IRFBG20PBF Datasheet

https://www.DiGi-Electronics.com

DiGi Electronics Part Number	IRFBG20PBF-DG
Manufacturer	Vishay Siliconix
Manufacturer Product Number	IRFBG20PBF
Description	MOSFET N-CH 1000V 1.4A TO220AB
Detailed Description	N-Channel 1000 V 1.4A (Tc) 54W (Tc) Through Hole TO-220AB

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Purchase and inquiry

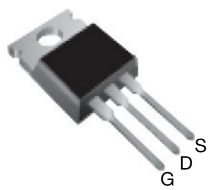
Manufacturer Product Number:	Manufacturer:
IRFBG20PBF	Vishay Siliconix
Series:	Product Status:
-	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
1000 V	1.4A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
10V	11Ohm @ 840mA, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250µA	38 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	500 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	54W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Through Hole
Supplier Device Package:	Package / Case:
TO-220AB	TO-220-3
Base Product Number:	
IRFBG20	

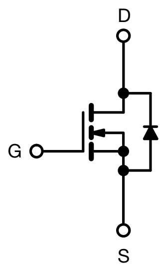
Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

Power MOSFET

TO-220AB





N-Channel MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	1000	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	11
Q_g max. (nC)	38	
Q_{gs} (nC)	4.9	
Q_{gd} (nC)	22	
Configuration	Single	

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- Fast switching
- Ease of paralleling
- Simple drive requirements
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS*
Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

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 TO-220AB package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220AB contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRFBG20PbF
Lead (Pb)-free and halogen-free	IRFBG20PbF-BE3

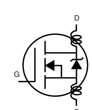
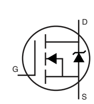
ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-source voltage			V_{DS}	1000	V
Gate-source voltage			V_{GS}	± 20	
Continuous drain current	V_{GS} at 10 V	T_C = 25 °C	I_D	1.4	A
		T_C = 100 °C		0.86	
Pulsed drain current [a]			I_{DM}	5.6	
Linear derating factor				0.43	W/°C
Single pulse avalanche energy [b]			E_{AS}	200	mJ
Repetitive avalanche current [a]			I_{AR}	1.4	A
Repetitive avalanche energy [a]			E_{AR}	5.4	mJ
Maximum power dissipation	T_C = 25 °C		P_D	54	W
Peak diode recovery dV/dt [c]			dV/dt	1.0	V/ns
Operating junction and storage temperature range			T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) [d]	For 10 s			300	
Mounting torque	6-32 or M3 screw			10	lbf · in
				1.1	N · m

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
b. V_{DD} = 50 V, starting T_J = 25 °C, L = 193 μH, R_g = 25 Ω, I_{AS} = 1.4 A (see fig. 12)
c. I_{SD} ≤ 1.4 A, dI/dt ≤ 60 A/μs, V_{DD} ≤ 600, T_J ≤ 150 °C
d. 1.6 mm from case

THERMAL RESISTANCE RATINGS				
PARAMETER	**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum junction-to-ambient	R_{thJA}	-	62	°C/W
Case-to-sink, flat, greased surface	R_{thCS}	0.50	-	
Maximum junction-to-case (drain)	R_{thJC}	-	2.3	

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA		1000	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA		-	1.2	-	V/°C
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		2.0	-	4.0	V
Gate-source leakage	I_{GSS}	V_{GS} = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 1000 V, V_{GS} = 0 V		-	-	100	μA
		V_{DS} = 800 V, V_{GS} = 0 V, T_J = 125 °C		-	-	500	
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 0.84 A [b]	-	-	11	Ω
Forward transconductance	g_{fs}	V_{DS} = 50 V, I_D = 0.84 A [b]		1.0	-	-	S
Dynamic							
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	500	-	pF
Output capacitance	C_{oss}			-	52	-	
Reverse transfer capacitance	C_{rss}			-	17	-	
Total gate charge	Q_g	V_{GS} = 10 V	I_D = 1.4 A, V_{DS} = 400 V, see fig. 6 and 13 [b]	-	-	38	nC
Gate-source charge	Q_{gs}			-	-	4.9	
Gate-drain charge	Q_{gd}			-	-	22	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 500 V, I_D = 1.4 A, R_g = 18 Ω, R_D = 370 Ω, see fig. 10 [b]		-	9.4	-	ns
Rise time	t_r			-	17	-	
Turn-off delay time	$t_{d(off)}$			-	58	-	
Fall time	t_f			-	31	-	
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	-	
Gate input resistance	R_g	f = 1 MHz, open drain		0.6	-	3.4	Ω
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	1.4	A
Pulsed diode forward current [a]	I_{SM}			-	-	5.6	
Body diode voltage	V_{SD}	T_J = 25 °C, I_S = 1.4 A, V_{GS} = 0 V [b]		-	-	1.5	V
Body diode reverse recovery time	t_{rr}	T_J = 25 °C, I_F = 1.4 A, dI/dt = 100 A/μs [b]		-	130	190	ns
Body diode reverse recovery charge	Q_{rr}			-	0.46	0.69	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 ≤ 300 μs; duty cycle ≤ 2 %

