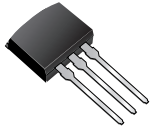


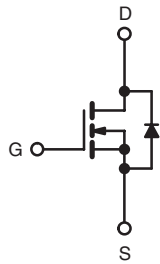
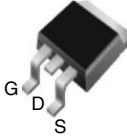
## Power MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	400	
$R_{DS(on)}$ (Max.) ( $\Omega$ )	$V_{GS} = 10\text{ V}$	1.0
$Q_g$ (Max.) (nC)	22	
$Q_{gs}$ (nC)	5.8	
$Q_{gd}$ (nC)	9.3	
Configuration	Single	

I<sup>2</sup>PAK (TO-262)



D<sup>2</sup>PAK (TO-263)



N-Channel MOSFET

### FEATURES

- Low Gate Charge  $Q_g$  Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic  $dV/dt$  Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective  $C_{OSS}$  Specified
- Lead (Pb)-free Available



Available  
RoHS\*  
COMPLIANT

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching

### TYPICAL SMPS TOPOLOGIES

- Single Transistor Flyback Xfmr. Reset
- Single Transistor Forward Xfmr. Reset (Both US Line Input Only)

ORDERING INFORMATION				
Package	D <sup>2</sup> PAK (TO-263)	D <sup>2</sup> PAK (TO-263)	D <sup>2</sup> PAK (TO-263)	I <sup>2</sup> PAK (TO-262)
Lead (Pb)-free	IRF730ASPbF	IRF730ASTRLPbF <sup>a</sup>	IRF730ASTRRPbF <sup>a</sup>	IRF730ALPbF
	SiHF730AS-E3	SiHF730ASTL-E3 <sup>a</sup>	SiHF730ASTR-E3 <sup>a</sup>	SiHFL014T-E3
SnPb	IRF730AS	IRF730ASTRL <sup>a</sup>	-	-
	SiHF730AS	SiHF730ASTL <sup>a</sup>	-	-

#### Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted					
PARAMETER	SYMBOL		LIMIT	UNIT	
Drain-Source Voltage	$V_{DS}$		400	V	
Gate-Source Voltage	$V_{GS}$		$\pm 30$		
Continuous Drain Current	$V_{GS}$ at 10 V	$T_C = 25\text{ }^\circ\text{C}$	5.5	A	
		$T_C = 100\text{ }^\circ\text{C}$	3.5		
Pulsed Drain Current <sup>a, e</sup>	$I_{DM}$		22		
Linear Derating Factor			0.6	W/ $^\circ\text{C}$	
Single Pulse Avalanche Energy <sup>b, e</sup>	$E_{AS}$		290	mJ	
Avalanche Current <sup>a</sup>	$I_{AR}$		5.5	A	
Repetitive Avalanche Energy <sup>a</sup>	$E_{AR}$		7.4	mJ	
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$		$P_D$	74	W
Peak Diode Recovery $dV/dt$ <sup>c, e</sup>			$dV/dt$	4.6	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 <sup>d</sup>		

#### Notes


- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 19\text{ mH}$ ,  $R_G = 25\text{ }^\circ\Omega$ ,  $I_{AS} = 5.5\text{ A}$  (see fig. 12).
- $I_{SD} \leq 5.5\text{ A}$ ,  $dI/dt \leq 90\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 150\text{ }^\circ\text{C}$ .
- 1.6 mm from case.
- Uses IRF730A/SiHF730A data and test condition

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

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mounted, steady-state) <sup>a</sup>	$R_{thJA}$	-	40	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	1.7	

