SP6086H
Synchronous Rectifier Driver

DESCRIPTION
The SP6086H is a low-drop diode emulator IC. By combining with an external switch, it replaces Schottky diodes in high-efficiency flyback converters.

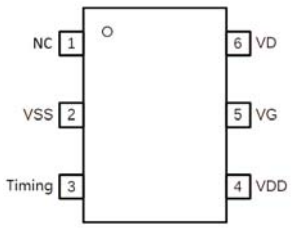
The SP6086H generates its own supply voltage and does not need auxiliary winding for either high-side or low-side applications. Programmable ringing detection circuitry prevents the SP6086H from false turning on at V_{DS} oscillations during discontinuous conduction mode (DCM) and quasi-resonant (QR) operation. It has a timing pin to allow SP6086H to turn on at a selected load.

SP6086H is available in space saving SOT-23-6L package.

APPLICATIONS
- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems
- Flyback Converters
- USB PD Quick Chargers

FEATURES
- Does not need auxiliary winding for either high-side or low-side applications
- Fast turn-on and turn-off delay
- Ringing detection prevents false turn-on during DCM and QR operations
- Less than 100mW standby power
- Up to 300KHz
- <400uA quiescent current at light load mode
- Supports CCM, DCM and QR operation
- Support both high-side and low-side rectification
- Available in space saving SOT-23-6L package

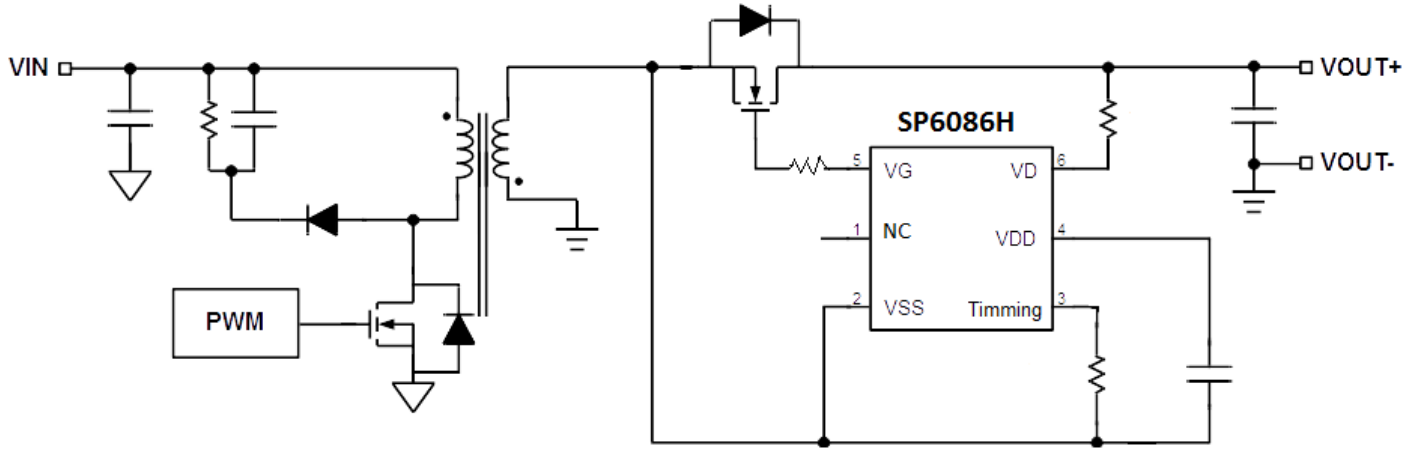
PIN CONFIGURATION (SOT-23-6L)



