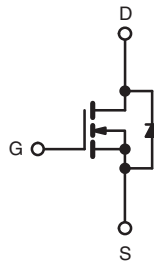
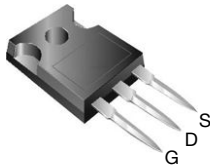


## Power MOSFET

PRODUCT SUMMARY	
$V_{DS}$ (V) at $T_J$ max.	560
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V   0.270
$Q_g$ (Max.) (nC)	76
$Q_{gs}$ (nC)	21
$Q_{gd}$ (nC)	34
Configuration	Single

**TO-247AC**


N-Channel MOSFET

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Low Figure-of-Merit  $R_{on} \times Q_g$
- 100 % Avalanche Tested
- High Peak Current Capability
- $dV/dt$  Ruggedness
- Improved  $T_{rr}/Q_{rr}$
- Improved Gate Charge
- High Power Dissipations Capability
- Compliant to RoHS Directive 2002/95/EC



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


ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	SiHG20N50C-E3
Lead (Pb)-free and Halogen-free	SiHG20N50C-GE3

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	$V_{DS}$	500	V	
Gate-Source Voltage	$V_{GS}$	$\pm 30$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>e</sup>	$V_{GS}$ at 10 V	$T_C = 25$ °C	20	A
		$T_C = 100$ °C	11	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	80		
Linear Derating Factor		1.8	W/°C	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	361	mJ	
Maximum Power Dissipation	$P_D$	250	W	
Peak Diode Recovery $dV/dt^c$	$dV/dt$	5	V/ns	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	°C	
Soldering Recommendations (Peak Temperature)	for 10 s	300 <sup>d</sup>		

#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 2.5$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 17$  A.
- $I_{SD} \leq 18$  A,  $dI/dt \leq 380$  A/ $\mu$ s,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 150$  °C.
- 1.6 mm from case.
- Limited by maximum junction temperature.

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	40	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.5	

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	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	500	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\text{ mA}$	-	700	-	mV/ $^\circ\text{C}$
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	3.0	-	5.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	25	$\mu\text{A}$
		$V_{DS} = 400\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$   $I_D = 10\text{ A}$	-	0.225	0.270	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}$ , $I_D = 10\text{ A}$	-	6.4	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1.0\text{ MHz}$	-	2451	2942	$\mu\text{F}$
Output Capacitance	$C_{oss}$		-	300	360	
Reverse Transfer Capacitance	$C_{rss}$		-	26	32	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$   $I_D = 18\text{ A}$ , $V_{DS} = 400\text{ V}$	-	65	76	nC
Gate-Source Charge	$Q_{gs}$		-	21	-	
Gate-Drain Charge	$Q_{gd}$		-	29	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}$ , $I_D = 18\text{ A}$ , $R_g = 9.1\text{ }\Omega$	-	80	-	ns
Rise Time	$t_r$		-	27	-	
Turn-Off Delay Time	$t_{d(off)}$		-	32	-	
Fall Time	$t_f$		-	44	-	
Gate Input Resistance	$R_g$	$f = 1\text{ MHz}$ , open drain	-	1.1	-	$\Omega$
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	20	A
Pulsed Diode Forward Current	$I_{SM}$		-	-	80	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_S = 18\text{ A}$ , $V_{GS} = 0\text{ V}$	-	-	1.5	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = I_S$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V = 35\text{ V}$	-	503	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	6.7	-	$\mu\text{C}$
Reverse Recovery Current	$I_{RRM}$		-	30	-	A

