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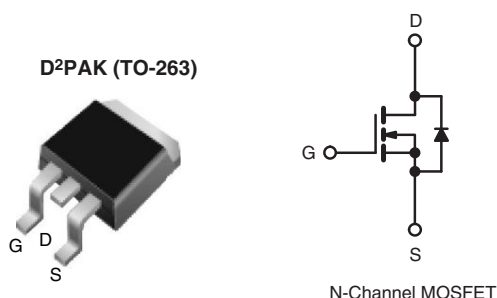


IRLZ44S, SiHLZ44S

Vishay Siliconix

Power MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	60	
R _{DS(on)} (Ω)	V _{GS} = 5.0 V	0.028
Q _g (Max.) (nC)	66	
Q _{gs} (nC)	12	
Q _{gd} (nC)	43	
Configuration	Single	



FEATURES

- Halogen-free According to IEC 61249-2-21
- Definition
- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Logic-Level Gate Drive
- R_{DS(on)} Specified at V_{GS} = 4 V and 5 V
- 175 °C Operating Temperature
- Fast Switching
- Compliant to RoHS Directive 2002/95/EC


RoHS*
 COMPLIANT
 HALOGEN
FREE
 Available

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 D²PAK (TO-263) is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D²PAK (TO-263) is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0 W in a typical surface mount application.

ORDERING INFORMATION		
Package	D ² PAK (TO-263)	D ² PAK (TO-263)
Lead (Pb)-free and Halogen-free	SiHLZ44S-GE3	SiHLZ44STRR-GE3 ^a
Lead (Pb)-free	IRLZ44SPbF	IRLZ44STRRPbF ^a
	SiHLZ44S-E3	SiHLZ44STR-E3 ^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}	60	V
Gate-Source Voltage	V _{GS}	± 10	
Continuous Drain Current ^f	V _{GS} at 5.0 V	T _C = 25 °C	A
Continuous Drain Current		T _C = 100 °C	
Pulsed Drain Current ^a	I _{DM}	200	
Linear Derating Factor		1.0	W/°C
Linear Derating Factor (PCB Mount) ^e		0.025	
Single Pulse Avalanche Energy ^b	E _{AS}	400	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C	W
Maximum Power Dissipation (PCB Mount) ^e		T _A = 25 °C	
Peak Diode Recovery dV/dt ^c	dV/dt	4.5	V/ns
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature) ^d	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 = 179 μH, R_g = 25 Ω, I_{AS} = 51 A (see fig. 12).
- I_{SD} ≤ 51 A, di/dt ≤ 250 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 175 °C.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).
- Current limited by the package, (die current = 51 A).

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

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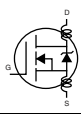

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THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Maximum Junction-to-Ambient (PCB Mount) ^a	R_{thJA}	-	40	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	1.0	

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}	$V_{GS} = 0, I_D = 250\ \mu\text{A}$	60	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\ \text{mA}$	-	0.070	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	-	2.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 10\ \text{V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\ \text{V}, V_{GS} = 0\ \text{V}$	-	-	25	μA
		$V_{DS} = 48\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 150\text{ }^\circ\text{C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 5.0\ \text{V}, I_D = 31\ \text{A}^b$	-	-	0.028	Ω
		$V_{GS} = 4.0\ \text{V}, I_D = 25\ \text{A}^b$	-	-	0.039	
Forward Transconductance	g_{fs}	$V_{DS} = 25\ \text{V}, I_D = 31\ \text{A}^b$	23	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\ \text{V}, V_{DS} = 25\ \text{V}, f = 1.0\ \text{MHz}, \text{ see fig. 5}$	-	3300	-	pF
Output Capacitance	C_{oss}		-	1200	-	
Reverse Transfer Capacitance	C_{rss}		-	200	-	
Total Gate Charge	Q_g	$V_{GS} = 5.0\ \text{V}, I_D = 51\ \text{A}, V_{DS} = 48\ \text{V}, \text{ see fig. 6 and 13}^b$	-	-	66	nC
Gate-Source Charge	Q_{gs}		-	-	12	
Gate-Drain Charge	Q_{gd}		-	-	43	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\ \text{V}, I_D = 51\ \text{A}, R_g = 4.6\ \Omega, R_D = 0.56\ \Omega, \text{ see fig. 10}^b$	-	17	-	ns
Rise Time	t_r		-	230	-	
Turn-Off Delay Time	$t_{d(off)}$		-	42	-	
Fall Time	t_f		-	110	-	
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 	-	-	50°	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	200	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 51\ \text{A}, V_{GS} = 0\ \text{V}^b$	-	-	2.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 51\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}^b$	-	130	180	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.84	1.3	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 $\leq 300\ \mu\text{s}$; duty cycle $\leq 2\%$.
- Current limited by the package, (Die Current = 51 A).



