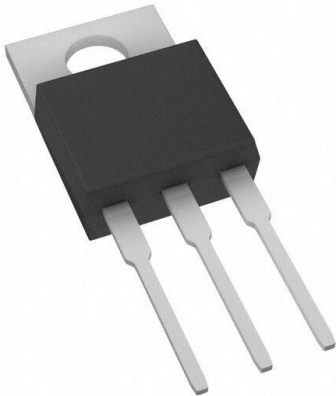


# IRFBE20PBF Datasheet

[www.digi-electronics.com](http://www.digi-electronics.com)



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	IRFBE20PBF-DG
Manufacturer	<a href="#">Vishay Siliconix</a>
Manufacturer Product Number	IRFBE20PBF
Description	MOSFET N-CH 800V 1.8A TO220AB
Detailed Description	N-Channel 800 V 1.8A (Tc) 54W (Tc) Through Hole T O-220AB



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

IRFBE20PBF

Series:

-

Part Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

1.8A (Tc)

Rds On (Max) @ Id, Vgs:

6.50hm @ 1.1A, 10V

Gate Charge (Qg) (Max) @ Vgs:

38 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

530 pF @ 25 V

Power Dissipation (Max):

54W (Tc)

Mounting Type:

Through Hole

Package / Case:

TO-220-3

Manufacturer:

Vishay Siliconix

Packaging:

Tube

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

800 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (TJ)

Supplier Device Package:

TO-220AB

Base Product Number:

IRFBE20

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Affected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

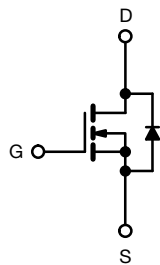
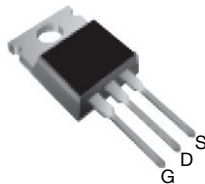
ECCN:

EAR99



## Power MOSFET

TO-220AB



N-Channel MOSFET

### 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](http://www.vishay.com/doc?99912)



Available  
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.

### PRODUCT SUMMARY

$V_{DS}$ (V)	800	
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V	6.5
$Q_g$ max. (nC)	38	
$Q_{gs}$ (nC)	5.0	
$Q_{gd}$ (nC)	21	
Configuration	Single	

### ORDERING INFORMATION

Package	TO-220AB
Lead (Pb)-free	IRFBE20PbF
Lead (Pb)-free and halogen-free	IRFBE20PbF-BE3

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

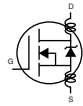

PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	$V_{DS}$	800	V	
Gate-source voltage	$V_{GS}$	$\pm 20$		
Continuous drain current	$V_{GS}$ at 10 V	$T_C = 25$ °C	A	
		$T_C = 100$ °C		
Pulsed drain current <sup>a</sup>	$I_{DM}$	7.2		
Linear derating factor		0.43	W/°C	
Single pulse avalanche energy <sup>b</sup>	$E_{AS}$	180	mJ	
Repetitive avalanche current <sup>a</sup>	$I_{AR}$	1.8	A	
Repetitive avalanche energy <sup>a</sup>	$E_{AR}$	5.4	mJ	
Maximum power dissipation	$T_C = 25$ °C	$P_D$	54	W
Peak diode recovery dV/dt <sup>c</sup>	$dV/dt$	2.0	V/ns	
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to +150	°C	
Soldering recommendations (peak temperature) <sup>d</sup>	For 10 s	300		
Mounting torque	6-32 or M3 screw		10	lbf · in
			1.1	N · m

### Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 104$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 1.8$  A (see fig. 12)
- $I_{SD} \leq 1.8$  A,  $dI/dt \leq 80$  A/ $\mu$ s,  $V_{DD} \leq 600$ ,  $T_J \leq 150$  °C
- 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	

