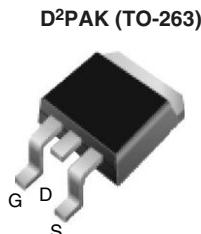


Power MOSFET

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



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	
Gate-Source Voltage	V_{GS}	± 10	
Continuous Drain Current ^f	I_D	50	
Continuous Drain Current		36	A
Pulsed Drain Current ^a	I_{DM}	200	
Linear Derating Factor		1.0	
Linear Derating Factor (PCB Mount) ^e		0.025	W/°C
Single Pulse Avalanche Energy ^b	E_{AS}	400	mJ
Maximum Power Dissipation	P_D	150	
Maximum Power Dissipation (PCB Mount) ^e		3.7	W
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	
Soldering Recommendations (Peak Temperature) ^d	for 10 s	300 ^d	°C

Notes

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

b. $V_{DD} = 25$ V, starting $T_J = 25$ °C, $L = 179 \mu H$, $R_g = 25 \Omega$, $I_{AS} = 51$ A (see fig. 12).

c. $I_{SD} \leq 51$ A, $dI/dt \leq 250$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 175$ °C.

d. 1.6 mm from case.

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

f. Current limited by the package, (die current = 51 A).

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

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 ($T_J = 25^\circ\text{C}$, unless otherwise noted)

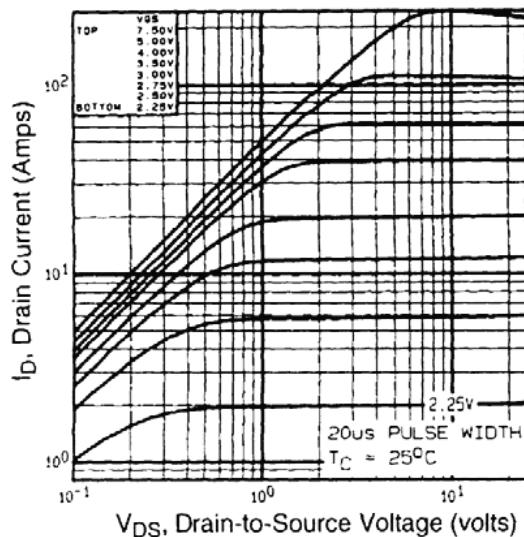
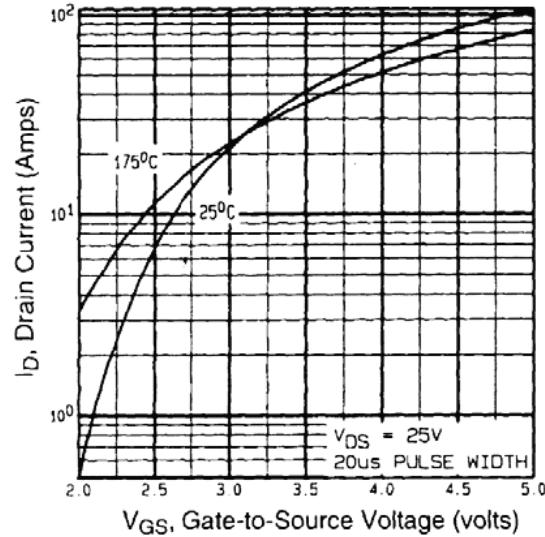
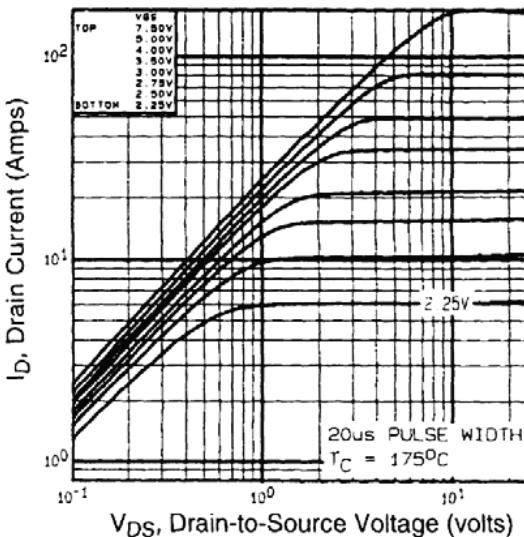
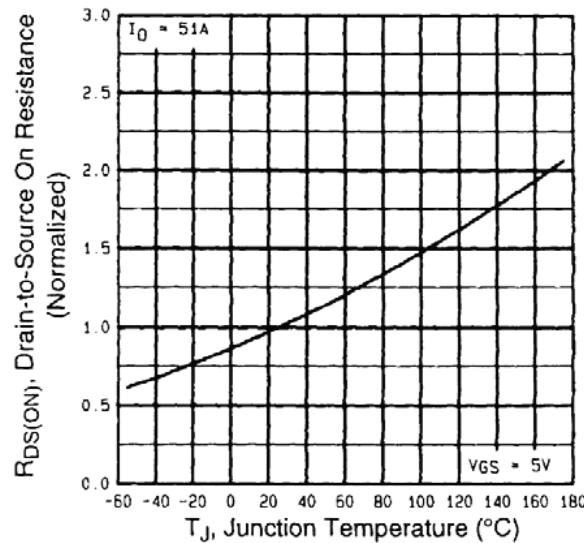
