

High Performance Digital Power Factor Correction Controller for AC/DC Power Supplies

1 Description

The iW2206 is a high-performance boost controller for AC/DC power supplies that need power factor correction. The device operates in transition mode and can support up to 250W of output power from a tiny SOT23-6 package.

The iW2206 tightly regulates the output DC bus voltage across AC line and load conditions. The digital control eliminates the need for external loop compensation while maintaining stability across all operating conditions. With Dialog's patented PF-Boost™ technology, the iW2206 can achieve power factor (PF) greater than 0.9 and total harmonic distortion (THD) less than 20% at loads from 33% of nominal load to full load and across the entire AC line voltage range.

The iW2206 by itself can achieve less than 150mW standby power in applications up to 100W. This eliminates the burden to turn-off the PFC stage for no-load standby in many applications. Audible noise during load transient and during startup is minimized by the device's adaptive current limit and with the advanced startup control, the PFC ready time is less than 0.2s. The iW2206 output DC bus voltage level is user-configurable to support either "following AC input voltage" or "fixed" for different application needs.

The iW2206 also features various protections such as output over-voltage, over-power, AC over-voltage, AC under-voltage, current-sense-resistor short, over-current, loop-open and over-temperature protection. This ensures robust and reliable system performance.

2 Features

- Universal AC input voltage range $90V_{AC} \sim 305V_{AC}$
- Supports up to 250W output power in tiny SOT-23-6 package
- AC line and load regulation $< \pm 3\%$
- $PF > 0.9$ and $THD < 20\%$ across AC line voltage when $> 33\%$ of full load
- Fast PFC ready time $< 0.2s$
- Standby power $< 150mW$ at $230V_{AC}$ input up to 100W
- Minimum audible noise across AC line and load condition, and during load transient or startup
- Configurable output DC bus voltage
- Wide operating supply voltage (V_{VCC}) range from 8.0V to 20V
- Comprehensive protection features
 - » Output over-voltage protection
 - » Output over-power protection
 - » AC over-voltage protection
 - » AC under-voltage protection (Brown-out)
 - » Cycle-by-cycle peak current limit
 - » Loop-open protection
 - » Current-sense-resistor short protection
 - » Over-temperature protection

3 Applications

- Two-stage LED lighting drivers
- Two-stage adapters, AC/DC power supplies

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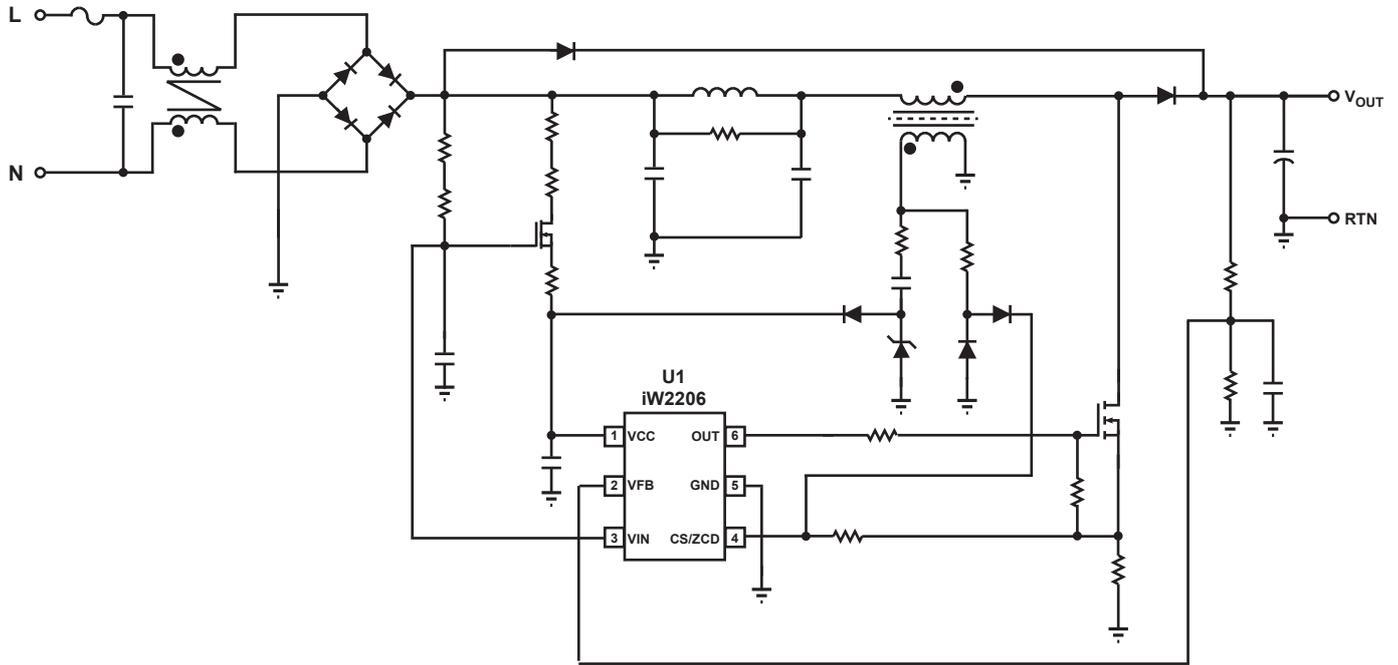


