

E Series Power MOSFET

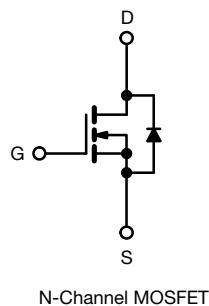
PRODUCT SUMMARY	
V_{DS} (V) at T_J max.	650
$R_{DS(on)}$ typ. (Ω) at 25 °C	$V_{GS} = 10$ V 0.026
Q_g max. (nC)	443
Q_{gs} (nC)	85
Q_{gd} (nC)	139
Configuration	Single

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



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	SiHG80N60E-GE3

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 ($T_J = 150$ °C)	V_{GS} at 10 V	$T_C = 25$ °C	80	A
		$T_C = 100$ °C	51	
Pulsed Drain Current ^a		I_{DM}	268	
Linear Derating Factor			4.2	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	1142	mJ
Maximum Power Dissipation		P_D	520	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +150	°C
Drain-Source Voltage Slope	$T_J = 125$ °C		70	V/ns
Reverse Diode dV/dt ^d			8.8	
Soldering Recommendations (Peak temperature) ^c	For 10 s		300	°C

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 140$ V, starting $T_J = 25$ °C, $L = 28.2$ mH, $R_g = 25$ Ω, $I_{AS} = 9$ A.
- 1.6 mm from case.
- $I_{SD} \leq I_D$, $dI/dt = 100$ A/μs, starting $T_J = 25$ °C.

THERMAL RESISTANCE RATINGS

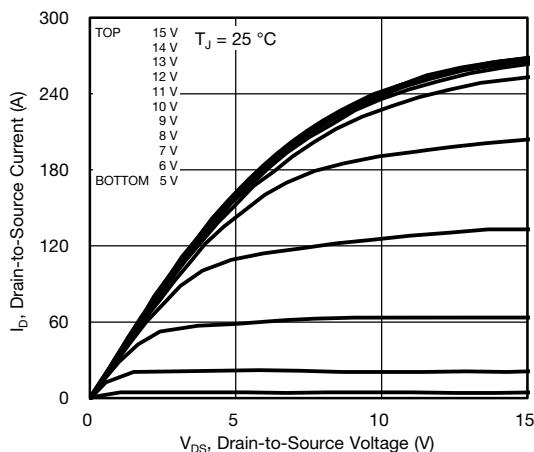
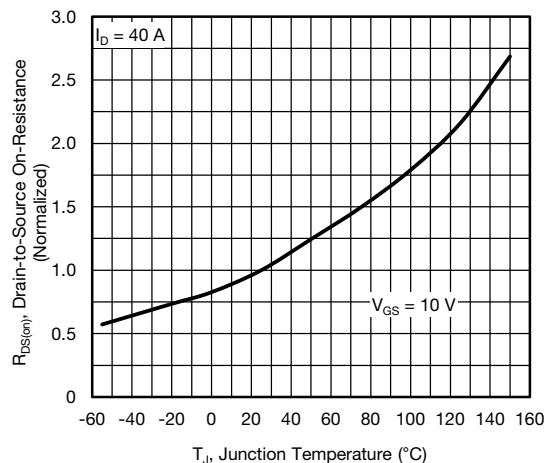
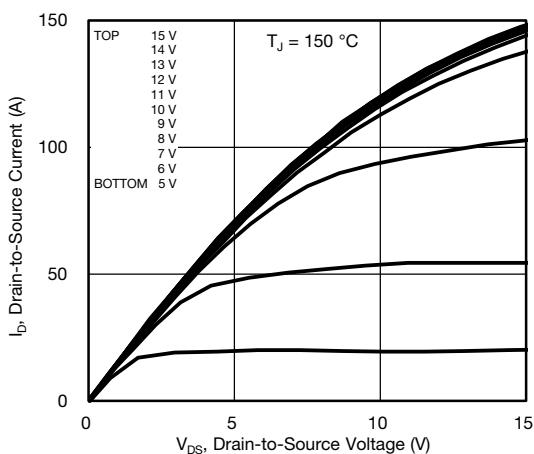
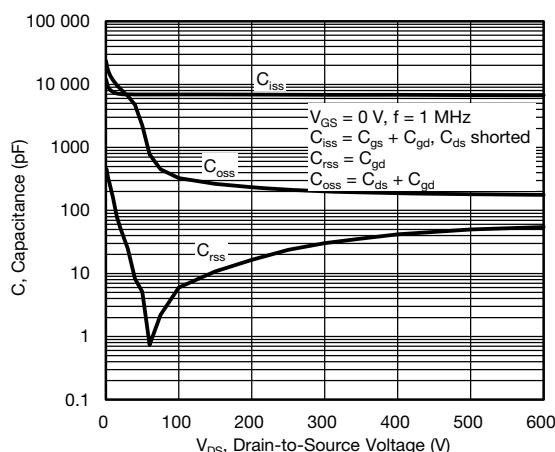
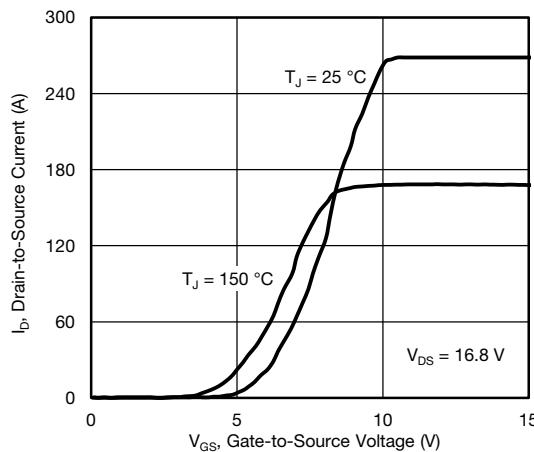
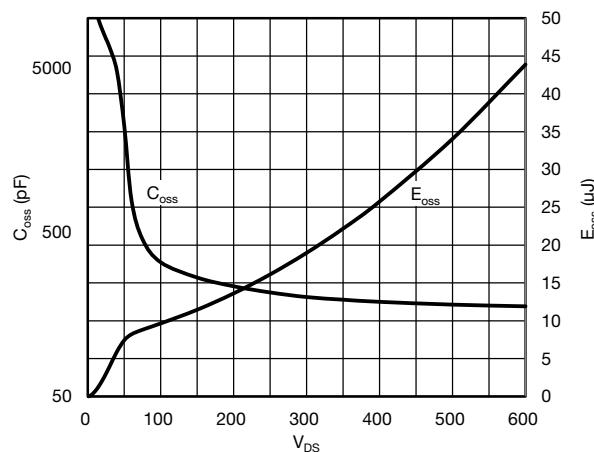
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	$^{\circ}\text{C}/\text{W}$
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.24	

