SP6018E
Synchronous Rectifier Driver

DESCRIPTION

The fundamental of SP6018E 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. Specially, SP6018E is designed for Resonance. It also maintains the MOSFET's body diode conduction at minimum level. The SP6018E is capable to adapt in almost all existing Resonance converters with few adjustments considered necessary.

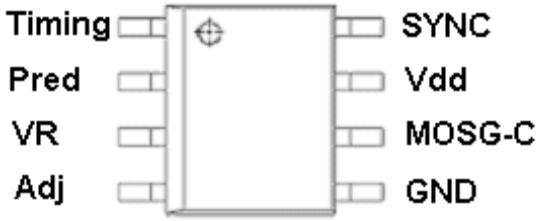
FEATURES

- Offers efficiency improvement over Schottky Diode (depends on drive configuration of the SR).
- Low Standby Power to meet DOE Lot 6 requirement.
- Prediction gate timing control.
- Minimum MOSFET body diode conduction.
- Operating frequency up to 400 KHz.
- Synchronize to transformer secondary voltage waveform.
- Internal over voltage protection

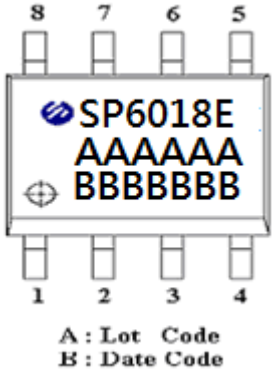
APPLICATIONS

- Switching Mode Power Supply
- Storage area network power supplies
- Telecommunication converters
- Embedded systems
- Industrial & commercial systems using high current processors
- Power converters to meet Lot 6 requirement

PIN CONFIGURATION (SOP-8)

