iW671 Product Brief

Digital Green-Mode Synchronous Rectifier Controller

1.0 Features

- Digital adaptive turn-off control minimizes deadtime and eliminates the schottky diode
- Integrated pulse linear regulator (PLR) allows SR operation at low system output voltage down to 2V in typical 5V2.5A USB charger applications
- Wide operating voltage up to 17V Input
- Optimized 5-V MOSFET gate driver
- Intelligent low power management achieves ultra-low no-load operating current < 0.6mA
- Lossless MOSFET VDS sensing for SR timing control
- Integrated adaptive voltage position monitor for fast flyback output voltage undershoot detection
- Device available in 8-lead SOIC package and 8-pin 3mm x 3mm DFN package

2.0 Description

The iW671 is a high performance synchronous rectifier controller with an integrated MOSFET driver for flyback converters operating at discontinuous conduction mode. Combined with the MOSFET, the iW671 can emulate the diode rectifier at the secondary side of the flyback to reduce conduction loss. The iW671 determines the timing of the driver by sensing the voltage across the $R_{DS(ON)}$ to achieve lossless sensing. The iW671 uses proprietary digital adaptive turn-off control technology to minimize the turn-off deadtime of the synchronous rectifier so that the schottky diode 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 iW671 integrates a pulse linear regulator to maintain the operation of synchronous rectifier at low system output voltage when the system is operating at constant current (CC) mode.

The iW671 also integrates the adaptive voltage position monitor to detect the flyabck converter output voltage undershoot. It can be used with iW1766 series primary-side control system to achieve fast dynamic load response and less than 15mW no-load power consumption in typical 5V2.5A charger applications.