Figure 3.1 : iW2206 PFC Boost Application Circuit

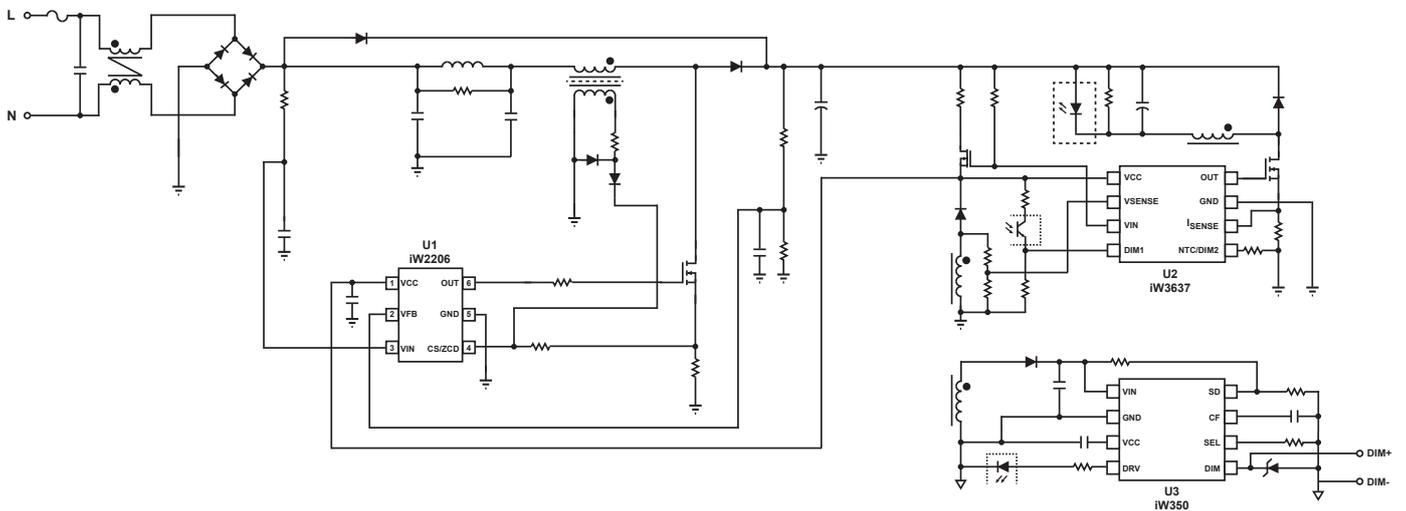


Figure 3.2 : iW2206 Application for Non-Isolated 2-stage Dimmable LED Driver with iW3637 and iW350

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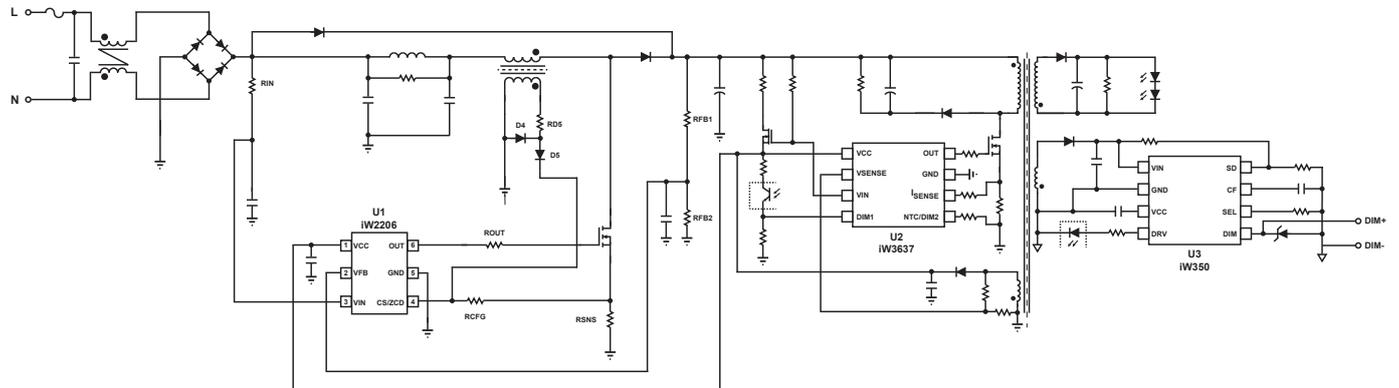


Figure 3.3 : iW2206 Application for Isolated 2-stage Dimmable LED Driver with the iW3637 and the iW350