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$, $I_D = 250 \mu\text{A}$		60	-	-	V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25°C , $I_D = 1 \text{ mA}$		-	0.070	-	$^\circ\text{C}/\text{C}$	
Gate-Source Threshold 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	
		$V_{DS} = 48 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 150^\circ\text{C}$		-	-	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}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1.0 \text{ MHz}$, see fig. 5		-	3300	-	pF	
Output Capacitance	C_{oss}			-	1200	-		
Reverse Transfer Capacitance	C_{rss}			-	200	-		
Total Gate Charge	Q_g	$V_{GS} = 5.0 \text{ V}$	$I_D = 51 \text{ A}$, $V_{DS} = 48 \text{ V}$, see fig. 6 and 13 ^b	-	-	66	nC	
Gate-Source Charge	Q_{gs}			-	-	12		
Gate-Drain Charge	Q_{gd}			-	-	43		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30 \text{ V}$, $I_D = 51 \text{ A}$, $R_g = 4.6 \Omega$, $R_D = 0.56 \Omega$, 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 ^c	A	
Pulsed Diode Forward Current ^a	I_{SM}			-	-	200		
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}$, $I_S = 51 \text{ A}$, $V_{GS} = 0 \text{ V}^b$		-	-	2.5	V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}$, $I_F = 51 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}^b$		-	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

