SP6039
High Performance Synchronous Rectifier Driver

DESCRIPTION

SP6039 is a high performance and tightly integrated secondary side synchronous rectifier for switching mode power supply system. It combines a much lower voltage drop N-channel MOSFET to emulate the traditional diode rectifier at the secondary side of Flyback converter, The fundamental of SP6039 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. The SP6039 is capable to adapt in almost all existing 5V Resonance converters with few adjustments considered necessary.

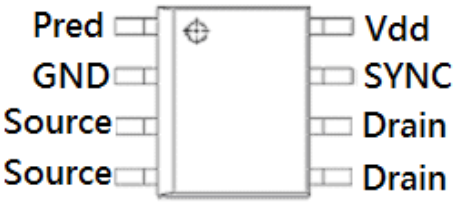
APPLICATIONS

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

FEATURES

- Offers efficiency improvement over Schottky Diode (depends on drive configuration of the SR).
- Low Standby Power to meet DOE Lot 6 requirement.
- Secondary-side synchronous rectifier optimized for 5V output system.
- Build-in 45V SR MOSFET with low Rdson
- Operating frequency up to 300 KHz.
- Synchronize to transformer secondary voltage waveform.
- Internal over voltage protection

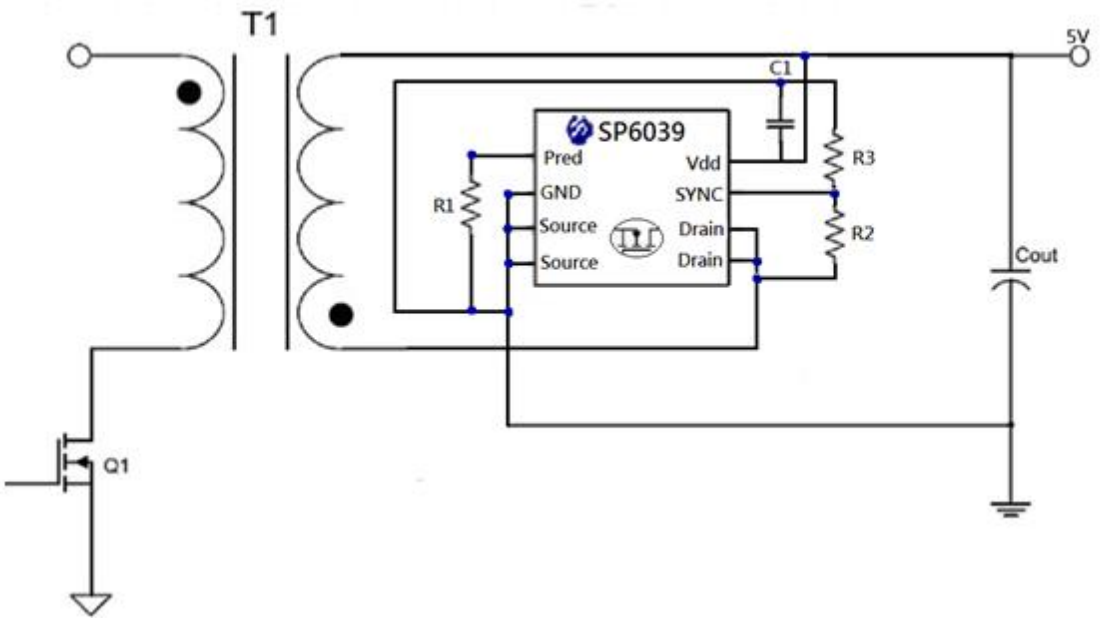
PIN CONFIGURATION (SOP-8)