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$	$I_D = 250 \mu\text{A}$	600	-	-	V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25°C , $I_D = 1 \text{ mA}$		-	0.68	-	$^{\circ}\text{C}/\text{C}$	
Gate-Source Threshold Voltage (N)	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$		2	-	4	V	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA	
		$V_{GS} = \pm 30 \text{ V}$		-	-	± 1	μA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600 \text{ V}$, $V_{GS} = 0 \text{ V}$		-	-	1	μA	
		$V_{DS} = 480 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^{\circ}\text{C}$		-	-	10		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$	$I_D = 40 \text{ A}$	-	0.026	0.030	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 30 \text{ V}$, $I_D = 40 \text{ A}$		-	20	-	S	
Dynamic								
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 100 \text{ V}$, $f = 1 \text{ MHz}$		-	6900	-	pF	
Output Capacitance	C_{oss}			-	327	-		
Reverse Transfer Capacitance	C_{rss}			-	6	-		
Effective Output Capacitance, Energy Related ^a	$C_{o(er)}$	$V_{DS} = 0 \text{ V}$ to 480 V , $V_{GS} = 0 \text{ V}$		-	1092	-	pF	
Effective Output Capacitance, Time Related ^b	$C_{o(tr)}$			-	224	-		
Total Gate Charge	Q_g	$V_{GS} = 10 \text{ V}$	$I_D = 40 \text{ A}$, $V_{DS} = 480 \text{ V}$	-	295	443	nC	
Gate-Source Charge	Q_{gs}			-	85	-		
Gate-Drain Charge	Q_{gd}			-	139	-		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 480 \text{ V}$, $I_D = 40 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_g = 9.1 \Omega$		-	63	95	ns	
Rise Time	t_r			-	153	230		
Turn-Off Delay Time	$t_{d(off)}$			-	239	359		
Fall Time	t_f			-	147	221		
Gate Input Resistance	R_g	$f = 1 \text{ MHz}$, open drain		0.6	1.2	2.4	Ω	
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	80	A	
Pulsed Diode Forward Current	I_{SM}			-	-	268		
Diode Forward Voltage	V_{SD}	$T_J = 25^{\circ}\text{C}$, $I_S = 40 \text{ A}$, $V_{GS} = 0 \text{ V}$		-	-	1.2	V	
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}$, $I_F = I_S = 40 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}$, $V_R = 25 \text{ V}$		-	746	1492	ns	
Reverse Recovery Charge	Q_{rr}			-	16	32	μC	
Reverse Recovery Current	I_{RRM}			-	33	-	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} .

