

IRFB17N60KPbF

SMPS MOSFET

HEXFET® Power MOSFET

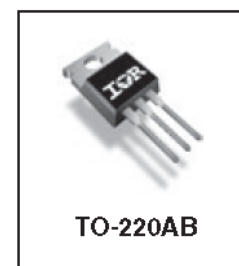
Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits
- Lead-Free

Benefits

- Smaller TO-220 Package
- 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

V_{DSS}	$R_{DS(on)}$ typ.	I_D
600V	0.35Ω	17A



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	17	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	11	
I_{DM}	Pulsed Drain Current ①	68	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	340	W
	Linear Derating Factor	2.7	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ②	11	V/ns
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting Torque, 6-32 or M3 screw	10	N

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ③	—	330	mJ
I_{AR}	Avalanche Current ④	—	17	A
E_{AR}	Repetitive Avalanche Energy ④	—	34	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.37	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	58	

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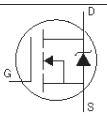
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.60	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.35	0.42	Ω	$V_{GS} = 10V, I_D = 10A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	50	μA	$V_{DS} = 600V, V_{GS} = 0V$
		—	—	250	μA	$V_{DS} = 480V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -30V$

Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	5.9	—	—	S	$V_{DS} = 50V, I_D = 10A$
Q_g	Total Gate Charge	—	—	99	nC	$I_D = 17A$
Q_{gs}	Gate-to-Source Charge	—	—	32	nC	$V_{DS} = 480V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	47	nC	$V_{GS} = 10V$, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	25	—	ns	$V_{DD} = 300V$
t_r	Rise Time	—	82	—		$I_D = 17A$
$t_{d(off)}$	Turn-Off Delay Time	—	38	—		$R_G = 7.5\Omega$
t_f	Fall Time	—	32	—		$V_{GS} = 10V$, See Fig. 10 ④
C_{iss}	Input Capacitance	—	2700	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	240	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	21	—		$f = 1.0MHz$, See Fig. 5
C_{oss}	Output Capacitance	—	2950	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz$
C_{oss}	Output Capacitance	—	67	—		$V_{GS} = 0V, V_{DS} = 480V, f = 1.0MHz$
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	120	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 480V$ ⑤

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	17	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	68		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	$T_J = 25^\circ\text{C}, I_S = 17A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	520	780	ns	$T_J = 25^\circ\text{C}, I_F = 17A$
Q_{rr}	Reverse Recovery Charge	—	5620	8430	nC	$di/dt = 100A/\mu s$ ④
t_{rr}	Reverse Recovery Time	—	580	870	ns	$T_J = 125^\circ\text{C}, I_F = 17A$
Q_{rr}	Reverse Recovery Charge	—	6470	9700	nC	$di/dt = 100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
② Starting $T_J = 25^\circ\text{C}$, $L = 2.3mH$, $R_G = 25\Omega$, $I_{AS} = 17A$,

- ③ $I_{SD} \leq 17A$, $di/dt \leq 380A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$

- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

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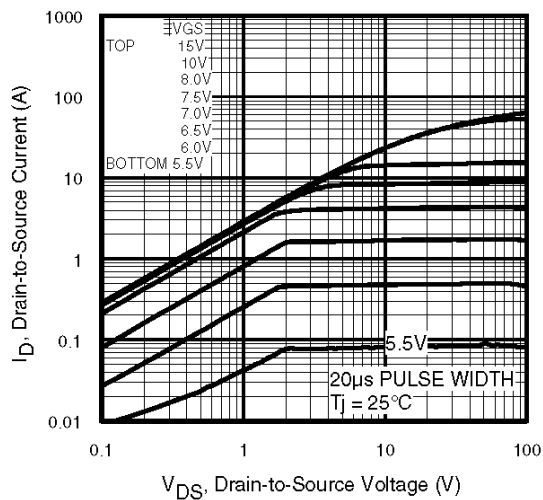


