

75Amps, 75Volts N-CHANNEL POWER MOSTFET

■ DESCRIPTION

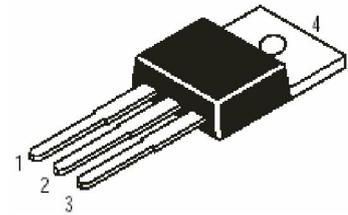
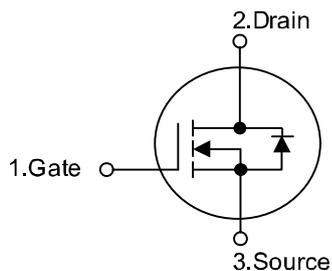
Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

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

■ FEATURES

- * $R_{DS(ON)} = 12.5m\Omega @ V_{GS} = 10 V$
- * Ultra low gate charge (typical 90 nC)
- * Fast switching capability
- * Avalanche energy Specified
- * Improved dv/dt capability, high ruggedness

■ SYMBOL



Pin1–Gate
Pin2–Drain
Pin3–Source

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	75	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	75	A
	$T_C = 100^\circ\text{C}$		56	A
Drain Current Pulsed (Note 1)		I_{DM}	300	A
Gate to Source Voltage		V_{GS}	± 20	V
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	900	mJ
	Repetitive (Note 1)	E_{AR}	300	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	15	V/ns
Total Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	220	W
	Derating above 25°C		1.4	W/ $^\circ\text{C}$
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Thermal Resistance Junction-Ambient	θ_{JA}			62.5	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction-Case	θ_{JC}			0.8	$^\circ\text{C}/\text{W}$
Thermal Resistance Case-Sink	θ_{CS}		0.5		$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	75			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 1\text{ mA}$, Referenced to 25°C		0.08		V/ $^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$			20	μA
		$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$, $T_J = 150^\circ\text{C}$			250	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
Gate-Source Leakage Reverse		$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 48\text{ A}$		12.5	15	m Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$		3300		pF
Output Capacitance	C_{OSS}			530		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
Switching Characteristics						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 38\text{ V}, I_D = 48\text{ A}$, $V_{GS} = 10\text{ V}$, (Note 4, 5)		12		ns
Rise Time	t_R			79		ns
Turn-Off Delay Time	$t_{D(OFF)}$			80		ns
Fall Time	t_F			52		ns
Total Gate Charge	Q_G		$V_{DS} = 60\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 48\text{ A}$, (Note 4, 5)		90	140
Gate-Source Charge	Q_{GS}			20	35	nC
Gate-Drain Charge (Miller Charge)	Q_{GD}			30	45	nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Source-Drain Diode Ratings and Characteristics						
Continuous Source Current	I_S				75	A
Pulsed Source Current	I_{SM}				300	
Diode Forward Voltage	V_{SD}	$I_S = 48A, V_{GS} = 0 V$			1.4	V
Reverse Recovery Time	t_{rr}	$I_S = 48A, V_{GS} = 0 V$		90		ns
Reverse Recovery Charge	Q_{rr}	$di_F / dt = 100 A/\mu s$		300		μC