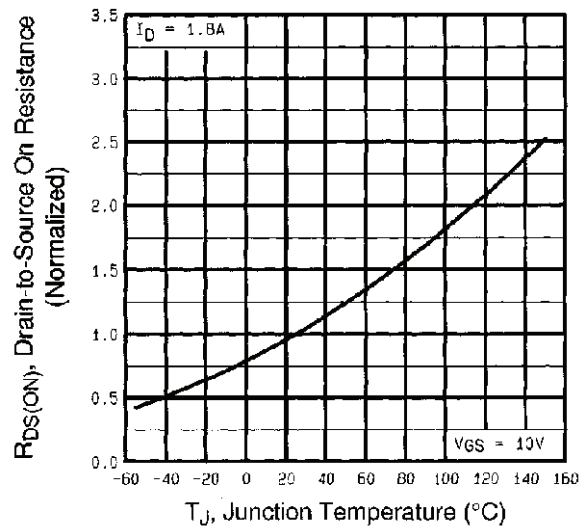
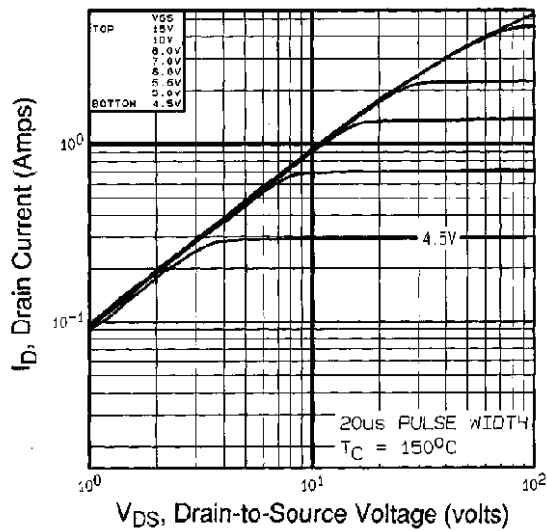
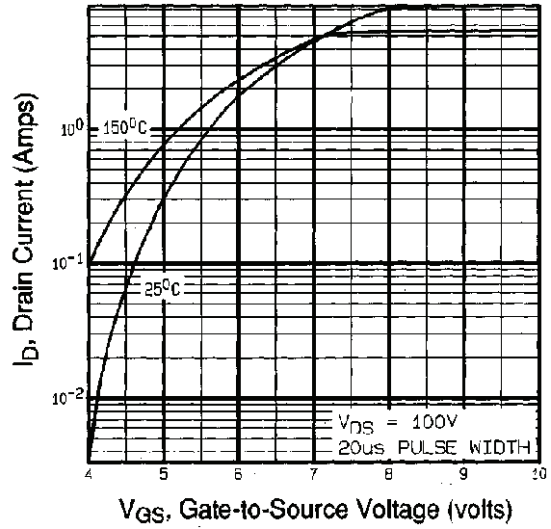
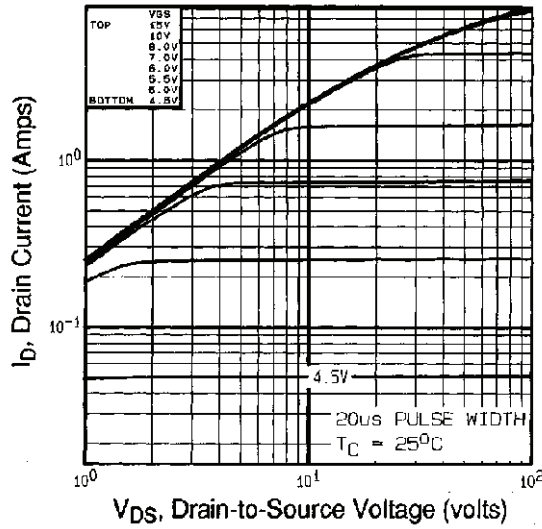
SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	800	-	-	V
$V_{DS}$ temperature coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\text{ mA}$	-	0.98	-	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	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$	-	-	$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 800\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	100	$\mu\text{A}$
		$V_{DS} = 640\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	500	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$   $I_D = 1.1\text{ A}^b$	-	-	6.5	$\Omega$
Forward transconductance	$g_{fs}$	$V_{DS} = 100\text{ V}$ , $I_D = 1.1\text{ A}^b$	0.80	-	-	S
<b>Dynamic</b>						
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1.0\text{ MHz}$ , see fig. 5	-	530	-	$\mu\text{F}$
Output capacitance	$C_{oss}$		-	150	-	
Reverse transfer capacitance	$C_{rss}$		-	90	-	
Total gate charge	$Q_g$	$V_{GS} = 10\text{ V}$   $I_D = 1.8\text{ A}$ , $V_{DS} = 400\text{ V}$ , see fig. 6 and 13 <sup>b</sup>	-	-	38	nC
Gate-source charge	$Q_{gs}$		-	-	5.0	
Gate-drain charge	$Q_{gd}$		-	-	21	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 400\text{ V}$ , $I_D = 1.8\text{ A}$ , $R_g = 18\text{ }\Omega$ , $R_D = 230\text{ }\Omega$ , see fig. 10 <sup>b</sup>	-	8.2	-	ns
Rise time	$t_r$		-	17	-	
Turn-off delay time	$t_{d(off)}$		-	58	-	
Fall time	$t_f$		-	27	-	
Gate input resistance	$R_g$	$f = 1\text{ MHz}$ , open drain	0.6	-	4.2	$\Omega$
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	-	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous source-drain diode current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	1.8	A
Pulsed diode forward current <sup>a</sup>	$I_{SM}$		-	-	7.2	
Body diode voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_S = 1.8\text{ A}$ , $V_{GS} = 0\text{ V}^b$	-	-	1.4	V
Body diode reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1.8\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	380	570	ns
Body diode reverse recovery charge	$Q_{rr}$		-	0.94	1.4	$\mu\text{C}$
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  $\leq 2\%$



