

## 15W AccuSwitch™ Quasi-Resonant PWM Controller with Integrated Power BJT for 5V Applications

### 1 Description

The iW1820 integrates a high performance digital AC/DC power supply controller and a power BJT switch in a power package to enable compact peak current mode PWM flyback power supplies. The device operates in quasi-resonant mode and features multiple key protection features, enabling designs with improved efficiency and lower EMI which lowering the bill of material cost.

The iW1820 features a distinctive soft-start scheme, which allows for fast and yet smooth start-up. It removes the need for a secondary feedback circuit while achieving excellent line and load regulation. It also eliminates the need for loop compensation components while maintaining stability overall operating conditions. The pulse-by-pulse waveform analysis allows for fast dynamic load response. The built-in power limit function enables optimized transformer design for a wide input voltage range.

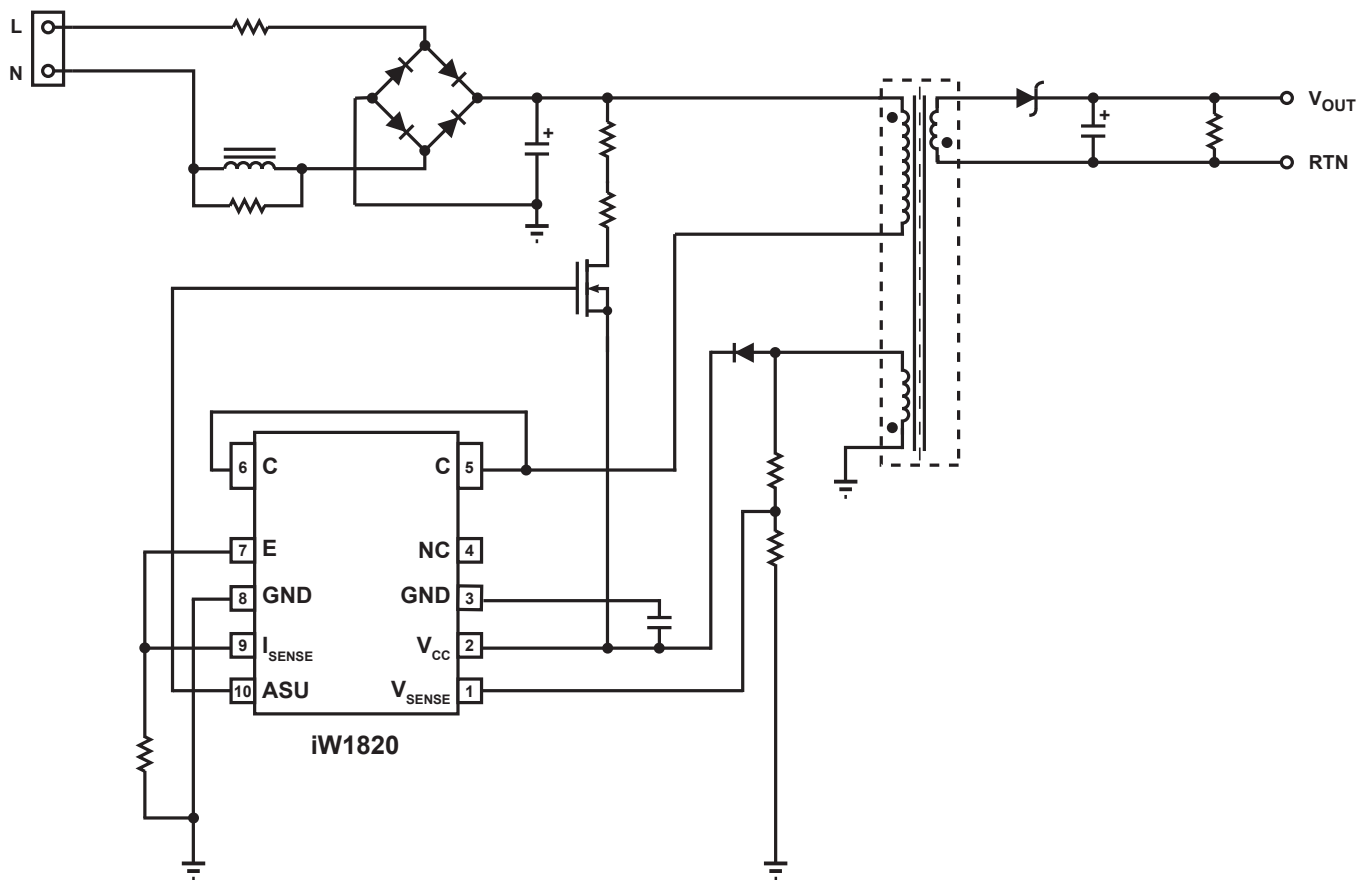
Dialog's innovative proprietary technology ensures that power supplies built with the iW1820 can achieve both the highest average efficiency and maintain less than 30mW no-load power consumption while achieving fast dynamic load response and the shortest possible start-up time for the 30mW no-load power in typical 5V adapter applications. For applications requiring greater than 5V output voltages, see the iW1819.

