

N-Channel Enhancement Mode Power MOSFET

Description

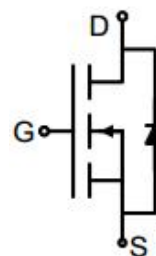
This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

General Features

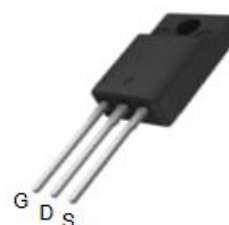
- V_{DS} 900V
- I_D (at $V_{GS} = 10V$) 6A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 3Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-220F

Ordering Information

Device	Package	Marking	Packaging
G6N90F	TO-220F	G6N90	50pcs/Tube

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	900	V
Continuous Drain Current	I_D	6	A
		3.8	
Pulsed Drain Current (note1)	I_{DM}	18	A
Gate-Source Voltage	V_{GS}	±30	V
Power Dissipation	P_D	69	W
Single pulse avalanche energy (note2)	E_{AS}	180	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	°C/W
Thermal Resistance, Junction-to-Case	R_{thJC}	1.8	°C/W

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 900V, V_{GS} = 0V$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	4.0	5.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3A$	--	2.5	3.0	Ω
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 450V,$ $f = 1.0MHz$	--	1060	--	pF
Output Capacitance	C_{oss}		--	20	--	
Reverse Transfer Capacitance	C_{rss}		--	2	--	
Total Gate Charge	Q_g	$V_{DD} = 450V,$ $I_D = 3A,$ $V_{GS} = 10V$	--	25	--	nC
Gate-Source Charge	Q_{gs}		--	8	--	
Gate-Drain Charge	Q_{gd}		--	12	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 450V,$ $I_D = 3A,$ $R_G = 25\Omega$	--	68	--	ns
Turn-on Rise Time	t_r		--	30	--	
Turn-off Delay Time	$t_{d(off)}$		--	97	--	
Turn-off Fall Time	t_f		--	18	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ C$	--	--	6	A
Body Diode Voltage	V_{SD}	$T_J = 25^\circ C, I_{SD} = 3A, V_{GS} = 0V$	--	--	1.2	V
Reverse Recovery Charge	Q_{rr}	$I_F = 3A, V_{GS} = 0V$ $di/dt=100A/us$	--	8	--	μC
Reverse Recovery Time	T_{rr}		--	1200	--	ns

Notes

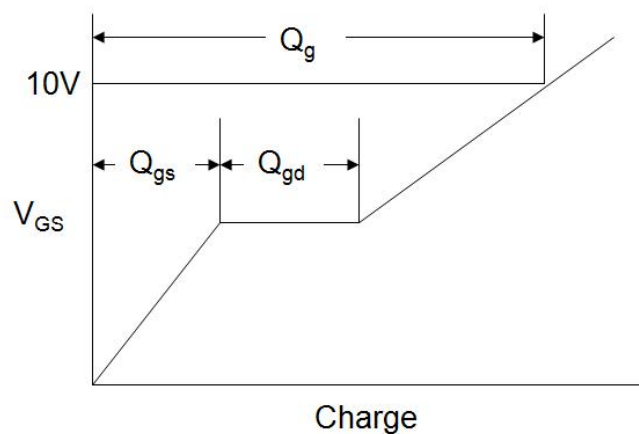
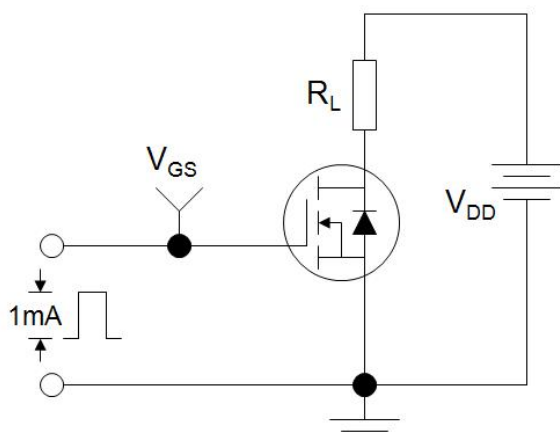
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^\circ\text{C}, V_{DD} = 50V, V_{GS} = 10V, L = 10mH, R_G = 25\Omega$

