

# JW7707C

## 60V, 13mΩ Synchronous Rectifier

### DESCRIPTION

JW7707C is a synchronous rectifier for Flyback converters. It integrates a 60V power MOSFET that can replace Schottky diode for high efficiency. It turns on the internal MOSFET if the  $V_{sw} < -500mV$  and turns it off before the current from GND to SW is lower than zero.

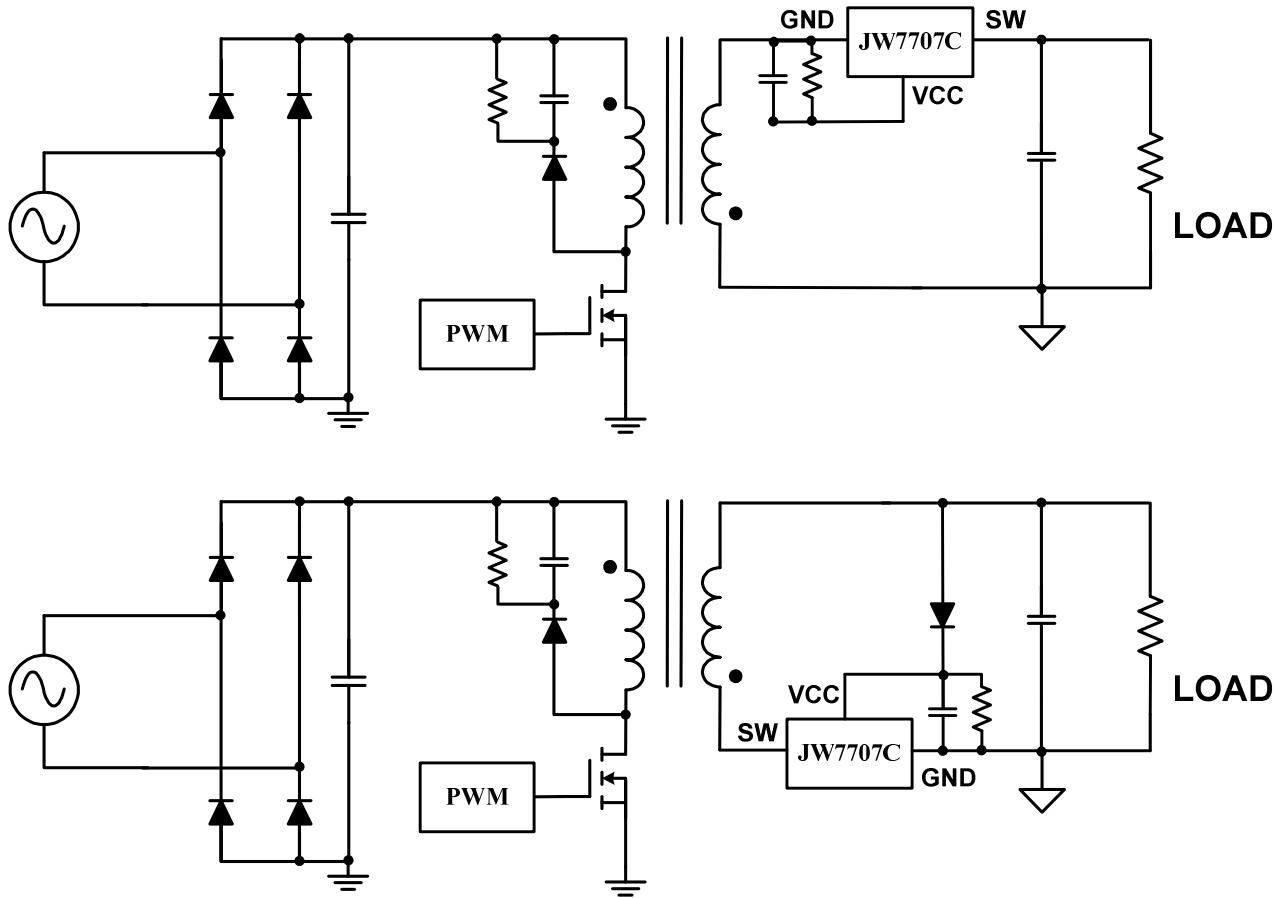
### FEATURES

- Supports DCM and Quasi-Resonant Flyback converter
- Integrated 13mΩ 60V Power MOSFET
- Supports High-side and Low-side Rectification
- No need external power supply

