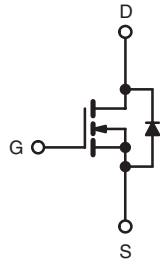
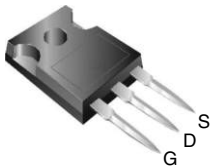


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	500	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.27
Q_g (Max.) (nC)	105	
Q_{gs} (nC)	26	
Q_{gd} (nC)	42	
Configuration	Single	

TO-247



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)
- Uninterruptable Power Supply
- High Speed Power Switching

TYPICAL SMPS TOPOLOGIES

- Full Bridge
- PFC Boost

ORDERING INFORMATION	
Package	TO-247
Lead (Pb)-free	IRP460APbF
	SiHFP460A-E3
SnPb	IRP460A
	SiHFP460A


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	V_{GS} at 10 V	I_D	$T_C = 25\text{ }^\circ\text{C}$	A
			$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^a		I_{DM}	80	
Linear Derating Factor			2.2	$W/^\circ\text{C}$
Single Pulse Avalanche Energy ^b		E_{AS}	960	mJ
Repetitive Avalanche Current ^a		I_{AR}	20	A
Repetitive Avalanche Energy ^a		E_{AR}	28	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	P_D	280	W
Peak Diode Recovery dV/dt^c		dV/dt	3.8	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

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting $T_J = 25\text{ }^\circ\text{C}$, $L = 4.3\text{ mH}$, $R_G = 25\text{ }\Omega$, $I_{AS} = 20\text{ A}$ (see fig. 12).
- $I_{SD} \leq 20\text{ A}$, $dI/dt \leq 125\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.

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

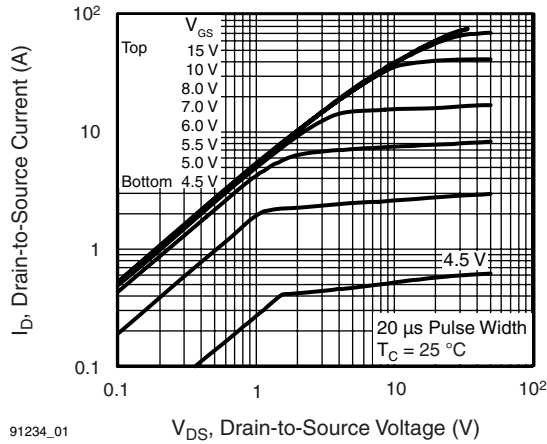
THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.45	

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 $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$	-	0.61	-	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}	$V_{GS} = \pm 30\text{ V}$	-	-	± 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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 12\text{ A}^b$	-	-	0.27	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 12\text{ A}^b$	11	-	-	S	
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5	-	3100	-	pF	
Output Capacitance	C_{oss}		-	480	-		
Reverse Transfer Capacitance	C_{rss}		-	18	-		
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}$, $f = 1.0\text{ MHz}$	4430		pF	
			$V_{DS} = 400\text{ V}$, $f = 1.0\text{ MHz}$	130			
Effective Output Capacitance	$C_{oss\text{ eff.}}$		$V_{DS} = 0\text{ V to }400\text{ V}^c$	140			
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 20\text{ A}$, $V_{DS} = 400\text{ V}$, see fig. 6 and 13 ^b	-	-	105	nC
Gate-Source Charge	Q_{gs}			-	-	26	
Gate-Drain Charge	Q_{gd}			-	-	42	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}$, $I_D = 20\text{ A}$, $R_G = 4.3\text{ }\Omega$, $R_D = 13\text{ }\Omega$, see fig. 10 ^b	-	18	-	ns	
Rise Time	t_r		-	55	-		
Turn-Off Delay Time	$t_{d(off)}$		-	45	-		
Fall Time	t_f		-	39	-		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	20	A	
Pulsed Diode Forward Current ^a	I_{SM}		-	-	80		
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}$, $I_S = 20\text{ A}$, $V_{GS} = 0\text{ V}^b$	-	-	1.8	V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$, $I_F = 20\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	480	710	ns	
Body Diode Reverse Recovery Charge	Q_{rr}		-	5.0	7.5	μC	
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)					

