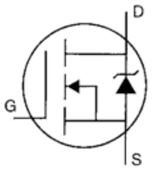
Dynamic dv/dt Rating
175°C Operating Temperature
Fast Switching
Ease of Paralleling
Simple Drive Requirements



V_{DSS}=50V
$R_{DS(on)}$=0.024Ω
I_D=50 * A

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.

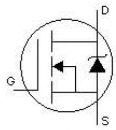
Absolute Maximum Ratings

	Parameter	**Max.**	**Units**
I_D@ Tc=25°C	Continuous Drain Current, V_{GS}@10V	50*	A
I_D@ Tc=100°C	Continuous Drain Current, V_{GS} @ 10V	38	
I_{DM}	Pulsed Drain Current ①	220	
P_D @ Tc=25°C	Power Dissipation	150	W
	Linear Derating Factor	1.0	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	100	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to -175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

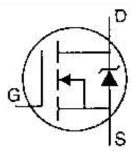
Thermal Resistance

	Parameter	**Min.**	**Typ.**	**Max.**	**Units**
$R_{θJC}$	Junction-to-Case	-	-	1.0	°C/W
$R_{θCS}$	Case-to-Sink, Flat, Greased Surface	-	0.50	-	
$R_{θJA}$	Junction-to-Ambient	-	-	62	

Electrical Characteristics @ T_J=25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	50	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	-	0.057	-	V/°C	Reference to 25°C, I_D=1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	-	-	0.024	Ω	V_{GS}=10V, I_D=32A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250μA
g_{fs}	Forward Transconductance	27	-	-	S	V_{DS}=25V, I_D=32A ④
I_{DSS}	Drain-to-Source Leakage Current	-	-	25	μA	V_{DS}=50V, V_{GS}=0V
		-	-	250		V_{DS}=48V, V_{GS}=0V, T_J=150°C
I_{GSS}	Gate-to-Source Forward Leakage	-	-	100	nA	V_{GS}=20V
	Gate-to-Source Reverse Leakage	-	-	-100		V_{GS}=-20V
Qg	Total Gate Charge	-	-	66	nC	I_D=54A
Qgs	Gate-to-Source Charge	-	-	21		V_{DS}=48V
Qgd	Gate-to-Drain ("Miller") Charge	-	-	25		V_{GS}=10V See Fig. 6 and 13 ④
td(on)	Turn-On Delay Time	-	12	-	nS	V_{DD}=28V
tr	Rise Time	-	120	-		I_D=54A
td(off)	Turn-Off Delay Time	-	42	-		R_G=9.1Ω
tf	Fall Time	-	95	-		R_D=0.49Ω See Figure 10
L_D	Internal Drain Inductance	-	4.5	-	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	-	7.5	-		
Ciss	Input Capacitance	-	1800	-	pF	V_{GS}=0V
Coss	Output Capacitance	-	960	-		V_{DS}=25V
Crss	Reverse Transfer Capacitance	-	160	-		f=1.0MHz See Figure 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Is	Continuous Source Current (Body Diode)	-	-	50	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	-	-	220		
V_{SD}	Diode Forward Voltage	-	-	2.5	V	T_J=25°C, I_S=54A, V_{GS}=0V ④
Trr	Reverse Recovery Time	-	66	99	ns	T_J=25°C, I_F=54A
Qrr	Reverse Recovery Charge	-	0.17	0.31	μC	di/dt=100A/μs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S-L_D)				

Notes:

①Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)

②V_{DD}=25V, starting T_J=25°C, L=34μH, R_G=25Ω, I_{AS}=54A (See Figure 12)

③I_{SD}≤54A, di/dt ≤250A/μs, V_{DD}≤$V_{(BR)DSS}$,

④Pulse width ≤ 300μs; duty cycle ≤ 2%.

