THE DATASHEET OF

IRFIB8N50K

International
IOR Rectifier

SMPS MOSFET

IRFIB8N50K

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ typ.	I_D
500V	290mΩ	6.7A

Applications

- Switch Mode Power Supply (SMPS)
- UninterruptIble Power Supply
- High Speed Power Switching

Benefits

- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current

TO-220
FULL-PAK

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	6.7	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	4.2	
I_{DM}	Pulsed Drain Current ①	27	
P_D @T_C = 25°C	Power Dissipation	45	W
	Linear Derating Factor	0.36	W/°C
V_{GS}	Gate-to-Source Voltage	±30	V
dv/dt	Peak Diode Recovery dv/dt ③	17	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torqe, 6-32 or M3 screw	1.1(10)	N•m (lbf•in)

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	–––	290	mJ
I_{AR}	Avalanche Current ①	–––	6.7	A
E_{AR}	Repetitive Avalanche Energy ①	–––	4.5	mJ

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	2.76	°C/W
$R_{\theta JA}$	Junction-to-Ambient	–––	65	

4/21/04

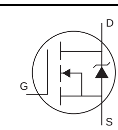
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.59	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	290	350	mΩ	V_{GS} = 10V, I_D = 4.0A ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	——	5.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	50	µA	V_{DS} = 500V, V_{GS} = 0V
		——	——	250		V_{DS} = 400V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 30V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -30V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	4.7	——	——	V	V_{DS} = 50V, I_D = 4.0A
Q_g	Total Gate Charge	——	——	89		I_D = 6.7A
Q_{gs}	Gate-to-Source Charge	——	——	24	nC	V_{DS} = 400V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	44		V_{GS} = 10V ④
$t_{d(on)}$	Turn-On Delay Time	——	17	——		V_{DD} = 250V
t_r	Rise Time	——	16	——		I_D = 6.7A
$t_{d(off)}$	Turn-Off Delay Time	——	28	——	ns	R_G = 38Ω
t_f	Fall Time	——	8.4	——		V_{GS} = 10V ④
C_{iss}	Input Capacitance	——	2160	——		V_{GS} = 0V
C_{oss}	Output Capacitance	——	240	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	27	——	pF	ƒ = 1.0MHz
C_{oss}	Output Capacitance	——	2600	——		V_{GS} = 0V, V_{DS} = 1.0V, ƒ = 1.0MHz
C_{oss}	Output Capacitance	——	62	——		V_{GS} = 0V, V_{DS} = 400V, ƒ = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	120	——		V_{GS} = 0V, V_{DS} = 0V to 400V ③

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	6.7	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	——	——	27		
V_{SD}	Diode Forward Voltage	——	——	2.0	V	T_J = 25°C, I_S = 6.7A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	430	640	ns	T_J = 25°C, I_F = 6.7A
Q_{rr}	Reverse RecoveryCharge	——	2840	4270	nC	di/dt = 100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See Fig. 11).

② Starting T_J = 25°C, L = 13mH, R_G = 25Ω, I_{AS} = 6.7A, dv/dt = 17V/ns (See Figure 12a).

③ I_{SD} ≤ 6.7A, di/dt ≤ 330A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C.