Fig 1. Typical Output Characteristics

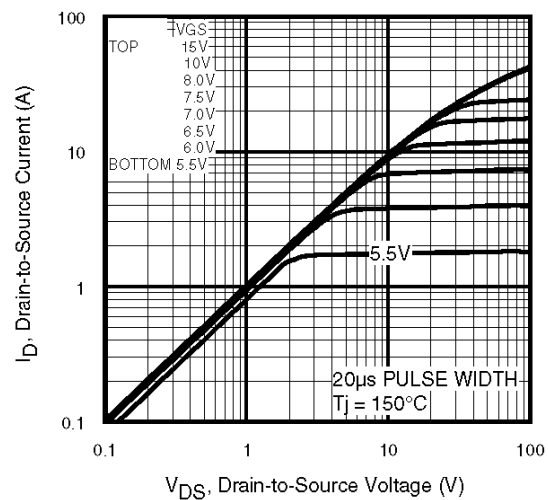


Fig 2. Typical Output Characteristics

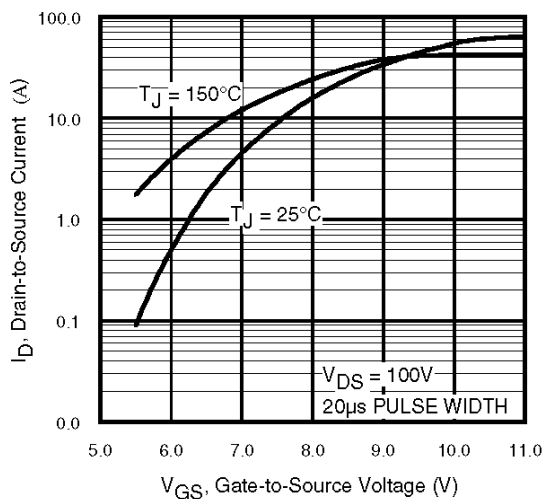


Fig 3. Typical Transfer Characteristics

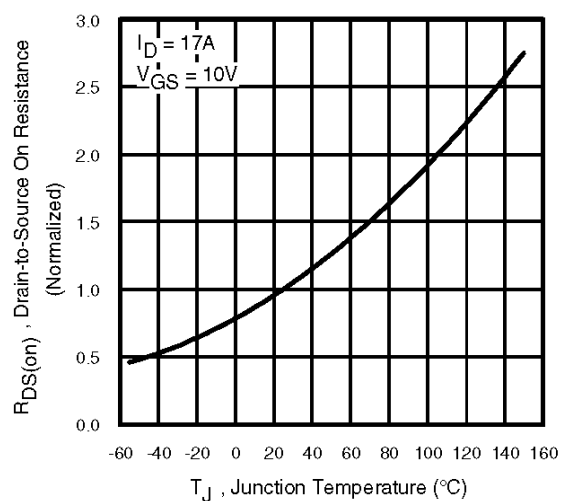


Fig 4. Normalized On-Resistance Vs. Temperature

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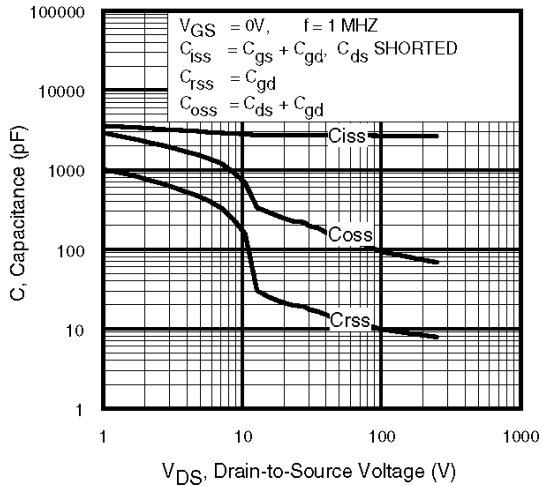


