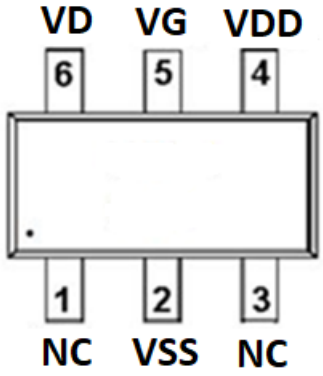
SP6089
Synchronous Rectifier Driver

DESCRIPTION
The SP6089 is a low-drop diode emulator IC, which when it combined with an external switch replaces Schottky diodes in high-efficiency flyback converters.
The SP6089 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 SP6089 from false turning on at V_{DS} oscillations during discontinuous conduction mode (DCM) and quasi-resonant (QR) operation.
SP6089 is available in space saving SOT-23-6L package.

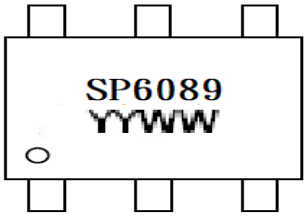
APPLICATIONS
- Industrial Power Systems
- Distributed Power Systems
- Battery Powered Systems
- Flyback Converters
- USB PD Quick Chargers

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
- <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

PINCONFIGURATION (SOT-23-6L)

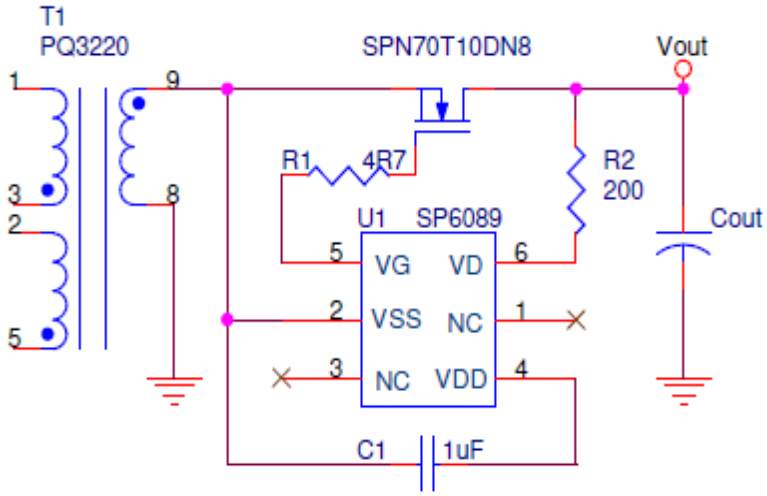


PART MARKING



Y : Year Code
W : Week Code

TYPICAL APPLCATION CIRCUIT



PIN DESCRIPTION

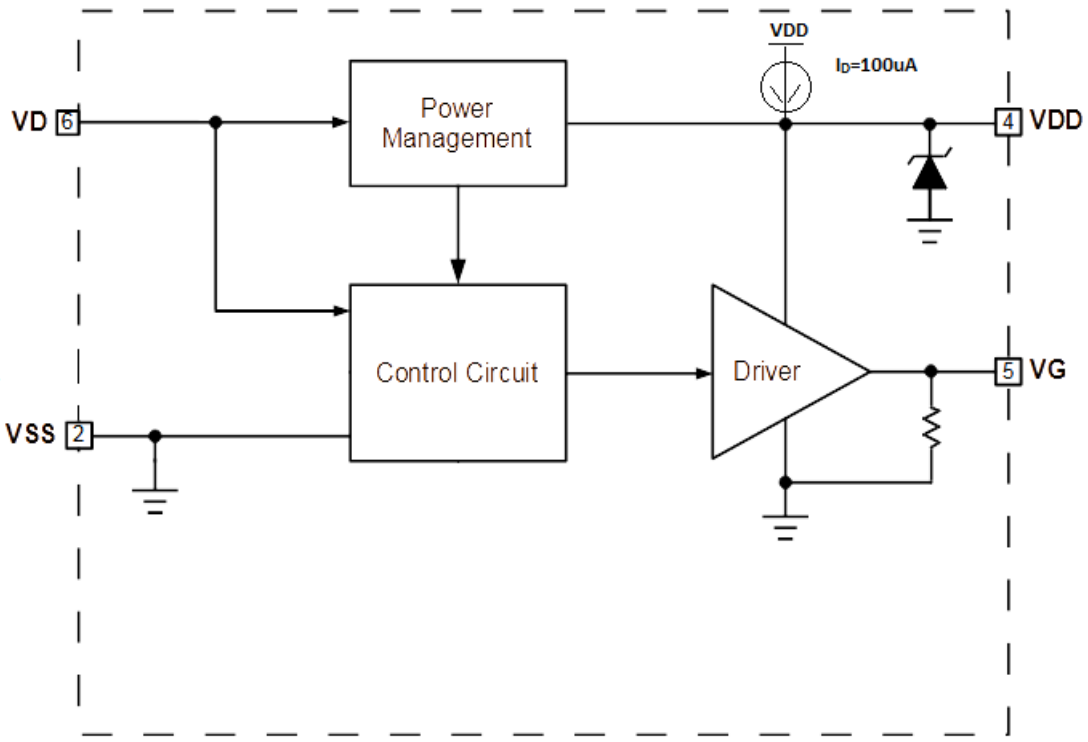
Pin	Symbol	Description
1	NC	
2	V_{SS}	Ground, also used as reference for V_D
3	NC	
4	V_{DD}	Linear regulator output. Supply voltage for internal circuits
5	V_G	Gate driver output
6	V_D	External FET drain voltage sensing and input of linear regulator

