



# SP6019C

## Synchronous Rectifier Driver

### DESCRIPTION

The fundamental of SP6019C 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. SP6019C is specially suitable for Forward and DC/DC Module.

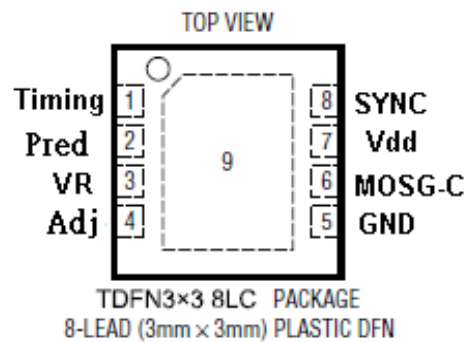
### FEATURES

- Offers efficiency improvement over Schottky Diode (depends on drive configuration of the SR).
- Drives all Power MOSFET.
- Prediction gate timing control.
- Minimum MOSFET body diode conduction.
- Operating at high switching frequency.
- Synchronize to transformer secondary voltage waveform.
- Linear setting of timing function.
- TDFN3X3 8LC package design

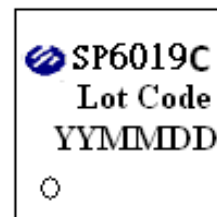
### APPLICATIONS

- Servers & workstations
- Storage area network power supplies
- Telecommunication converters
- Embedded systems
- Industrial & commercial systems using high current processors
- DC/DC Power Module

### PIN CONFIGURATION (TDFN3X3 8LC)



### PART MARKING

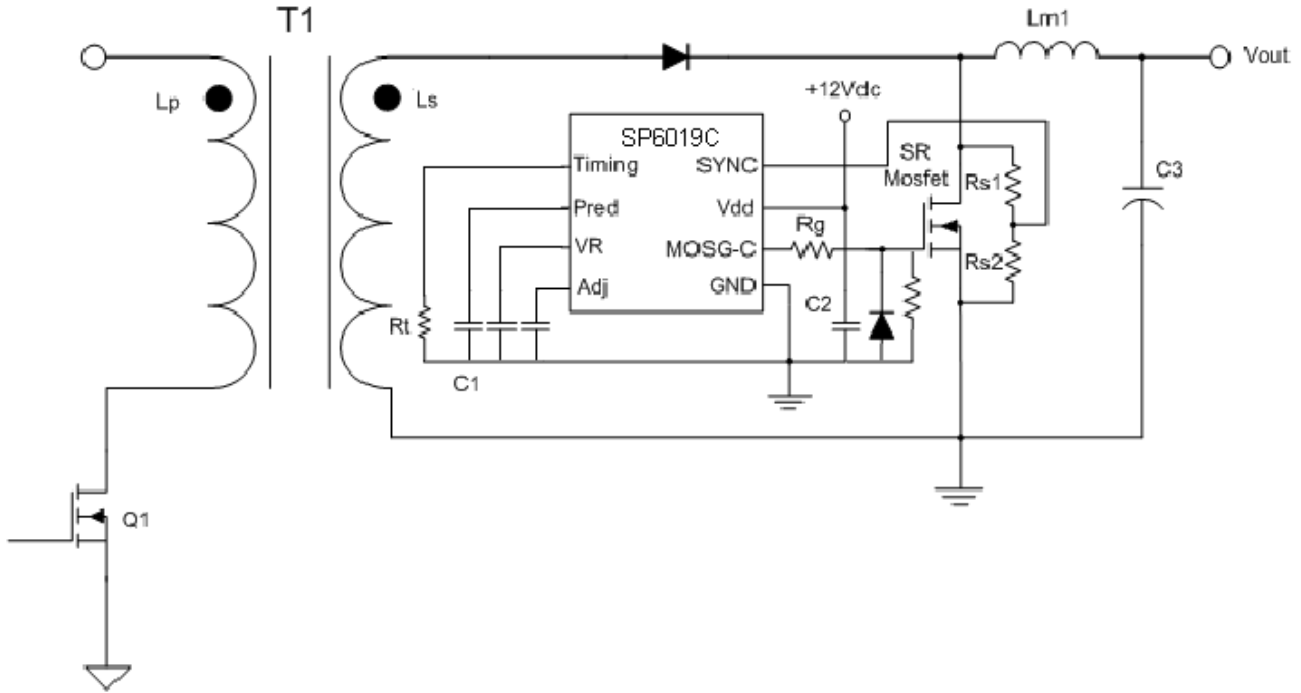




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### TYPICAL APPLICATION CIRCUIT



