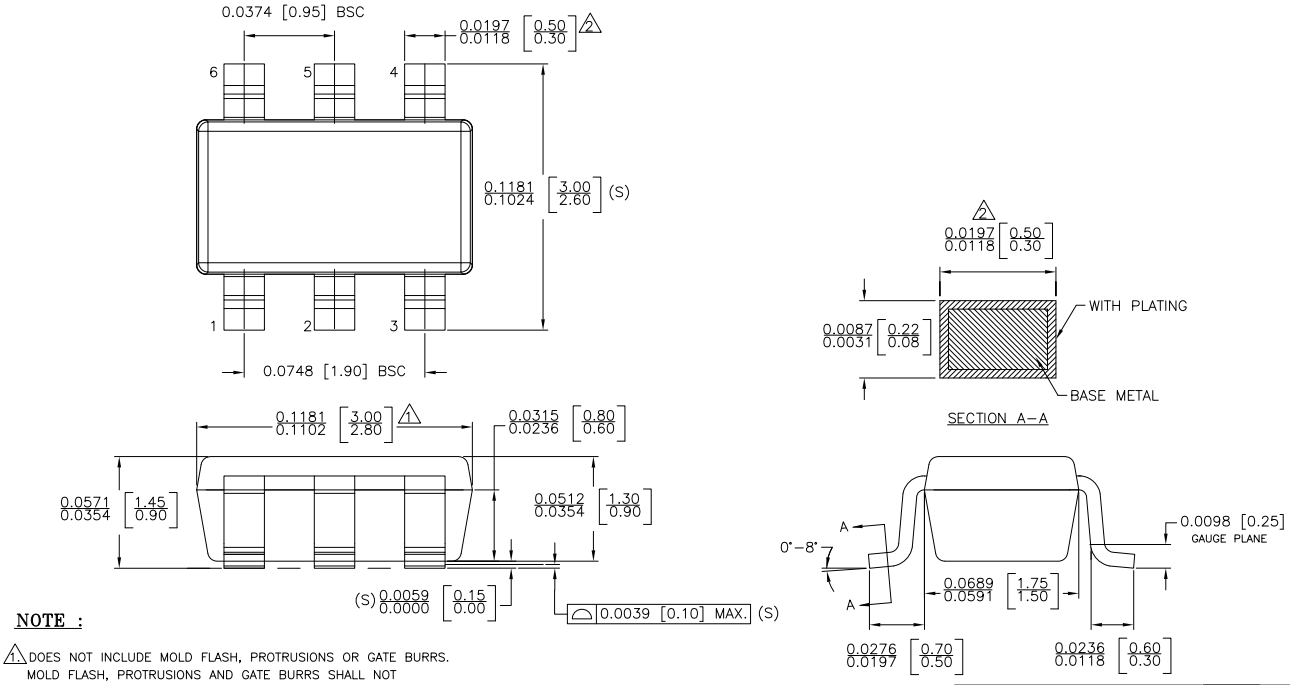
Pin Number	Pin Name	Type	Pin Description
1	V_{CC}	Power Input	IC power supply.
2	V_{SENSE}	Analog Input	Auxiliary voltage sense. It is used for primary-side regulation and detection of secondary-side load transient signal.
3	CFG	Analog Input	In iW1702-0x/0xB and iW1702-3x/3xB options, it is used for 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.

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} = 20mA max)	V_{CC}	-0.3 to 25.0	V
Continuous DC supply current at V_{CC} pin (V_{CC} = 15V)	I_{CC}	20	mA
OUTPUT (pin 6)		-0.3 to 20.0	V
V_{SENSE} input (pin 2, I_{VSENSE} ≤ 10mA)		-0.7 to 4.0	V
CS/FS input (pin 4)		-0.3 to 4.0	V
CFG (pin 3, I_{CFG} ≤ 20mA)		-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		±2,000	V
Latch-up test per JESD78E		±100	mA

6 Physical Dimensions



NOTE :

1. DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.127 MM PER SIDE.
2. 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]

dialog SEMICONDUCTOR	
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

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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