

Power MOSFET

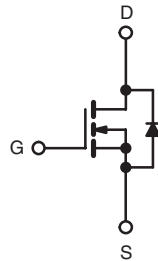
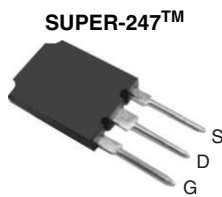
PRODUCT SUMMARY		
V_{DS} (V)	600	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	0.16
Q_g (Max.) (nC)	220	
Q_{gs} (nC)	64	
Q_{gd} (nC)	110	
Configuration	Single	

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
- Lead (Pb)-free Available



Available
RoHS*
COMPLIANT



N-Channel MOSFET

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching

ORDERING INFORMATION	
Package	Super-247™
Lead (Pb)-free	IRFPS30N60KPbF
	SiHFPS30N60K-E3
SnPb	IRFPS30N60K
	SiHFPS30N60K

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	30	A
		$T_C = 100$ °C	19	
Pulsed Drain Current ^a		I_{DM}	120	
Linear Derating Factor			3.6	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	520	mJ
Repetitive Avalanche Current ^a		I_{AR}	30	A
Repetitive Avalanche Energy ^a		E_{AR}	45	mJ
Maximum Power Dissipation	$T_C = 25$ °C	P_D	450	W
Peak Diode Recovery dV/dt^c		dV/dt	13	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	

Notes


- Repetitive rating; pulse width limited by maximum junction temperature.
- Starting $T_J = 25$ °C, $L = 1.1$ mH, $R_G = 25$ Ω , $I_{AS} = 30$ A.
- $I_{SD} \leq 30$ A, $dI/dt \leq 630$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °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 ^a	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain) ^a	R_{thJC}	-	0.28	

Note

a. R_{th} is measured at T_J approximately 90 °C.

SPECIFICATIONS $T_J = 25\text{ °C}$, 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 °C, $I_D = 1\text{ mA}^d$	-	0.66	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	3.0	-	5.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	-	-	50	μA
		$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ °C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 18\text{ A}^b$	-	0.16	0.19	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}, I_D = 18\text{ A}$	16	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}$	-	5870	-	pF
Output Capacitance	C_{oss}		-	530	-	
Reverse Transfer Capacitance	C_{rss}		-	54	-	
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}, f = 1.0\text{ MHz}$	-	6920	-
Effective Output Capacitance	$C_{oss\text{ eff.}}$		$V_{DS} = 480\text{ V}, f = 1.0\text{ MHz}$	-	140	-
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, V_{DS} = 480\text{ V}^b$	$V_{DS} = 0\text{ V to } 480\text{ V}^c$	-	270	-
Gate-Source Charge	Q_{GS}		-	-	220	nC
Gate-Drain Charge	Q_{GD}		-	-	64	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 30\text{ A}, R_G = 3.9\text{ }\Omega, V_{GS} = 10\text{ V}^b$	-	29	-	
Rise Time	t_r		-	120	-	
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	
Fall Time	t_f		-	50	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	30	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	120	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ °C}, I_S = 30\text{ A}, V_{GS} = 0\text{ V}^b$	-	-	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ °C}, I_F = 30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}^b$	-	640	960	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	11	16	μC
Body Diode Recovery Current	I_{RRM}		-	31	-	A
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} .

