

VISHAY

IRF9630, SiHF9630

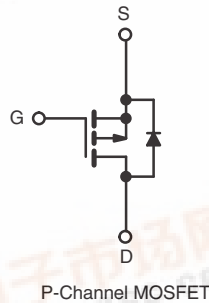
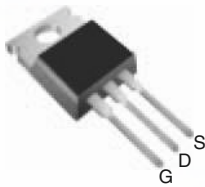
Vishay Siliconix

Power MOSFET

PRODUCT SUMMARY

V_{DS} (V)	- 200	
$R_{DS(on)}$ (Max.) (Ω)	$V_{GS} = -10$ V	0.80
Q_g (Max.) (nC)	29	
Q_{gs} (nC)	5.4	
Q_{gd} (nC)	15	
Configuration	Single	

TO-220



FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- P-Channel
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Lead (Pb)-free Available

RoHS*
COMPLIANT

DESCRIPTION

Third generation Power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION

Package	TO-220
Lead (Pb)-free	IRF9630PbF SiHF9630-E3
SnPb	IRF9630 SiHF9630

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	- 200	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current	V_{GS} at - 10 V	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
Pulsed Drain Current ^a	I_{DM}	- 26	
Linear Derating Factor		0.59	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b	E_{AS}	500	mJ
Repetitive Avalanche Current ^a	I_{AR}	- 6.4	A
Repetitive Avalanche Energy ^a	E_{AR}	7.4	mJ
Maximum Power Dissipation	P_D	74	W
Peak Diode Recovery dV/dt ^c	dV/dt	- 5.0	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	
Mounting Torque	6-32 or M3 screw	10	
		1.1	N · m

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. $V_{DD} = -50$ V, starting $T_J = 25^\circ\text{C}$, $L = 17$ mH, $R_G = 25\ \Omega$, $I_{AS} = -6.5$ A (see fig. 12).

c. $I_{SD} \leq -6.5$ A, $dI/dt \leq 120$ A/ μs , $V_{DD} \leq V_{DS}$, $T_J \leq 150^\circ\text{C}$.

d. 1.6 mm from case.

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

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THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	1.7	

SPECIFICATIONS T _J = 25 °C, unless otherwise noted							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA		- 200	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = - 1 mA		-	- 0.24	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA		- 2.0	-	- 4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 200 V, V _{GS} = 0 V		-	-	- 100	μA
		V _{DS} = - 160 V, V _{GS} = 0 V, T _J = 125 °C		-	-	- 500	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = - 10 V	I _D = - 3.9 A ^b	-	-	0.80	Ω
Forward Transconductance	g _{fs}	V _{DS} = - 50 V, I _D = - 3.9 A ^b		2.8	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 25 V, f = 1.0 MHz, see fig. 5		-	700	-	pF
Output Capacitance	C _{oss}			-	200	-	
Reverse Transfer Capacitance	C _{rss}			-	40	-	
Total Gate Charge	Q _g	V _{GS} = - 10 V	I _D = - 6.5 A, V _{DS} = - 160 V, see fig. 6 and 13 ^b	-	-	29	nC
Gate-Source Charge	Q _{gs}			-	-	5.4	
Gate-Drain Charge	Q _{gd}			-	-	15	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 100 V, I _D = - 6.5 A, r _G = 12 Ω, r _D = 15 Ω, see fig. 10 ^b		-	12	-	ns
Rise Time	t _r			-	27	-	
Turn-Off Delay Time	t _{d(off)}			-	28	-	
Fall Time	t _f			-	24	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact		-	4.5	-	nH
Internal Source Inductance	L _S			-	7.5	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	- 6.5	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	- 26	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = - 6.5 A, V _{GS} = 0 V ^b		-	-	- 6.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = - 6.5 A, dI/dt = 100 A/μs ^b		-	200	300	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	1.9	2.9	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

