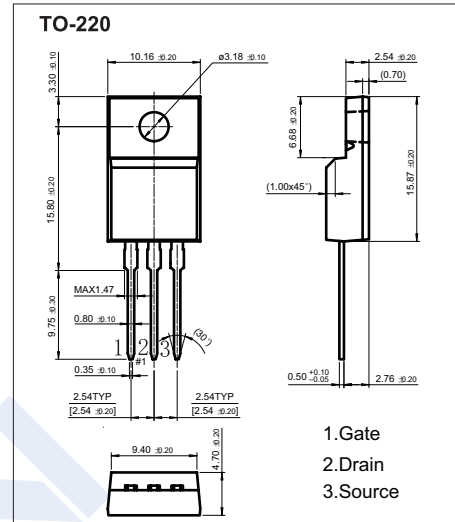
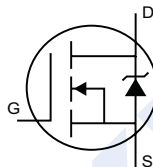


## N-Channel MOSFET

### IRF3205 (KRF3205)

■ Features

- $V_{DS} = 55V$
- $R_{DS(ON)} = 8.0m\Omega$
- $I_D = 110A$  ⑤
- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated



■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	55	V
Gate-Source Voltage	$V_{GS}$	±20	
Continuous Drain Current, $V_{GS} @ 10V$	$I_D$	$T_C=25^\circ C$	110 ⑤
		$T_C=100^\circ C$	80
Pulsed Drain Current ①	$I_{DM}$	390	A
Power Dissipation	$P_D$	200	W
Avalanche Current ①	$I_{AR}$	62	A
Repetitive Avalanche Energy ①	$E_{AR}$	20	mJ
Peak Diode Recovery dv/dt ③	dv/dt	5.0	V/ns
Thermal Resistance Junction-to-Case	$R_{thJC}$	0.75	°C/W
Thermal Resistance Junction-to-Ambient	$R_{thJA}$	62	
Junction Temperature	$T_J$	175	°C
Storage Temperature Range	$T_{stg}$	-55 to 175	

## N-Channel MOSFET

## IRF3205 (KRF3205)

■ Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{DS}$	$I_D = 250 \mu\text{A}$ , $V_{GS} = 0 \text{ V}$	55			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 55 \text{ V}$ , $V_{GS} = 0 \text{ V}$			25	$\mu\text{A}$
		$V_{DS} = 44 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 150^\circ\text{C}$			250	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
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-Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$ , $I_D = 62 \text{ A}$ ④			8.0	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 25 \text{ V}$ , $I_D = 62 \text{ A}$ ④	44			S
Total Gate Charge	$Q_g$	$I_D = 62 \text{ A}$ $V_{DS} = 44 \text{ V}$ $V_{GS} = 10 \text{ V}$ , See Fig. 6 and 13			146	nC
Gate Source Charge	$Q_{gs}$				35	
Gate Drain Charge	$Q_{gd}$				54	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 28 \text{ V}$ $I_D = 62 \text{ A}$ $R_G = 4.5 \Omega$ $V_{GS} = 10 \text{ V}$ , See Fig. 10 ④		14		ns
Turn-On Rise Time	$t_r$			101		
Turn-Off Delay Time	$t_{d(off)}$			50		
Turn-Off Fall Time	$t_f$			65		
Internal Drain Inductance	$L_D$	Between lead, 6mm (0.25in.) from package and center of die contact		4.5		nH
Internal Source Inductance	$L_S$			7.5		
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$ $V_{DS} = 25 \text{ V}$ $f = 1.0 \text{ MHz}$ . See Fig. 5		3247		pF
Output Capacitance	$C_{oss}$			781		
Reverse Transfer Capacitance	$C_{rss}$			211		
Single Pulse Avalanche Energy ②	$E_{AS}$	$I_{AS} = 62 \text{ A}$ , $L = 138 \mu\text{H}$		1050 ⑥	264 ⑦	mJ
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}$ , $I_F = 62 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ ④		69	104	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			143	215	nC
Maximum Body-Diode Continuous Current	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode.			110	A
Body-Diode Pulsed Source Current ①	$I_{SM}$				390	
Diode Forward Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}$ , $I_S = 62 \text{ A}$ , $V_{GS} = 0 \text{ V}$ ④			1.3	V
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ )				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 138 \mu\text{H}$ ,  $R_G = 25 \Omega$ ,  $I_{AS} = 62 \text{ A}$ . (See Figure 12).
- ③  $I_{SD} \leq 62 \text{ A}$ ,  $di/dt \leq 207 \text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$
- ④ Pulse width  $\leq 400 \mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑤ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑥ This is a typical value at device destruction and represents operation outside rated limits.
- ⑦ This is a calculated value limited to  $T_J = 175^\circ\text{C}$ .