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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

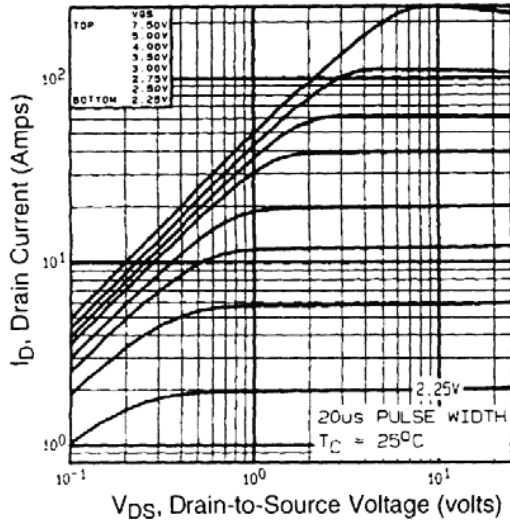


Fig. 1 - Typical Output Characteristics, $T_C = 25^\circ\text{C}$

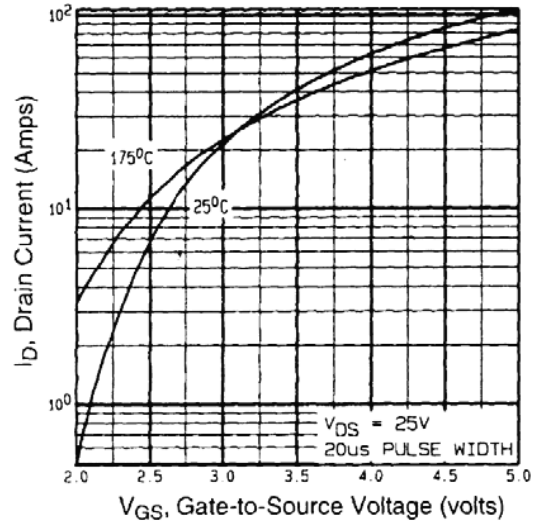


Fig. 3 - Typical Transfer Characteristics

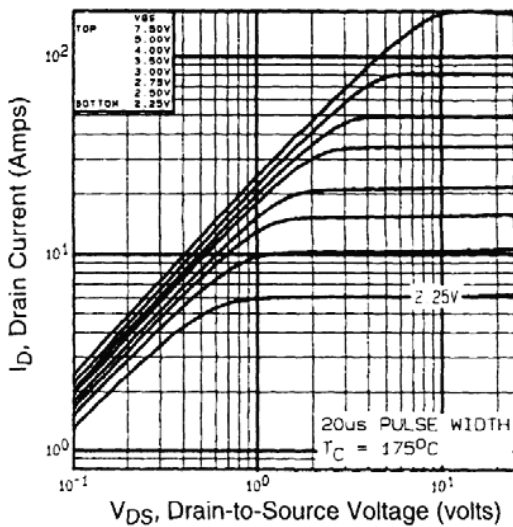


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$

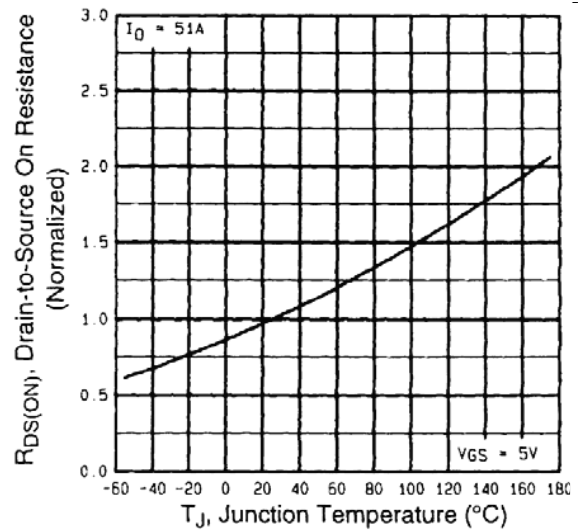


Fig. 4 - Normalized On-Resistance vs. Temperature

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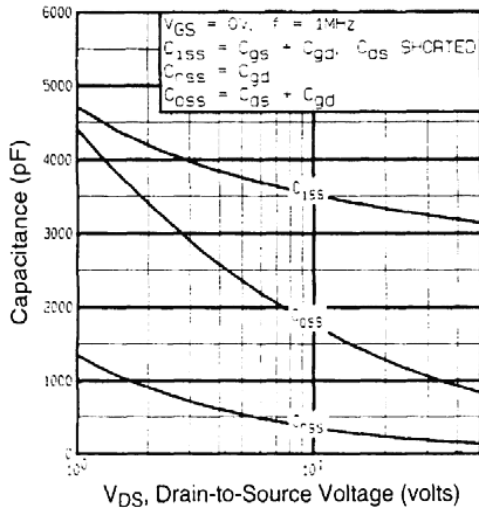