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

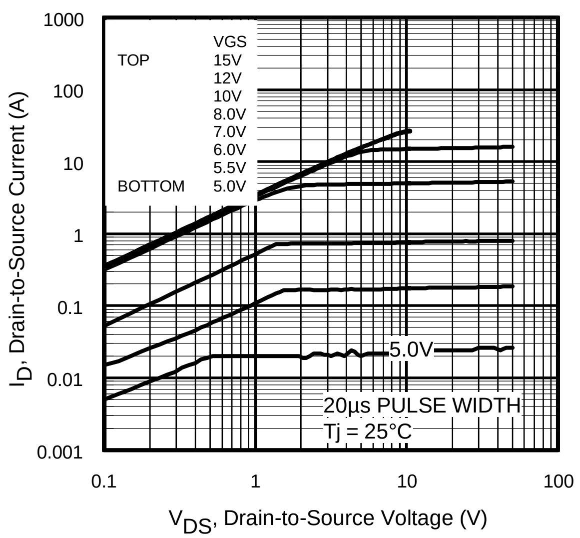


Fig 1. Typical Output Characteristics

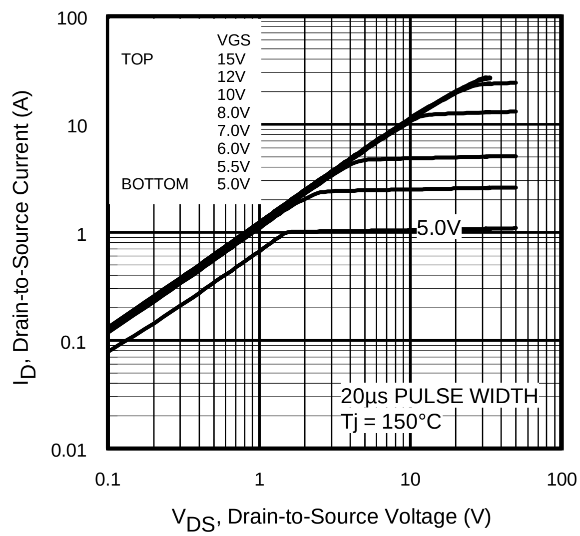


Fig 2. Typical Output Characteristics

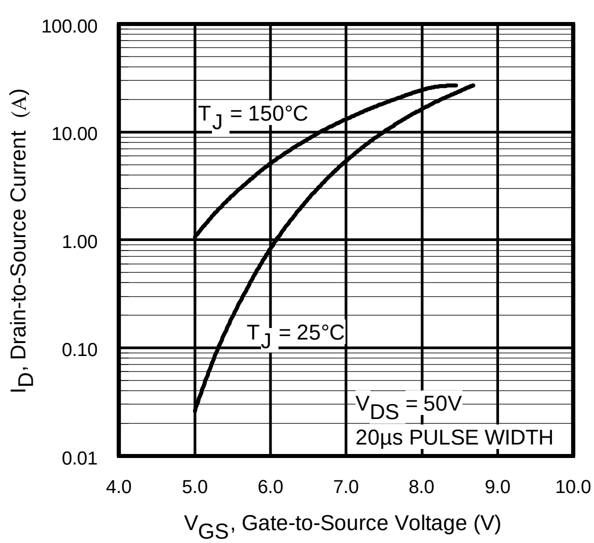


Fig 3. Typical Transfer Characteristics

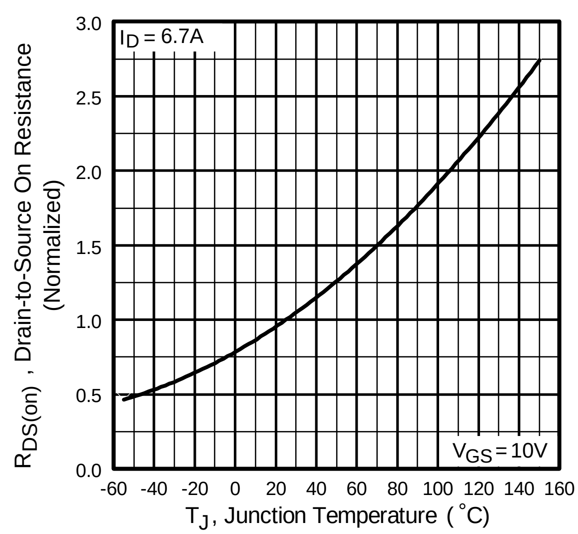


Fig 4. Normalized On-Resistance Vs. Temperature

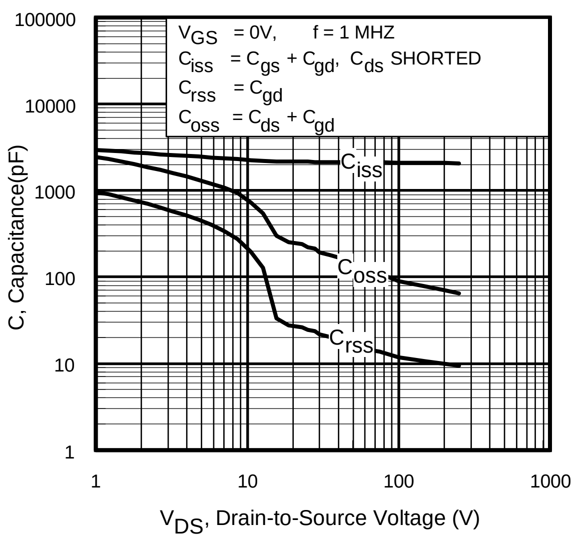


