

Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	- 100
$R_{DS(on)}$ (Ω)	$V_{GS} = -10$ V 1.2
Q_g (Max.) (nC)	8.7
Q_{gs} (nC)	2.2
Q_{gd} (nC)	4.1
Configuration	Single

FEATURES

- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- P-Channel
- Fast Switching
- Ease of Paralleling
- Lead (Pb)-free Available

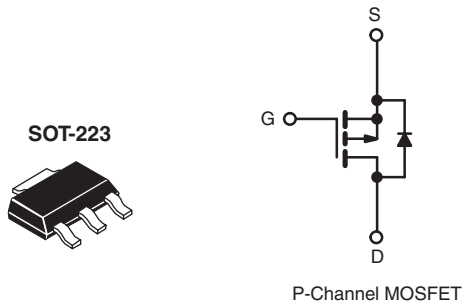


Available
RoHS*
COMPLIANT

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 SOT-223 package is designed for surface-mount using vapor phase, infrared, or wave soldering techniques. Its unique package design allows for easy automatic pick-and-place as with other SOT or SOIC packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of greater than 1.25 W is possible in a typical surface mount application.



ORDERING INFORMATION		
Package	SOT-223	SOT-223
Lead (Pb)-free	IRFL9110PbF	IRFL9110TRPbF ^a
	SiHFL9110-E3	SiHFL210T-E3 ^a
SnPb	IRFL9110	IRFL9110TR ^a
	SiHFL9110	SiHFL9110T ^a

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	- 100	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current	V_{GS} at - 10 V	$T_C = 25$ °C	- 1.1	A
		$T_C = 100$ °C	- 0.69	
Pulsed Drain Current ^a	I_{DM}	- 8.8	W/°C	
Linear Derating Factor		0.025		
Linear Derating Factor (PCB Mount) ^e		0.017		
Single Pulse Avalanche Energy ^b	E_{AS}	100	mJ	
Avalanche Current ^a	I_{AR}	- 1.1	A	
Peak Diode Recovery dV/dt ^c	E_{AR}	0.31	mJ	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	3.1	W
Maximum Power Dissipation (PCB Mount) ^e		$T_A = 25$ °C	2.0	
Peak Diode Recovery dV/dt ^c	dV/dt	- 5.5	V/ns	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	°C	
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d		

Notes

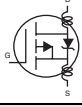
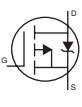
- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = -25$ V, starting $T_J = 25$ °C, $L = 7.7$ mH, $R_G = 25$ Ω , $I_{AS} = -4.4$ A (see fig. 12).
- $I_{SD} \leq -4.4$ A, $dI/dt \leq -75$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

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

THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mount) ^a	R_{thJA}	-	-	60	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	-	40	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

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}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$		- 100	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = -1\text{ mA}$		-	- 0.091	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		- 2.0	-	- 4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$		-	-	- 100	μA
		$V_{DS} = -80\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	- 500	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$	$I_D = -0.66\text{ A}^b$	-	-	1.2	Ω
Forward Transconductance	g_{fs}	$V_{DS} = -50\text{ V}, I_D = -0.66\text{ A}$		0.82	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V},$ $V_{DS} = -25\text{ V},$ $f = 1.0\text{ MHz}$, see fig. 5		-	200	-	pF
Output Capacitance	C_{oss}			-	94	-	
Reverse Transfer Capacitance	C_{rss}			-	18	-	
Total Gate Charge	Q_g	$V_{GS} = -10\text{ V}$	$I_D = -4.0\text{ A}, V_{DS} = -80\text{ V},$ see fig. 6 and 13 ^b	-	-	8.7	nC
Gate-Source Charge	Q_{GS}			-	-	2.2	
Gate-Drain Charge	Q_{GD}			-	-	4.1	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -50\text{ V}, I_D = -4.0\text{ A},$ $R_G = 24\text{ }\Omega, R_D = 11\text{ }\Omega$, see fig. 10 ^b		-	10	-	ns
Rise Time	t_r			-	27	-	
Turn-Off Delay Time	$t_{d(off)}$			-	15	-	
Fall Time	t_f			-	17	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 		-	4.0	-	nH
Internal Source Inductance	L_S			-	6.0	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	- 1.1	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	- 8.8	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = -1.1\text{ A}, V_{GS} = 0\text{ V}^b$		-	-	- 5.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = -4.0\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$		-	80	160	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.15	0.30	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)					