### 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
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	400	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\text{ mA}^d$	-	0.5	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2.0	-	4.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 400\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	25	$\mu\text{A}$
		$V_{DS} = 320\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 3.3\text{ A}^b$	-	-	1.0	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}$ , $I_D = 3.3\text{ A}^d$	3.1	-	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1.0\text{ MHz}$ , see fig. 5 <sup>d</sup>	-	600	-	pF
Output Capacitance	$C_{oss}$		-	103	-	
Reverse Transfer Capacitance	$C_{rss}$		-	4.0	-	
Output Capacitance	$C_{oss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}$ , $f = 1.0\text{ MHz}$	-	890	-
			$V_{DS} = 320\text{ V}$ , $f = 1.0\text{ MHz}$	-	30	-
Effective Output Capacitance	$C_{oss\text{ eff.}}$	$V_{DS} = 0\text{ V to } 320\text{ V}^{c, d}$	-	45	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$ , $I_D = 3.5\text{ A}$ , $V_{DS} = 3200\text{ V}$ , see fig. 6 and 13 <sup>b, d</sup>	-	-	22	nC
Gate-Source Charge	$Q_{gs}$		-	-	5.8	
Gate-Drain Charge	$Q_{gd}$		-	-	9.3	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\text{ V}$ , $I_D = 3.5\text{ A}$ , $R_G = 12\text{ }\Omega$ , $R_D = 57\text{ }\Omega$ , see fig. 10 <sup>b, d</sup>	-	10	-	ns
Rise Time	$t_r$		-	22	-	
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	
Fall Time	$t_f$		-	16	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode 	-	-	5.5	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$		-	-	22	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_S = 5.5\text{ A}$ , $V_{GS} = 0\text{ V}^b$	-	-	1.6	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 3.5\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}^{b, d}$	-	370	550	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	1.6	2.4	$\mu\text{C}$
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  $\leq 2\%$ .
- $C_{oss\text{ eff.}}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DS}$ .
- Uses IRF730A/SiHF730A data and test conditions.



## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

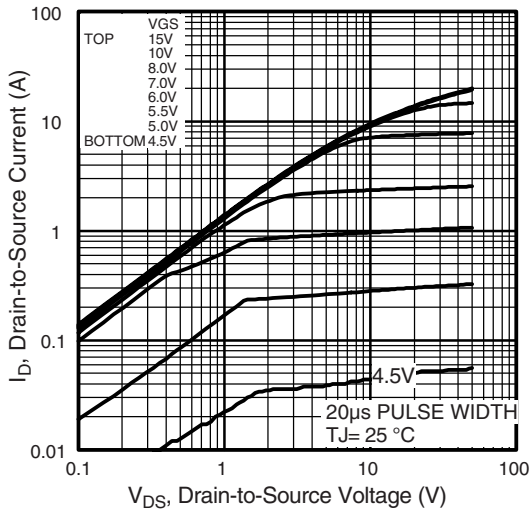


Fig. 1 - Typical Output Characteristics

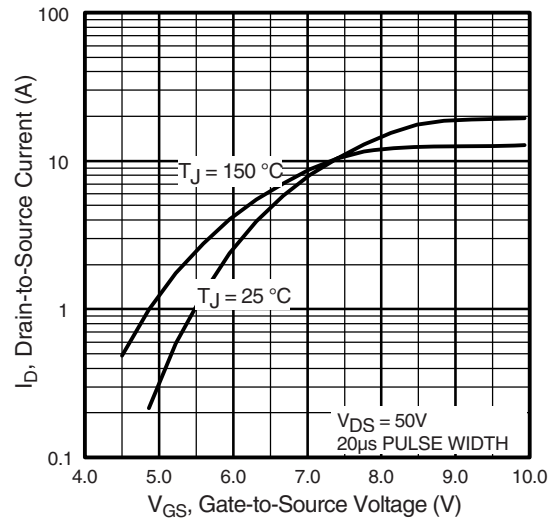


Fig. 3 - Typical Transfer Characteristics

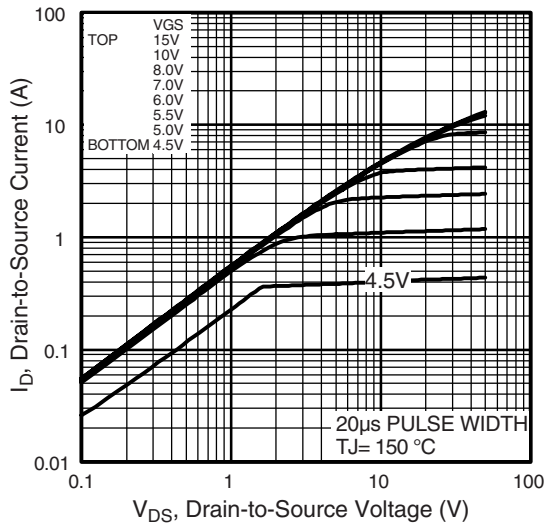


Fig. 2 - Typical Output Characteristics

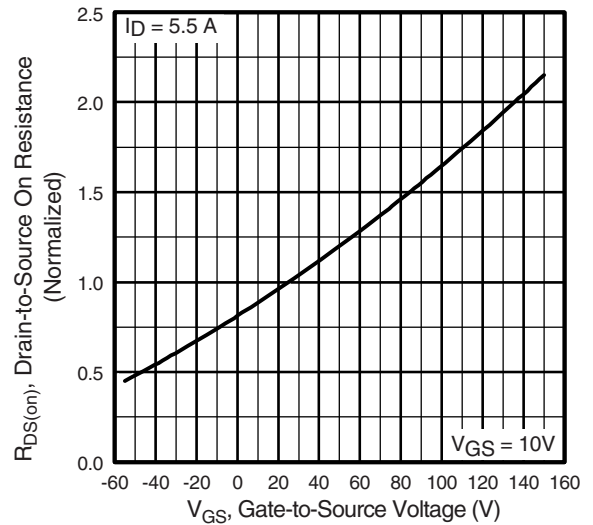


Fig. 4 - Normalized On-Resistance vs. Temperature

