



110 Amps, 55 Volts N-CHANNEL POWER MOSFET

■ DESCRIPTION

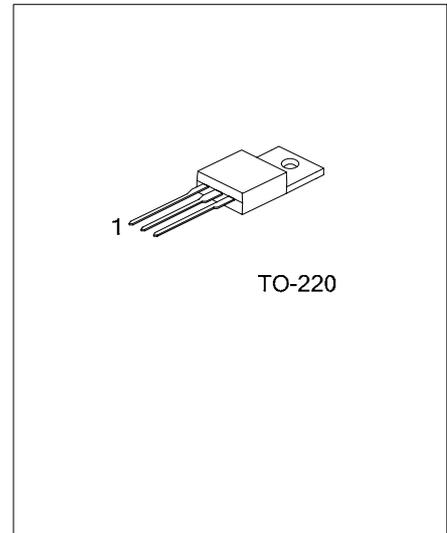
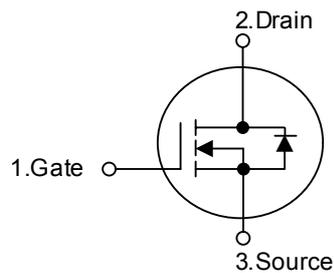
The YR 3205 is three-terminal silicon device with current conduction capability of about 110A, fast switching speed. Low on-state resistance, breakdown voltage rating of 55V, and max threshold voltages of 4 volt.

It is mainly suitable electronic ballast, and low power switching mode power appliances.

■ FEATURES

- * $R_{DS(ON)} = 8.0m\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 30 nC)
- * Low reverse transfer Capacitance ($C_{RSS} =$ typical 80 pF)
- * Fast switching capability
- * 100% avalanche energy specified
- * Improved dv/dt capability

■ SYMBOL



*Pb-free plating product number: YR3205

Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	110 ⑤	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	66	
I_{DM}	Pulsed Drain Current ①	440	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current ①	62	A
E_{AR}	Repetitive Avalanche Energy ①	20	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.75	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.057	—	V/°C	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	8.0	mΩ	$V_{GS} = 10\text{V}$, $I_D = 62\text{A}$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.5	—	3.5	V	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$
g_{fs}	Forward Transconductance	44	—	—	S	$V_{DS} = 25\text{V}$, $I_D = 62\text{A}$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 55\text{V}$, $V_{GS} = 0\text{V}$
		—	—	250		$V_{DS} = 44\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20\text{V}$
Q_g	Total Gate Charge	—	—	146	nC	$I_D = 62\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	35		$V_{DS} = 44\text{V}$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	54		$V_{GS} = 10\text{V}$, See Fig. 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 28\text{V}$
t_r	Rise Time	—	101	—		$I_D = 62\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	50	—		$R_G = 4.5\Omega$
t_f	Fall Time	—	65	—		$V_{GS} = 10\text{V}$, See Fig. 10 ④
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	—		
C_{iss}	Input Capacitance	—	3247	—	pF	$V_{GS} = 0\text{V}$
C_{oss}	Output Capacitance	—	781	—		$V_{DS} = 25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	211	—		$f = 1.0\text{MHz}$, See Fig. 5
E_{AS}	Single Pulse Avalanche Energy ②	—	1050 ⑥	264 ⑦		mJ

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode)①	—	—	390		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 62\text{A}$, $V_{GS} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	69	104	ns	$T_J = 25^\circ\text{C}$, $I_F = 62\text{A}$
Q_{rr}	Reverse Recovery Charge	—	143	215	nC	$di/dt = 100\text{A}/\mu\text{s}$ ④
t_{on}	Forward Turn-On Time	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 $T_J = 175^\circ\text{C}$.