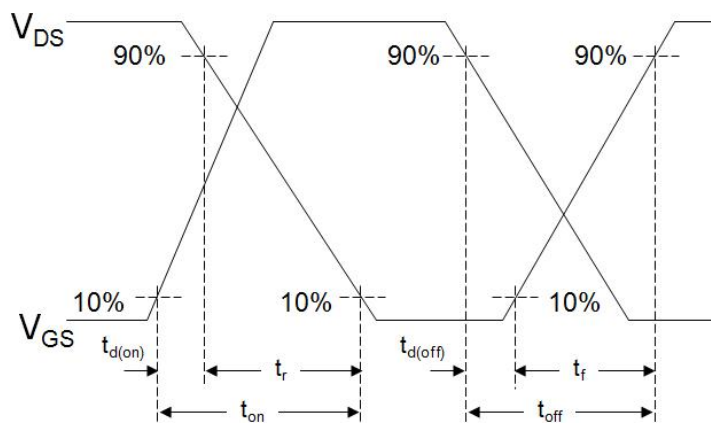
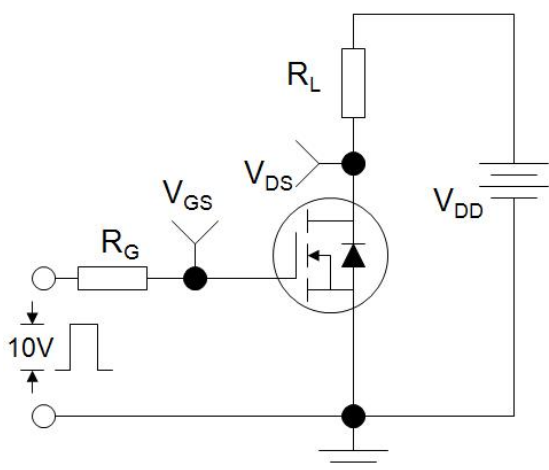
The table shows the minimum avalanche energy, which is 500mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

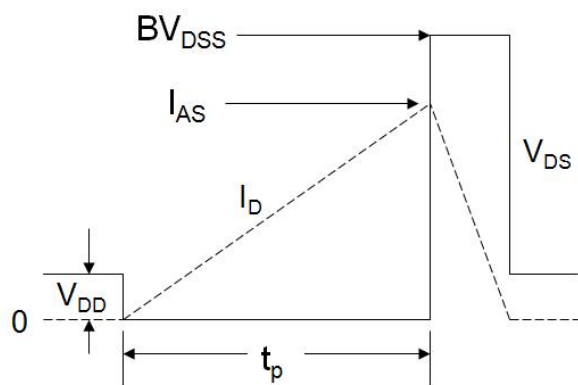
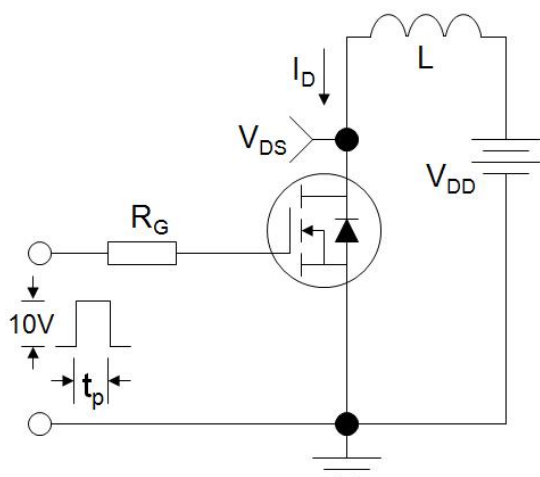
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

