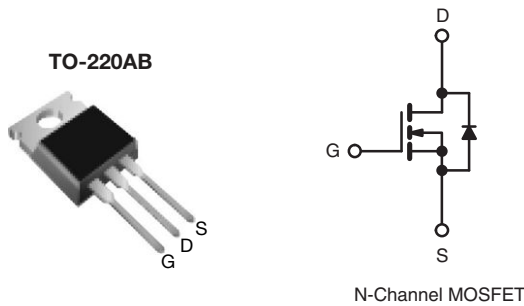


Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V) at T_J max.	560
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$ 0.225
Q_g (Max.) (nC)	76
Q_{gs} (nC)	21
Q_{gd} (nC)	29
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



ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	SiHP18N50C-E3


ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current ($T_J = 150\text{ }^\circ\text{C}$) ^a	V_{GS} at 10 V	$T_C = 25\text{ }^\circ\text{C}$	18
		$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^b	I_{DM}	72	A
Linear Derating Factor	TO-220AB	1.8	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^c	E_{AS}	361	mJ
Maximum Power Dissipation	TO-220AB	223	W
Peak Diode Recovery dV/dt ^d	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) ^d	for 10 s	300	

Notes

- Drain current limited by maximum junction temperature.
- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 2.5\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 17\text{ A}$.
- $I_{SD} \leq 18\text{ A}$, $dI/dt \leq 380\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 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	TO-220	R_{thJA}	-	62	°C/W	
Maximum Junction-to-Case (Drain)	TO-220	R_{thJC}	-	0.56		

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 $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$	-	0.6	-	V/°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 ^a	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	μF
Output Capacitance	C_{oss}		-	300	360	
Reverse Transfer Capacitance	C_{rss}		-	26	32	
Internal Gate Resistance	R_g	$f = 1.0\text{ MHz}, \text{ open drain}$	-	1.1	-	Ω
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	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 18\text{ A}$ $R_g = 7.5\text{ }\Omega, V_{GS} = 10\text{ V}$	-	80	-	ns
Rise Time	t_r		-	27	-	
Turn-Off Delay Time	$t_{d(off)}$		-	32	-	
Fall Time	t_f		-	44	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	18	A
Pulsed Diode Forward Current	I_{SM}		-	-	72	
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}	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S,$ $dI/dt = 100\text{ A}/\mu\text{s}, V_R = 35\text{ V}$	-	503	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	6.7	-	μC
Reverse Recovery Current	I_{RRM}		-	30	-	A

Note

a. Repetitive rating; pulse width limited by maximum junction temperature.

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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