Fig 1. Typical Output Characteristics

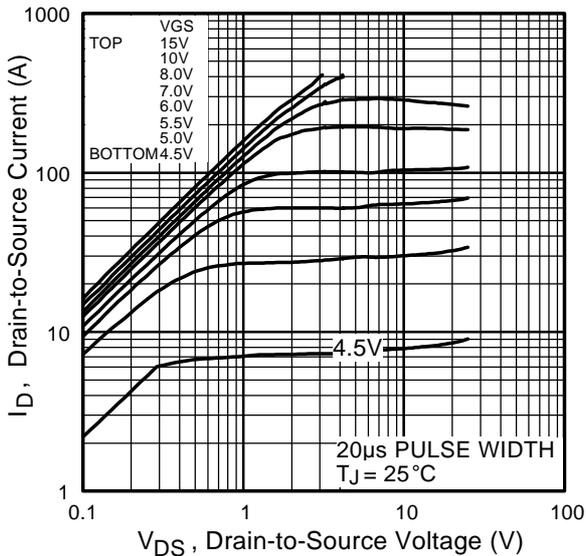


Fig 2. Typical Output Characteristics

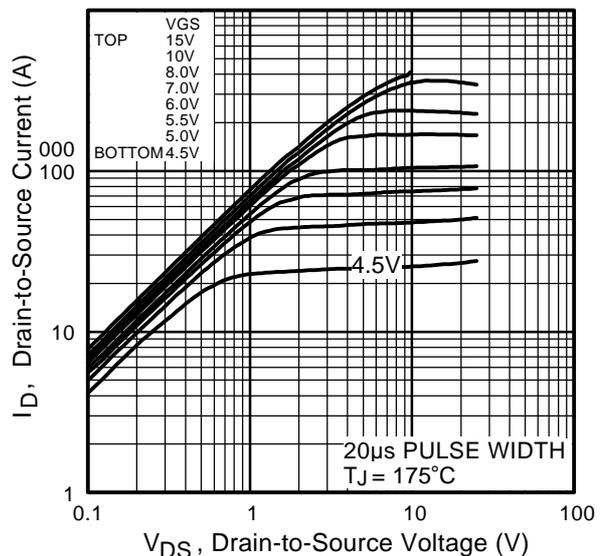


Fig 3. Typical Transfer Characteristics

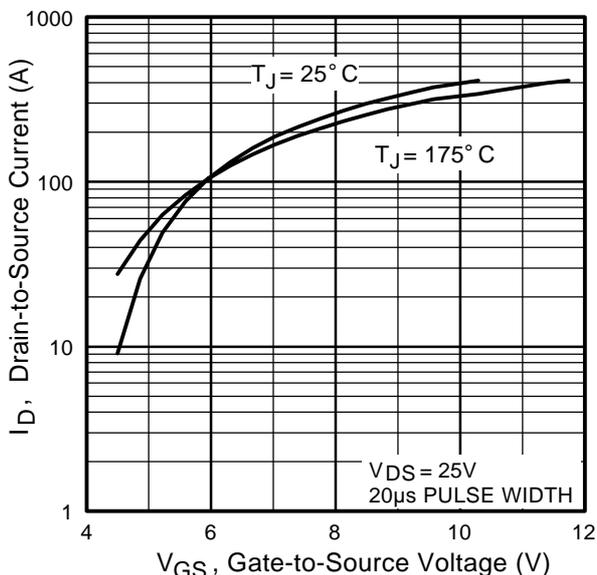


Fig 4. Normalized On-Resistance Vs. Temperature

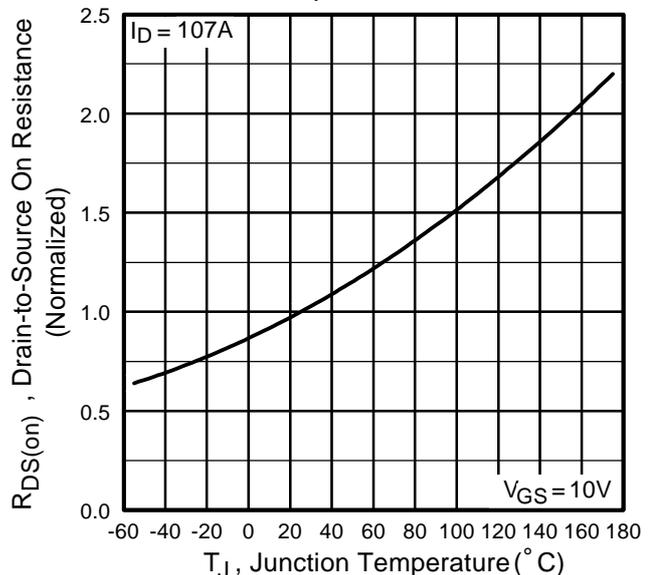


