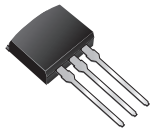


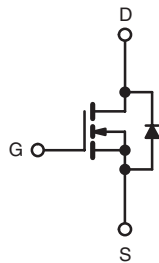
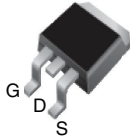
Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	900	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	8.0
Q_g (Max.) (nC)	38	
Q_{gs} (nC)	4.7	
Q_{gd} (nC)	21	
Configuration	Single	

I²PAK (TO-262)



D²PAK (TO-263)



N-Channel MOSFET

FEATURES

- Surface Mount (IRFBF20S/SiHFBF20S)
- Low-Profile Through-Hole (IRFBF20L/SiHFBF20L)
- Available in Tape and Reel (IRFBF20S/SiHFBF20S)
- Dynamic dV/dt Rating
- 150 °C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- 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 D²PAK 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 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. The through-hole version (IRFBF20L/SiHFBF20L) is available for low-profile applications.

ORDERING INFORMATION				
Package	D ² PAK (TO-263)	D ² PAK (TO-263)	D ² PAK (TO-263)	I ² PAK (TO-262)
Lead (Pb)-free	IRFBF20SPbF	IRFBF20STRLPbF ^a	IRFBF20STRRPbF ^a	IRFBF20LPbF
	SiHFBF20S-E3	SiHFBF20STL-E3 ^a	SiHFBF20STR-E3 ^a	SiHFBF20L-E3
SnPb	IRFBF20S	IRFBF20STL ^a	IRFBF20STR ^a	IRFBF20L
	SiHFBF20S-E3	SiHFBF20STL ^a	SiHFBF20STR ^a	SiHFBF20L

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted					
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage ^e			V_{DS}	900	V
Gate-Source Voltage ^e			V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25$ °C	I_D	1.7	A
		$T_C = 100$ °C		1.1	
Pulsed Drain Current ^{a,e}			I_{DM}	6.8	
Linear Derating Factor				0.43	W/°C
Single Pulse Avalanche Energy ^{b,e}			E_{AS}	180	mJ
Repetitive Avalanche Current ^a			I_{AR}	1.7	A
Repetitive Avalanche Energy ^a			E_{AR}	5.4	mJ
Maximum Power Dissipation	$T_C = 25$ °C		P_D	54	W
	$T_A = 25$ °C			3.1	
Peak Diode Recovery dV/dt ^{c,e}			dV/dt	1.5	V/ns

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

IRFBF20S, IRFBF20L, SiHFBF20S, SiHFBF20L

Vishay Siliconix



ABSOLUTE MAXIMUM RATINGS $T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted			
PARAMETER	SYMBOL	LIMIT	UNIT
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw	10	N

Notes


- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$; starting $T_J = 25\text{ }^\circ\text{C}$, $L = 117\text{ mH}$, $R_G = 25\text{ }\Omega$, $I_{AS} = 1.7\text{ A}$ (see fig. 12).
- $I_{SD} \leq 1.7\text{ A}$, $di/dt \leq 70\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.
- Uses IRFBF20/SiHFBF20 data and test conditions.

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mounted, steady-state) ^a	R_{thJA}	-	40	°C/W
Maximum Junction-to-Case	R_{thJC}	-	2.3	

Note

- 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}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	900	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$	-	1.1	-	mV/°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}	$V_{DS} = 900\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	100	μA
		$V_{DS} = 720\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	500	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ $I_D = 1.0\text{ A}^b$	-	-	8.0	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 1.0\text{ A}^b$	0.6	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5	-	490	-	pF
Output Capacitance	C_{oss}		-	55	-	
Reverse Transfer Capacitance	C_{riss}		-	18	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$ $I_D = 1.7\text{ A}$, $V_{DS} = 360\text{ V}$, see fig. 6 and 13 ^b	-	-	38	nC
Gate-Source Charge	Q_{gs}		-	-	4.7	
Gate-Drain Charge	Q_{gd}		-	-	21	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 450\text{ V}$, $I_D = 1.7\text{ A}$, $R_G = 18\text{ }\Omega$, $V_{GS} = 10\text{ V}$, see fig. 10 ^b	-	8.0	-	ns
Rise Time	t_r		-	21	-	
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	
Fall Time	t_f		-	32	-	

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	1.7	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	6.8	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}$, $I_S = 1.7\text{ A}$, $V_{GS} = 0\text{ V}^b$	-	-	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}$, $I_F = 1.7\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	350	530	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.85	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. Uses IRFBF20/SiHFBF20 data and test conditions.

