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[Vishay/Siliconix](#)  
[SIHG47N65E-GE3](#)

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**SiHG47N65E**

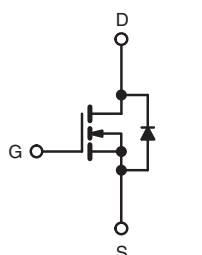
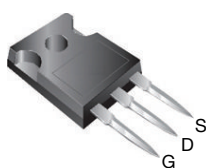
Vishay Siliconix

## E Series Power MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V) at $T_J$ max.	700	
$R_{DS(on)}$ max. at 25 °C ( $\Omega$ )	$V_{GS} = 10$ V	0.072
$Q_g$ max. (nC)	273	
$Q_{gs}$ (nC)	46	
$Q_{gd}$ (nC)	79	
Configuration	Single	

TO-247AC



N-Channel MOSFET

### FEATURES

- Low figure-of-merit (FOM)  $R_{on} \times Q_g$
- Low input capacitance ( $C_{iss}$ )
- Reduced switching and conduction losses
- Ultra low gate charge ( $Q_g$ )
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
  - High-intensity discharge (HID)
  - Fluorescent ballast lighting
- Industrial
  - Welding
  - Induction heating
  - Motor drives
  - Battery chargers
  - Renewable energy
  - Solar (PV inverters)

### ORDERING INFORMATION

Package	TO-247AC
Lead (Pb)-free and Halogen-free	SiHG47N65E-GE3

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	139	
Linear Derating Factor		3.3	W/°C
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	1410	mJ
Maximum Power Dissipation	$P_D$	417	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	°C
Drain-Source Voltage Slope	$dV/dt$	37	V/ns
Reverse Diode $dV/dt$ <sup>d</sup>		9	
Soldering Recommendations (Peak Temperature) <sup>c</sup>		300	°C

#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 28.2$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 10$  A.
- 1.6 mm from case.
- $I_{SD} \leq I_D$ ,  $dI/dt = 100$  A/ $\mu$ s, starting  $T_J = 25$  °C.



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
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### THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	40	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.3	

### SPECIFICATIONS ( $T_J = 25\text{ °C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	650	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ °C}$ , $I_D = 1\text{ mA}$	-	0.70	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2	-	4	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
		$V_{GS} = \pm 30\text{ V}$	-	-	$\pm 1$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 650\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 520\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ °C}$	-	-	25	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 24\text{ A}$	-	0.060	0.072	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 30\text{ V}$ , $I_D = 24\text{ A}$	-	16.7	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 100\text{ V}$ , $f = 1\text{ MHz}$	-	5682	-	pF
Output Capacitance	$C_{oss}$		-	251	-	
Reverse Transfer Capacitance	$C_{rss}$		-	1	-	
Effective Output Capacitance, Energy Related <sup>a</sup>	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 520\text{ V}$ , $V_{GS} = 0\text{ V}$	-	192	-	
Effective Output Capacitance, Time Related <sup>b</sup>	$C_{o(tr)}$		-	665	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$ , $I_D = 24\text{ A}$ , $V_{DS} = 520\text{ V}$	-	182	273	nC
Gate-Source Charge	$Q_{gs}$		-	46	-	
Gate-Drain Charge	$Q_{gd}$		-	79	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 520\text{ V}$ , $I_D = 6\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_g = 9.1\text{ }\Omega$	-	47	94	ns
Rise Time	$t_r$		-	87	131	
Turn-Off Delay Time	$t_{d(off)}$		-	156	234	
Fall Time	$t_f$		-	103	206	
Gate Input Resistance	$R_g$	$f = 1\text{ MHz}$ , open drain	-	0.64	-	$\Omega$
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	47	A
Pulsed Diode Forward Current	$I_{SM}$		-	-	139	
Diode Forward Voltage	$V_{SD}$	$T_J = 25\text{ °C}$ , $I_S = 24\text{ A}$ , $V_{GS} = 0\text{ V}$	-	0.9	1.2	V
Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ °C}$ , $I_F = I_S = 24\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 25\text{ V}$	-	753	1506	ns
Reverse Recovery Charge	$Q_{rr}$		-	14	28	$\mu\text{C}$
Reverse Recovery Current	$I_{RRM}$		-	28	-	A

#### Notes

- a.  $C_{oss(er)}$  is a fixed capacitance that gives the same energy as  $C_{oss}$  while  $V_{DS}$  is rising from 0 % to 80 %  $V_{DSS}$ .  
b.  $C_{oss(tr)}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 % to 80 %  $V_{DSS}$ .