Notes

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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

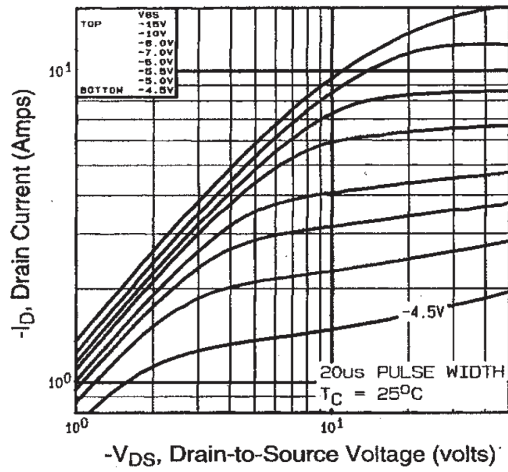


Fig. 1 - Typical Output Characteristics

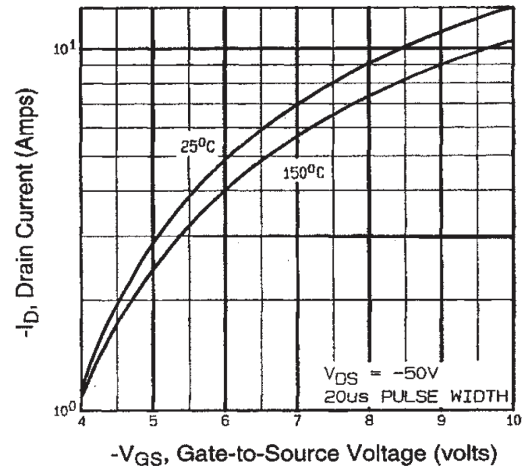


Fig. 3 - Typical Transfer Characteristics

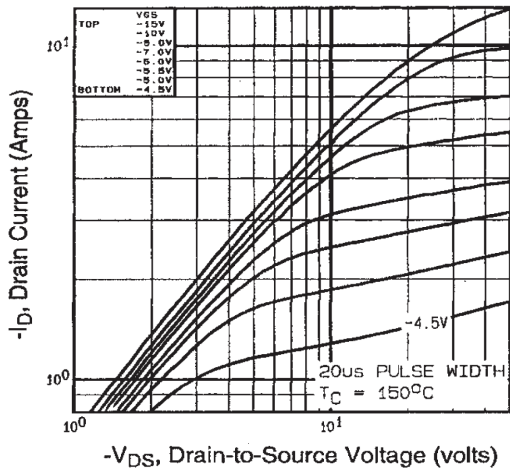


Fig. 2 - Typical Output Characteristics

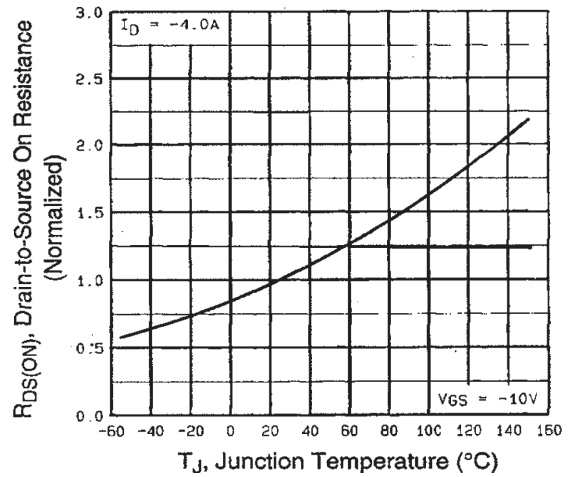


Fig. 4 - Normalized On-Resistance vs. Temperature