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

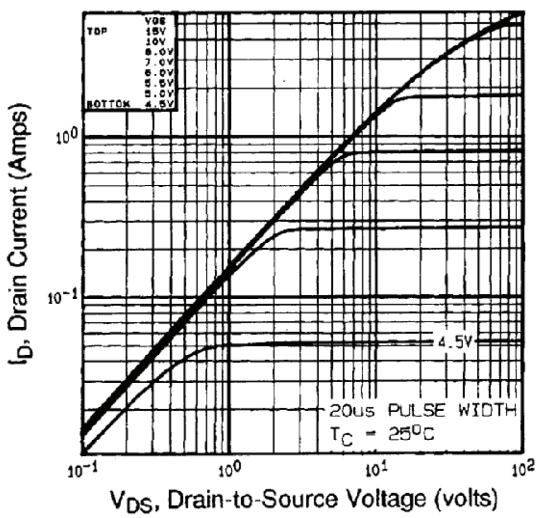


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

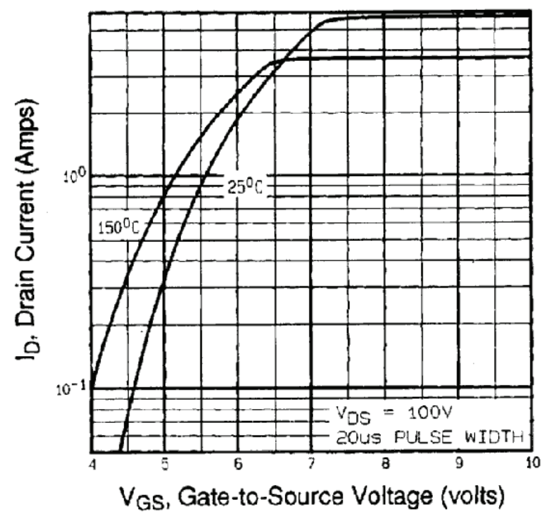


Fig. 3 - Typical Transfer Characteristics

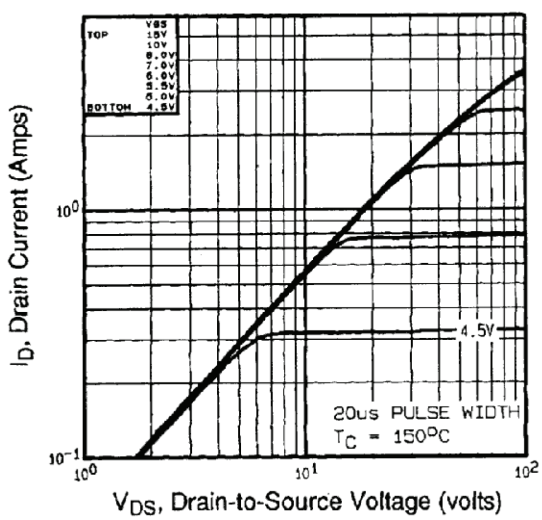


Fig. 2 - Typical Output Characteristics, T_C = 150 °C

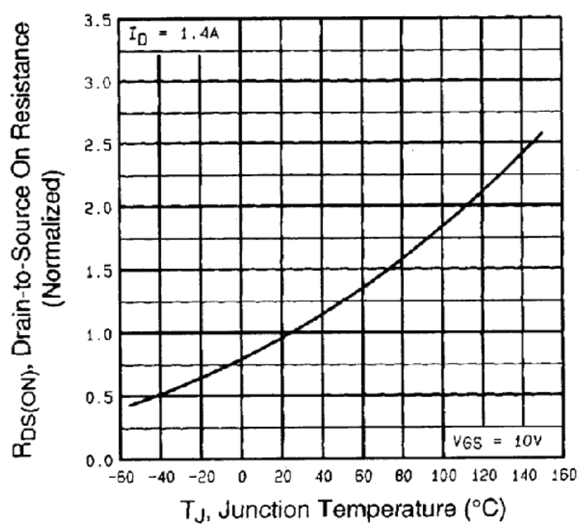


Fig. 4 - Normalized On-Resistance vs. Temperature