Note 1. Repeativity rating: pulse width limited by junction temperature

2. $L=0.24mH, I_{AS}=48A, R_G=20\Omega$, Starting $T_J=25^\circ C$

3. $I_{SD}\leq 48A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ C$

4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

5. Essentially independent of operating temperature.

■ **TEST CIRCUITS AND WAVEFORMS**

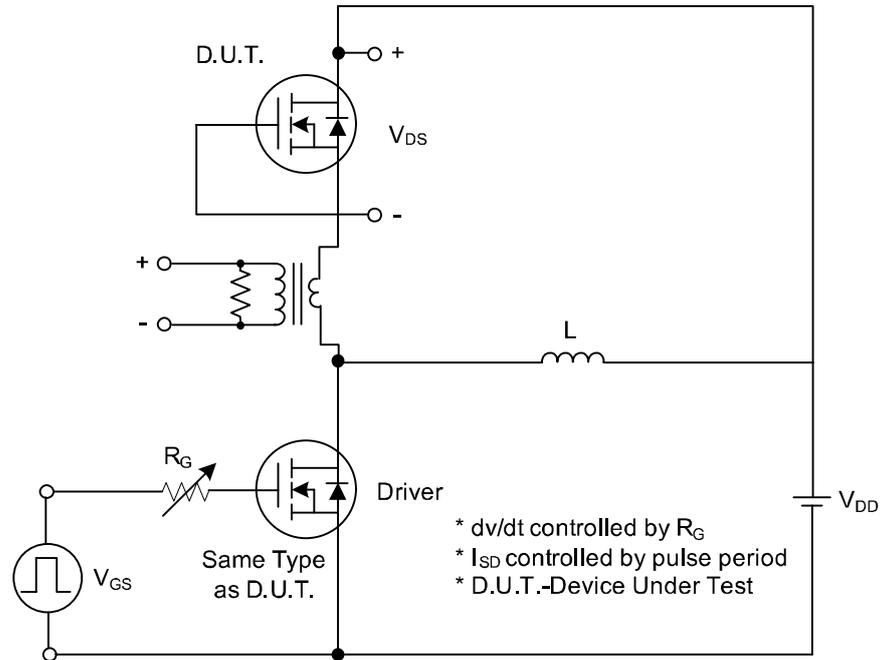