## N-Channel MOSFET

### IRF3205 (KRF3205)

■ Typical Characteristics

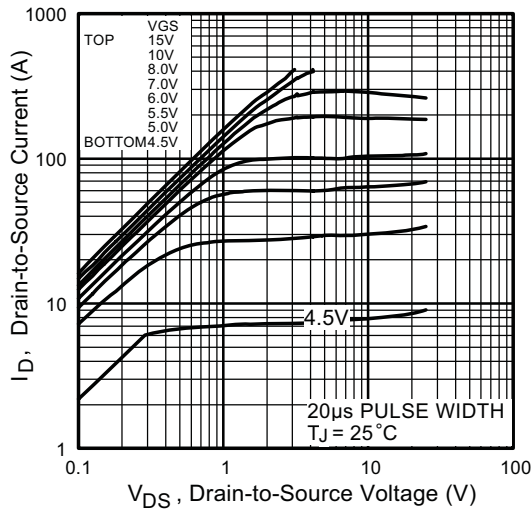


Fig 1. Typical Output Characteristics

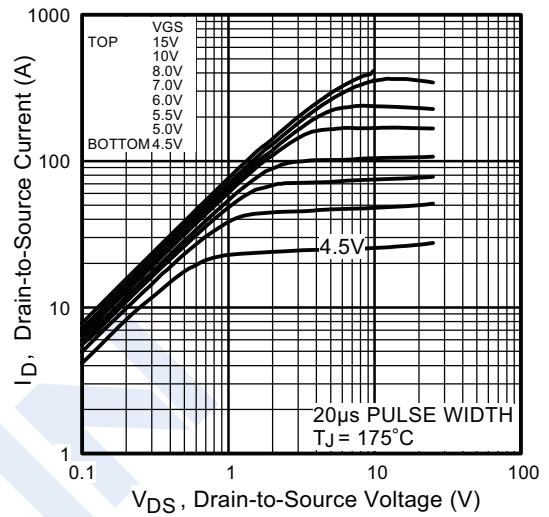


Fig 2. Typical Output Characteristics

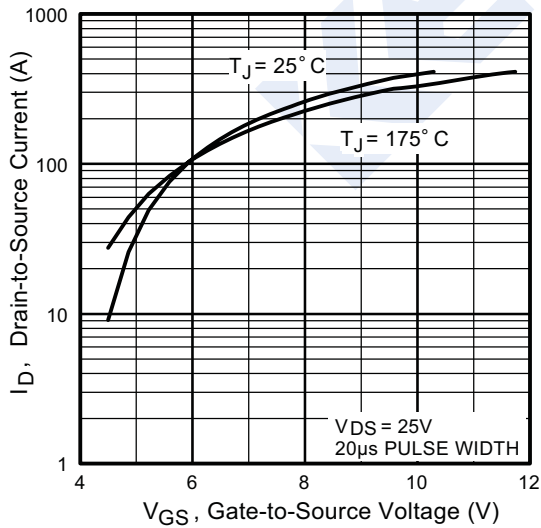