Notes

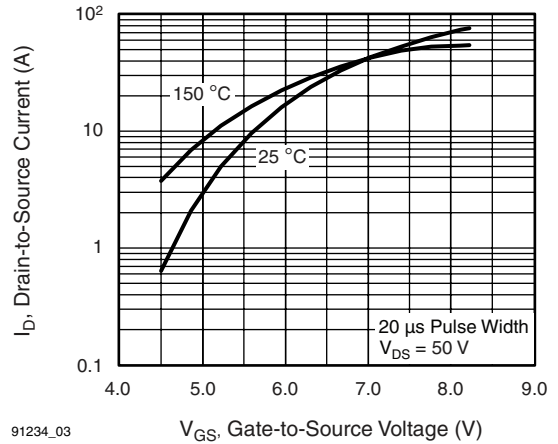
- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
- c. $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80 % V_{DS} .

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



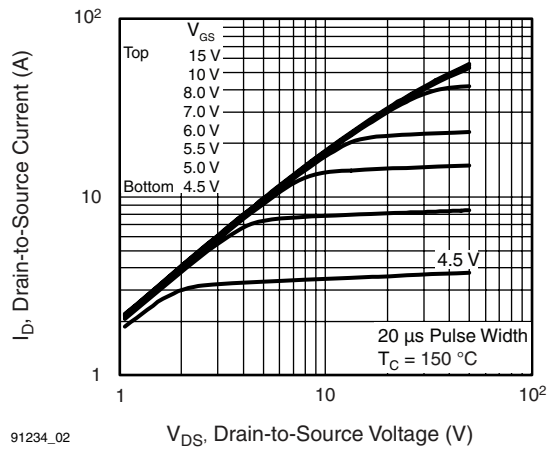
91234_01

Fig. 1 - Typical Output Characteristics



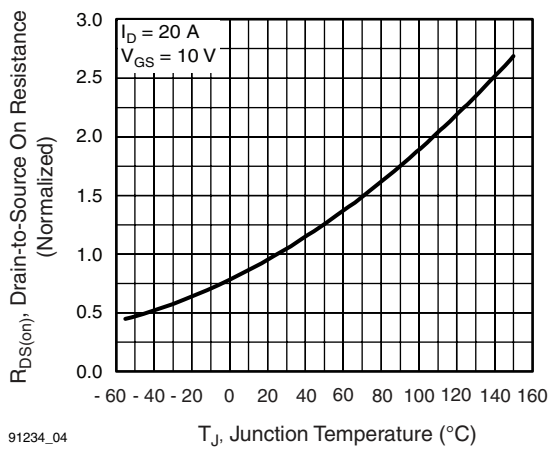
91234_03

Fig. 3 - Typical Transfer Characteristics



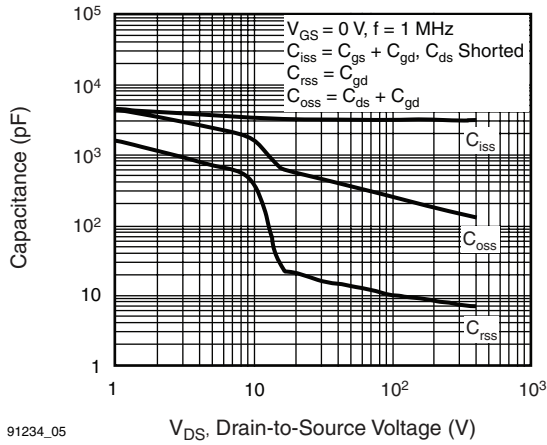
91234_02

Fig. 2 - Typical Output Characteristics



