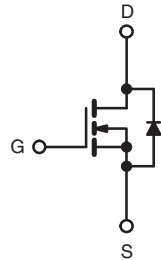
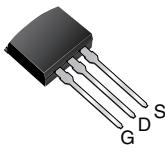


## Power MOSFET

PRODUCT SUMMARY	
$V_{DS}$ (V)	100
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 5\text{ V}$ 0.27
$Q_g$ (Max.) (nC)	12
$Q_{gs}$ (nC)	3.0
$Q_{gd}$ (nC)	7.1
Configuration	Single

**I<sup>2</sup>PAK (TO-262)**


N-Channel MOSFET

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Logic-Level Gate Drive
- $R_{DS(on)}$  Specified at  $V_{GS} = 4\text{ V}$  and  $5\text{ V}$
- 175°C Operating Temperature
- Compliant to RoHS Directive 2002/95/EC



**RoHS\***  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### DESCRIPTION

Third generation Power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The I<sup>2</sup>PAK (TO-262) is a through hole power package capable of accommodating die size up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package.

ORDERING INFORMATION	
Package	I <sup>2</sup> PAK (TO-262)
Lead (Pb)-free and Halogen-free	SiHL520L-GE3
Lead (Pb)-free	IRL520LPbF SiHL520L-E3

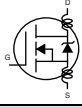
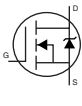
ABSOLUTE MAXIMUM RATINGS ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-Source Voltage		$V_{DS}$	100	V	
Gate-Source Voltage		$V_{GS}$	$\pm 10$		
Continuous Drain Current	$V_{GS}$ at 5 V	$I_D$	$T_C = 25\text{ }^\circ\text{C}$	9.2	A
			$T_C = 100\text{ }^\circ\text{C}$	6.5	
Pulsed Drain Current <sup>a</sup>		$I_{DM}$	36	W/ $^\circ\text{C}$	
Linear Derating Factor			0.40		
Linear Derating Factor (PCB Mount) <sup>e</sup>			0.025		
Single Pulse Avalanche Energy <sup>b</sup>		$E_{AS}$	170	mJ	
Avalanche Current <sup>a</sup>		$I_{AR}$	9.2	A	
Repetitive Avalanche Energy <sup>a</sup>		$E_{AR}$	6.0	mJ	
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	$P_D$	60	W	
Peak Diode Recovery dV/dt <sup>c</sup>		dV/dt	5.5	V/ns	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to + 175	$^\circ\text{C}$	
Soldering Recommendations (Peak Temperature)	for 10 s		300 <sup>d</sup>		

#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 25\text{ V}$ , starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3.0\text{ mH}$ ,  $R_G = 25\text{ }\Omega$ ,  $I_{AS} = 9.2\text{ A}$  (see fig. 12).
- $I_{SD} \leq 9.2\text{ A}$ ,  $dI/dt \leq 110\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 175\text{ }^\circ\text{C}$ .
- 1.6 mm from case.

