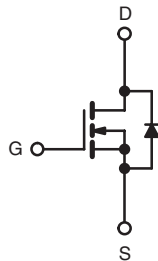
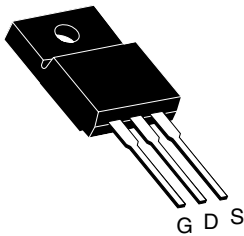




Power MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	600	
R _{DS(on)} (Ω)	V _{GS} = 10 V	0.75
Q _g (Max.) (nC)	49	
Q _{gs} (nC)	13	
Q _{gd} (nC)	20	
Configuration	Single	

TO-220 FULLPAK



N-Channel MOSFET

FEATURES

- Low Gate Charge Q_g Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Compliant to RoHS directive 2002/95/EC



RoHS* COMPLIANT

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- High Voltage Isolation = 2.5 kV_{RMS} (t = 60 s, f = 60 Hz)

TYPICAL SMPS TOPOLOGIES

- Single Transistor Forward
- Active Clamped Forward

ORDERING INFORMATION	
Package	TO-220 FULLPAK
Lead (Pb)-free	IRFIB6N60APbF
	SiHFIB6N60A-E3
SnPb	IRFIB6N60A
	SiHFIB6N60A


ABSOLUTE MAXIMUM RATINGS T _C = 25 °C, unless otherwise noted			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	600	V
Gate-Source Voltage	V _{GS}	± 30	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	5.5
		T _C = 100 °C	3.5
Pulsed Drain Current ^a	I _{DM}	37	
Linear Derating Factor		0.48	W/°C
Single Pulse Avalanche Energy ^b	E _{AS}	290	mJ
Repetitive Avalanche Current ^a	I _{AR}	9.2	A
Repetitive Avalanche Energy ^a	E _{AR}	6.0	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	60
Peak Diode Recovery dV/dt ^c	dV/dt	5.0	V/ns
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw		10
			1.1

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting T_J = 25 °C, L = 6.8 mH, R_G = 25 Ω, I_{AS} = 9.2 A (see fig. 12).
- I_{SD} ≤ 9.2 A, dI/dt ≤ 50 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 150 °C.
- 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	65	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	2.1	

SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	600	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}^d$	-	660	-	mV/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	-	-	25	μA
		$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3.3\text{ A}^b$	-	-	0.75	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 25\text{ V}, I_D = 5.5\text{ A}$	5.5	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}$, see fig. 5	-	1400	-	μF
Output Capacitance	C_{oss}		-	180	-	
Reverse Transfer Capacitance	C_{rss}		-	7.1	-	
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}, f = 1.0\text{ MHz}$	-	1957	-
			$V_{DS} = 480\text{ V}, f = 1.0\text{ MHz}$	-	49	-
Effective Output Capacitance	$C_{oss\text{ eff.}}$	$V_{DS} = 0\text{ V to } 480\text{ V}^c$	-	96	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}, I_D = 9.2\text{ A}, V_{DS} = 400\text{ V}$, see fig. 6 and 13 ^b	-	-	49	nC
Gate-Source Charge	Q_{gs}		-	-	13	
Gate-Drain Charge	Q_{gd}		-	-	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 9.2\text{ A}, R_G = 9.1\text{ }\Omega, R_D = 35.5\text{ }\Omega$, see fig. 10 ^b	-	13	-	ns
Rise Time	t_r		-	25	-	
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	
Fall Time	t_f		-	22	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	5.5	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	37	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 9.2\text{ A}, V_{GS} = 0\text{ V}^b$	-	-	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 9.2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$	-	530	800	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	3.0	4.4	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
- $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DS} .
- $t = 60\text{ s}, f = 60\text{ Hz}$.