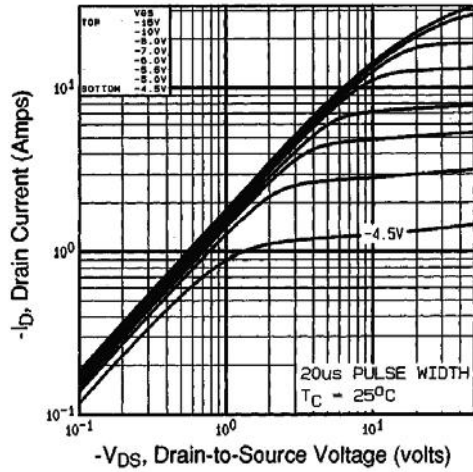


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^{\circ}\text{C}$

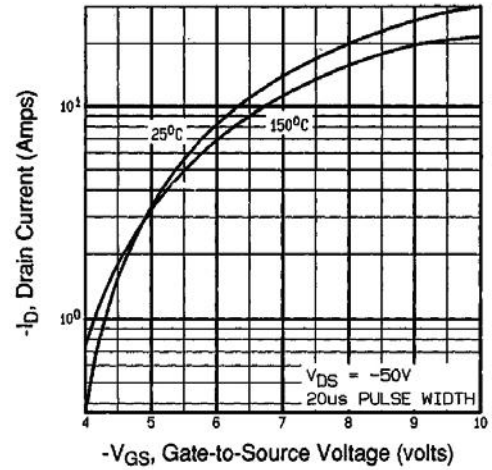


Fig. 3 - Typical Transfer Characteristics

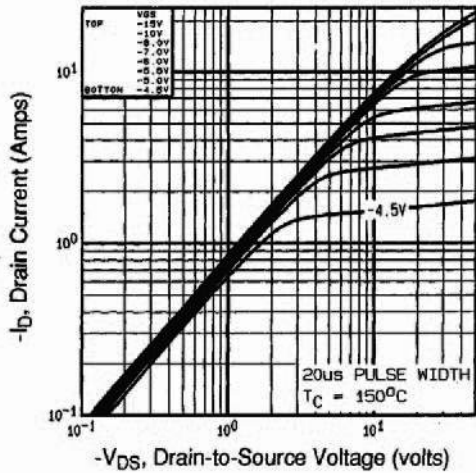


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^{\circ}\text{C}$

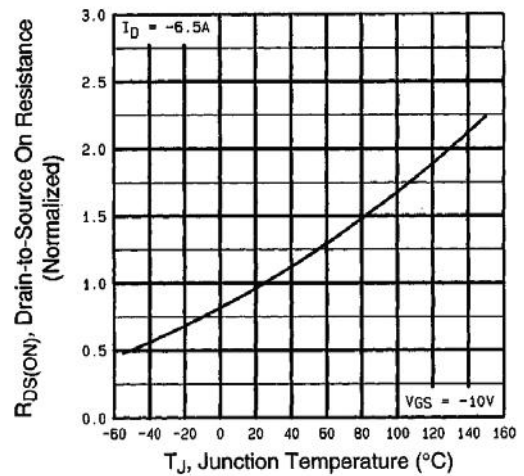


Fig. 4 - Normalized On-Resistance vs. Temperature

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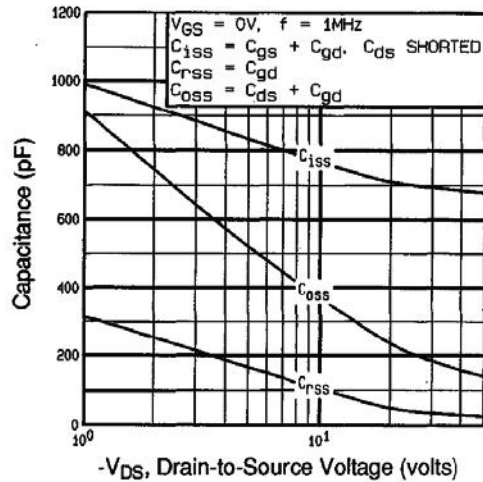


