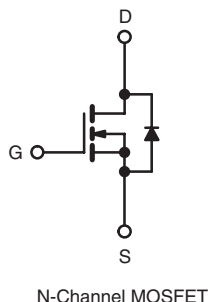
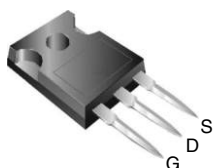


Power MOSFET

PRODUCT SUMMARY

V_{DS} (V)	500	
$R_{DS(on)}$ (Max.) (Ω)	$V_{GS} = 10$ V	0.37
Q_g (Max.) (nC)	77	
Q_{gs} (nC)	26	
Q_{gd} (nC)	34	
Configuration	Single	

TO-247



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
- Effective C_{OSS} Specified
- Lead (Pb)-free



RoHS
COMPLIANT

APPLICATIONS

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

TYPICAL SMPS TOPOLOGIES

- Two Transistor Forward
- Half Bridge and Full Bridge
- PFC Boost

ORDERING INFORMATION

Package	TO-247
Lead (Pb)-free	IRFP450NPbF SiHFP450N-E3
SnPb	IRFP450N SiHFP450N

ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$, unless otherwise noted

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
Pulsed Drain Current ^a	I_{DM}	56	
Linear Derating Factor		1.6	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b	E_{AS}	170	mJ
Repetitive Avalanche Current ^a	I_{AR}	14	A
Repetitive Avalanche Energy ^a	E_{AR}	20	mJ
Maximum Power Dissipation	P_D	200	W
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	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw	10	lbf · in
		1.1	N · m

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting $T_J = 25^\circ\text{C}$, $L = 1.7$ mH, $R_G = 25\ \Omega$, $I_{AS} = 14$ A (see fig. 12).
- $I_{SD} \leq 14$ A, $dI/dt \leq 510$ A/ μs , $V_{DD} \leq V_{DS}$, $T_J \leq 150^\circ\text{C}$.
- 1.6 mm from case.

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.64	

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 V, I _D = 250 μA		500	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.59	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		3.0	-	5.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 30 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V		-	-	25	μA
		V _{DS} = 400 V, V _{GS} = 0 V, T _J = 125 °C		-	-	250	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 8.4 A ^b	-	-	0.37	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 8.4 A		7.9	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	2260	-	pF
Output Capacitance	C _{oss}			-	210	-	
Reverse Transfer Capacitance	C _{rss}			-	14	-	
Output Capacitance	C _{oss}	V _{GS} = 0 V	V _{DS} = 1.0 V, f = 1.0 MHz	-	2410	-	
Effective Output Capacitance	C _{oss} eff.		V _{DS} = 400 V, f = 1.0 MHz	-	59	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	V _{DS} = 0 V to 400 V ^c	-	110	-	nC
Gate-Source Charge	Q _{gs}		I _D = 14 A, V _{DS} = 400 V, see fig. 6 and 13 ^b	-	-	77	
Gate-Drain Charge	Q _{gd}			-	-	26	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 14 A R _G = 6.2 Ω, V _{GS} = 10 V, see fig. 10 ^b		-	20	-	ns
Rise Time	t _r			-	63	-	
Turn-Off Delay Time	t _{d(off)}			-	29	-	
Fall Time	t _f			-	25	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	14	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	56	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 14 A, V _{GS} = 0 V ^b		-	-	1.4	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 14 A, dI/dt = 100 A/μs ^b		-	430	650	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	3.7	5.6	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. Pulse width $\leq 400\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
c. $C_{oss\text{ eff.}}$ 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