### PIN DESCRIPTION

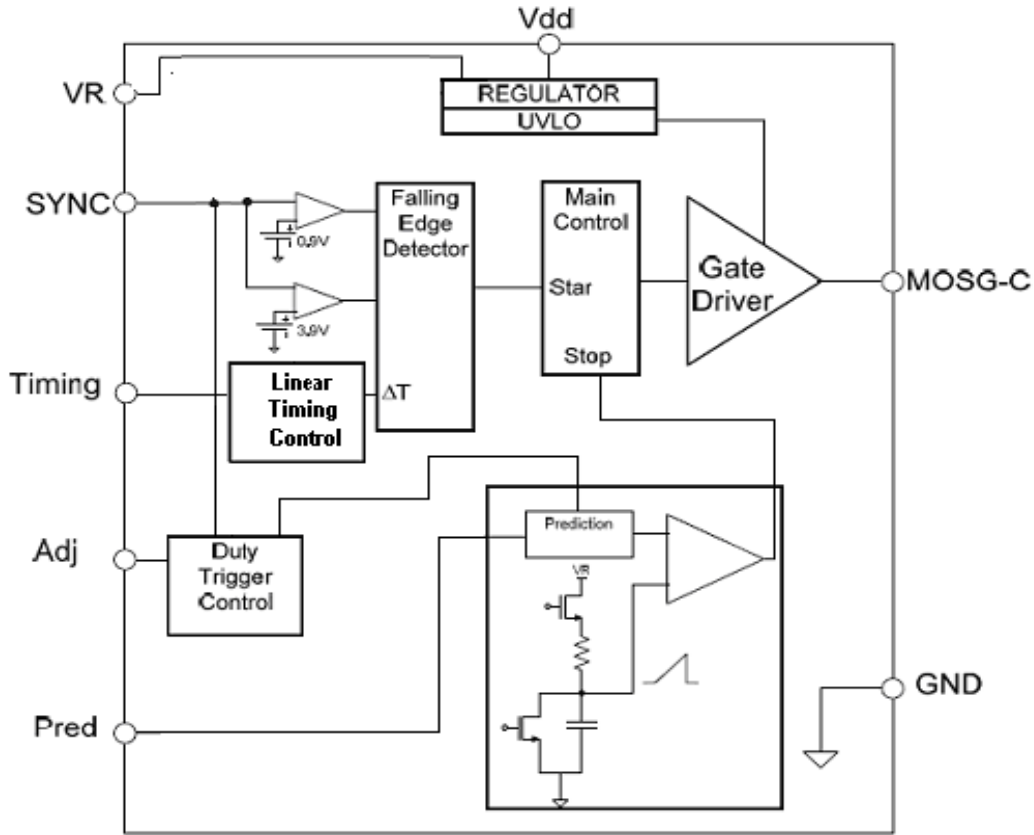
Pin	Symbol	Description
1	Timing	Discontinuous current filter timing adjustment resistor connection.
2	Pred	Capacitor to store previous cycle timing for SR MOSFET.
3	VR	Voltage Regulator.
4	Adj	Trigger point adjustment for Dynamic state.
5	GND	Ground connection.
6	MOSG-C	Catch MOSFET gate drive.
7	Vdd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



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### BLOCK DIAGRAM



### ORDERING INFORMATION

Part Number	Package	Part Marking
SP6019CTDN8RGB	TDFN3X3-8LC	SP6019C

※ SP6019CTDN8RGB : Tape Reel ; Pb - Free ; Halogen - 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
V <sub>dd</sub>	DC Supply Voltage	16	V
I <sub>OUT</sub>	Peak Source Current (Pulsed)	2.0	A
	Peak Sink Current (Pulsed)	2.0	A
P <sub>D</sub>	Power Dissipation @ T <sub>A</sub> =85°C (*)	1.8	W
T <sub>J</sub>	Operating Junction Temperature Range	-40 to 125	°C
T <sub>STG</sub>	Storage Temperature Range	-40 to 150	°C
T <sub>LEAD</sub>	Lead Soldering Temperature for 5 sec.	260	°C

### THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R <sub>θJC</sub>	Thermal Resistance Junction - Case (*)	8	°C/W