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

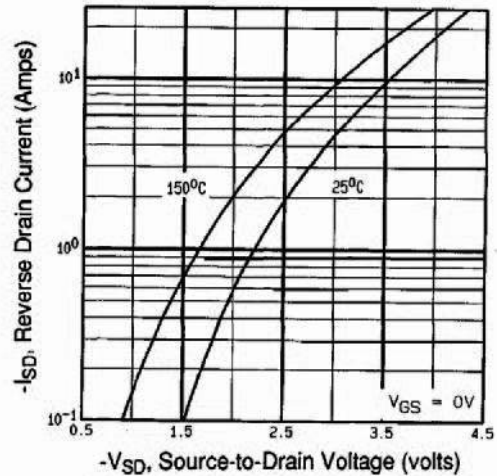


Fig. 7 - Typical Source-Drain Diode Forward Voltage

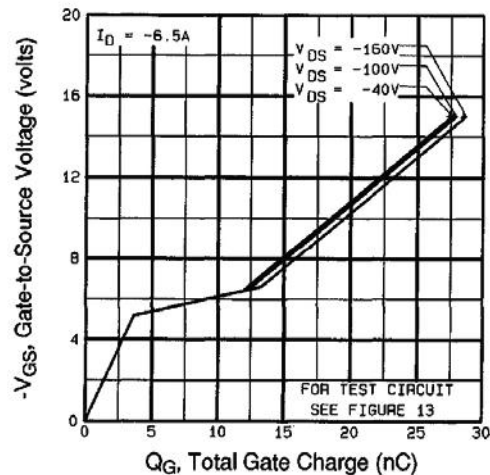


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

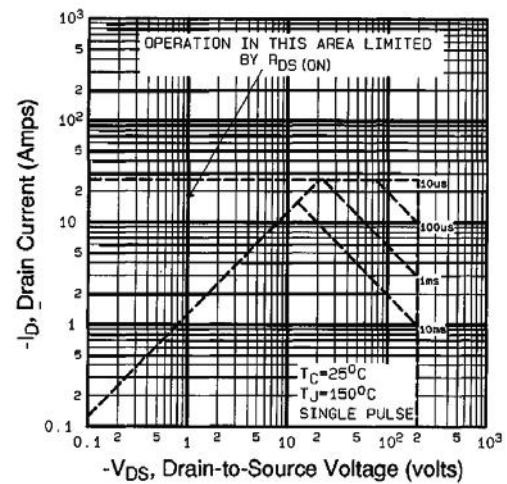


Fig. 8 - Maximum Safe Operating Area

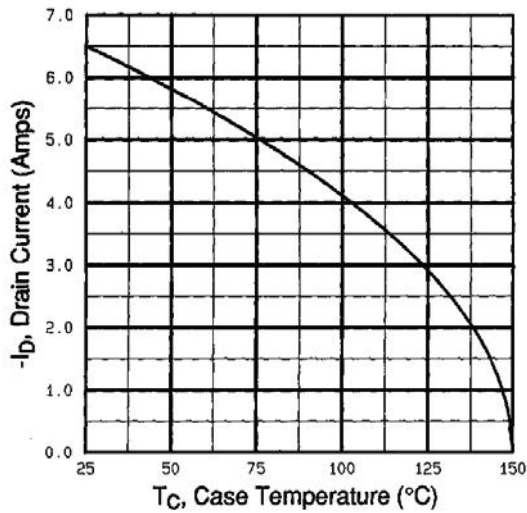


Fig. 9 - Maximum Drain Current vs. Case Temperature