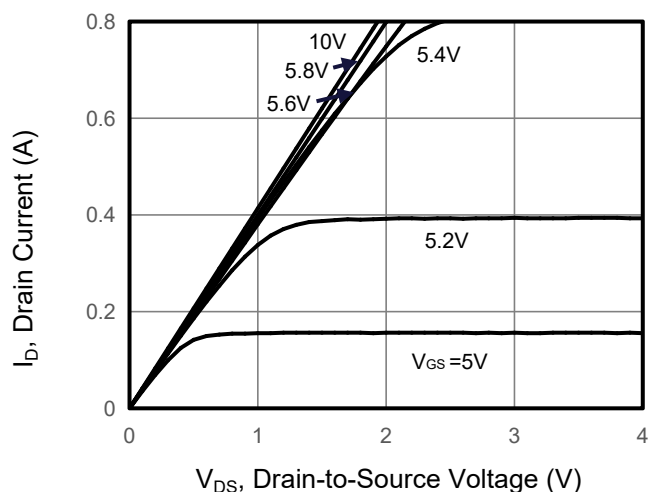


Figure 2. Transfer Characteristics

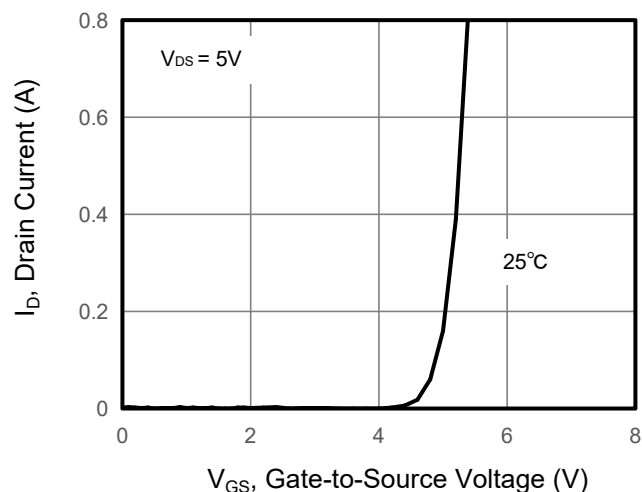


Figure 3. Drain Source On Resistance

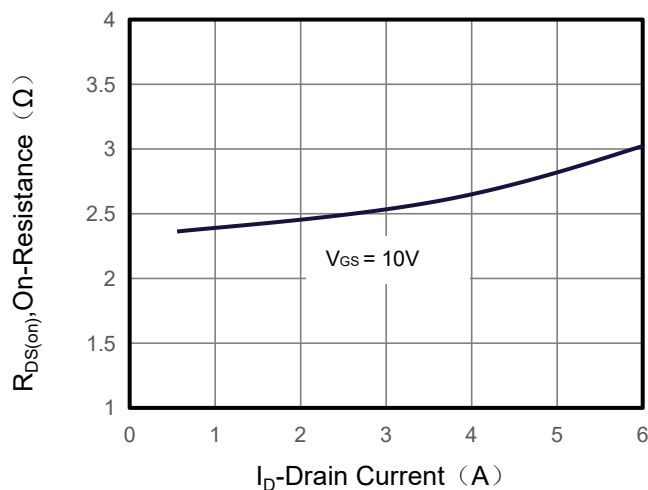


Figure 4. Gate Charge

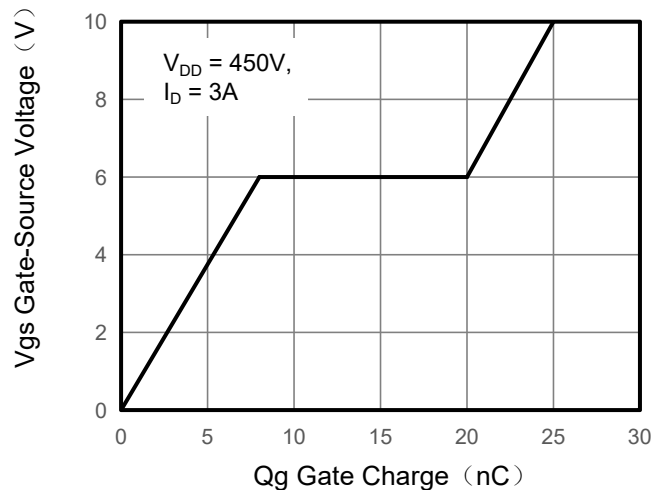