TYPICAL CHARACTERISTICS 25°C , unless otherwise noted

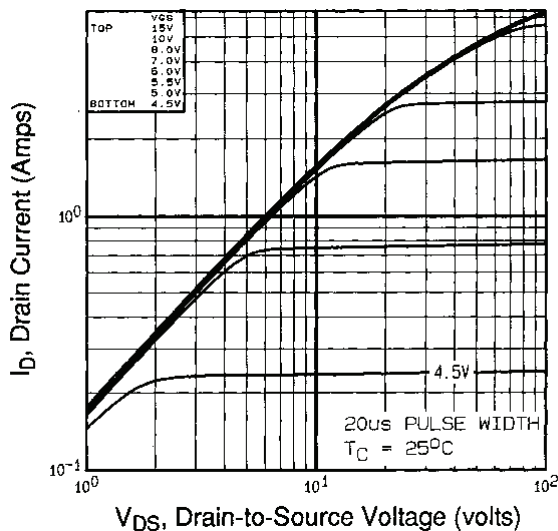


Fig. 1 - Typical Output Characteristics

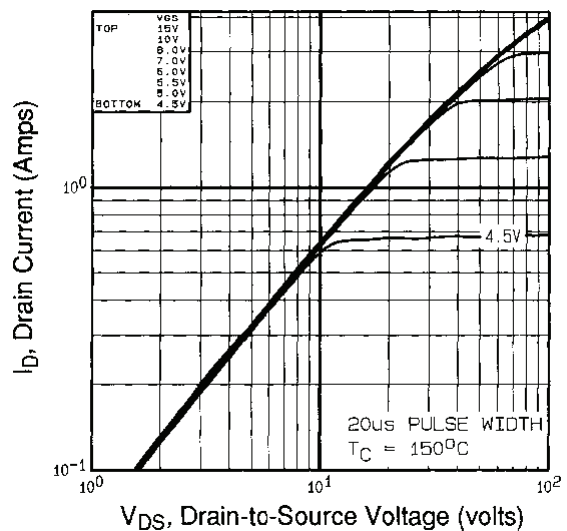


Fig. 2 - Typical Output Characteristics

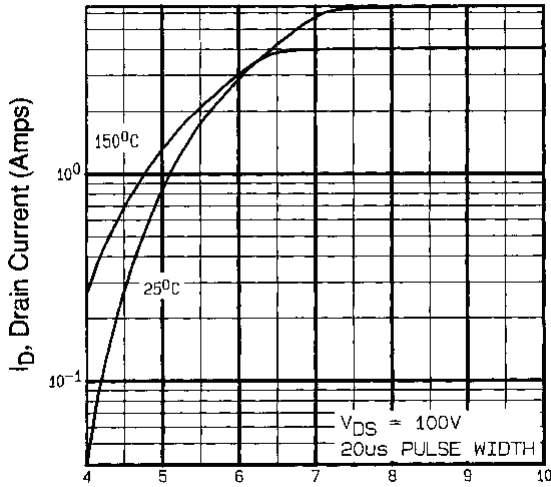


Fig. 3 - Typical Transfer Characteristics

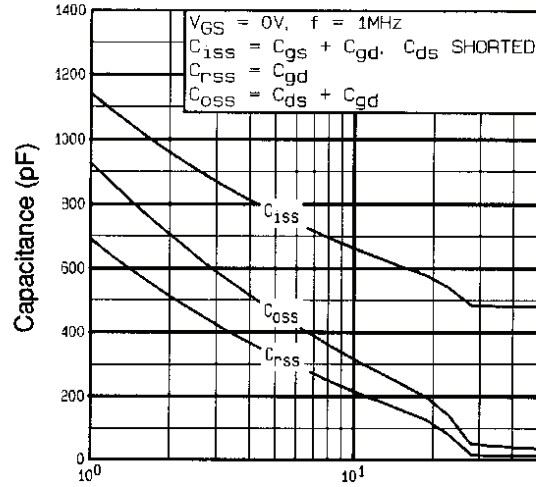


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

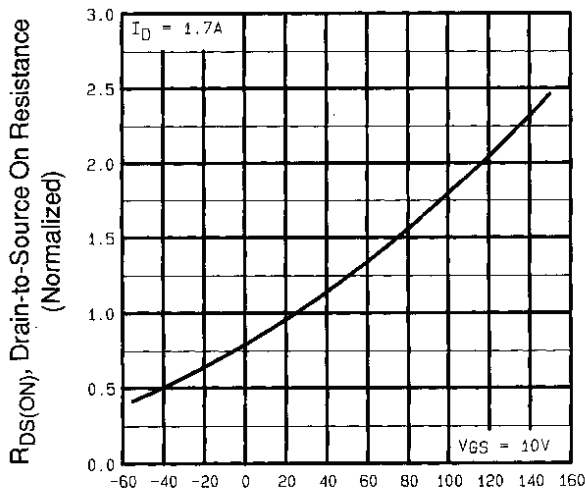