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

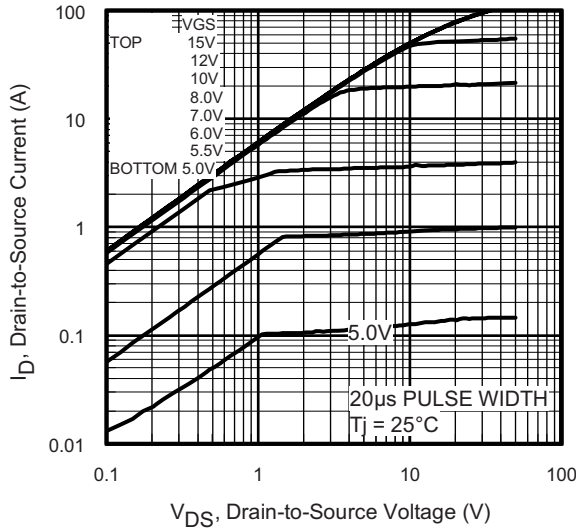


Fig. 1 - Typical Output Characteristics

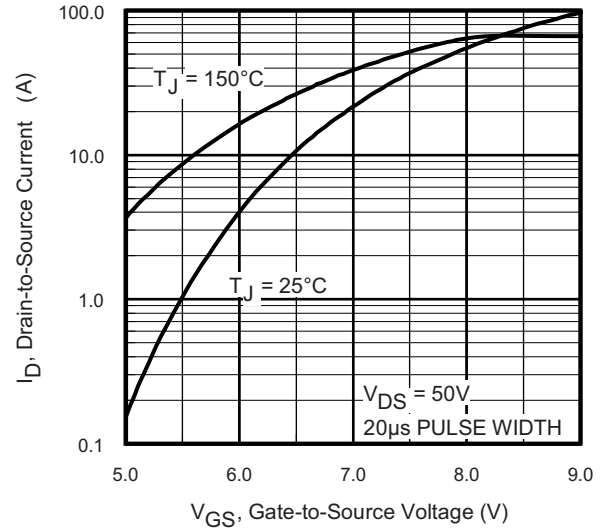


Fig. 3 - Typical Transfer Characteristics

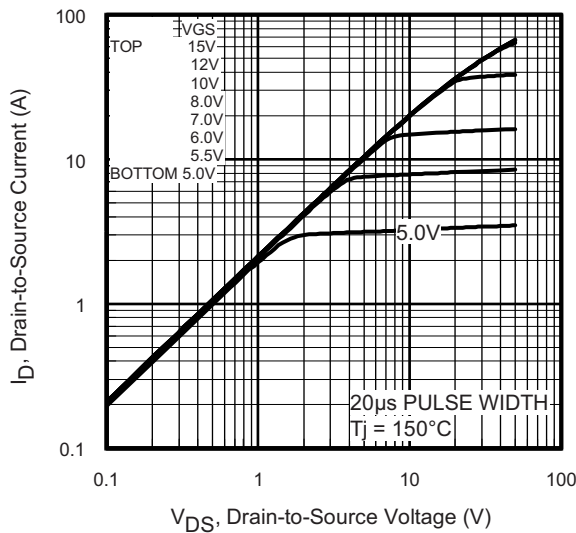


Fig. 2 - Typical Output Characteristics

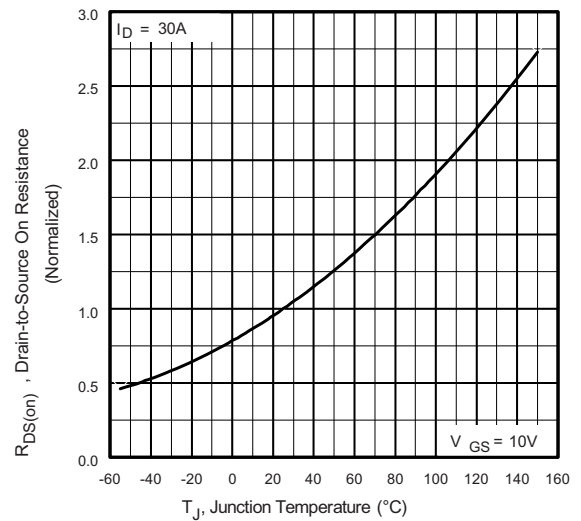


Fig. 4 - Normalized On-Resistance vs. Temperature