**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



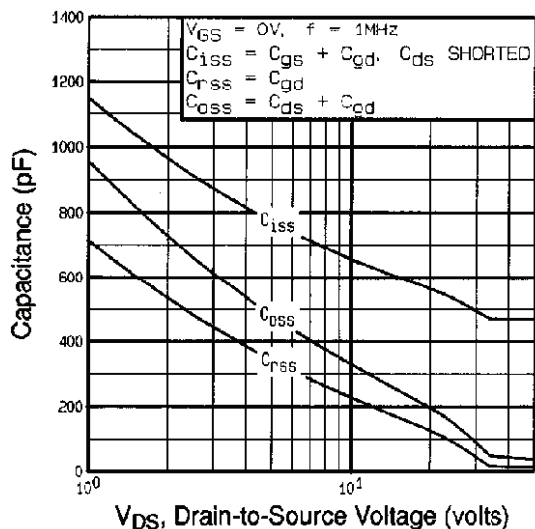


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

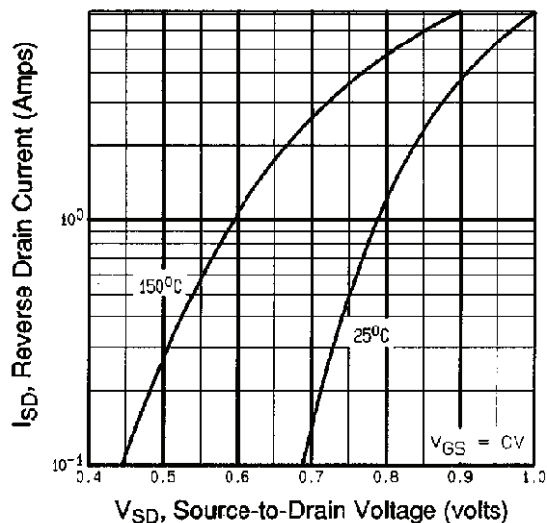


Fig. 7 - Typical Source-Drain Diode Forward Voltage

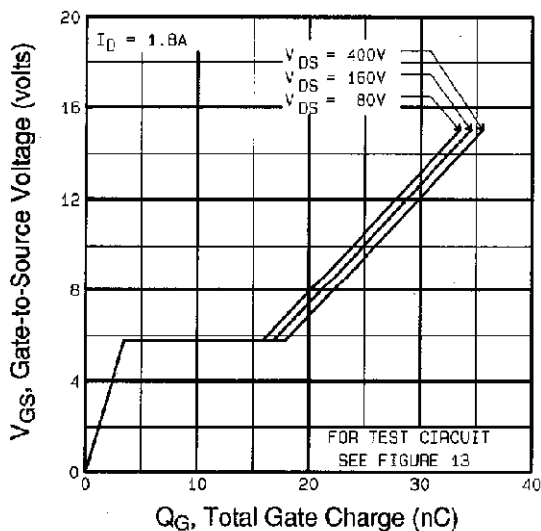


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

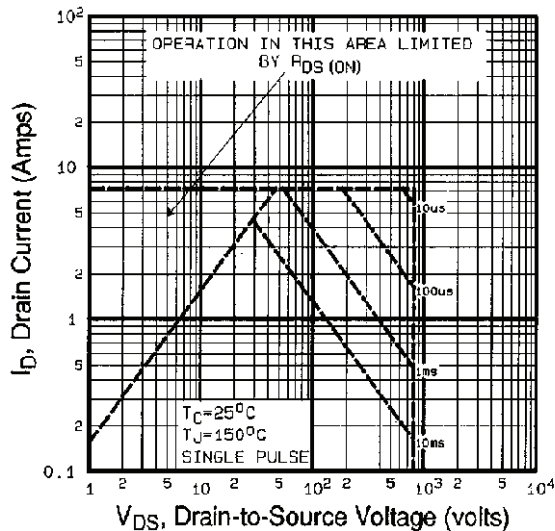


Fig. 8 - Maximum Safe Operating Area

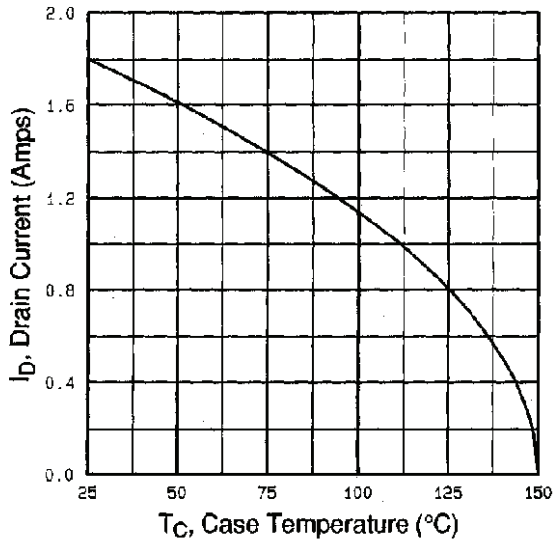