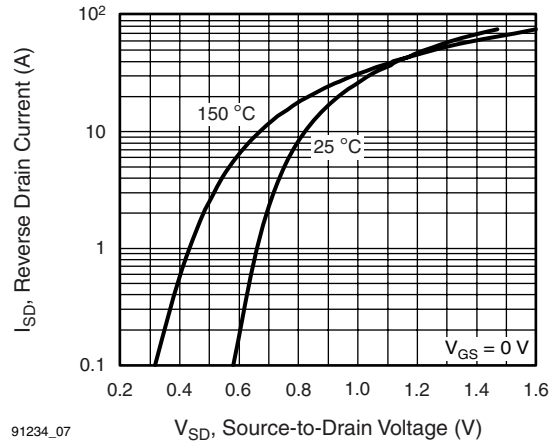
91234_04

Fig. 4 - Normalized On-Resistance vs. Temperature



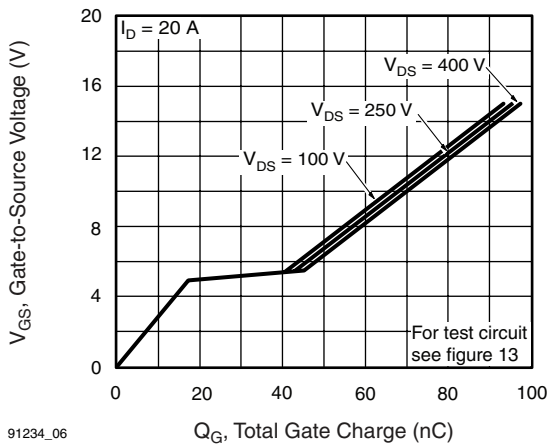
91234_05

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



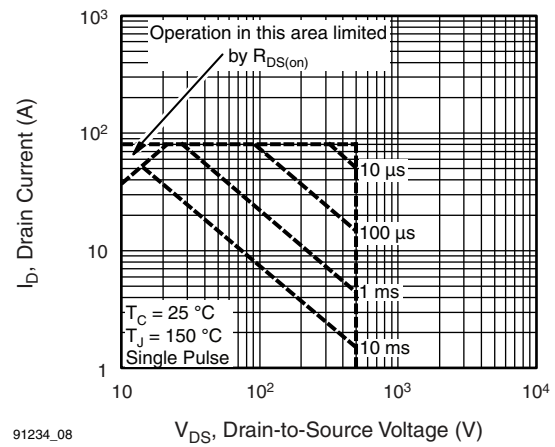
91234_07

Fig. 7 - Typical Source-Drain Diode Forward Voltage



91234_06

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



91234_08

Fig. 8 - Maximum Safe Operating Area

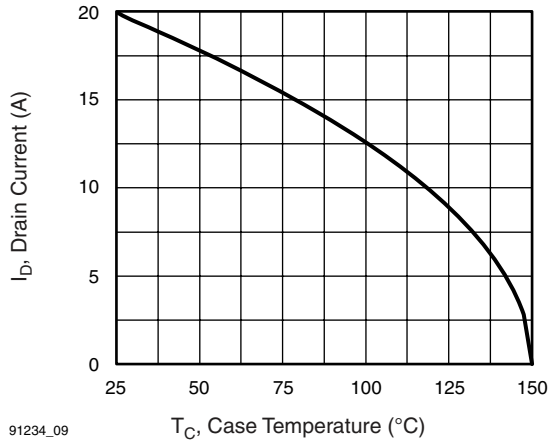


Fig. 9 - Maximum Drain Current vs. Case Temperature