Fig. 4 - Normalized On-Resistance vs. Temperature

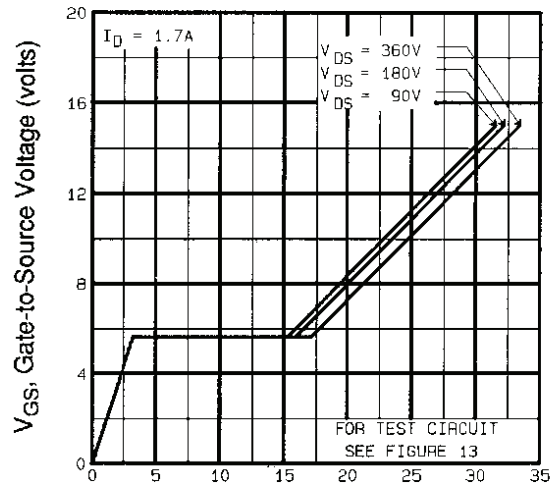


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

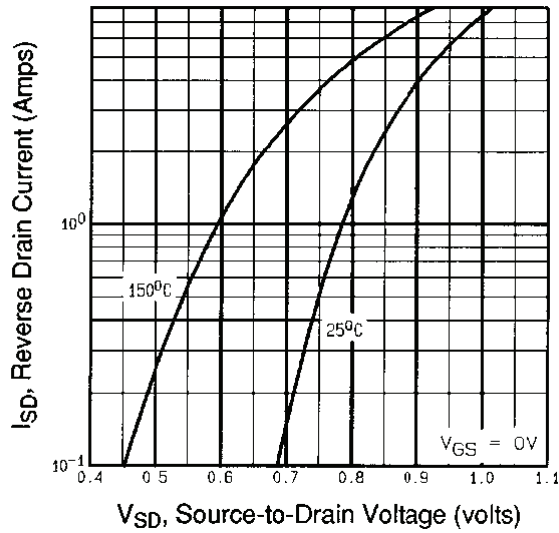


Fig. 7 - Typical Source-Drain Diode Forward Voltage

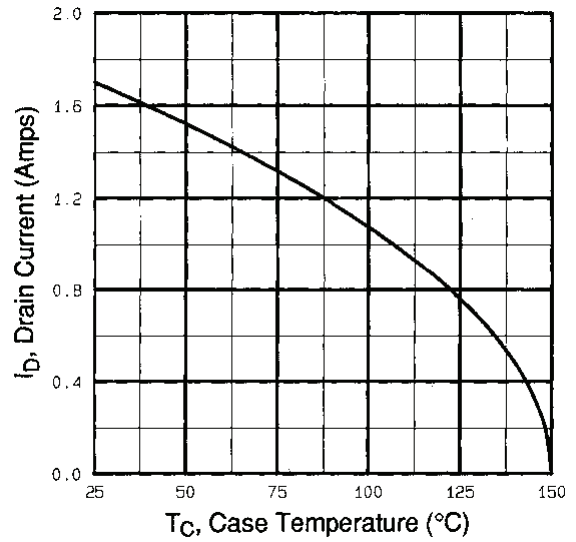


Fig. 9 - Maximum Drain Current vs. Case Temperature

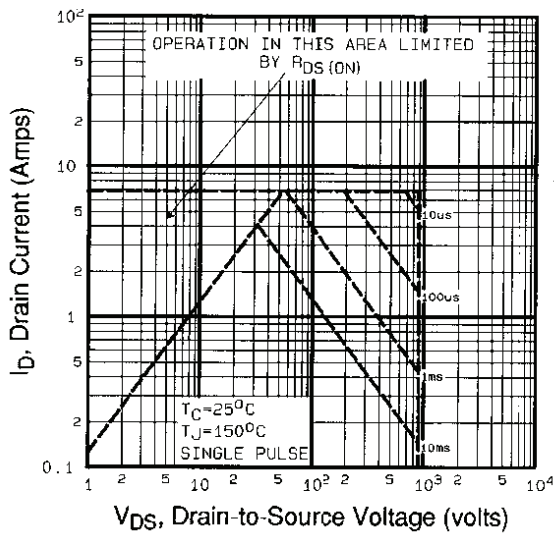


Fig. 8 - Maximum Safe Operating Area

