



SP6003

Synchronous Rectifier MOSFET Driver

DESCRIPTION

The fundamental of SP6003 synchronous rectifier (SR) driver IC is based on our U.S. patented methods that utilize the principle of “prediction” logic circuit. The IC deliberates previous cycle timing to control the SR in present cycle by “predictive” algorithm that makes adjustments to the turn-off time, in order to achieve maximum efficiency and avoid cross-conduction at the same time. Additionally, it maintains the MOSFET’s body diode conduction at minimum level.

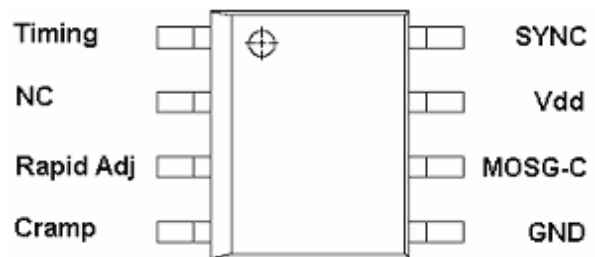
FEATURES

- Offers 4 to 8% efficiency improvement over Schottky Diode (depending on drive configuration of the SR switch).
- Controls Synchronous Rectifier (SR) MOSFET.
- Flyback converter topology.
- Prediction gate timing control.
- Minimum MOSFET body diode conduction.
- Operating frequency up to 350 KHz.
- Synchronizes to transformer secondary voltage waveform.

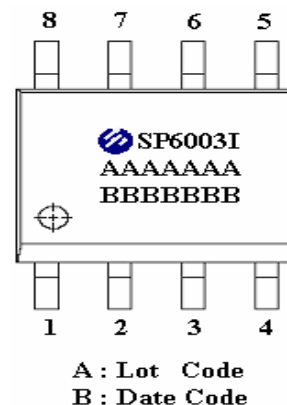
APPLICATIONS

- Isolated flyback topology power supplies.
- Operates in either AC/DC or DC/DC mode.
- Capable of driving all logic level Power MOSFET.

PIN CONFIGURATION(SOP-8P)



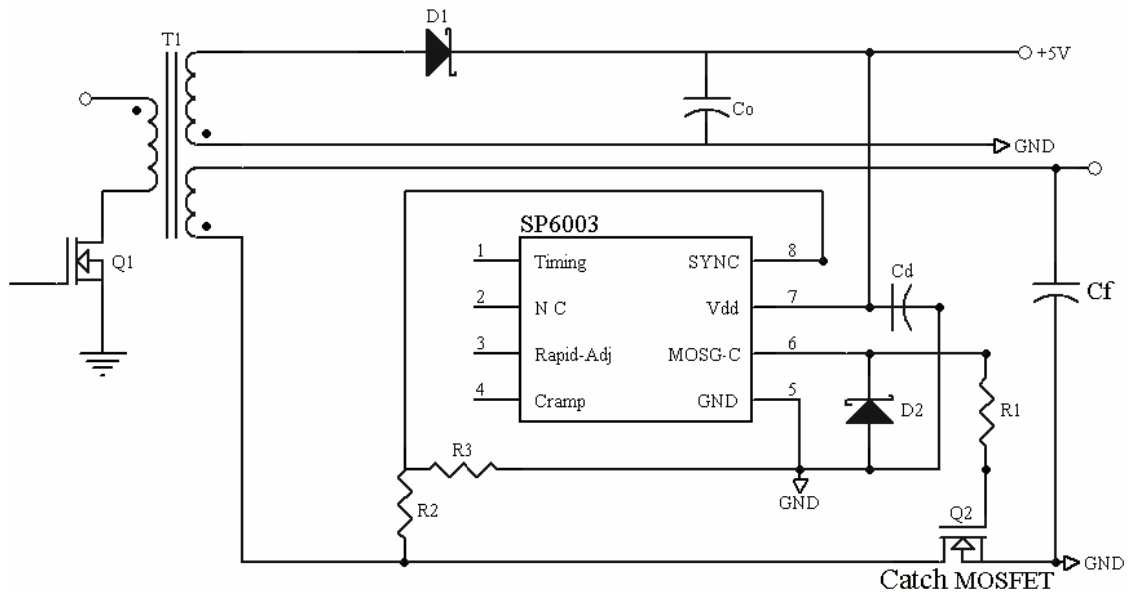
PART MARKING





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TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION

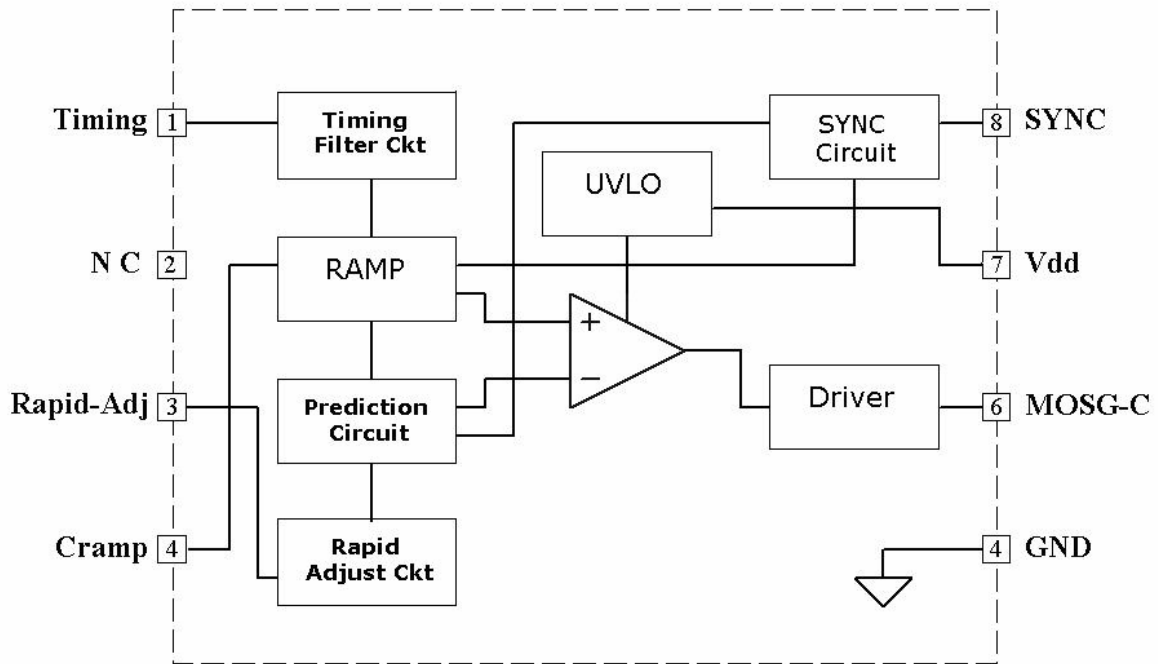
Pin	Symbol	Description
1	Timing	Discontinuous current filter timing adjustment resistor connection.
2	NC	No connection.
3	Rapid-Adj	Capacitor connection to adjust fast pulse width reduction response.
4	Cramp	Ramp capacitor adjustment to extend MOSFET's gate timing.
5	GND	Ground connection.
6	MOSG-C	Catch MOSFET gate drive.
7	Vdd	DC supply voltage.
8	SYNC	Synchronized signal from transformer's output.



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BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6003S8R	SOP- 8P	SP6003 I
SP6003S8RG	SOP- 8P	SP6003 I

SP6003S8RG : Pb - Free

ABSOLUTE MAXIMUM RATINGS (TA=25°C, unless otherwise specified.)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
Vdd	DC Supply Voltage	7	V
SYNC	SYNC Voltage	7.5	V
IOUT	Peak Source Current (Pulsed)	1	A
	Peak Sink Current (Pulsed)	1.5	A
PD	Power Dissipation @ TA=85°C (*)	0.25	W
TOPJ	Operating Junction Temperature Range	-40 to 125	
TSTG	Storage Temperature Range	-40 to 150	
TLEAD	Lead Soldering Temperature for 10 sec.	300	



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THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
Rthjc	Thermal Resistance Junction – Case (*)	45	/W

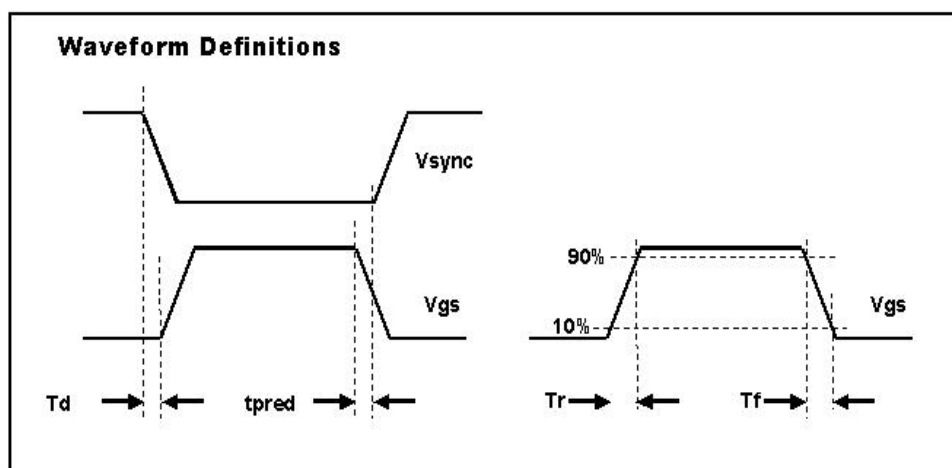
(*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.