### 2 Features

- No-load power consumption < 30mW at 230V<sub>AC</sub> with typical application circuit (5-star rating)
- **AccuSwitch™** technology – integrated 800V bipolar junction transistor (BJT)
- Optimized for 5V/2A AC/DC adapters/chargers with < 30mW no-load power consumption at 230V<sub>AC</sub> and fast dynamic load response for both one-time and repetitive load transients
- Very tight constant voltage and constant current regulation over entire operating range
- **PrimAccurate™** primary-side feedback eliminates optocoupler and simplifies design
- **EZ-EMI®** design enhances manufacturability
- Intrinsically low common mode noise
- Optimized 72kHz maximum PWM switching frequency achieves best size and efficiency
- Adaptive multi-mode PWM/PFM control improves efficiency
- Quasi-resonant operation for highest overall efficiency
- Dynamic base current control
- No external loop compensation components required
- Complies with EPA 2.0/CoC Ver5/DoE energy efficiency specifications with ample margin
- Built-in single-point protections against output short-circuit, output low impedance, and output overvoltage
- Built-in over-temperature protection (OTP)
- No audible noise over entire operating range

### 3 Applications

- Compact AC/DC adapters/chargers for media tablets and smart phones
- AC/DC adaptor for consumer electronics
- AC/DC power supplies for home appliances and industrial applications



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### 4 Pinout Description

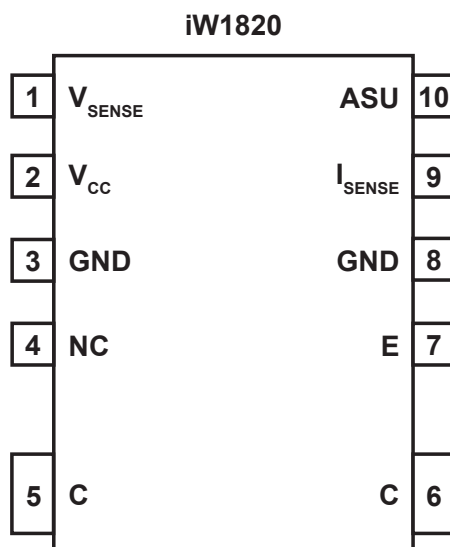


Figure 4.1 : 10-Lead SOIC Batwing Package

| Pin Number | Pin Name    | Type          | Pin Description                                                                        |
|------------|-------------|---------------|----------------------------------------------------------------------------------------|
| 1          | $V_{SENSE}$ | Analog Input  | Auxiliary voltage sense (used for primary-side regulation).                            |
| 2          | $V_{CC}$    | Power Input   | Power supply for control logic.                                                        |
| 3          | GND         | Ground        | Ground.                                                                                |
| 4          | NC          |               |                                                                                        |
| 5          | C           | BJT Collector | Collector of internal BJT.                                                             |
| 6          | C           | BJT Collector | Collector of internal BJT.                                                             |
| 7          | E           | BJT Emitter   | Emitter of internal BJT.                                                               |
| 8          | GND         | Ground        | Ground.                                                                                |
| 9          | $I_{SENSE}$ | Analog Input  | Primary current sense. Used for cycle-by-cycle peak current control and current limit. |
| 10         | ASU         | Output        | Control signal. Used for active start-up device.                                       |

