

Power MOSFET

PRODUCT SUMMARY

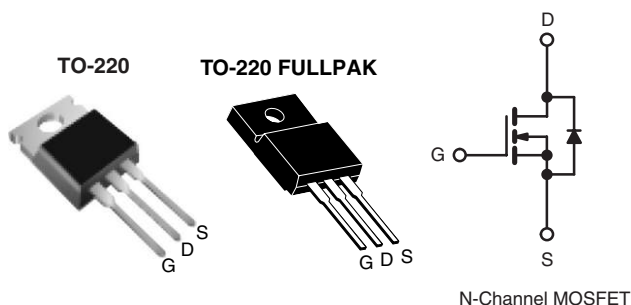
V_{DS} (V) at T_J max.	560	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.225
Q_g (Max.) (nC)	76	
Q_{gs} (nC)	21	
Q_{gd} (nC)	29	
Configuration	Single	

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



Available
RoHS*
COMPLIANT



ORDERING INFORMATION

Package	TO-220	TO-220 FULLPAK
Lead (Pb)-free	SiHP18N50C-E3	SiHF18N50C-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	$T_C = 25\text{ }^\circ\text{C}$	A
		$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^b	I_{DM}	72	
Linear Derating Factor	TO-220	1.8	W/ $^\circ\text{C}$
	FULLPAK	0.3	
Single Pulse Avalanche Energy ^c	E_{AS}	361	mJ
Maximum Power Dissipation	TO-220	223	W
	FULLPAK	38	
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
	FULLPAK		-	65	
Maximum Junction-to-Case (Drain)	TO-220	R_{thJC}	-	0.56	
	FULLPAK		-	3.29	

SPECIFICATIONS $T_J = 25\text{ °C}$, 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/ $^{\circ}\text{C}$
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 ^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	pF
Output Capacitance	C_{oss}			-	300	360	
Reverse Transfer Capacitance	C_{rss}			-	26	32	
Internal Gate Resistance	R_g	$f = 1.0\text{ MHz}$, 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

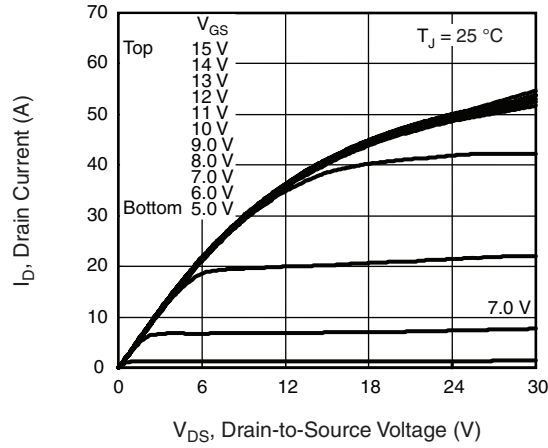


Fig. 1 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$ (TO-220)