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

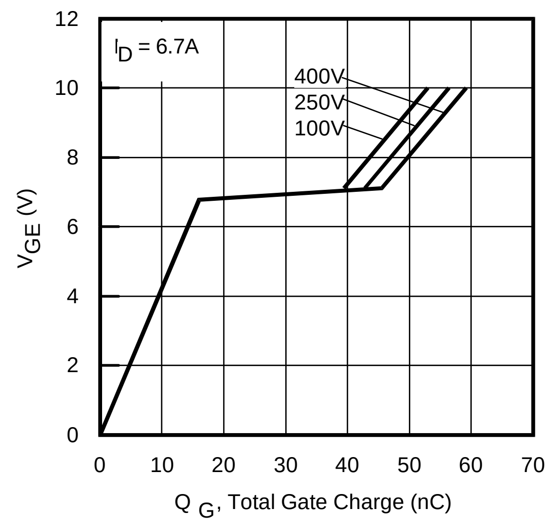


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

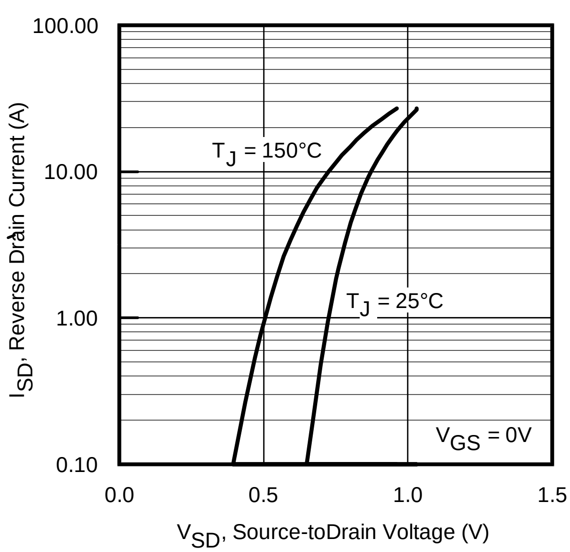


Fig 7. Typical Source-Drain Diode Forward Voltage

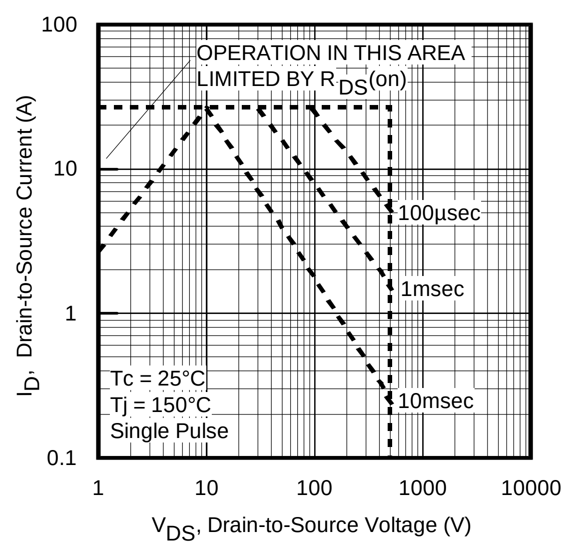


Fig 8. Maximum Safe Operating Area

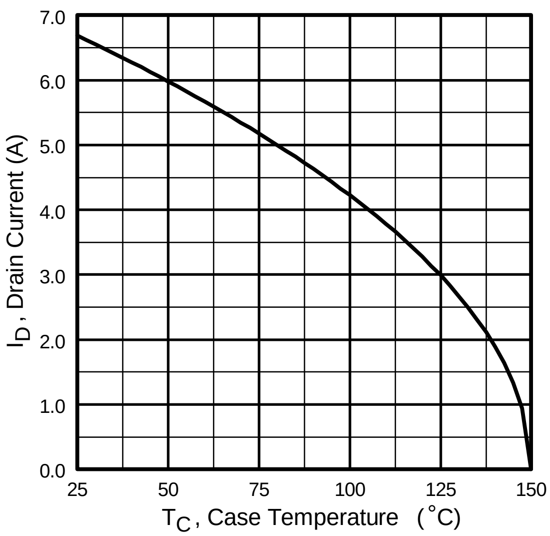


Fig 9. Maximum Drain Current Vs. Case Temperature