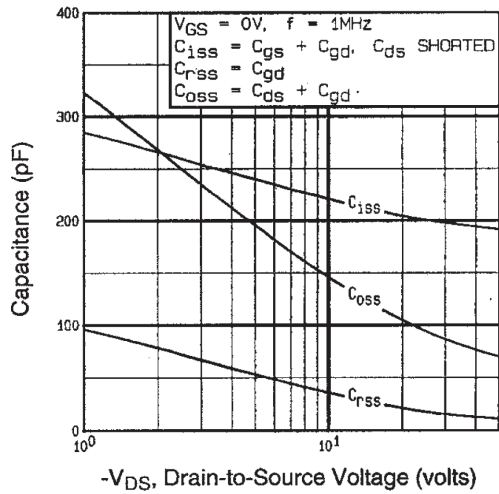


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

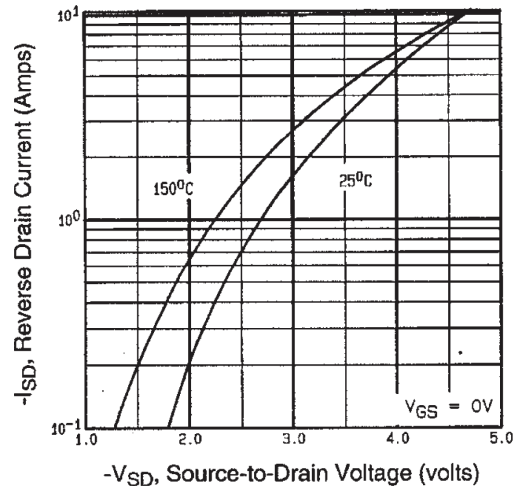


Fig. 7 - Typical Source-Drain Diode Forward Voltage

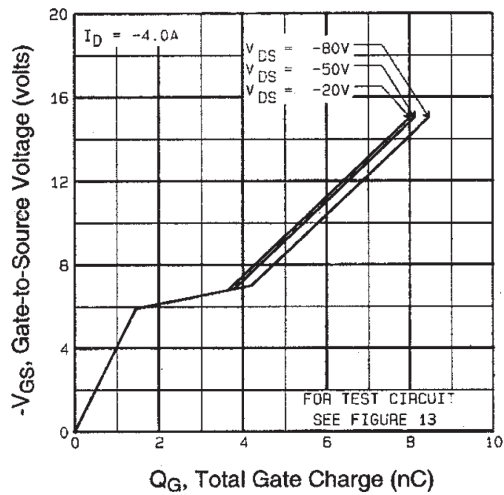


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

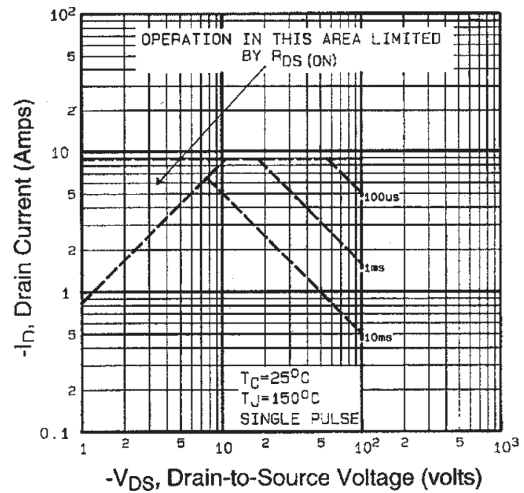


Fig. 8 - Maximum Safe Operating Area

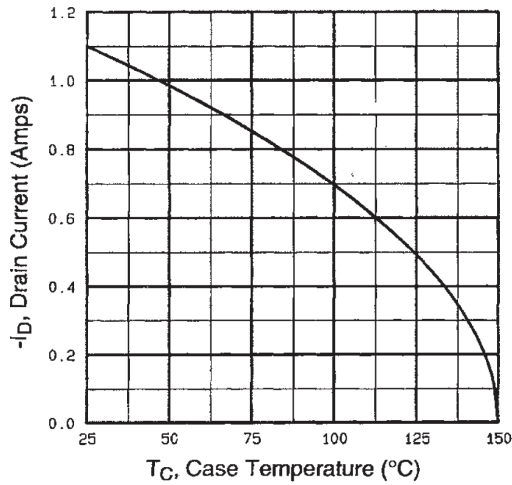


Fig. 9 - Maximum Drain Current vs. Case Temperature