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

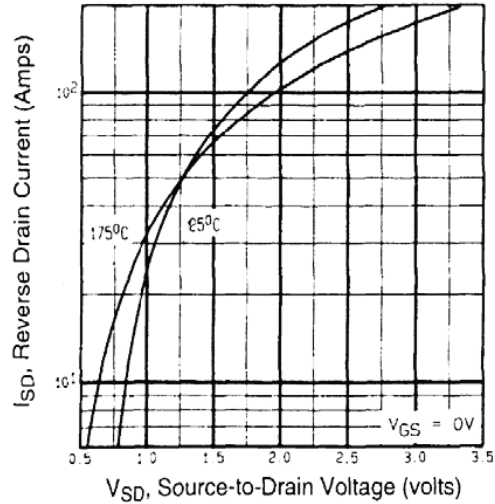


Fig. 7 - Typical Source-Drain Diode Forward Voltage

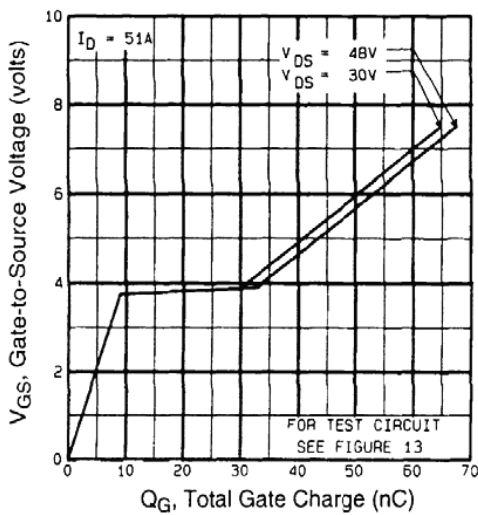


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

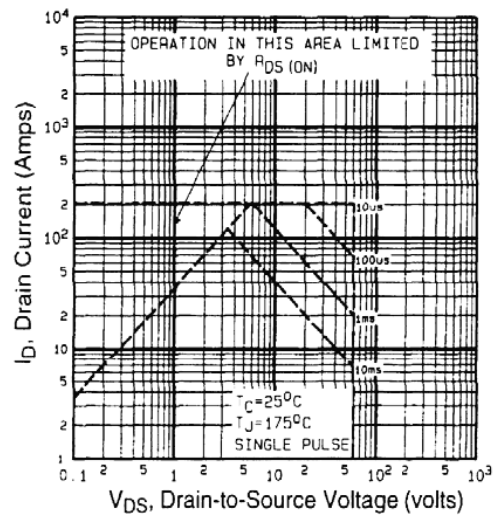


Fig. 8 - Maximum Safe Operating Area



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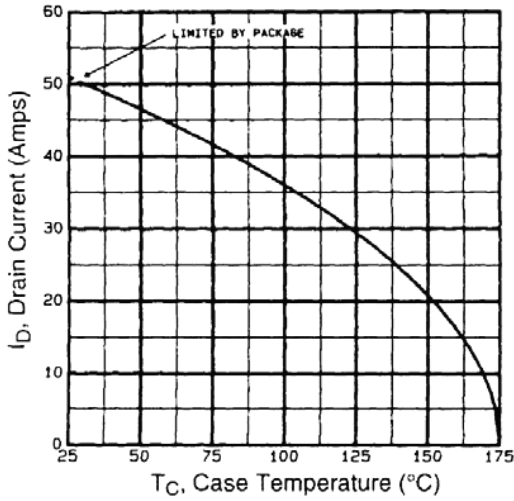