PART MARKING

A : Lot Code
B : Date Code

TYPICAL APPLCATION CIRCUIT



PIN DESCRIPTION

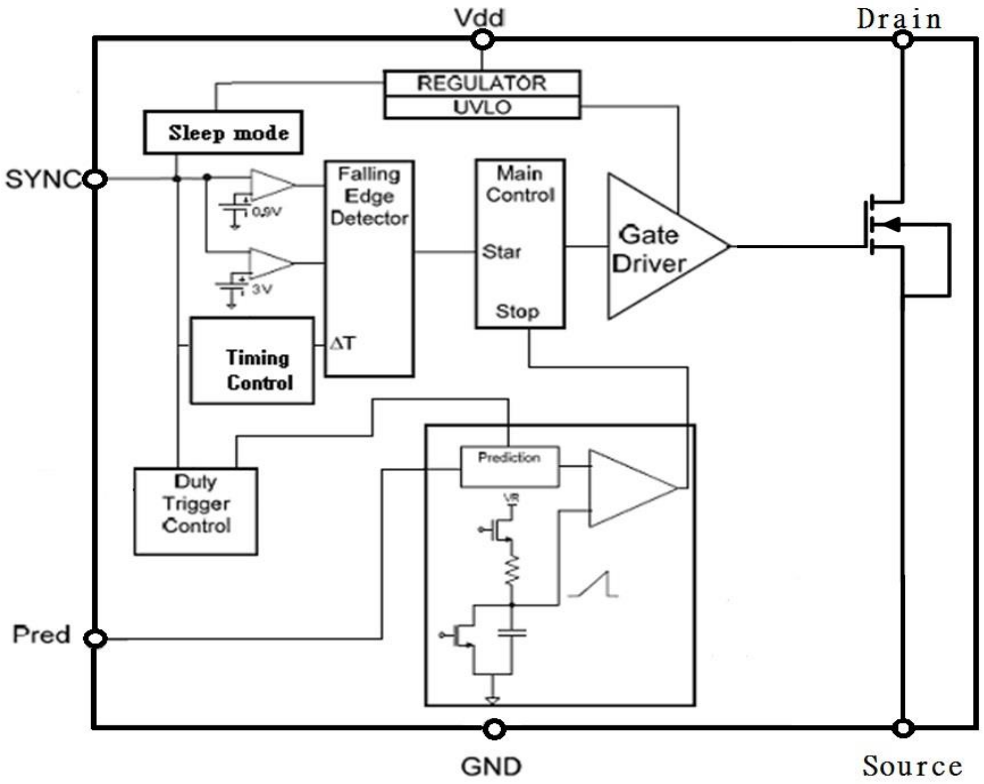
Pin	Symbol	Description
1	Pred	By connecting a resistor to ground to set the dead time.
2	GND	Ground connection.
3	Source	Internal MOSFET Source
4	Source	Internal MOSFET Source
5	Drain	Internal MOSFET drain
6	Drain	Internal MOSFET drain
7	SYNC	Synchronized signal from Vds of SR MOSFET
8	Vdd	DC supply voltage.

ORDERING INFORMATION

Part Number	Package	Part Marking
SP6039S8RGB	SOP-8	SP6039

※ SP6039S8RGB : Tape Reel ; Pb – Free ; Halogen - Free

BLOCK DIAGRAM



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	13	V
I_{DRAIN}	Continuous Drain Current (Tc = 25℃)	4	A
	Continuous Drain Current (Tc = 100℃)	3.5	A
Vd to Vs	Drain to Source	45	V
P_D	Power Dissipation @ T_A=85℃ (*)	0.3	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

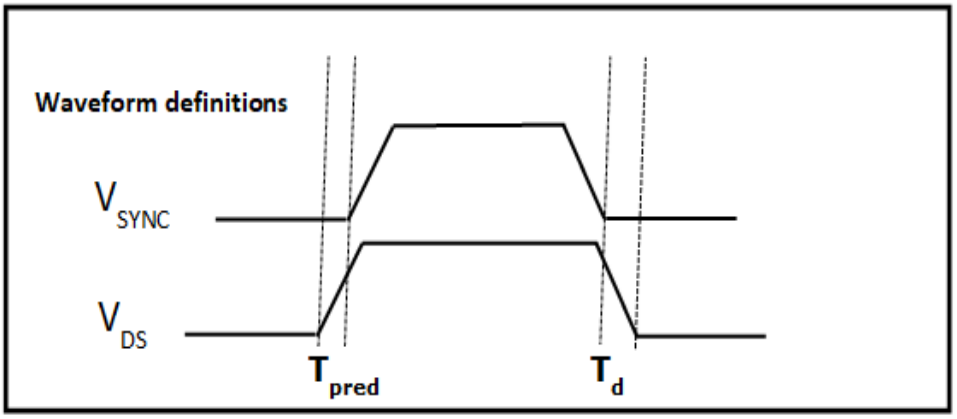
Symbol	Parameter	Value	Unit
$R_{\Theta JA}$	Thermal Resistance-Junction to Ambient (*)	110	℃/W

