

## Digital Green-Mode Synchronous Rectifier

### 1 Description

The iW873 is a high performance synchronous rectifier controller with integrated MOSFET and driver for flyback converters operating at discontinuous conduction mode. It emulates the diode rectifier at the secondary side of the flyback to reduce conduction loss. The iW873 determines the timing of the driver by sensing the voltage across the  $R_{DS(ON)}$  of the built-in MOSFET to achieve lossless sensing. Proprietary digital adaptive turn-off control technology is used to minimize the turn-off deadtime of the synchronous rectifier so that the parallel Schottky diode required by conventional synchronous rectifiers can be eliminated. The integrated driver has strong driving capability for high efficiency. The operating power consumption of the controller excluding the driver is less than 4mW at no load to achieve the ultra-low no-load power consumption for 5V applications. The iW873 integrates a pulse linear regulator to maintain the operation of the synchronous rectifier at low system output voltage when the system is operating in constant current (CC) mode.

### 2 Features

- Integrated 60V power MOSFET
- Digital adaptive turn-off control minimizes dead-time and eliminates the parallel Schottky diode
- Integrated pulse linear regulator (PLR) allows SR operation at low system output voltage down to 2.4V in typical 5V, 2A USB charger applications with iW873-00
- Wide  $V_{IN}$  pin operating voltage up to 25V
- Intelligent low power management achieves ultra-low no-load operating current
- Lossless MOSFET  $V_{DS}$  sensing for SR timing control
- 8-pin SOIC package

### 3 Applications

- Compact AC/DC adapters/chargers for media tablets and smart phones

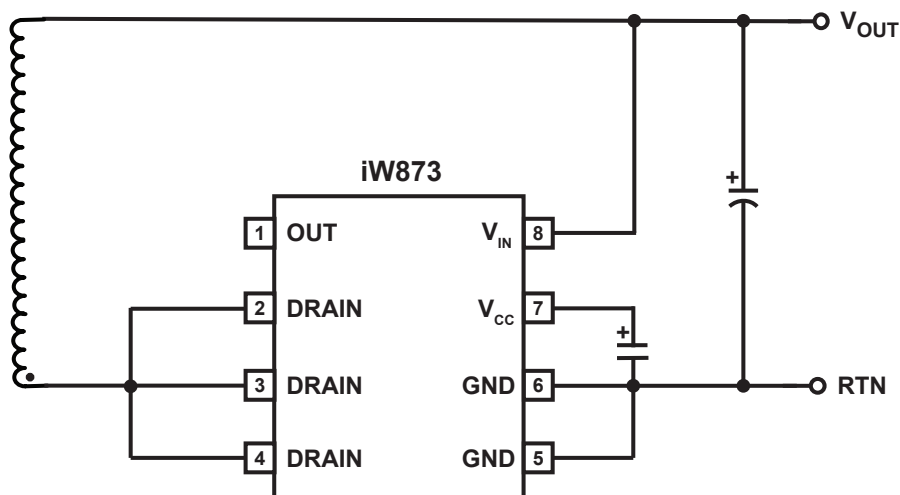
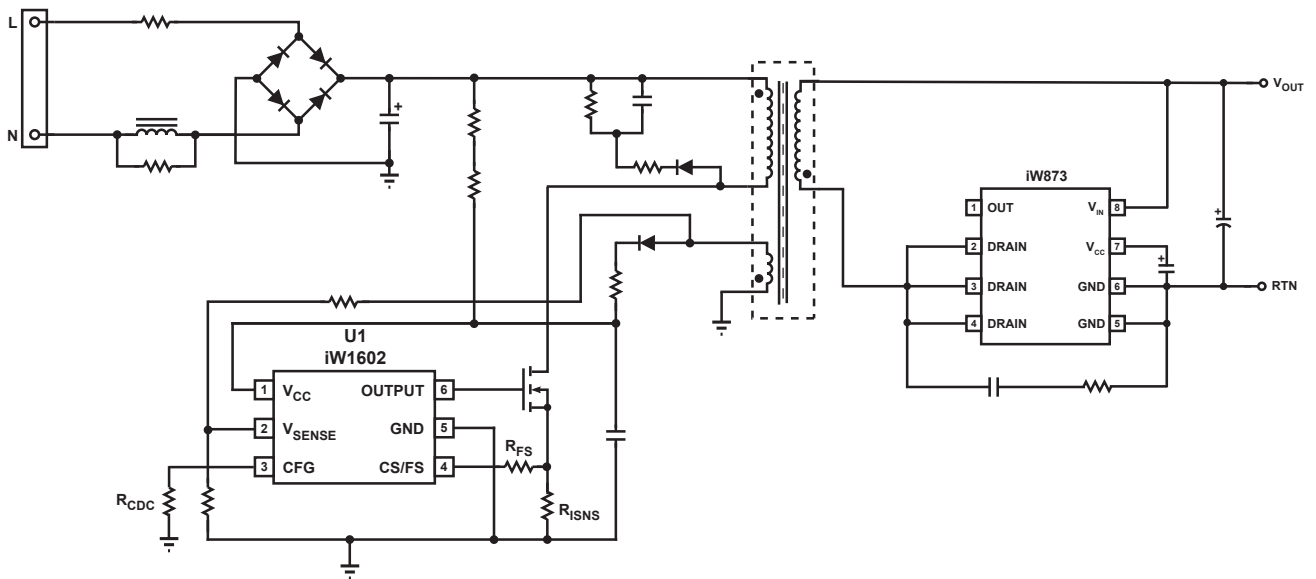