PART MARKING

Y : Year Code
W : Week Code

TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION

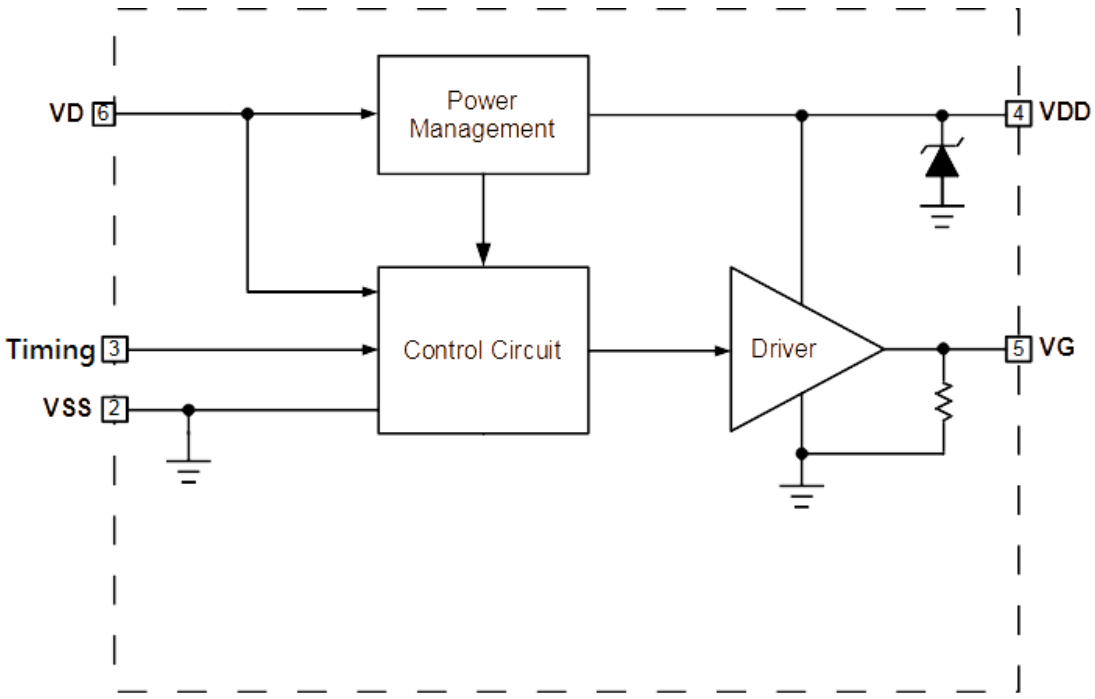
Pin No.	Pin Name	Description
1	NC	
2	VSS	Ground, also used as reference for VD
3	Timing	Discontinuous current filter timing adjustment by a resistor
4	VDD	Linear regulator output. Supply voltage for internal circuits
5	VG	Gate driver output
6	VD	External FET drain voltage sensing and input of linear regulator

ORDERING INFORMATION

Part Number	Package	Part Marking
SP6086HS26RGB	SOT-23-6L	SP6086H

※ SP6086HS26RGB : Tape Reel ; Pb – Free ; Halogen – Free

BLOCK DIAGRAM



The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
Vdd	VDD, VG and SL pins voltages to VSS	-0.3 ~ 8.0	V
V_D	VD pin voltage to VSS	-0.7 ~ 200	V
P_D	Power Dissipation @ T_A=85℃ (*)	0.3	W
T_J	Junction temperature	-40 ~ 150	°C
T_{STG}	Storage temperature	-40 ~ 150	°C
T_{LEAD}	Lead soldering temperature for 5 sec	260	°C