Fig. 9 - Maximum Drain Current vs. Case Temperature

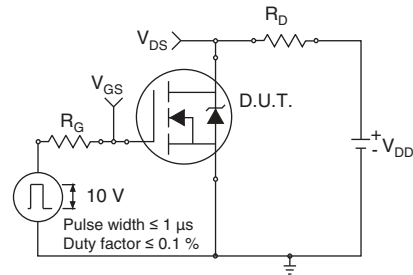


Fig. 10a - Switching Time Test Circuit

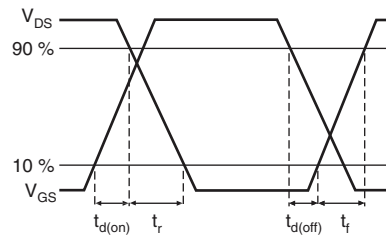


Fig. 10b - Switching Time Waveforms

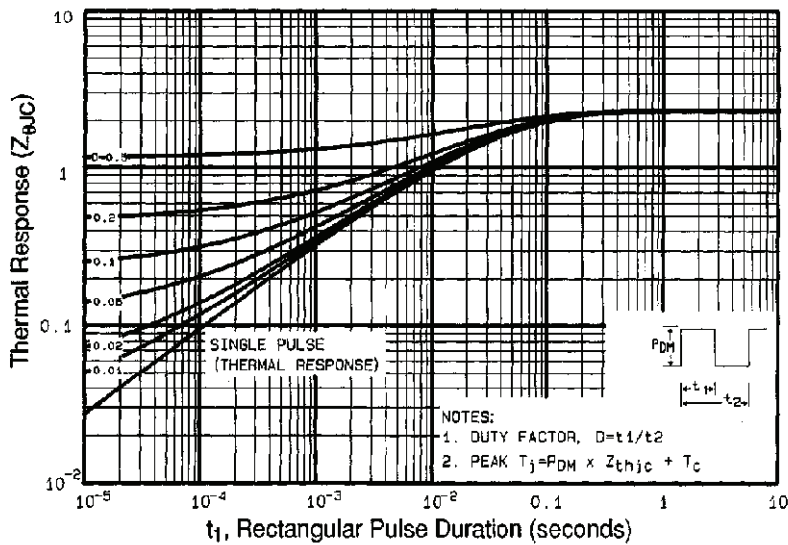


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

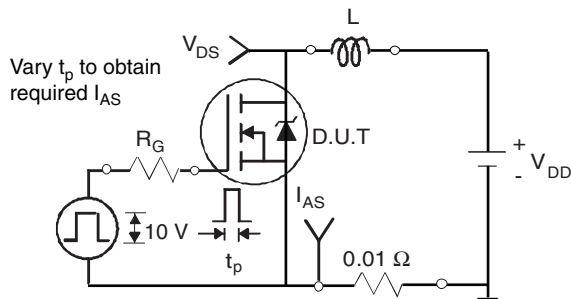


Fig. 12a - Unclamped Inductive Test Circuit

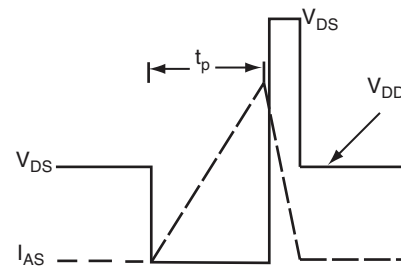


Fig. 12b - Unclamped Inductive Waveforms

