

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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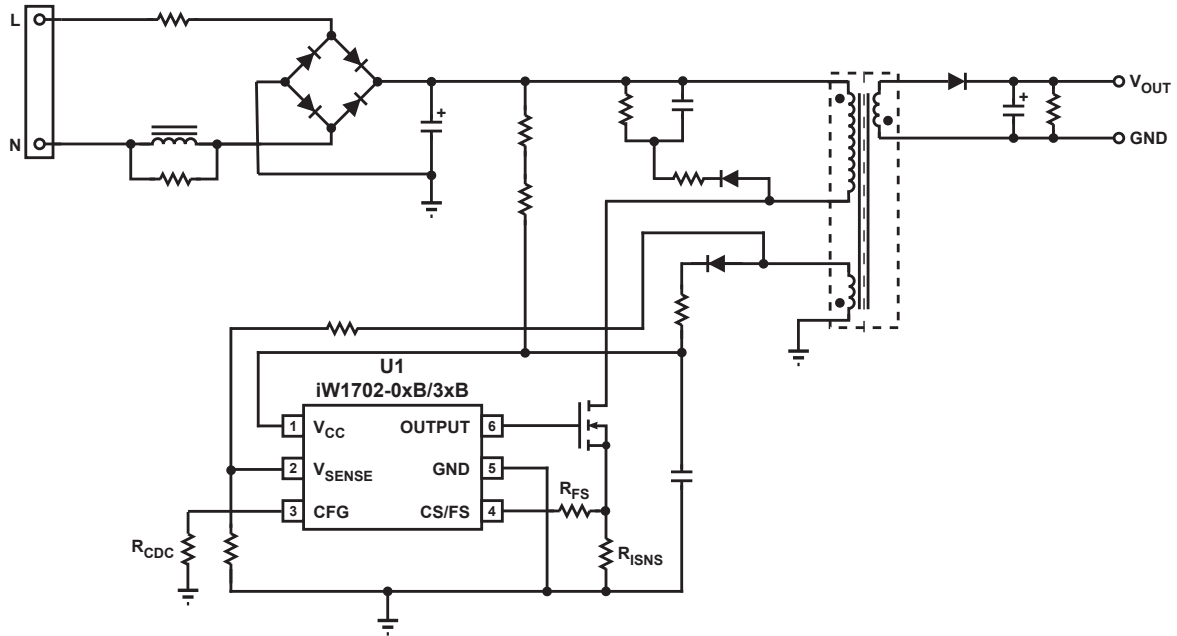


Figure 3.1 : iW1702 Typical Application Circuit (Achieving < 75mW No-Load Power Consumption in 12V, 2A 24W Adapter Design).