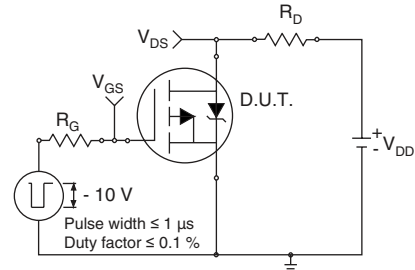


Fig. 10a - Switching Time Test Circuit

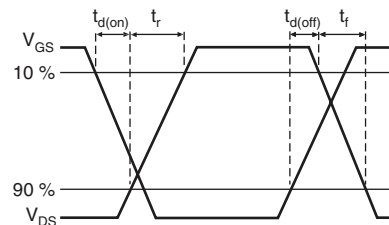


Fig. 10b - Switching Time Waveforms

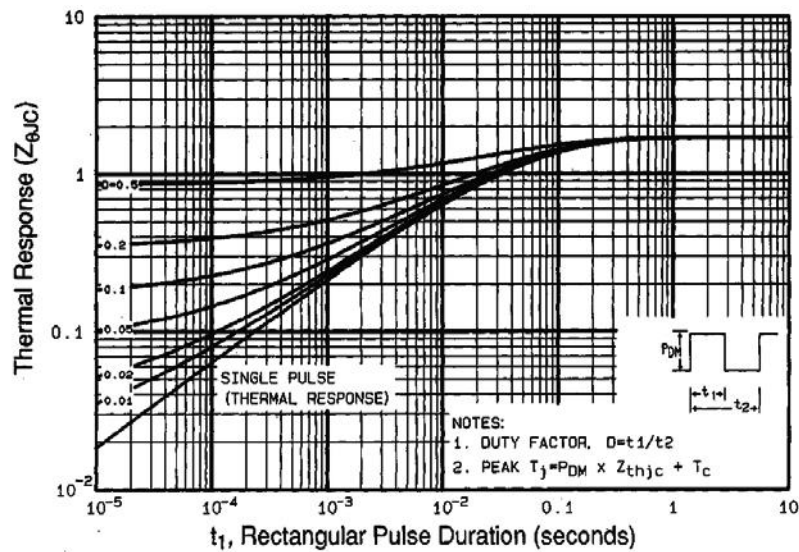


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

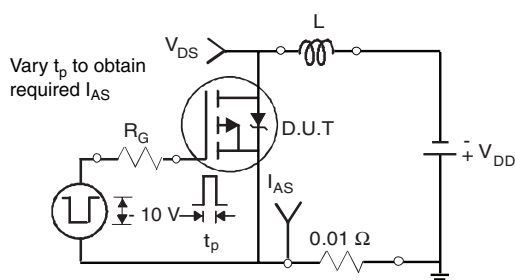


Fig. 12a - Unclamped Inductive Test Circuit

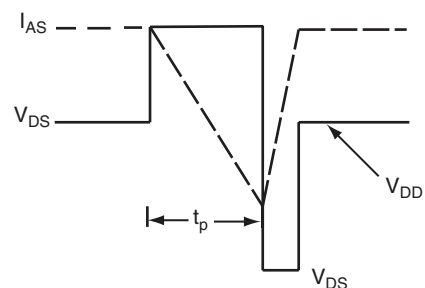


Fig. 12b - Unclamped Inductive Waveforms