Fig 3. Typical Transfer Characteristics

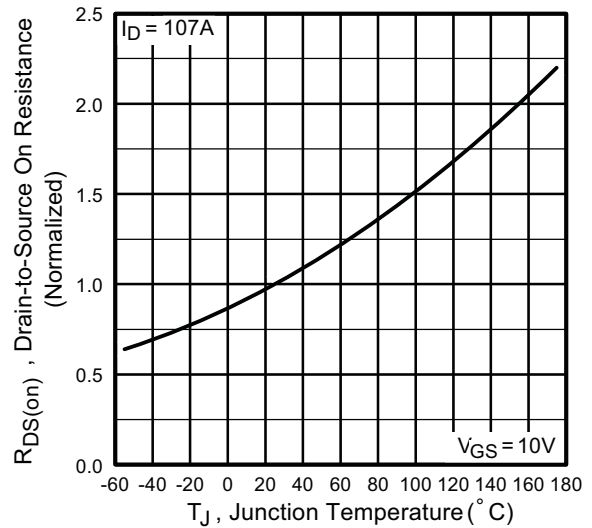
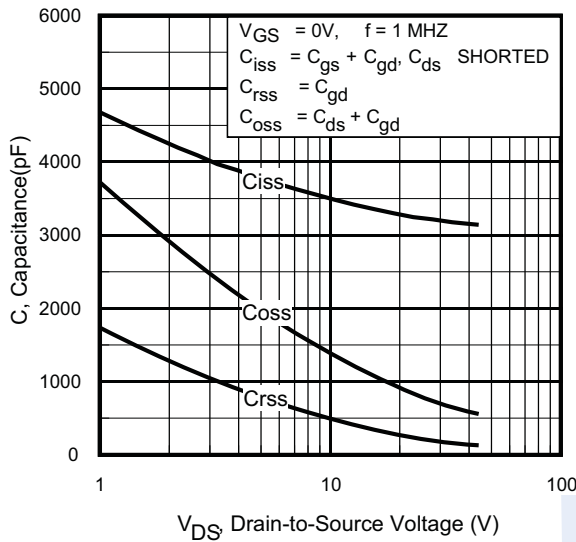


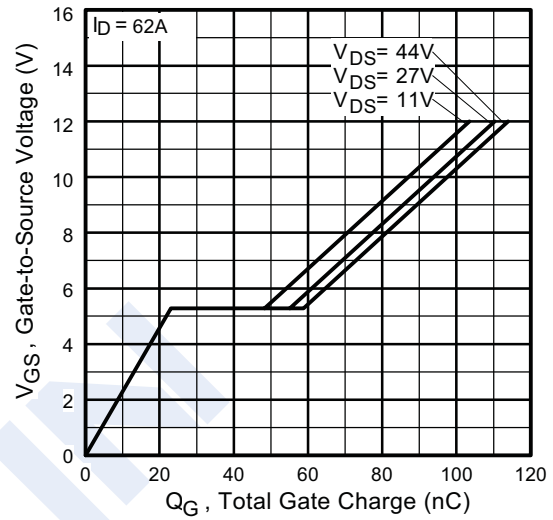
Fig 4. Normalized On-Resistance Vs. Temperature

### N-Channel MOSFET

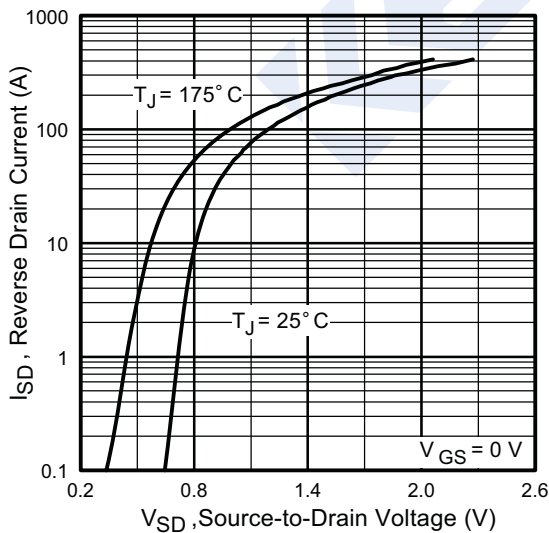
### IRF3205 (KRF3205)