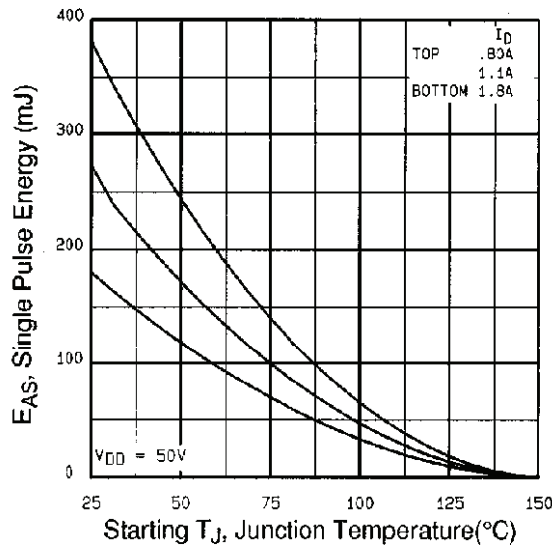


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

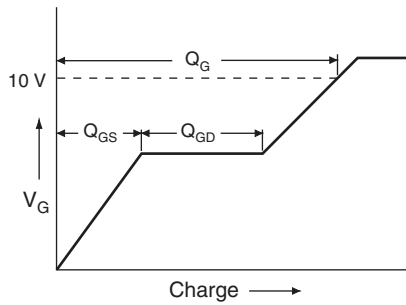


Fig. 13a - Basic Gate Charge Waveform

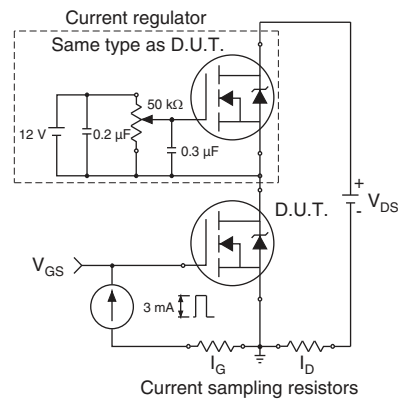
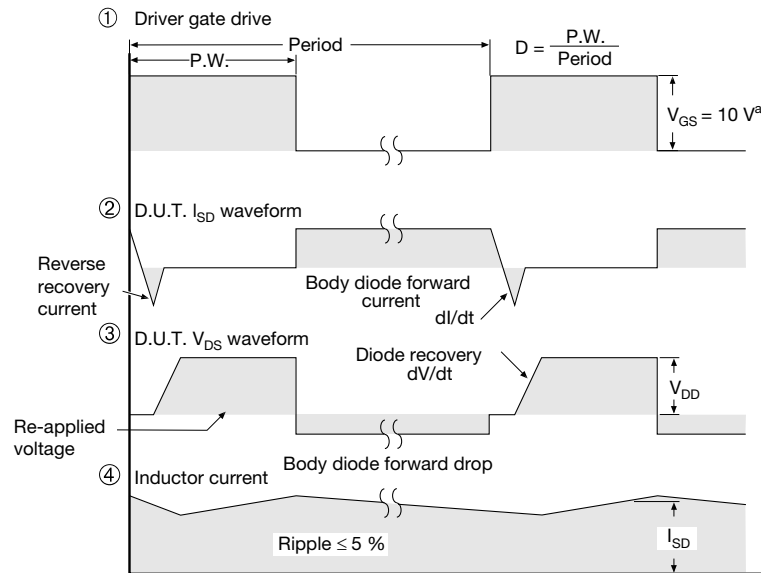
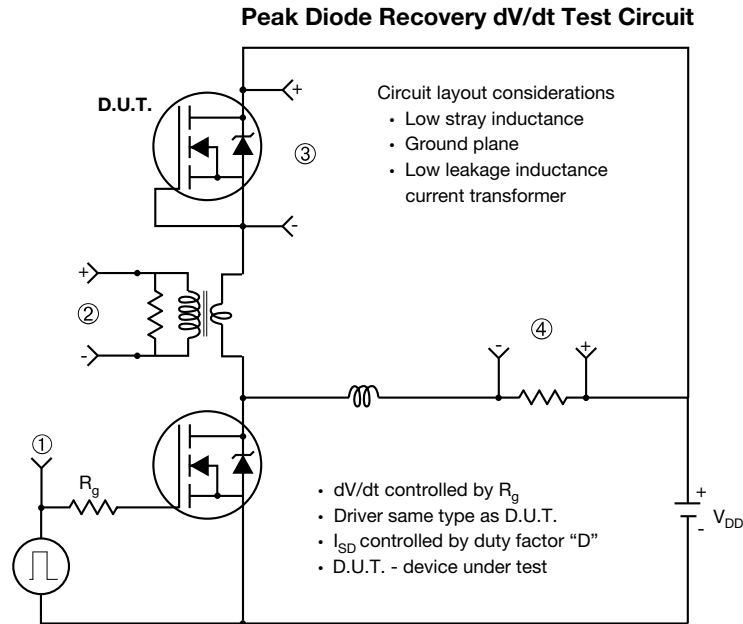


Fig. 13b - Gate Charge Test Circuit





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

**Fig. 14 - For N-Channel**

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