



SP6075

Fast Turn-off Intelligent Rectifier

DESCRIPTION

The SP6075 is a low-drop diode emulator controller IC which when combined with an external MOS FET replaces Schottky diodes in high-efficiency flyback converters. The chip regulates the forward drop of an external MOS FET to about 40mV and switches it off as soon as the voltage becomes negative.

SP6075 It combines a low $R_{ds(on)}$ N-channel MOSFET to emulate the traditional diode rectifier at the secondary side of Flyback converter, is available in space saving SOP-8 package.

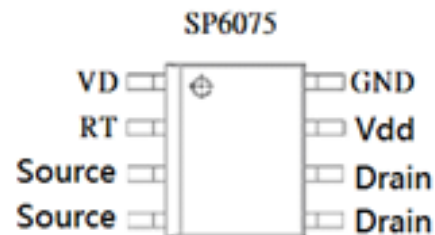
FEATURES

- Works with 5V Logic Level FETS
Less Than 100mW Standby Power
- Fast Turn-off Delay of 25ns
- 3.6V~5.5V VDD operating range
- Build-in 40V SR MOSFET with low $R_{ds(on)}$
- Supports DCM and Quasi-Resonant Operation
- Supports High-side and Low-side Rectification
- Available in space saving SOP-8 Package

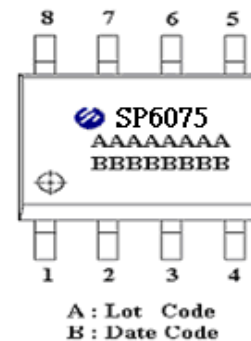
APPLICATIONS

- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems
- Flyback Converters

PIN CONFIGURATION (SOP-8)