ORDERING INFORMATION

Part Number	Package	Part Marking
SP6089S26RGB	SOT-23-6L	SP6089

※ SP6089S26RGB : Tape Reel ; Pb – Free ; Halogen - Free

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

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

Symbol	Para	Value	Unit
V_D	V_D pin voltage to V_{SS}	-0.7~200	V
V_{DD}	V_{DD} and V_G pins voltages to V_{SS}	-0.3~8	V
V_G	Driver Pin	-0.3~8	V
P_D	The power dissipation	0.30	W
T_J	Operating junction temperature range	-40 to 150	℃
T_{STG}	The storage temperature range	-55 to 150	℃

THERMAL RESISTANCE

Symbol	Para	Value	Unit
$R_{\theta JA}$	Thermal Resistance Junction –to Ambient	220	℃/W
$R_{\theta JC}$	Thermal Resistance Junction –to Case	110	℃/W

ELECTRICAL CHARACTERISTICS

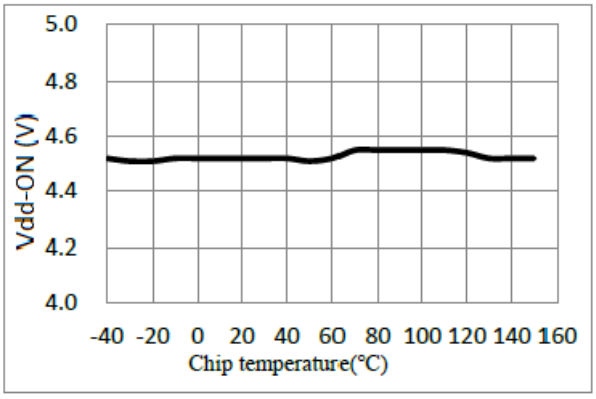
(T_A=25℃, V_{dd}=6V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Supply Section						
UVLO	V_{DD} UVLO rising	V_{DD} Rising	4.0	4.4	4.7	V
	V_{DD} UVLO Hysteresis			0.4		V
I_{DD}	Operating current	---	280	340	430	uA
I_{ST}	V_{DD} Startup Current	V_{DD} = V_{DD_ON} -0.1V			150	uA
V_{DD}	V_{DD} Operating Voltage	V_D=40V，Other Floating	5.8	6.2	6.6	V
V_{DD} _clamp	V_{DD} Clamp Voltage	I_{DD}=40mA	6.1	6.5	6.9	V
Control Circuitry Section						
V_{LL_DS}	V_{SS}-V_D Turn-on Threshold		150	200	250	mV
V_{FWD}	V_{SS}-V_D Forward Voltage			0		mV
	V_{SS}-V_D Turn-off Threshold		15	20	25	
T_{BON}	Turn-on blanking time	C_{LOAD}=5nF	1.1	1.3	1.6	uS
T_{BOFF}	Turn-off blanking time	C_{LOAD}=5nF	0.2	0.3	0.5	uS
T_{DON}	The Turn-on Delay	C_{LOAD}=5nF	120	150	180	nS
T_{DOFF}	Turn-off Delay Time	C_{LOAD}=5nF	25	30	33	nS
Gate Driver Section						
V_{DRV}	Maximum Drive Voltage	---		6		V
V_{GSMIN}	Regulated Minimum Drive Voltage			3		V
I_{SOURCE}	Maximum Source current	C_{LOAD}=5nF		1.5		A
I_{SINK}	Maximum Sink current	C_{LOAD}=5nF		4		A
T_{RISE}	Driving Rising Time	C_{LOAD}=5nF			25	nS
T_{FALL}	Driving Falling Time	C_{LOAD}=5nF			10	nS