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

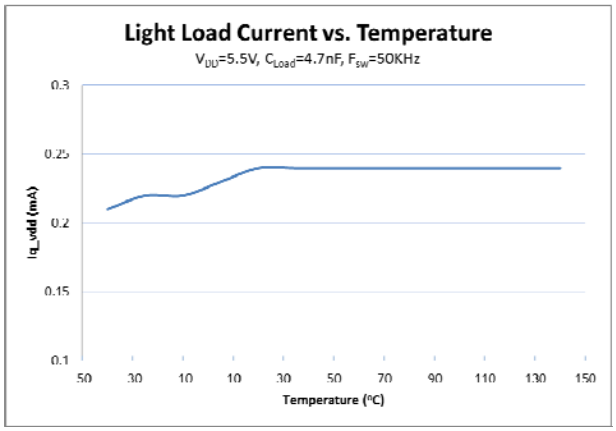
ELECTRICAL CHARACTERISTICS

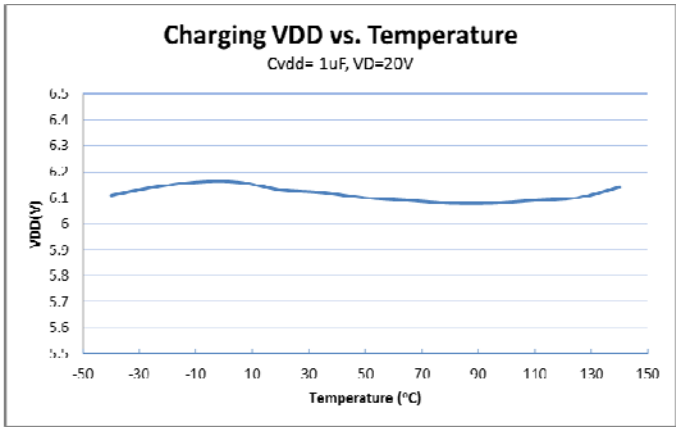
(T_A=25°C, V_{DD}=5.5V, unless otherwise specified)

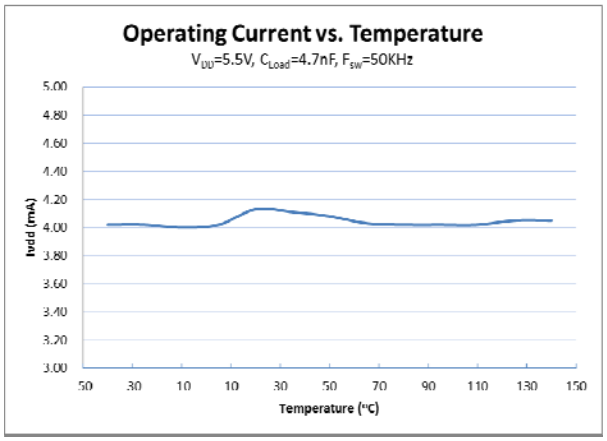
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Supply Section						
UVLO	VDD UVLO rising		4.5	4.9	5.3	V
	VDD UVLO Hysteresis			1.2		V
	VDD clamp voltage	I_{DD} = 10mA		7.5		V
I_{VD}	VDD charging current	V_D = 20V, V_{DD} = 0V		20		mA
		V_D= 20V, RVDD=1KΩ		7		mA
	VDD regulation voltage	V_D = 20V	6	6.3	6.5	V
I_{CC}	Operating current	C_{LOAD}=4.7nF, F_{SW}=50kHz		5		mA
	Shutdown current	V_{DD}=UVLO – 0.5V			140	uA
$I_{STANDBY}$	Light-load mode current	R_{timing}=100kΩ		250	400	uA
Control Circuitry Section						
V_{LL-DS}	VSS-VD turn-on threshold			230		mV
V_{fwd}	VSS-VD forward voltage			25		mV
	VSS-VD turn-off threshold			3		mV
T_{Don}	Turn-on delay	C_{LOAD}=5nF, V_{GS}=2V			75	ns
		C_{LOAD}=10nF, V_{GS}=2V			100	ns
	Turn-off propagation delay(*)	V_D=V_{SS}		15		ns
T_{Doff}	Turn-off total delay	V_D=V_{SS}, C_{LOAD}=5nF, R_{GATE}=0Ω, V_{GS}=2V		30		ns
		V_D=V_{SS}, C_{LOAD}=10nF, R_{GATE}=0Ω, V_{GS}=2V		40		ns
T_{Bon}	Turn-on blanking time			0.7		us
V_{Boff}	Turn-off blanking V_{DS} threshold		1.5		2.5	V
T_{timing}	Falling slope detection timer	R_{timing}=100kΩ, V_D transition from 2V to -0.1V		30		ns
Vtiming	Reference voltage	Rtiming=100kΩ,	0.95	0.985	1.01	V
T_{LL1}	Light-load-enter pulse width			0.8		us
T_{LL1-H}	Light-load-enter pulse width hysteresis			0.3		us
T_{LL2}	Light-load-enter pause width			1		ms
T_{LL-DEL}	Light-load-enter delay			6		cycle
Gate Driver Section						
V_{G-L}	Gate output low voltage	I_{LOAD}=1mA			0.1	V
V_{G-H}	Gate output high voltage		6			V
	Peak source current(*)			0.5		A
	Peak sink current(*)			3		A
	Pull down impedance			1		Ω