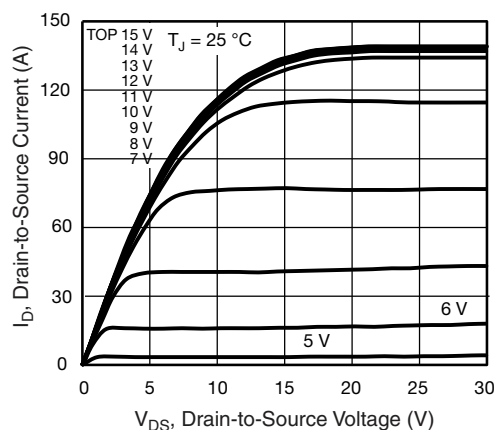


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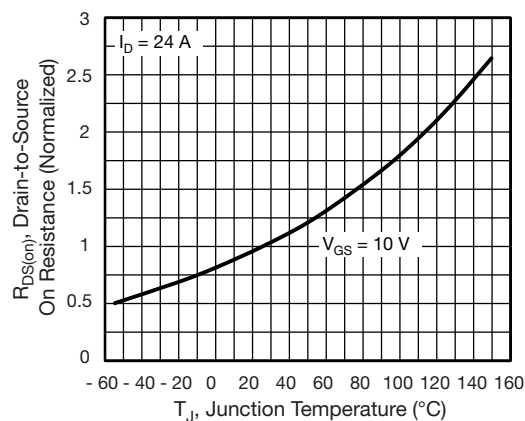
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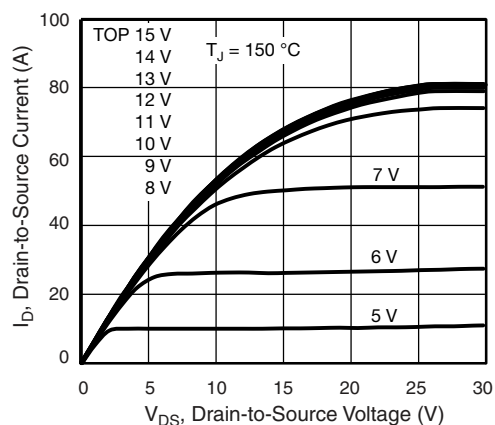
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



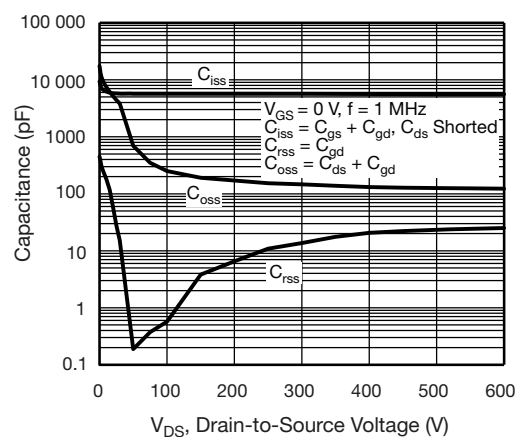
**Fig. 1 - Typical Output Characteristics**



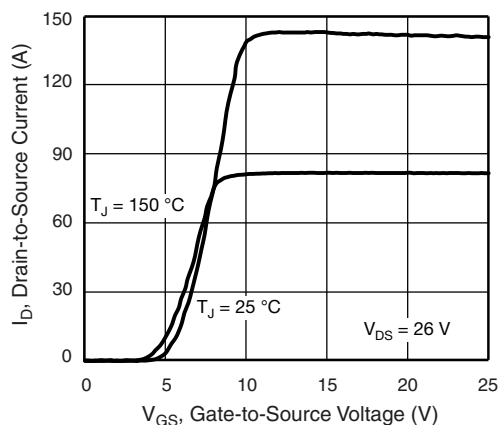
**Fig. 4 - Normalized On-Resistance vs. Temperature**