Fig. 9 - Maximum Drain Current vs. Case Temperature

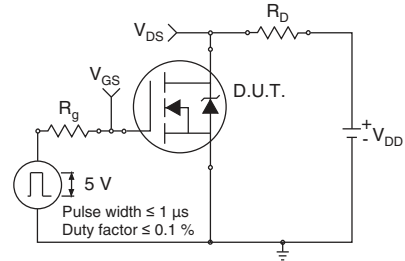


Fig. 10a - Switching Time Test Circuit

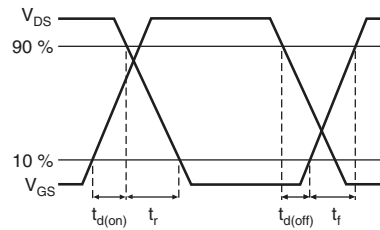


Fig. 10b - Switching Time Waveforms

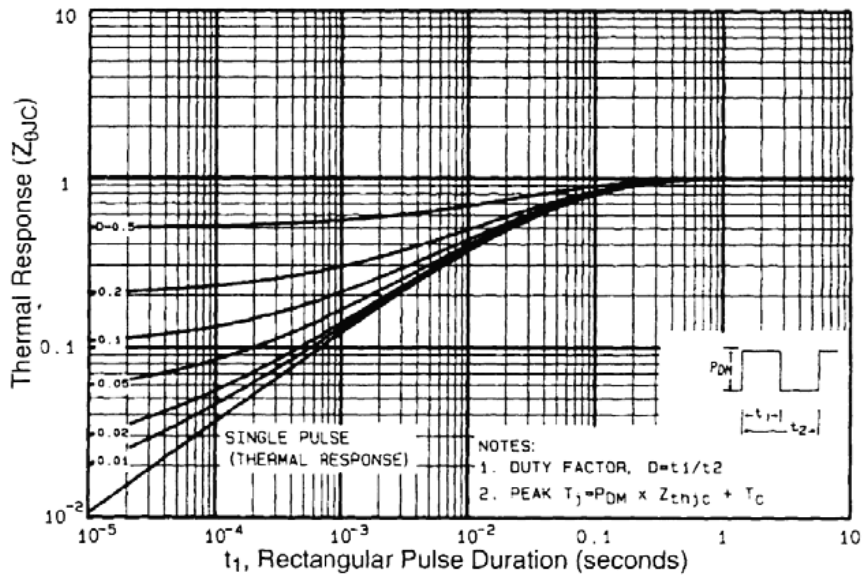


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

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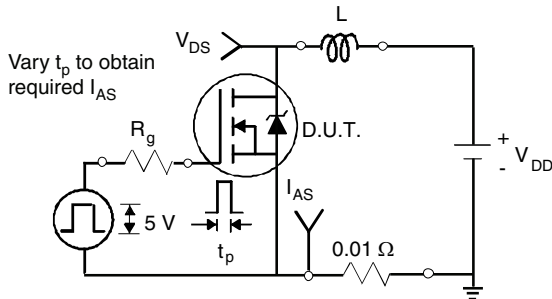