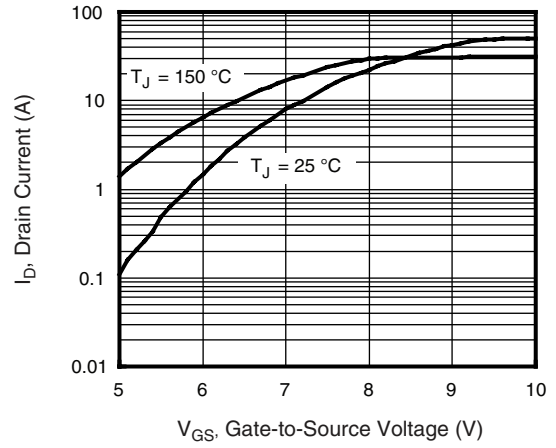


Fig. 3 - Typical Transfer Characteristics

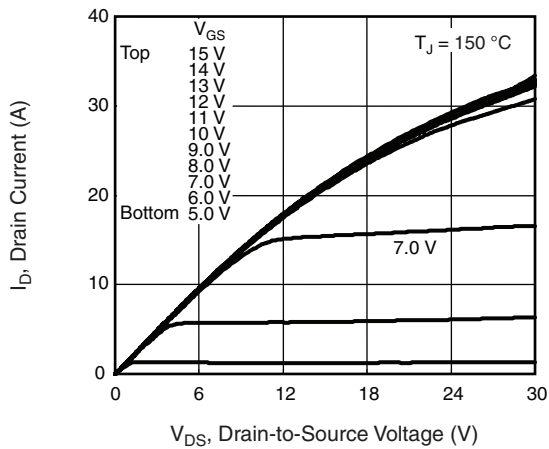


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$ (TO-220)