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



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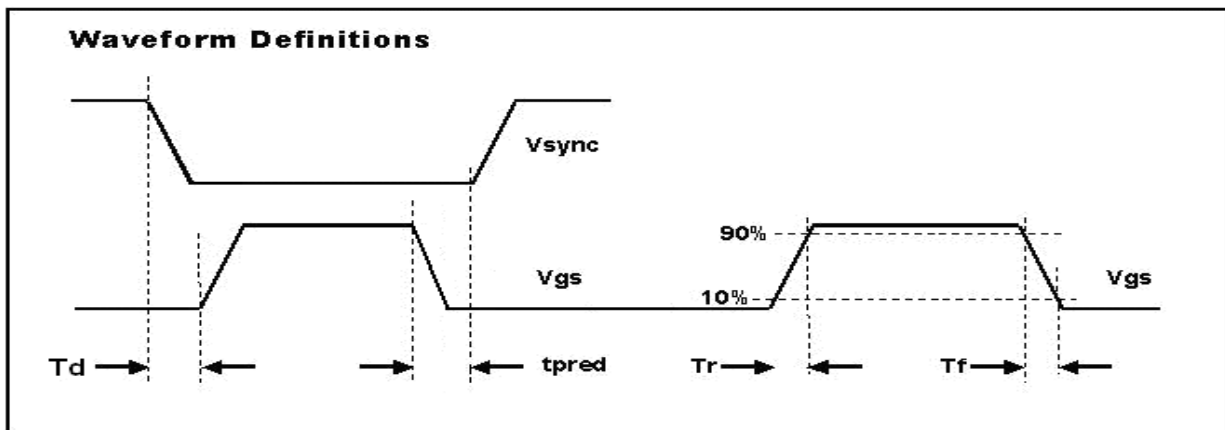
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### ELECTRICAL CHARACTERISTICS

( $T_A=25^{\circ}\text{C}$ ,  $V_{dd}=12\text{V}$ , Freq. =50 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>SUPPLY INPUT</b>						
$I_{DD}$	Supply current	$V_{SYNC}=0\text{V}$ , $V_{dd}$ on		3	4	mA
$V_{dd}$	Supply voltage	$I_{dd\ peak} < 2\text{A}$			16	V
$V_{dd\ on}$	Enable voltage		7.8	8.2	8.6	V
$V_{dd\ hysteresis}$	Enable voltage hysteresis			0.25	0.5	V
$V_{ovp}$	Over voltage protection		15.5	16.5	17.5	V
$V_{ovp\ hysteresis}$	Over voltage protection hysteresis			0.3		V
<b>SYNC REFERENCE (SYNC)</b>						
$V_{shth}$	SYNC high threshold		3.5	3.9		V
$V_{slth}$	SYNC low threshold			0.9	1.2	V
$I_{sync}$	SYNC input current				3	mA
<b>Voltage Regulator REFERENCE (VR)</b>						
$VR$	voltage		5.2		5.4	V
$I_{VR}$	VR Output Current				50	mA
<b>ON TIME DUTY SETUP ( PIN 6 )</b>						
$T_{on-time}$				26	32	us
<b>MOSFET GATE DRIVER (MOSG-C)</b>						
$V_{oh}$	Output high voltage	$I_o = -200\text{mA}$	10.5	11.0		V
$V_{ol}$	Output low voltage	$I_o = 200\text{mA}$		0.5	0.8	V
$T_d$	Propagation delay	No load	25	50	155	ns
$T_{pred}$		No load		120		ns
$T_r$	Rise time	Load = 1nF (*)		10	25	ns
$T_f$	Fall time	Load = 1nF (*)		10	25	ns
<b>Dynamic Protect</b>						
$D_t$	Dynamic variable	Pin 4 open		600		ns
$T_{on-min}$	MOSG-C on time	PWM adjusts time > $D_t$		0.5		us

(\*)  $T_r$  &  $T_f$  are measured among 10% and 90% of starting and final voltage.