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

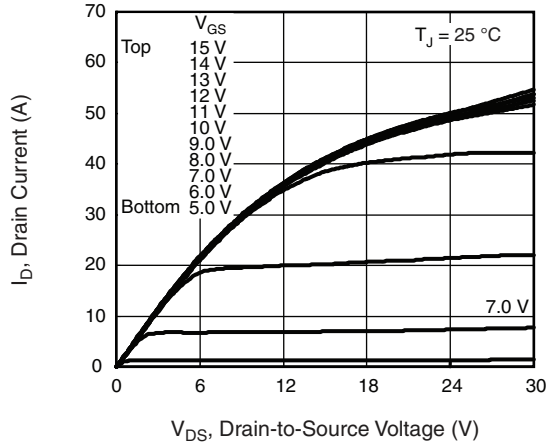


Fig. 1 - Typical Output Characteristics,  $T_C = 25\text{ }^\circ\text{C}$

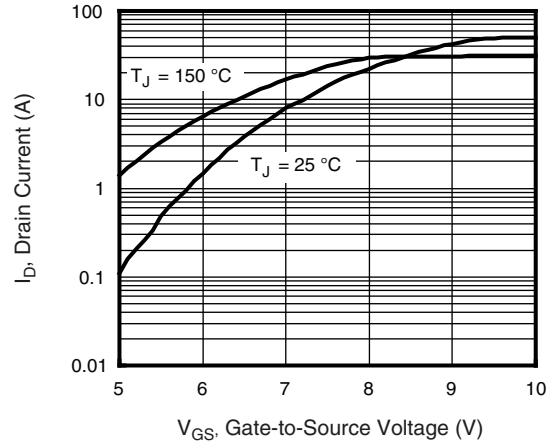


Fig. 3 - Typical Transfer Characteristics

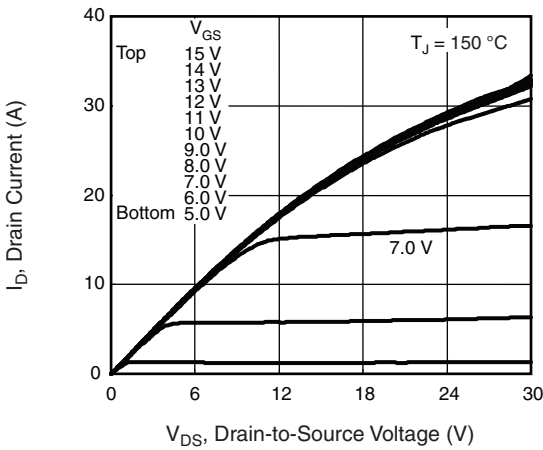


Fig. 2 - Typical Output Characteristics,  $T_C = 150\text{ }^\circ\text{C}$

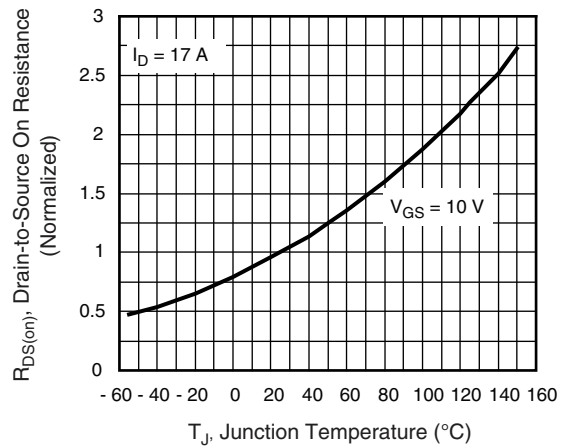


Fig. 4 - Normalized On-Resistance vs. Temperature

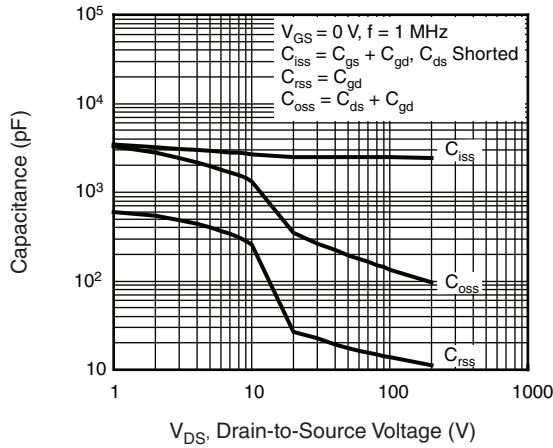


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

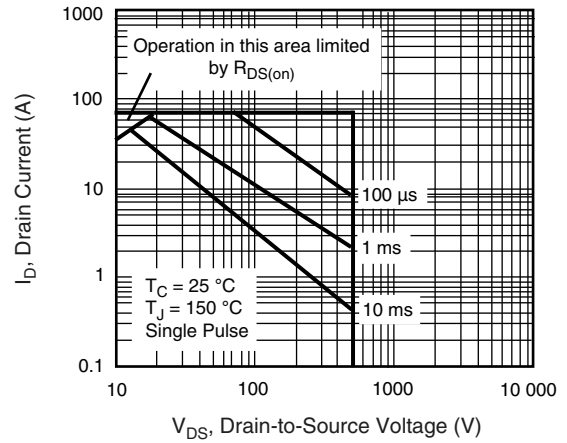