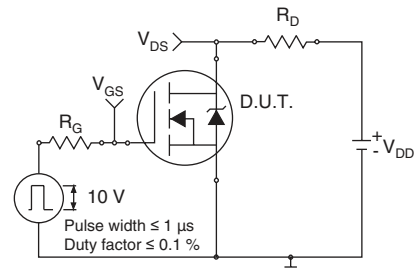


Fig. 10a - Switching Time Test Circuit

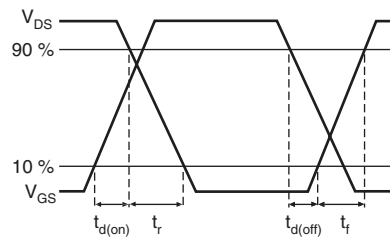


Fig. 10b - Switching Time Waveforms

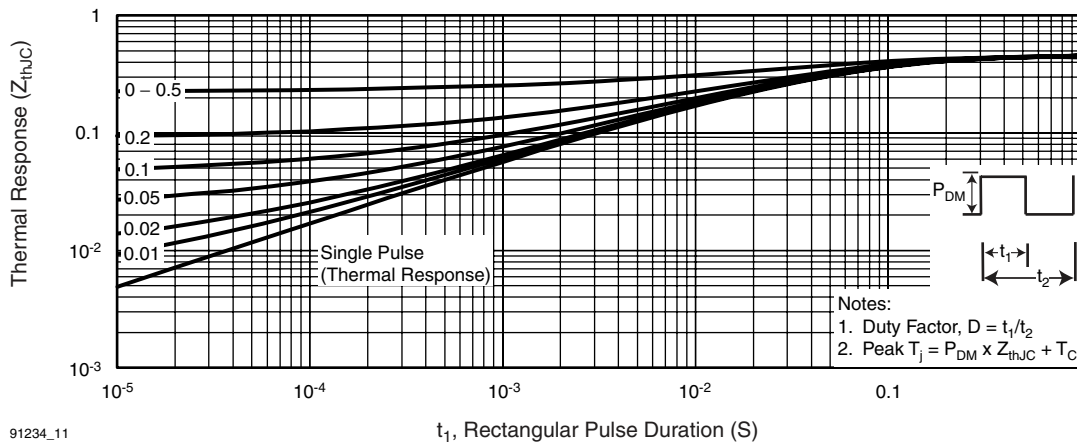


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

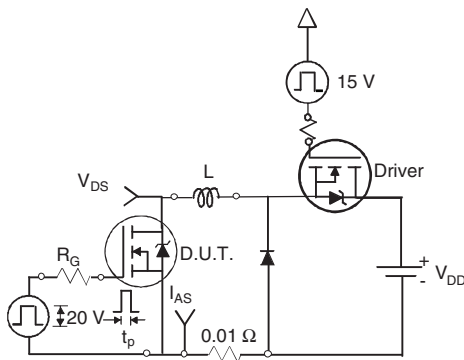


Fig. 12a - Unclamped Inductive Test Circuit

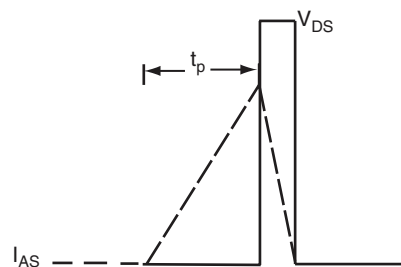


Fig. 12b - Unclamped Inductive Waveforms

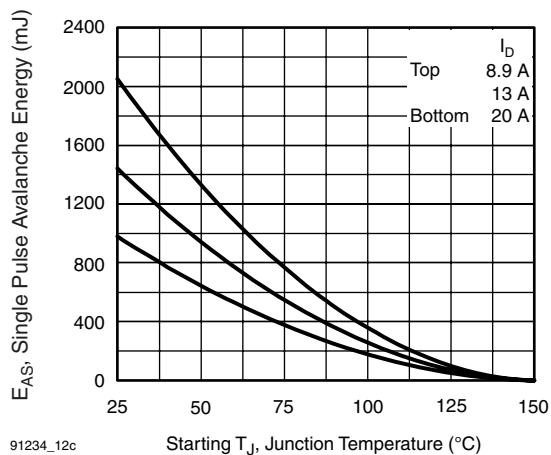


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