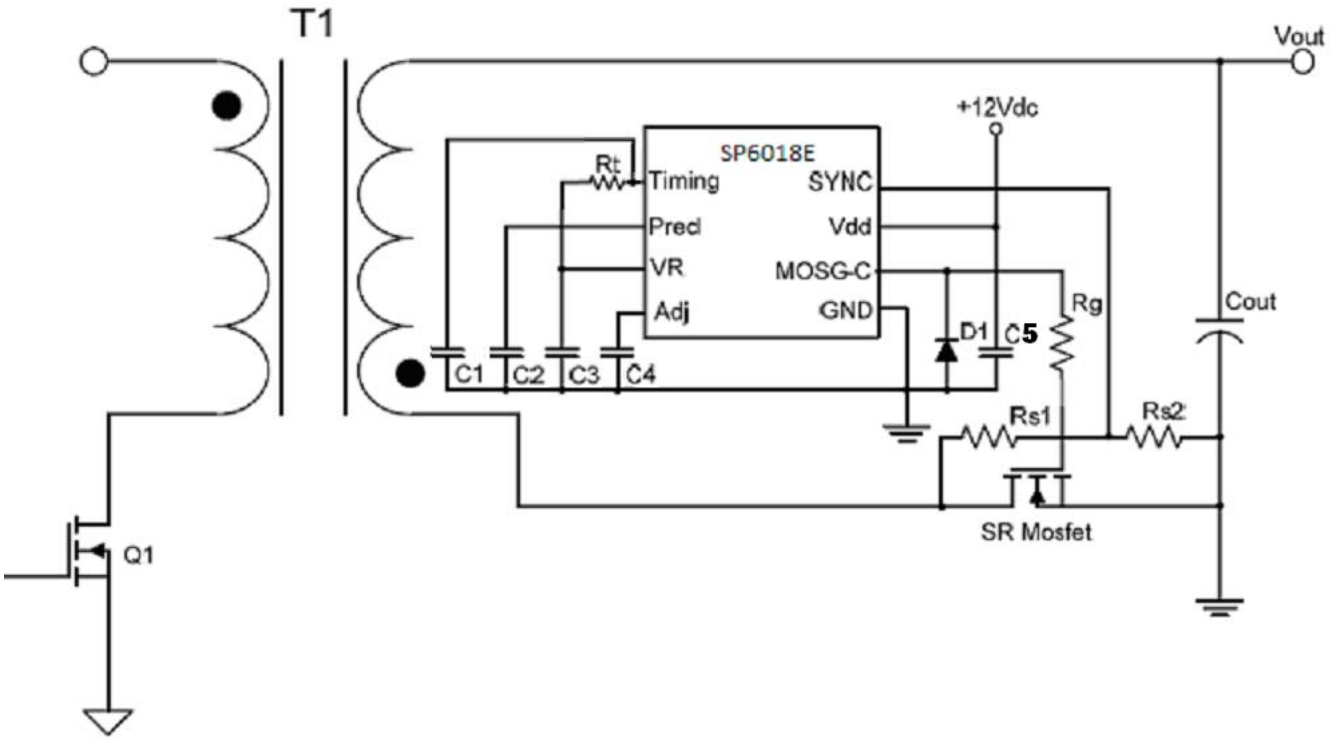


PART MARKING



A : Lot Code
B : Date Code

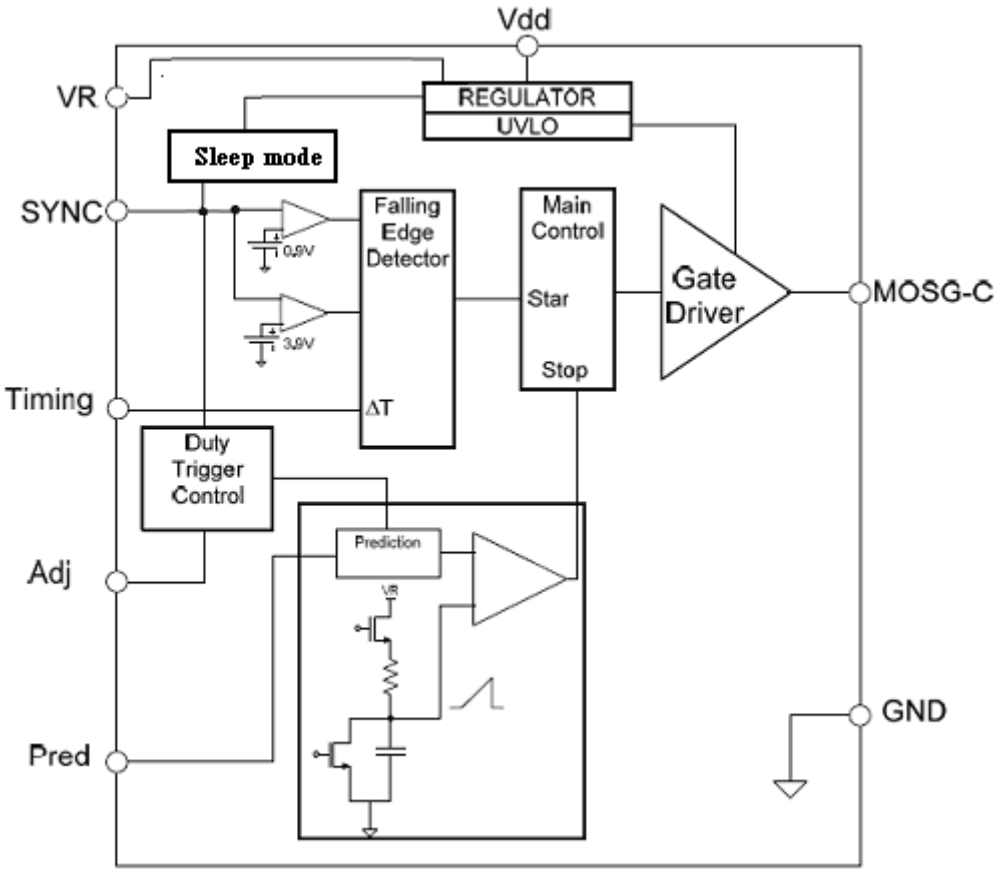
TYPICAL APPLCATION CIRCUIT



PIN DESCRIPTION

Pin	Symbol	Description
1	Timing	Discontinuous current filter timing adjustment resistor connection.
2	Pred	Capacitor to store previous cycle timing for SR MOSFET.
3	VR	Voltage Regulator.
4	Adj	Trigger point adjustment for Dynamic state.
5	GND	Ground connection.
6	MOSG-C	Catch MOSFET gate drive.
7	Vdd	DC supply voltage.
8	SYNC	Synchronized signal from the V_{DS} of SR MOSFET.