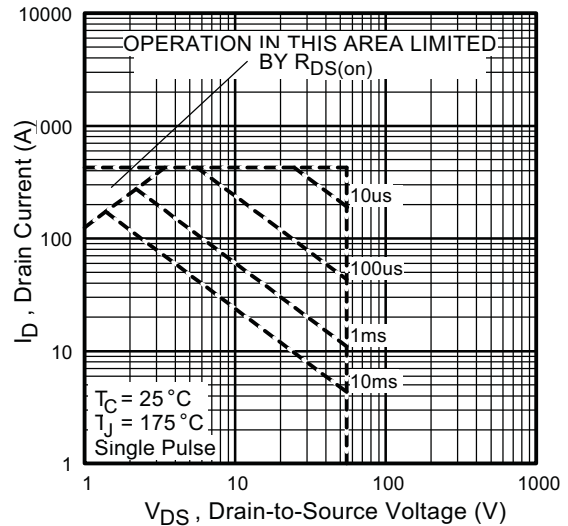
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



**Fig 7.** Typical Source-Drain Diode Forward Voltage



**Fig 8.** Maximum Safe Operating Area

### N-Channel MOSFET

### IRF3205 (KRF3205)

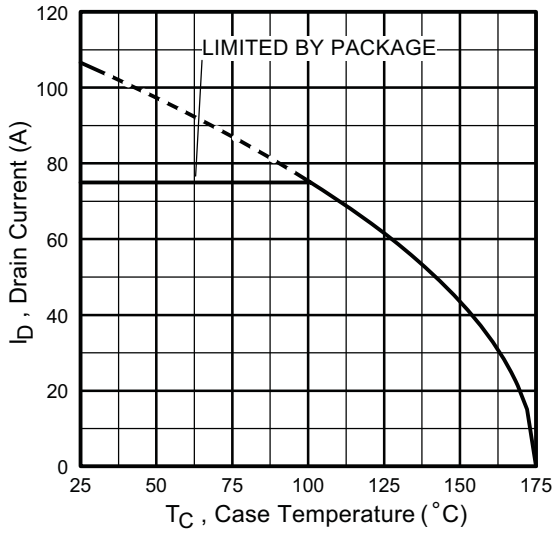


Fig 9. Maximum Drain Current Vs. Case Temperature

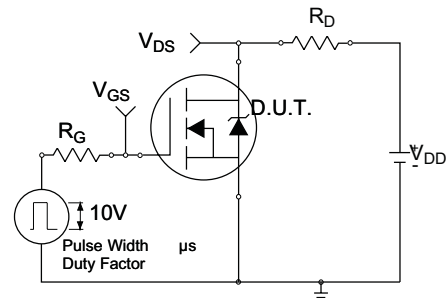


Fig 10a. Switching Time Test Circuit