Figure 5. Capacitance

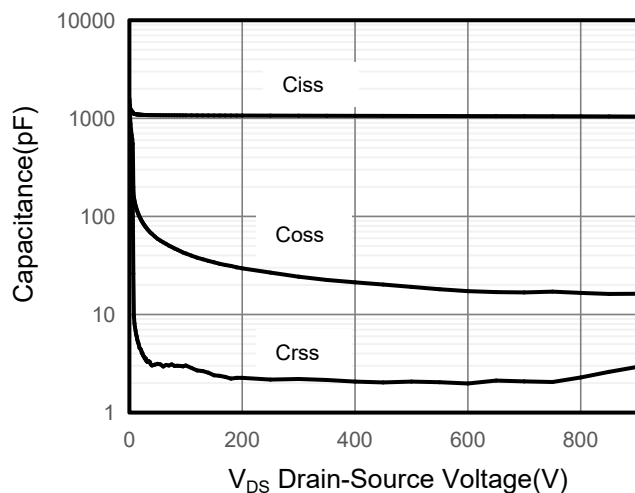
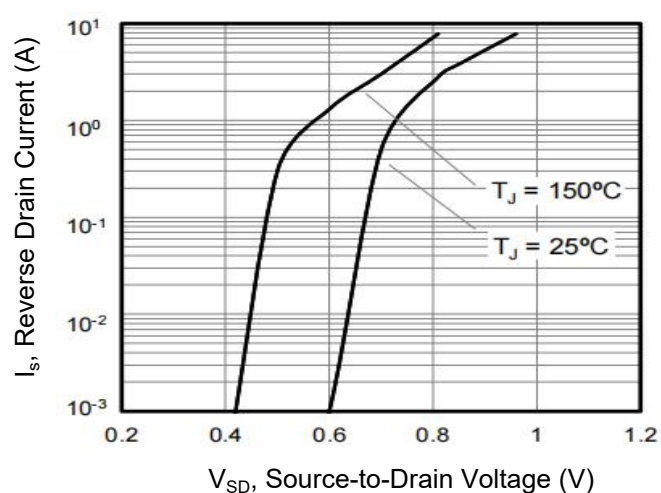


Figure 6. Source-Drain Diode Forward



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Figure 7. Drain-Source On-Resistance