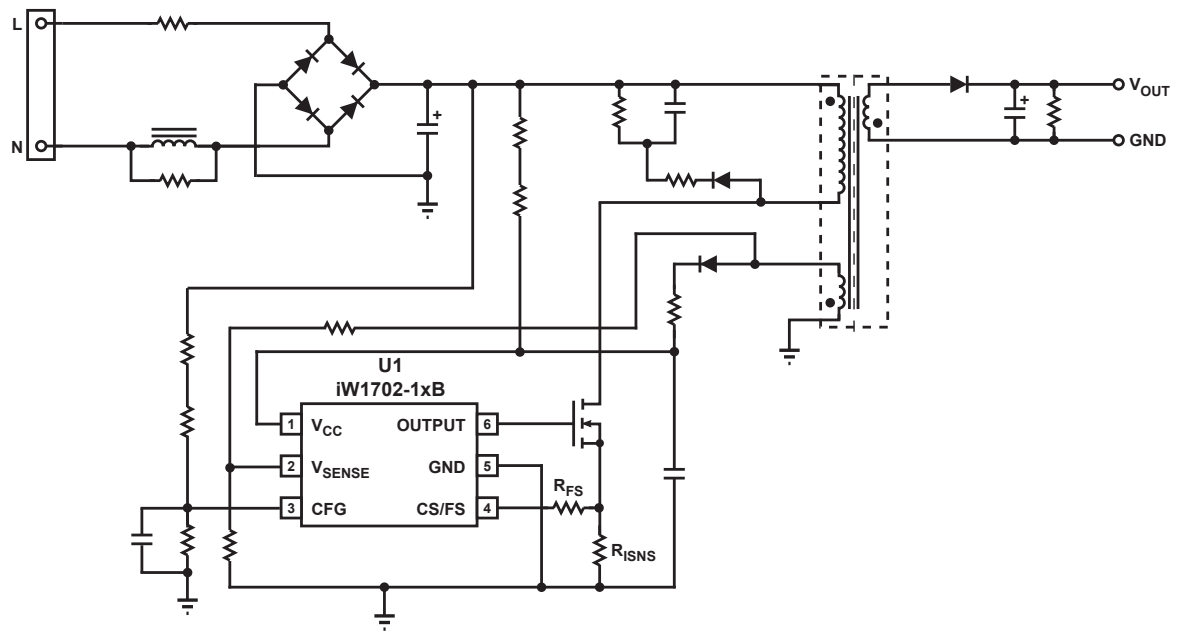


Figure 3.2 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection.

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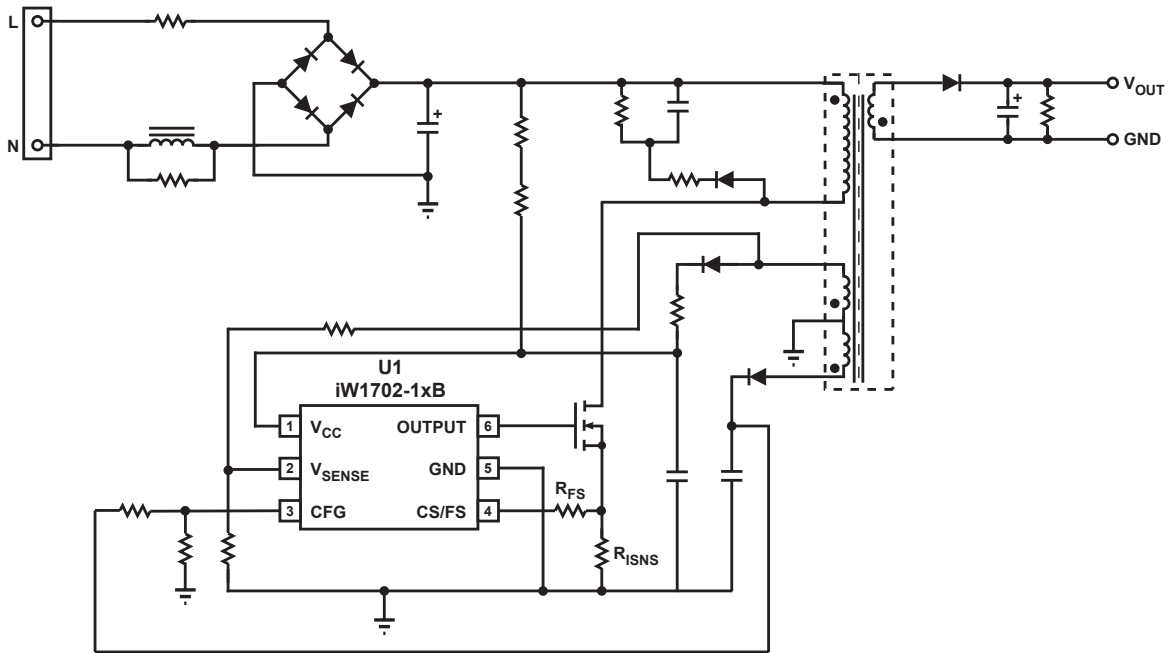


Figure 3.3 : iW1702-1xB Typical Application Circuit with Input Over-Voltage Protection Using Transformer Winding.