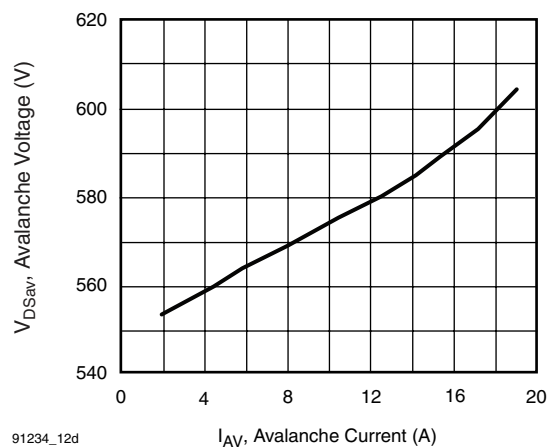


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

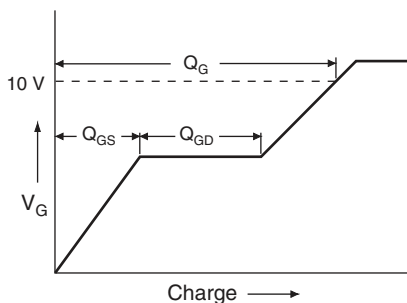


Fig. 13a - Basic Gate Charge Waveform

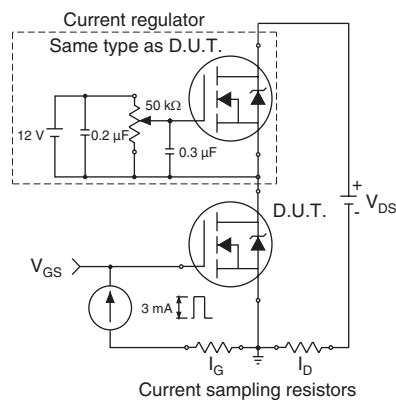


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

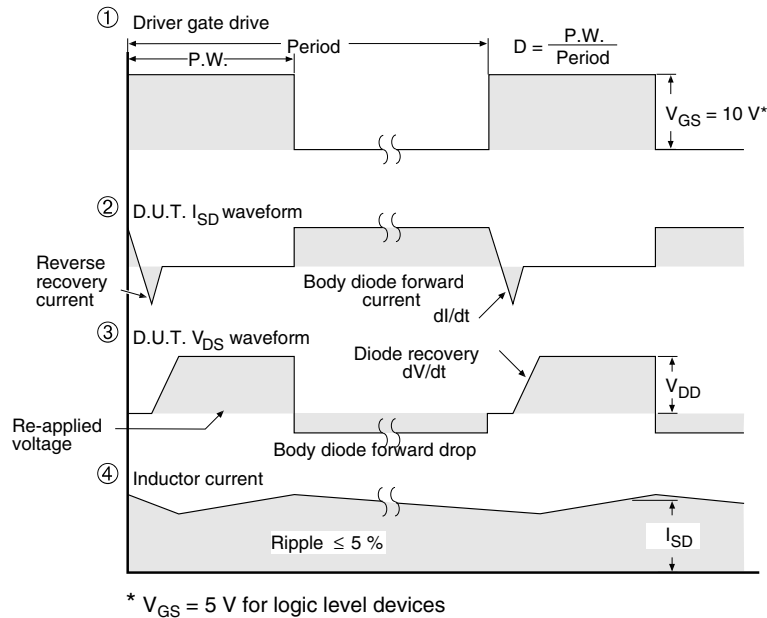
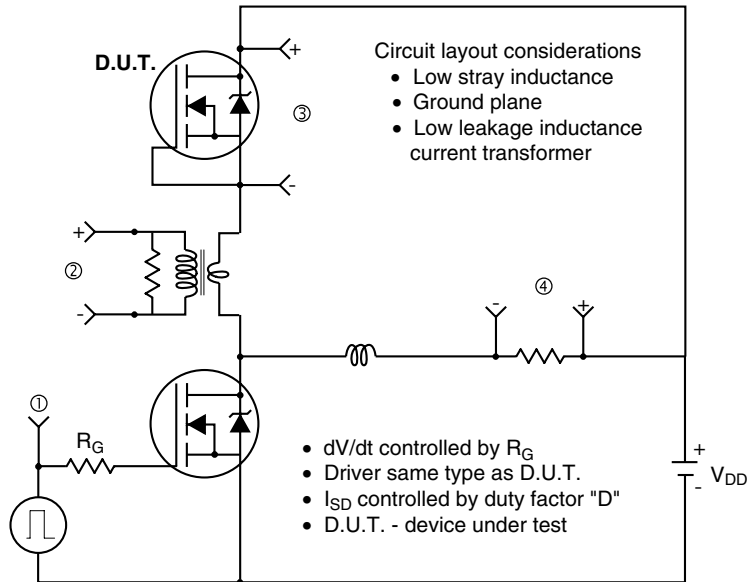


Fig. 14 - For N-Channel

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?91234>.



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.