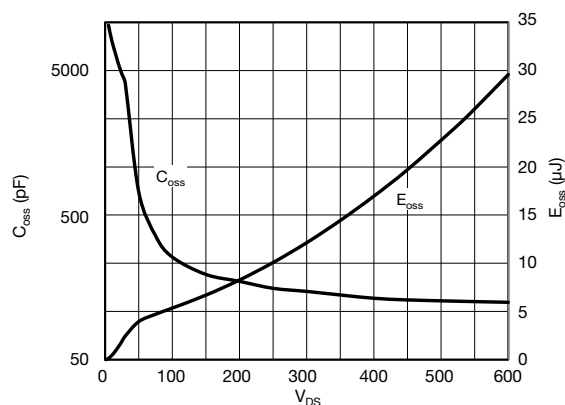
**Fig. 2 - Typical Output Characteristics**



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



**Fig. 3 - Typical Transfer Characteristics**



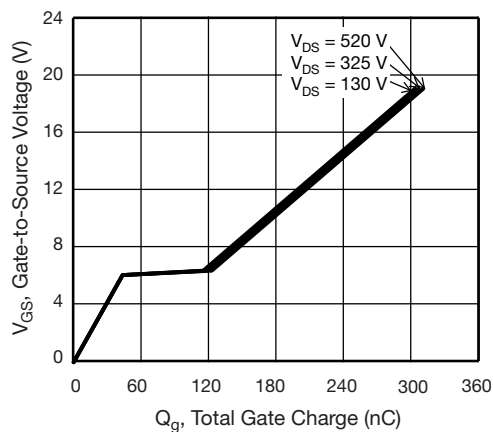
**Fig. 6 -  $C_{oss}$  and  $E_{oss}$  vs.  $V_{ds}$**



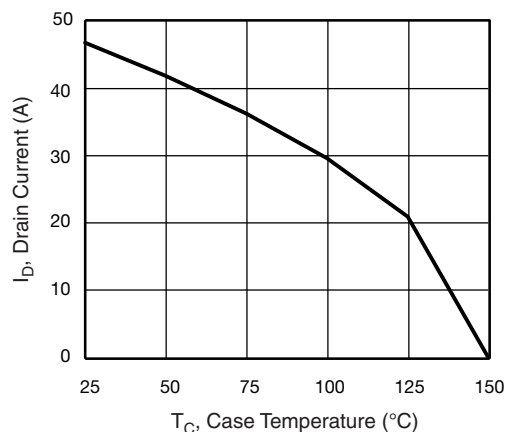
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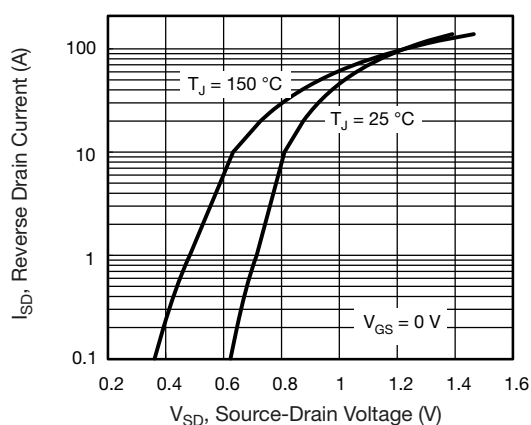
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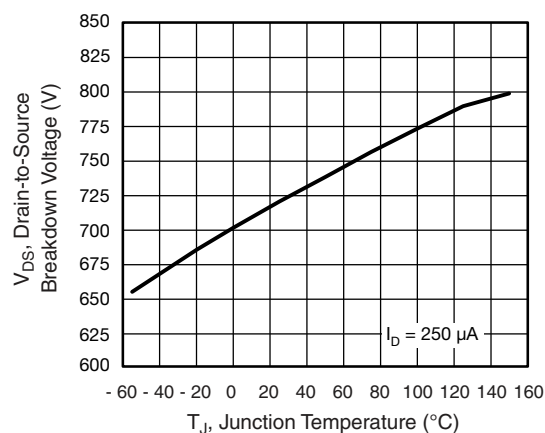
**Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage**