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

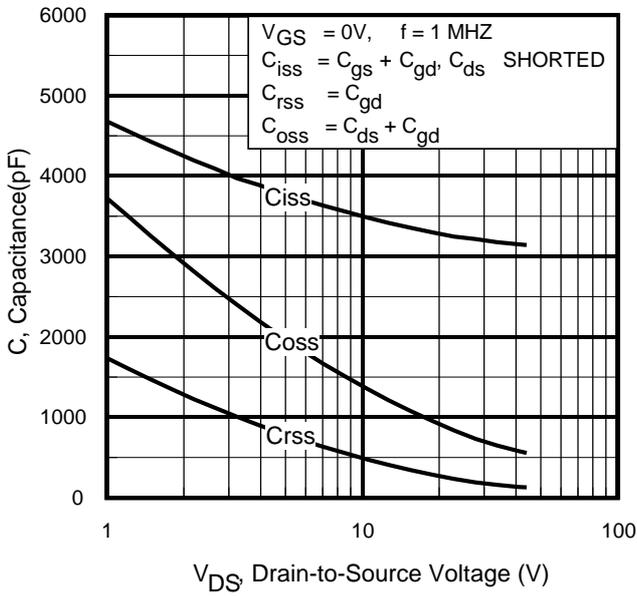


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

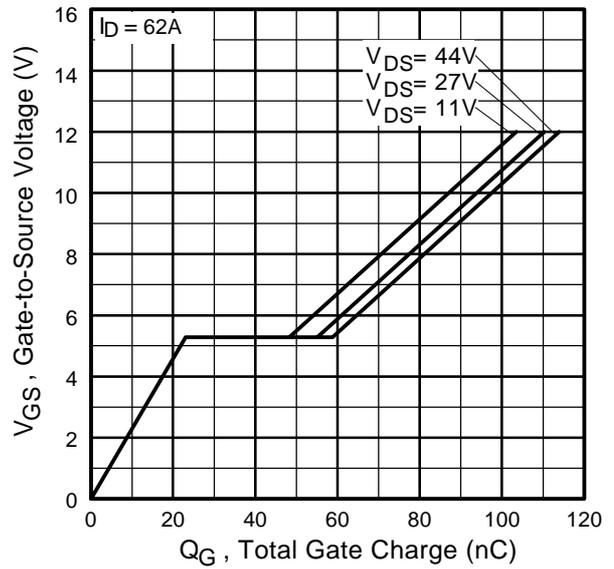


Fig 7. Typical Source-Drain Diode Forward Voltage

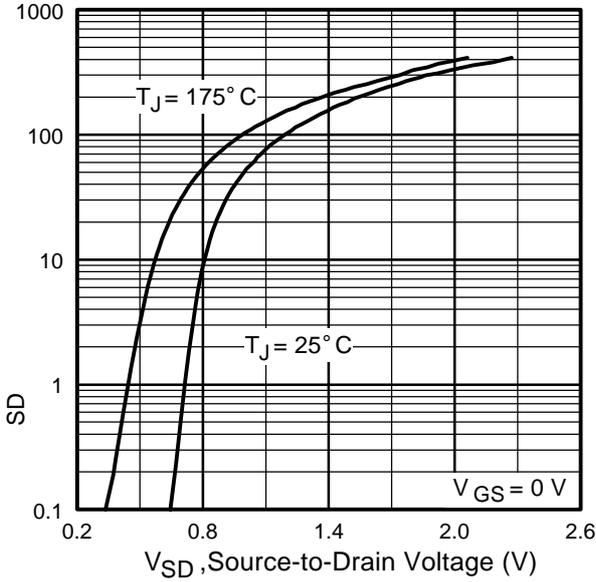


Fig 8. Maximum Safe Operating Area