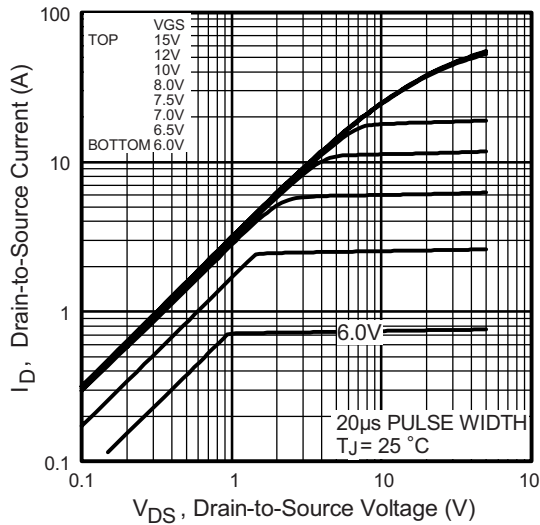


Fig. 1 - Typical Output Characteristics

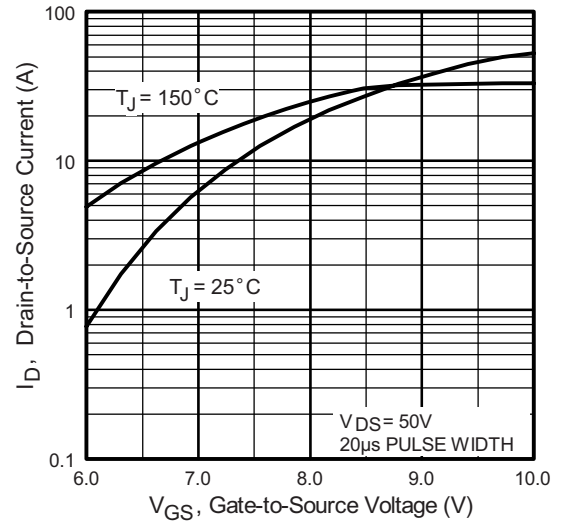


Fig. 3 - Typical Transfer Characteristics

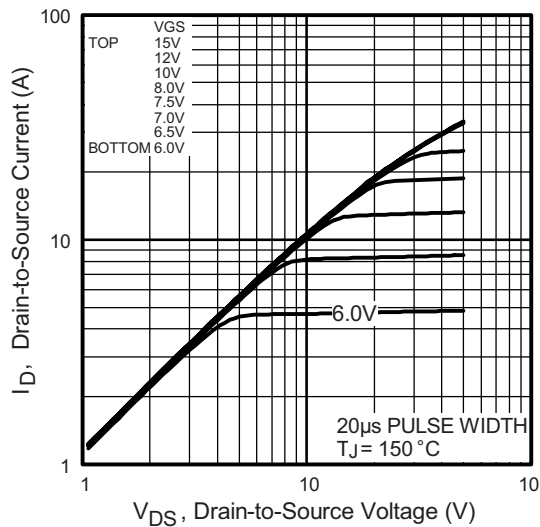


Fig. 2 - Typical Output Characteristics

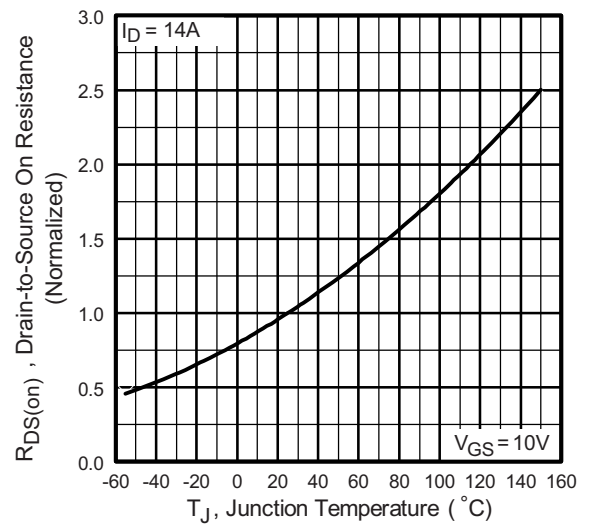


Fig. 4 - Normalized On-Resistance vs. Temperature

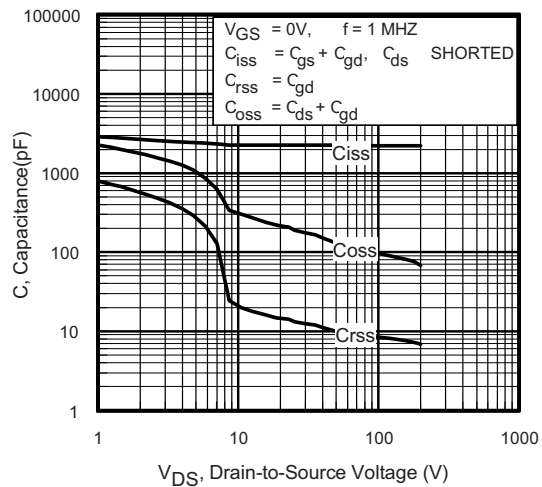


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

