SP6002
Synchronous Rectifier Driver

DESCRIPTION

The fundamental of SP6002 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. It also maintains the MOSFET's body diode conduction at minimum level. The SP6002 is capable to adapt in almost all existing forward converters with few adjustments considered necessary.

FEATURES

- Offers 4 to 8% efficiency improvement over Schottky Diodes (depend on drive configuration of the SR).

- Drives all logic level Power MOSFET.

- Prediction gate timing control.

- Minimum MOSFET body diode conduction.

- Operating frequency up to 650 KHz.

- Synchronize to transformer secondary voltage waveform.

APPLICATIONS

- Servers & workstations

- Storage area network power supplies

- Telecommunication converters

- Embedded systems

- Industrial & commercial systems using high current processors

PIN CONFIGURATION (SOP-8)

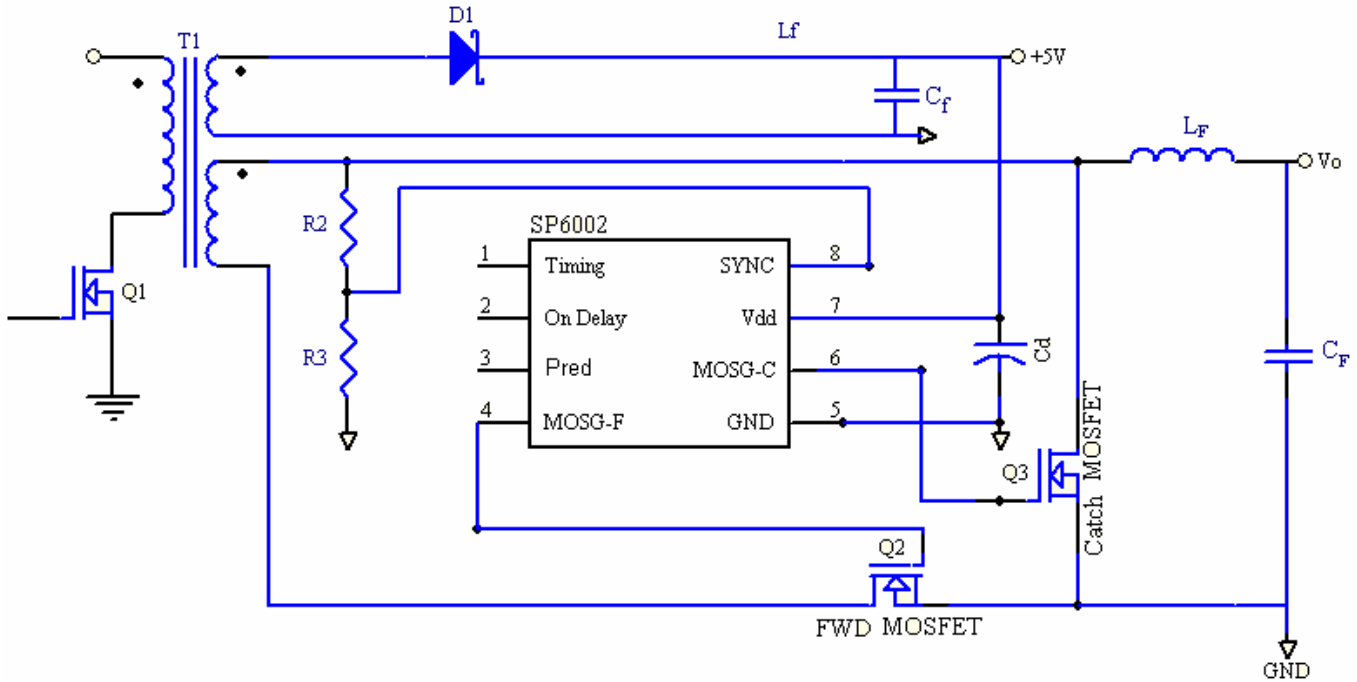| Timing | SYNC |
On Delay	Vdd
Pred	MOSG-C
MOSG-F	GND