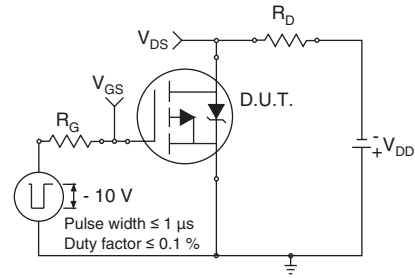


Fig. 10a - Switching Time Test Circuit

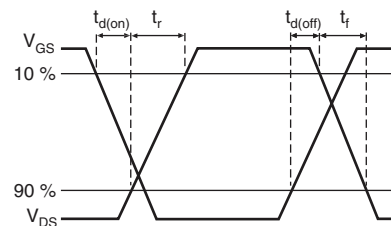


Fig. 10b - Switching Time Waveforms

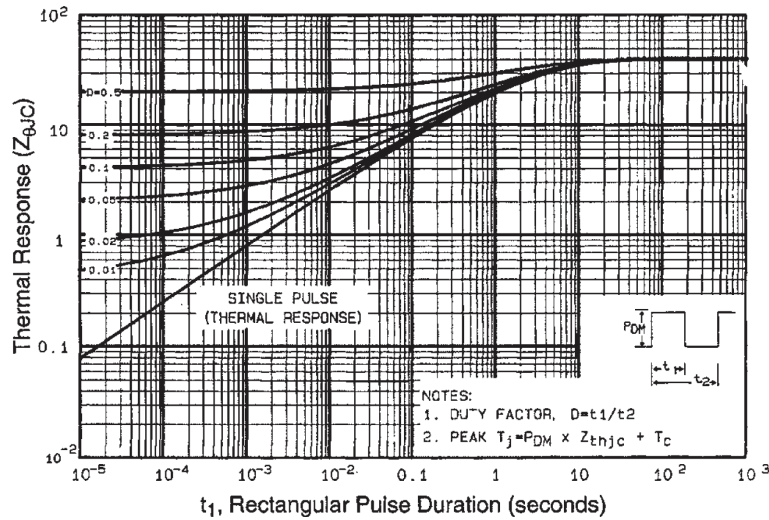


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

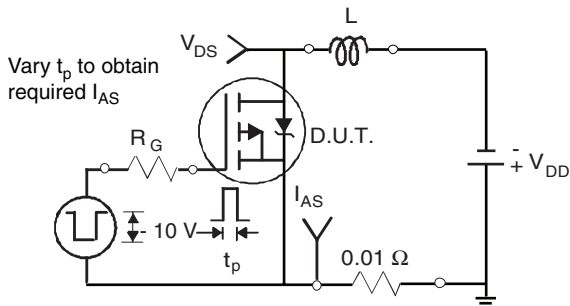


Fig. 12a - Unclamped Inductive Test Circuit

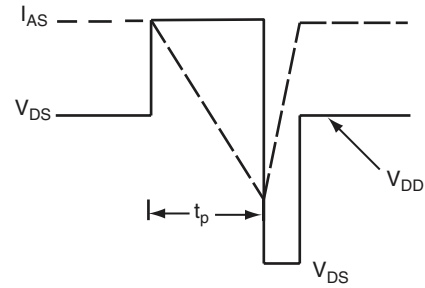


Fig. 12b - Unclamped Inductive Waveforms

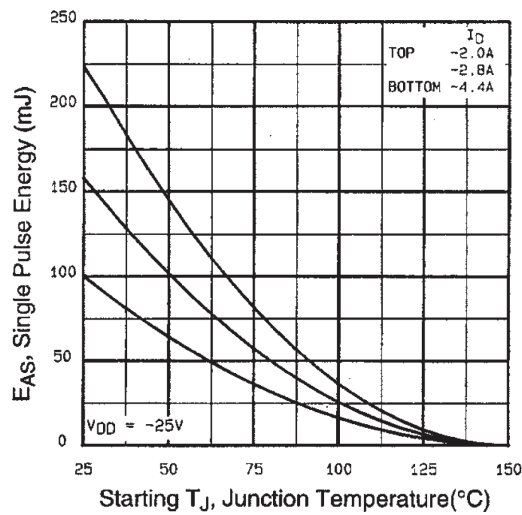