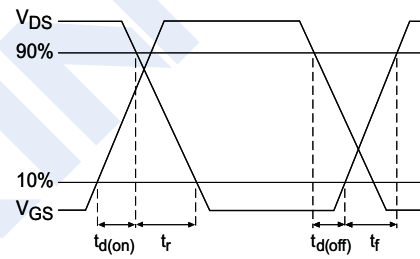


Fig 10b. Switching Time Waveforms

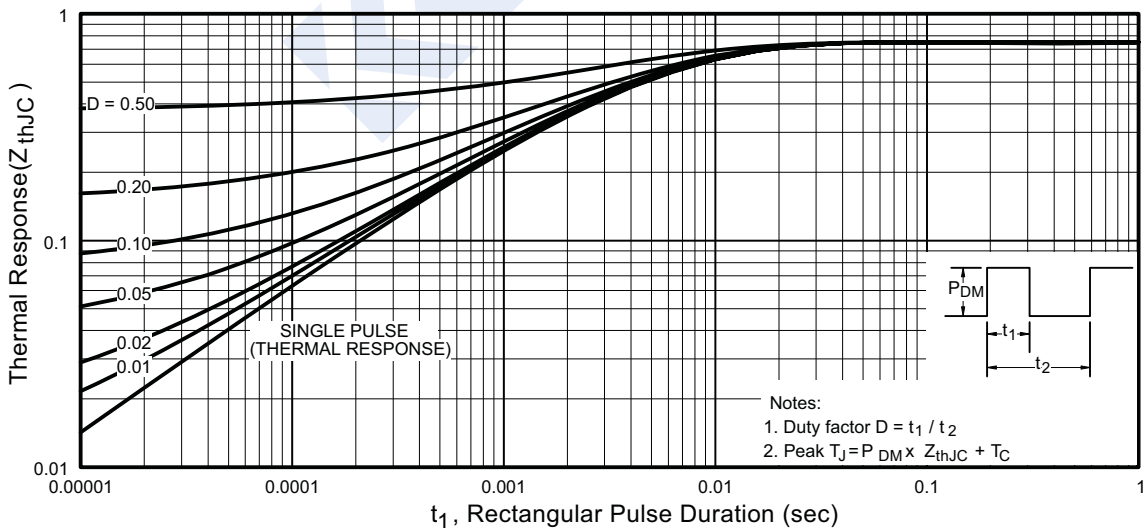


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

### N-Channel MOSFET

### IRF3205 (KRF3205)

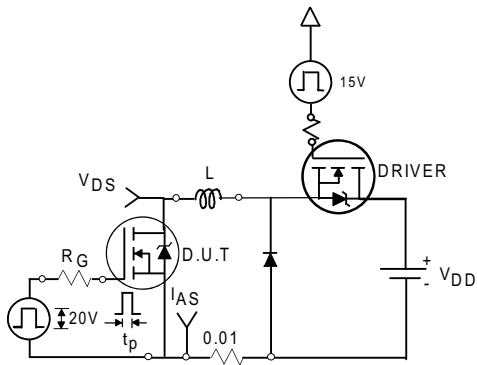


Fig 12a. Unclamped Inductive Test Circuit

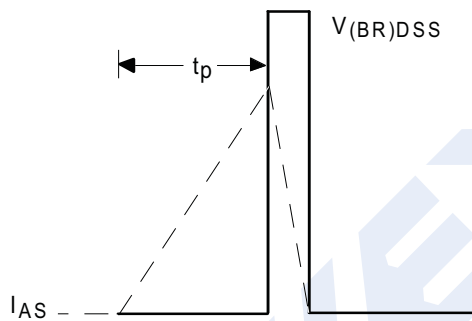


Fig 12b. Unclamped Inductive Waveforms

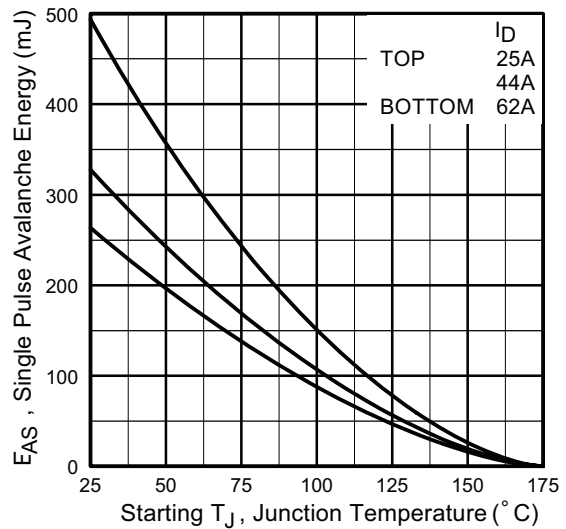