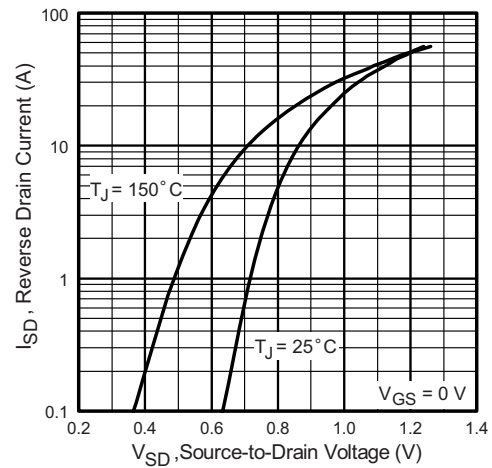


Fig. 7 - Typical Source-Drain Diode Forward Voltage

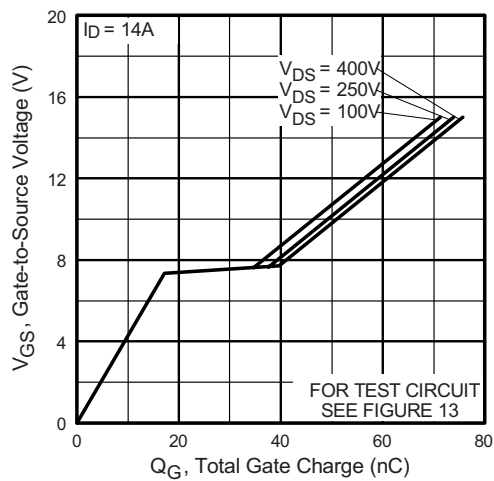


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

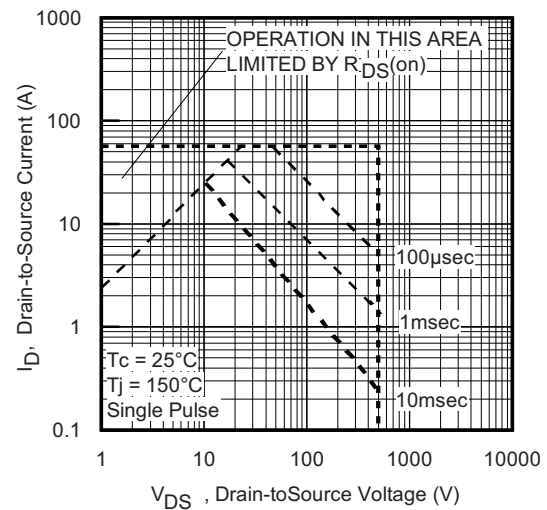


Fig. 8 - Maximum Safe Operating Area

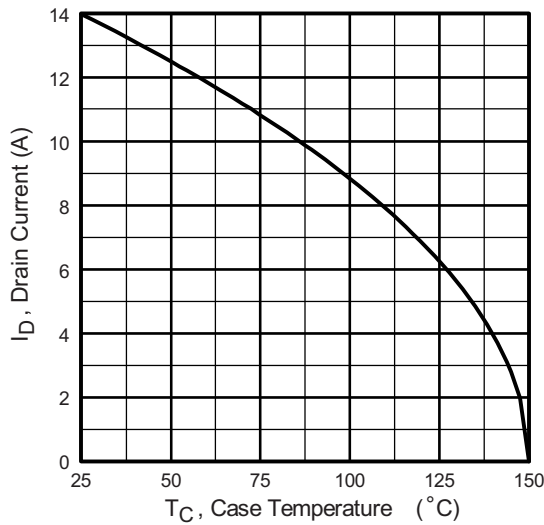


Fig. 9 - Maximum Drain Current vs. Case Temperature

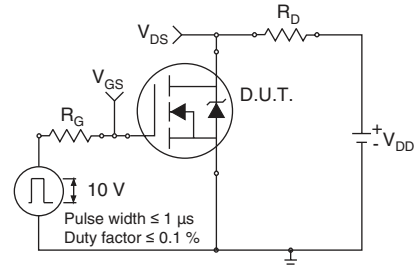