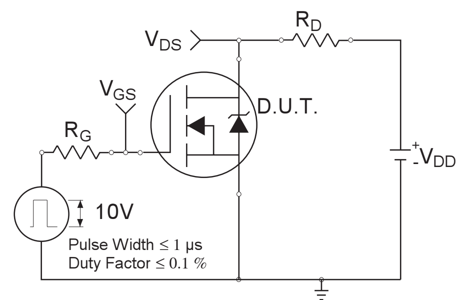


Fig 10a. Switching Time Test Circuit

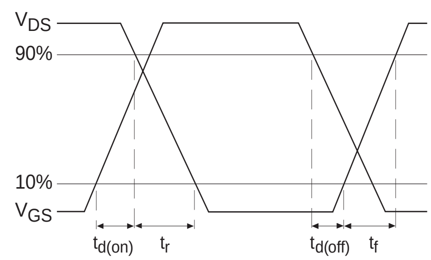


Fig 10b. Switching Time Waveforms

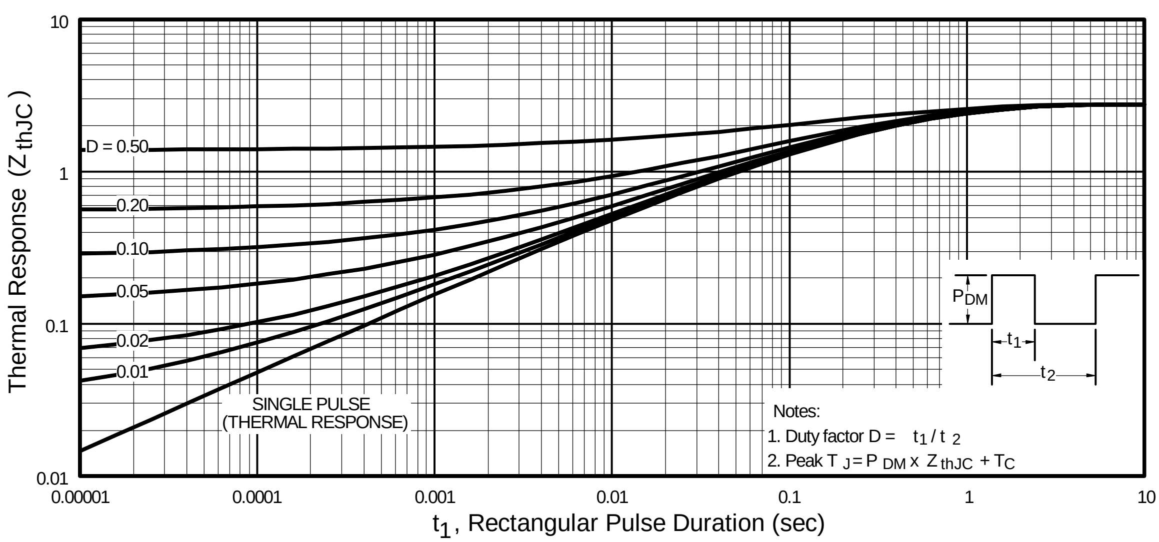


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

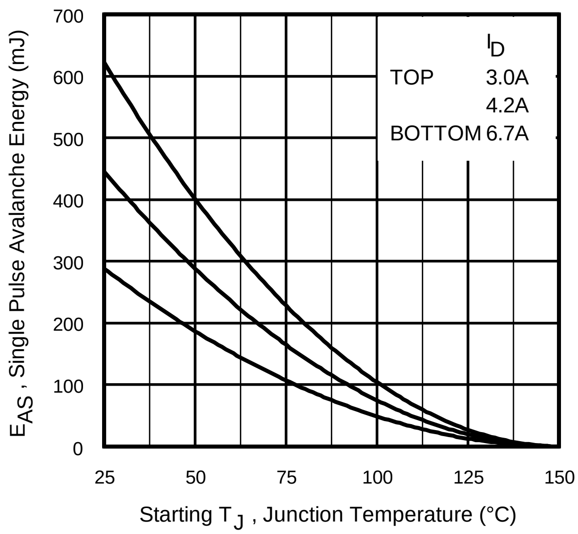


Fig 12a. Maximum Avalanche Energy Vs. Drain Current

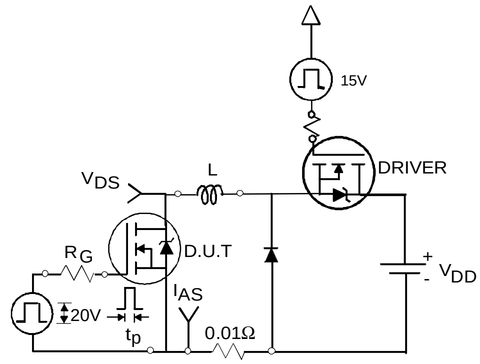


Fig 12c. Unclamped Inductive Test Circuit