Fig. 12a - Unclamped Inductive Test Circuit

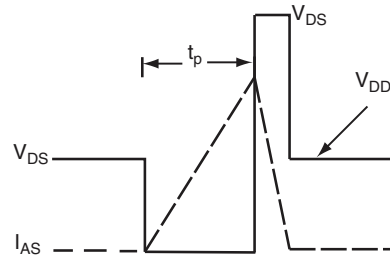


Fig. 12b - Unclamped Inductive Waveforms

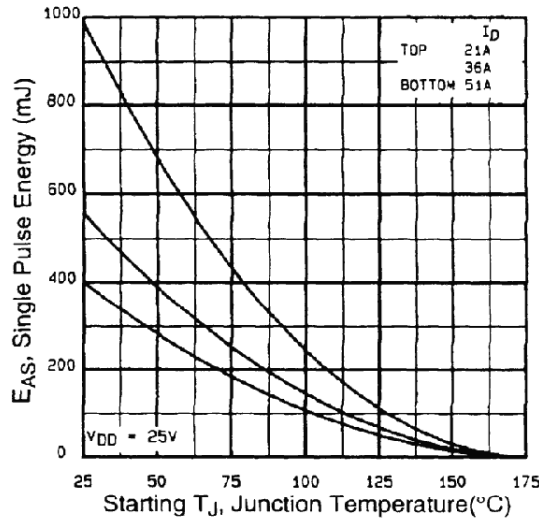


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

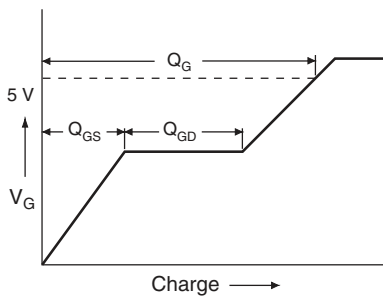


Fig. 13a - Basic Gate Charge Waveform

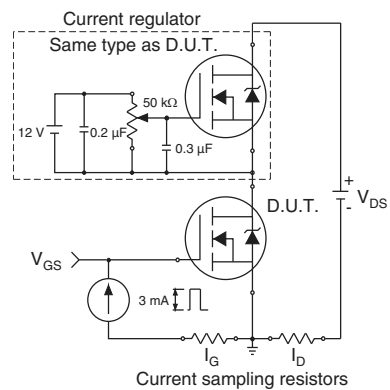
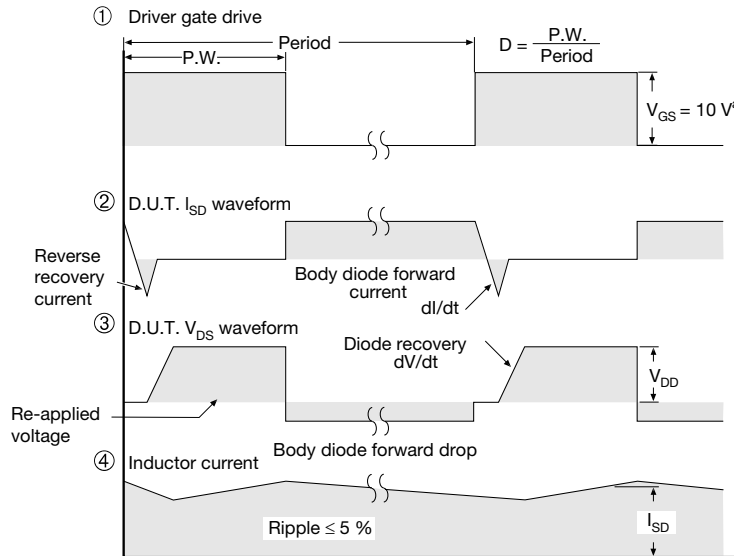
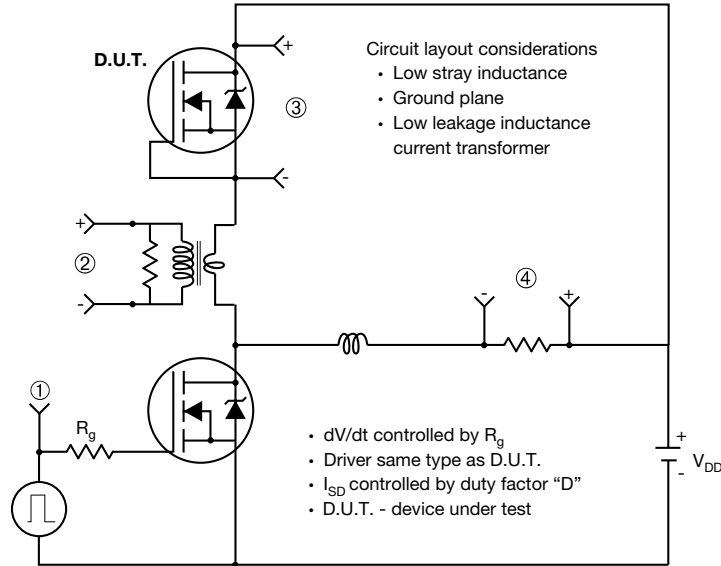