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

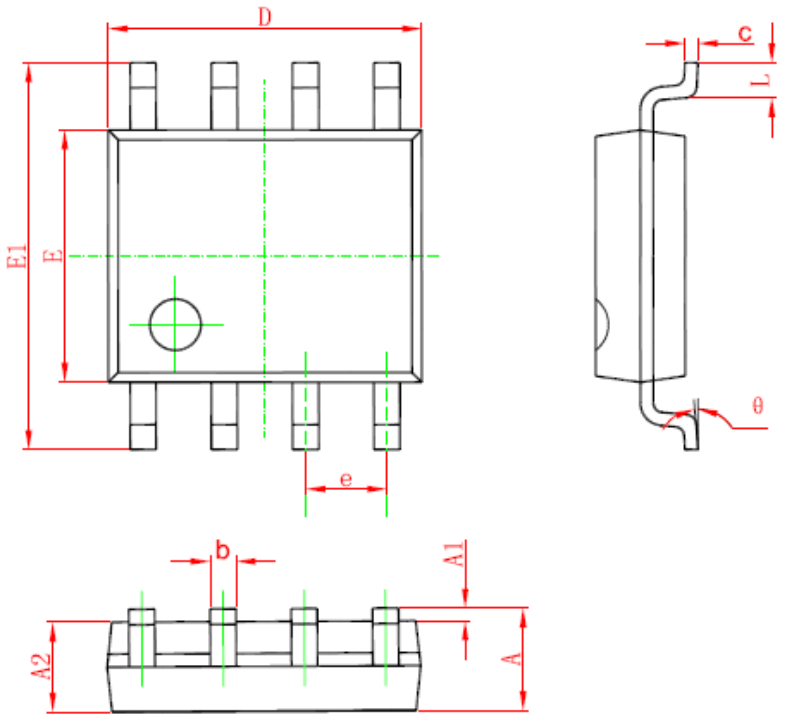
ELECTRICAL CHARACTERISTICS

(T_A=25℃, V_{dd}=5V, Freq. =50 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY INPUT						
Idd	Supply current	No load & Sleep mode		0.2	0.35	mA
		V_{SYNC}=Vdd ,No load	3.0	4	5	mA
Vdd	Supply voltage	Idd peak < 1A	4.5		13	V
Vdd on	Enable voltage		3.4	3.7	4.1	V
Vdd hysteresis	Enable voltage		0.1	0.3	0.5	V
SYNC REFERENCE (SYNC)						
Vshth	SYNC high threshold			3.0		V
Vslth	SYNC low threshold			0.9		V
Vsync	SYNC clamp voltage	Isync=3mA	Vdd+1.5			V
Vsync WK	SYNC wake-up voltage	Pulse width >1uS for Vdd=5V	6.			V
Isync	SYNC input current				3	mA
PREDICTION SECTION						
Vpred		Pin1=15KΩ		1.25		V
Td	Propagation delay	Pin1=15KΩ		100		ns
Tpred	Dead time	Pin1=15KΩ		165		ns
Tr	Rise time			11		ns
Tf	Fall time			8		ns
SR MOSFET SECTION						
BVdss	MOSFET Drain-Source Breakdown Voltage	VGS=0V,ID=250uA	45			V
Rds(on)	On Resistance	VGS=4.5V,ID=8A		10	14	mΩ
Ciss	Input Capacitance	Vds=20V,Vgs=0V, f=1MHz		942		
Coss	Output Capacitance			309		
Crss	Reverse Transfer Capacitance			29		
Td(on)	Turn On Time	Vds=20V, Id=10A, Vgs=10V, Rg=10Ω		6		
Td(off)	Turn Off Time			21		



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°

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