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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 2, $I_{CC} = 20\text{mA max}$ )             | $V_{CC}$      | -0.3 to 25.0 | V     |
| Continuous DC supply current at $V_{CC}$ pin ( $V_{CC} = 15\text{V}$ )   | $I_{CC}$      | 25           | mA    |
| ASU output (pin 10)                                                      |               | -0.3 to 19.0 | V     |
| $V_{SENSE}$ input (pin 1, $I_{VSENSE} \leq 10\text{mA}$ )                |               | -0.7 to 4.0  | V     |
| $I_{SENSE}$ input (pin 9)                                                |               | -0.3 to 4.0  | V     |
| Collector-Base breakdown voltage                                         | $V_{CBO}$     | 800          | V     |
| Collector current (Note 1)                                               | $I_C$         | 4            | A     |
| Collector peak current (Note 1) ( $t_p < 1\text{ms}$ )                   | $I_{CM}$      | 8            | A     |
| Maximum junction temperature                                             | $T_{JMAX}$    | 150          | °C    |
| Operating junction temperature                                           | $T_{JOPT}$    | -40 to 150   | °C    |
| Storage temperature                                                      | $T_{STG}$     | -55 to 150   | °C    |
| Electrostatic Discharge Capability (Human Body Model), JEDEC JS-001-2012 | $ESD_{(HBM)}$ | ±2000        | V     |
| Electrostatic Discharge Capability (Charged Device Model), JESD22-C101   | $ESD_{(CDM)}$ | ±1000        | V     |
| Latch-up test per JESD78D                                                |               | ±100         | mA    |

#### Notes:

Note 1. Limited by maximum junction temperature.

### 6 Thermal Characteristics

| Parameter                                                                           | Symbol               | Value | Units |
|-------------------------------------------------------------------------------------|----------------------|-------|-------|
| Thermal Resistance Junction-to-Ambient <sup>1</sup>                                 | $\theta_{JA}$        | 55.2  | °C/W  |
| Characterization Parameter Junction-to-Collector pin (pin 5 and pin 6) <sup>2</sup> | $\Psi_{J-COLLECTOR}$ | 5.8   | °C/W  |
| Thermal Shutdown Threshold <sup>3</sup>                                             | $T_{SD}$             | 150   | °C    |
| Thermal Shutdown Recovery <sup>3</sup>                                              | $T_{SD-R}$           | 120   | °C    |