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6018ES8RGB	SOP-8	SP6018E
SP6018ES8TGB	SOP-8	SP6018E

※ SP6018ES8RGB : Tape Reel ; Pb – Free ; Halogen - Free

※ SP6018ES8TGB : Tube ; Pb – Free ; Halogen - Free

ABSOULTE MAXIMUM RATINGS (TA=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	16	V
I_{OUT}	Peak Source Current (Pulsed)	2.0	A
	Peak Sink Current (Pulsed)	2.0	A
P_D	Power Dissipation @ T_A=85℃ (*)	0.25	W
T_J	Operating Junction Temperature Range	-40 to125	℃
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

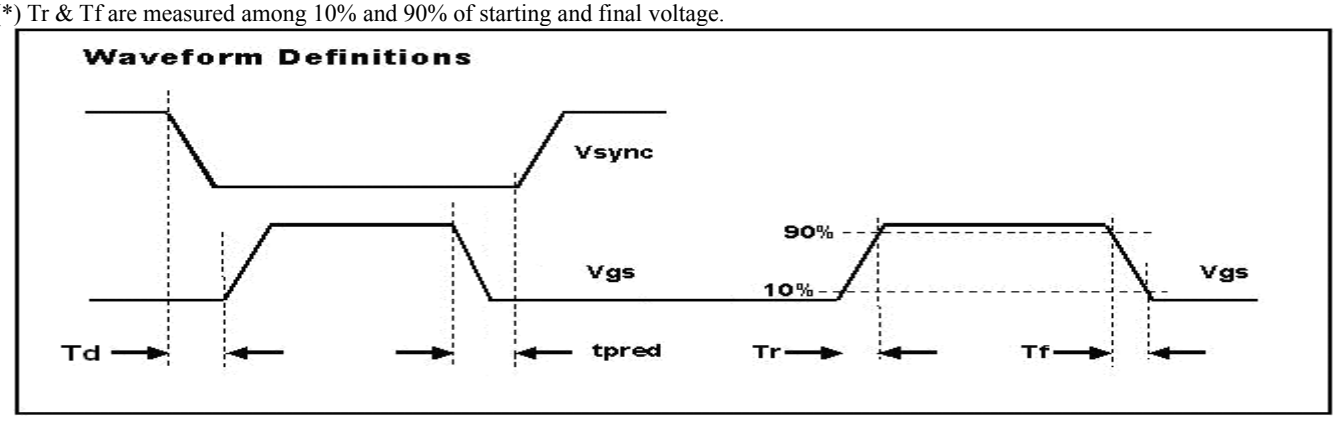
(*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.

ELECTRICAL CHARACTERISTICS

(T_A=25℃, V_{dd}=12V, Freq. =50 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY INPUT						
I_{DD}	Supply current	Sleep Mode		0.15		mA
		V_{SYNC}=0V, Vdd on		3	4	mA
Vdd	Supply voltage	Idd peak < 2A			16	V
Vdd on	Enable voltage		9	10	11	V
Vdd hysteresis	Hysteresis Voltage of Supply Voltage			0.7		V
Vovp	Over voltage protection		15	16		V
Vovp hysteresis	Hysteresis Voltage of OVP			1.2		V
SYNC REFERENCE (SYNC)						
Vshth	SYNC high threshold		3.5	3.9		V
Vslth	SYNC low threshold			0.9	1.2	V
Vsync	SYNC clamp voltage	Isync=3mA	10		16	V
Isync	SYNC input current				3	mA
Voltage Regulator REFERENCE (VR)						
V_R	Reference Voltage		5.2		5.4	V
I_{VR}	VR Output Current				20	mA
ON TIME DUTY SETUP (PIN 6)						
$T_{on\text{-}time}$				19	20	us
MOSFET GATE DRIVER (MOSG-C)						
Voh	Output high voltage	Io = -200mA	10.5	11.0		V
Vol	Output low voltage	Io = 200mA		0.5	0.8	V
Td	Propagation delay	No load	50	80		ns
Tpred		No load		120		ns
Tr	Rise time	Load = 1nF (*)		10	25	ns
Tf	Fall time	Load = 1nF (*)		10	25	ns
Dynamic Protect						
Dt	Dynamic variable	Pin 4 open		600		ns
Ton-min	MOSG-C on time	PWM adjusts time > Dt		1		us

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



PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)