PART MARKING

SP6002I
AAAAAAA
BBBBBBB

A : Lot Code
B : Date Code

TYPICAL APPLCATION CIRCUIT

PIN DESCRIPTION

Pin	Symbol	Description
1	Timing	Discontinuous current filter timing adjustment resistor connection.
2	On Delay	Imposed delay between Catch gate turn OFF and Forward gate turn ON.
3	Pred	Capacitor to store previous cycle timing for Catch MOSFET
4	MOSG-F	Forward MOSFET gate drive.
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
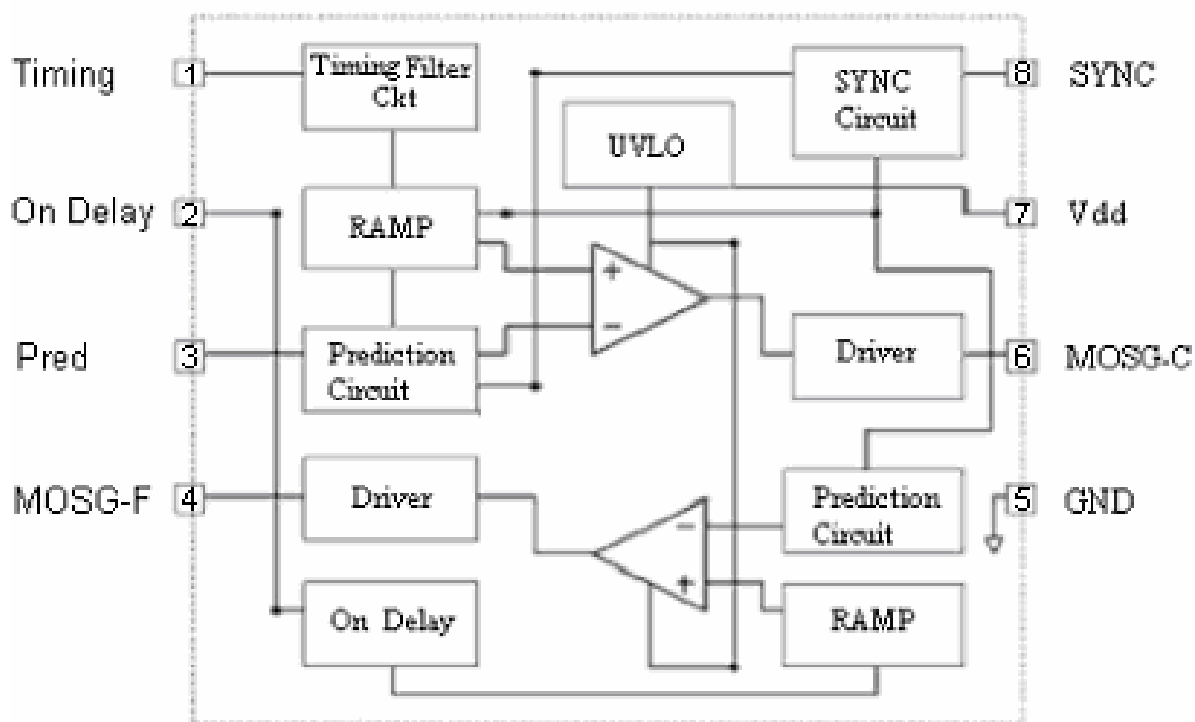
ORDERING INFORMATION

Part Number	Package	Part Marking
SP6002S8RG	SOP-8	SP6002**I**
SP6002S8TG	SOP-8	SP6002**I**

※ SP6002S8RG : 7" Tape Reel ; Pb – Free

※ SP6002S8TG : Tube ; Pb – Free

ABSOULTE MAXIMUM RATINGS (T_A=25℃, unless otherwise specified.)
The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V_{dd}	DC Supply Voltage	7	V
V_{SYNC}	SYNC Voltage	7.5	V
I_{OUT}	Peak Source Current (Pulsed)	1	A
	Peak Sink Current (Pulsed)	1.5	A
P_D	Power Dissipation @ T_A=85℃ (*)	0.25	W
T_J	Operating Junction Temperature Range	-40 to 150	℃
T_{STG}	Storage Temperature Range	-40 to 150	℃
T_{LEAD}	Lead Soldering Temperature for 5 sec.	260	℃

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R$_{\Theta JC}$	Thermal Resistance Junction – Case (*)	45	℃/W

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

ELECTRICAL CHARACTERISTICS

(T$_A$=25℃, V$_{dd}$=5V, V$_{SYNC}$=5V, Freq. =300 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY INPUT						
Idd	Supply current	No load	4	5.5	8	mA
Vonth	Vdd turn on threshold(*)			5.0	7.0	V
Voffth	Vdd turn off threshold		3.8	4.1		V
SYNC REFERENCE (SYNC)						
Vshth	SYNC high voltage		3.9	5.0		V
Vslth	SYNC low voltage			0.9	1.2	V
MOSFET GATE DRIVER (MOSG-C & MOSG-F)						
Voh	Output high voltage	Io = -200mA	4.8	4.9	5.0	V
Vol	Output low voltage	Io = 200mA	0.0	0.1	0.2	V
Td	Propagation delay	No load	15	20	25	ns
Tr	Rise time	Load = 1nF (**)	24	28	36	ns
Tf	Fall time	Load = 1nF (**)	20	23	30	ns
Tpred	Delay time	No load		100		ns