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

b. Pulse width $\leq 300 \mu\text{s}$; duty cycle $\leq 2\%$.

c. Current limited by the package, (Die Current = 51 A).

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

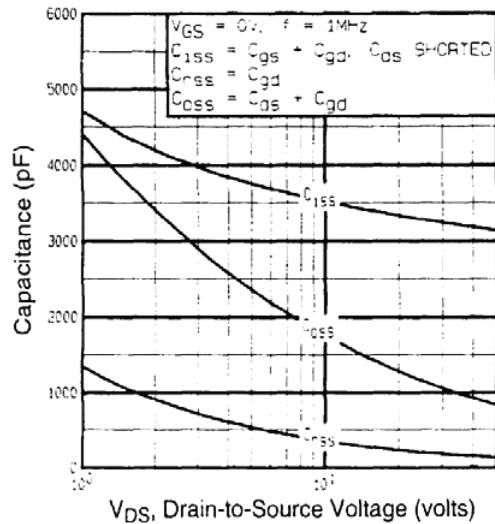


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

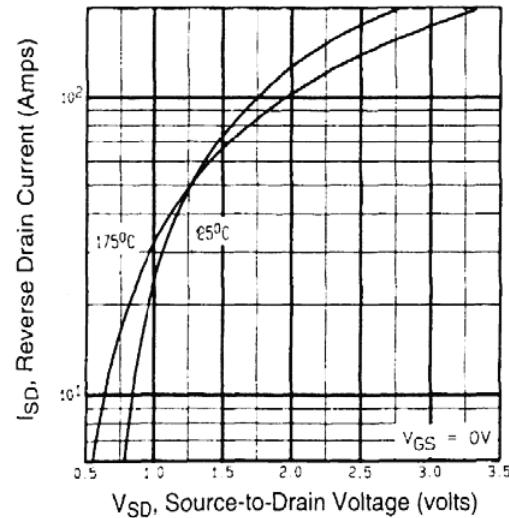


Fig. 7 - Typical Source-Drain Diode Forward Voltage

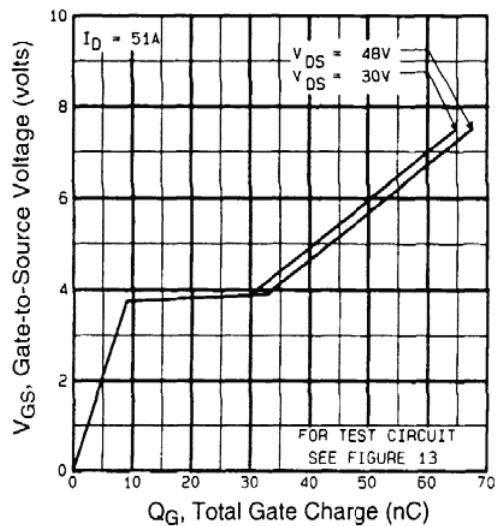


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

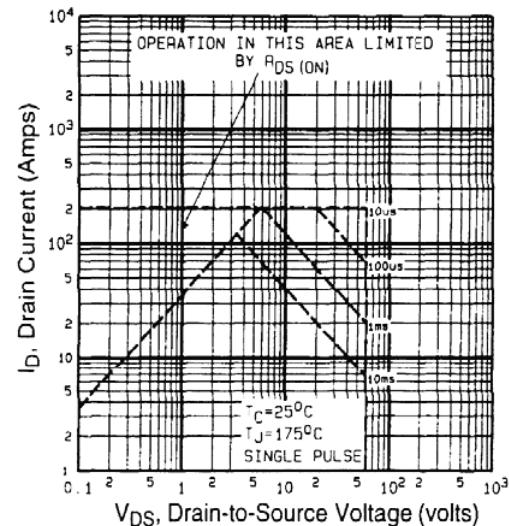