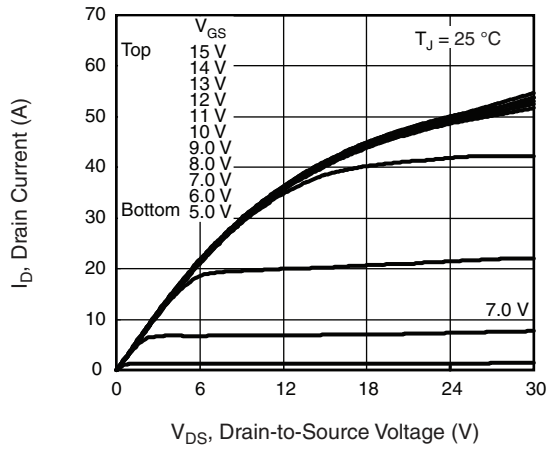


Fig. 1 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

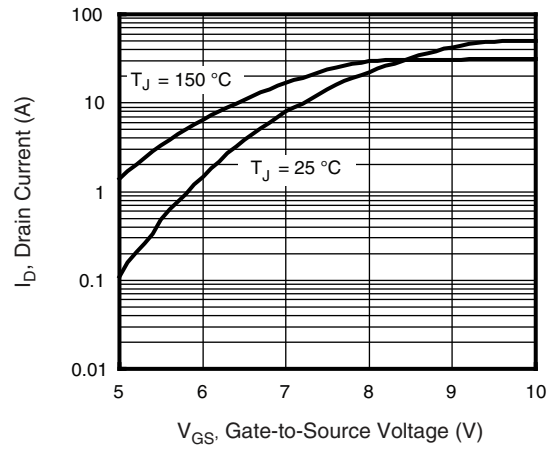


Fig. 3 - Typical Transfer Characteristics

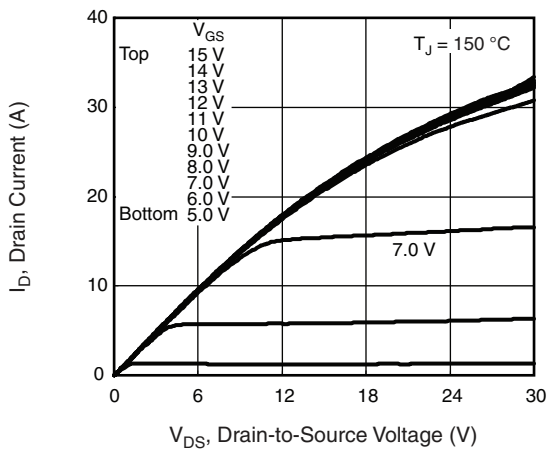


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

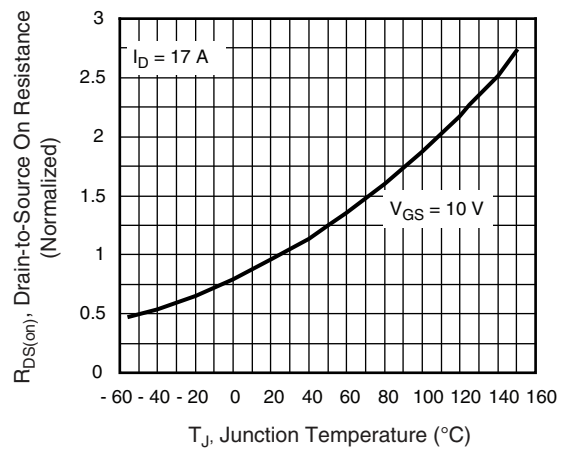


Fig. 4 - Normalized On-Resistance vs. Temperature

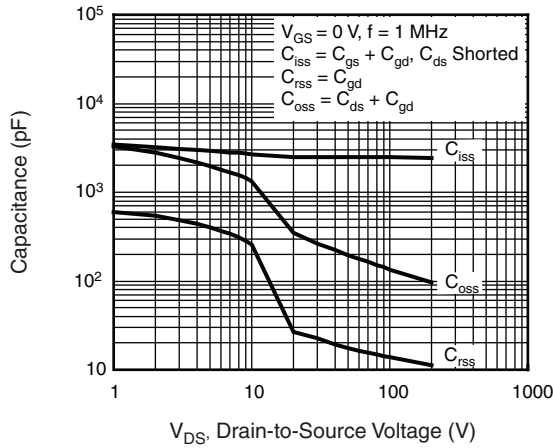


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

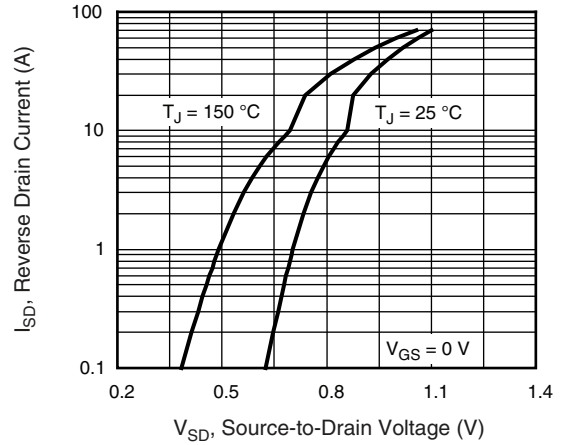


Fig. 7 - Typical Source-Drain Diode Forward Voltage

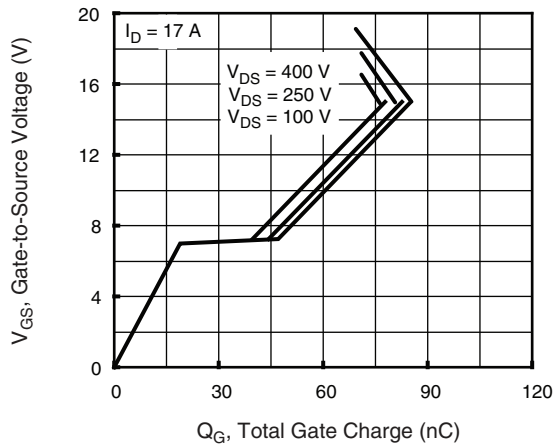


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