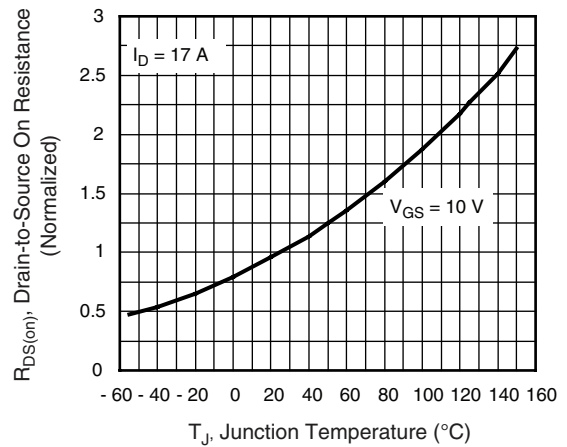


Fig. 4 - Normalized On-Resistance vs. Temperature

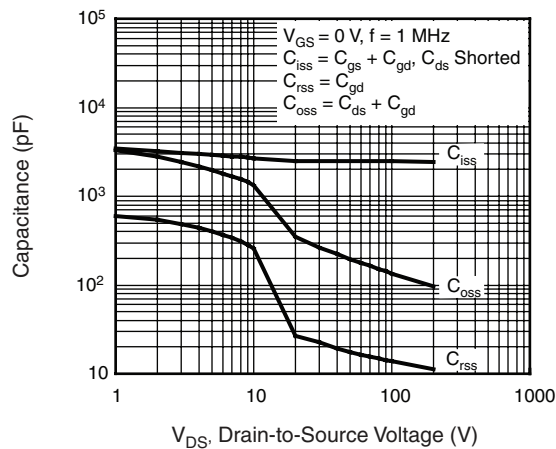


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

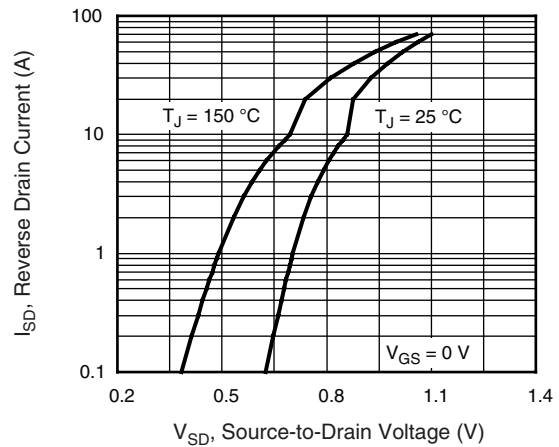


Fig. 7 - Typical Source-Drain Diode Forward Voltage

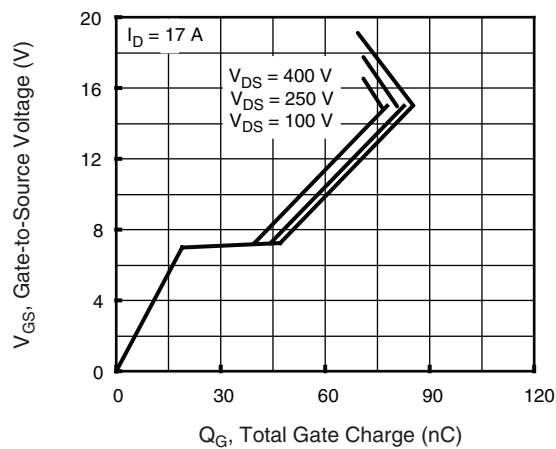


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

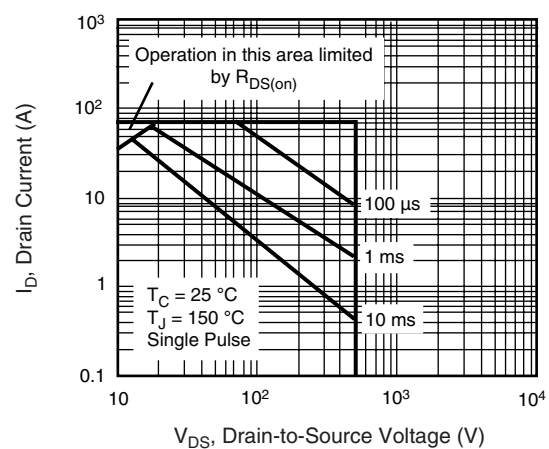


Fig. 8 - Maximum Safe Operating Area

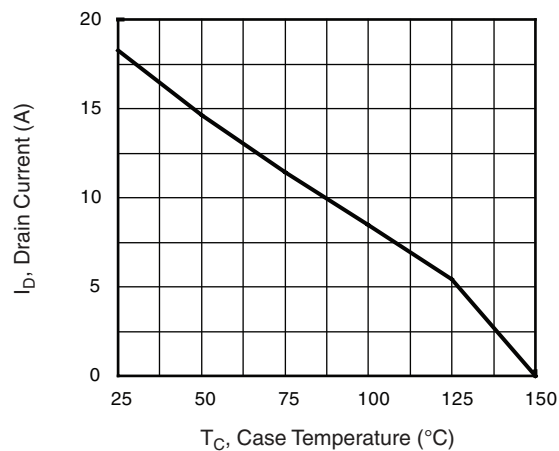


Fig. 9 - Maximum Drain Current vs. Case Temperature (TO-220)

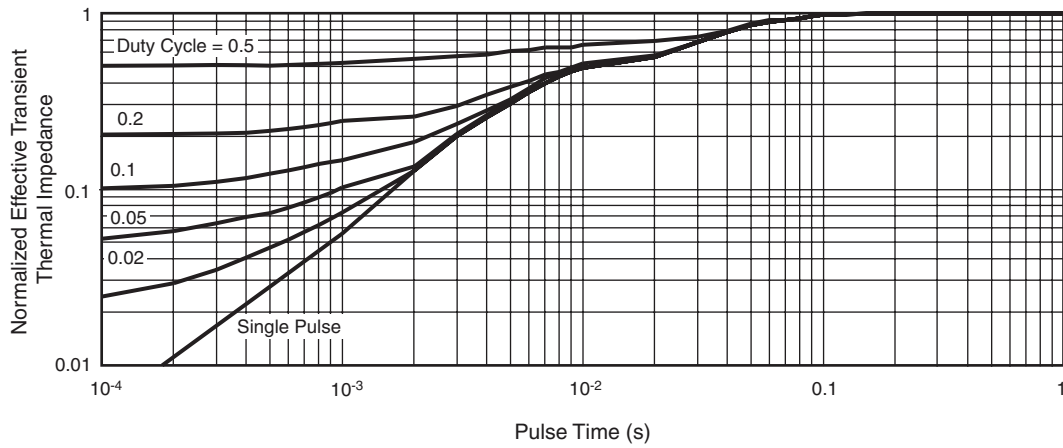


Fig. 10 - Normalized Thermal Transient Impedance, Junction-to-Case (TO-220)