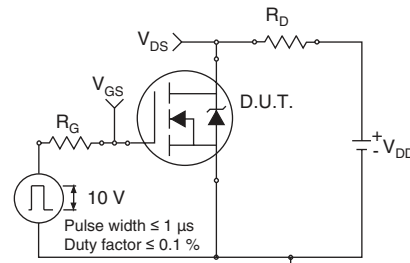


Fig. 10a - Switching Time Test Circuit

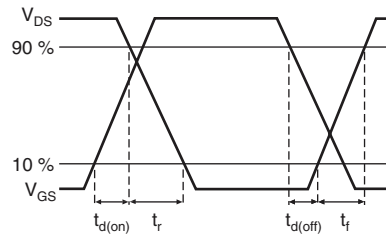


Fig. 10b - Switching Time Waveforms

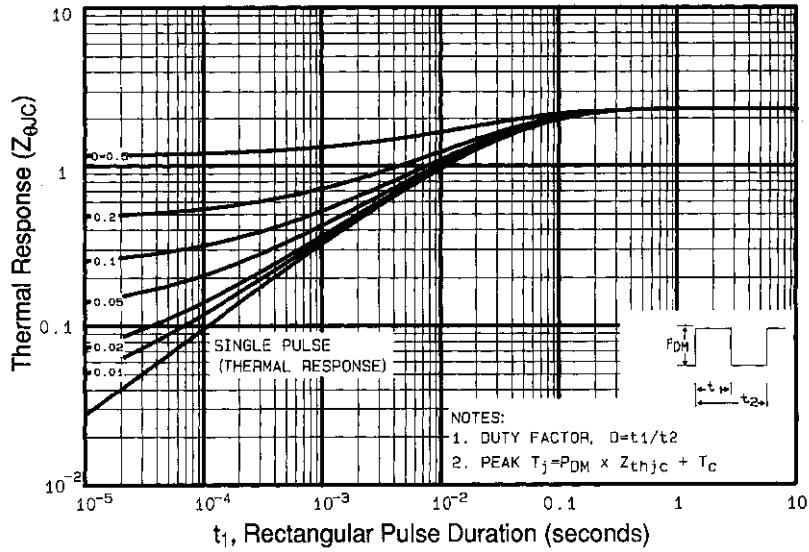


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

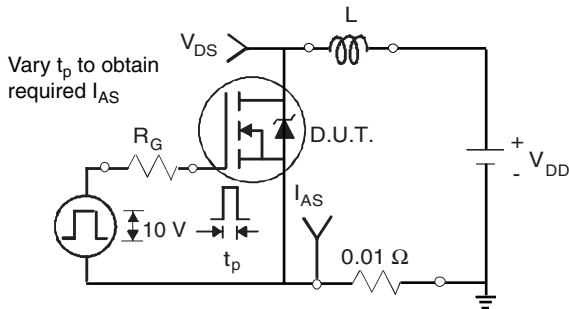


Fig. 12a - Unclamped Inductive Test Circuit

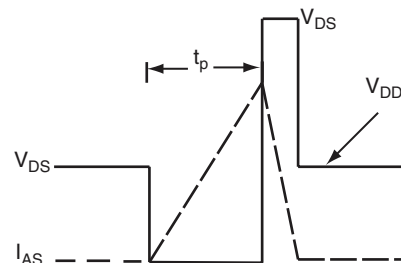


Fig. 12b - Unclamped Inductive Waveforms

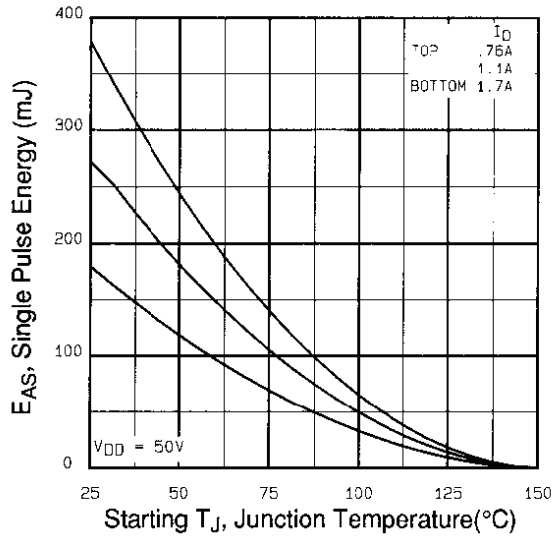