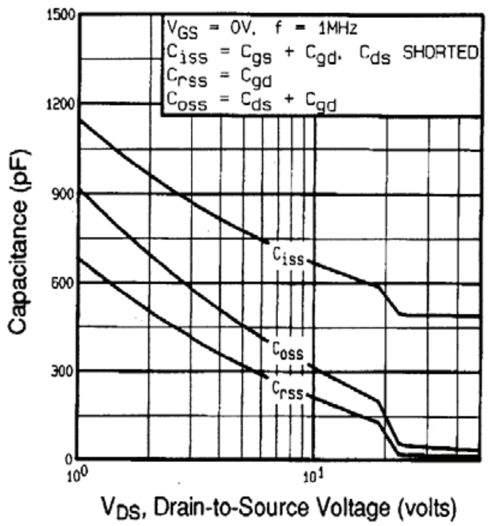


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

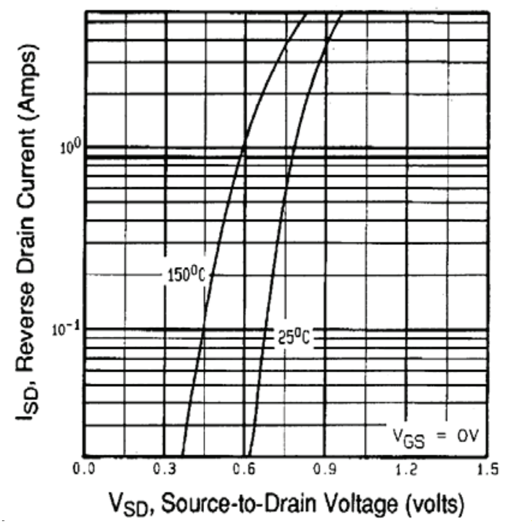


Fig. 7 - Typical Source-Drain Diode Forward Voltage

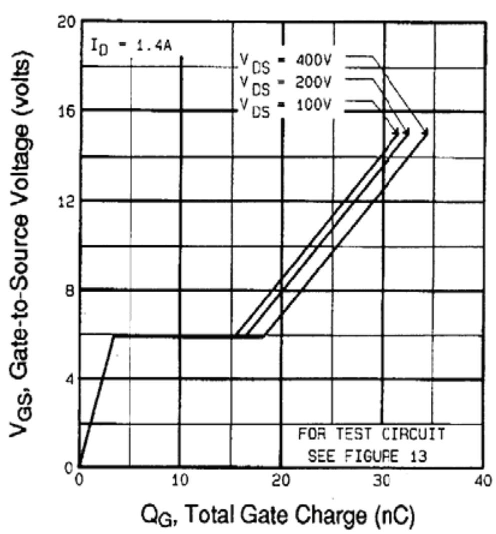


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

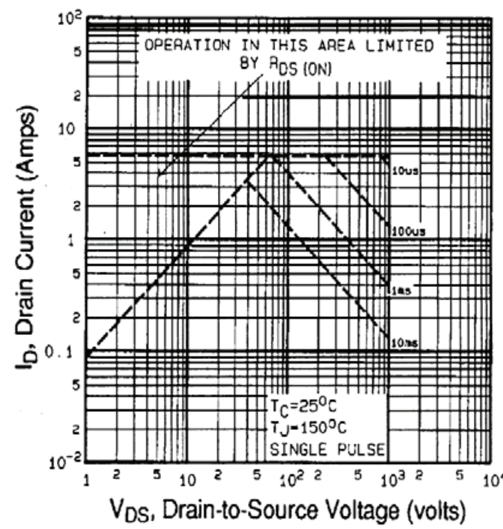


Fig. 8 - Maximum Safe Operating Area

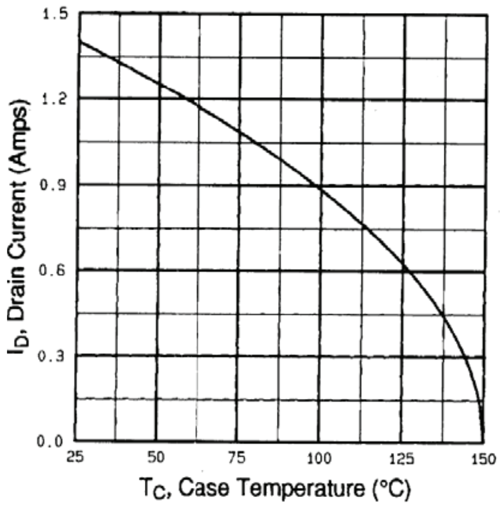


Fig. 9 - Maximum Drain Current vs. Case Temperature