Fig. 13b - Gate Charge Test Circuit



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Peak Diode Recovery dV/dt Test Circuit



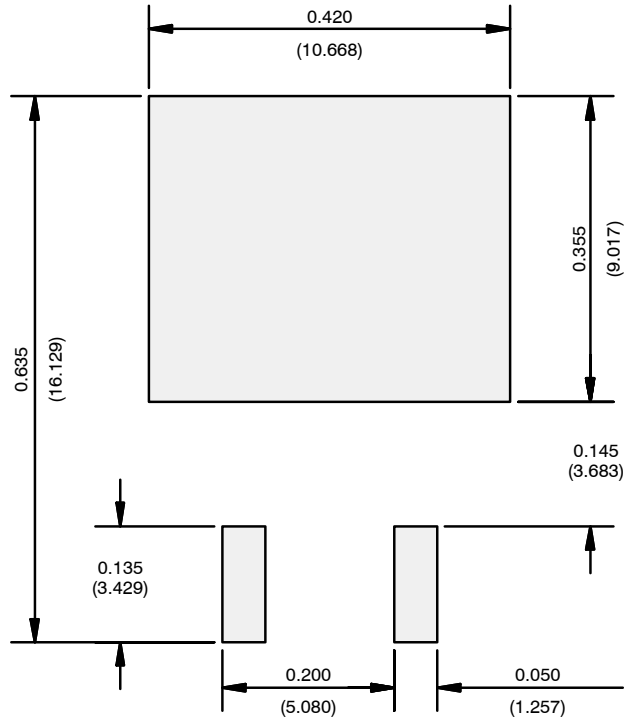
Note
 a. $V_{GS} = 5\text{ V}$ for logic level devices

Fig. 14 - For N-Channel

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RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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