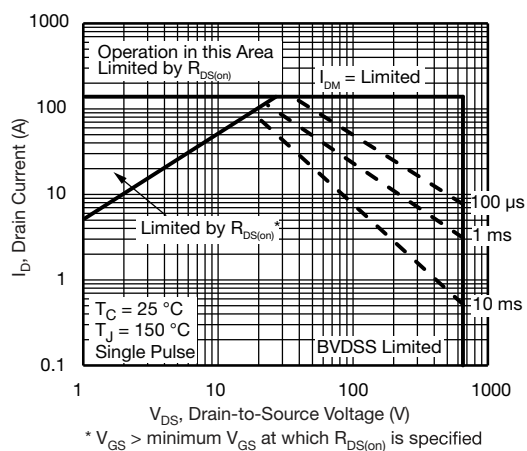
**Fig. 10 - Maximum Drain Current vs. Case Temperature**



**Fig. 8 - Typical Source-Drain Diode Forward Voltage**



**Fig. 11 - Temperature vs. Drain-to-Source Voltage**



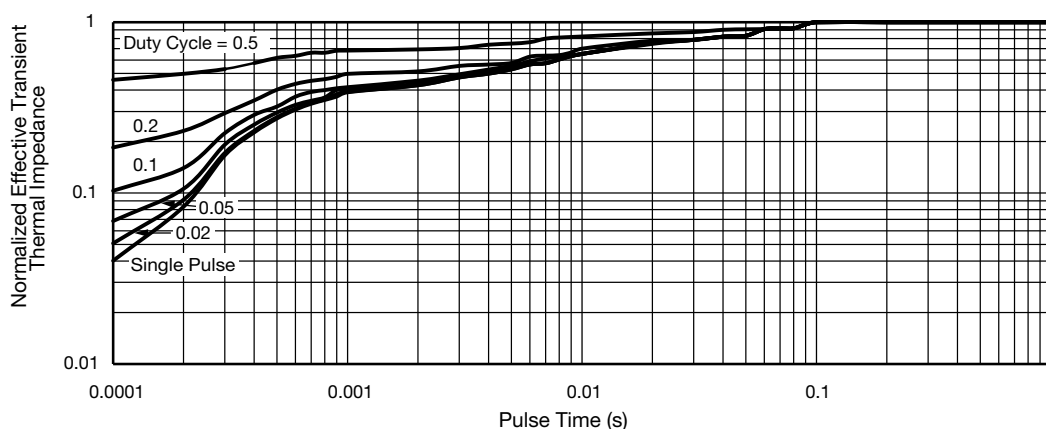
**Fig. 9 - Maximum Safe Operating Area**



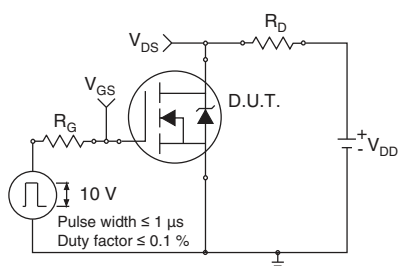
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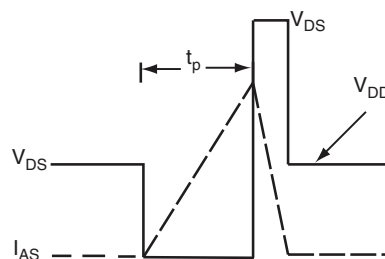
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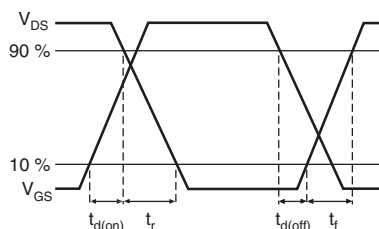
**Fig. 12 - Normalized Thermal Transient Impedance, Junction-to-Case**



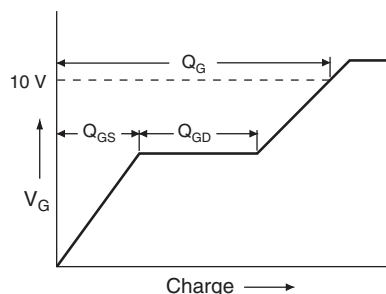
**Fig. 13 - Switching Time Test Circuit**