Figure 1: Supply Current VS Supply Voltage

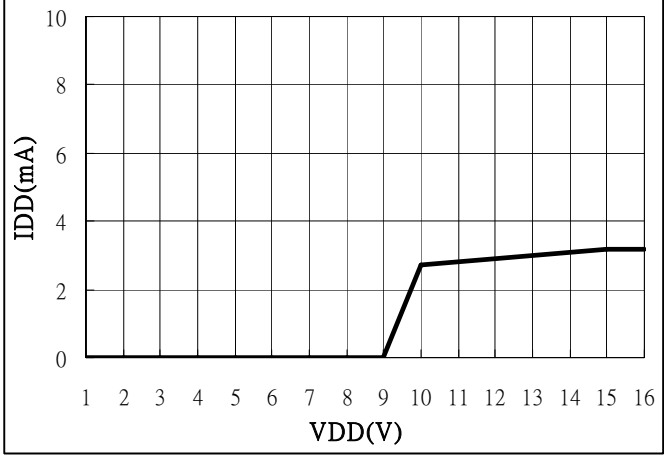


Figure 2: VR Voltage VS Supply Voltage

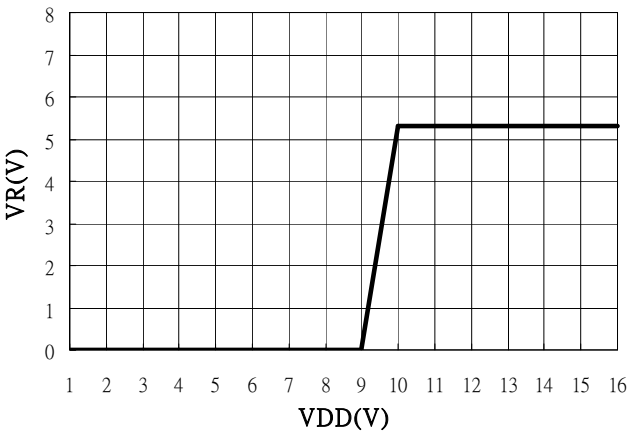


Figure 3: Tpred VS Cpred

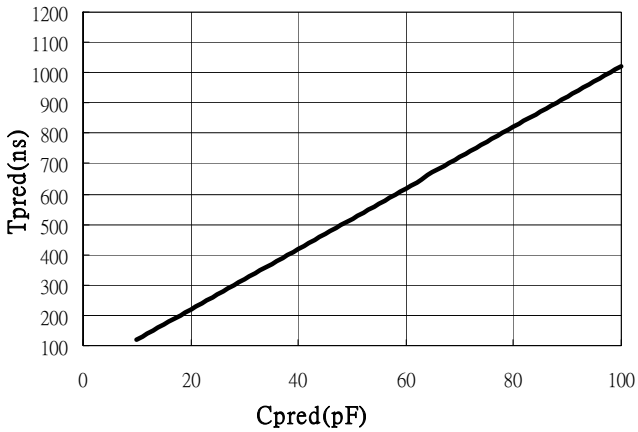


Figure 4: Dynamic time VS C adj (pF)