TYPICAL CHARACTERISTICS

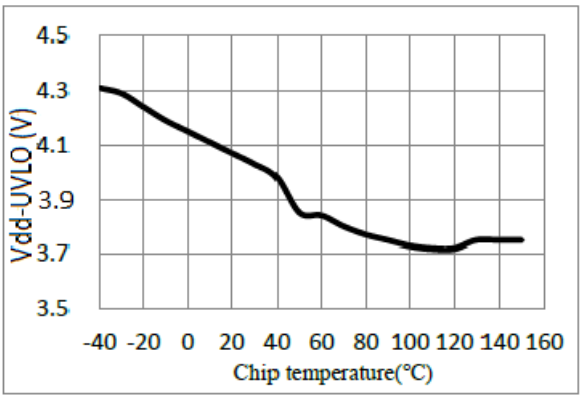
Vdd Start-up Voltage vs Temperature

C_{Vdd}=1uF，Vdd Rising，Current Suddenly Increases



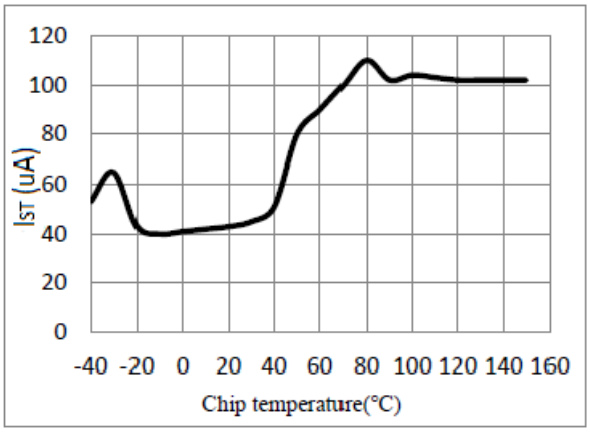
Vdd Turn-off Voltage vs Temperature

C_{Vdd}=1uF，Vdd Falling，Current Suddenly Drops



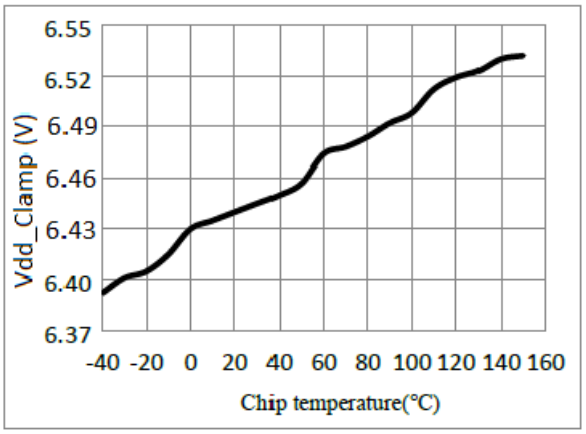
Vdd Start-up Current vs Temperature

C_{Vdd}=1uF，Vdd-ON- 0.1V



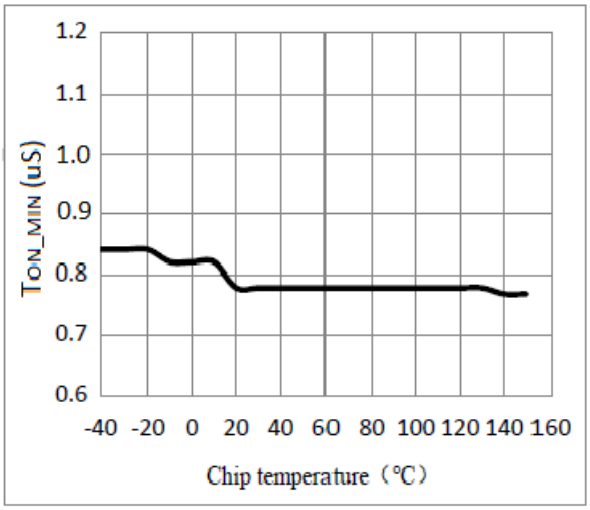
Vdd Clamp Voltage vs Temperature

C_{Vdd}=1uF，I_{CC}=20mA



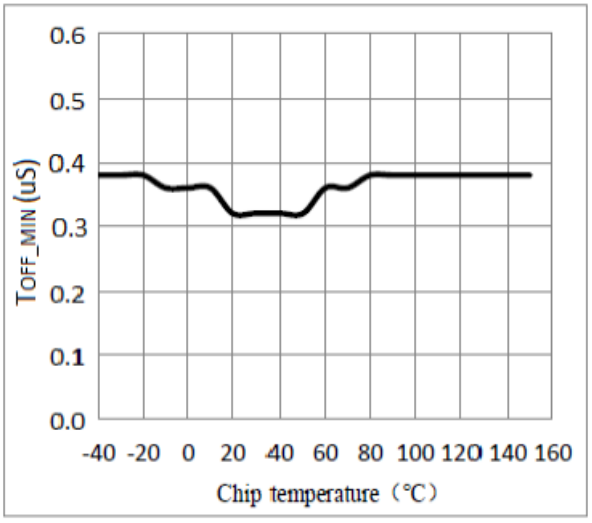
SR Minimum Turn-on Time vs Temperature

Vdd=6V



SR Minimum Turn-off Time vs Temperature

Vdd=6V



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