3.0 Applications

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

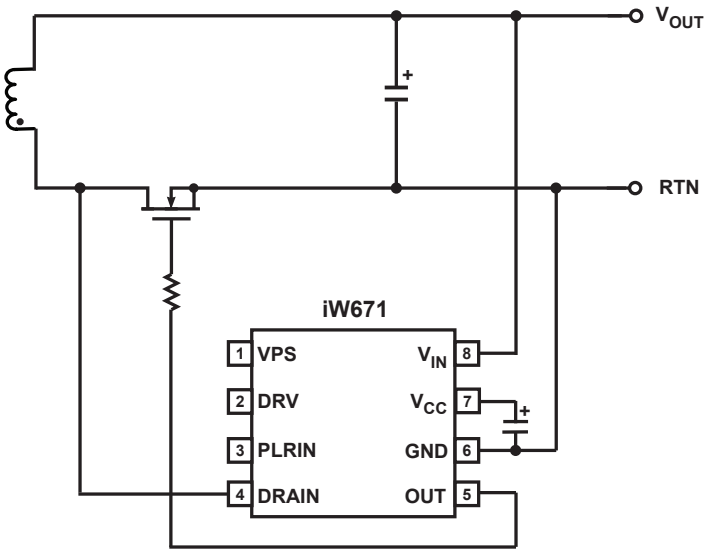


Figure 3.1: iW671 Typical Application Circuit

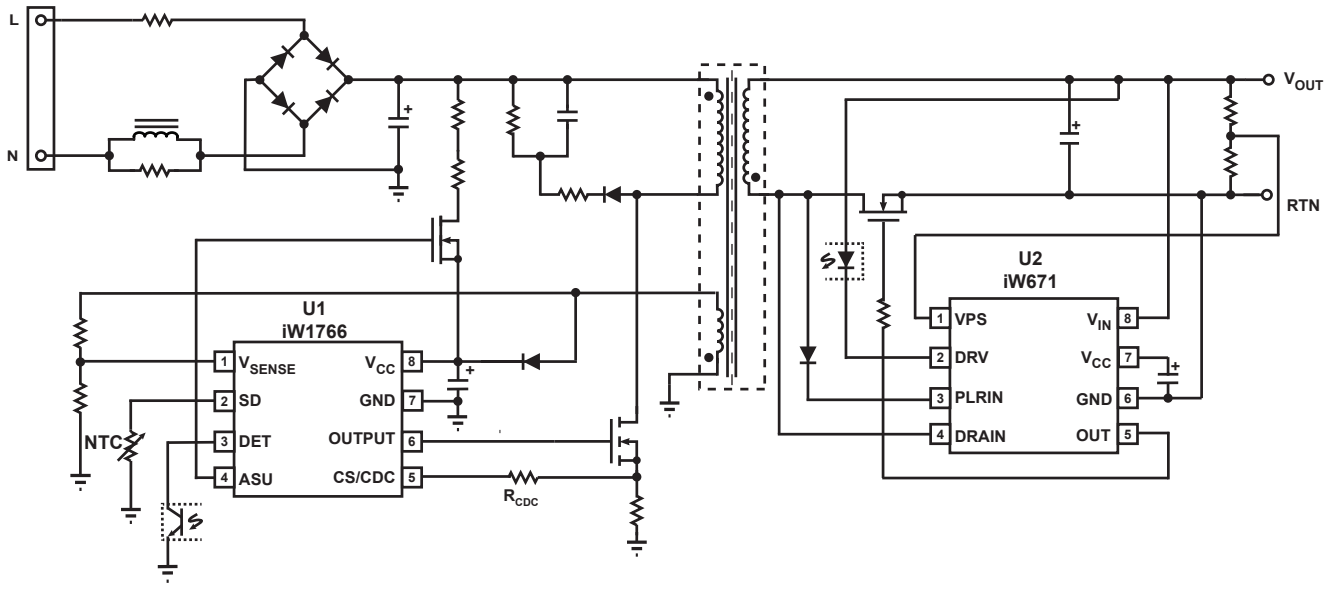


Figure 3.2: iW671 Typical Application Circuit (Using iW1766 as Primary-Side Controller)
(Achieving < 15mW No-Load Power Consumption in 5V2.5A Adapter Designs with Fast Dynamic Load Response, and supporting constant current operation down to 2V system output)

4.0 Pinout Description

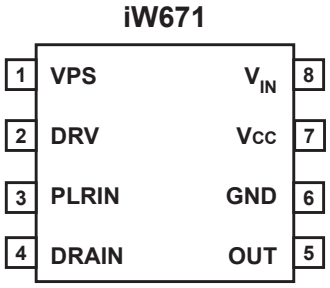


Figure 4.1: 8-Pin DFN Package

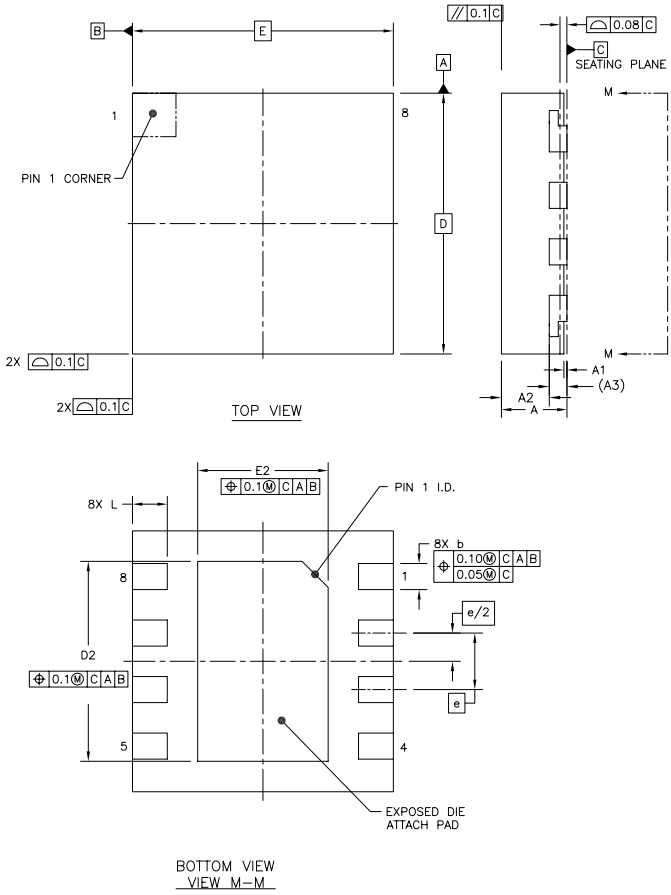
Pin #	Name	Type	Pin Description
1	VPS	Analog Input	Voltage position sense. Power supply output voltage information to be compared with the internal reference voltage.
2	DRV	Analog Output	External circuit drive, which drives an external circuit such as the opto-coupler LED.
3	PLRIN	Power Input	Pulse linear regulator input. Connect this pin through a diode (cathode to the pin) to the drain of the synchronous rectifier MOSFET.
4	DRAIN	Analog Input	Synchronous rectifier MOSFET drain voltage sensing.
5	OUT	Output	Synchronous rectifier MOSFET driver.
6	GND	Ground	Ground.
7	V_{CC}	Power Input	Output of internal LDO and PLR. It provides bias voltage for the internal logic circuit and the MOSFET driver. Connect this pin to a decoupling capacitor.
8	V_{IN}	Power Input	Connect to adapter/charger output for bias voltage. The internal LDO clamps the V_{CC} voltage at 5V when V_{IN} > 5V. It is also the input for the PLR enable comparator and the SR enable comparator.