(*) We have build in a diode from SYNC(pin8) to VDD(pin7).
(**) Tr & Tf are measured among 10% and 90% of starting and final voltage.
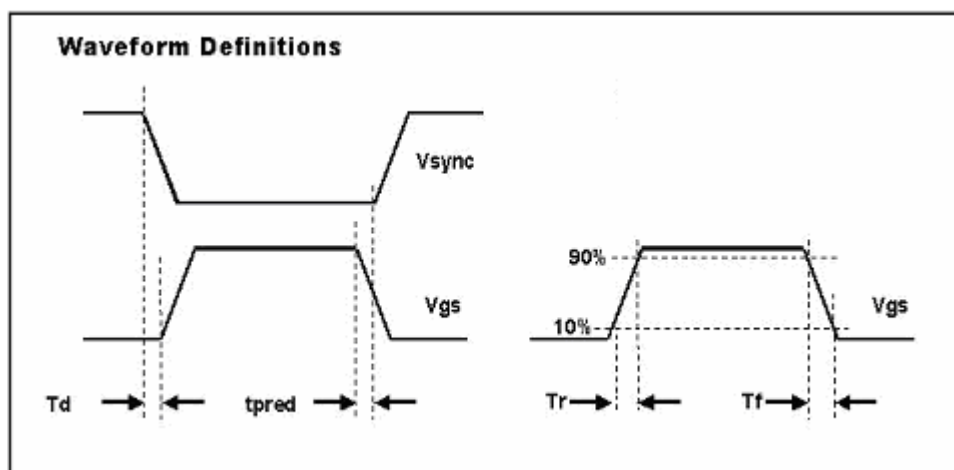
Vgs = MOSG-C Output

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PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)
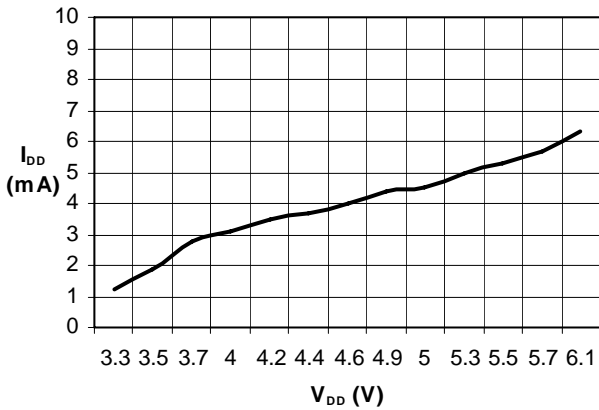
Figure 1: Supply Current vs Supply Voltage

I_{DD} (mA) vs V_{DD} (V)

Figure 4: Supply Current vs Load Capacitor

I_{DD} (mA) vs C_{Load} (pF)
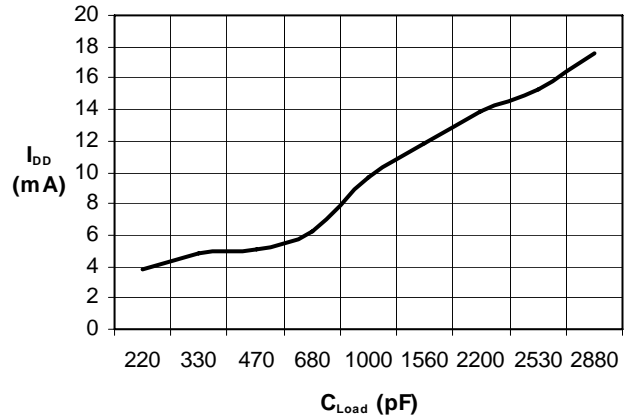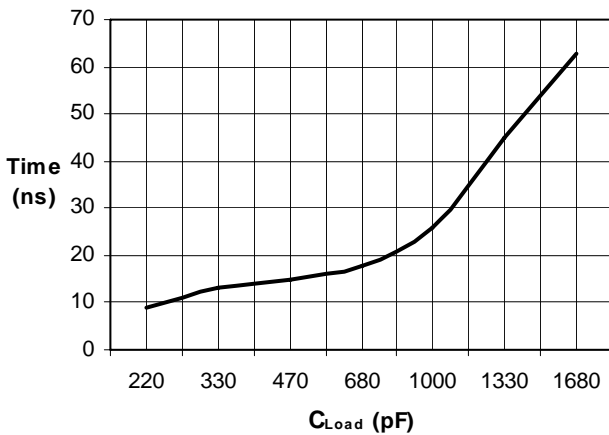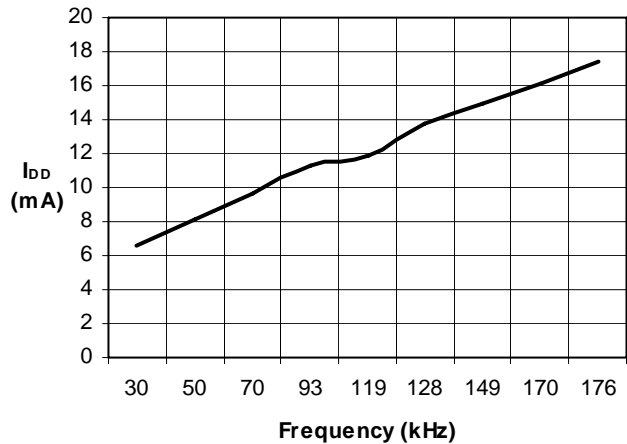
Figure 2: Output Rise Time vs Load Capacitor