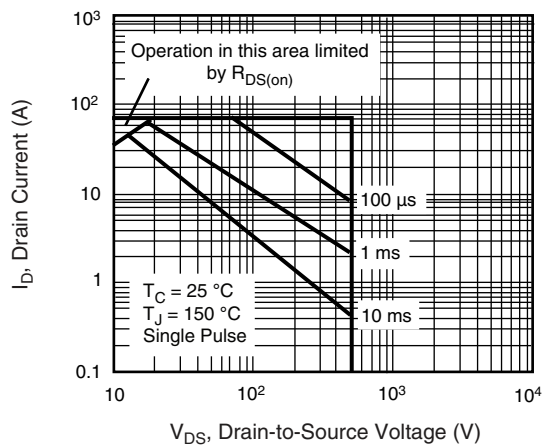


Fig. 8 - Maximum Safe Operating Area

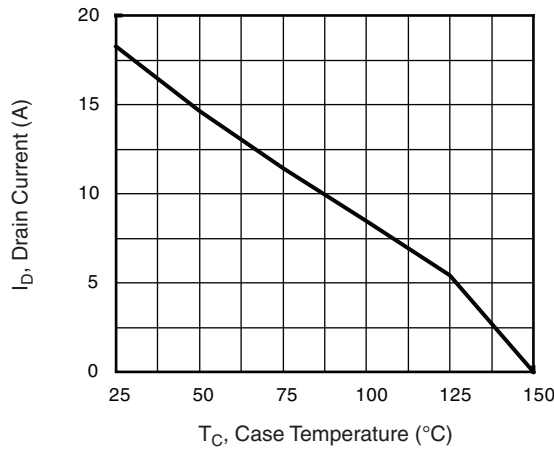


Fig. 9 - Maximum Drain Current vs. Case Temperature

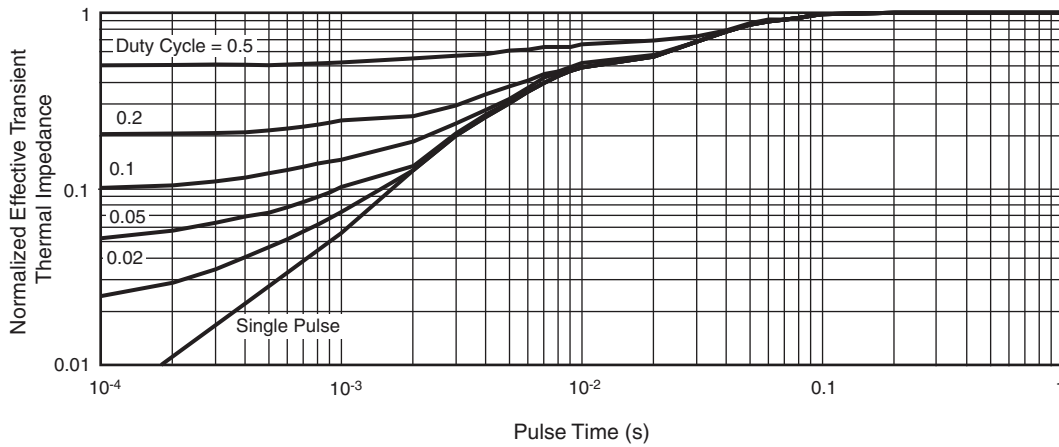


Fig. 10 - Normalized Thermal Transient Impedance, Junction-to-Case

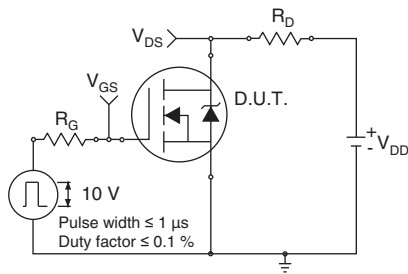


Fig. 11a - Switching Time Test Circuit

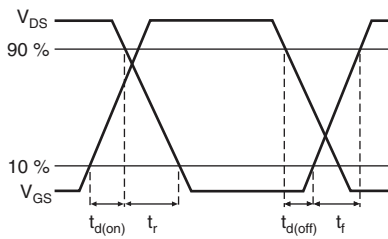


Fig. 11b - Switching Time Waveforms

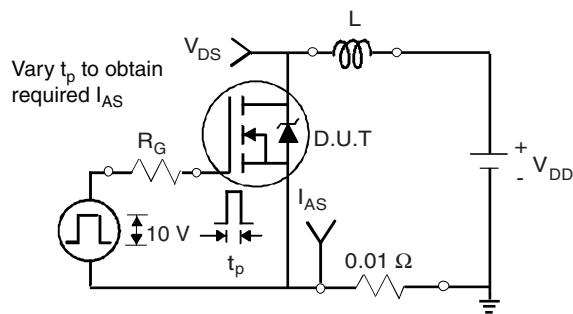


Fig. 12a - Unclamped Inductive Test Circuit

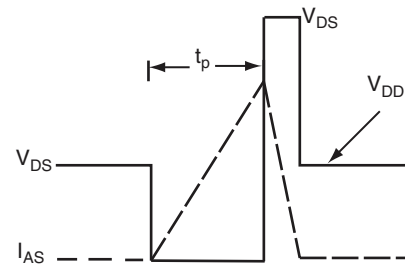


Fig. 12b - Unclamped Inductive Waveforms