Figure 3.1 : iW873 Typical Application Circuit

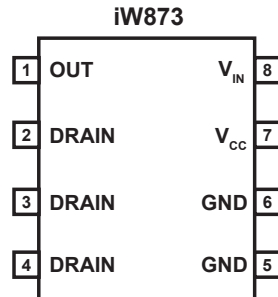
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**Figure 3.2 : iW873-00 Typical Application Circuit (Using iW1602 as Primary-Side Controller)**  
 (Achieving <75mW No-Load Power Consumption in 5V, 2A Adapter Designs with Fast Dynamic Load Response, and Supporting Constant Current Operation down to 2.4V System Output)

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### 4 Pinout Description



**Figure 4.1 : 8-Lead SOIC Package**

| Pin No. | Pin Name        | Type         | Pin Description   |
|---------|-----------------|--------------|---|
| 1       | OUT             | Power Output | Synchronous rectifier MOSFET driver output and the gate of the integrated MOSFET. Leave this pin open if not used.  |
| 2       | DRAIN           | Power Input  | Synchronous rectifier MOSFET Drain.   |
| 3       | DRAIN           | Power Input  | Synchronous rectifier MOSFET Drain.   |
| 4       | DRAIN           | Power Input  | Synchronous rectifier MOSFET Drain.   |
| 5       | GND             | Ground       | Synchronous rectifier MOSFET source and controller ground.  |
| 6       | GND             | Ground       | Synchronous rectifier MOSFET source and controller ground.  |
| 7       | V <sub>CC</sub> | Power Input  | IC power supply and output of LDO and PLR output. Connect this pin to a capacitor.  |
| 8       | V <sub>IN</sub> | Analog Input | Input of the internal LDO and system output voltage sensing circuit. Connects to adapter/charger output for bias voltage. The internal LDO clamps the V <sub>CC</sub> voltage at 5V. It is also the input for the comparator to enable PLR and the comparator to enable SR operation. |

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### 5 Absolute Maximum Ratings