Time (ns) vs C_{Load} (pF)
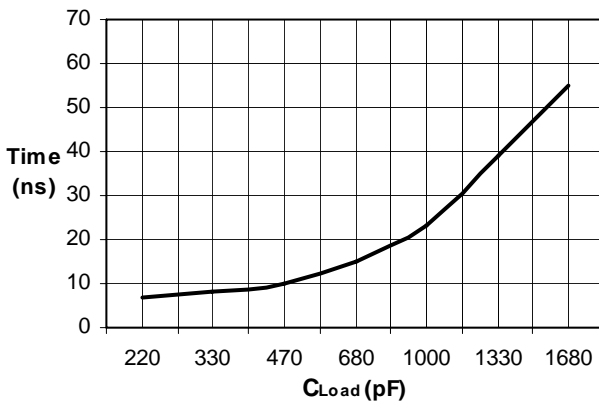
Figure 5: Supply Current vs Freq. @ No Load

I_{DD} (mA) vs Frequency (kHz)
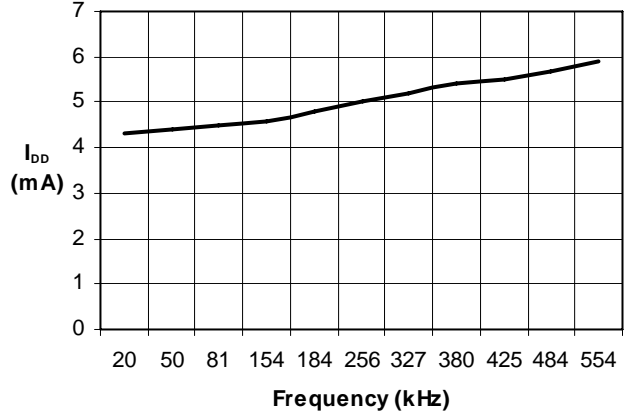
Figure 3: Output Fall Time vs Load Capacitor
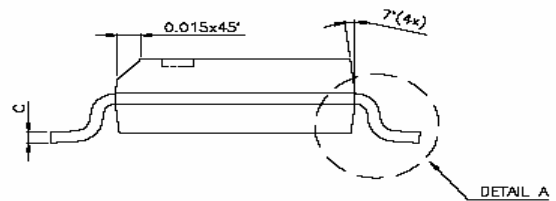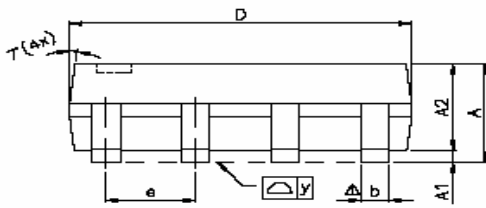
Time (ns) vs C_{Load} (pF)

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

I_{DD} (mA) vs Frequency (kHz)

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SOP- 8 PACKAGE OUTLINE
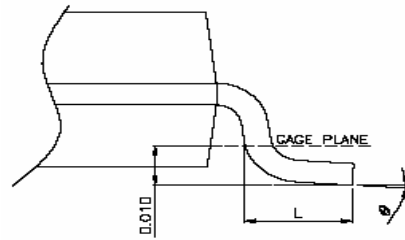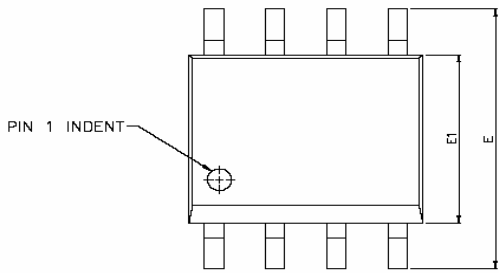
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	——	0.25	0.004	——	0.010
A2	——	1.45	——	——	0.057	——
b	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	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
y	——	——	0.076	——	——	0.003
θ	0°	——	8°	0°	——	8°

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