

Power MOSFET

PRODUCT SUMMARY

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

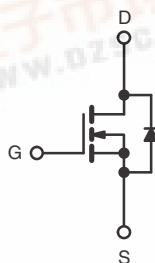
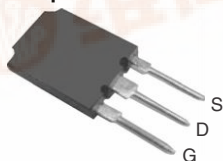
FEATURES

- 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

Super TO-247AC



N-Channel MOSFET

ORDERING INFORMATION

Package	Super TO-247AC
Lead (Pb)-free	SiHS20N50C-E3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^e	V_{GS} at 10 V	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
Pulsed Drain Current ^a	I_{DM}	80	
Linear Derating Factor		1.8	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b	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	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50$ V, starting $T_J = 25^\circ\text{C}$, $L = 2.5$ mH, $R_g = 25\ \Omega$, $I_{AS} = 17$ A.
- $I_{SD} \leq 18$ A, $dI/dt \leq 380$ A/ μs , $V_{DD} \leq V_{DS}$, $T_J \leq 150^\circ\text{C}$.
- 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	$^\circ\text{C}/\text{W}$
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
Static						
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}	$V_{GS} = \pm 30\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	25	μA
		$V_{DS} = 400\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$	-	0.225	0.270	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 10\text{ A}$	-	6.4	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$	-	2451	2942	pF
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	-	Ω
Drain-Source Body Diode Characteristics						
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	-	μC
Reverse Recovery Current	I_{RRM}		-	30	-	A

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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