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}

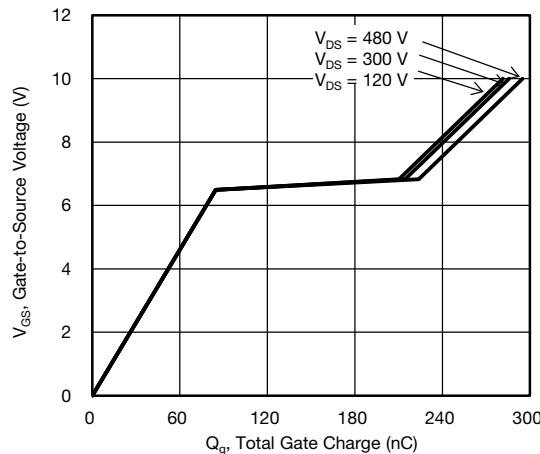


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

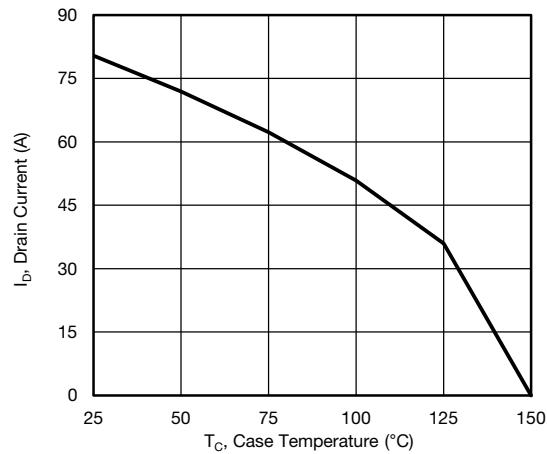


Fig. 10 - Maximum Drain Current vs. Case Temperature

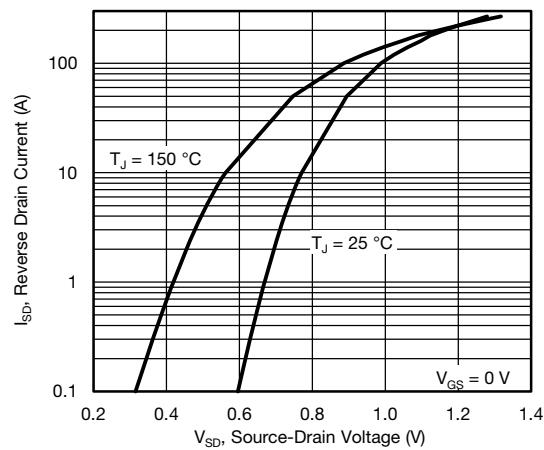


Fig. 8 - Typical Source-Drain Diode Forward Voltage

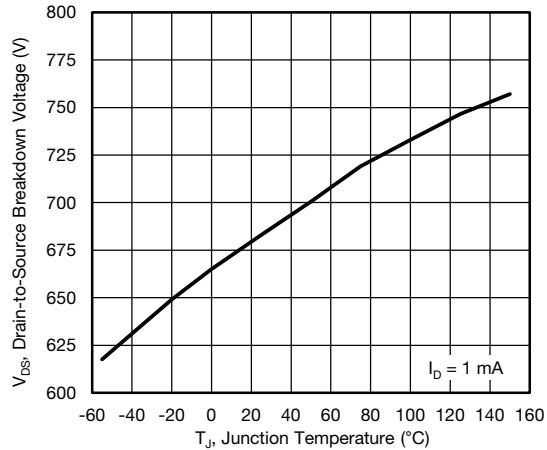


Fig. 11 - Temperature vs. Drain-to-Source Voltage