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4 Pinout Description

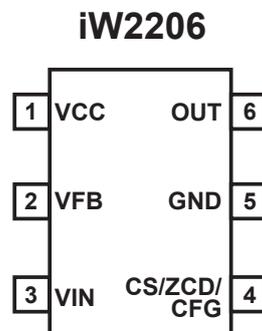


Figure 4.1 : 6-Lead SOT23 Package

| Pin Number | Pin Name | Type | Pin Description |
|------------|------------|---------------|---|
| 1 | VCC | Power Input | IC power supply. |
| 2 | VFB | Analog Input | Output DC bus voltage sense. |
| 3 | VIN | Analog Input | Input AC line voltage sense. |
| 4 | CS/ZCD/CFG | Analog Input | Power MOSFET current sense, inductor reset sense and configuration. |
| 5 | GND | Ground | Ground reference. |
| 6 | OUTPUT | Analog Output | Power MOSFET gate drive. |

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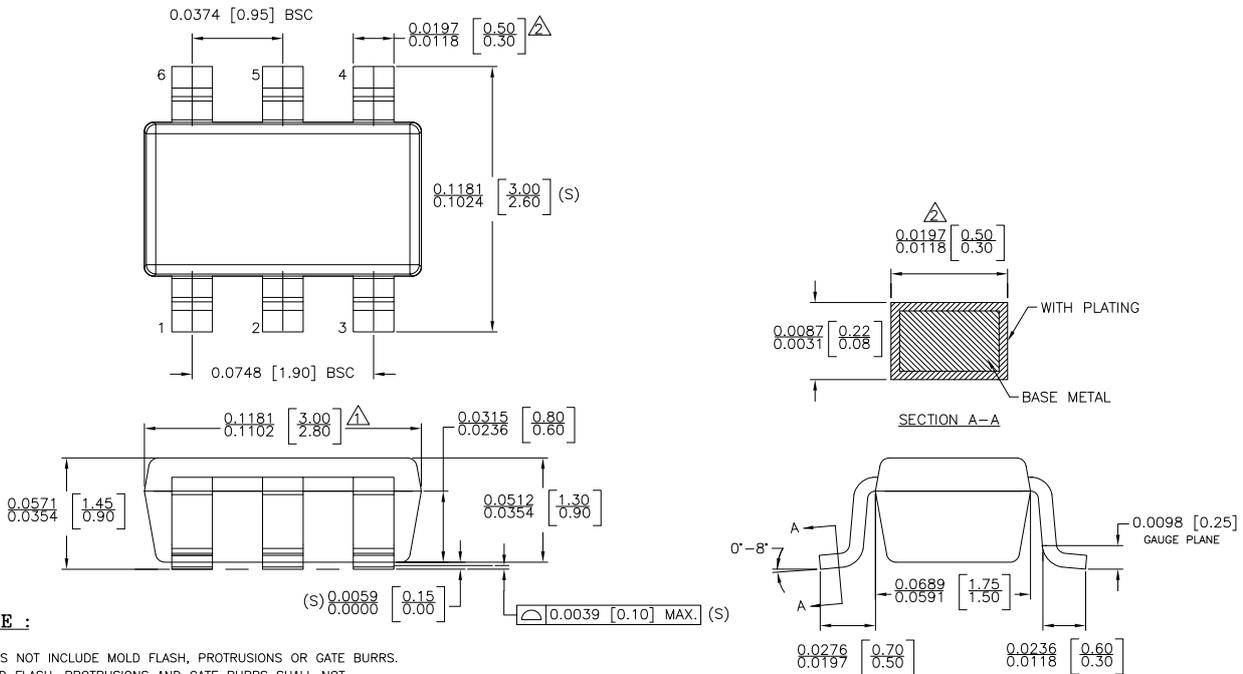
5 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to Electrical Characteristics in Section 6.

| Parameter | Symbol | Value | Units |
|--|---------------|--------------|-------|
| DC supply voltage range (pin 1, $I_{VCC} = 20\text{mA}$ max) | V_{VCC} | -0.3 to 22.0 | V |
| Continuous DC supply current at VCC pin ($V_{VCC} = 15\text{V}$) | I_{VCC} | 20 | mA |
| V_{VIN} (pin 3) | | -0.3 to 20.0 | V |
| OUTPUT (pin 6) | | -0.3 to 20.0 | V |
| V_{VFB} (pin 2, $I_{FB} \leq 10\text{mA}$) | | -0.7 to 5.0 | V |
| CS/ZCD/CFG input (pin 4) | | -0.3 to 5.0 | 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} | 190 | °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 EIA/J 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 | |

7 Ordering Information

| Part Number | Description | Package | Description |
|-------------|---|---------|--------------------------|
| iW2206-00 | Optimized for gate driver with diode pull down | SOT-23 | Tape & Reel ¹ |
| iW2206-10 | Optimized for gate driver with bipolar PNP pull down | SOT-23 | Tape & Reel ¹ |
| iW2206-11 | Supports up to 347V _{AC} input voltage | SOT-23 | Tape & Reel ¹ |
| iW2206-20 | Disabled Output OVP, OPP and standby mode for CC applications | SOT-23 | Tape & Reel ¹ |

Note 1: Tape & Reel packing quantity is 3,000/reel. Minimum packing quantity is 3,000.

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