

## Power MOSFET

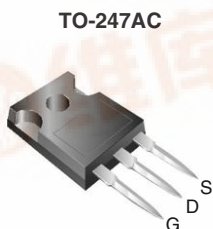
PRODUCT SUMMARY	
$V_{DS}$ (V) at $T_J$ max.	650 V
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V 0.07
$Q_g$ (Max.) (nC)	216
$Q_{gs}$ (nC)	39
$Q_{gd}$ (nC)	57
Configuration	Single

### FEATURES

- Low Figure-of-Merit  $R_{on} \times Q_g$
- 100 % Avalanche Tested
- Gate Charge Improved
- Lowest  $R_{DS(on)}$  for TO-247AC Package
- Compliant to RoHS Directive 2002/95/EC



Available  
**RoHS\***  
 COMPLIANT



N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	SiHG47N60S-E3

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	600	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$V_{GS}$ at 10 V	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	140	
Linear Derating Factor		3.3	W/°C
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	1800	mJ
Maximum Power Dissipation	$P_D$	417	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature) <sup>c</sup>	for 10 s	300	


#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 73.5$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 7$  A.
- 1.6 mm from case.

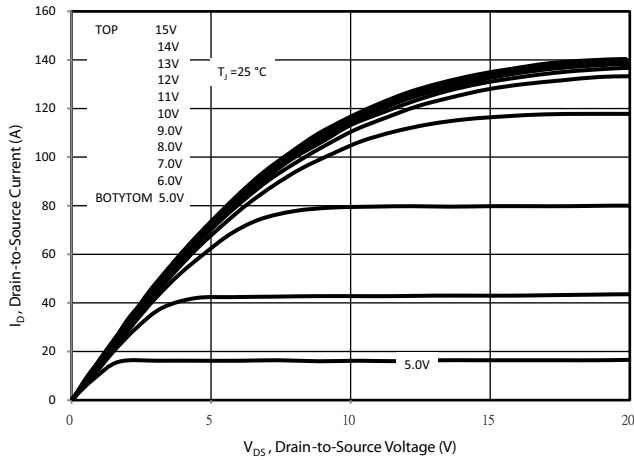
\* Pb containing terminations are not RoHS compliant, exemptions may apply



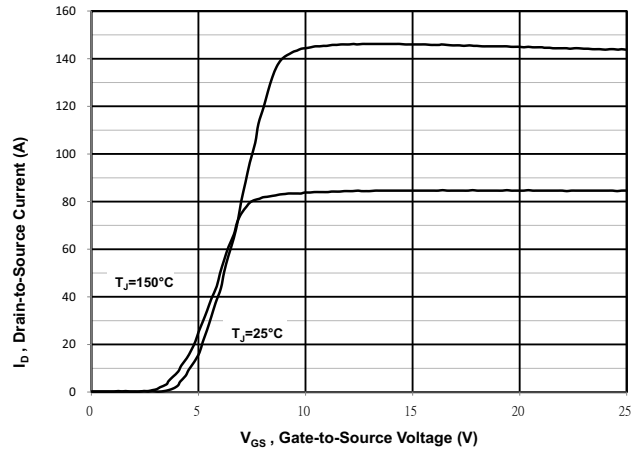
THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	40	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.3	

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	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	600	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\text{ mA}$	-	0.7	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	-	4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$	-	-	10	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	-	0.057	0.07	$\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 8\text{ V}, I_D = 3\text{ A}$	-	7.5	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}$	-	6500	-	$\mu\text{F}$
Output Capacitance	$C_{oss}$		-	3900	-	
Reverse Transfer Capacitance	$C_{rss}$		-	15	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, V_{DS} = 400\text{ V}$	-	180	216	nC
Gate-Source Charge	$Q_{gs}$		-	39	-	
Gate-Drain Charge	$Q_{gd}$		-	57	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 380\text{ V}, I_D = 47\text{ A}, R_g = 4.4\text{ }\Omega, V_{GS} = 13\text{ V}$	-	30	-	ns
Rise Time	$t_r$		-	12	-	
Turn-Off Delay Time	$t_{d(off)}$		-	115	-	
Fall Time	$t_f$		-	9	-	
Gate Input Resistance	$R_g$	$f = 1\text{ MHz}, \text{open drain}$	-	0.62	-	$\Omega$
<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	$I_{SM}$		-	-	140	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}, I_S = 47\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S, di/dt = 100\text{ A}/\mu\text{s}, V_R = 25\text{ V}$	-	750	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	18	-	$\mu\text{C}$
Body Diode Reverse Recovery Current	$I_{RRM}$		-	39	-	A