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

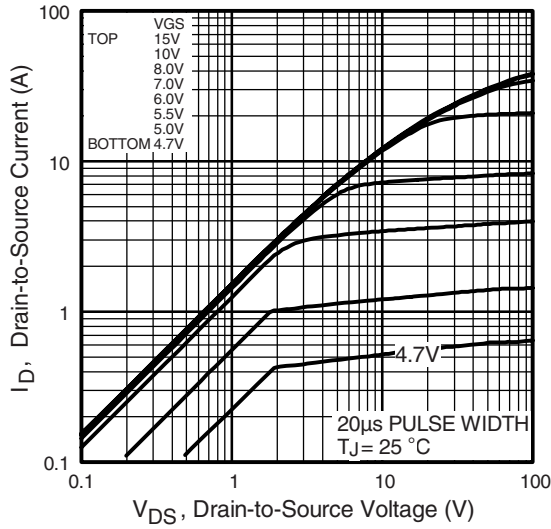


Fig. 1 - Typical Output Characteristics

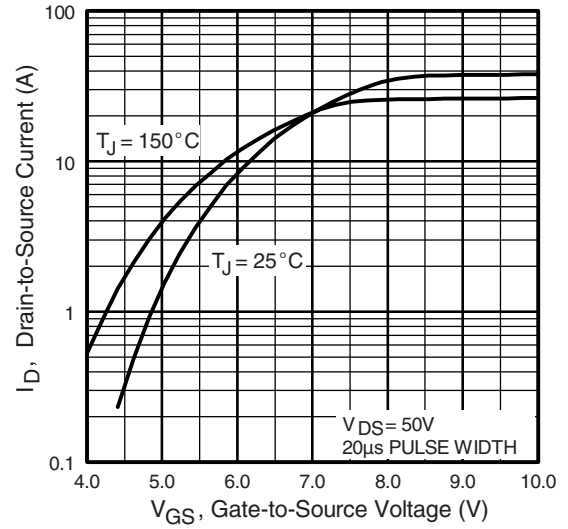


Fig. 3 - Typical Transfer Characteristics

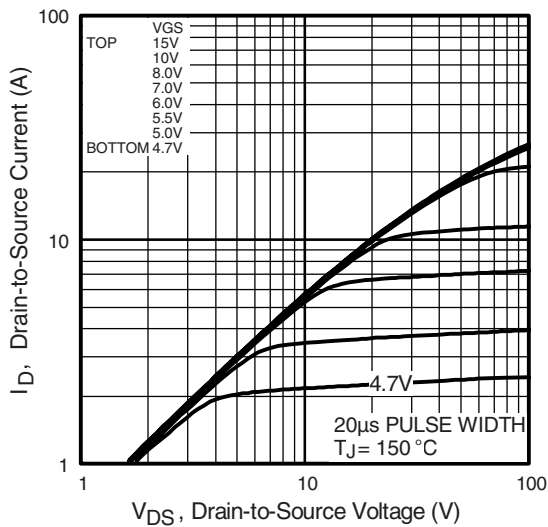


Fig. 2 - Typical Output Characteristics

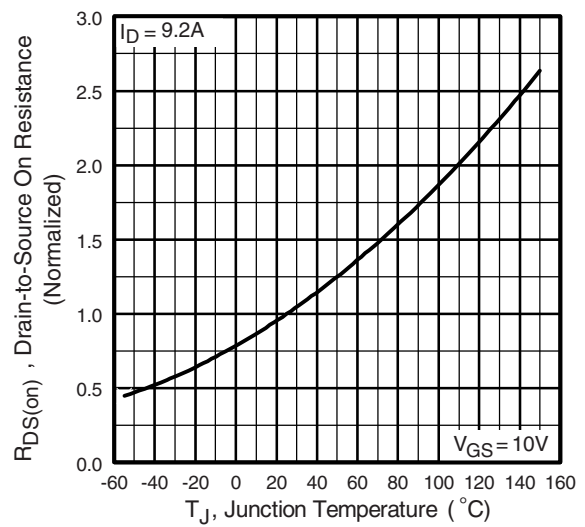


Fig. 4 - Normalized On-Resistance vs. Temperature

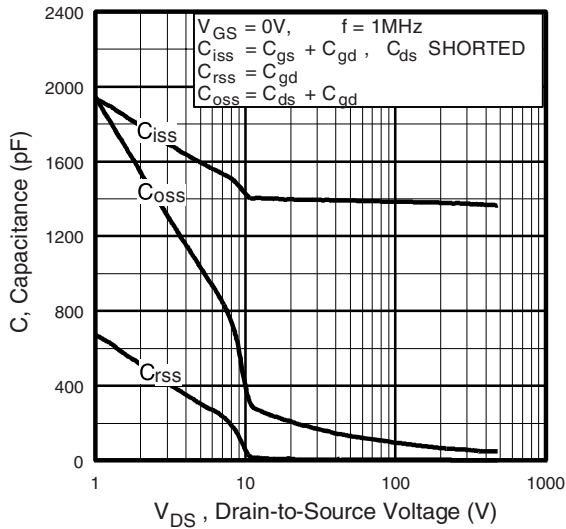