ELECTRICAL CHARACTERISTICS

(TA=25 °C, VDD=5V, VSYNC=5V, Freq. =300 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY INPUT						
IDD	Supply current	No load		5		mA
Vonh	Vdd turn on threshold			4.2		V
Voffh	Vdd turn off threshold			4.0		V
SYNC REFERENCE (SYNC)						
Vshth	SYNC high threshold			3.9		V
Vslth	SYNC low threshold			0.9		V
MOSFET GATE DRIVER (MOSG-F)						
Voh	Output high voltage	IMOSG-C=-200mA	4.8	4.9	5.0	V
Vol	Output low voltage	IMOSG-C=200mA	0.0	0.1	0.2	V
Td	Propagation delay	No load	15	20	25	ns
Tr	MOSG-F rise time	Load = 1nF (*)	24	28	36	ns
Tf	MOSG-F fall time	Load = 1nF (*)	20	23	30	ns

(*) Tr & Tf are measured among 10% and 90% of starting and final voltage.





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PERFORMANCE CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

Figure 1: Supply Current vs Supply Voltage

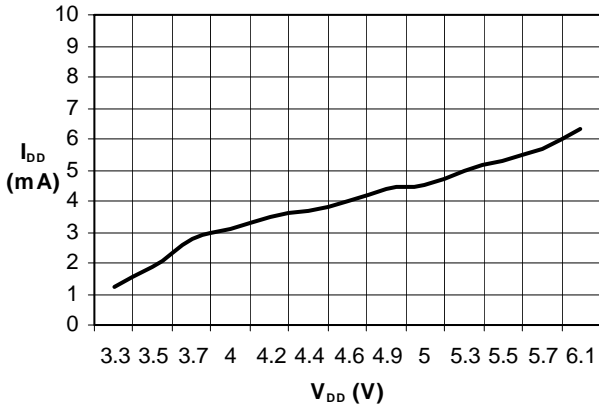


Figure 4: Supply Current vs Load Capacitor