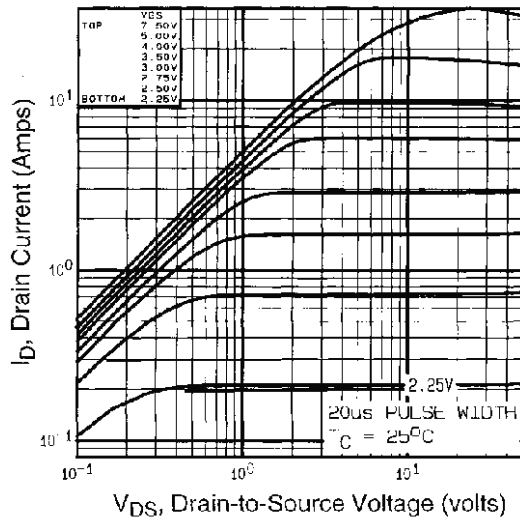
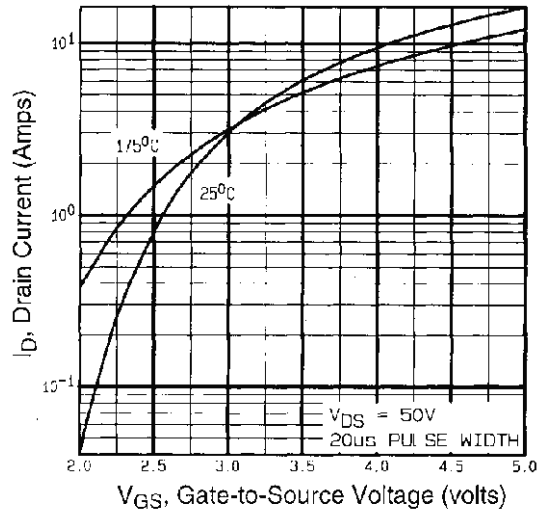
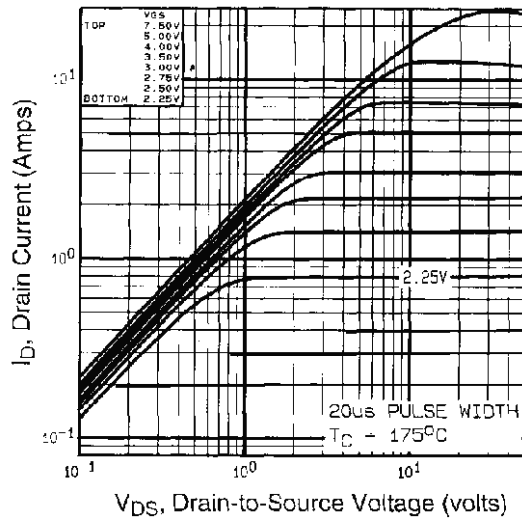
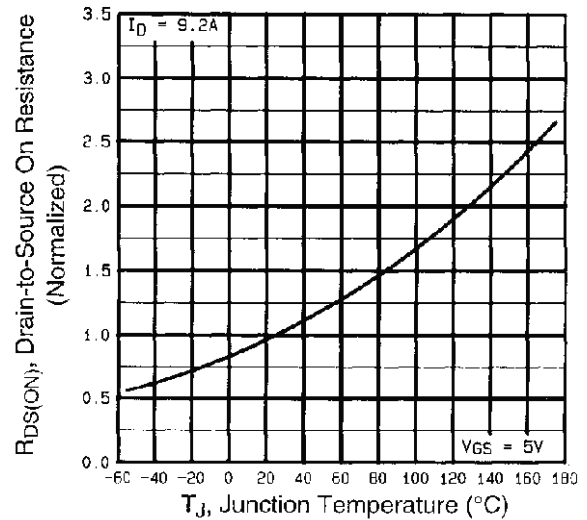
\* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	62	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	2.5	

SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}, I_D = 1\text{ mA}$	-	0.12	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0	-	2.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 10\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	-	-	25	$\mu\text{A}$
		$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 5\text{ V}, I_D = 5.5\text{ A}^b$	-	-	0.27	$\Omega$
		$V_{GS} = 4\text{ V}, I_D = 4.6\text{ A}^b$	-	-	0.38	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}, I_D = 5.5\text{ A}^b$	3.2	-	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}, \text{ see fig. 5}$	-	490	-	pF
Output Capacitance	$C_{oss}$		-	150	-	
Reverse Transfer Capacitance	$C_{rss}$		-	30	-	
Total Gate Charge	$Q_g$	$V_{GS} = 5\text{ V}, I_D = 9.2\text{ A}, V_{DS} = 80\text{ V}, \text{ see fig. 6 and 13}^b$	-	-	12	nC
Gate-Source Charge	$Q_{GS}$		-	-	3.0	
Gate-Drain Charge	$Q_{GD}$		-	-	7.1	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, I_D = 9.2\text{ A}, R_G = 9\text{ }\Omega, R_D = 5.2\text{ }\Omega, \text{ see fig. 10}^b$	-	9.8	-	ns
Rise Time	$t_r$		-	64	-	
Turn-Off Delay Time	$t_{d(off)}$		-	21	-	
Fall Time	$t_f$		-	27	-	
<b>Dynamic</b>						
Internal Drain Inductance	$L_D$	Between lead, 6 mm (0.25") from package and center of die contact 	-	4.5	-	nH
Internal Source Inductance	$L_S$		-	7.5	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	9.2	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$		-	-	36	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}, I_S = 9.2\text{ A}, V_{GS} = 0\text{ V}^b$	-	-	2.5	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}, I_F = 9.2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$	-	130	190	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	0.83	1.0	$\mu\text{C}$
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  $\leq 300\text{ }\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Fig. 1 - Typical Output Characteristics,  $T_C = 25^\circ\text{C}$** 