PART MARKING

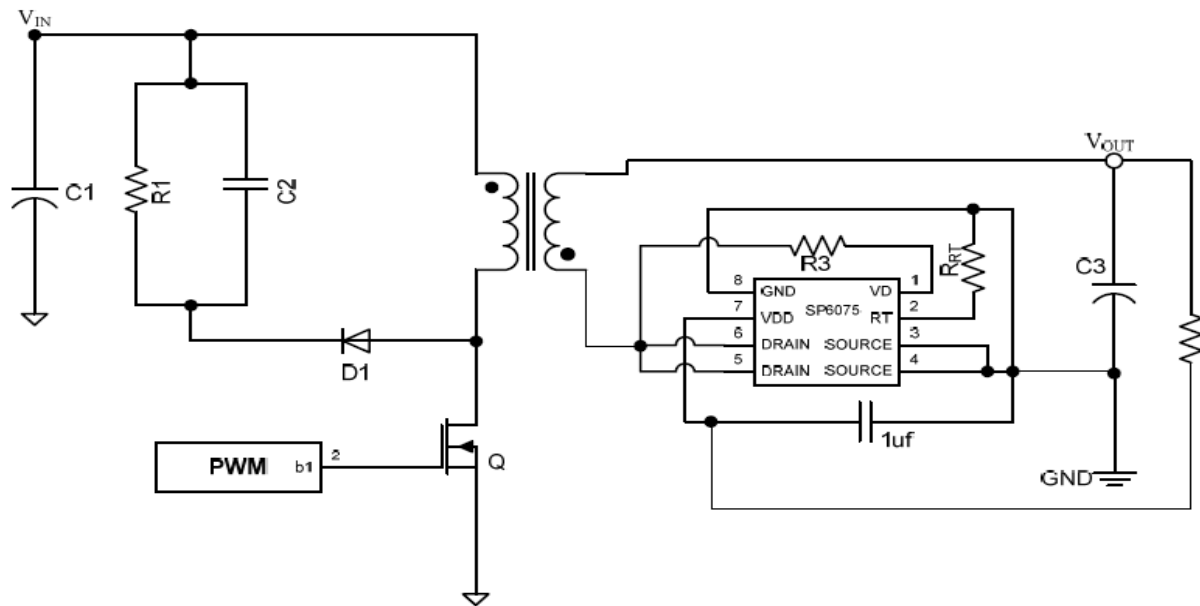




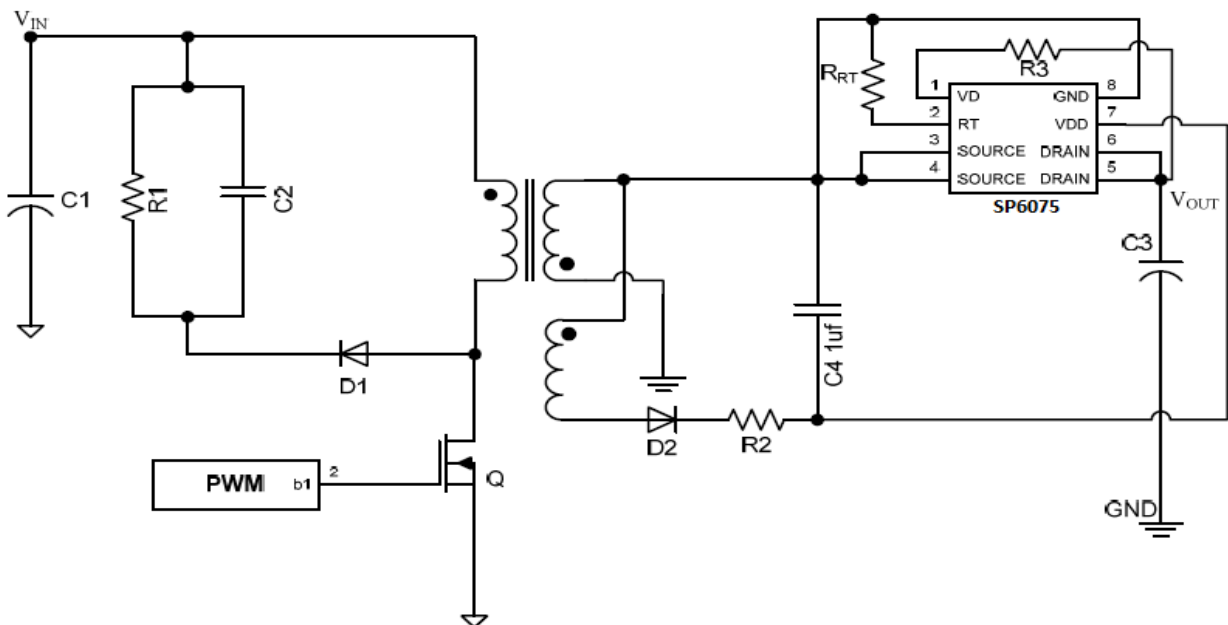
SP6075

Fast Turn-off Intelligent Rectifier

TYPICAL APPLICATION CIRCUIT



IC Supply Derived Directly from Output Voltage



IC Supply Derived from Auxiliary Winding in High-Side Rectification



SP6075

Fast Turn-off Intelligent Rectifier

PIN DESCRIPTION

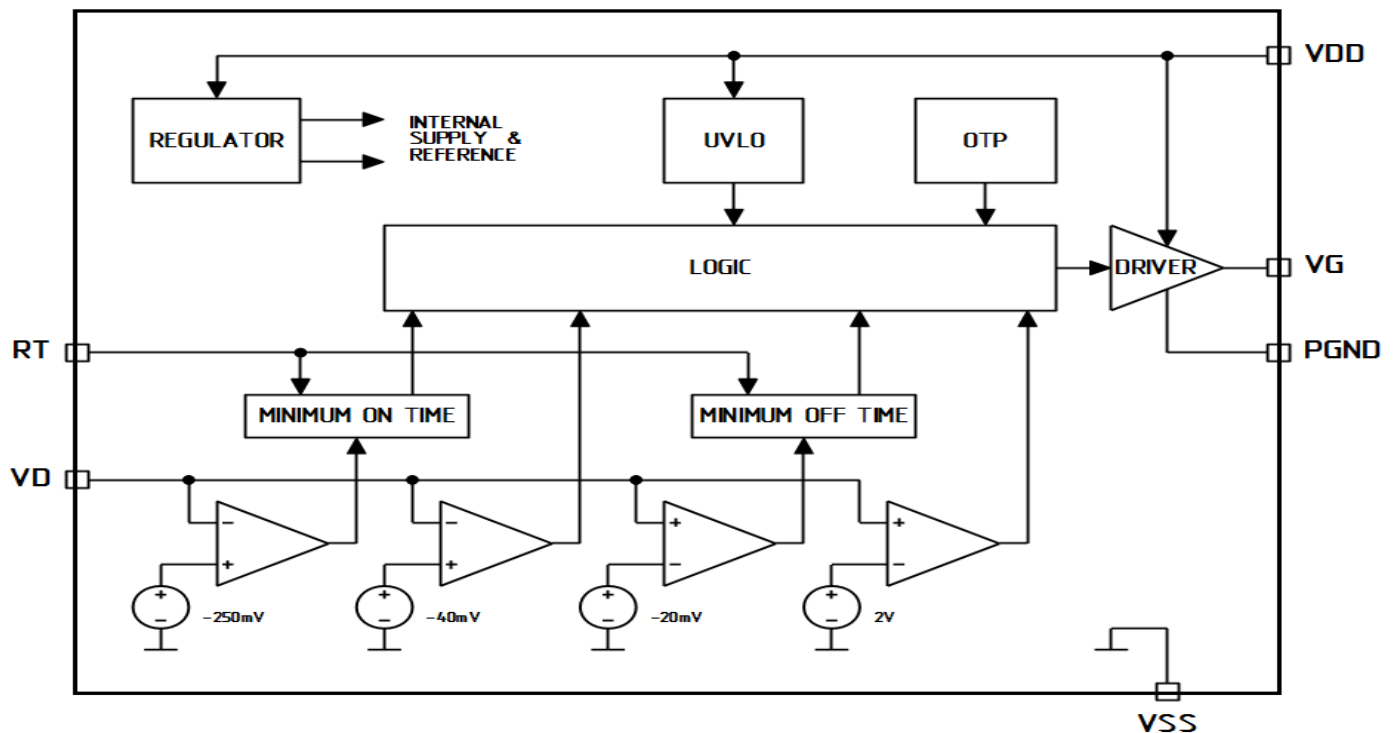
Pin	Symbol	Description
1	VD	External FET drain voltage sensing
2	RT	Minimum On-time setting pin. A resistor connected between this pin and VSS defines minimum On-time
3	Source	Internal MOSFET Source
4	Source	Internal MOSFET Source
5	Drain	Internal MOSFET drain
6	Drain	Internal MOSFET drain
7	Vdd	DC supply voltage.
8	GND	Ground connection.