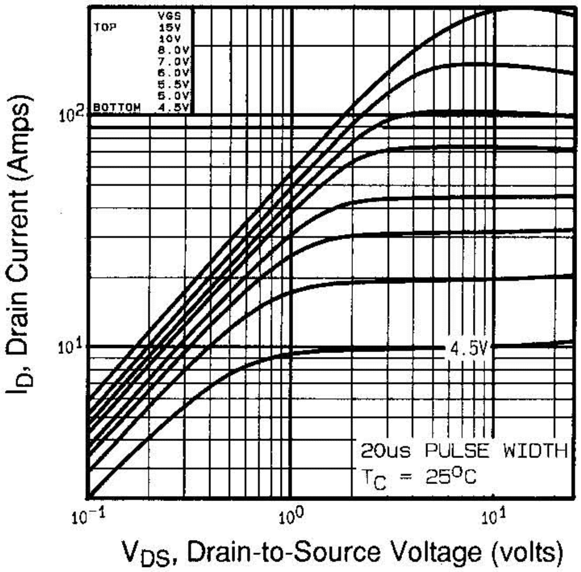


Fig 1. Typical Output Characteristics,

Tc=25°C

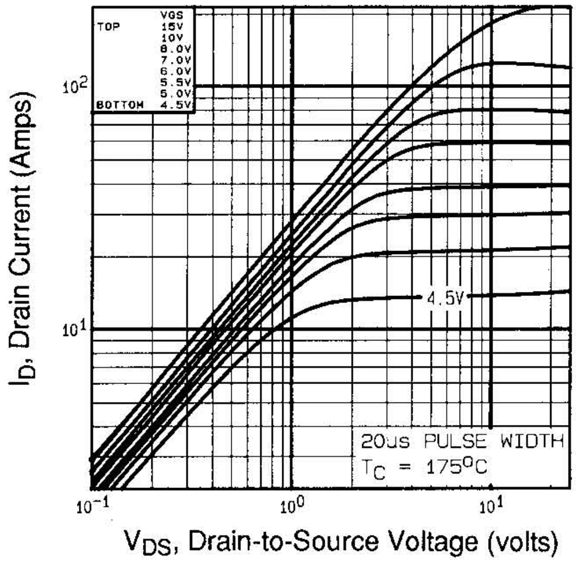


Fig 2. Typical Output Characteristics,

Tc=175°C

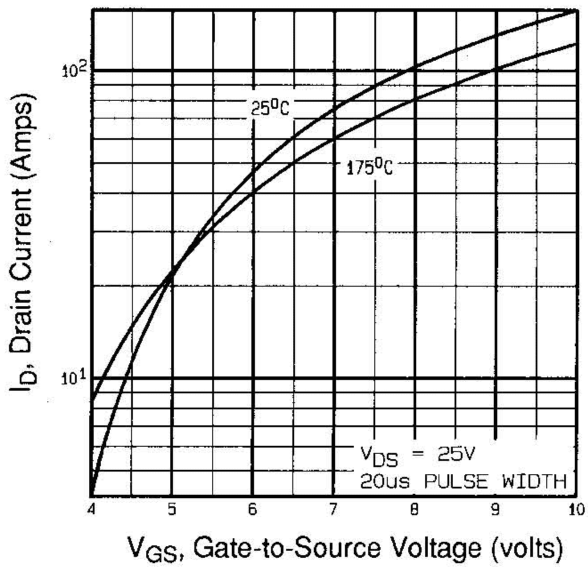


Fig 3. Typical Transfer Characteristics

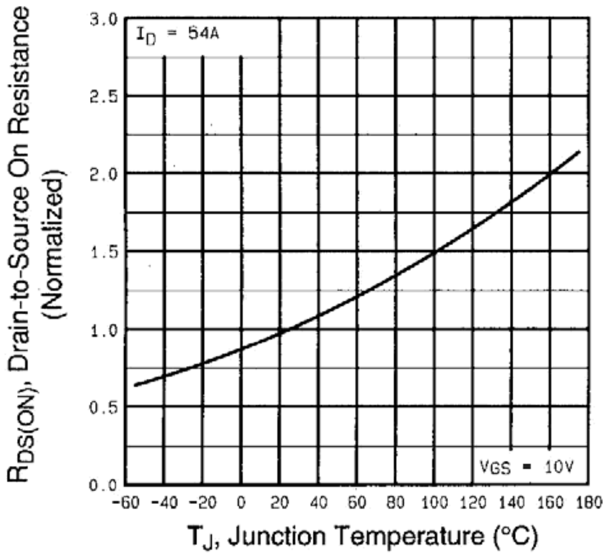


Fig 4. Normalized On-Resistance

Vs. Temperature