### APPLICATIONS

- Flyback converters
- Adaptors

### TYPICAL APPLICATION



## ORDER INFORMATION

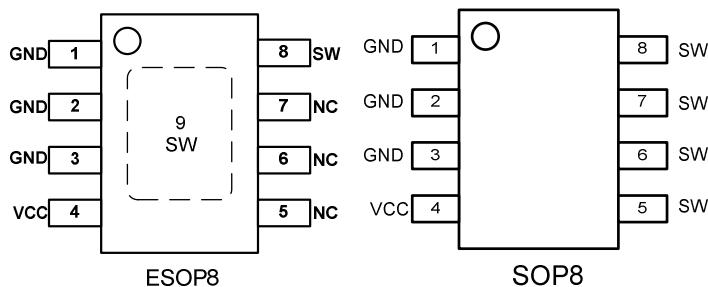
LEAD FREE FINISH	TAPE AND REEL	PACKAGE	TOP MARKING
JW7707CESOP#PBF	JW7707CESOP#TRPBF	ESOP8	JW7707C
JW7707CSOPB#PBF	JW7707CSOPB#TRPBF	SOP8	JW7707C

Note:

JWXXXXPPPF#TRPBF  
 └── Pb Free  
 └── Tape and Reel (If "TR" is not shown, it means Tube)  
 └── Package Code  
 └── Part Number

## PIN CONFIGURATION

TOP VIEW



## ABSOLUTE MAXIMUM RATING<sup>1)</sup>

SW PIN .....	60V
Maximum Power Dissipation <sup>2)</sup> .....	2.5W
Junction Temperature <sup>3)</sup> .....	150°C
Lead Temperature .....	260°C
Storage Temperature.....	-65°C to 150°C

## RECOMMENDED OPERATING CONDITIONS

SW Pin.....	20V to 55V
VCC PIN.....	7V to 9V
Operation Junction Temp. .....	-40°C to 125°C

## THERMAL PERFORMANCE<sup>4)</sup>

ESOP8 .....	50 ... 10°C/W
SOP8 .....	96 ... 45°C/W

### Note:

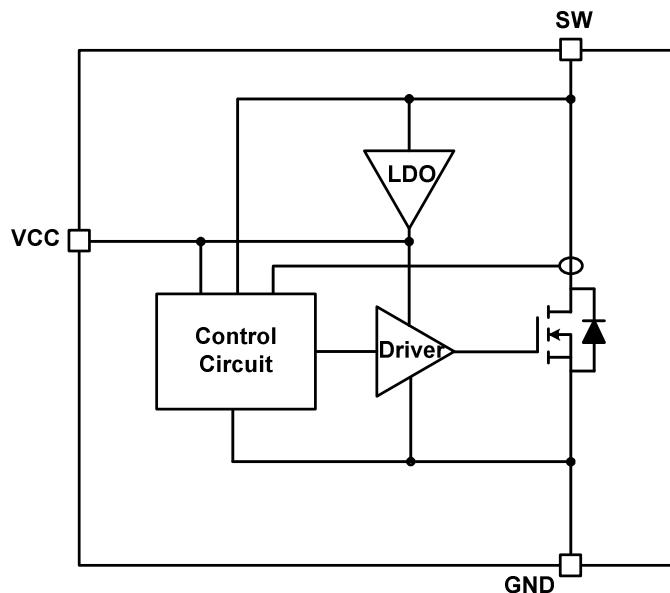
- 1) Exceeding these ratings may damage the device.
- 2) TA=25°C. The maximum allowable power dissipation is a function of the maximum junction temperature T<sub>J</sub>(MAX), the junction-to-ambient thermal resistance  $\theta_{JA}$ , and the ambient temperature T<sub>A</sub>. The maximum allowable continuous power dissipation at any ambient temperature is calculated by P<sub>D</sub>(MAX)=(T<sub>J</sub>(MAX)-T<sub>A</sub>)/  $\theta_{JA}$ . Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.
- 3) Measured on JESD51-7, 4-layer PCB.

## ELECTRICAL CHARACTERISTICS

<i>TA = 25°C, unless otherwise stated.</i>						
Item	Symbol	Condition	Min.	Typ.	Max.	Units
Internal MOS turn on Threshold	V <sub>MOS_ON</sub>			-0.5		V
Internal MOS turn on delay	T <sub>DON</sub>			190		ns
Internal MOS turn off delay	T <sub>DOFF</sub>			10		ns
GT On Blanking Time	T <sub>B</sub>			500		ns
MOS Minimum off time	T <sub>OFF_MIN</sub>			2.5		uS
Internal MOS R <sub>dson</sub>	R <sub>dson</sub>	VCC=8.5V, I <sub>sw</sub> =8A		13		mΩ
Maximum Peak Current	I <sub>peak</sub>	T <sub>J</sub> =25°C		58		A
Quiescent Current	I <sub>q</sub>	VCC=6V, C <sub>VCC</sub> =0.1uF	44	56	68	uA
Drain to Source Breakdown Voltage	V <sub>(BR)DSS</sub>	VCC=10V, I <sub>sw</sub> =250uA	60			V
VCC Voltage	V <sub>CC</sub>	SW=40V, VCC=0.1uF		7.8		V
VCC startup voltage	V <sub>CC_ON</sub>			3.85		V
VCC UVLO	V <sub>CC_UVLO</sub>			3.6		V

**PIN DESCRIPTION**

Pin No.		Name		Description
ESOP	SOP			
1、2、3	1、2、3	GND	Ground	
4	4	VCC	Power supply, Bypass a capacitor between VCC and GND.	
5、6、7		NC		
8、9	5、6、7、8	SW	Internal Power MOSFET Drain.	