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

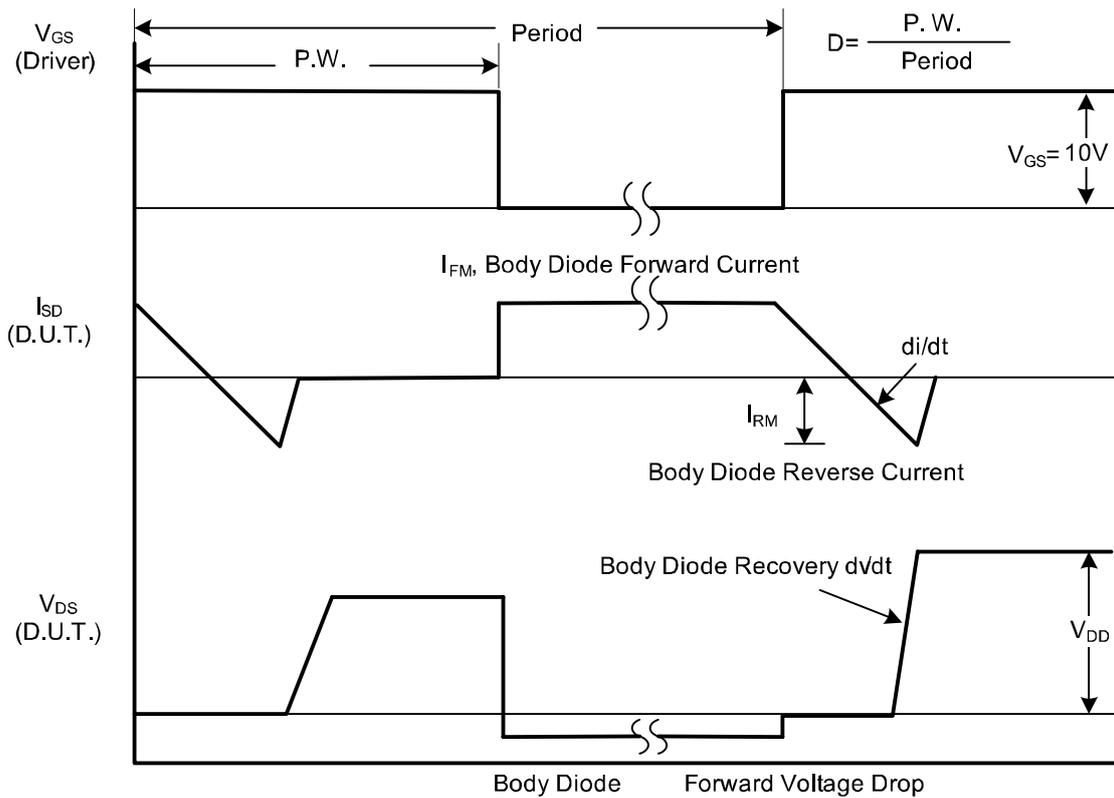


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

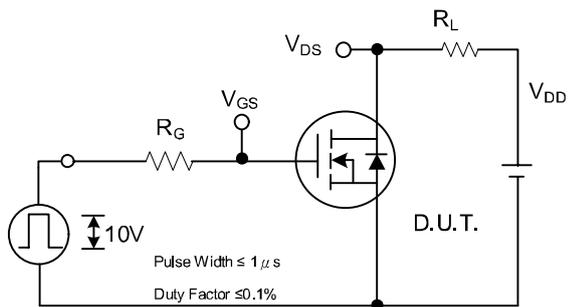


Fig. 2A Switching Test Circuit

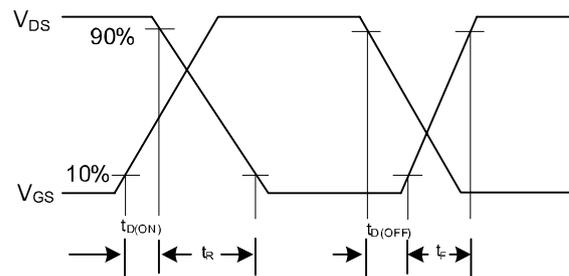


Fig. 2B Switching Waveforms

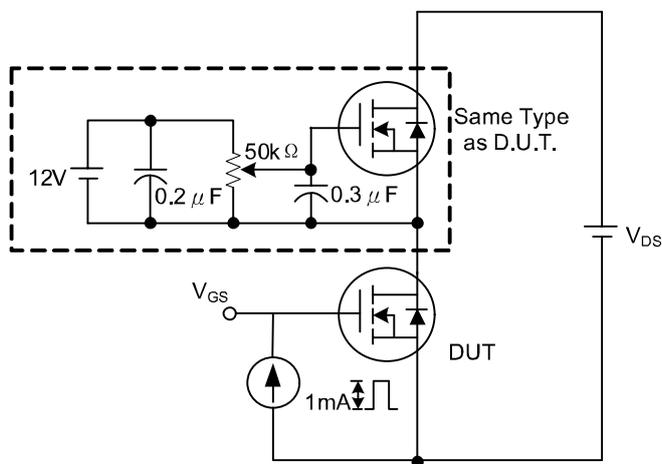


Fig. 3A Gate Charge Test Circuit

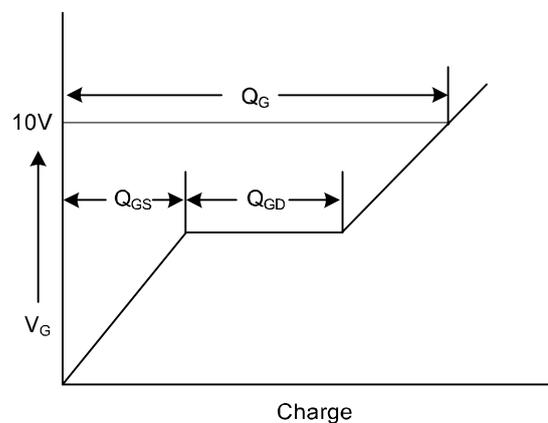


Fig. 3B Gate Charge Waveform