**Fig. 3 - Typical Transfer Characteristics**

**Fig. 2 - Typical Output Characteristics,  $T_C = 150^\circ\text{C}$** 

**Fig. 4 - Normalized On-Resistance vs. Temperature**

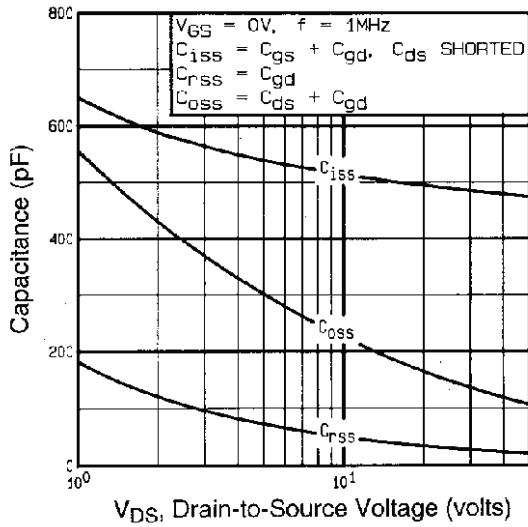


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

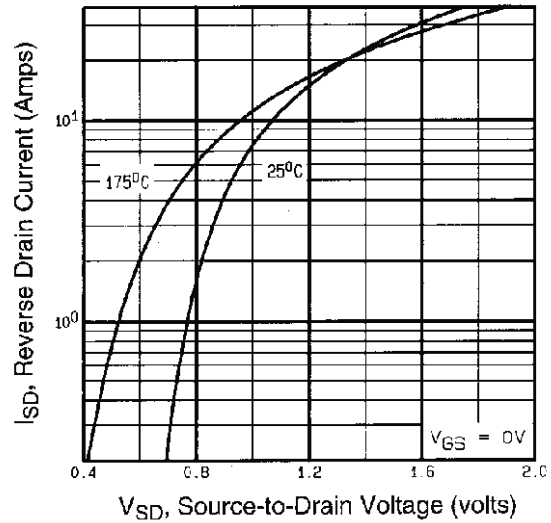


Fig. 7 - Typical Source-Drain Diode Forward Voltage

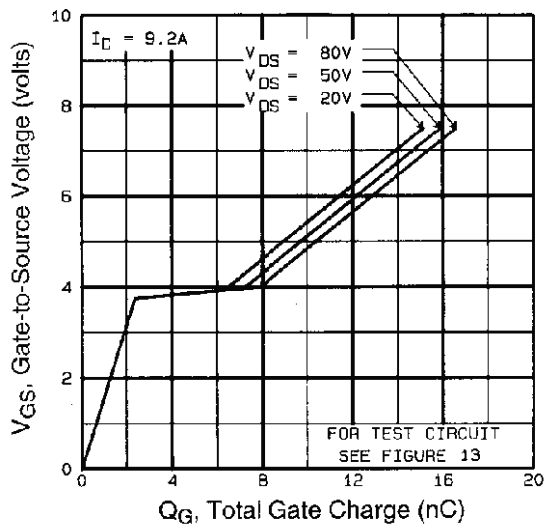


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

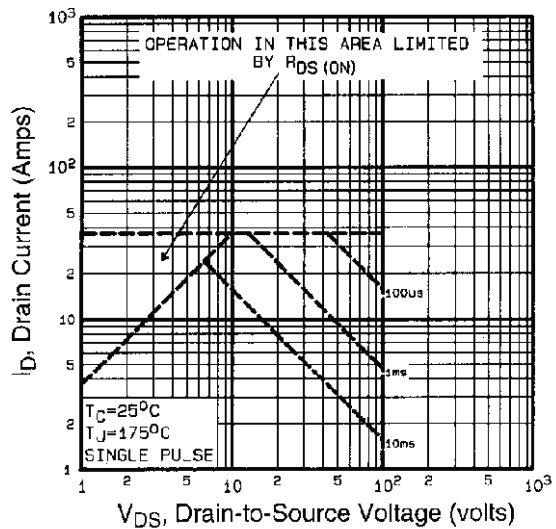


