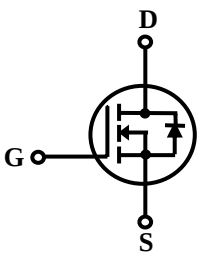
Features

- N-Channel MOSFET
- BV_{DSS} (Minimum) : 600 V
- $R_{DS(ON)}$ (Maximum) : 0.65 ohm
- I_D : 12 A
- Qg (Typical) : 56 nc
- P_D (@TC=25 ℃) : 35 W

General Description

This power MOSFET is produced with advanced VDMOS technology of SAMWIN. This technology enable power MOSFET to have better characteristics, such as fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics. It is mainly suitable for half bridge or full bridge resonant topology like a electronic ballast, and also low power switching mode power appliances.

TO-220
SW F 12N60



Absolute Maximum Ratings

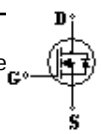
Symbol	Parameter		Value	Units
V_{DSS}	Drain to Source Voltage		600	V
I_D	Continuous Drain Current (@Tc=25℃)		11	A
	Continuous Drain Current (@Tc=100℃)		6.3	A
I_{DM}	Drain Current Pulsed	(Note 1)	40	A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	260	mJ
E_{AR}	Repetitive Avalanche Energy	(Note 1)	3.5	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Total Power Dissipation (@Tc=25℃)		150	W
	Derating Factor above 25℃		3.6	W/℃
T_{STG},T_J	Operating junction temperature &Storage temperature		-55 ~ +150	℃
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.		300	℃

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	1.09	℃/ W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink	-	-	-	℃/ W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	62.5	℃/ W

Electrical Characteristics (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Value			Units
			Min	Typ	Max	
Off Characteristics						
BV_{DSS}	Drain- Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	600	-	-	V
$\triangle BV_{DSS}/\triangle Tj$	Breakdown Voltage Temperature coefficient	I_D=250uA,referenced to 25℃	-	0.4	-	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=600V, V_{GS}=0V， Tc=25℃	-	-	1	uA
I_{DSS}	Drain-Source Leakage Current	V_{DS}=480V,V_{GS}=0V,Tc=125℃	-	-	50	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=20V,V_{DS}=0V	-	-	10	nA
	Gate-Source Leakage Reverse	V_{GS}=--20V, V_{DS}=0V	-	-	-10	nA
On Characteristics						
V_{GS}(th)	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	3.0	3.75	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-state Resistance	V_{GS}=10V,I_D=5.5A	-	0.65	0.7	ohm
Dynamic Characteristics						
Ciss	Input Capacitance	V_{GS}=0V,V_{DS}=25V, f=1MHz	-	1740		pF
Coss	Output Capacitance		-	195		
Crss	Reverse Transfer Capacitance		-	49		
Dynamic Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=300V,I_D=5.0A R_G=4.7ohm (Note4,5)	-	-	22.5	ns
t_r	Rise Time		-	-	18.5	
$t_{d(off)}$	Turn-off Delay Time		-	-	55	
t_f	Fall Time		-	-	31.5	
Q_g	Total Gate Charge	V_{DS}=480V,V_{GS}=10V, I_D=10A (Note4,5)	-	59		nc
Q_{gs}	Gate-Source Charge		-	10	-	
Q_{gd}	Gate-Drain Charge (Miller Charge)		-	32	-	

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET 	-	-	11	A
I_{SM}	Pulsed Source Current		-	-	40	
V_{SD}	Diode Forward Voltage	I_S=10A,V_{GS}=0V	-	-	1.6	V
t_{rr}	Reverse Recovery Time	I_S=10A,V_{GS}=0V, dI_F/dt=100A/us	-	460	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.2	-	uc

※NOTES

1. Repeativity rating: pulse width limited by junction temperature
2. L=45mH,I_{AS}=10A,V_{DD}=50V,RG=25ohm, Starting TJ=25℃
3. I_{SD}≤11A,di/dt≤200A/us,V_{DD}=480V, Starting TJ=25℃
4. Pulse Test: Pulse Width≤300us,Duty Cycle≤2%
5. Essentially independent of operating temperature.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area for TO-220