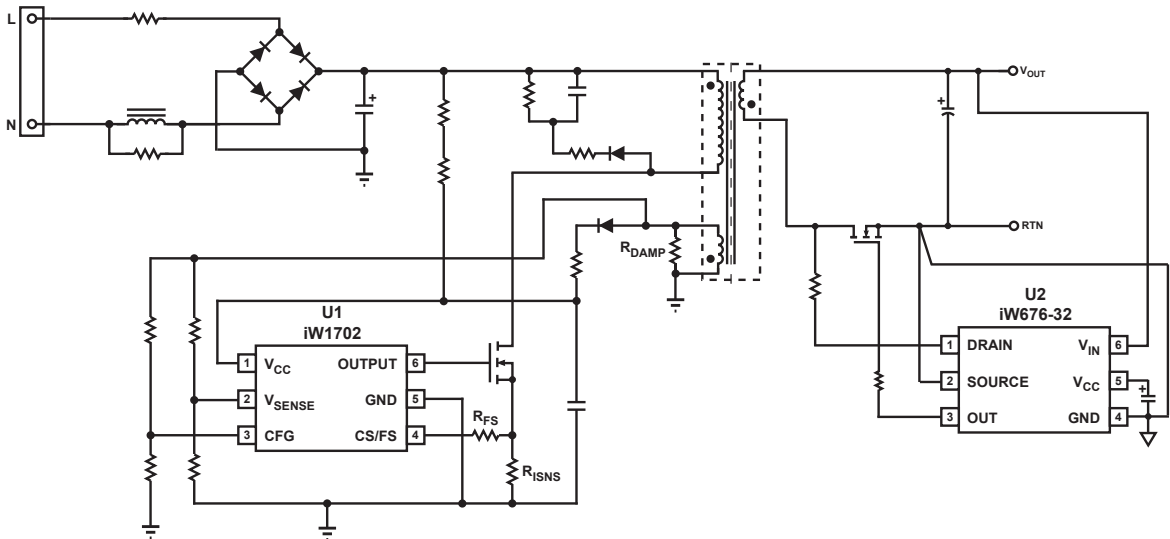


Figure 3.4 : iW1702 Typical Application Circuit with Supplement Output Over-Voltage Protection and iW676-32 Secondary Synchronous Rectifier Controller with Active Voltage Positioning.

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4 Pinout Description

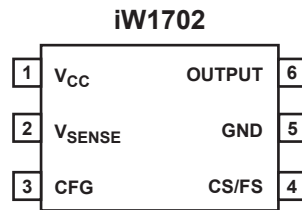


Figure 4.1 : 6-Lead SOT23 Package

| 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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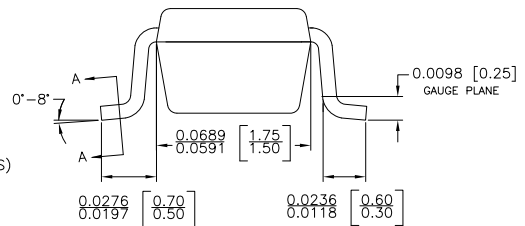
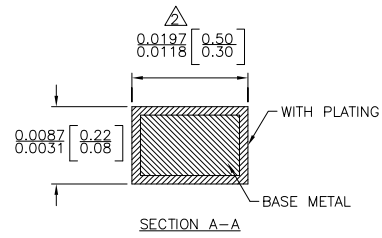
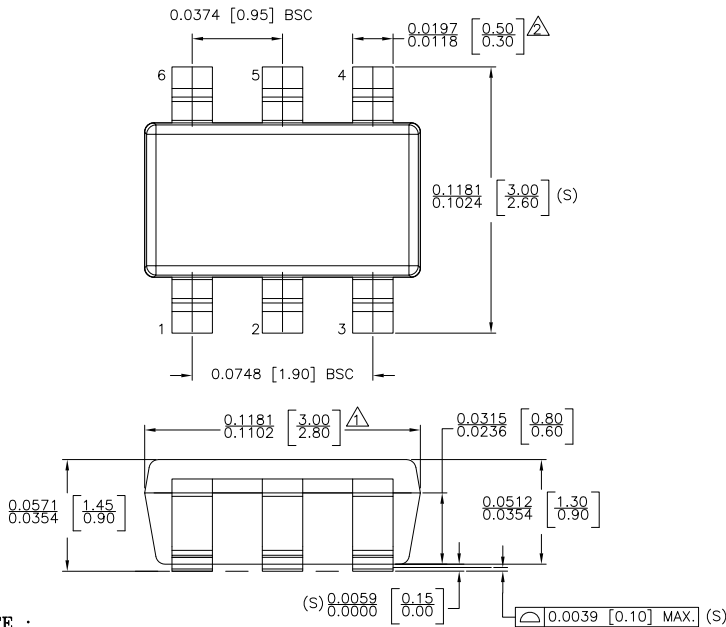
5 Absolute Maximum Ratings

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 JESD22-A114 | | $\pm 2,000$ | V |
| Latch-up test per JESD78A | | ± 100 | mA |

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6 Physical Dimensions



NOTE :

- Δ DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.127 MM PER SIDE.
- Δ 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 ordering quantity is 3,000.

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