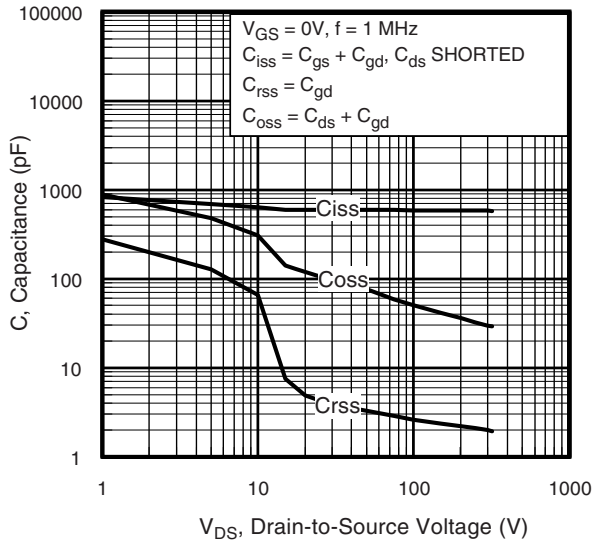


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

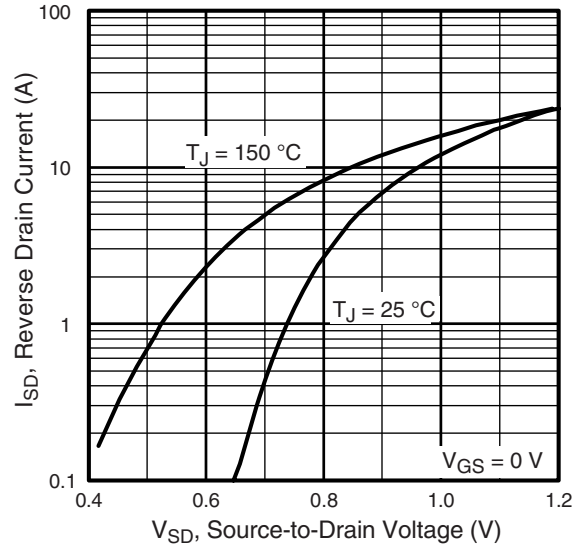


Fig. 7 - Typical Source-Drain Diode Forward Voltage

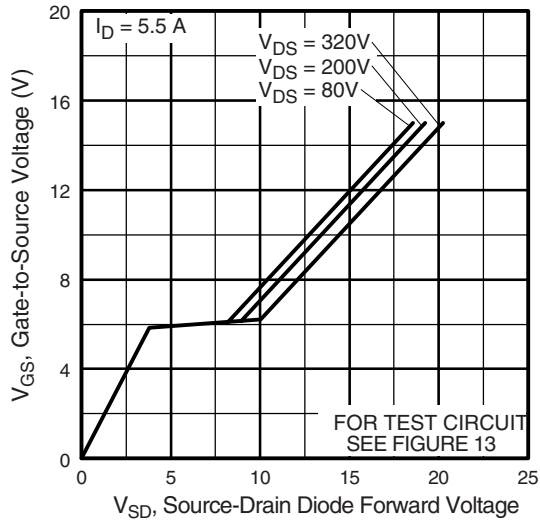


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

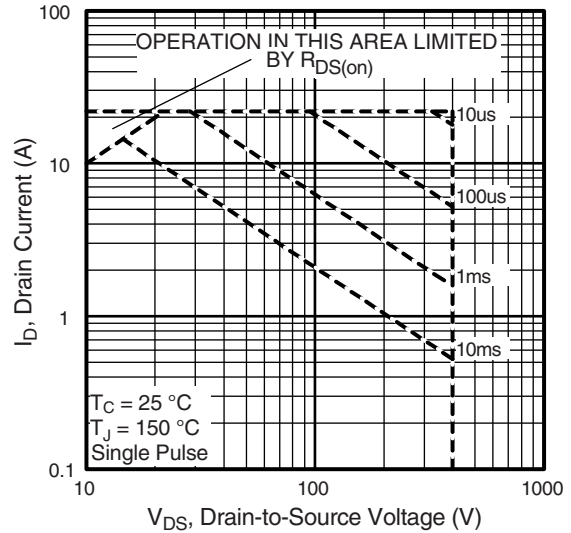
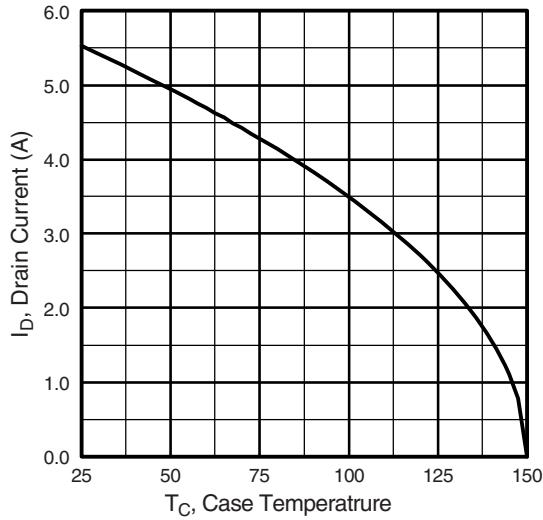
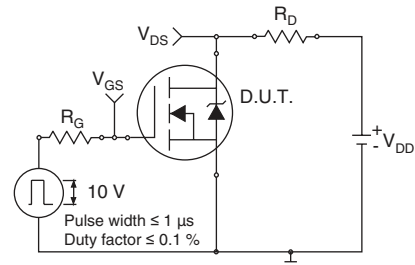