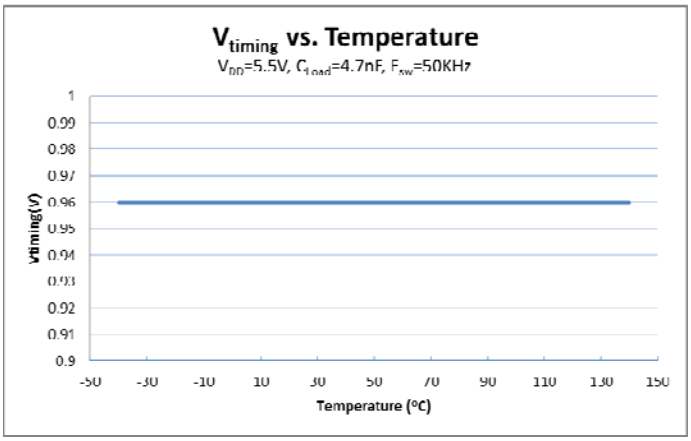
Notes:
(*)Guaranteed by design and characterization.

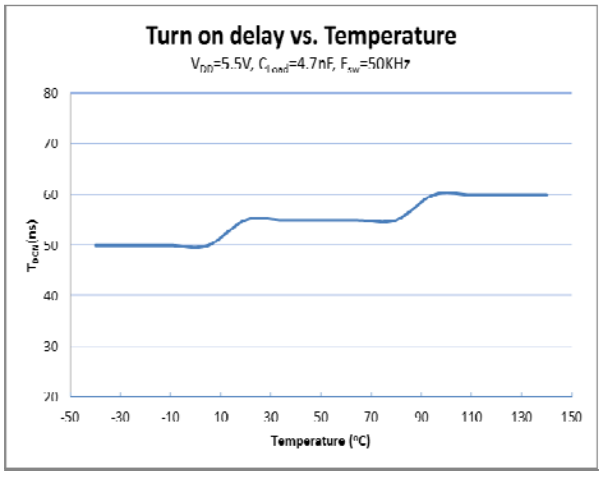
TYPICAL CHARACTERISTICS

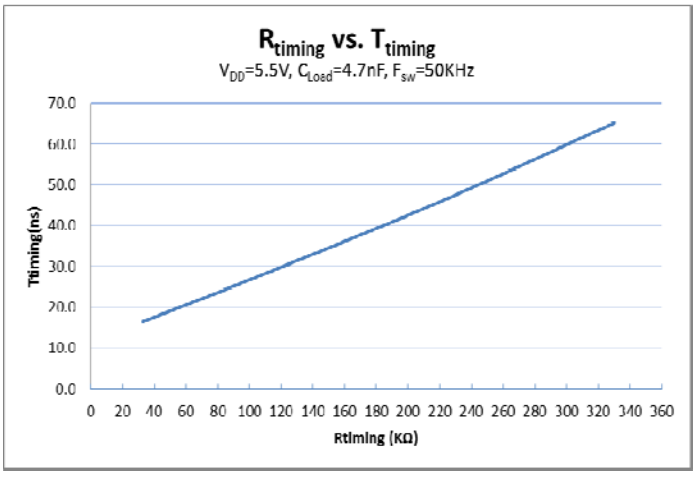












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