ORDERING INFORMATION

Part Number	Package	Part Marking
SP6075S8RGB	SOP-8	SP6075

※ SP6075S8RGB : Tape Reel ; Pb – Free ; Halogen – Free

BLOCK DIAGRAM





SP6075

Fast Turn-off Intelligent Rectifier

ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}\text{C}$, 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	-0.3 ~ 7.0	V
PGND	Power Ground, return for gate driver	-0.3 ~ 0.3	V
V _D to V _S	Drain to Source	40	V
V _D	External FET drain voltage sensing	-1.0 ~ 60	V
P _D	Power Dissipation @ $T_A=85^{\circ}\text{C}$ (*)	0.3	W
T _J	Junction temperature	-40 ~ 150	$^{\circ}\text{C}$
T _{STG}	Storage temperature	-40 ~ 150	$^{\circ}\text{C}$
T _{LEAD}	Lead soldering temperature for 5 sec	260	$^{\circ}\text{C}$

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{ΘJA}	Thermal Resistance Junction –to Ambient (*)	110	$^{\circ}\text{C}/\text{W}$

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

**SP6075****Fast Turn-off Intelligent Rectifier****ELECTRICAL CHARACTERISTICS, (TA=25°C, VDD=5V, RRT = 100kΩ, unless otherwise specified)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Supply Section						
Vdd	Supply voltage		3.6		5.5	V
Vdd on	Vdd UVLO rising				3.6	V
Vdd hysteresis	Vdd UVLO hysteresis		0.2			V
ICC	Operating current	CLOAD=5nF, FSW=100kHz			10	mA
Iq	Quiescent current	VSS-V _D =0.5V			3	mA
	Shutdown current	VDD=3V			100	uA
	Thermal shutdown			150		°C
	Thermal shutdown hysteresis			30		°C
Control Circuitry Section						
Vfwd	VSS-V _D forward voltage			40		mV
	VSS-V _D turn-off threshold			20		mV
TDon	Turn-on delay	CLOAD=5nF		100		nS
		CLOAD=10nF		150		nS
	Input bias current on V _D pin	V _D =60V			1	uA
TMIN	Minimum on-time	CLOAD=5nF		1.6		uS
VBoff	Turn-off blanking V _{DS}			2		V
VON-DS	Turn-on V _{DS} threshold			-250		mV
Gate Driver Section						
V _{G-L}	Gate output low voltage	I _{LOAD} =1mA			0.1	V
V _{G-H}	Gate output high voltage	VDD=5V	4.5			V
	Turn-off propagation delay	V _D =V _{SS}		25		nS
T _{Doff}	Turn-off total delay	V _D =V _{SS} , CLOAD=5nF, R _{GATE} =0Ω, V _{GS} =2V		35		nS
		V _{SS} , CLOAD=10nF, R _{GATE} =0Ω, V _{GS} =2V		45		nS
	Maximum source current (*)			0.5		A
	Maximum sink current (*)		2			A
	Pull down impedance			1		Ω
SR MOSFET SECTION						
BVdss	MOSFET Drain-Source	V _{GS} =0V, I _D =250uA	40			V
Rds(on)	Drain-Source On-Resistance	V _{GS} =10V, I _D =7A			17	mΩ
		V _{GS} =4.5V, I _D =6A			22	
Ciss	Input Capacitance	V _{ds} =15V, V _{gs} =0V, f=1MHz		1013		pF
Coss	Output Capacitance			107		
Crss	Reverse Transfer Capacitance			76		
Td(on)	Turn On Time	V _{ds} =20V, I _d =10A, V _{gs} =10V, R _g =10Ω		2.8		nS
Td(off)	Turn Off Time			22.8		