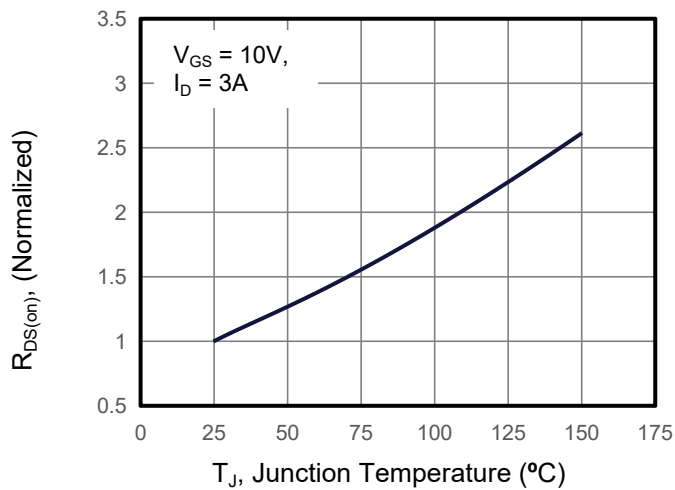


Figure 8. Safe Operation Area

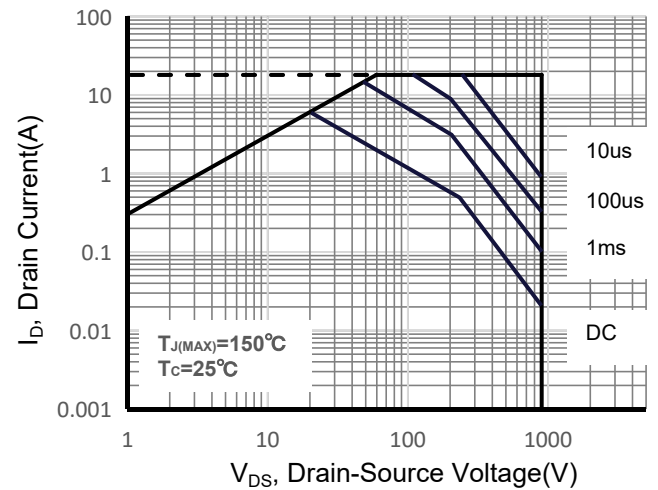


Figure 9. Maximum Continuous Drain Current vs Case Temperature

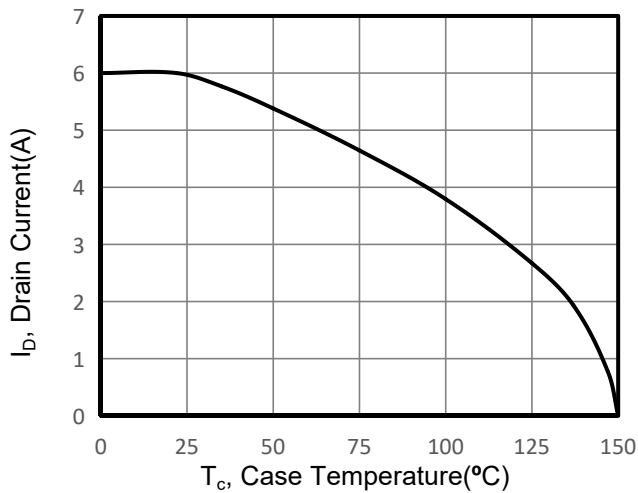
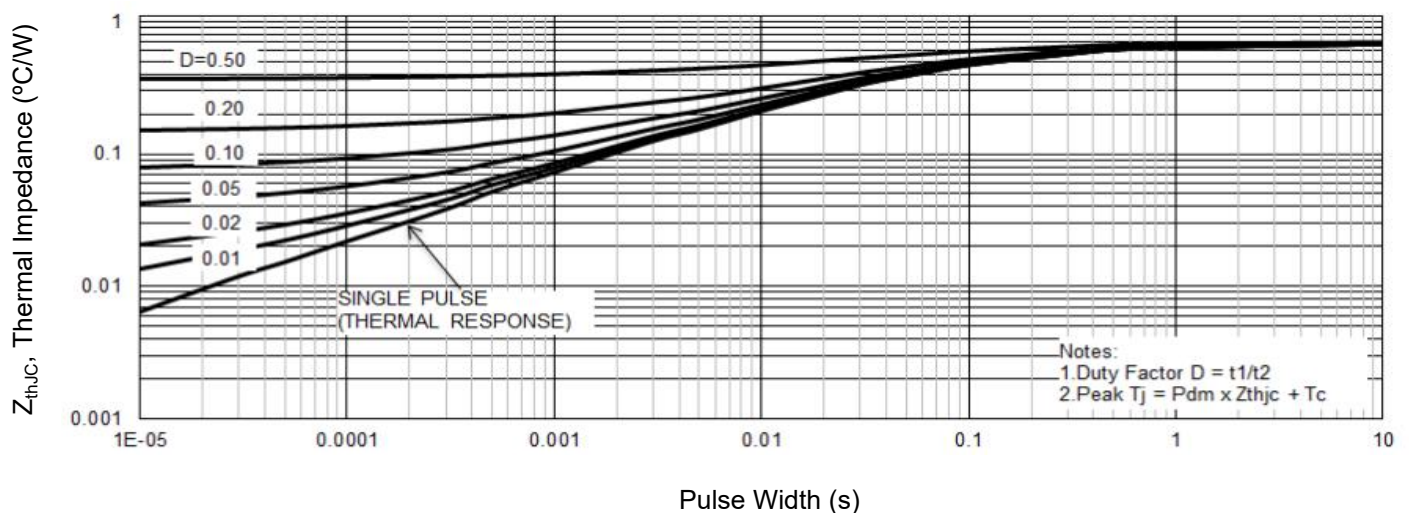
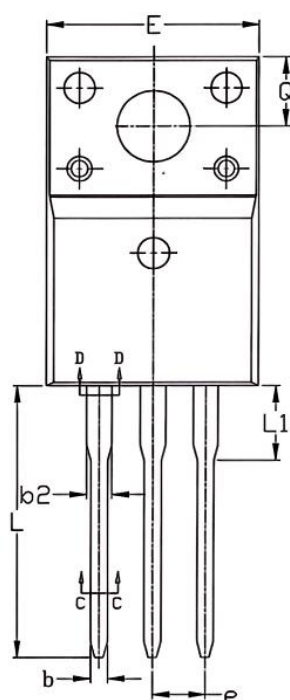