Fig. 10a - Switching Time Test Circuit

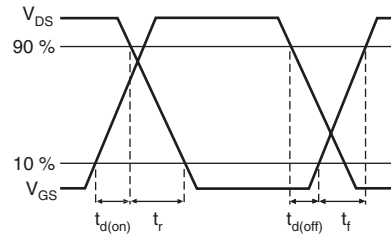


Fig. 10b - Switching Time Waveforms

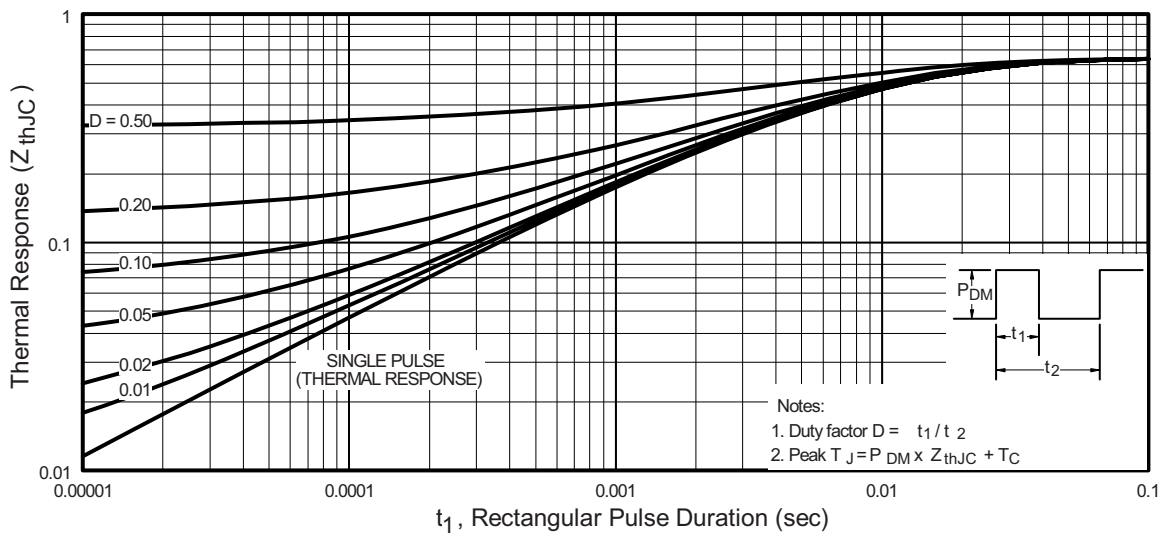


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

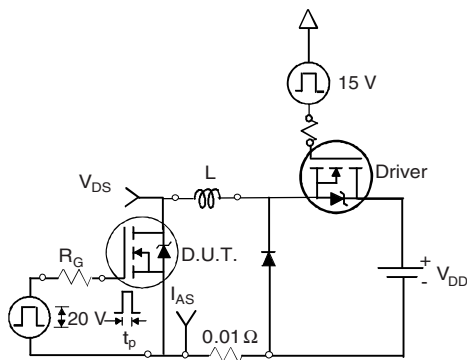


Fig. 12a - Unclamped Inductive Test Circuit

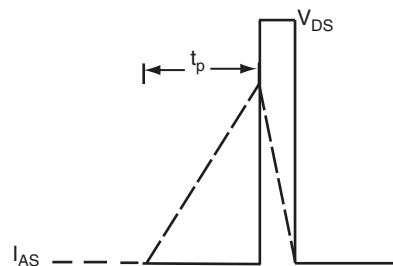


Fig. 12b - Unclamped Inductive Waveforms