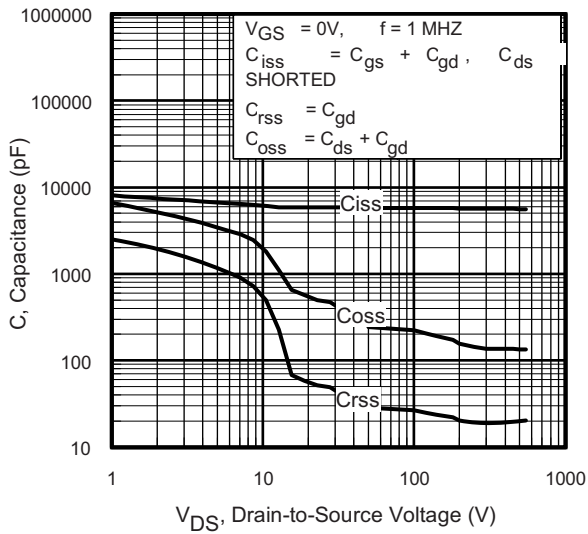


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

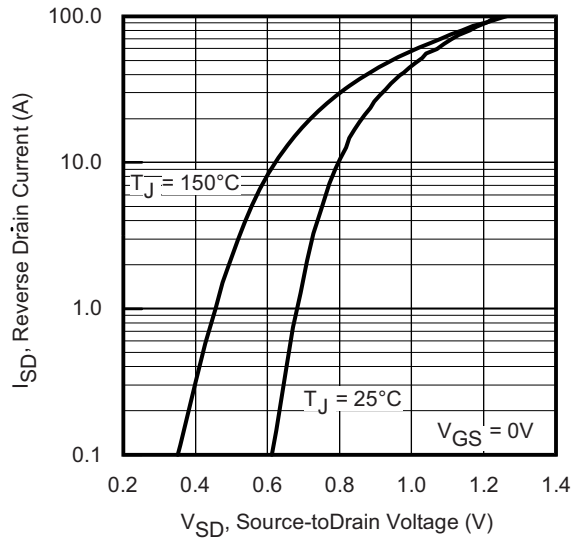


Fig. 7 - Typical Source-Drain Diode Forward Voltage

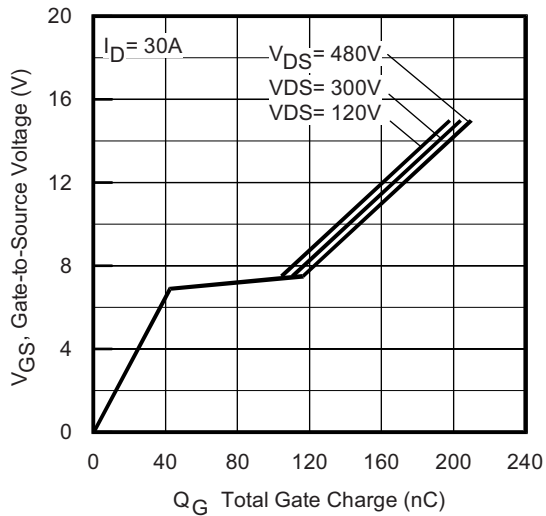


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

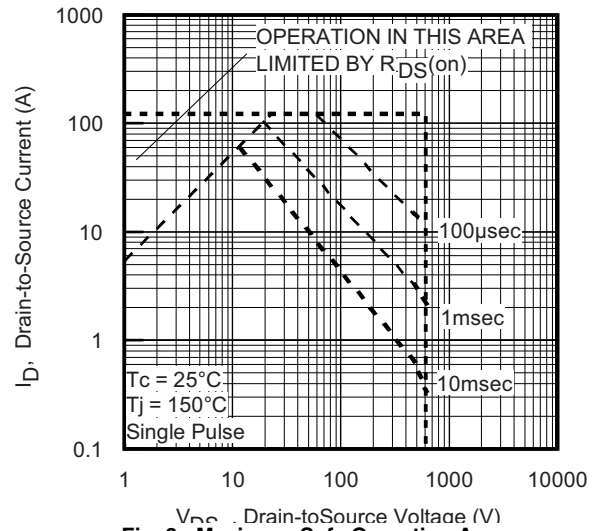


Fig. 8 - Maximum Safe Operating Area

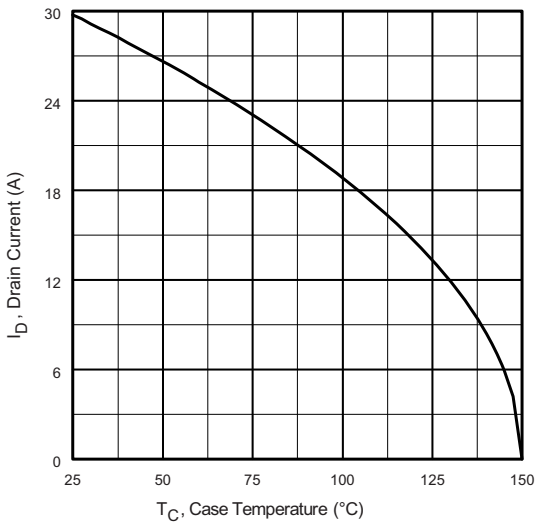