Fig. 8 - Maximum Safe Operating Area

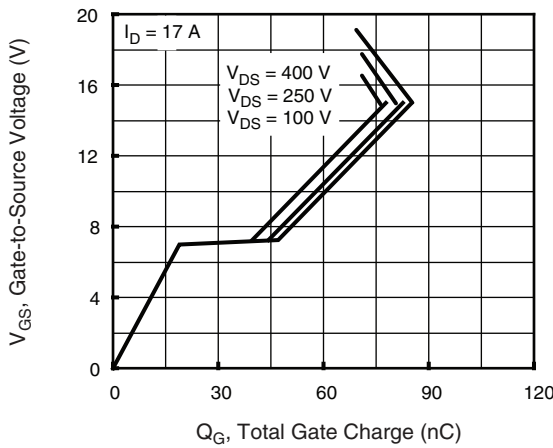


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

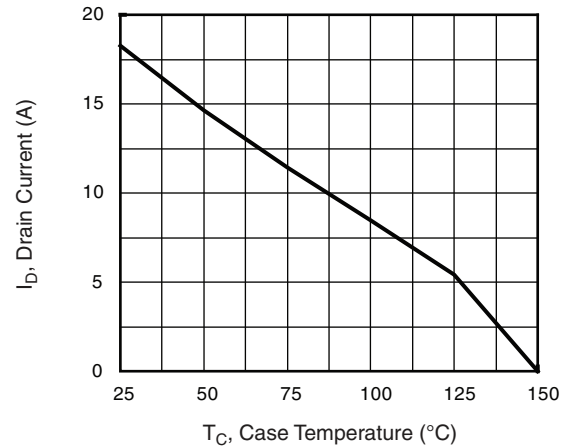


Fig. 9 - Maximum Drain Current vs. Case Temperature

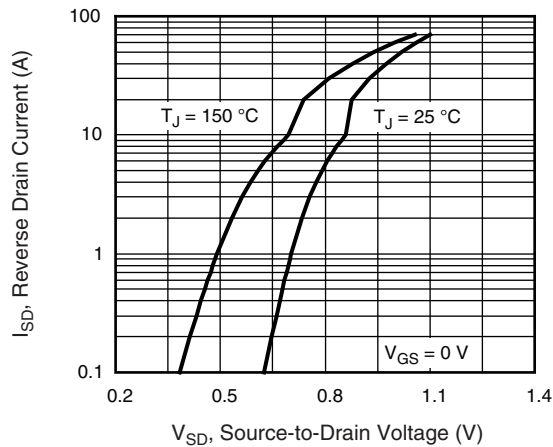
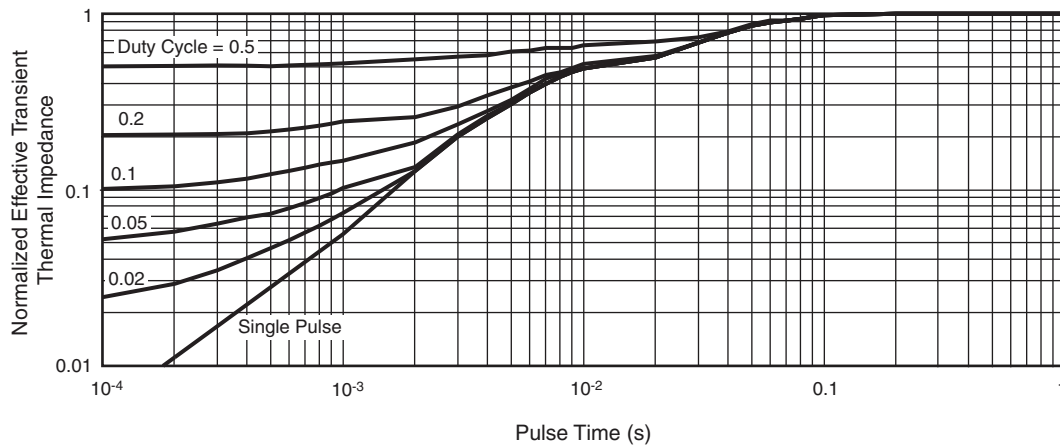
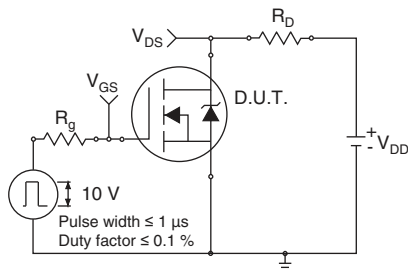


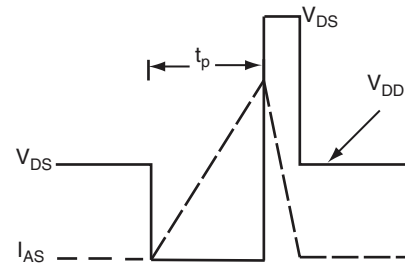
Fig. 7 - Typical Source-Drain Diode Forward Voltage



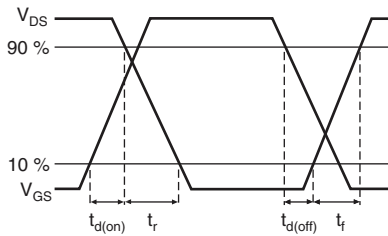
**Fig. 10 - Normalized Thermal Transient Impedance, Junction-to-Case (TO-247)**