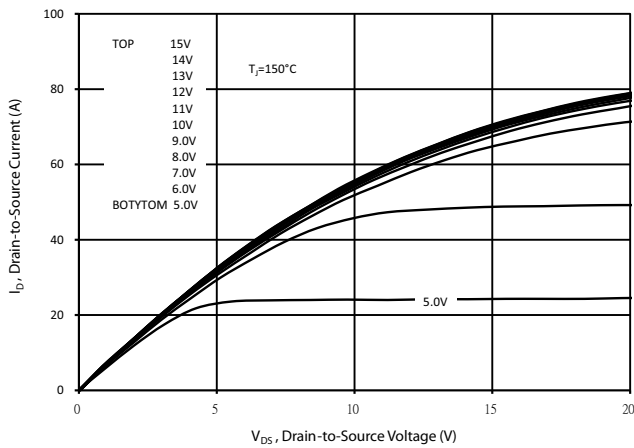
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



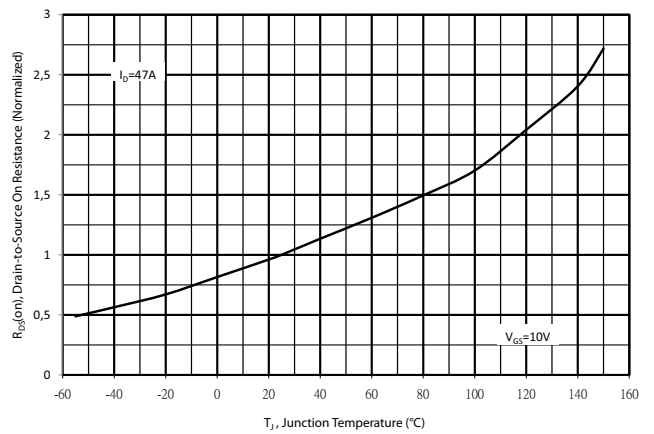
**Fig. 1 - Typical Output Characteristics (TO-247)**