5.0 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 1, I_{CC} = 15mA max)	V_{IN}	-0.3 to TBD	V
Continuous DC supply current at V_{IN} pin (V_{IN} = 9V)	I_{VO}	15	mA
Continuous DC supply current at V_{CC} pin (V_{CC} = 5.5V)	I_{VCC}	15	mA
Gate peak output current	I_G	±3	A
DRAIN pin voltage	V_D	-1.5 to 60	V
PLRIN		-1.5 to 60	V
PLRIN peak input current		500	mA
V_{CC} pin voltage	V_{CC}	6	V
DRV pin voltage		-0.3 to TBD	V
DRV pin current range (continuous)		15	mA
VPS pin voltage		-0.3 to V_{CC}	V
VPS pin current rating		1	mA
Junction temperature	T_J	-40 to 150	°C
Storage temperature		–65 to 150	°C
Thermal Resistance Junction-to-Ambient (DFN package)	θ_{JA}	67	°C/W
Thermal Resistance Junction-to-Ambient (SOIC-8 package)	θ_{JA}	160	°C/W
ESD rating per JEDEC JESD22-A114		2,000	V

6.0 Physical Dimensions



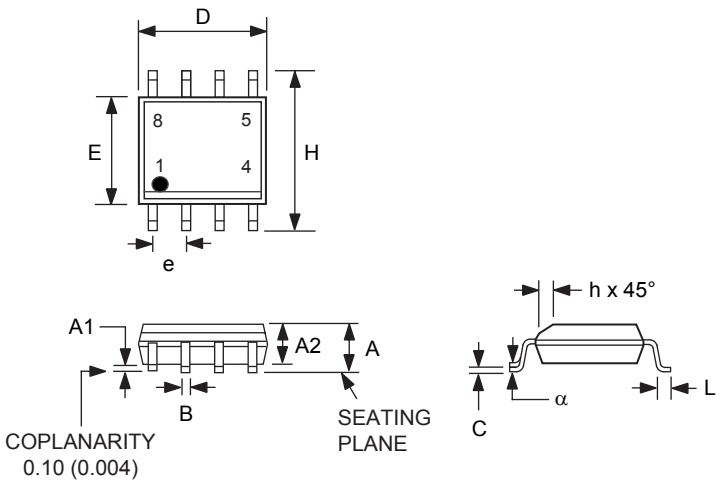
DESCRIPTION		SYMBOL	MILLIMETER		
			MIN	NOM	MAX
TOTAL THICKNESS		A	0.7	0.75	0.8
STAND OFF		A1	0	0.035	0.05
MOLD THICKNESS		A2	---	0.55	0.575
L/F THICKNESS		A3	0.203 REF		
LEAD WIDTH		b	0.25	0.30	0.35
BODY SIZE	X	E	3 BSC		
	Y	D	3 BSC		
LEAD PITCH		e	0.65 BSC		
EP SIZE	X	E2	1.4	1.5	1.6
	Y	D2	2.2	2.3	2.4
LEAD LENGTH		L	0.30	0.40	0.50

NOTES

1.0 COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD.

Figure 6.1 : Physical Dimensions of 8-Pin DFN Package

8-Lead Small Outline (SOIC) Package



Symbol	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.0040	0.010	0.10	0.25
A2	0.049	0.059	1.25	1.50
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
D	0.189	0.197	4.80	5.00
E	0.150	0.157	3.80	4.00
e	0.050 BSC		1.27 BSC	
H	0.228	0.244	5.80	6.20
h	0.10	0.020	0.25	0.50
L	0.016	0.049	0.4	1.25
α	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 < 270˚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.

Figure 6.2 : Physical Dimensions of 8-Lead SOIC Package

7.0 Ordering Information

Part Number	Options	Package	Description
iW671-00-SO8		SOIC-8	Tape & Reel[1]
iW671-00-DFN1		DFN, 8 pin	Tape & Reel[1]

Note 1: Tape & Reel packing quantity is 2,500 per reel. Minimum ordering quantity is 2,500.

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iWatt semiconductors are typically used in power supplies in which high voltages are present during operation. High-voltage safety precautions should be observed in design and operation to minimize the chance of injury.

Revision	Date	Change
0.1	8/12/2013	Product brief generated