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

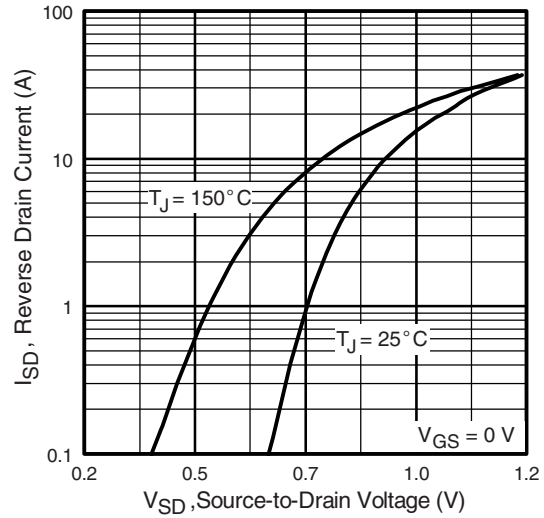


Fig. 7 - Typical Source-Drain Diode Forward Voltage

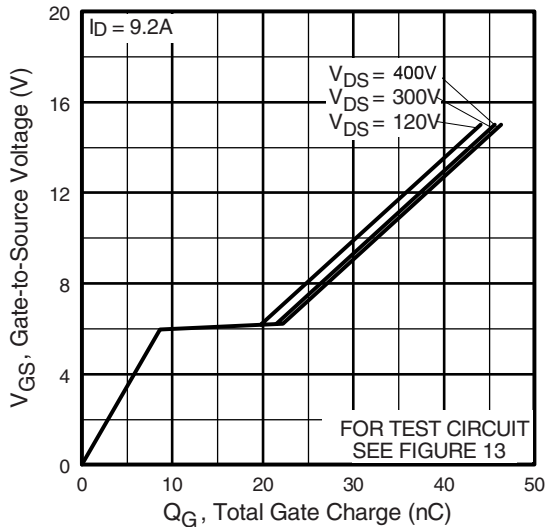


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

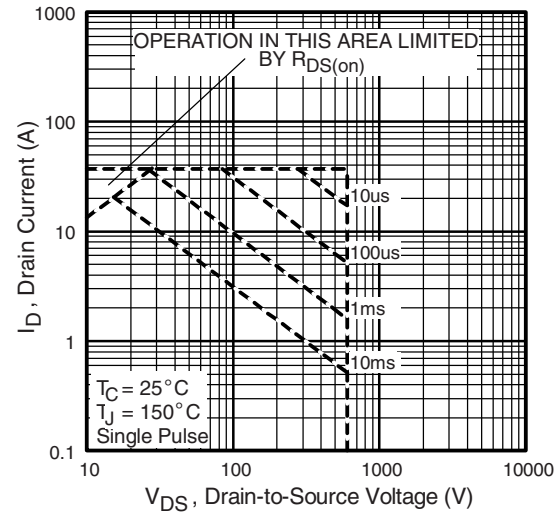


Fig. 8 - Maximum Safe Operating Area

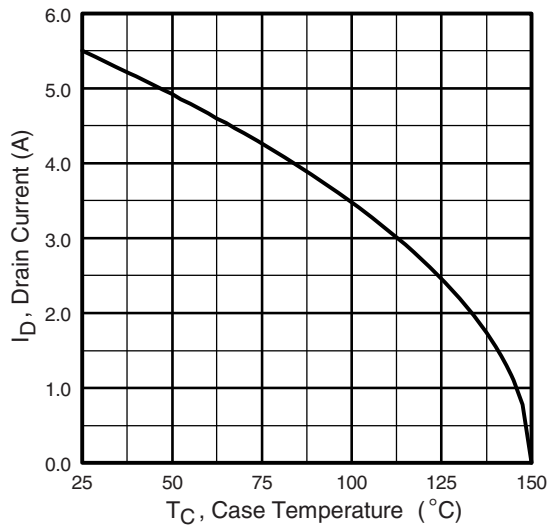


Fig. 9 - Maximum Drain Current vs. Case Temperature

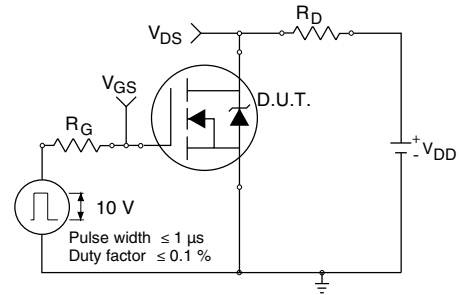


