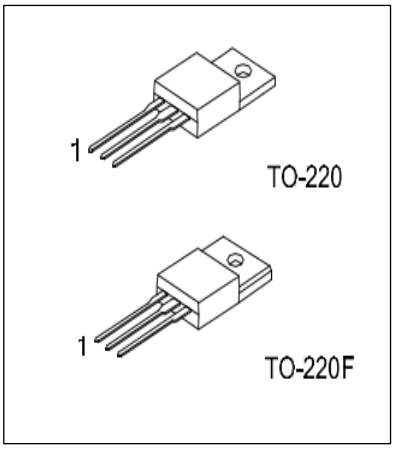
5.4 Amps，900Volts N-Channel MOSFET



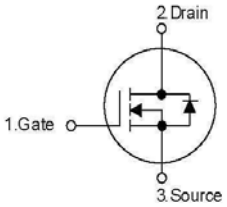
■ Description

The HX5N90 N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ Features

- $R_{DS(ON)}$ = 2.3Ω@V_{GS} = 10 V
- Low gate charge (typical 31nC)
- High ruggedness
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability

■ Symbol



■ Ordering Information

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
HX5N90-TA3-T	HX5N90L-TA3-T	TO-220	G	D	S	Tube
HX5N90-TF3-T	HX5N90L-TF3-T	TO-220F	G	D	S	Tube

Note:Pin Assignment: G:Gate D:Drain S:Source

HX5N90L-TA3-T （1）Packing Type （2）Package Type （3）Lead Plating	(1)T:Tube,R:Tape Reel (2)TA3:TO-220,TF3:TO-220F (3)L:Lead Free Plating Blank：Pb/Sn

■ Absolute Maximum Ratings(T_c=25℃,unless otherwise specified)

Parameter		Symbol	Ratings		Units
			TO-220	TO-220F	
Drain-Source Voltage		V_{DSS}	900		V
Gate-Source Voltage		V_{GSS}	±30		V
Drain Currenet Continuous	T_c=25℃	I_D	5.4	3.0*	A
	T_c=100℃		3.42	1.9	A
Drain Current Pulsed	(Note 1)	I_{DP}	21.6	12.0*	A
Avalanche Energy	Repetitive (Note 1)	E_{AR}	15.8	5.1	mJ
	Single Pulse (Note 2)	E_{AS}	660		mJ
Peak Diode Recovery dv/dt	(Note 3)	dv/dt	4.0		V/ns
Total Power Dissipation	T_c=25℃	P_D	158	51	W
	Derate above 25℃		1.27	0.41	W/℃
Junction Temperature		T_J	+150		℃
Storage Temperature		T_{STG}	-55~+150		℃

*Drain current limited by maximum junction temperature.

■ Thermal Characteristics

Parameter	Symbol	Ratings		Units
		TO-220	TO-220F	
Thermal Resistance Junction-Ambient	R_{thJA}	62.5		℃/W
Thermal Resistance, Case-to-Sink Typ.	R_{thCS}	0.5	--	
Thermal Resistance Junction-Case	R_{thJC}	0.79	2.45	

■ Electrical Characteristics（T_J=25℃,unless Otherwise specified.）

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	900	--	--	V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=900V,V_{GS}=0V	--	--	10	μA
			V_{DS}=720V,T_C=125℃	--	--	100	μA
Gate-Body Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	--	--	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	--	--	-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA	--	1.0	--	V/℃
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	3.0	--	5.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{DS}=10V,I_D=2.7A	--	1.8	2.3	Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V, f=1MH_Z	--	1200	1550	pF
Output Capacitance		C_{OSS}		--	110	145	pF
Reverse Transfer Capacitance		C_{RSS}		--	13	17	pF
Switching Characteristics							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=450V,I_D=5.4A, R_G=25Ω (Note 4, 5)	--	28	65	ns
Rise Time		t_R		--	65	140	ns
Turn-Off Delay Time		$t_{D(OFF)}$		--	65	140	ns
Fall Time		t_F		--	50	110	ns
Total Gate Charge		Q_G	V_{DS}=720V, I_D=5.4A V_{GS}=10V (Note 4, 5)	--	31	40	nC
Gate-Source Charge		Q_{GS}		--	7.2	--	nC
Gate-Drain Charge		Q_{GD}		--	15	--	nC
Drain-Source Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V,I_{SD}=5.4A	--	--	1.4	V
Continuous Drain-Source Current		I_{SD}		--	--	5.4	A
Pulsed Drain-Source Current		I_{SM}		--	--	21.6	A
Reverse Recovery Time		t_{RR}	I_{SD}=5.4A, dI_{SD}/dt=100A/μs (Note 4)	--	610	--	ns
Reverse Recovery Charge		Q_{RR}		--	5.26	--	μC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L=43 mH, I_{AS} = 5.4A, V_{DD} = 50V, R_G=25Ω,Starting TJ=25°C
3. I_{SD}≤5.4 A, di/dt ≤200A/μs, V_{DD}≤BV_{DSS}, Starting TJ=25°C
4. Pulse Test : Pulse width ≤300μs, Duty cycle≤2%
5. Essentially independent of operating temperature