Fig. 8 - Maximum Safe Operating Area

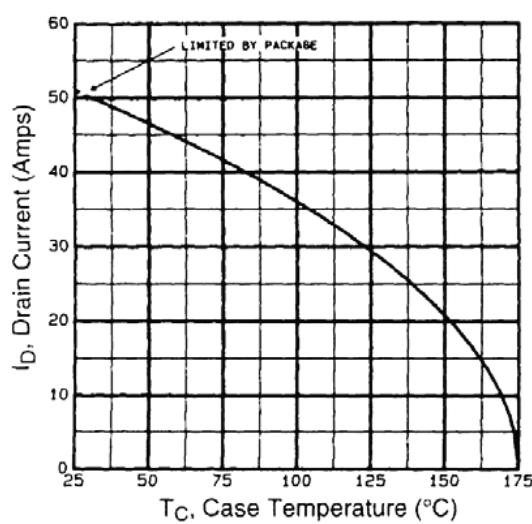


Fig. 9 - Maximum Drain Current vs. Case Temperature

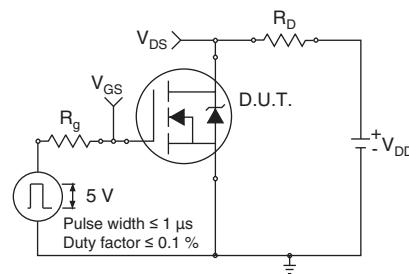


Fig. 10a - Switching Time Test Circuit

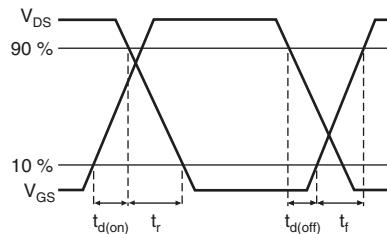


Fig. 10b - Switching Time Waveforms

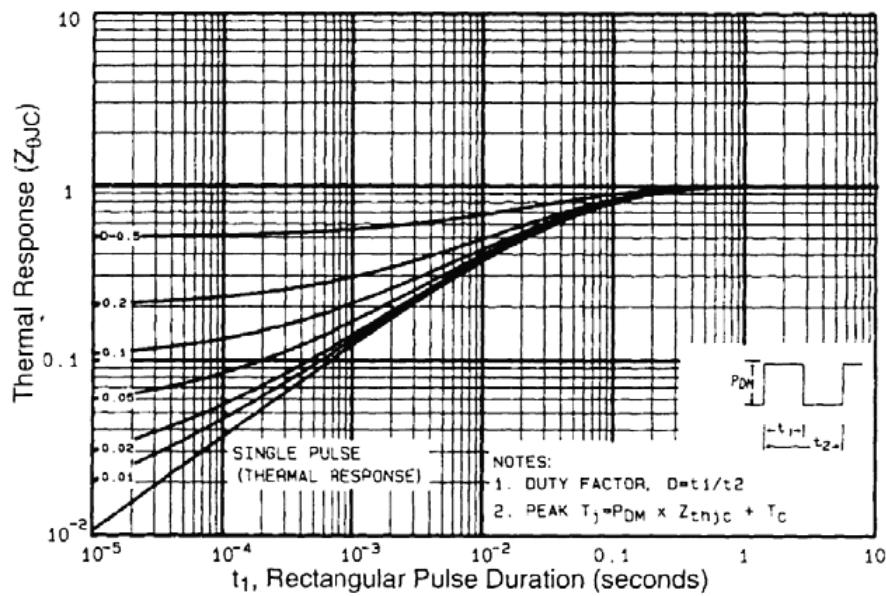


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

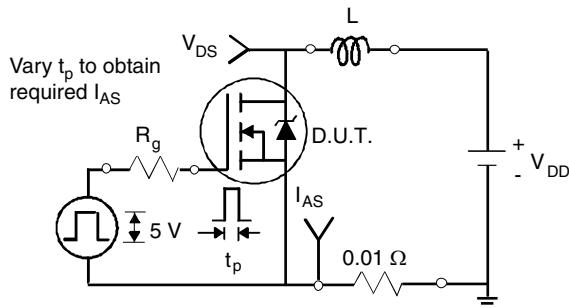


Fig. 12a - Unclamped Inductive Test Circuit

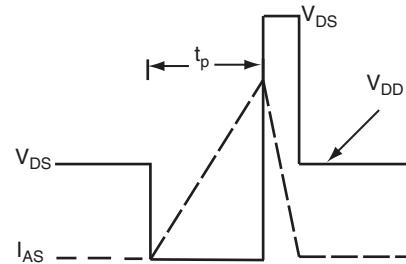


Fig. 12b - Unclamped Inductive Waveforms