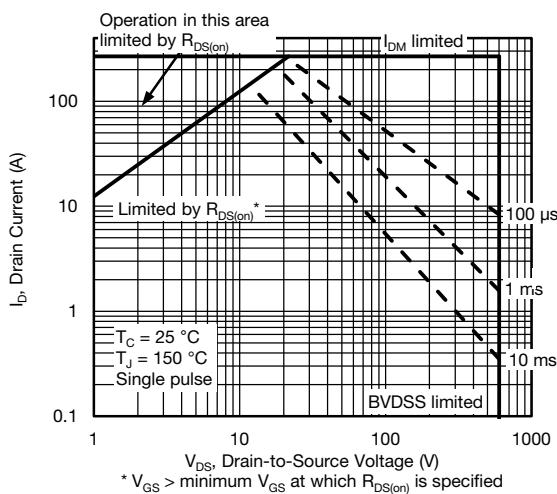


Fig. 9 - Maximum Safe Operating Area

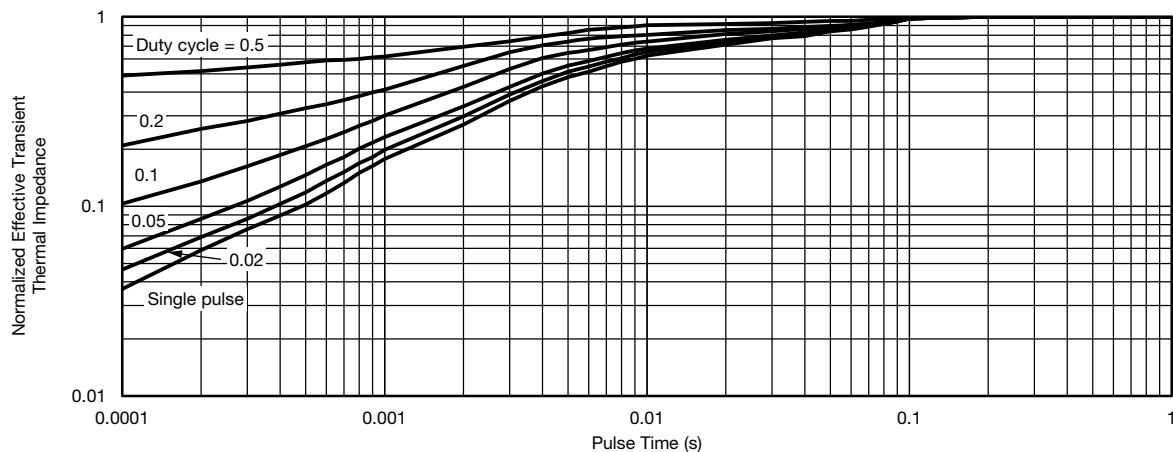


Fig. 12 - Normalized Thermal Transient Impedance, Junction-to-Case

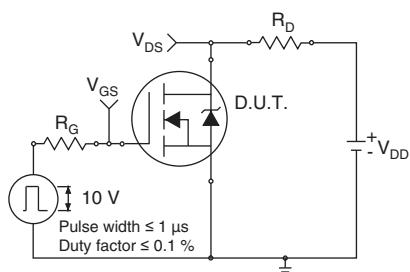


Fig. 13 - Switching Time Test Circuit

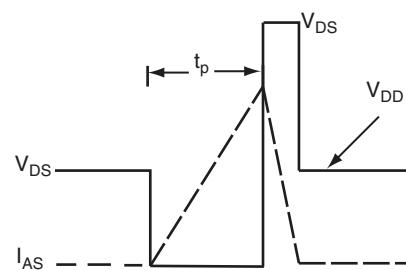


Fig. 16 - Unclamped Inductive Waveforms

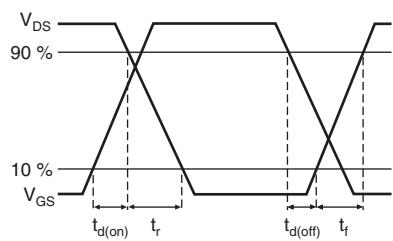


Fig. 14 - Switching Time Waveforms

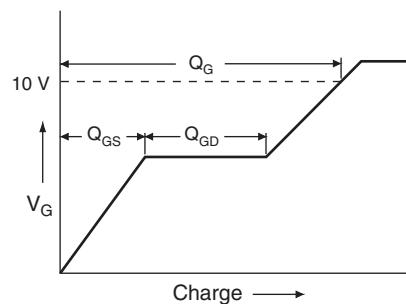