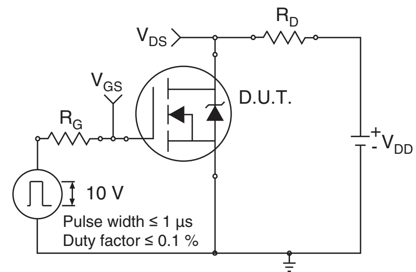


Fig. 10a - Switching Time Test Circuit

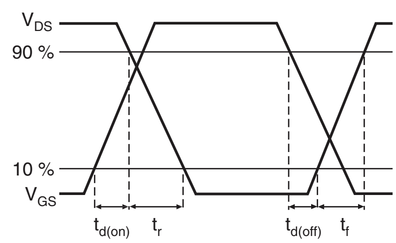


Fig. 10b - Switching Time Waveforms

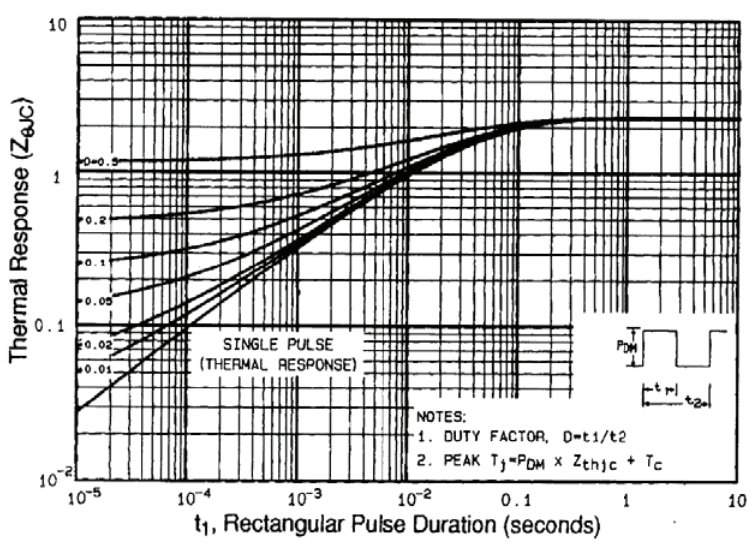


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

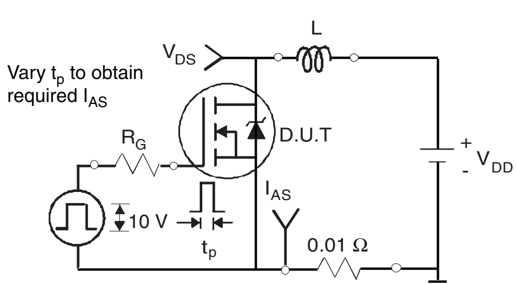


Fig. 12a - Unclamped Inductive Test Circuit

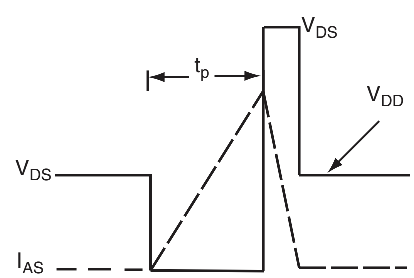


Fig. 12b - Unclamped Inductive Waveforms