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

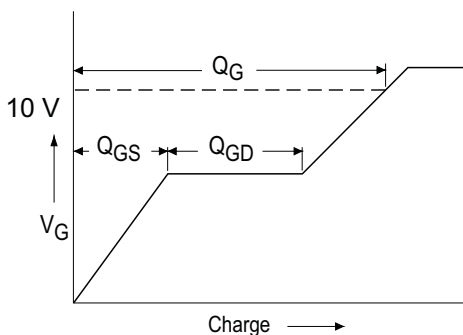


Fig 13a. Basic Gate Charge Waveform

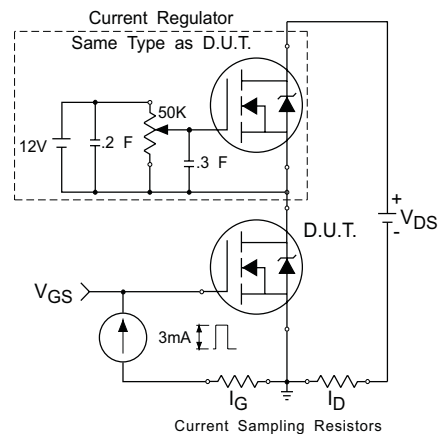
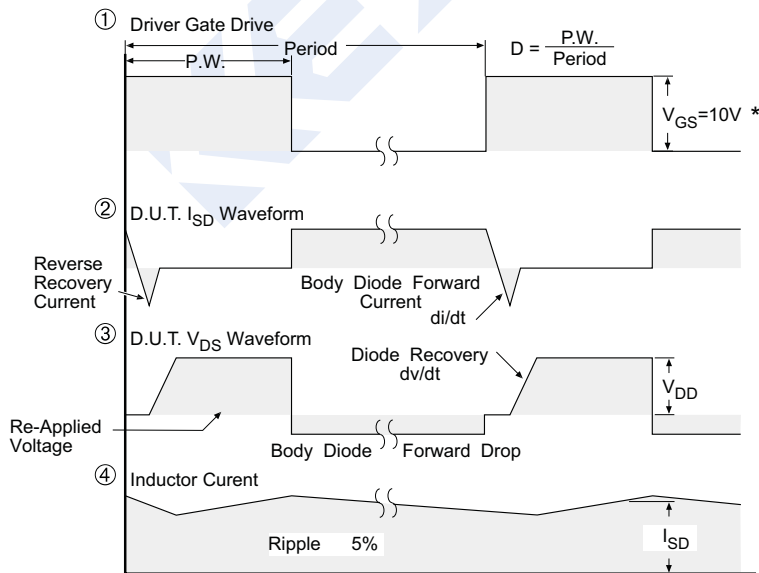
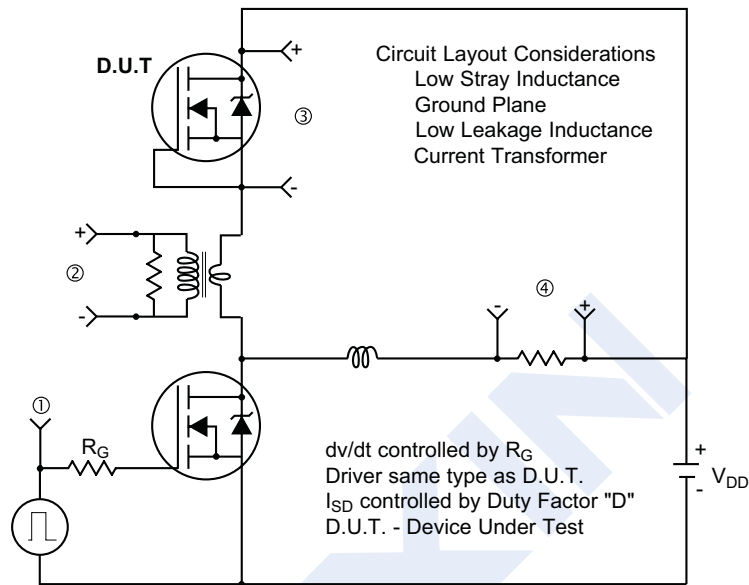


Fig 13b. Gate Charge Test Circuit

### N-Channel MOSFET

### IRF3205 (KRF3205)

#### Peak Diode Recovery dv/dt Test Circuit



\*  $V_{GS} = 5V$  for Logic Level Devices

Fig 14. For N-Channel HEXFETS