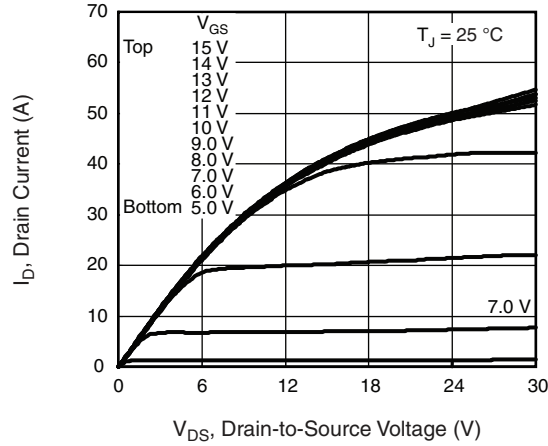


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^{\circ}\text{C}$

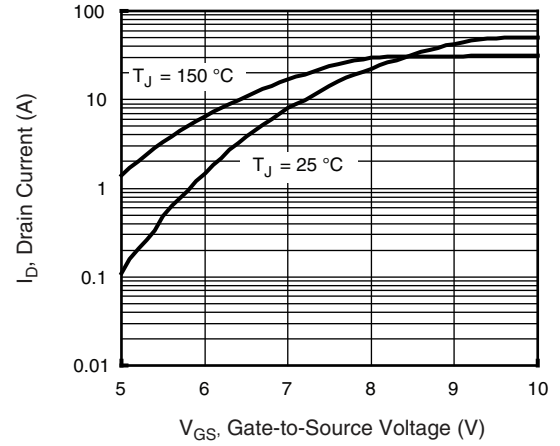


Fig. 3 - Typical Transfer Characteristics

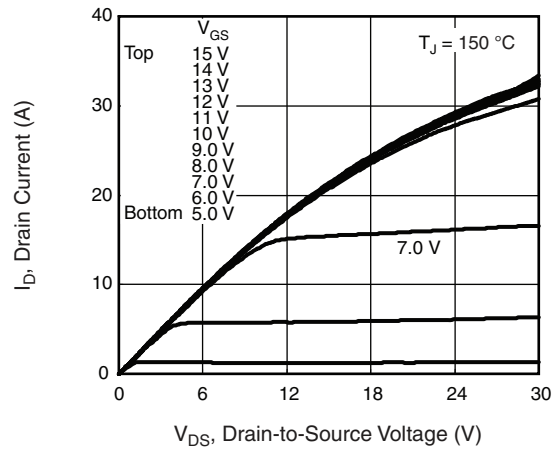


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^{\circ}\text{C}$

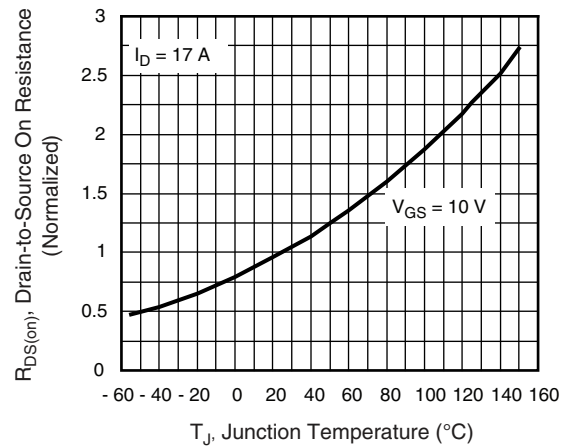


Fig. 4 - Normalized On-Resistance vs. Temperature

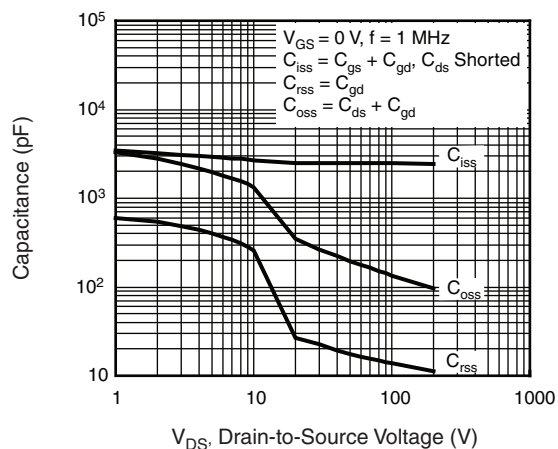


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