Fig. 17 - Basic Gate Charge Waveform

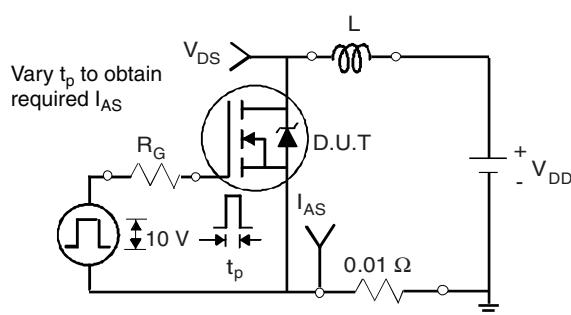


Fig. 15 - Unclamped Inductive Test Circuit

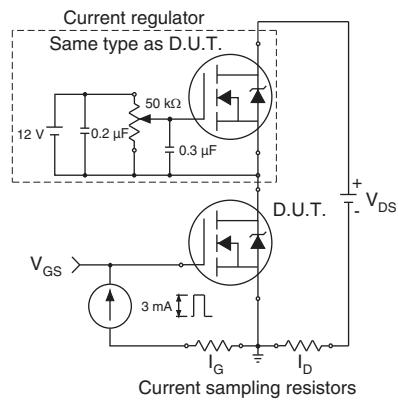
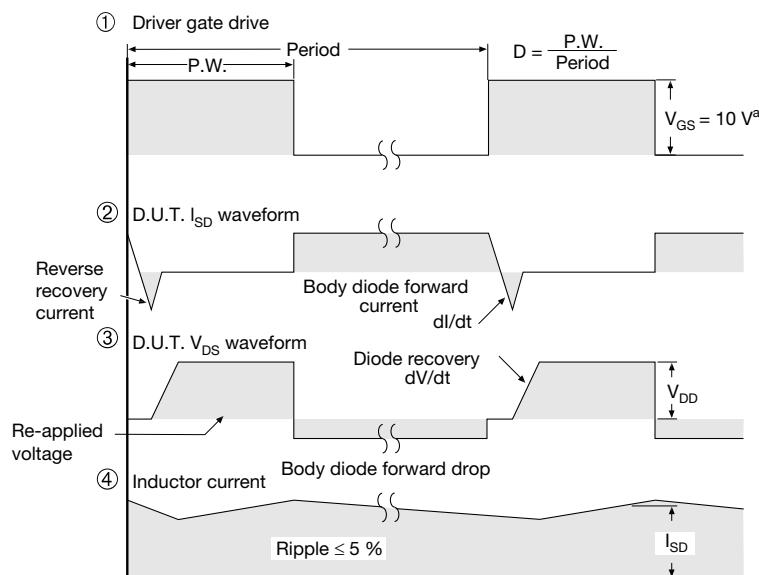
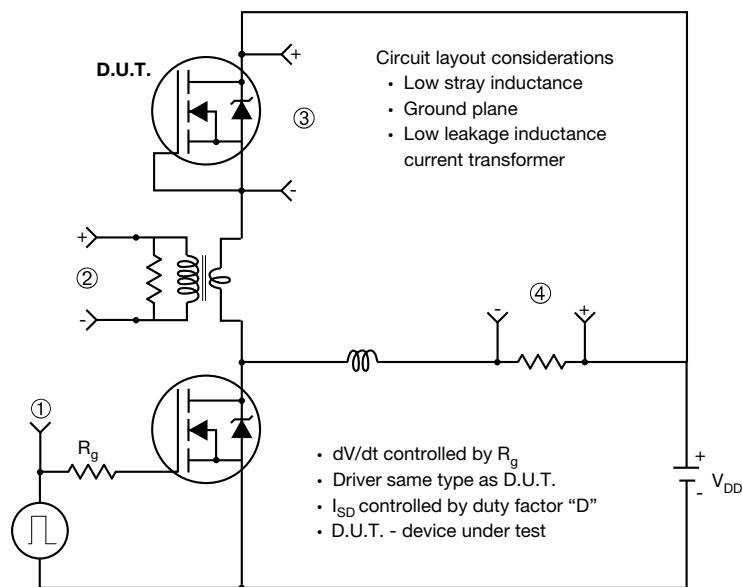


Fig. 18 - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

Note

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

Fig. 19 - For N-Channel

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