SP6007
Fast Turn-off Intelligent Rectifier

DESCRIPTION

The SP6007 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.
SP6007 is available in space saving SOT-23-6 package.

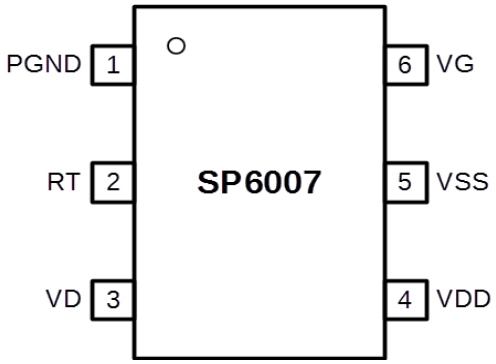
APPLICATIONS

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

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
- Supports DCM and Quasi-Resonant Operation
- Supports High-side and Low-side Rectification
- Available in space saving SOT-23-6 Package

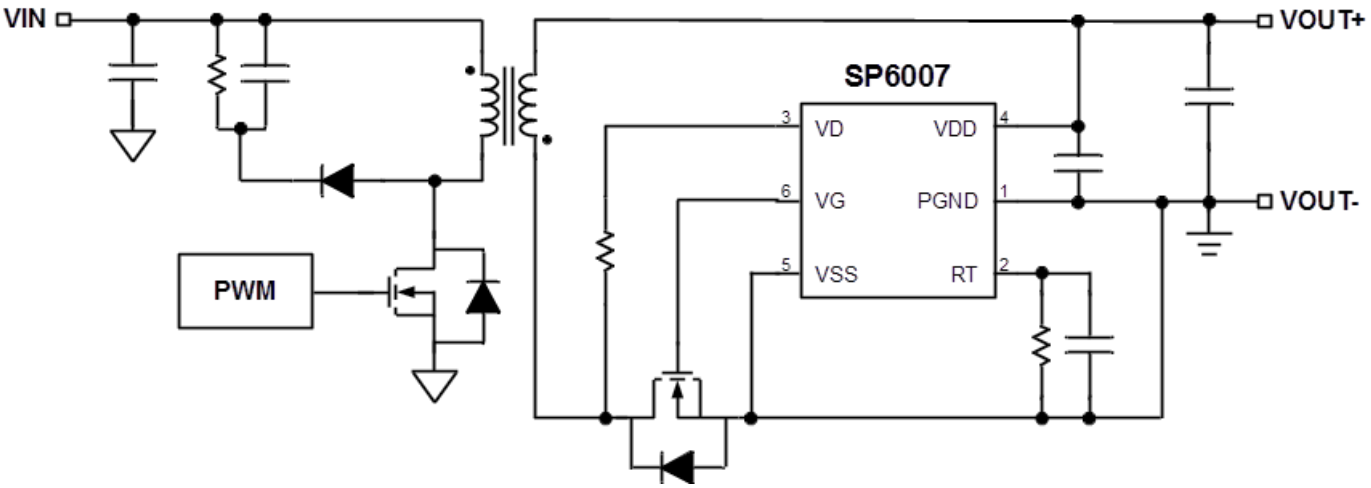
PIN CONFIGURATION (SOT-23-6L)