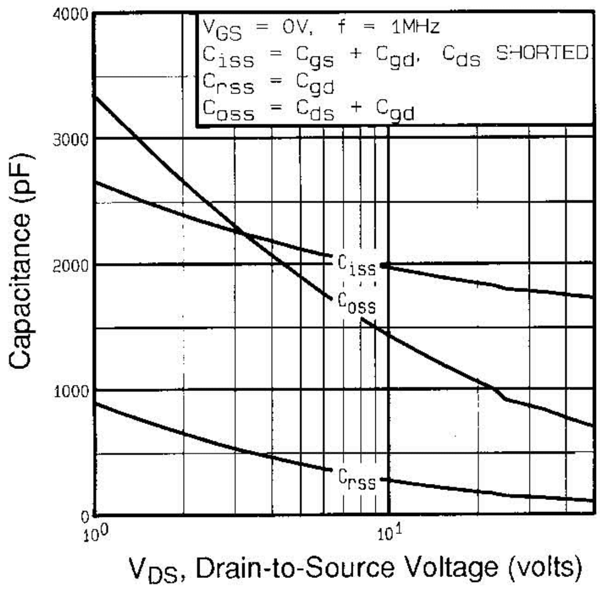


Fig 5. Typical Capacitance Vs.
Drain-to-Source Voltage

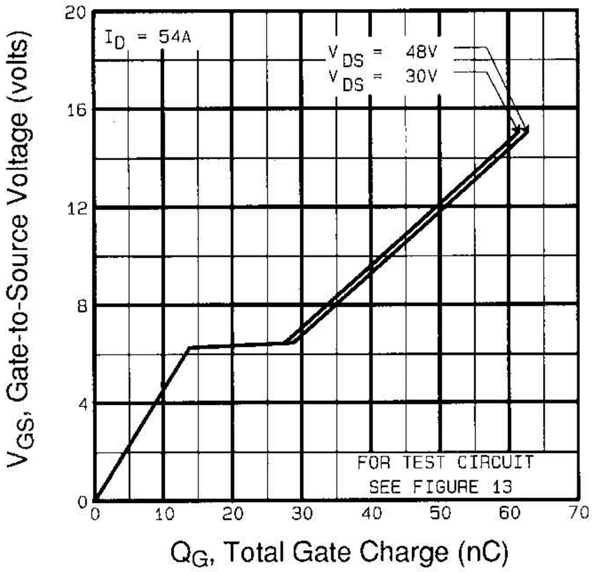


Fig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage

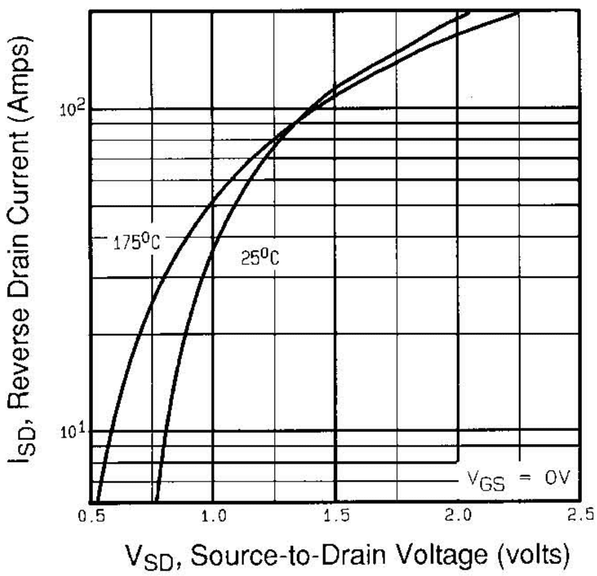


Fig 7. Typical Source-Drain Diode
Forward Voltage

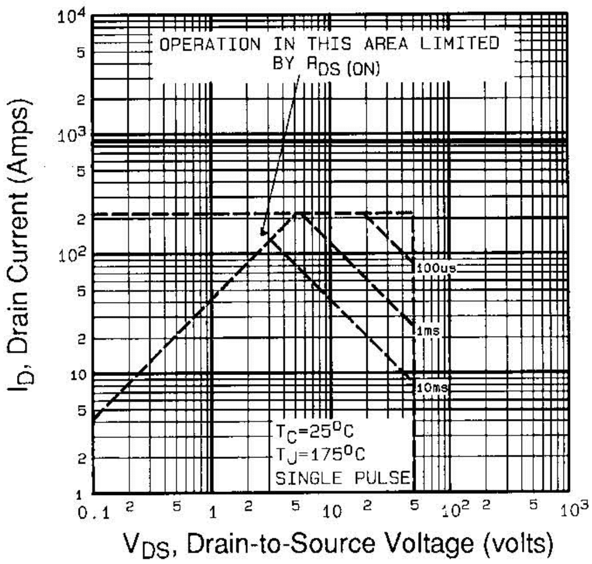


Fig 8. Maximum Safe Operating Area