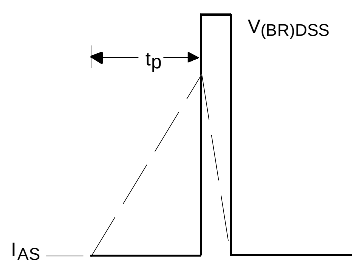


Fig 12d. Unclamped Inductive Waveforms

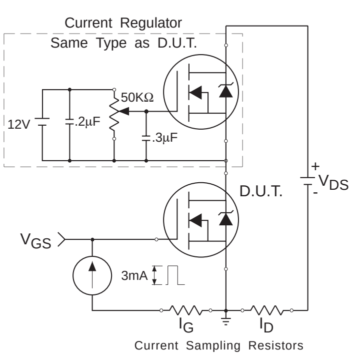


Fig 13a. Gate Charge Test Circuit

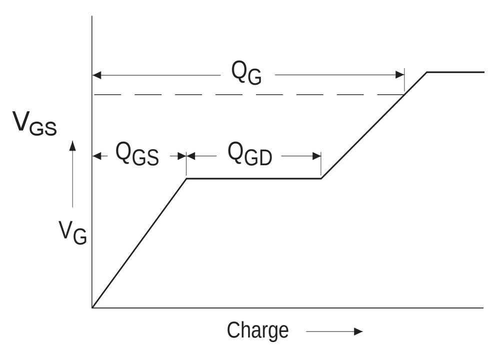


Fig 13b. Basic Gate Charge Waveform

Peak Diode Recovery dv/dt Test Circuit

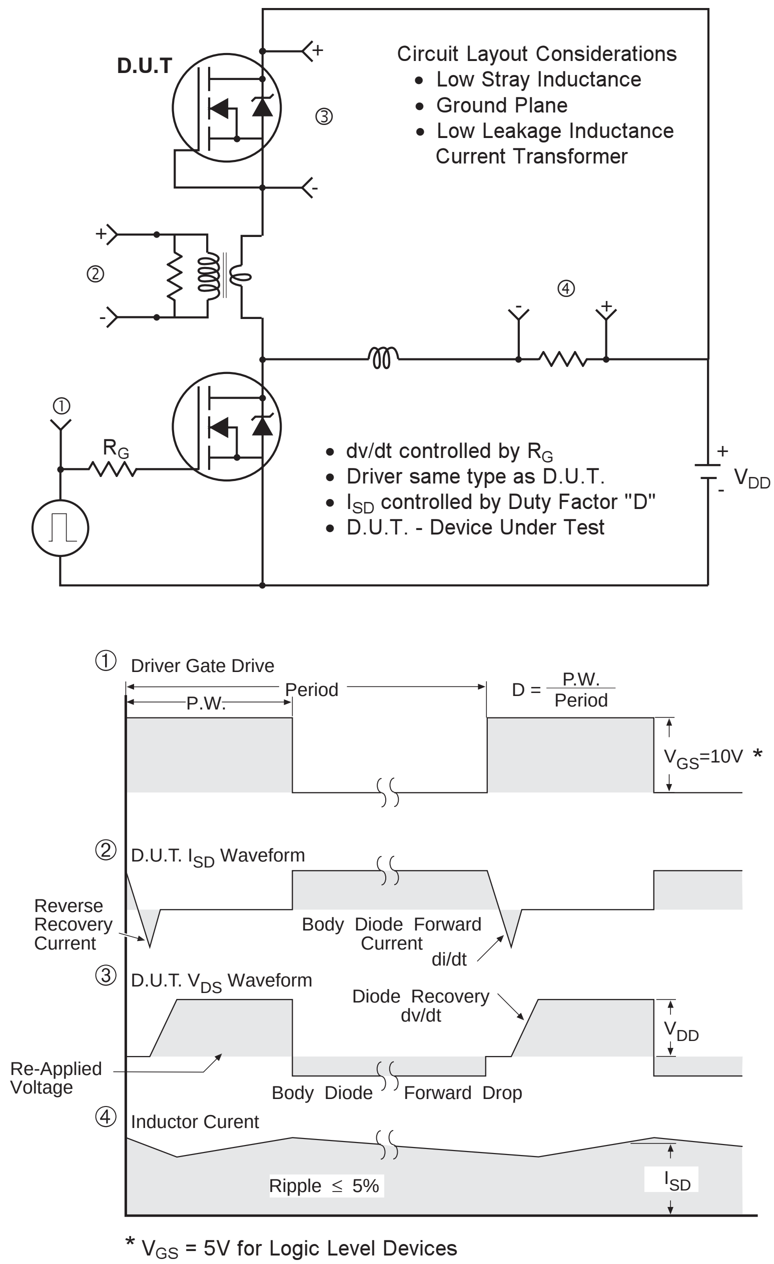
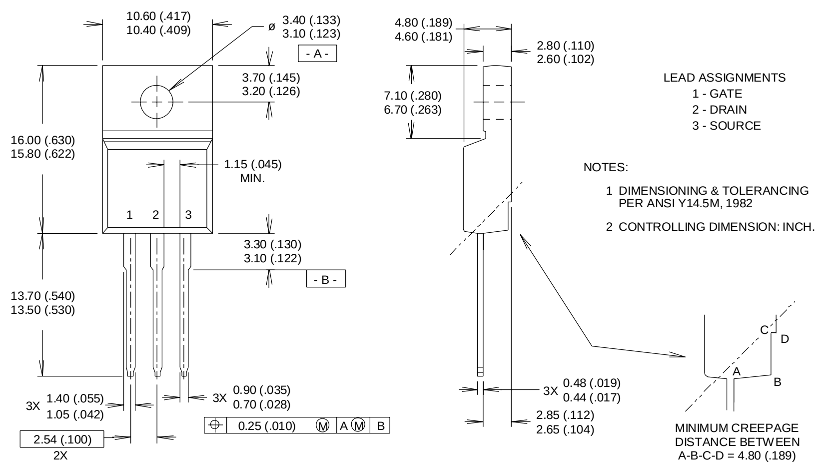


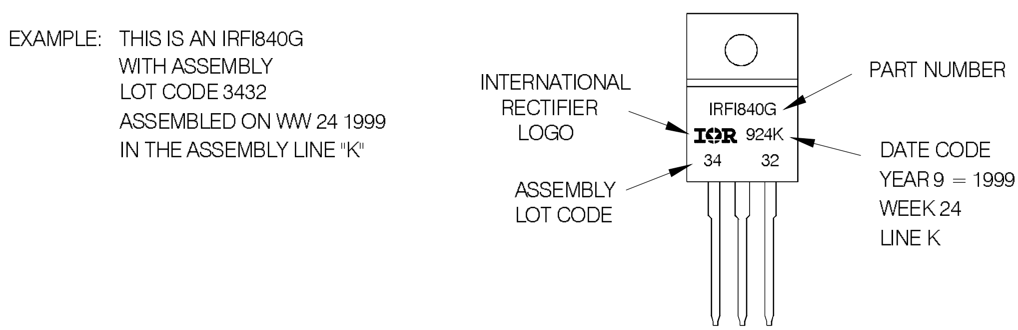
Fig 14. For N-Channel HEXFET® Power MOSFETs

TO-220 Full-Pak Package Outline

Dimensions are shown in millimeters (inches)



TO-220 Full-Pak Part Marking Information



TO-22O Full-Pak package is not recommended for Surface Mount Application.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Industrial market.
Qualification Standards can be found on IR's Web site.

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