Fig. 10a - Switching Time Test Circuit

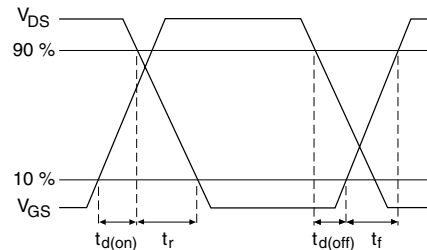


Fig. 10b - Switching Time Waveforms

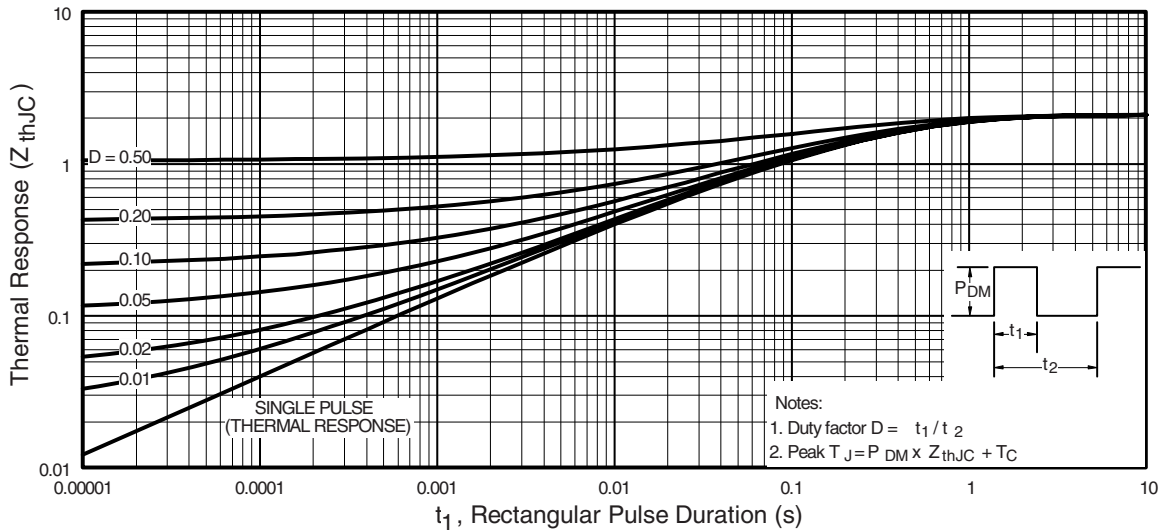


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

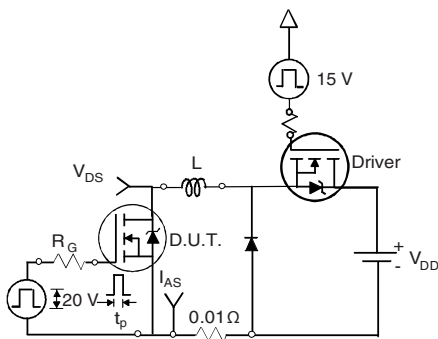


Fig. 12a - Unclamped Inductive Test Circuit

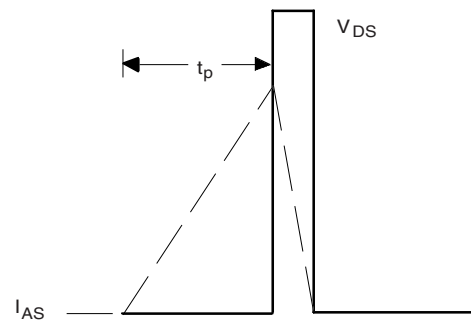


Fig. 12b - Unclamped Inductive Waveforms

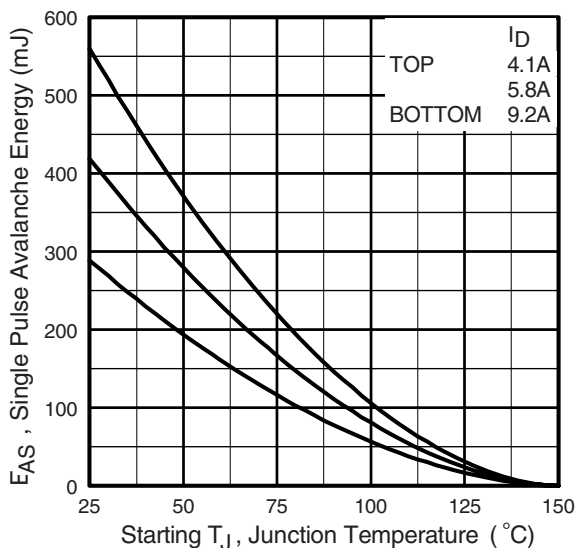