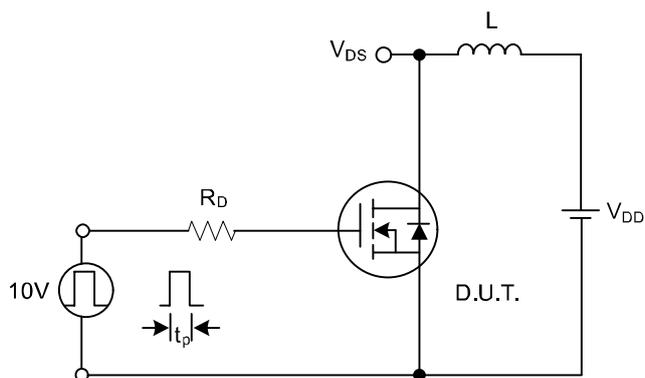


Fig. 4A Unclamped Inductive Switching Test Circuit

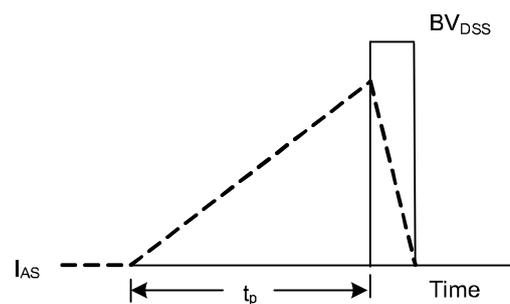
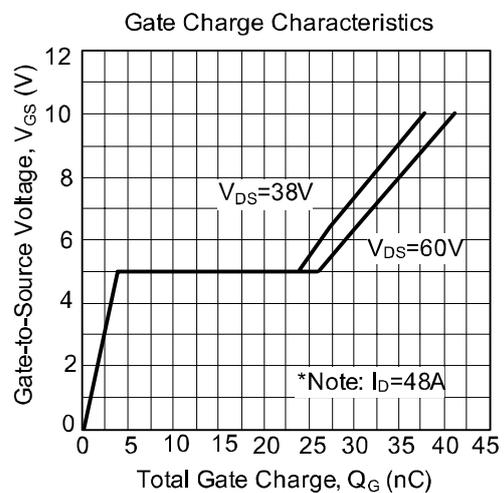
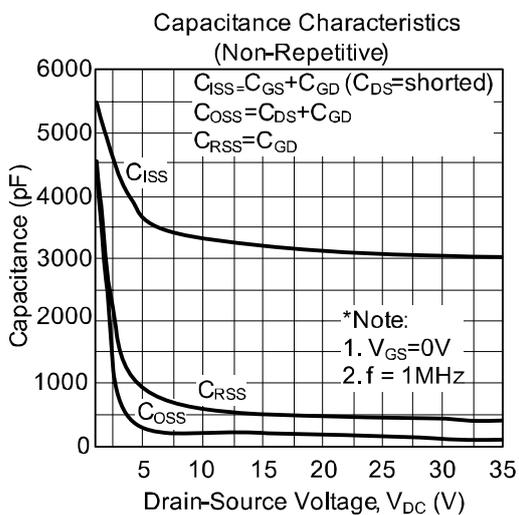
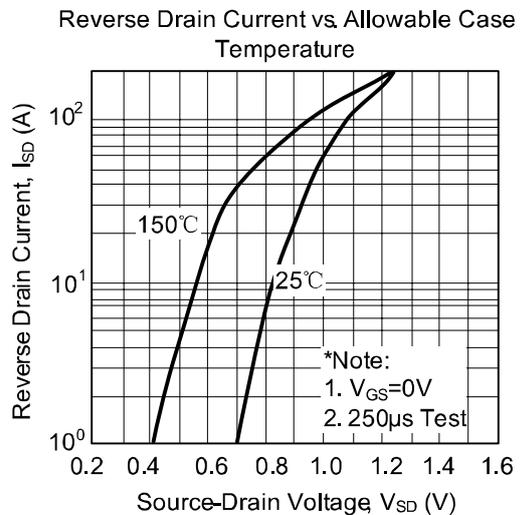
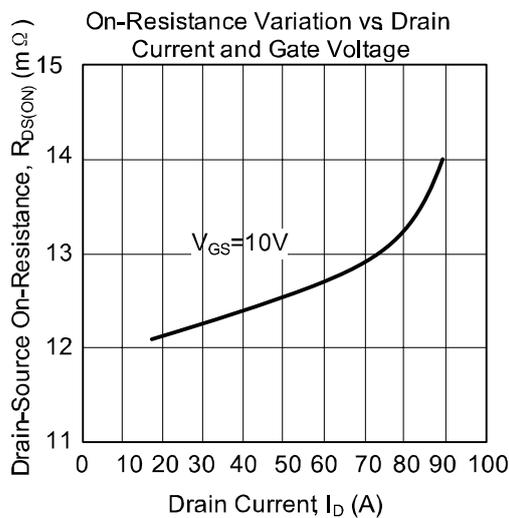
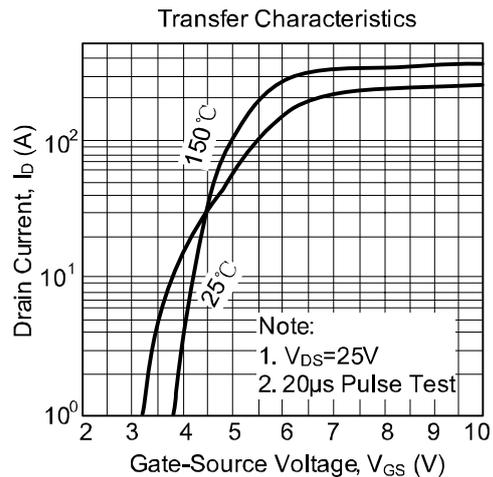
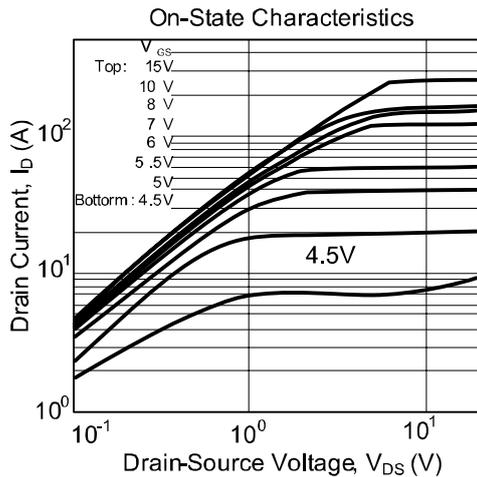


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)