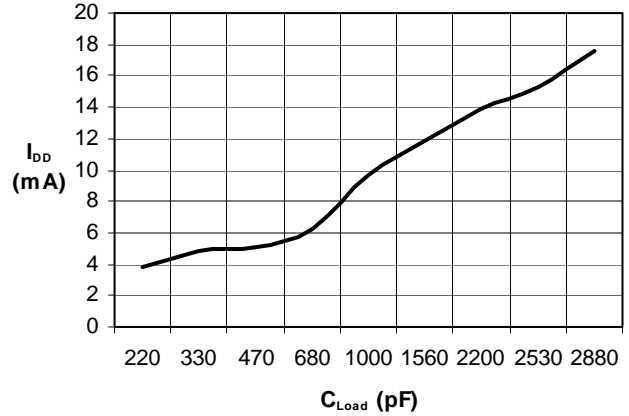


Figure 2: Output Rise Time vs Load Capacitor

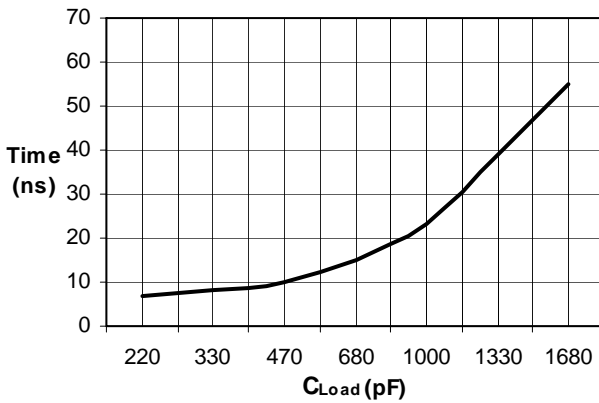


Figure 5: Supply Current vs Freq. @ No Load

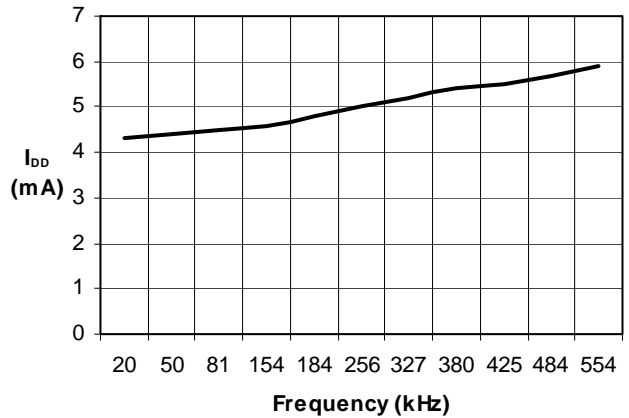


Figure 3: Output Fall Time vs Load Capacitor

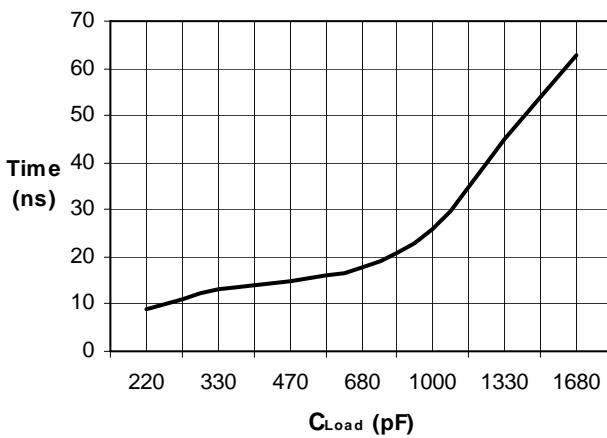
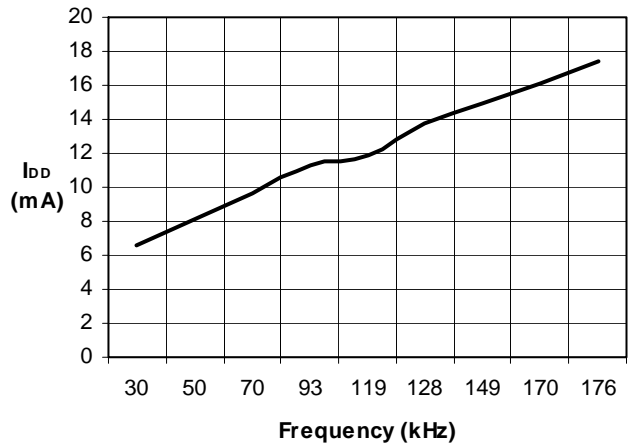


Figure 6: Supply Current vs Freq. @ Load=1nF



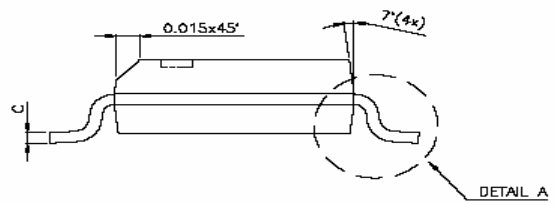
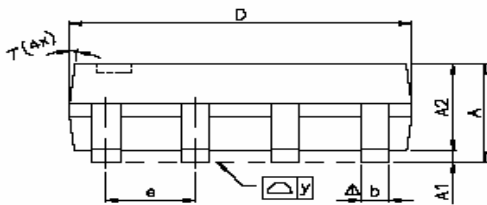
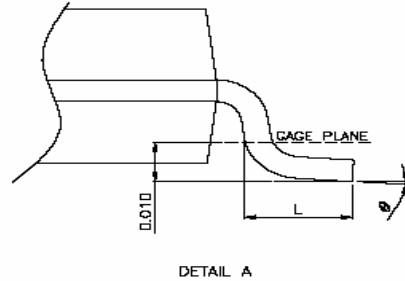
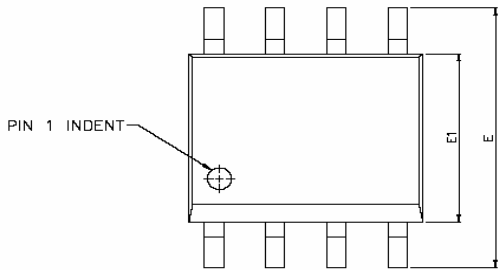
*Fig. 2-4: Frequency = 85 kHz.



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SOP- 8 PACKAGE OUTLINE



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	—	0.25	0.004	—	0.010
A2	—	1.45	—	—	0.057	—
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	—	1.27	—	—	0.050	—
L	0.38	0.71	1.27	0.015	0.028	0.050
Δ y	—	—	0.076	—	—	0.003
θ	0°	—	8°	0°	—	8°



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