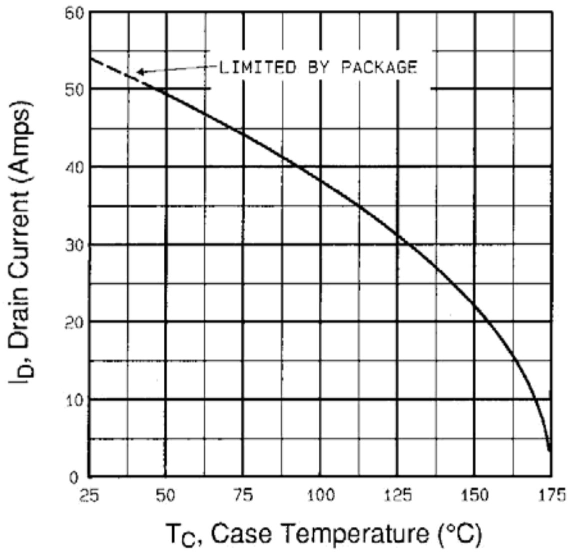


Fig 9. Maximum Drain Current Vs.
Case Temperature

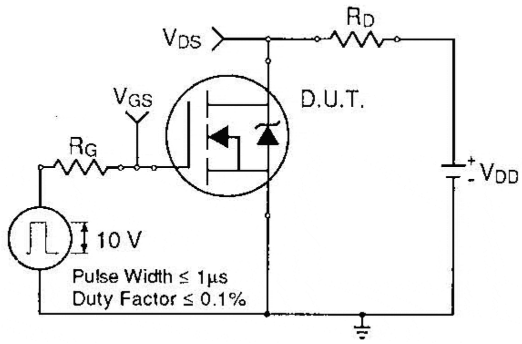


Fig 10a. Switching Time Test Circuit

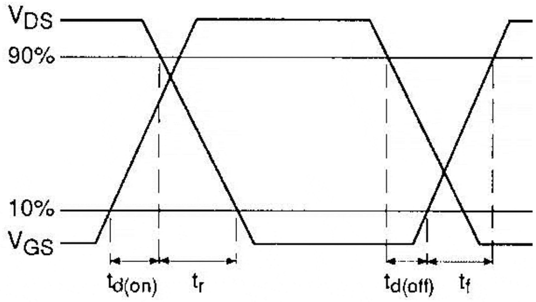


Fig 10b. Switching Time Waveforms

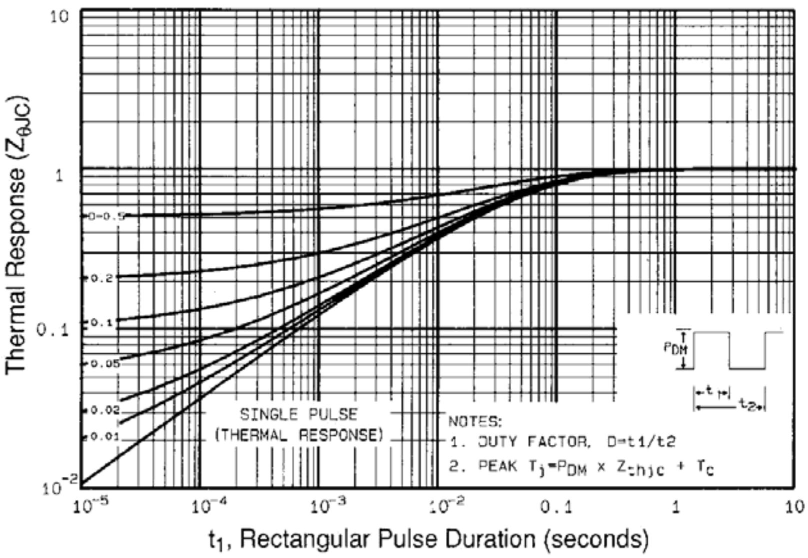


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

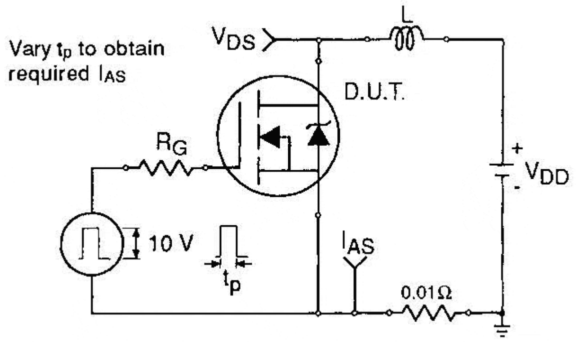