■ Typical Characteristics

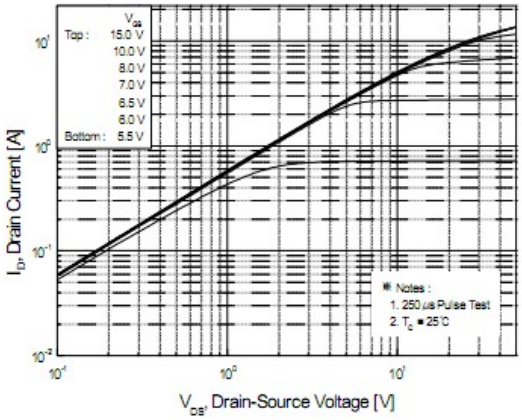


Figure 1. On-Region Characteristics

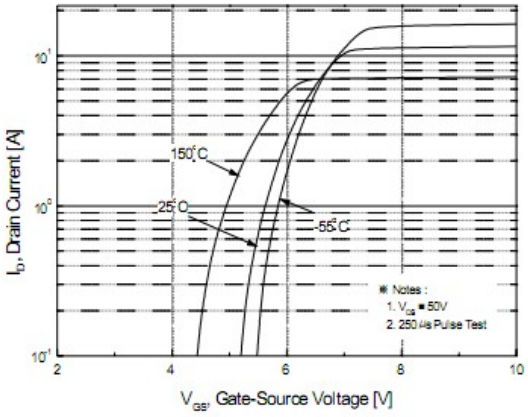


Figure 2. Transfer Characteristics

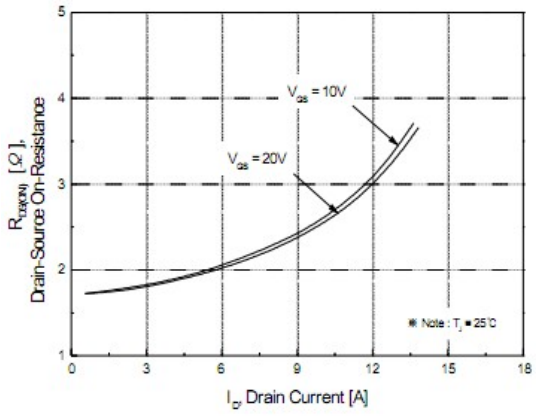


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

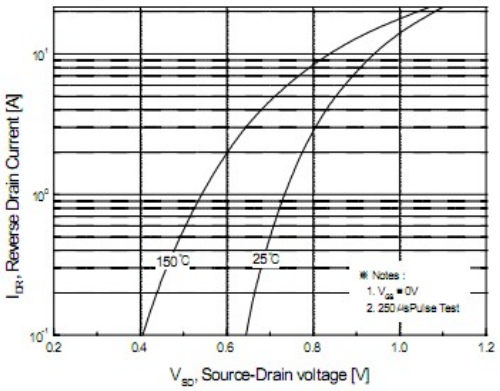


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

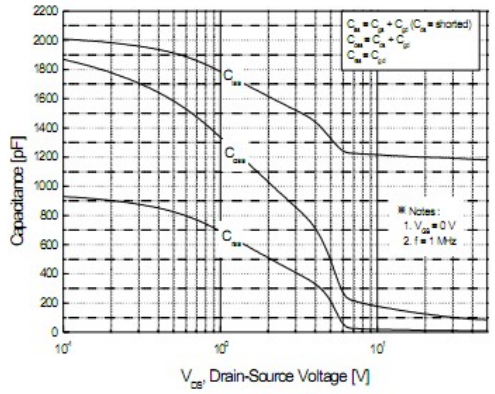


Figure 5. Capacitance Characteristics

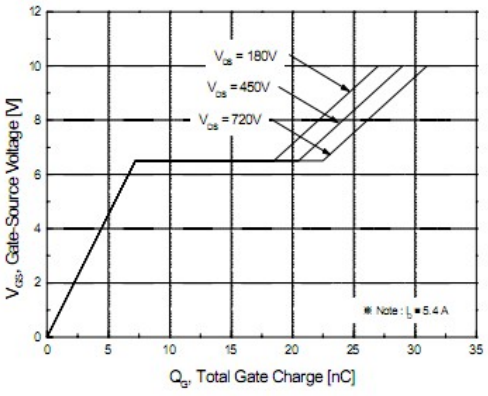


Figure 6. Gate Charge Characteristics

■ Typical Characteristics (Continued)