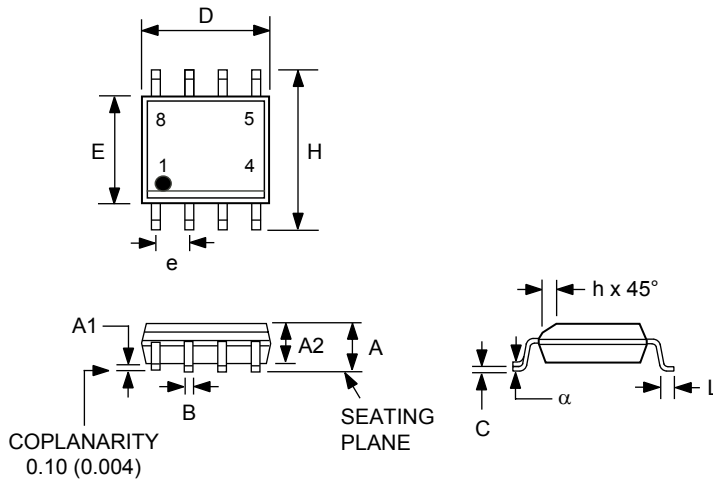
Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded.

| Parameter   | Symbol             | Value      | Units |
|---|--------------------|------------|-------|
| $V_{IN}$ DC supply voltage range (pin 8, $I_{CC} = 15\text{mA}$ max)    | $V_{IN}$           | -0.3 to 33 | V     |
| Continuous DC supply current at $V_{IN}$ pin ( $V_{IN} = 30\text{V}$ )  | $I_{VO}$           | 15         | mA    |
| Continuous DC supply current at $V_{CC}$ pin ( $V_{CC} = 5.5\text{V}$ ) | $I_{VCC}$          | 15         | mA    |
| DRAIN pin voltage   | $V_D$              | -1.5 to 60 | V     |
| $V_{CC}$ pin voltage  | $V_{CC}$           | -0.6 to 6  | V     |
| Junction temperature  | $T_J$              | -40 to 150 | °C    |
| Storage temperature   |                    | -65 to 150 | °C    |
| Thermal Resistance Junction-to-Ambient (SOIC-8 package)                 | $\theta_{JA\_SO8}$ | TBD        | °C/W  |
| ESD rating per JEDEC JESD22-A114  |                    | 2,000      | V     |

## Digital Green-Mode Synchronous Rectifier

### 6 Physical Dimensions

#### 8-Lead Small Outline (SOIC) Package



| Symbol   | Inches     |        | Millimeters |      |
|----------|------------|--------|-------------|------|
|          | MIN        | MAX    | MIN         | MAX  |
| A        | —          | 0.069  | —           | 1.75 |
| A1       | 0.0040     | 0.0098 | 0.10        | 0.25 |
| A2       | 0.0520     | 0.0600 | 1.32        | 1.50 |
| B        | 0.0123     | 0.0200 | 0.31        | 0.51 |
| C        | 0.0075     | 0.0098 | 0.19        | 0.25 |
| D        | 0.189      | 0.197  | 4.80        | 5.00 |
| E        | 0.1495     | 0.1575 | 3.80        | 4.00 |
| e        | 0.050 BSC  |        | 1.27 BSC    |      |
| H        | 0.2284     | 0.2440 | 5.80        | 6.20 |
| h        | 0.0098 BSC |        | 0.25 BSC    |      |
| L        | 0.0158     | 0.050  | 0.4         | 1.27 |
| $\alpha$ | 0°         | 8°     | 0°          | 8°   |

Compliant to JEDEC Standard MS12F

Controlling dimensions are in inches; millimeter dimensions are for reference only

This product is RoHS compliant and Halide free.

Soldering Temperature Resistance:

[a] Package is IPC/JEDEC Std 020D moisture sensitivity level 1

[b] Package exceeds JEDEC Std No. 22-A111 for solder immersion resistance; package can withstand 10 s immersion < 260°C

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25 mm per side.

The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.

### 7 Ordering Information

| Part no. | Options                           | Package     | Description              |
|----------|-----------------------------------|-------------|--------------------------|
| iW873-00 | Support CC operation down to 2.4V | SOIC, 8 pin | Tape & Reel <sup>1</sup> |

**Note 1:** Tape and reel packing quantity is 2,500/reel. Minimum ordering quantity is 2,500.

## Digital Green-Mode Synchronous Rectifier

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