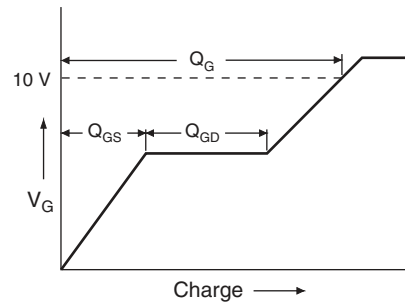


Fig. 13a - Basic Gate Charge Waveform

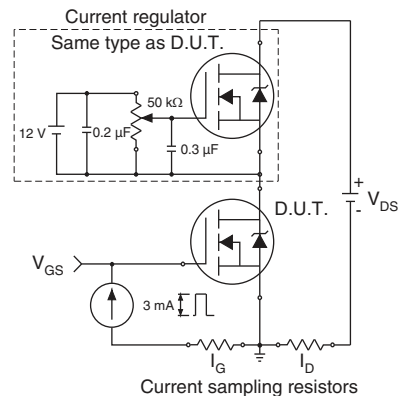
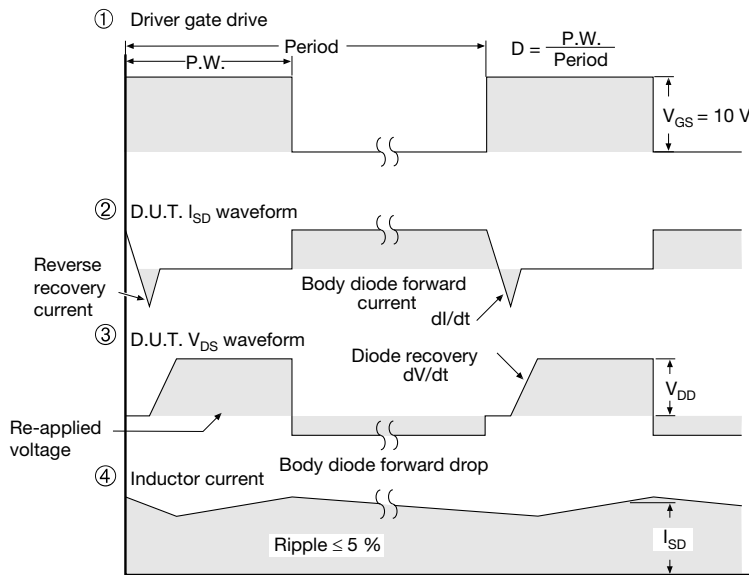
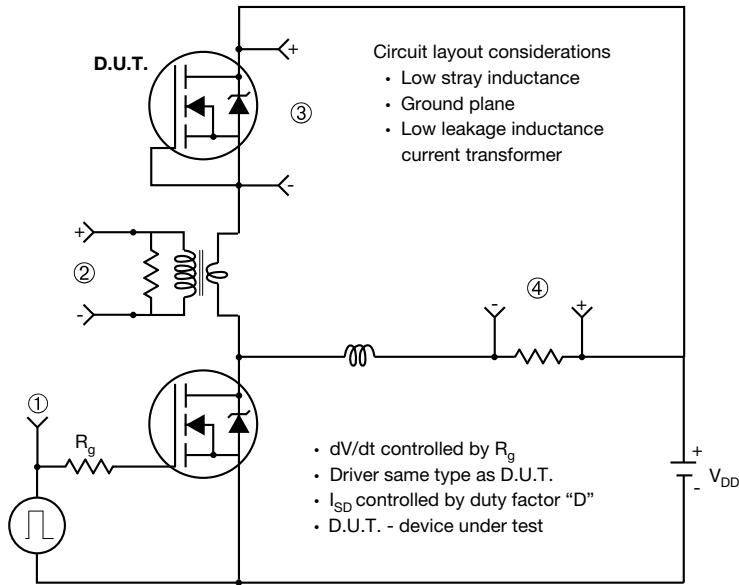


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Note

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

Fig. 14 - For N-Channel

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TO-220 FULLPAK (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.570	4.830	0.180	0.190
A1	2.570	2.830	0.101	0.111
A2	2.510	2.850	0.099	0.112
b	0.622	0.890	0.024	0.035
b2	1.229	1.400	0.048	0.055
b3	1.229	1.400	0.048	0.055
c	0.440	0.629	0.017	0.025
D	8.650	9.800	0.341	0.386
d1	15.88	16.120	0.622	0.635
d3	12.300	12.920	0.484	0.509
E	10.360	10.630	0.408	0.419
e	2.54 BSC		0.100 BSC	
L	13.200	13.730	0.520	0.541
L1	3.100	3.500	0.122	0.138
n	6.050	6.150	0.238	0.242
Ø P	3.050	3.450	0.120	0.136
u	2.400	2.500	0.094	0.098
v	0.400	0.500	0.016	0.020

ECN: X09-0126-Rev. B, 26-Oct-09
DWG: 5972

Notes

1. To be used only for process drawing.
2. These dimensions apply to all TO-220, FULLPAK leadframe versions 3 leads.
3. All critical dimensions should C meet $C_{pk} > 1.33$.
4. All dimensions include burrs and plating thickness.
5. No chipping or package damage.



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