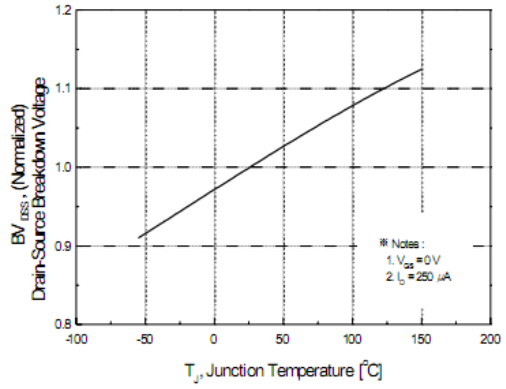


Figure 7. Breakdown Voltage Variation vs Temperature

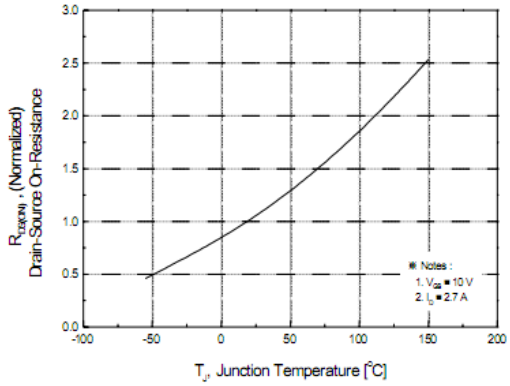


Figure 8. On-Resistance Variation vs Temperature

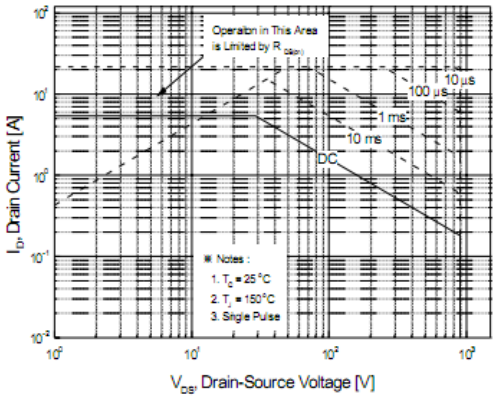


Figure 9-1. Maximum Safe Operating Area for TO220

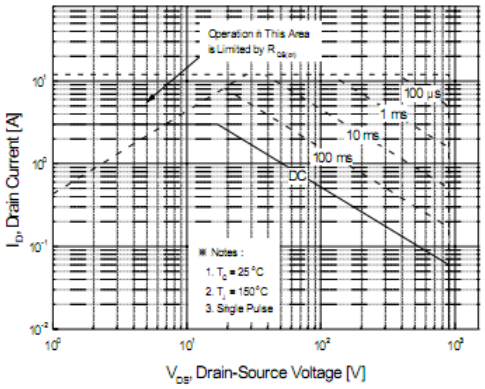


Figure 9-2. Maximum Safe Operating Area for TO220F

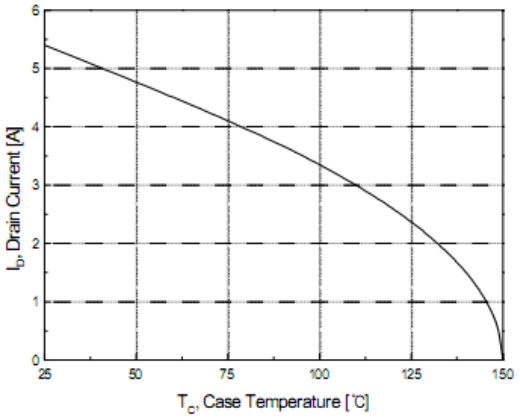