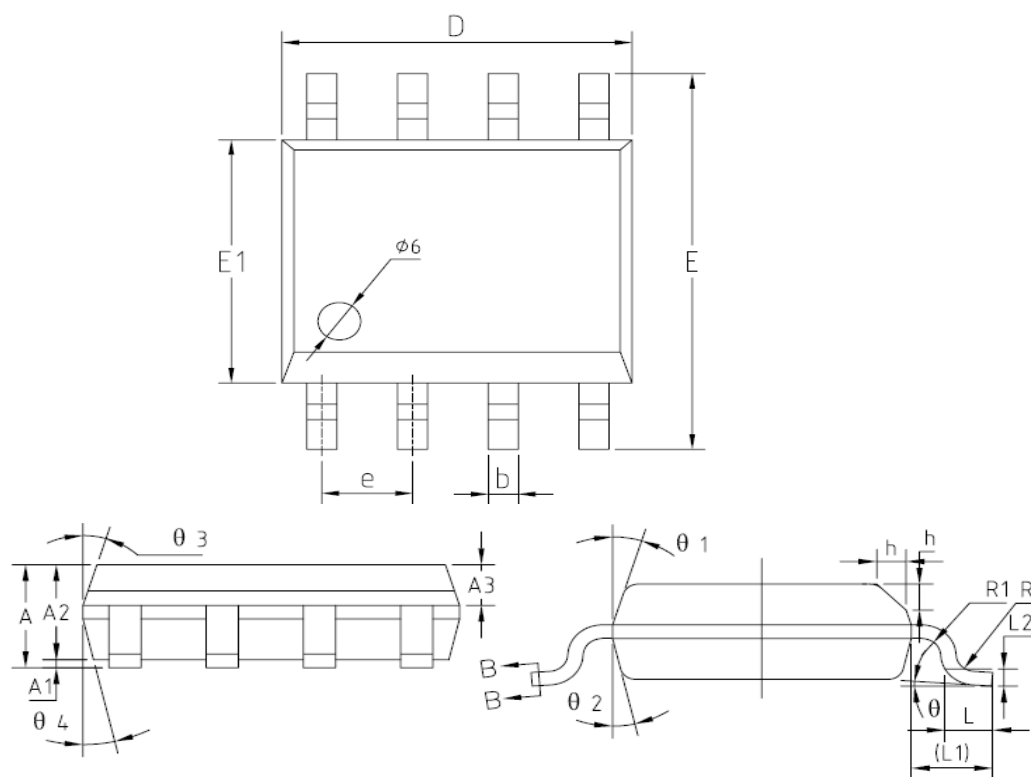
Notes: (*) Guaranteed by design and characterization



SP6075

Fast Turn-off Intelligent Rectifier

SOP-8 PACKAGE OUTLINE



SYMBOL	MIN	NOM	MAX
A	1.35	--	1.75
A1	0.10	--	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.33	-	0.51
c	0.17	--	0.25
D	4.80	4.93	5.05
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25BSC		
R	0.07	--	--
R1	0.07	--	0.20
h	0.25	--	0.50
θ	0°	--	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°



SP6075

Fast Turn-off Intelligent Rectifier

Information provided is alleged to be exact and consistent. SYNC Power Corporation presumes no responsibility for the penalties of use of such information or for any violation of patents or other rights of third parties which may result from its use. No license is granted by allegation or otherwise under any patent or patent rights of SYNC Power Corporation. Conditions mentioned in this publication are subject to change without notice. This publication surpasses and replaces all information previously supplied. SYNC Power Corporation products are not authorized for use as critical components in life support devices or systems without express written approval of SYNC Power Corporation.

© The SYNC Power logo is a registered trademark of SYNC Power Corporation

© 2019 SYNC Power Corporation – Printed in Taiwan – All Rights Reserved

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>