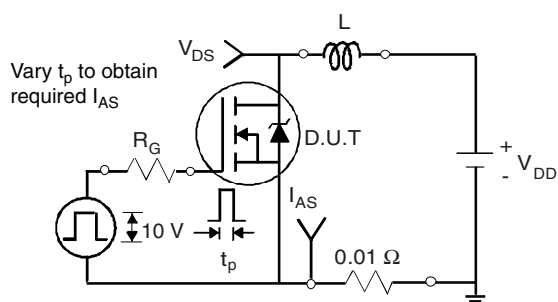
**Fig. 16 - Unclamped Inductive Waveforms**



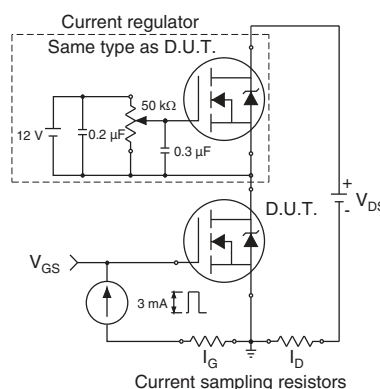
**Fig. 14 - Switching Time Waveforms**



**Fig. 17 - Basic Gate Charge Waveform**



**Fig. 15 - Unclamped Inductive Test Circuit**



**Fig. 18 - Gate Charge Test Circuit**

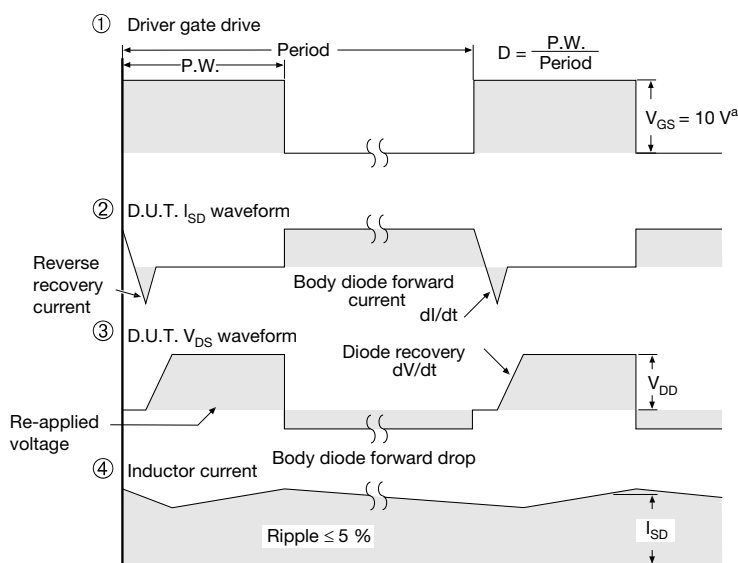
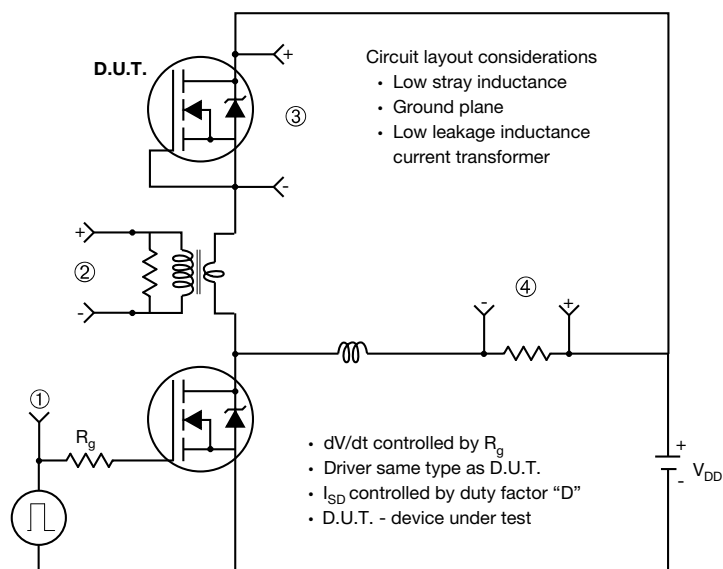


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**Peak Diode Recovery dV/dt Test Circuit**



**Note**

a. V<sub>GS</sub> = 5 V for logic level devices

**Fig. 19 - For N-Channel**

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