**Fig. 3 - Typical Transfer Characteristics**



**Fig. 2 - Typical Output Characteristics (TO-247)**



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

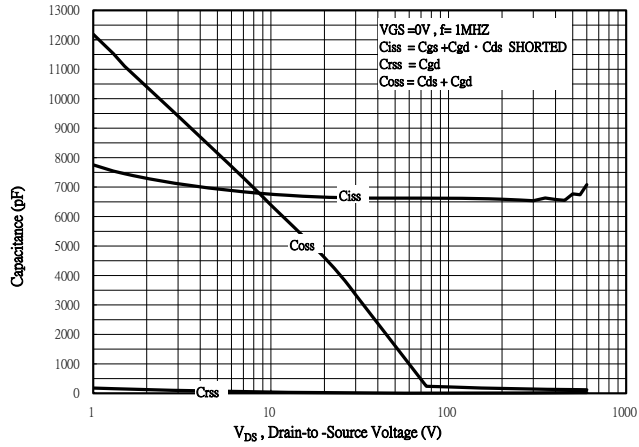


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

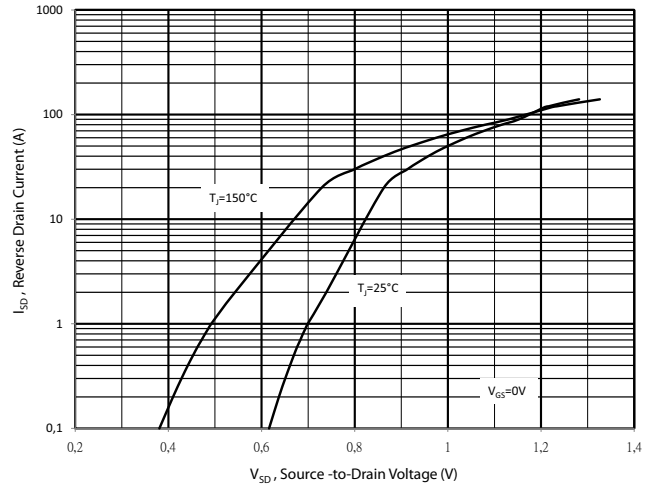


Fig. 7 - Typical Source-Drain Diode Forward Voltage

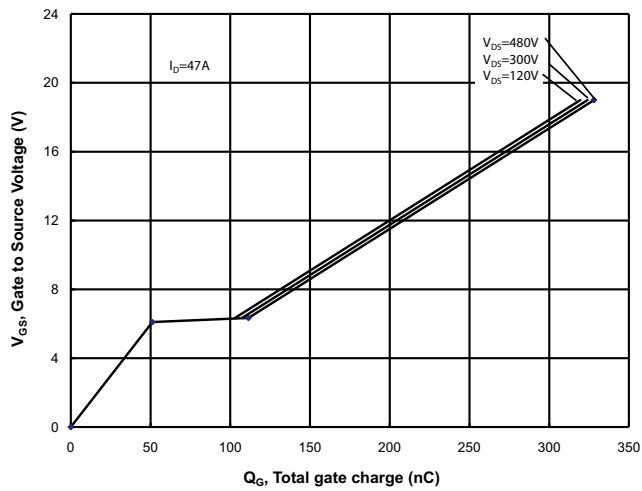


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

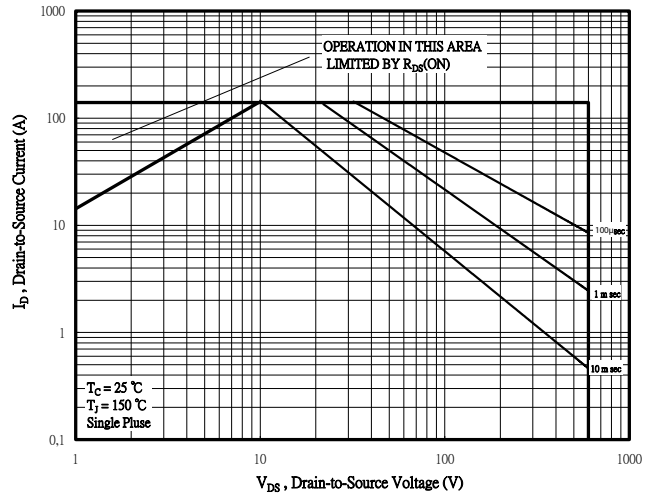


Fig. 8 - Maximum Safe Operating Area

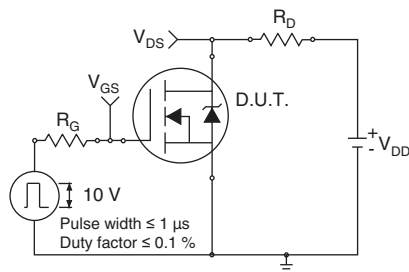


Fig. 9a - Switching Time Test Circuit

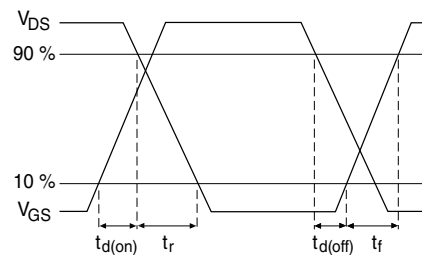
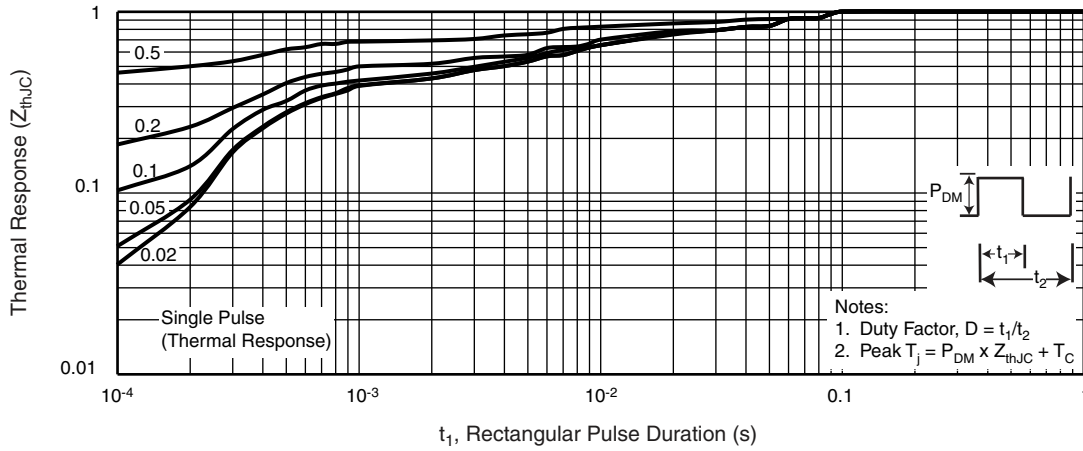
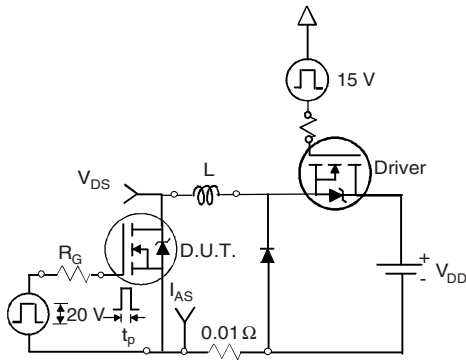