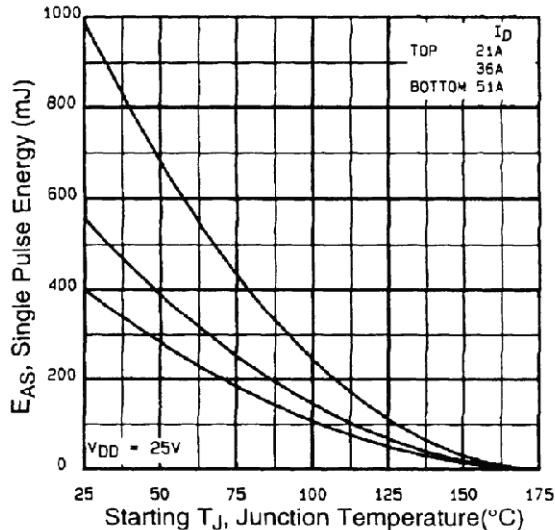


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

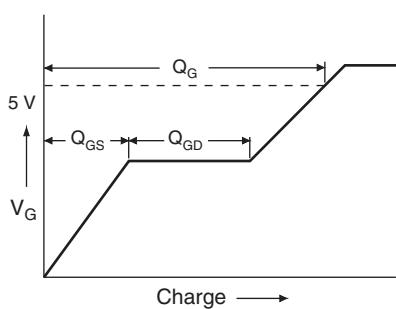


Fig. 13a - Basic Gate Charge Waveform

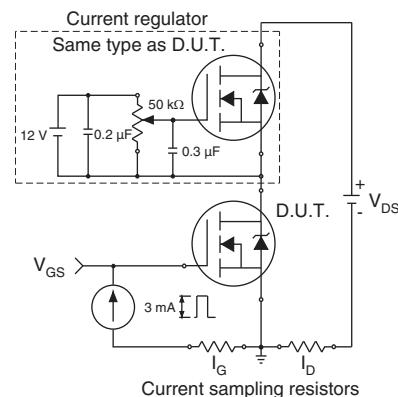
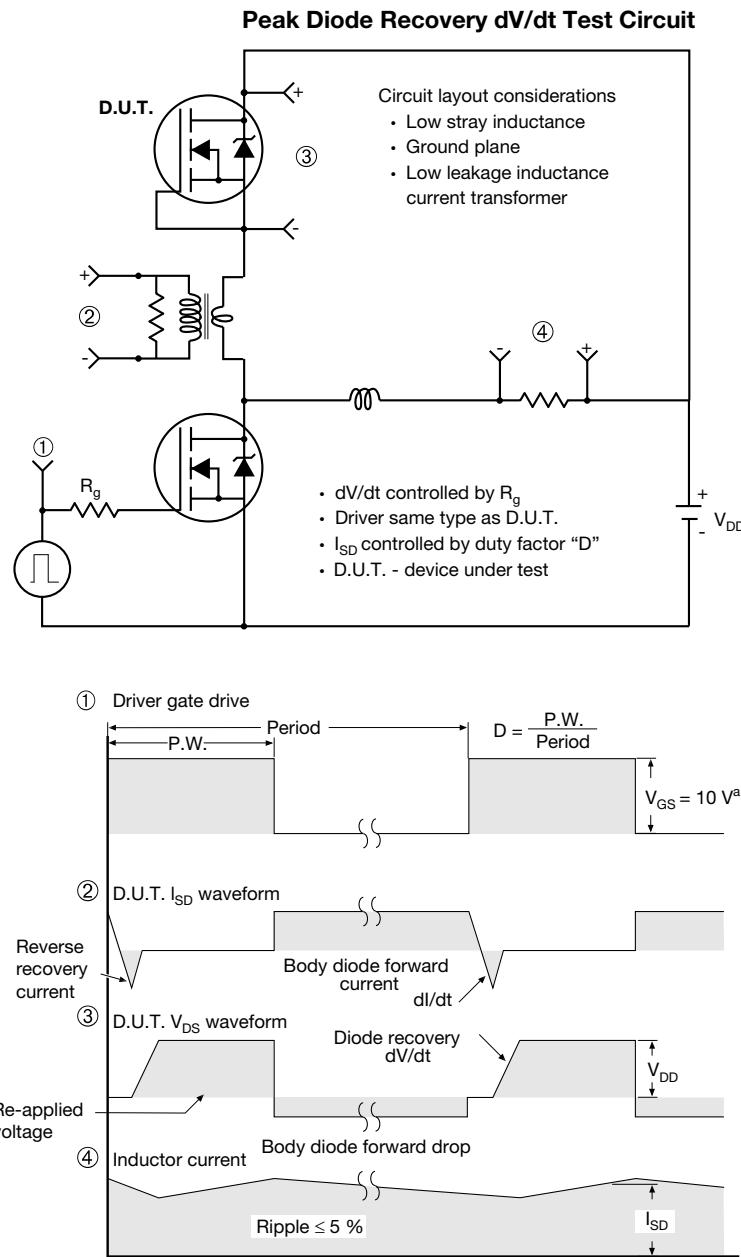
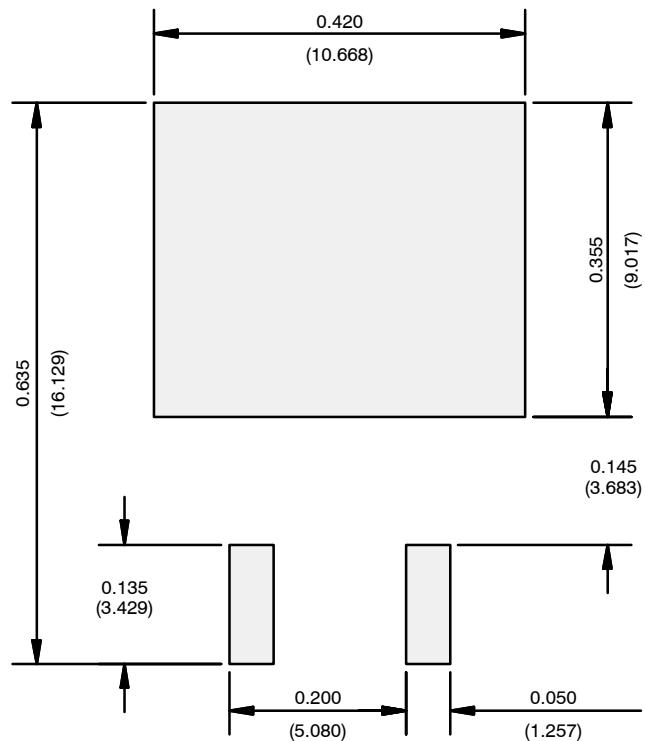


Fig. 13b - Gate Charge Test Circuit


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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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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