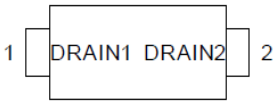
SP687
X2 Capacitor Discharge IC

DESCRIPTION
SP687 blocks current flow in the X2 capacitor safety discharge resistors, reducing the power loss to less than 5mW at 230 VAC. When AC voltage is disconnected, SP687 automatically discharges the X2 capacitor by connecting the series discharge resistors. This operation allows total flexibility in the choice of the X2 capacitor to optimize differential mode EMI filtering and reduce inductor costs, with no change in power consumption. SP687 meets IEC 62368-1: 2020 version.

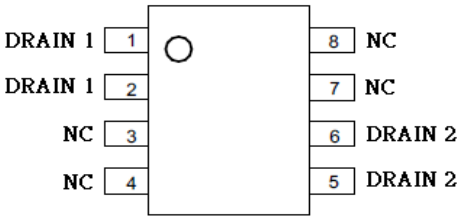
APPLICATIONS
- AC/DC Switching Power Adaptor/Desktop
- Battery Charger
- Open-Frame Switching Power Supply
- LED Power Supply

FEATURES
- 750V CDMOS Process
- Auto Re-Start
- X2 Capacitor Discharge
- Less than 5mW power consumption at 230VAC
- SOP-8/SOD-123 Package design

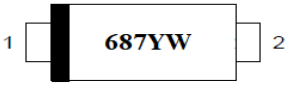
PIN CONFIGURATION
SOD-123



S0P-8



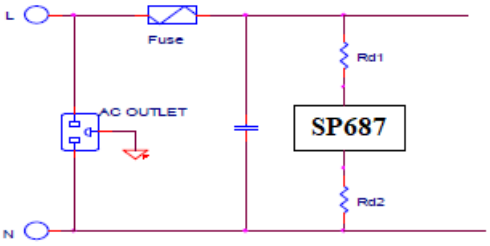
PART MARKING

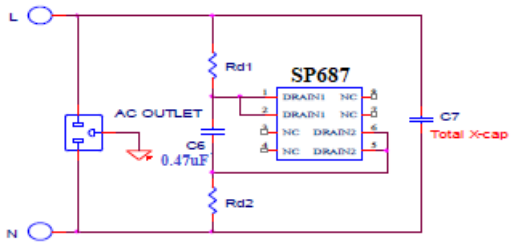


Y : Year Code
W: Week Code

A : Lot Code
B : Date Code

TYPICALAPPLCATION CIRCUIT



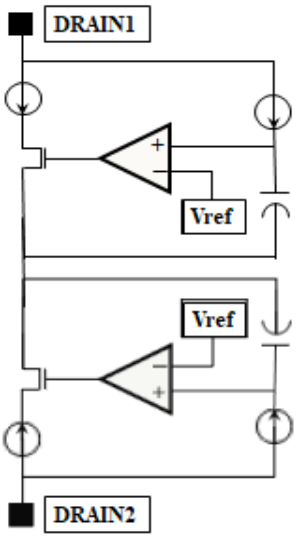


ORDERINGINFORMATION

Part Number	Package	Part Marking
SP687D12RGB	SOD123	687YW
SP687S8RGB	SOP-8	SP687

※ SP689D12RGB : Tape Reel ; Pb – Free ; Halogen-Free
※ SP689S25RGB : Tape Reel ; Pb – Free ; Halogen-Free

BLOCK DIAGRAM



ABSOULTE MAXIMUM RATINGS (T_A=25℃, unless otherwise specified.)

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

PARAMETER		Symbol	RATINGS	Unit
Turn on ID Max. Current Continues		I_D	7.5	mA
Package Power Dissipation @ $T_A \leq 25^oC$ (SOP8)		P_D	0.85	W
Package Power Dissipation @ $T_A \leq 25^oC$ (SOD123)		P_D	0.5	W
Drain1 to Drain2 Voltage		V_{DSS}	750	V
Operating Ambient Temperature	SOP-8	T_{OA}	85	℃
Storage Temperature	SOP-8	T_{STG}	-65~+150	℃
Junction to Ambient *	SOP-8	θ_{JA}	147	℃/W
Case Temperature		θ_{JC}	28	
Operating Ambient Temperature	SOD123	T_{OA}	85	℃
Storage Temperature	SOD123	T_{STG}	-55~+150	℃
Junction to Ambient *	SOD123	θ_{JA}	250	℃/W
Case Temperature		θ_{JC}	50	

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

ELECTRICAL CHARACTERISTICS

(T_A=25℃, V_{HV}=30V, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	Min	Typ	Max	Unit
Breakdown Voltage						
Drain1(d1) to Drain2 (d2)	BV_{DSS}		700			V
Internal MOSFET Turn On Delay Time						
700V MOSFET On delay time	Ton delay	Vd1d2=50V, Rd1+Rd2=10.2K		200	400	mS
700V MOSFET On delay time	Ton delay	Vd1d2=127V, Rd1+Rd2=10.2K		70	140	mS
700V MOSFET Discharge Current						
700V MOSFET Discharge Current	I_D	Vd1d2=50V, Rd1+Rd2=10.2K		3.8		mA
Discharge Time Test (400V discharged to 60V)						
400V to 60V discharging time test	Tdischarging	Rd1&Rd2=10.2K; Cx=0.47uF		45		mS
Supply Current Without Turning on Internal MOSFET						
Supply Current @ line Frequency=47Hz	I supply ac	Vin=230 Vac and Frequency=47Hz			20	uA

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