**BLOCK DIAGRAM**

## FUNCTIONAL DESCRIPTION

### Operation

JW7707C is a synchronous rectifier, it can replace the Schottky to improve the efficiency in Flyback converters. It supports operation in DCM and Quasi-Resonant Flyback converters. It can power itself through the internal LDO during the turn-off period, a 0.1uF capacitor is needed between VCC and GND.

### Turn-on Blanking Time

The control circuitry contains a blanking function. When the internal MOSFET is turned on, it at least last for some time, the turn on blanking time is about 500ns. During the turn on blanking period, the turn off threshold is not totally blanked, but changes the threshold current. This assures that the internal MOSFET can always be turned off even during the blanking period.

### Under-Voltage Lockout (UVLO)

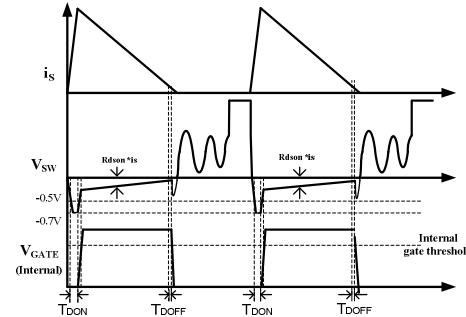
When the VCC is below UVLO threshold, the internal MOSFET is turned off and never turned on before the VCC exceeds the startup voltage.

### Turn On Phase

The switch current first flows through the body diode of integrate MOSFET, which generates a negative  $V_{SW}$ . When the  $V_{SW}$  is higher than 0.7V and then  $V_{SW}$  is lower than  $V_{MOS\_ON}$ , it turns on the integrate MOSFET after 190ns delay.

### Turn Off Phase

The JW7707C senses the current of the internal MOSFET  $I_{SW}$ , before  $I_{SW}$  is lower than Internal MOS turn off threshold, the driver voltage of the switch is pulled down to zero after 10ns delay.



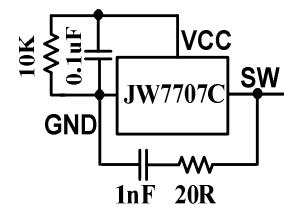
Turn on and turn off delay

### Startup

During the startup period, when the VCC is lower than startup voltage, the internal MOSFET is turned off. The current flows though body diode until the VCC exceeds the startup voltage.

### RC Snubber Circuit

In some applications (output short circuit protection), the inductor current may go into slight CCM condition. To avoid the voltage spike across the synchronous rectifier, we suggest RC snubber should be placed between SW and GND, and a resistor should be paralleled with VCC capacitor.