Fig. 8 - Maximum Safe Operating Area

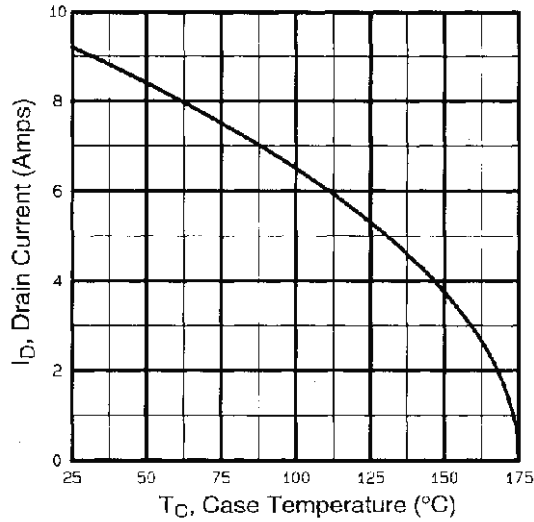


Fig. 9 - Maximum Drain Current vs. Case Temperature

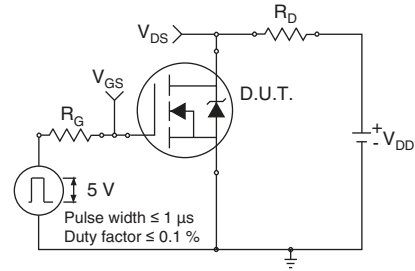


Fig. 10a - Switching Time Test Circuit

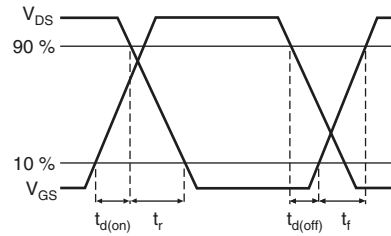


Fig. 10b - Switching Time Waveforms

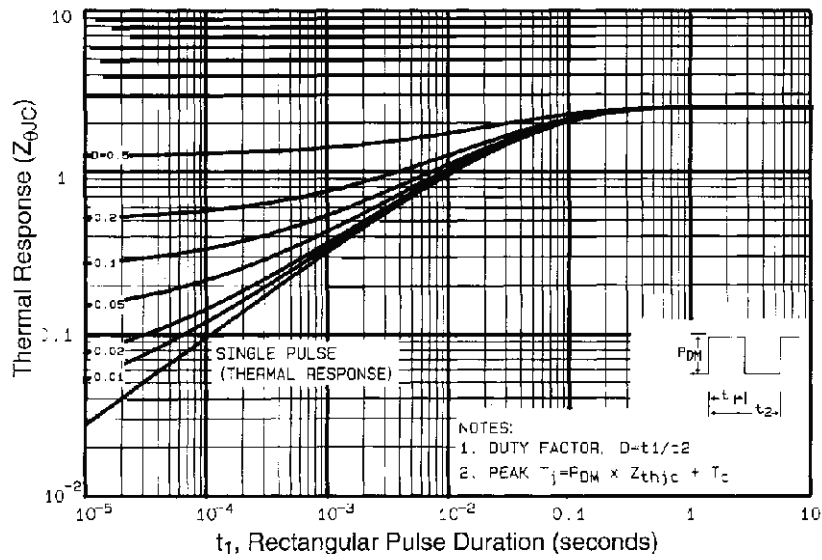


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

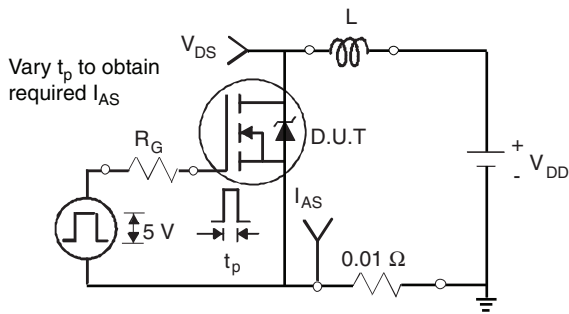


Fig. 12a - Unclamped Inductive Test Circuit

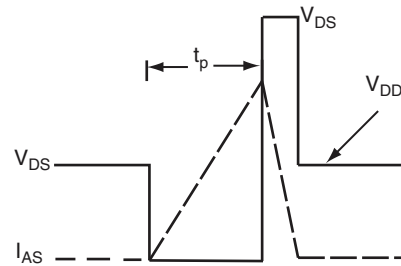