#### Notes:

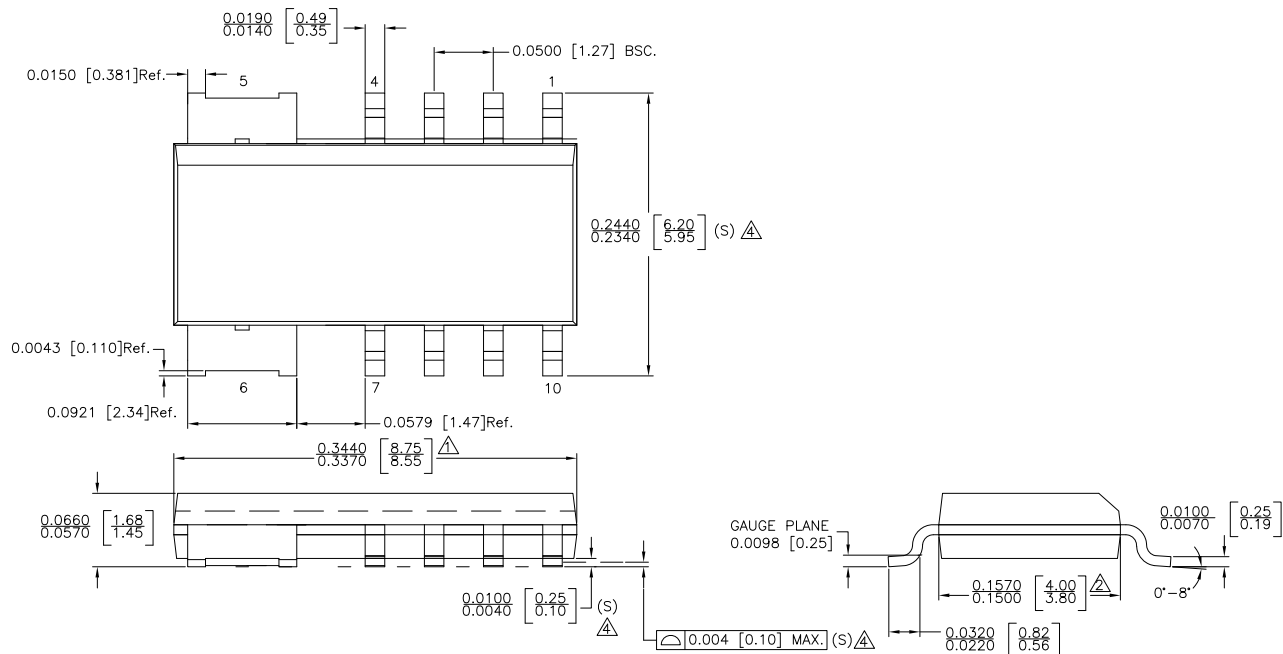
Note 1. Device is mounted on a 4-layer JEDEC board with 100mm<sup>2</sup> of 70µm thick copper, in a one-cubic-foot natural convection chamber.

Note 2.  $\Psi_{J-COLLECTOR}$  [Psi Junction to Collector pin] provides an estimation of the die junction temperature relative to the Collector pin [internal BJT Collector] surface temperature.

Note 3. These parameters are typical and they are guaranteed by design.


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### 7 Physical Dimensions



#### NOTE :

- ⚠ DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
- ⚠ DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .010 INCH PER SIDE.
- 3. THIS PART IS COMPLIANT WITH JEDEC SPECIFICATION MS-012 AB.
- ⚠ LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC(S)
- 5. CONTROL DIMENSIONS IN INECHES.[mm]

|                                                                                       |                               |
|---------------------------------------------------------------------------------------|-------------------------------|
|  |                               |
| STATUS:<br>RELEASED                                                                   | SCALE:<br>DO NOT SCALE        |
| TERMINAL FINISH:<br>NiPdAu (PPF)                                                      |                               |
| TITLE:<br>10 SOIC BATWING PACKAGE OUTLINE                                             |                               |
| REV:<br>A                                                                             | REVISION NOTE:<br>NEW DRAWING |
| DATE:<br>29-SEP-2015                                                                  |                               |

### 8 Ordering Information

| Part no.  | Options                                            | Package       | Description              |
|-----------|----------------------------------------------------|---------------|--------------------------|
| iW1820-30 | Cable Comp = 0mV, OTP recovery threshold = 100°C   | SO-10 Batwing | Tape & Reel <sup>1</sup> |
| iW1820-31 | Cable Comp = 300mV, OTP recovery threshold = 100°C | SO-10 Batwing | Tape & Reel <sup>1</sup> |
| iW1820-33 | Cable Comp = 450mV, OTP recovery threshold = 100°C | SO-10 Batwing | Tape & Reel <sup>1</sup> |
| iW1820-35 | Cable Comp = 150mV, OTP recovery threshold = 100°C | SO-10 Batwing | Tape & Reel <sup>1</sup> |

**Note 1:** Tape & Reel packing quantity is 2,500/reel. Minimum packing quantity is 2,500.

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