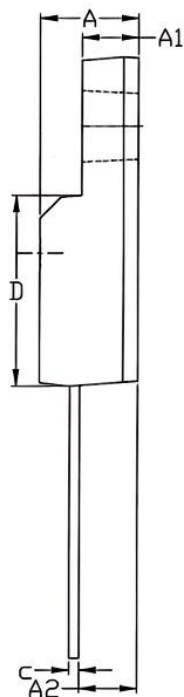
Figure 10. Normalized Maximum Transient Thermal Impedance



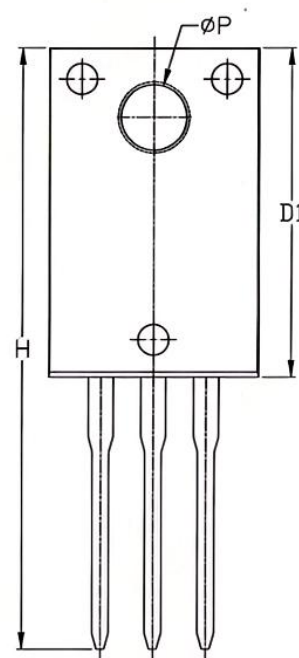
TO-220F Package Information



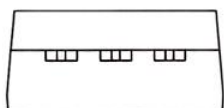
TOP VIEW



SIDE VIEW(Right)



BOTTOM VIEW



SIDE VIEW(Front)

DIM SYMBOL	MIN.	NOM.	MAX.
A	4.600	4.700	4.800
A1	2.600	2.700	2.800
A2	2.660	2.760	2.860
b	0.740	0.840	0.940
b1	0.700	0.800	0.900
b2	1.140	1.240	1.340
b3	1.100	1.200	1.300
c	0.440	0.540	0.640
c1	0.400	0.500	0.600
D	9.090	9.190	9.290
D1	15.770	15.870	15.970
E	10.060	10.160	10.260
e	2.540 BSC.		
H	28.800	29.000	29.200
L	12.930	13.130	13.330
L1	3.400	3.600	3.800
ØP	3.080	3.180	3.280
Q	3.150	3.350	3.550