Fig. 12b - Unclamped Inductive Waveforms

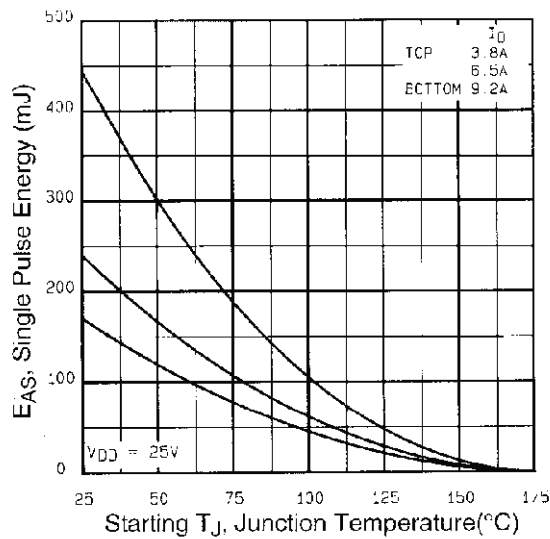


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

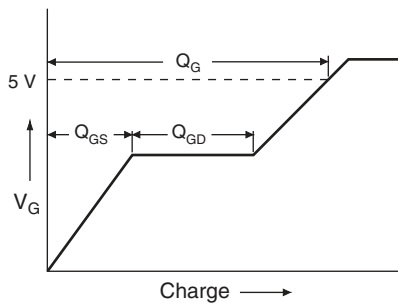


Fig. 13a - Basic Gate Charge Waveform

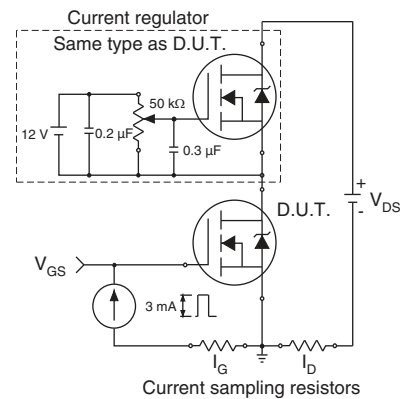
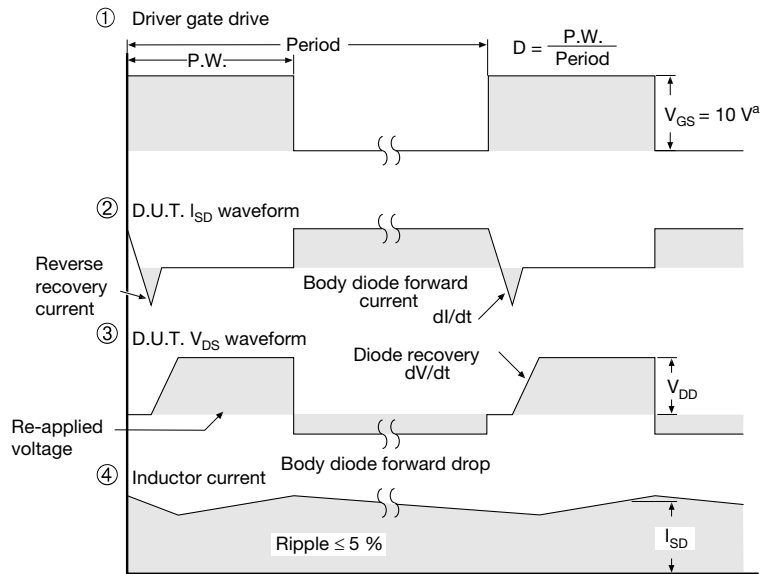
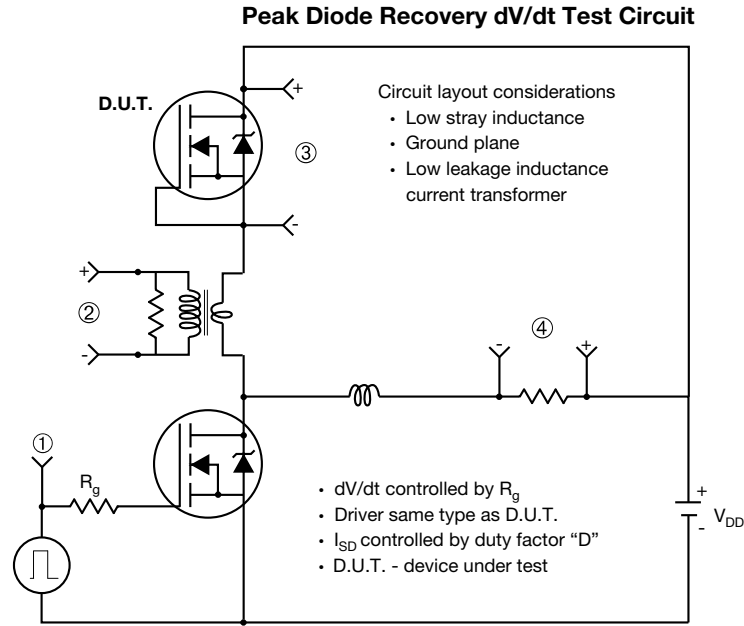


Fig. 13b - Gate Charge Test Circuit



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

**Fig. 14 - For N-Channel**

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