Fig 12a. Unclamped Inductive Test Circuit

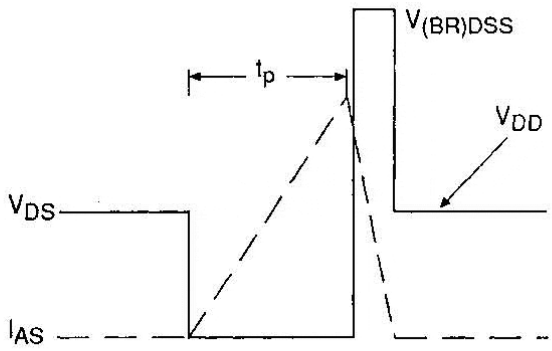


Fig 12b. Unclamped Inductive Waveforms

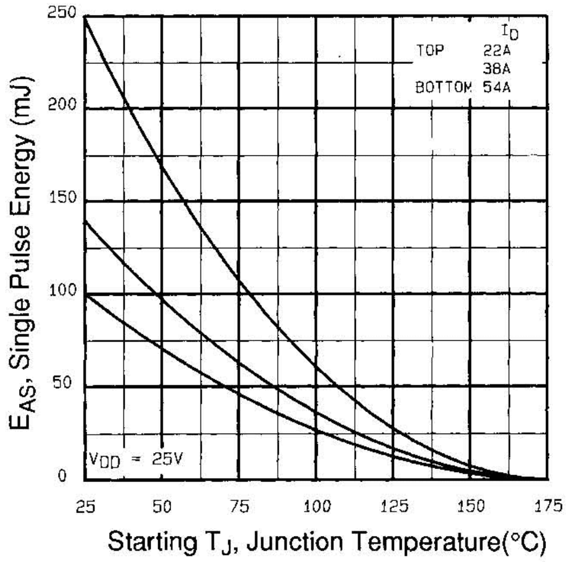


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

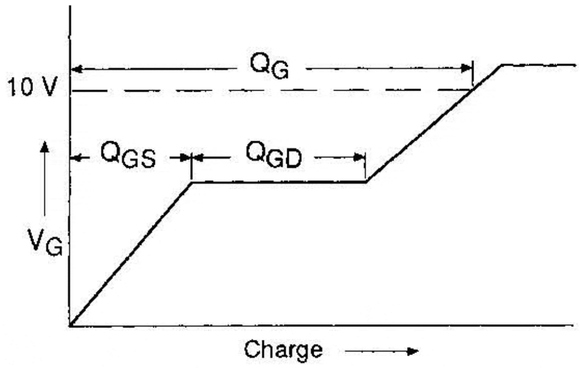


Fig 13a. Basic Gate Charge Waveform

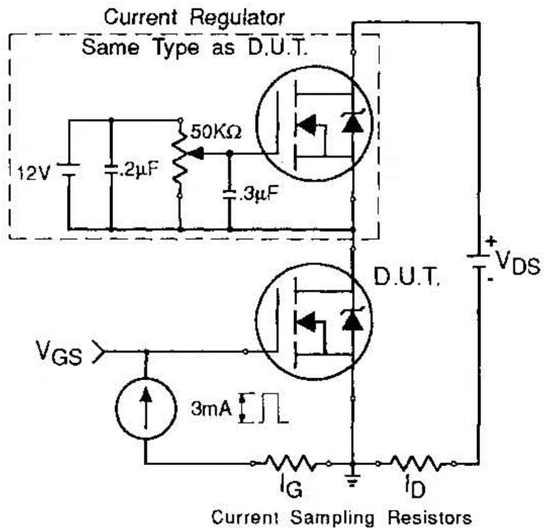


Fig 13b. Gate Charge Test CIrcuit