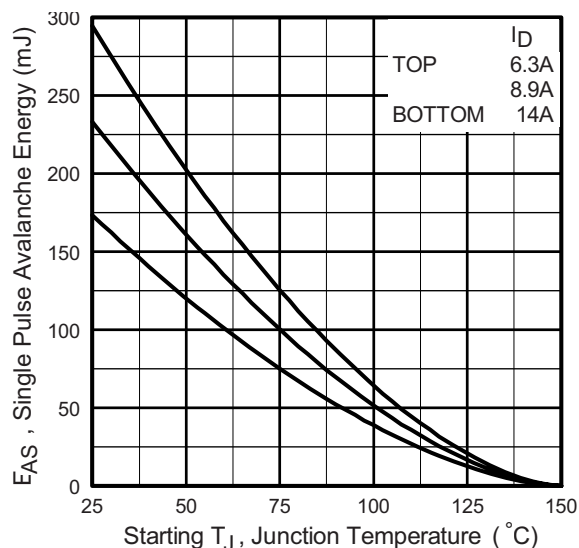


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

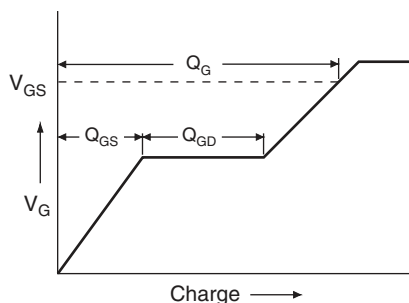


Fig. 13a - Basic Gate Charge Waveform

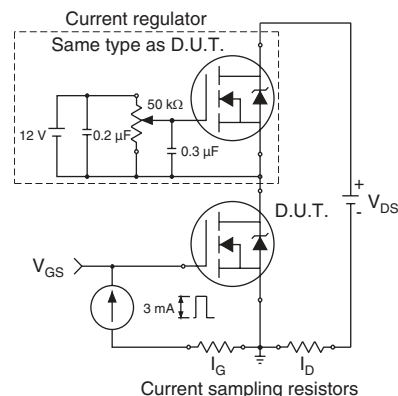


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

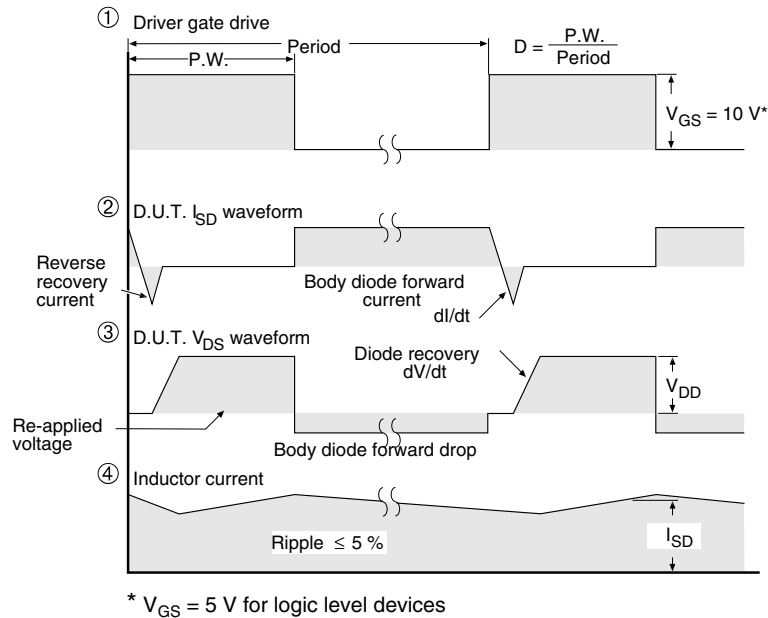
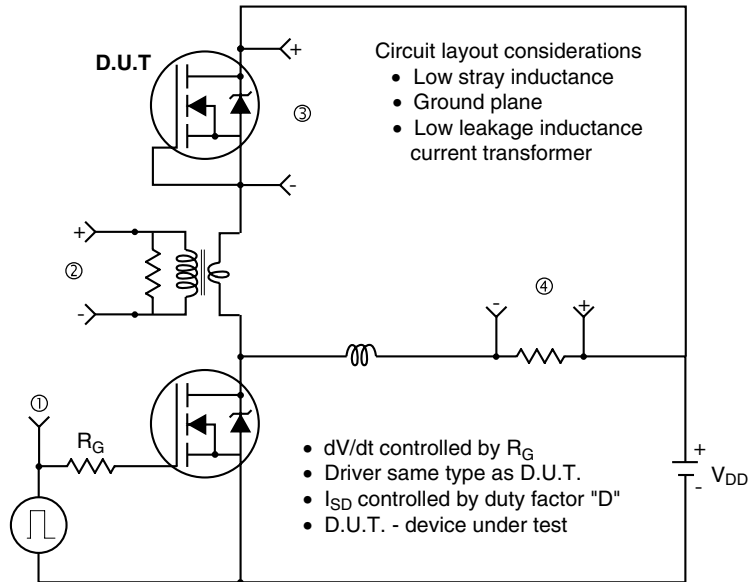


Fig. 14 - For N-Channel

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