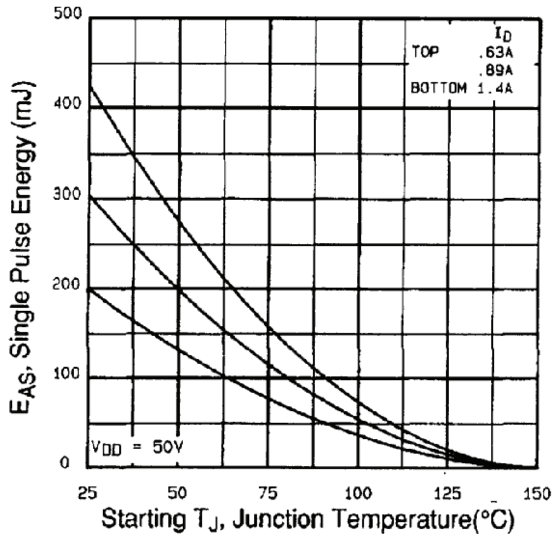


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

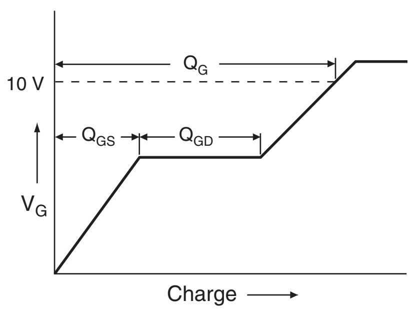


Fig. 13a - Basic Gate Charge Waveform

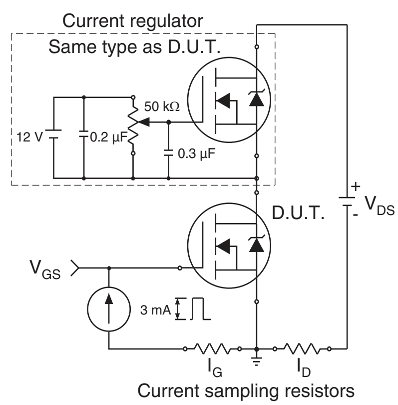
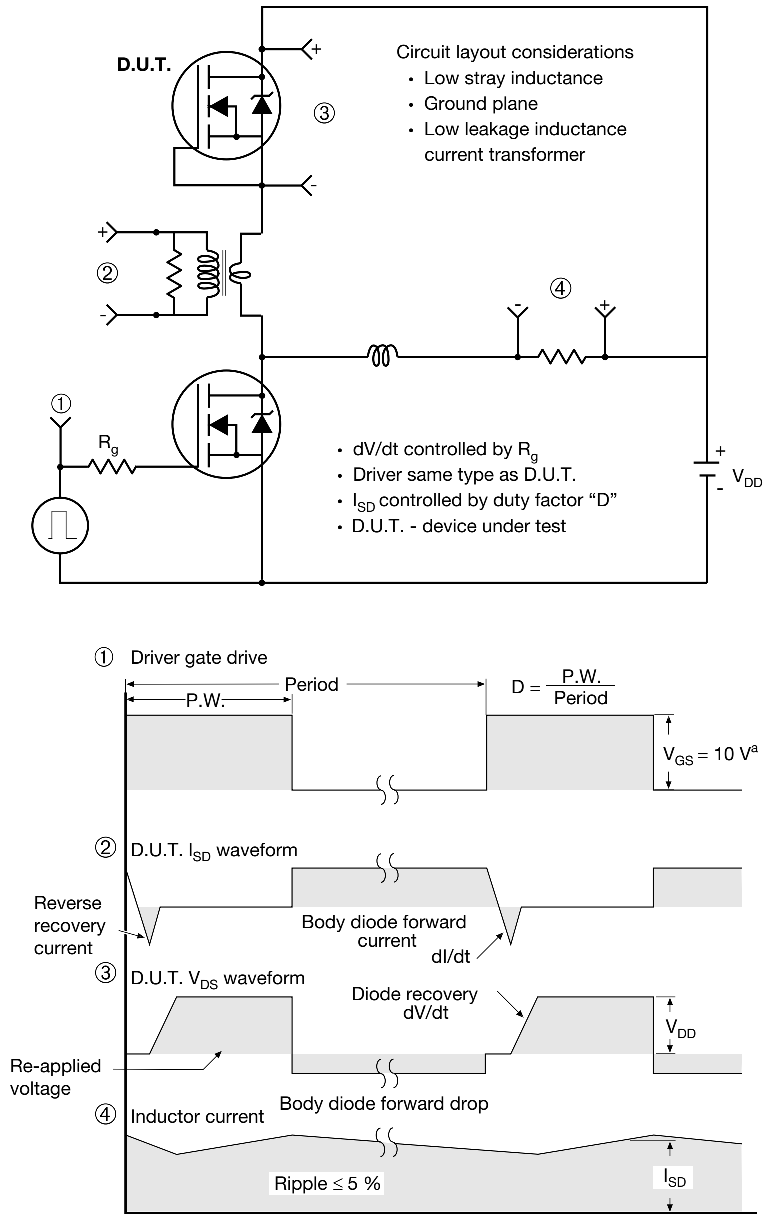


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Note

a. V_{GS} = 5 V for logic level devices

Fig. 14 - For N-Channel

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