Figure 10. Maximum Drain Current vs Case Temperature 220

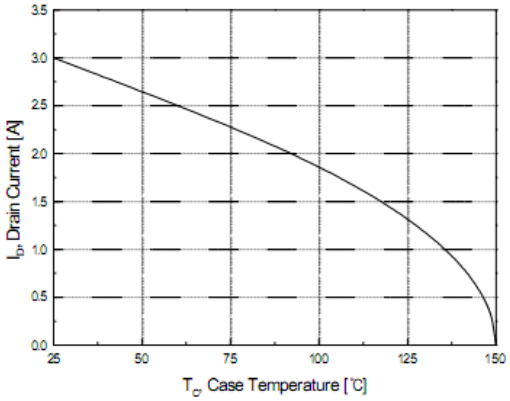


Figure 10. Maximum Drain Current vs Case Temperature 220F

■ Typical Characteristics (Continued)

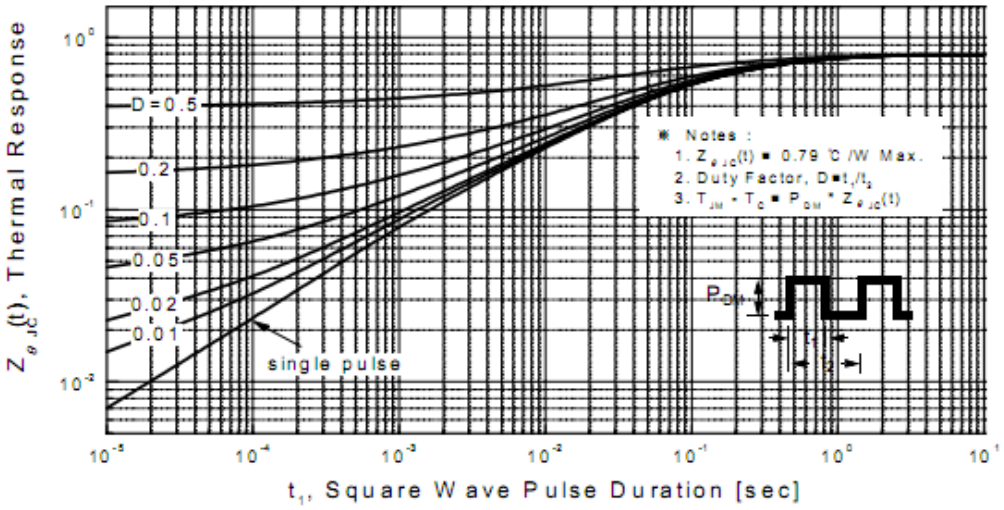


Figure 11-1. Transient Thermal Response Curve for TO220

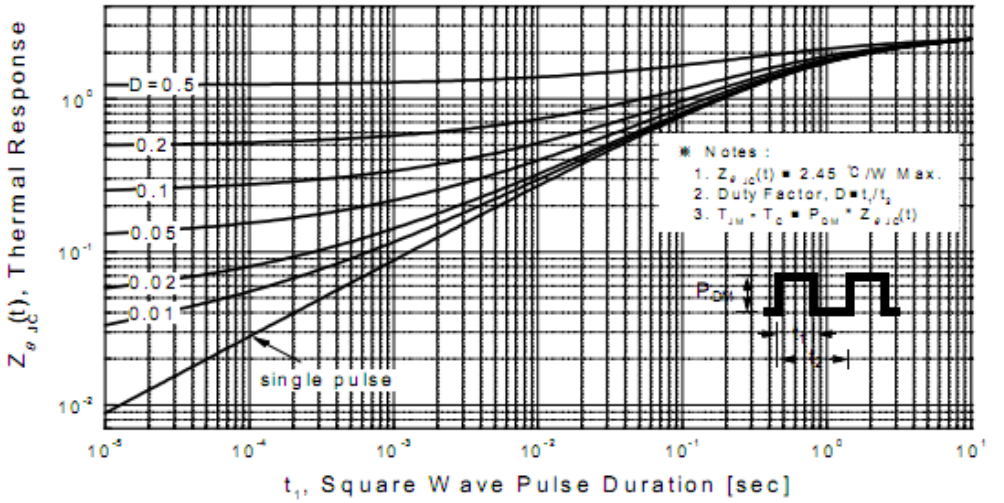


Figure 11-2. Transient Thermal Response Curve for TO220F