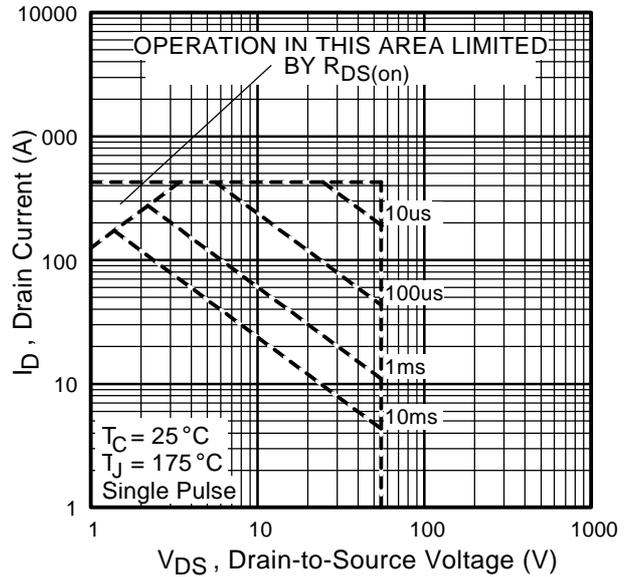


Fig 9. Maximum Drain Current Vs. Case Temperature

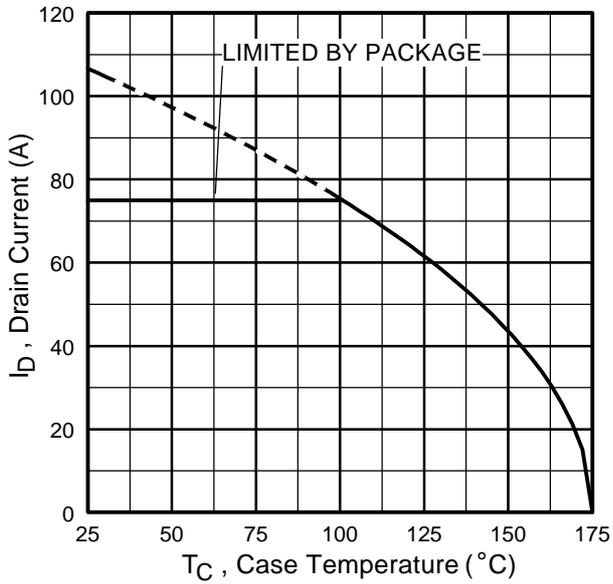


Fig 10b. Switching Time Waveforms

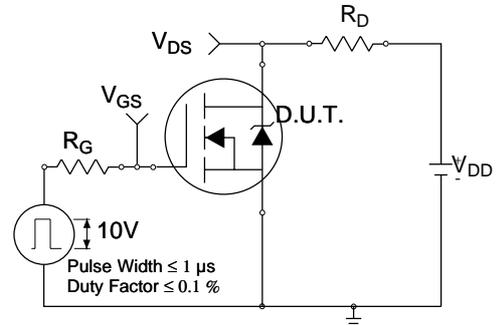


Fig 10a. Switching Time Test Circuit

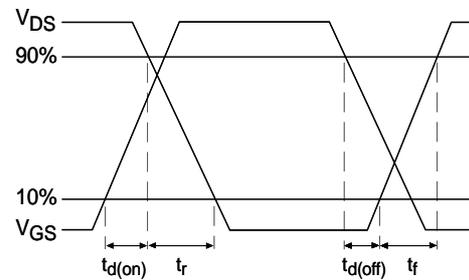


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