Fig. 9 - Maximum Drain Current vs. Case Temperature

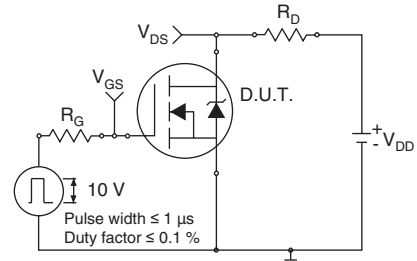


Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms

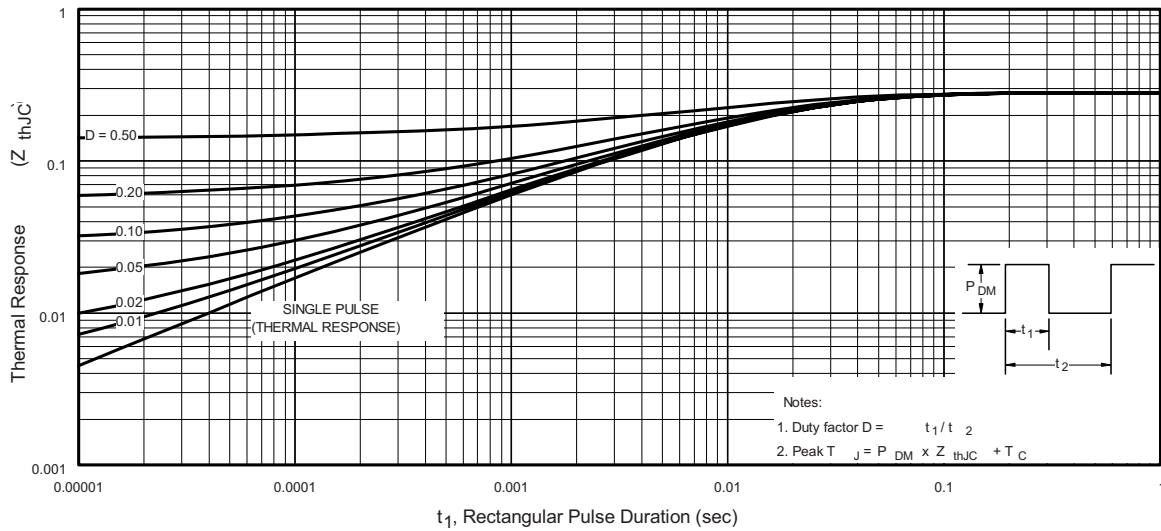


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

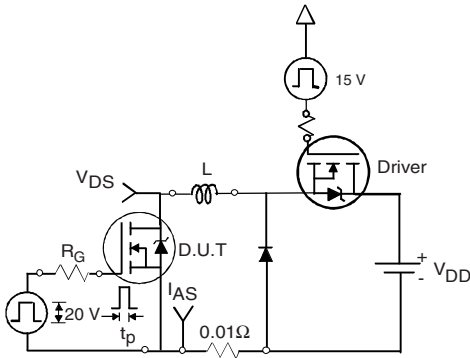


Fig. 12a - Unclamped Inductive Test Circuit

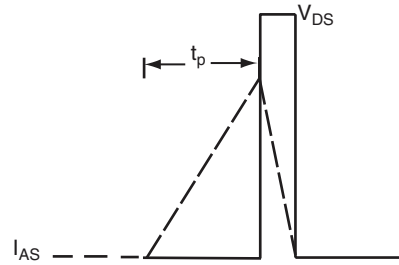


Fig. 12b - Unclamped Inductive Waveforms