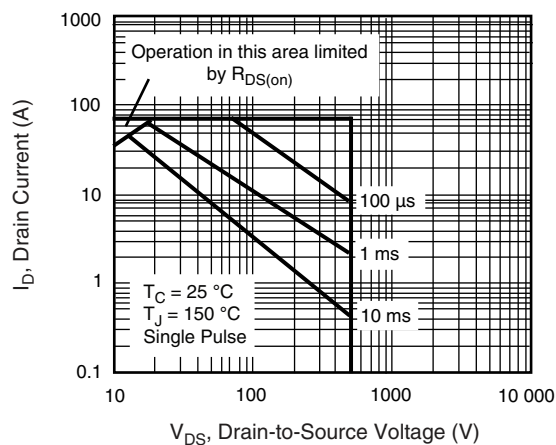


Fig. 8 - Maximum Safe Operating Area

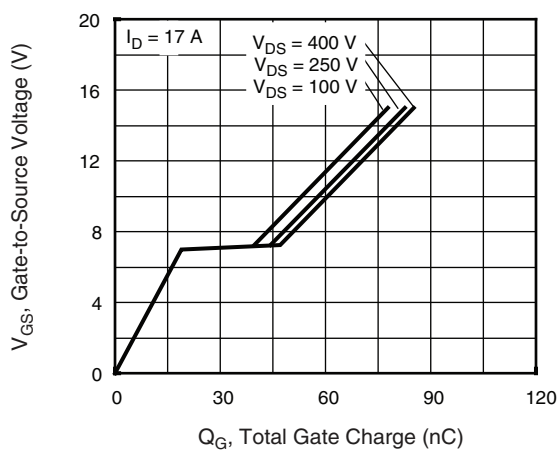


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

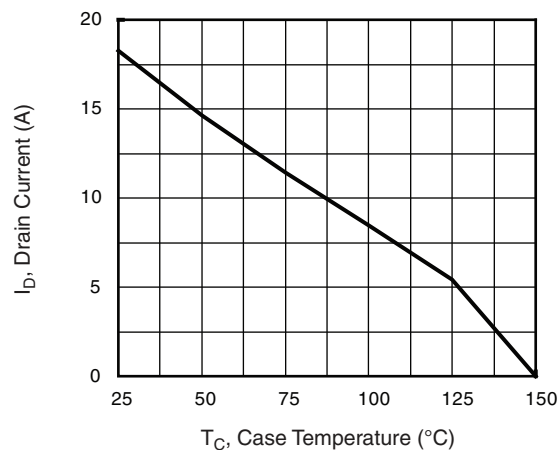


Fig. 9 - Maximum Drain Current vs. Case Temperature

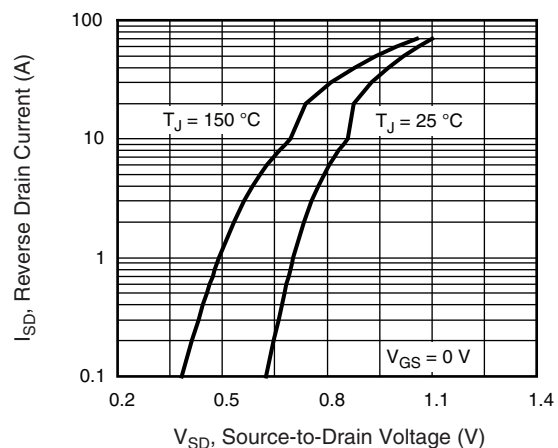


Fig. 7 - Typical Source-Drain Diode Forward Voltage

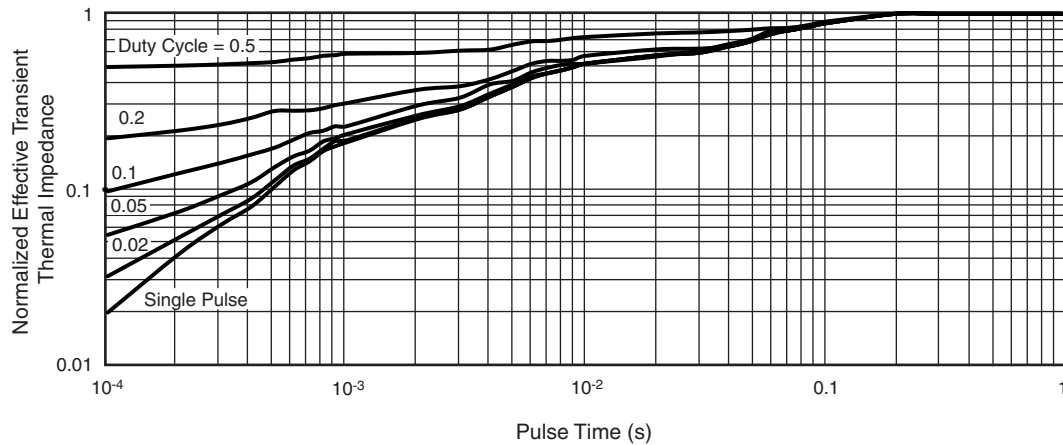


Fig. 10 - Normalized Thermal Transient Impedance, Junction-to-Case (Super TO-247AC)