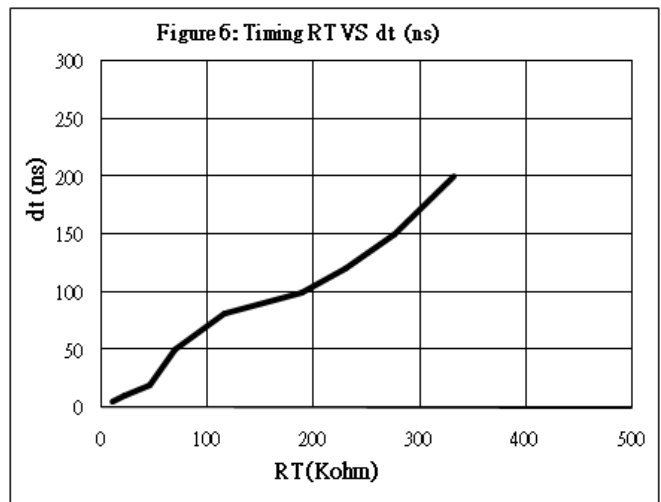
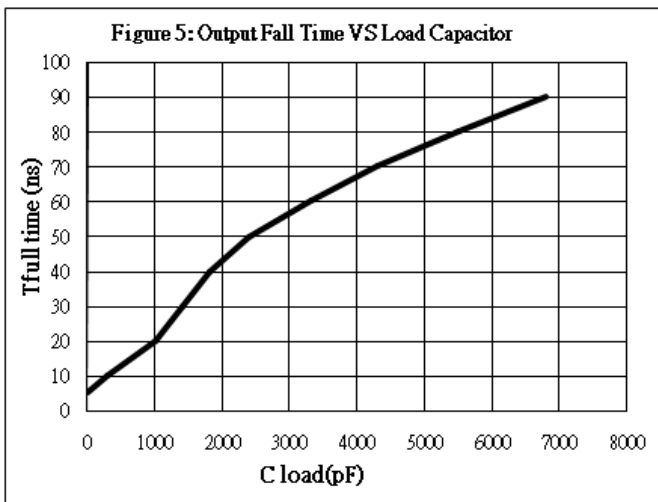
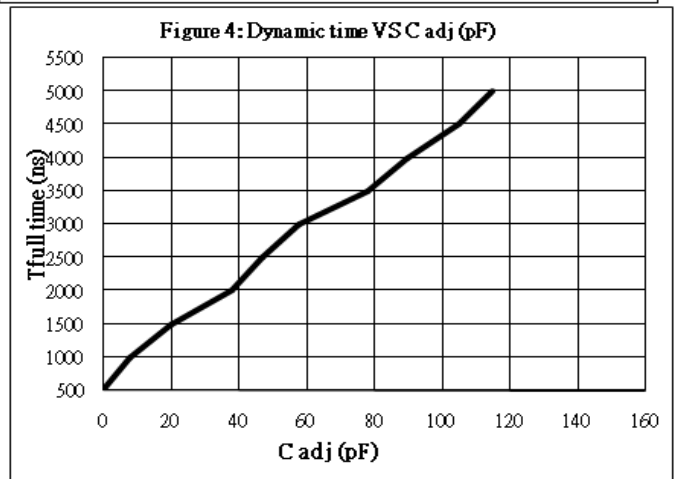
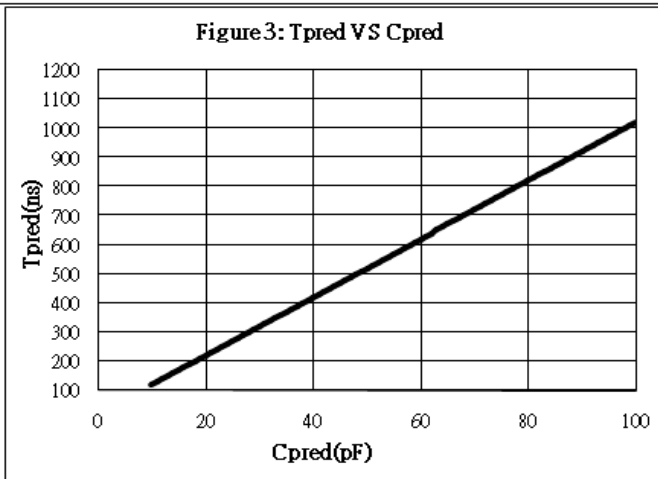
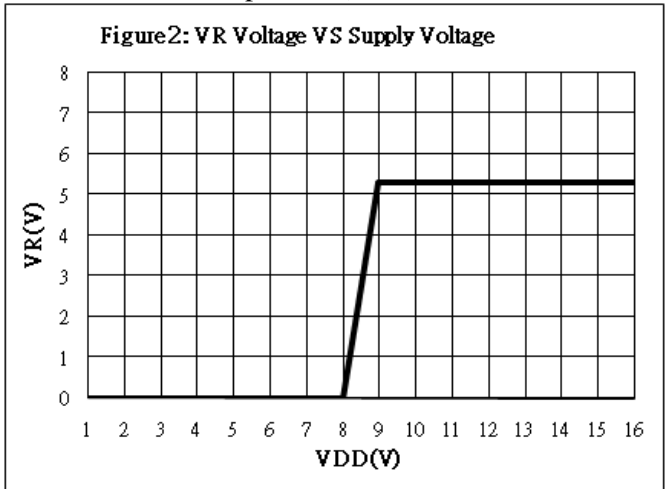
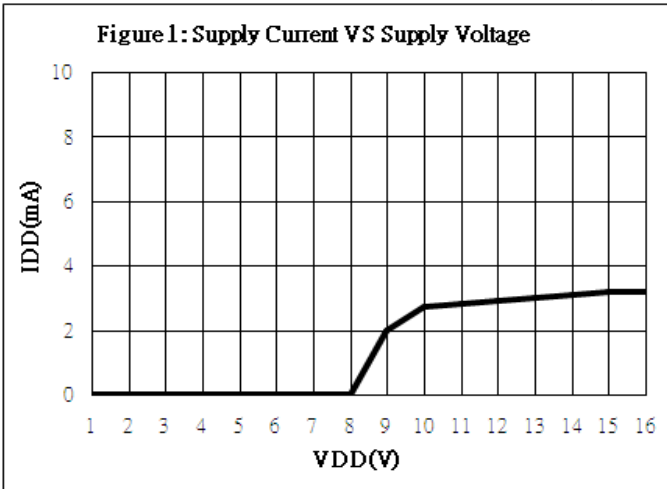