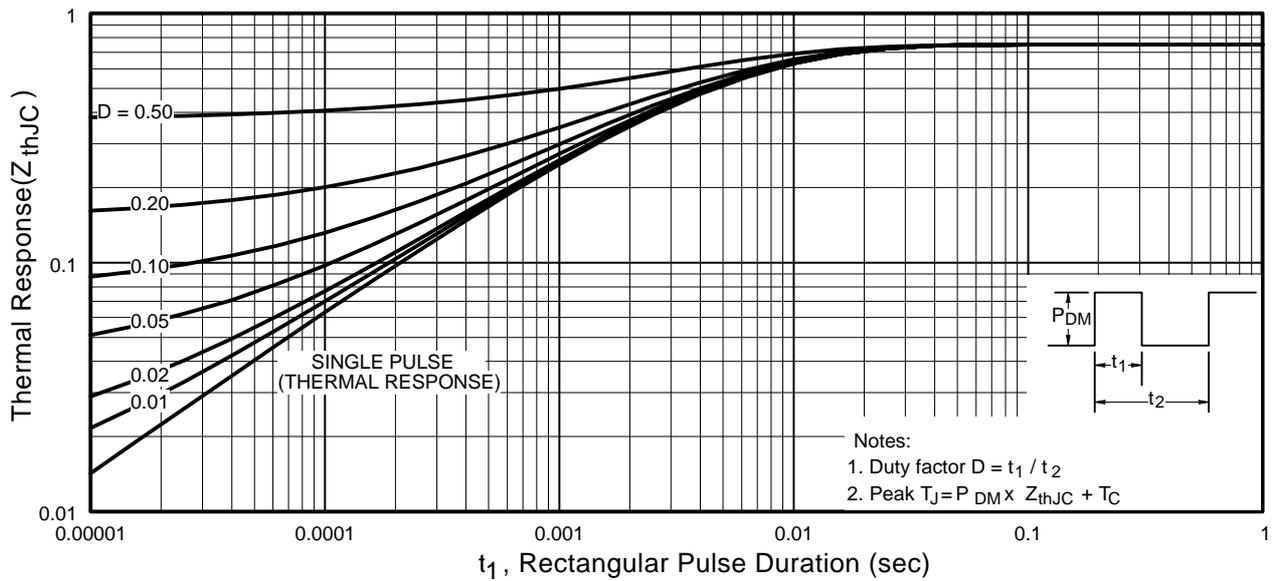


Fig 12a. Unclamped Inductive Test Circuit

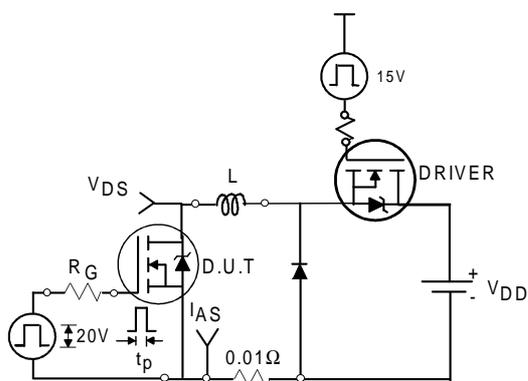


Fig 12b. Unclamped Inductive Waveforms

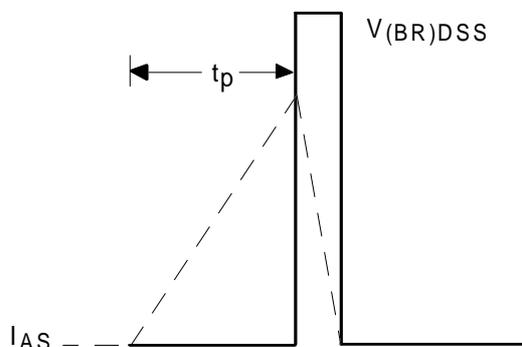


Fig 13a. Basic Gate Charge Waveform

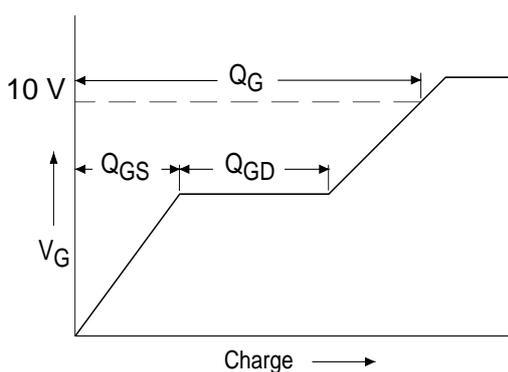


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