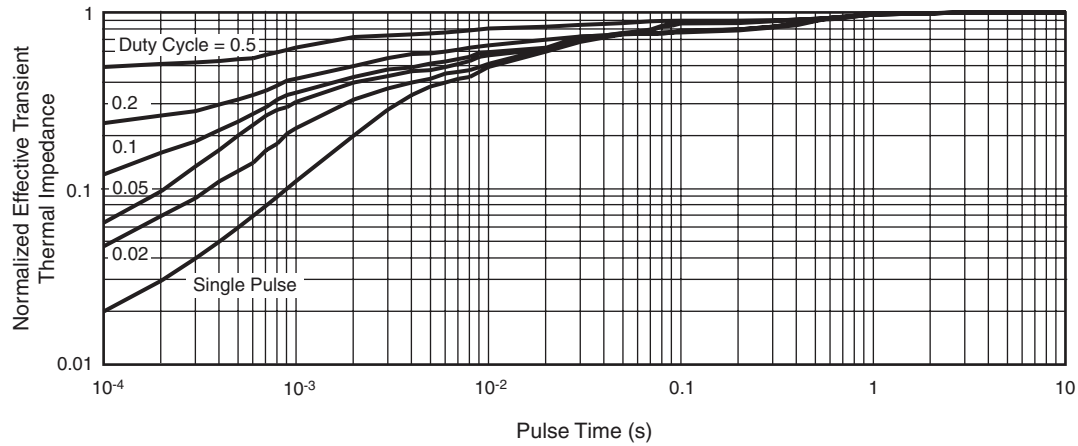


Fig. 11 - Normalized Thermal Transient Impedance, Junction-to-Case (TO-220FP)