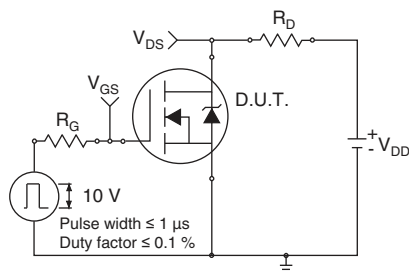


Fig. 11a - Switching Time Test Circuit

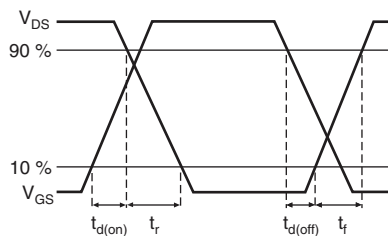


Fig. 11b - Switching Time Waveforms

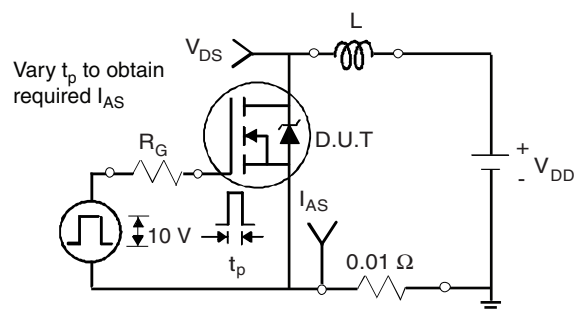


Fig. 12a - Unclamped Inductive Test Circuit

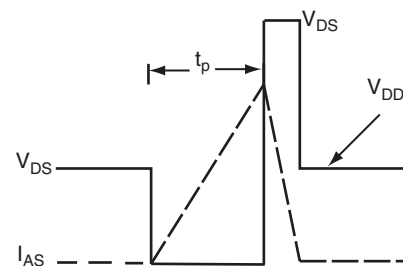


Fig. 12b - Unclamped Inductive Waveforms

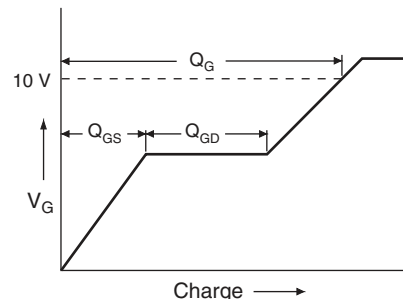


Fig. 13a - Basic Gate Charge Waveform

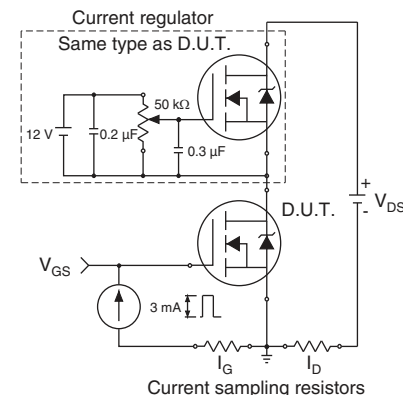
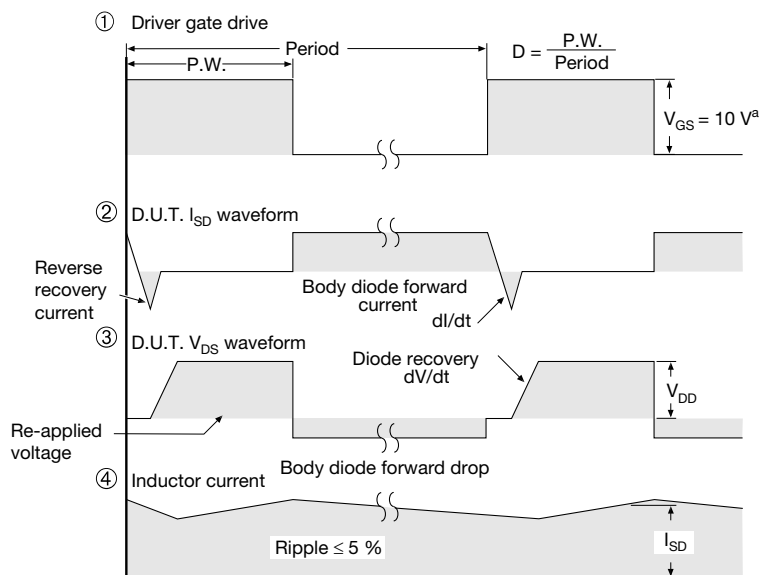
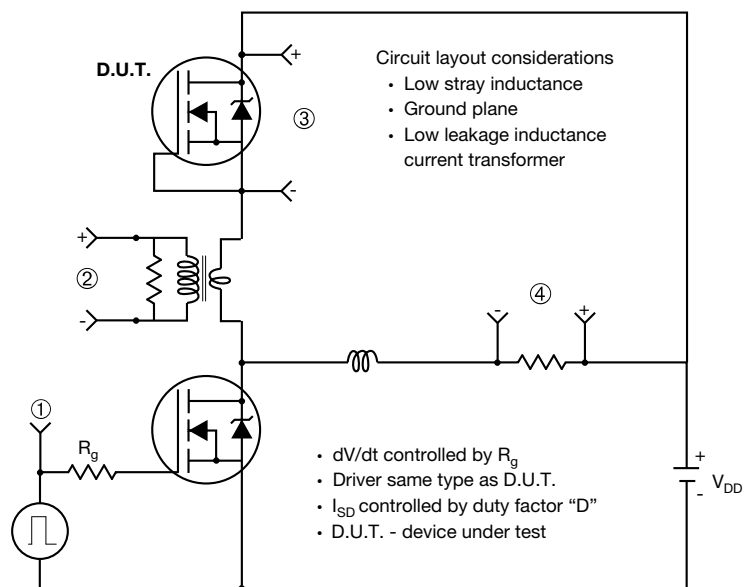


Fig. 13b - Gate Charge Test Circuit

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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