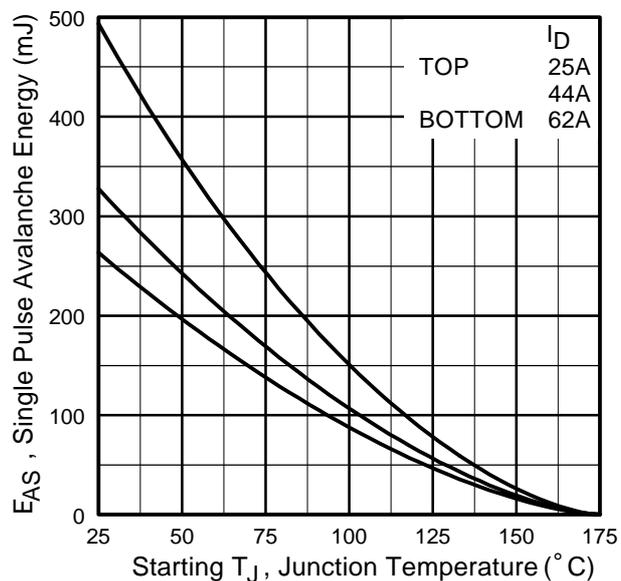


Fig 13b. Gate Charge Test Circuit

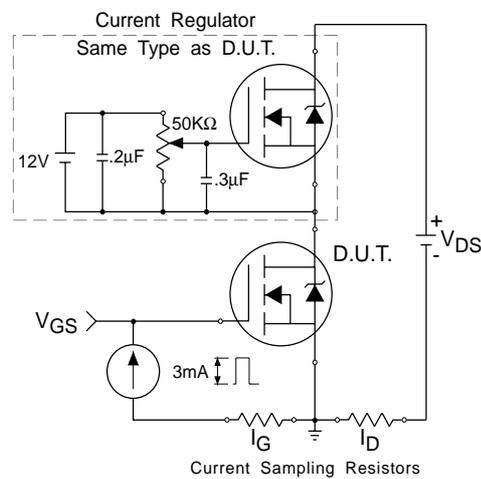
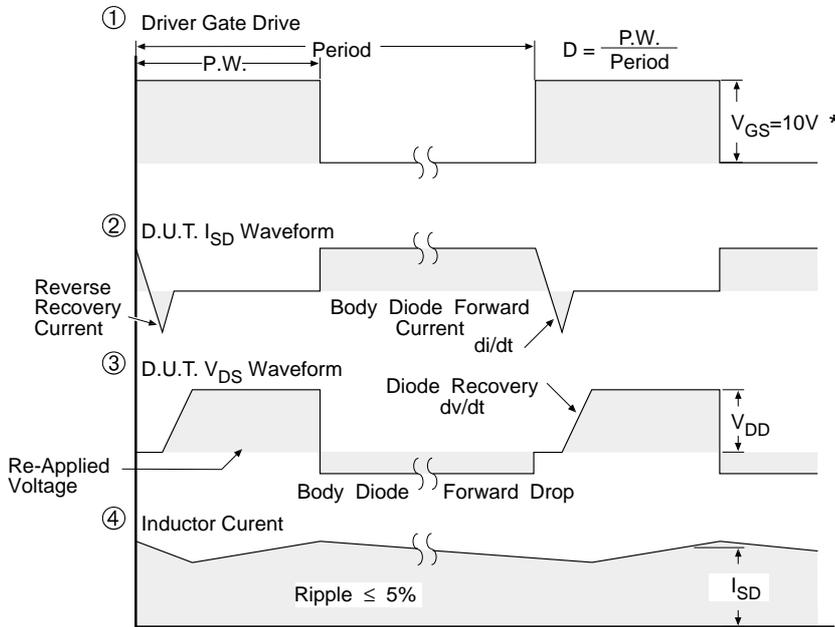
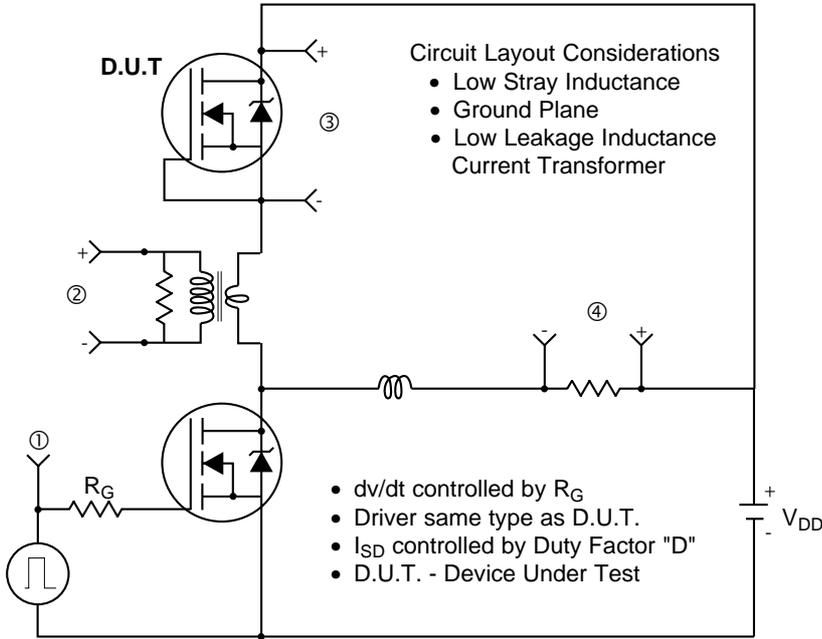


Fig 14. For N-Channel HEXFETS

Peak Diode Recovery dv/dt Test Circuit



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