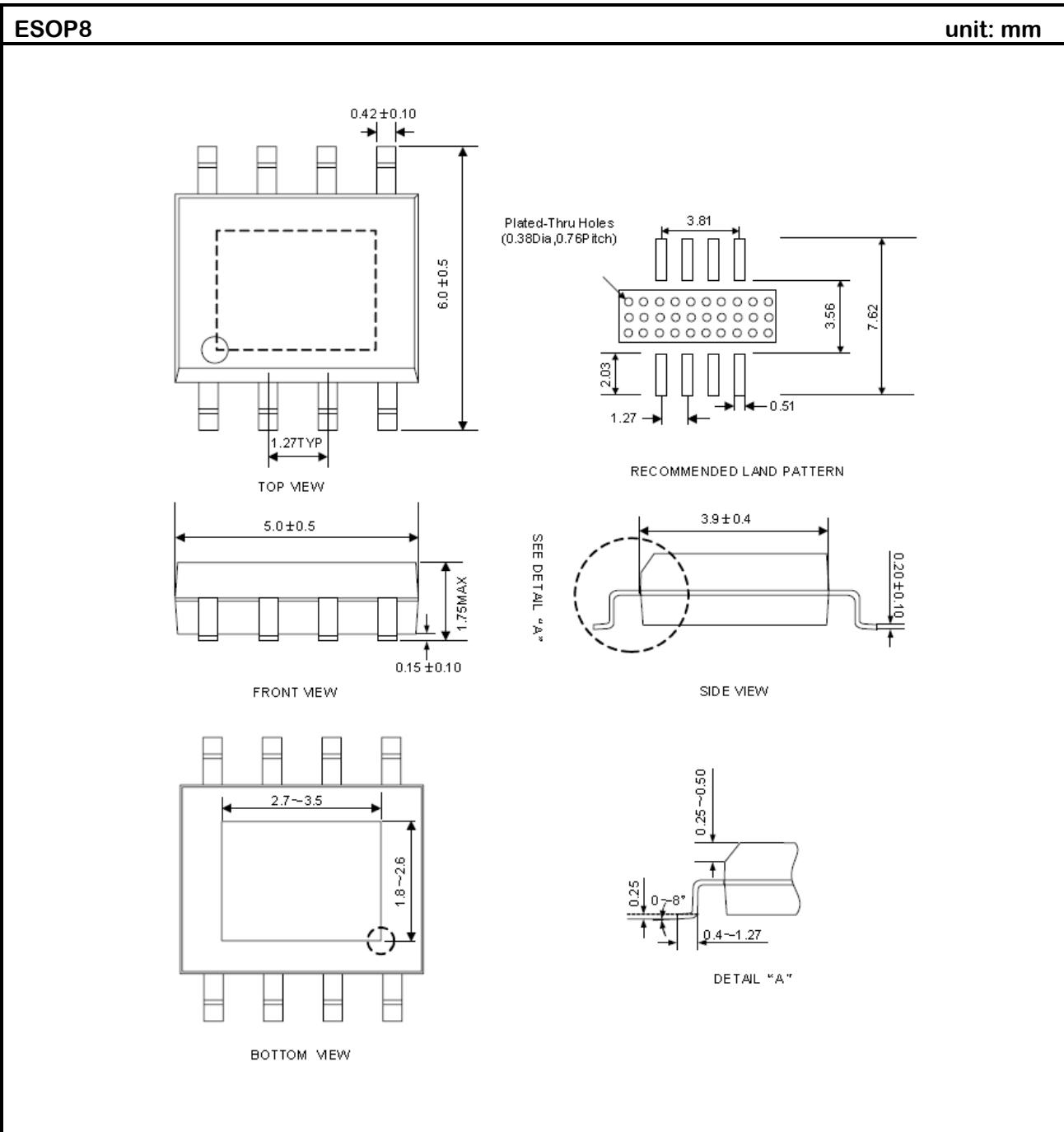


RC Snubber circuit

### PCB Layout Guidelines

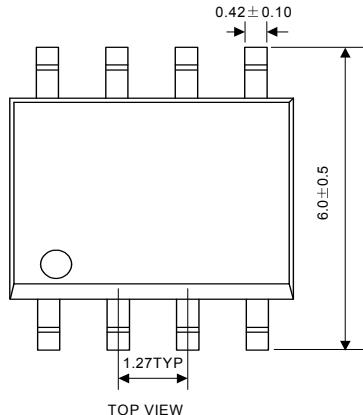
1. The VCC pin must be locally bypassed with a capacitor.
2. The PAD must be connected to main power loop.
3. NC pins can be connected to SW pins

## PACKAGE OUTLINE

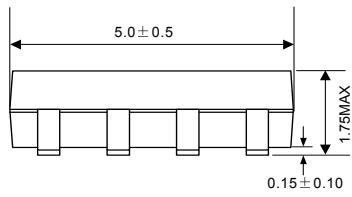


SOP8

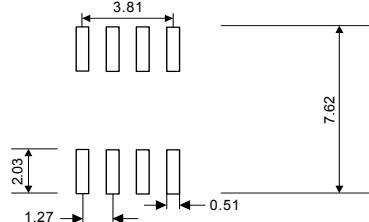
UNIT: mm



TOP VIEW

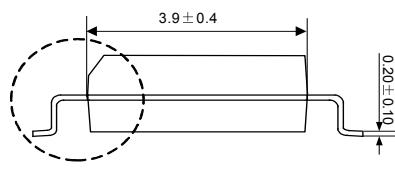


FRONT VIEW

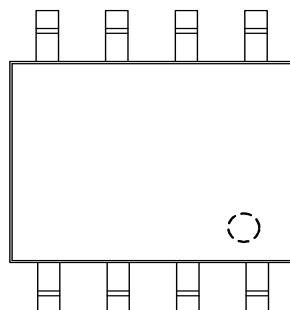


RECOMMENDED LAND PATTERN

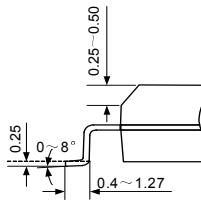
SEE DETAIL "A"



SIDE VIEW



BOTTOM VIEW



DETAIL "A"