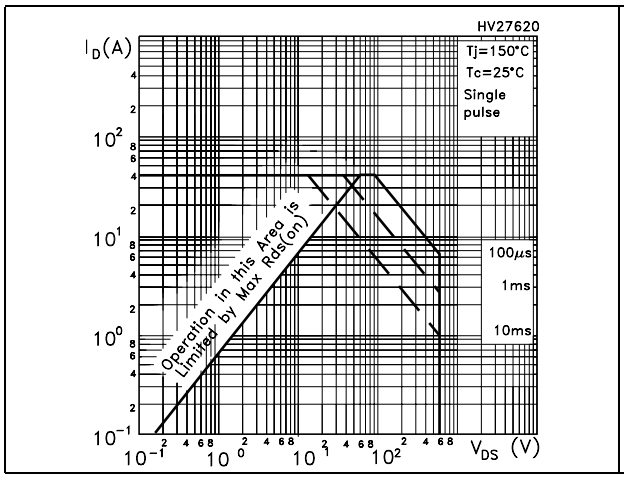


Figure 3. Thermal impedance for TO-220

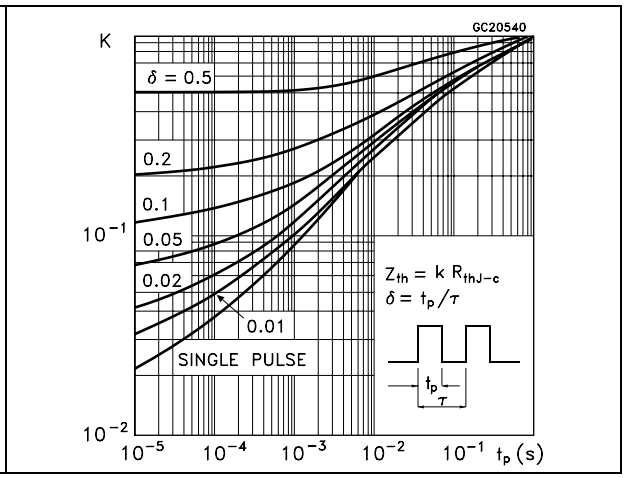


Figure 4. Safe operating area for TO-220FP

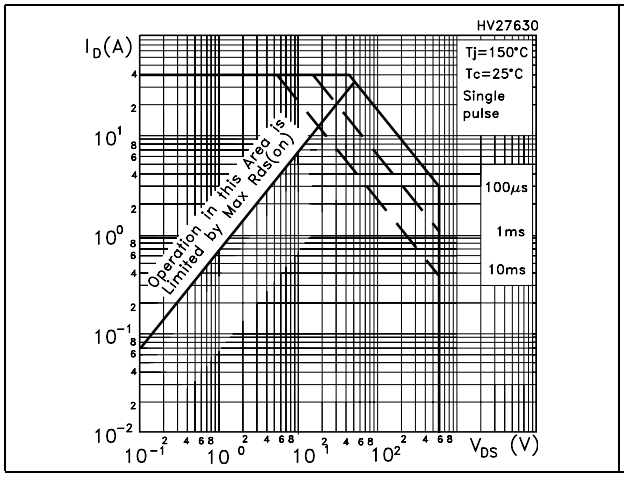


Figure 5. Thermal impedance for TO-220FP

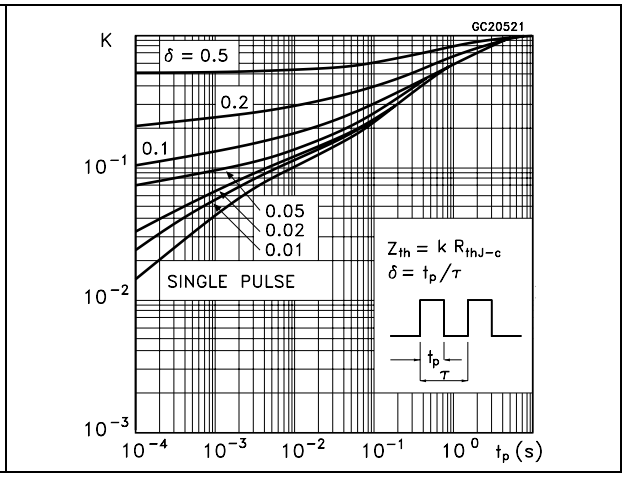


Figure 6. Output characteristics

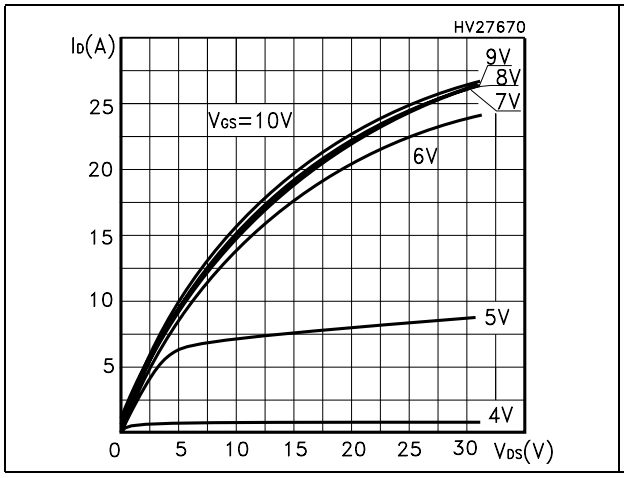


Figure 7. Transfer characteristics