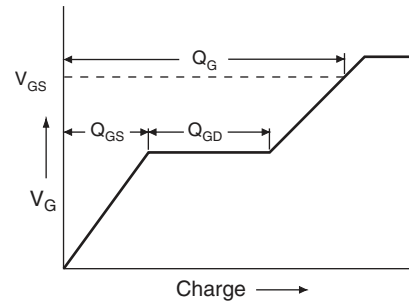
Fig. 9b - Switching Time Waveforms



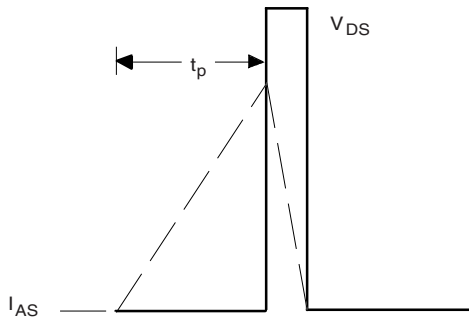
**Fig. 10 - Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-247AC)**



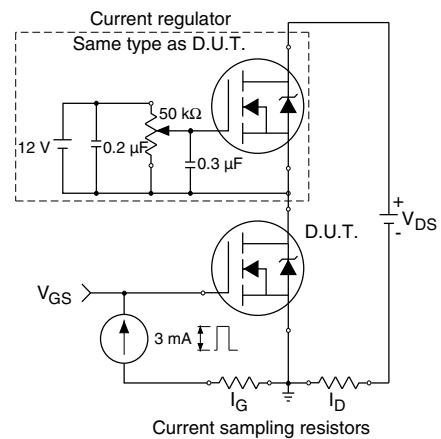
**Fig. 11a - Unclamped Inductive Test Circuit**



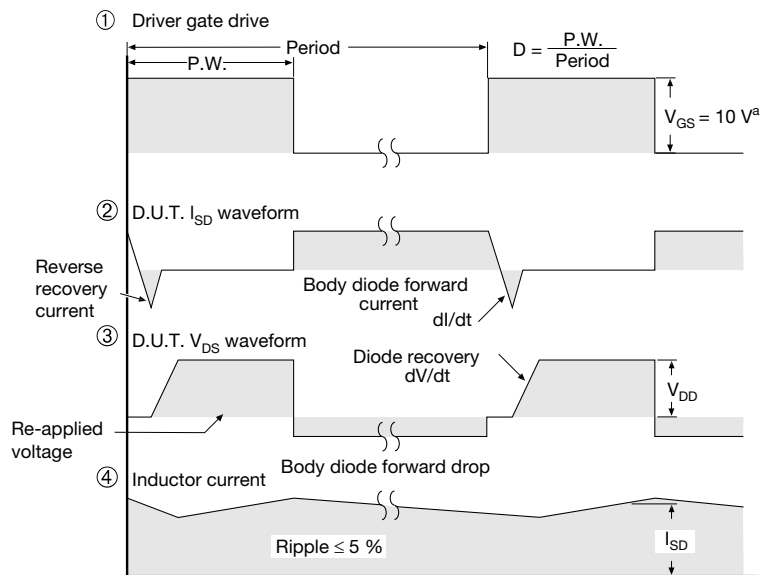
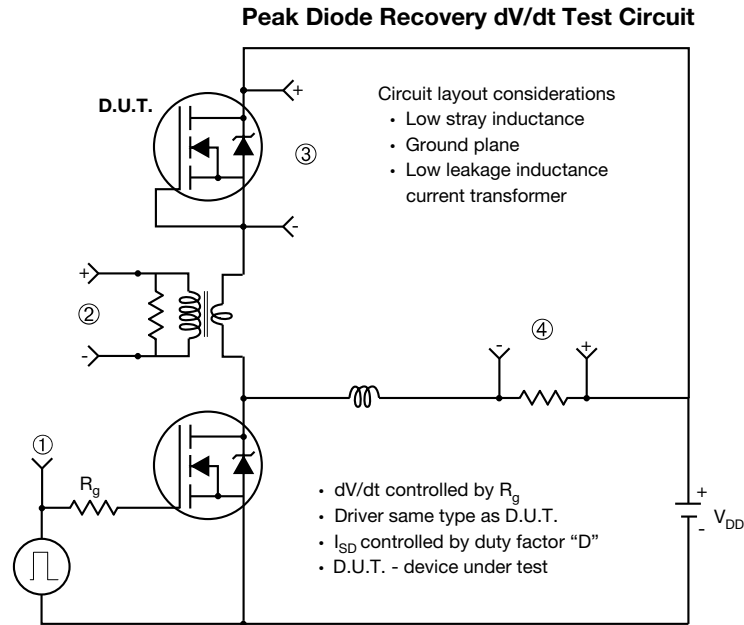
**Fig. 12a - Basic Gate Charge Waveform**



**Fig. 11b - Unclamped Inductive Waveforms**



**Fig. 12b - Gate Charge Test Circuit**



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

**Fig. 13 - For N-Channel**

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