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

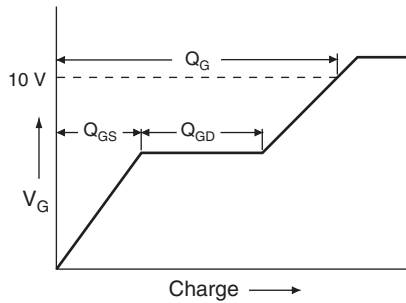


Fig. 13a - Basic Gate Charge Waveform

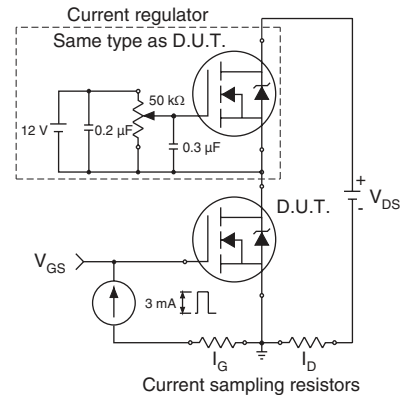
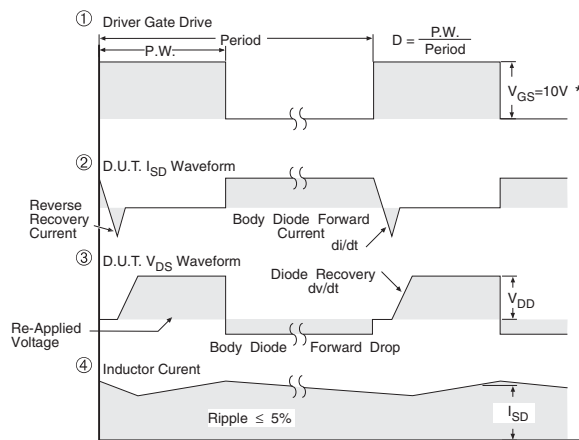
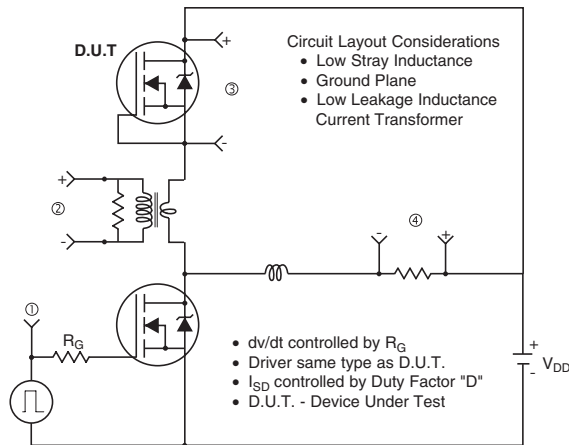


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



* $V_{GS} = 5V$ for Logic Level Devices

Fig. 14 - For N-Channel

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