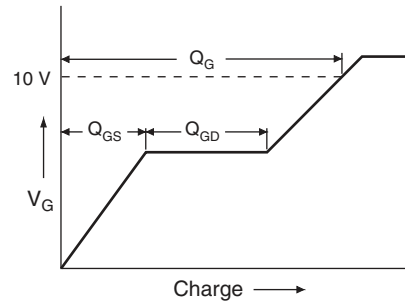
**Fig. 11a - Switching Time Test Circuit**



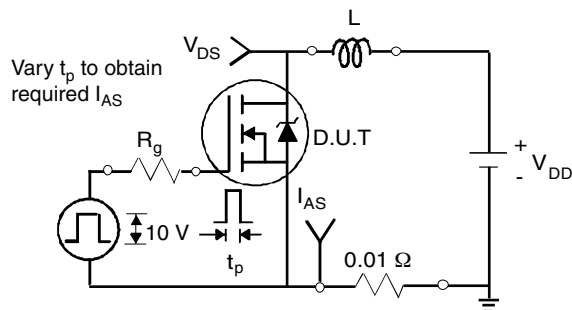
**Fig. 12b - Unclamped Inductive Waveforms**



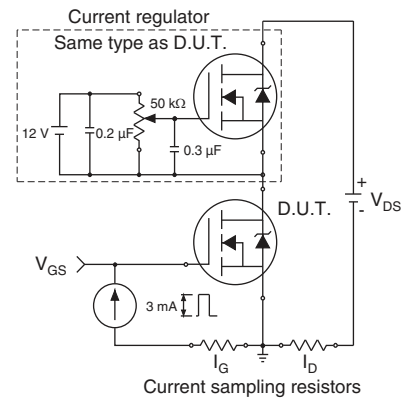
**Fig. 11b - Switching Time Waveforms**



**Fig. 13a - Basic Gate Charge Waveform**

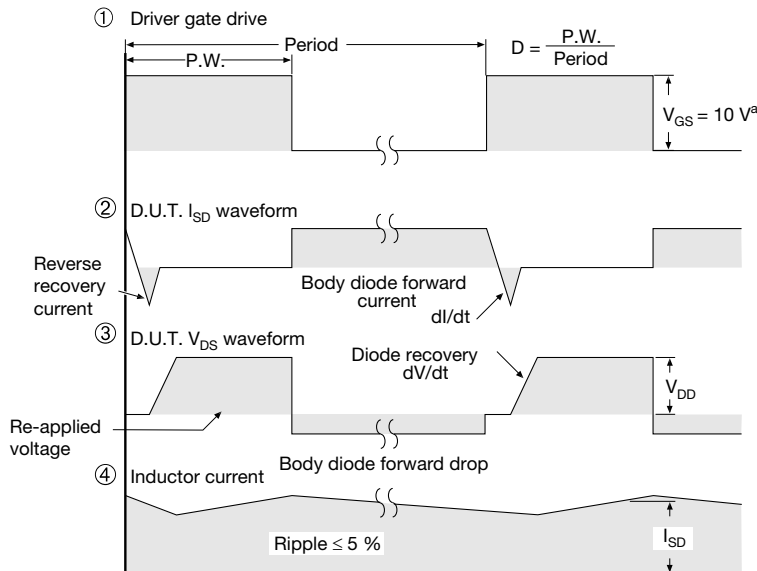
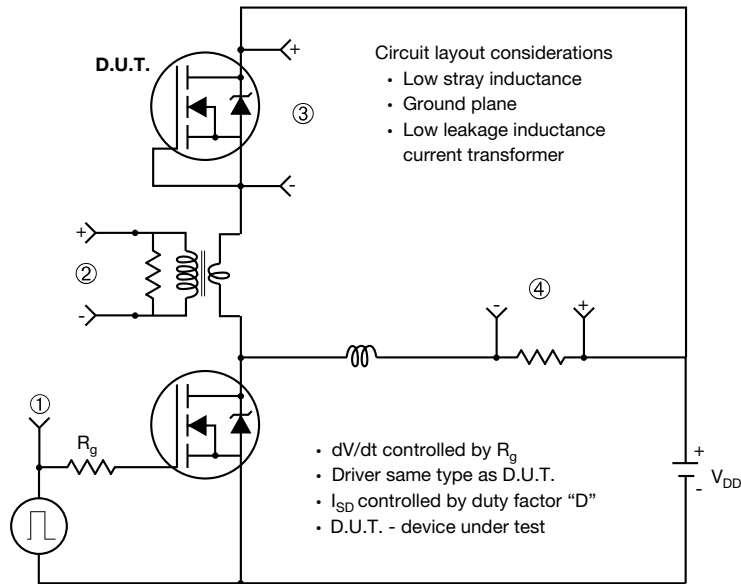


**Fig. 12a - Unclamped Inductive Test Circuit**



**Fig. 13b - Gate Charge Test Circuit**

Peak Diode Recovery dV/dt Test Circuit



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

Fig. 14 - For N-Channel

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