Fig. 8 - Maximum Safe Operating Area



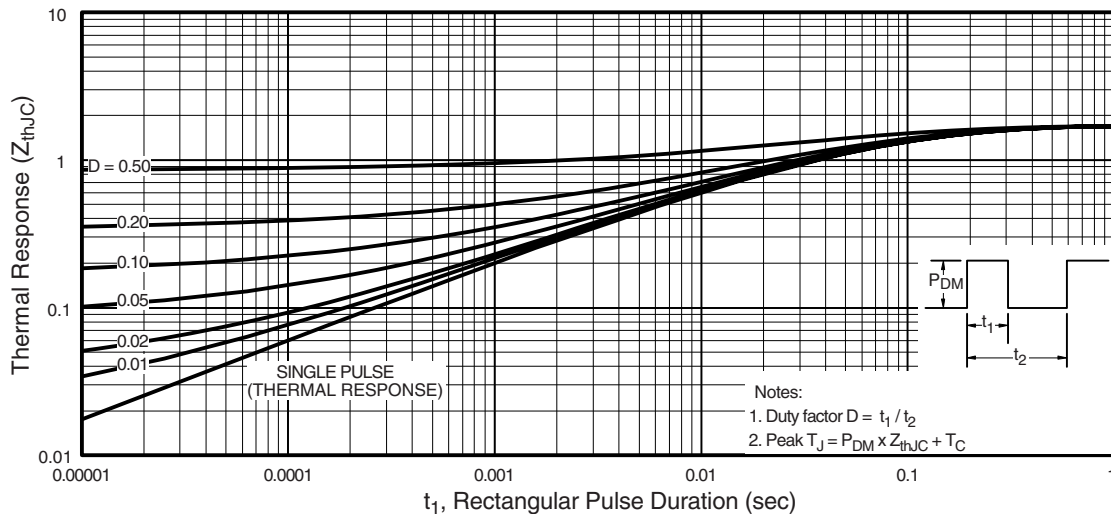
**Fig. 9 - Maximum Drain Current vs. Case Temperature**



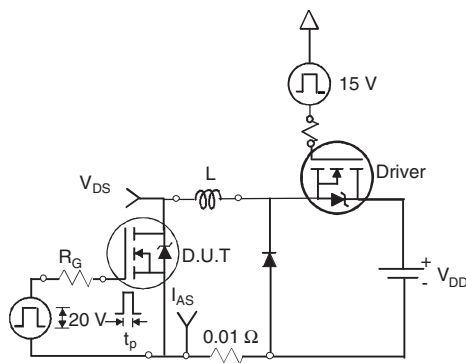
**Fig. 10a - Switching Time Test Circuit**