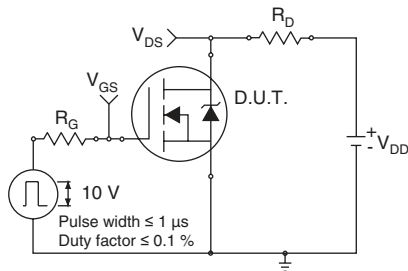


Fig. 12a - Switching Time Test Circuit

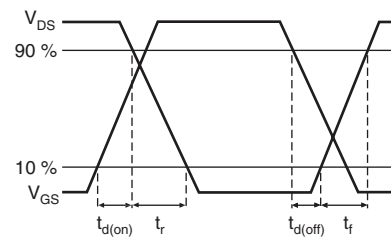


Fig. 12b - Switching Time Waveforms

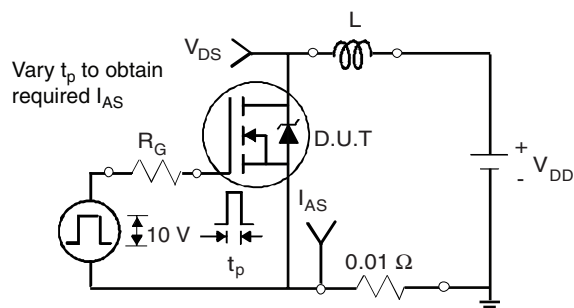


Fig. 13a - Unclamped Inductive Test Circuit

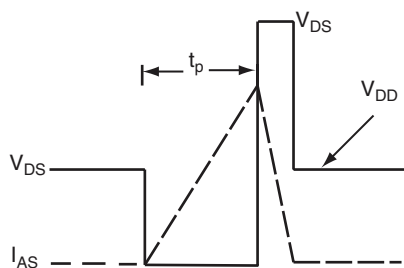


Fig. 13b - Unclamped Inductive Waveforms

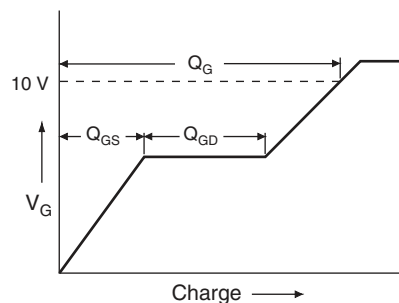


Fig. 14a - Basic Gate Charge Waveform

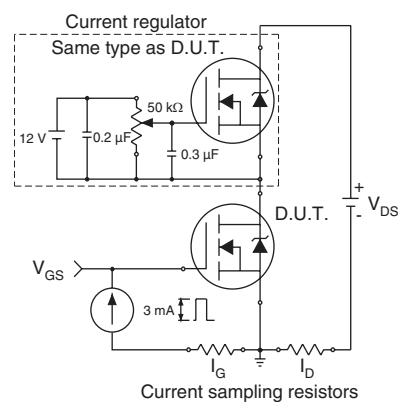
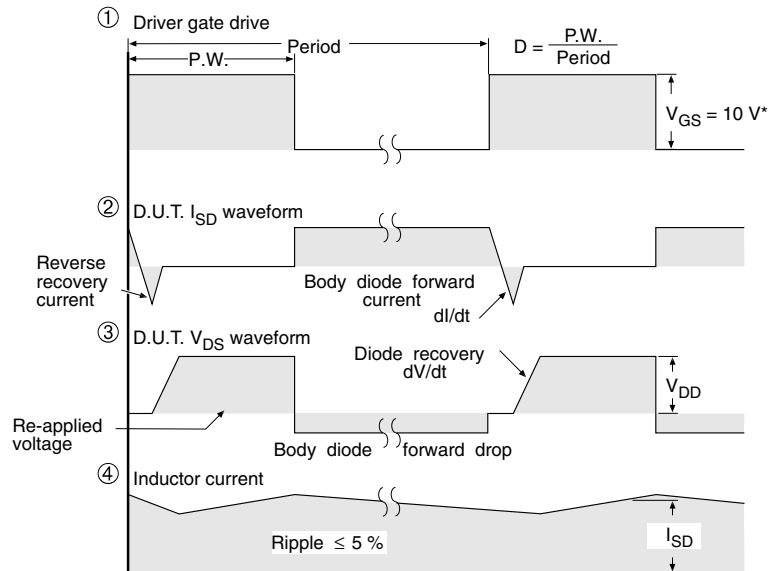
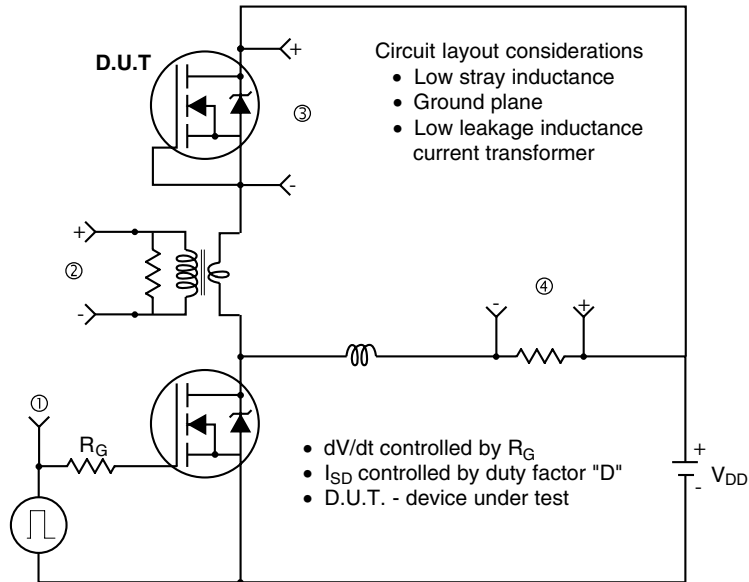


Fig. 14b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



* $V_{GS} = 5 V$ for logic level and $3 V$ drive devices

Fig. 15 - For N-Channel

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