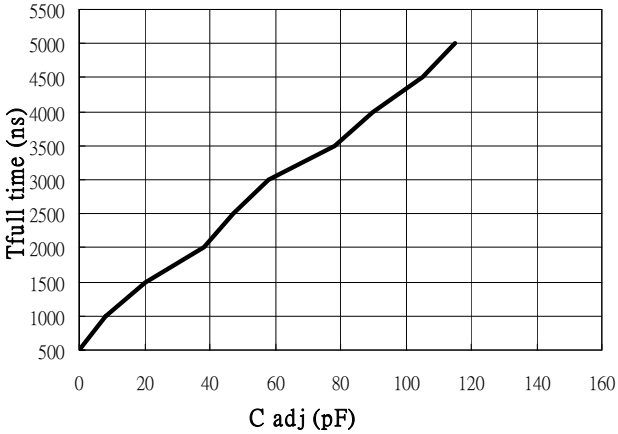


Figure 5: Output Fall Time VS Load Capacitor

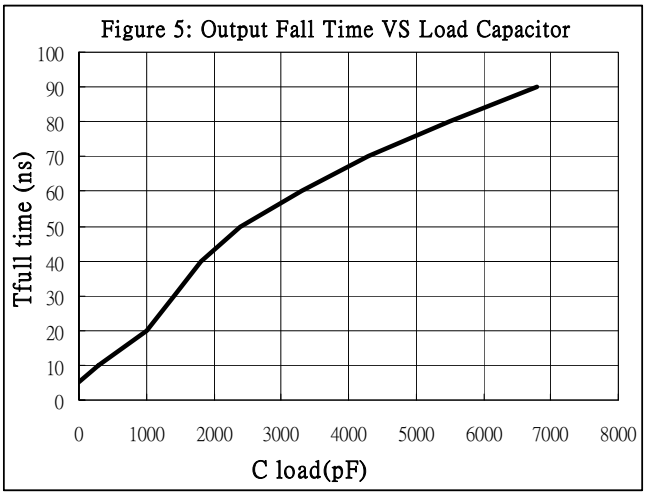


Figure 6: Output Rise Time VS Load Capacitor

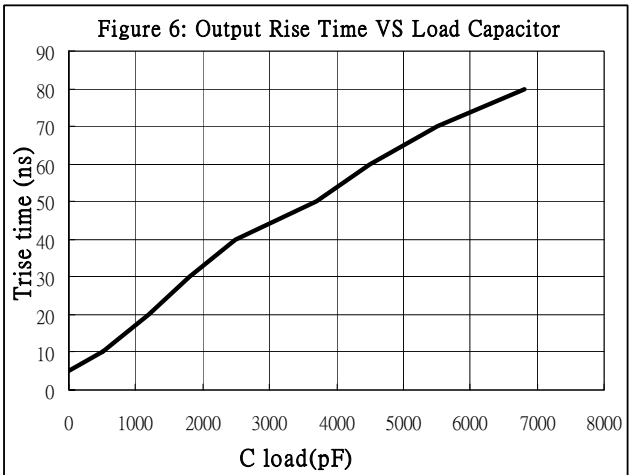
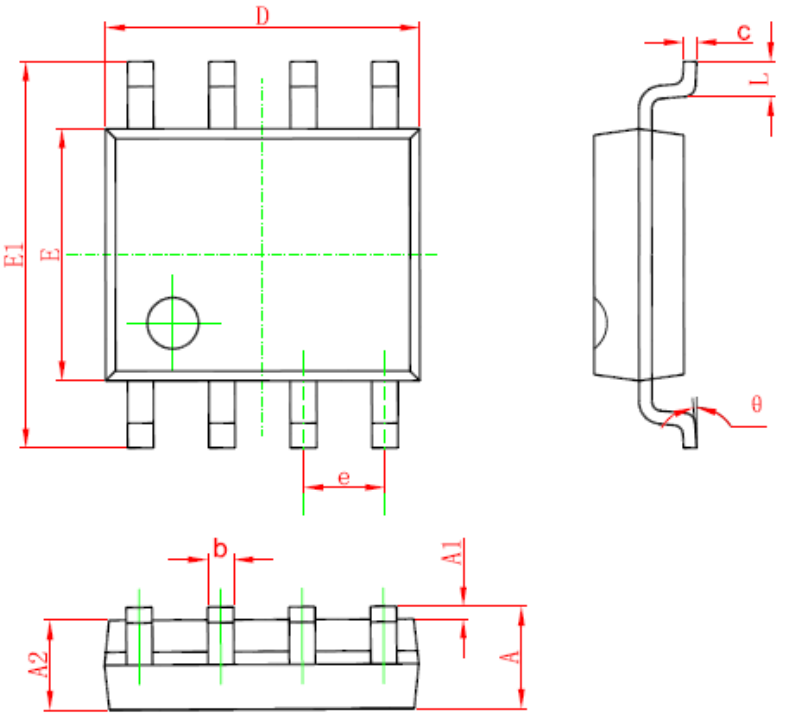


*Fig. 1 : No Load ; No SYNC
*Fig. 3 : Frequency = 100 kHz
*Fig. 4~5 : Frequency = 65 kHz.

SOP- 8 PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

SYNC Power Corporation
7F-2, No.3-1, Park Street
NanKang District (NKSP), Taipei, Taiwan, 115, R.O.C
Phone: 886-2-2655-8178
Fax: 886-2-2655-8468
http://www.syncpower.com