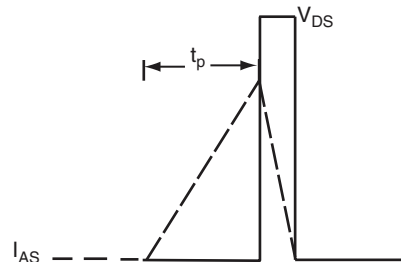
**Fig. 10b - Switching Time Waveforms**



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



**Fig. 12a - Unclamped Inductive Test Circuit**



**Fig. 12b - Unclamped Inductive Waveforms**

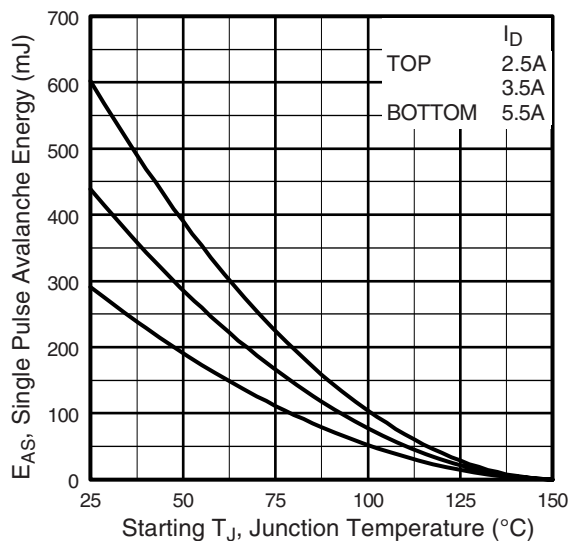


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

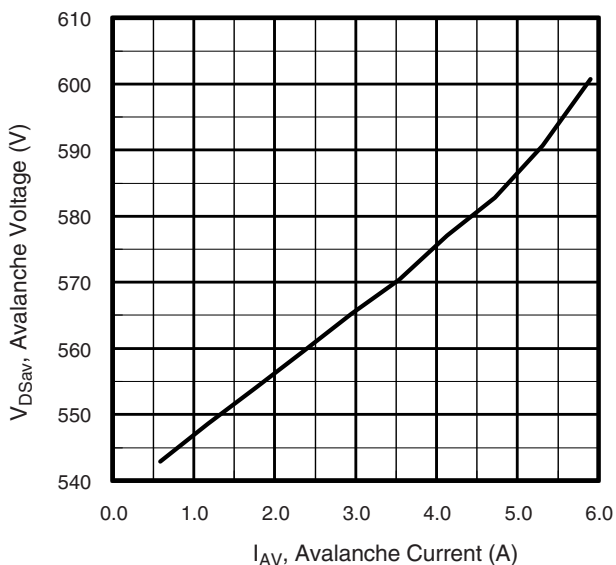


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

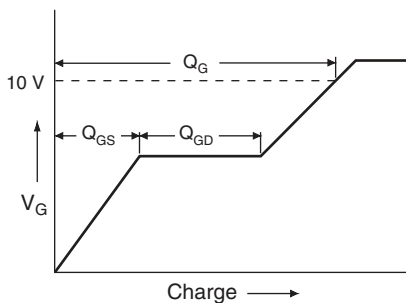


Fig. 13a - Maximum Avalanche Energy vs. Drain Current

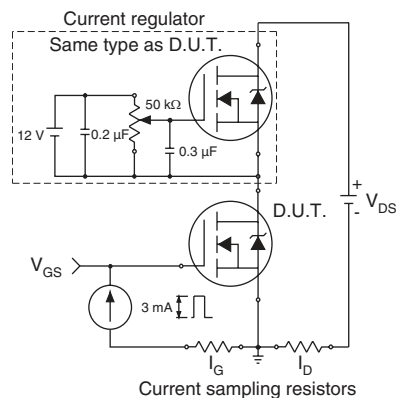


Fig. 13b - Gate Charge Test Circuit

## Peak Diode Recovery $dV/dt$ Test Circuit

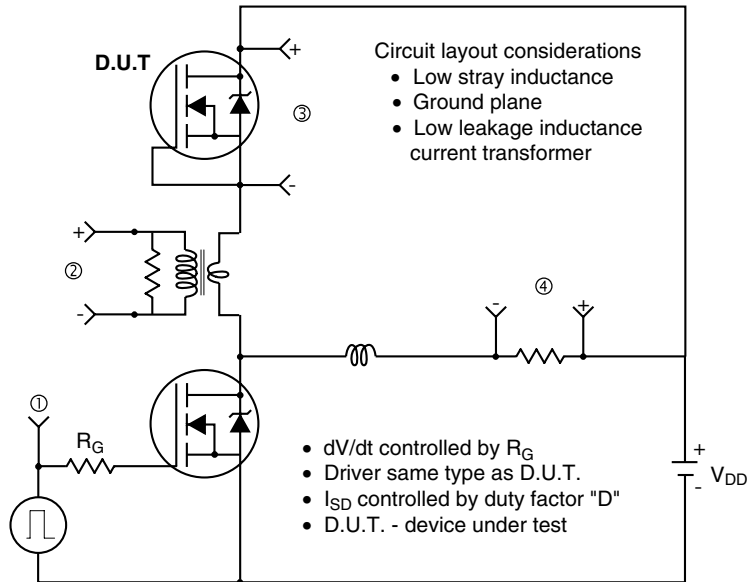


Fig. 14 - For N-Channel

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?91046>.



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.