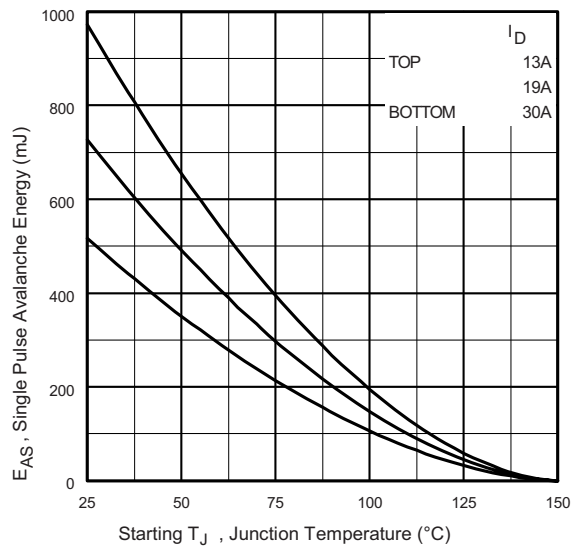


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

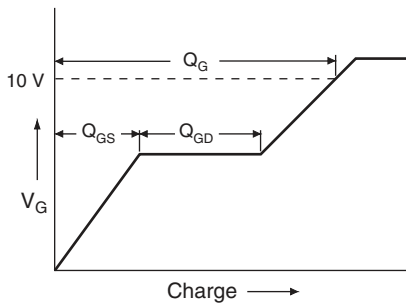


Fig. 13a - Basic Gate Charge Waveform

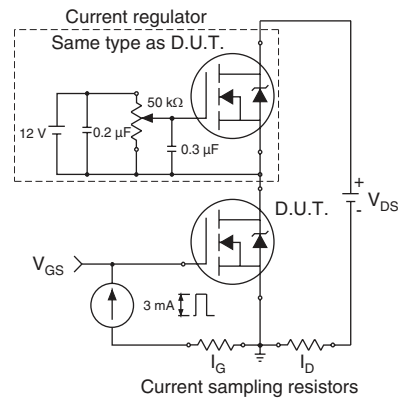


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

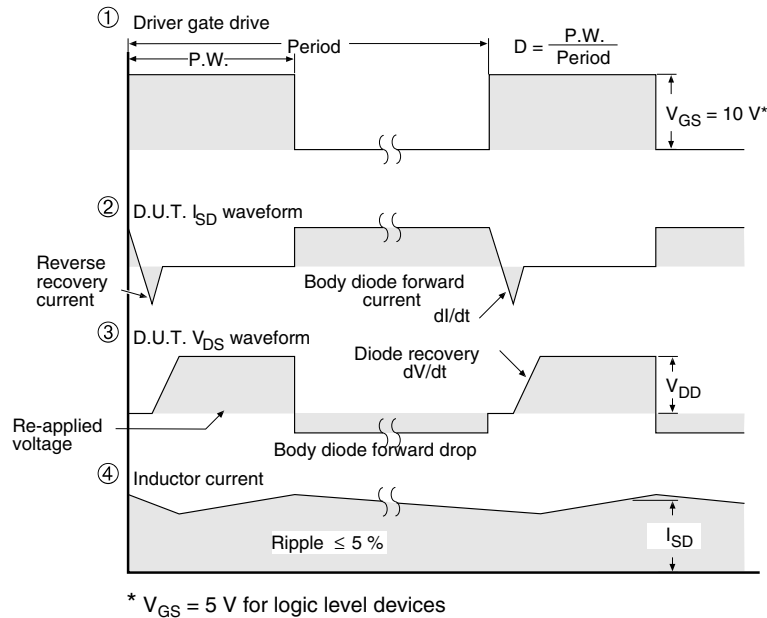
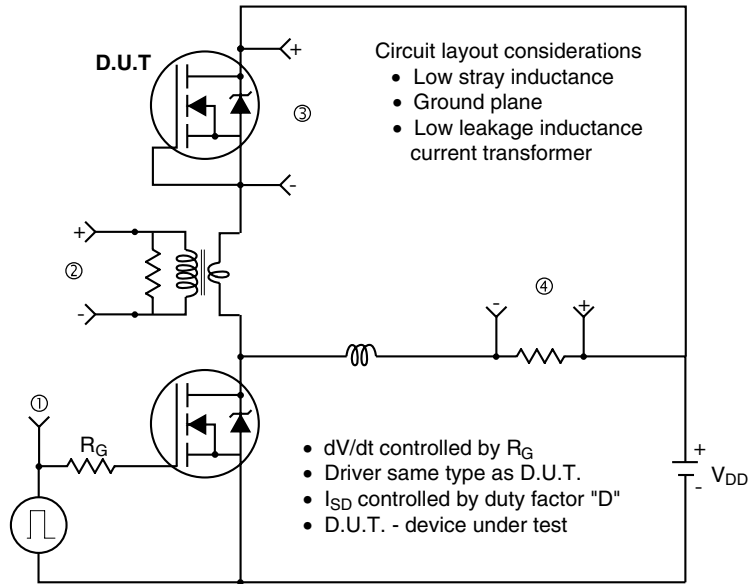


Fig. 14 - For N-Channel

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