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

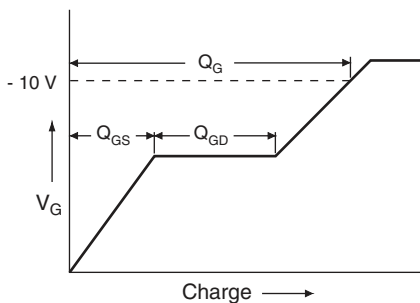


Fig. 13a - Basic Gate Charge Waveform

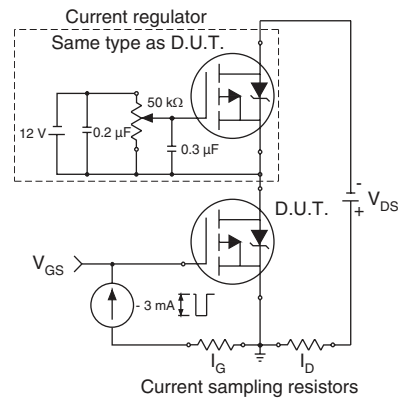
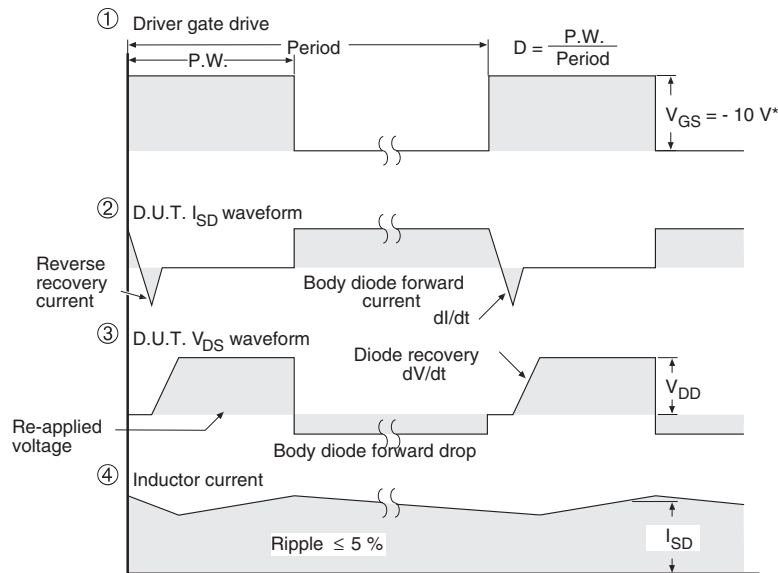
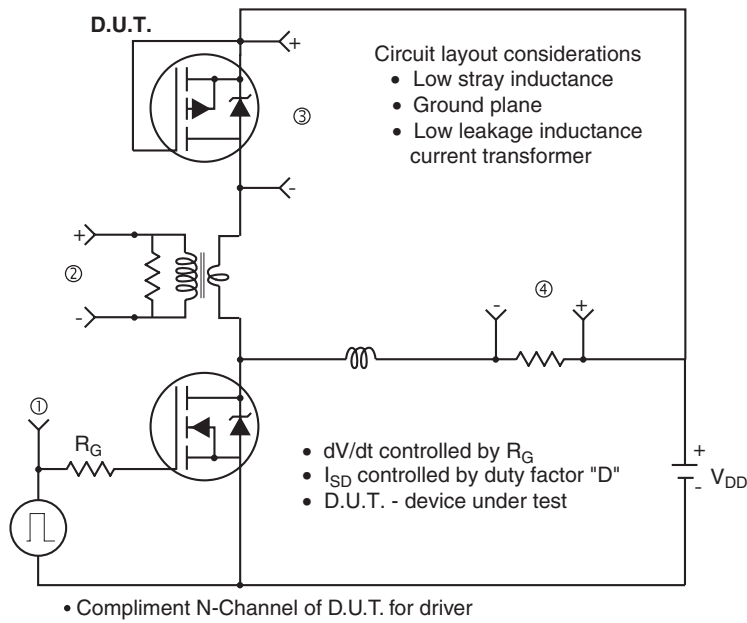


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



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

Fig. 14 - For P-Channel

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