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

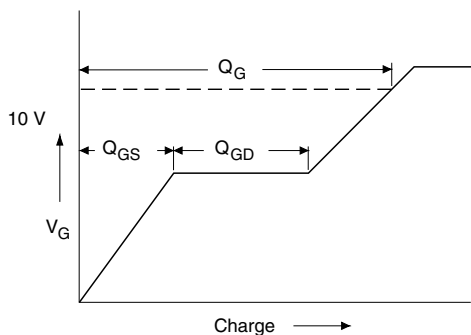


Fig. 13a - Basic Gate Charge Waveform

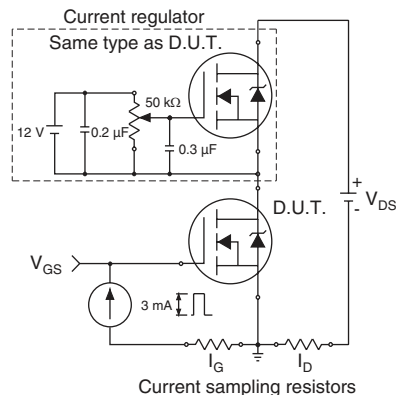
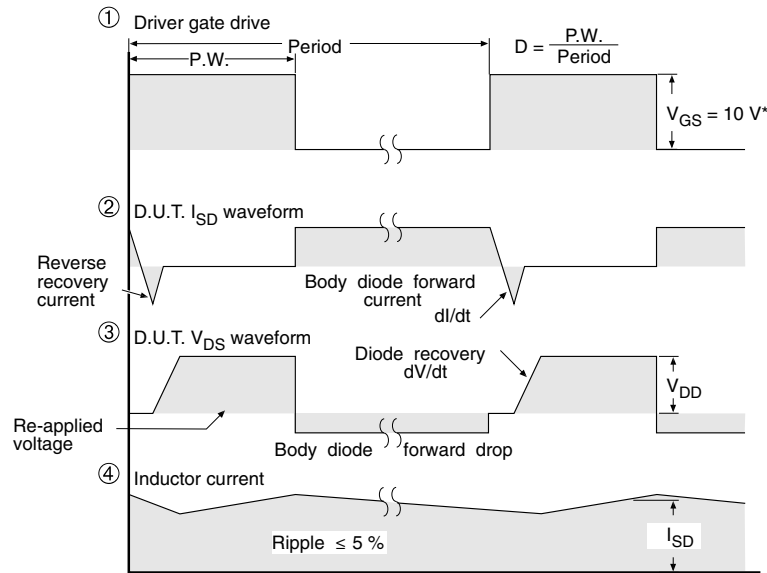
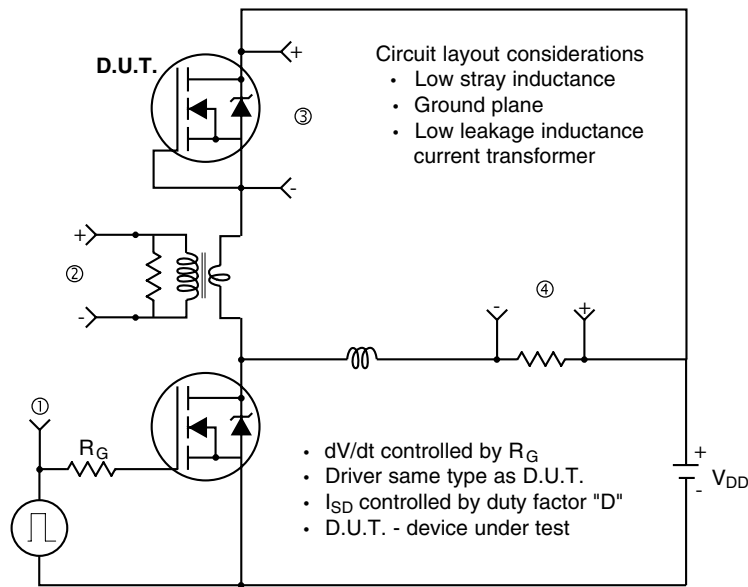


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



* $V_{GS} = 5 V$ for logic level devices

Fig. 14 - For N-Channel

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