PART MARKING

Y : Year Code
W : Week Code

TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION

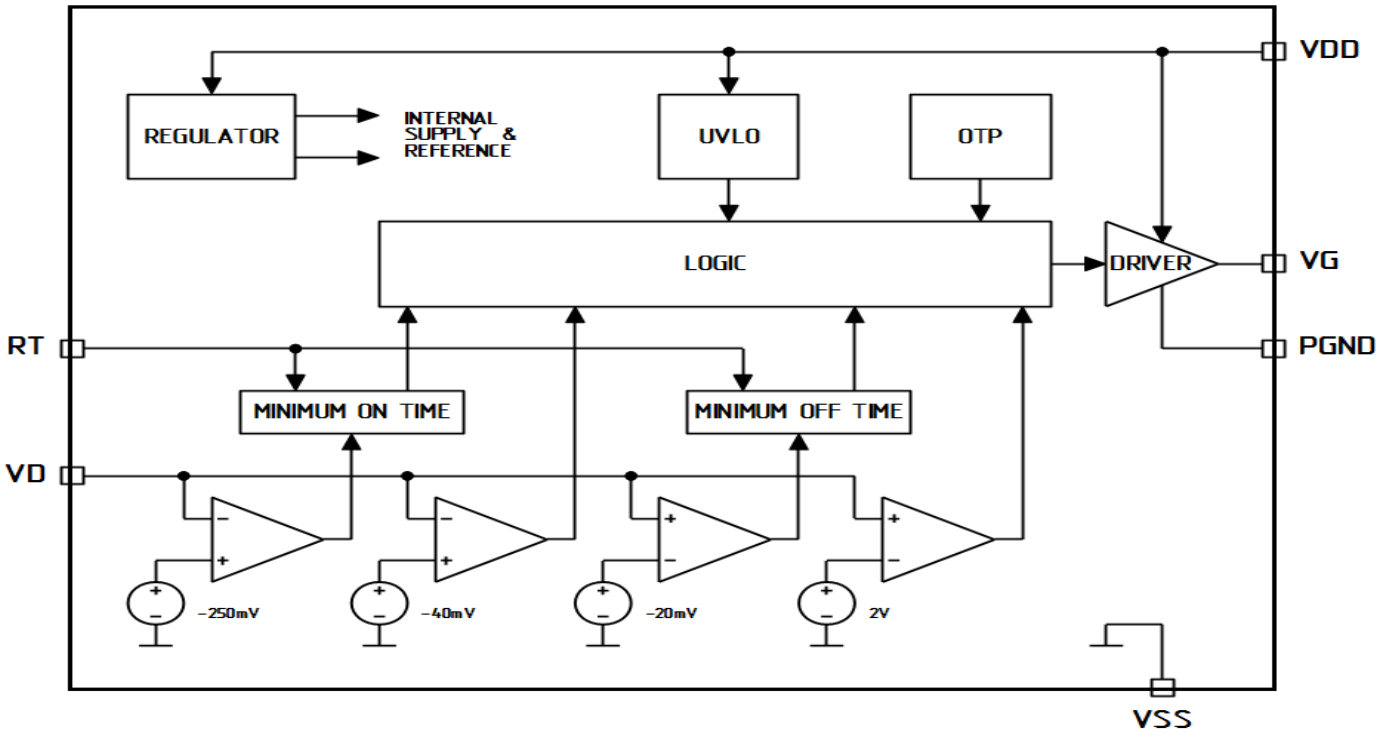
Pin No.	Pin Name	Description
1	PGND	Power Ground, return for gate driver
2	RT	Minimum On-time setting pin. A resistor connected between this pin and VSS defines minimum On-time
3	VD	External FET drain voltage sensing
4	Vdd	DC supply voltage.
5	VSS	Ground, also used as reference for VD
6	VG	Gate driver output

ORDERING INFORMATION

Part Number	Package	Part Marking
SP6007S26RGB	SOT-23-6L	SP6007

※ SP6007S26RGB : Tape Reel ; Pb – Free ; Halogen – Free

BLOCK DIAGRAM



ABSOLUTE 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
Vdd	DC Supply Voltage	-0.3 ~ 7.0	V
PGND	Power Ground, return for gate driver	-0.3 ~ 0.3	V
VD	External FET drain voltage sensing	-1.0 ~ 60	V
P_D	Power Dissipation @ T_A=85℃ (*)	0.3	W
T_J	Junction temperature	-40 ~ 150	℃
T_{STG}	Storage temperature	-40 ~ 150	℃
T_{LEAD}	Lead soldering temperature for 5 sec	260	℃

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance Junction –to Ambient (*1)	220	℃/W
$R_{\theta JC}$	Thermal Resistance Junction –to Case (*2)	110	℃/W

(*1) θJA is measured in natural convection (still air) at TA = 25°C with the component mounted on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

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

ELECTRICAL CHARACTERISTICS

(T_A=25℃, V_{DD}=5V, R_{RT} = 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
I_{CC}	Operating current	C_{LOAD}=5nF, F_{SW}=100kHz			10	mA
Iq	Quiescent current	V_{SS}-V_D=0.5V			3	mA
	Shutdown current	V_{DD}=3V			100	uA
	Thermal shutdown			150		℃
	Thermal shutdown hysteresis			30		℃
Control Circuitry Section						
V_{fwd}	V_{SS}-V_D forward voltage			40		mV
	V_{SS}-V_D turn-off threshold			20		mV
T_{Don}	Turn-on delay	C_{LOAD}=5nF		100		nS
		C_{LOAD}=10nF		150		nS
	Input bias current on VD pin	V_D=60V			1	uA
T_{MIN}	Minimum on-time	C_{LOAD}=5nF		1.6		uS
V_{Boff}	Turn-off blanking V_{DS}			2		V
V_{ON-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	V_{DD}=5V	4.5			V
	Turn-off propagation delay	V_D=V_{SS}		25		nS
T_{Doff}	Turn-off total delay	V_D=V_{SS}, C_{LOAD}=5nF, R_{GATE}=0Ω, V_{GS}=2V		35		nS
		V_D=V_{SS}, C_{LOAD}=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

Notes:
(*) Guaranteed by design and characterization

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