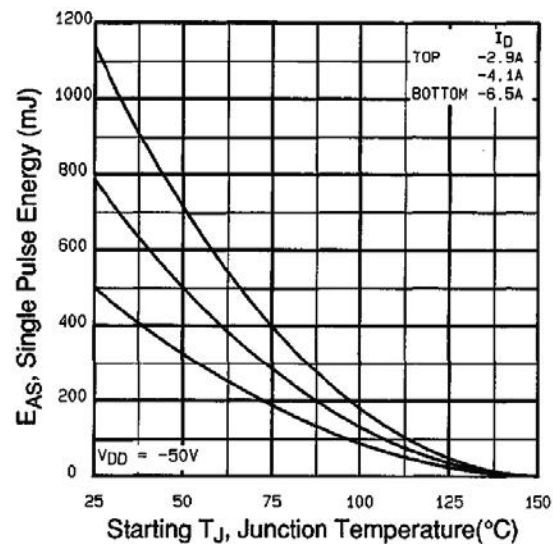


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

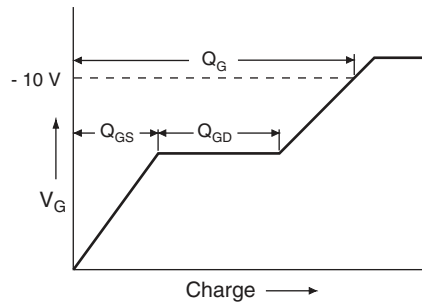


Fig. 13a - Basic Gate Charge Waveform

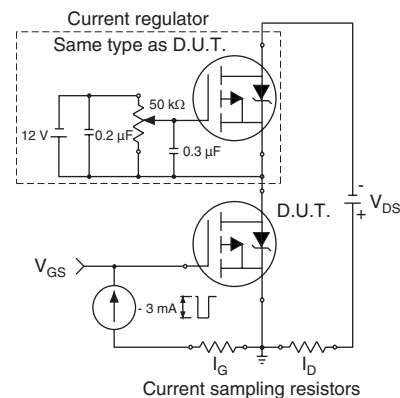


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

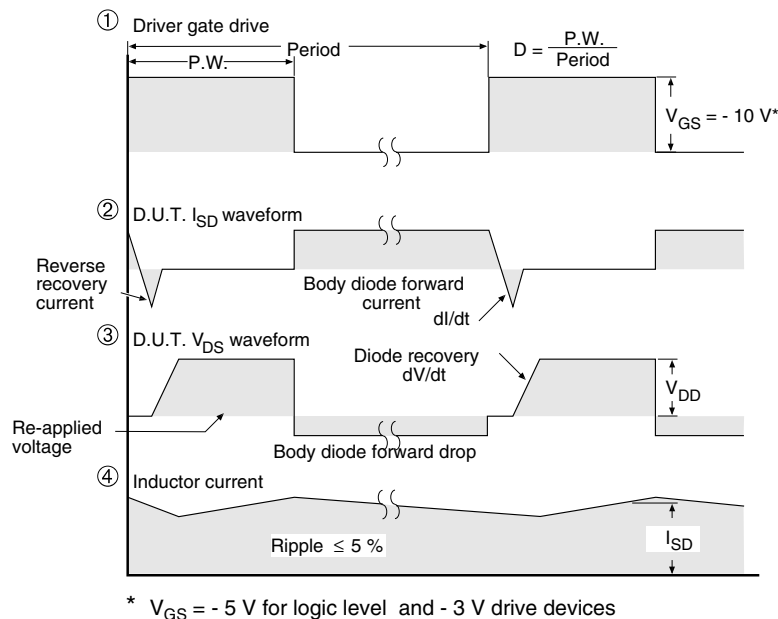
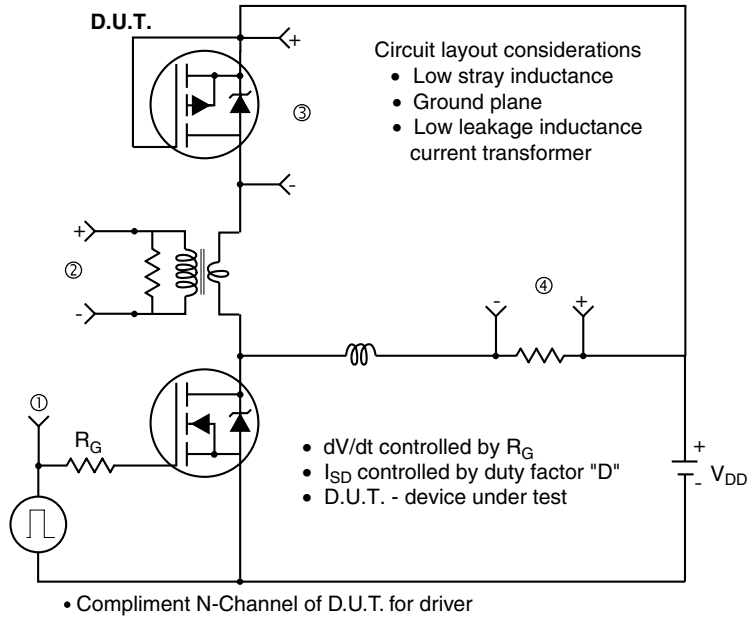


Fig. 14 - For P-Channel



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