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PERFORMANCE CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified.)



\*Fig. 1 : No Load ; No SYNC

\*Fig. 3 : Frequency = 100 kHz

\*Fig. 4~5 : Frequency = 65 kHz.

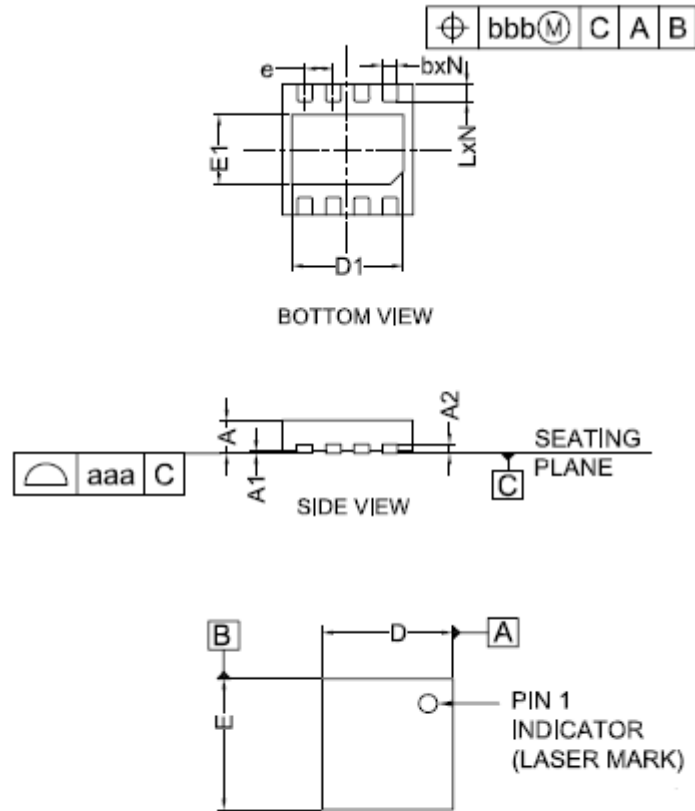
\*Fig. 6 : The falling time of negative edge from 3.9V to 0.9V



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### TDFN3X3- 8LC PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	0,70	0,75	0,80
A1	0,00	0,02	0,05
A2	0,203		
b	0,30	0,35	0,40
D	2,90	3,00	3,10
D1	2,51	2,56	2,61
E	2,90	3,00	3,10
E1	1,55	1,60	1,65
e	0,65BSC		
L	0,35	0,40	0,45
N	8		
aaa	0,08		
bbb	0,10		

NOTES:  
 1.CONTROLLING DIMENSIONS ARE IN MILLIMETERS(ANGLES IN DEGREES).  
 2. COPLANARITY APPLIES TO THE EXPOSED PAD AS THE TERMINALS.



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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>