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

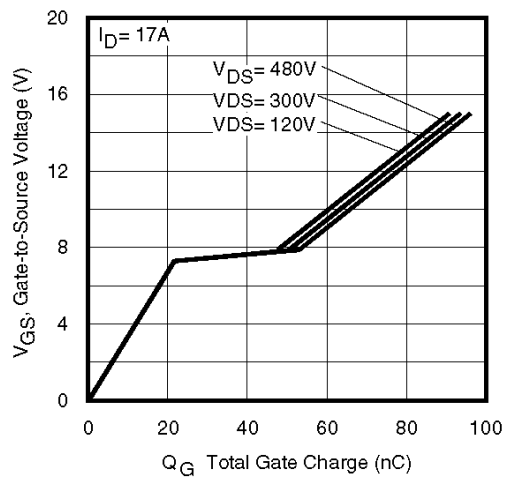


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

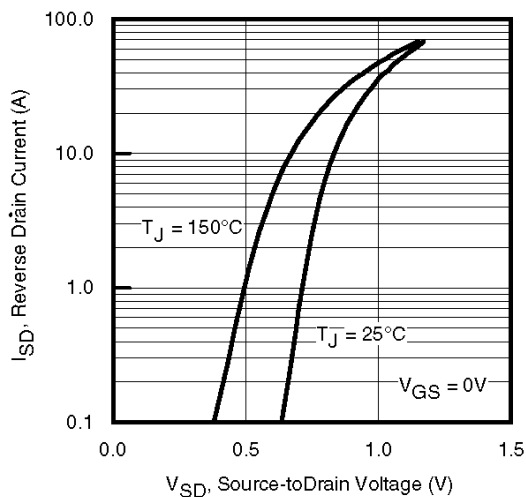


Fig 7. Typical Source-Drain Diode Forward Voltage

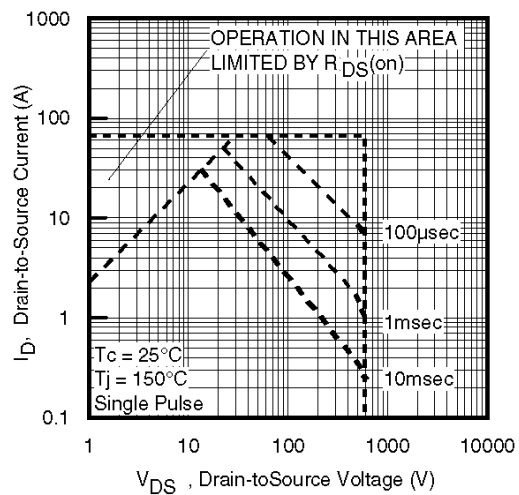


Fig 8. Maximum Safe Operating Area

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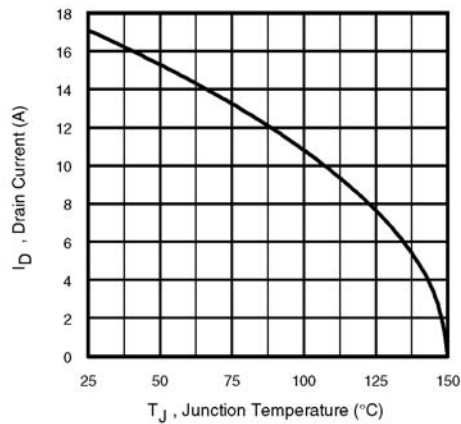


Fig 9. Maximum Drain Current Vs. Case Temperature

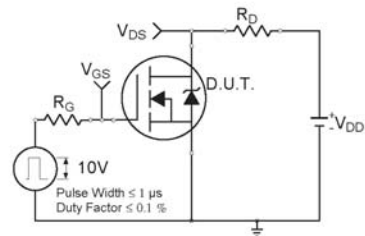


Fig 10a. Switching Time Test Circuit

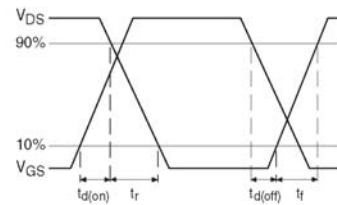


Fig 10b. Switching Time Waveforms

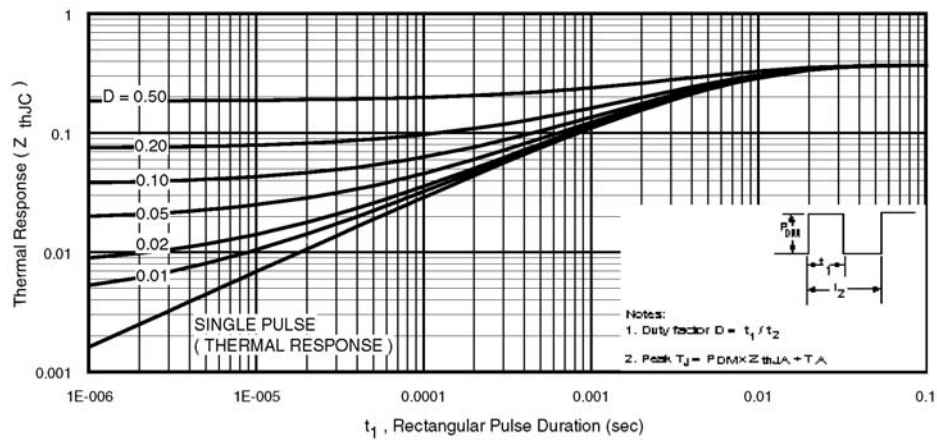


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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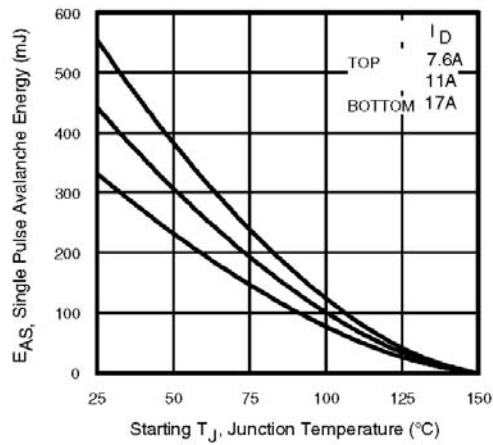


Fig 12a. Maximum Avalanche Energy Vs. Drain Current

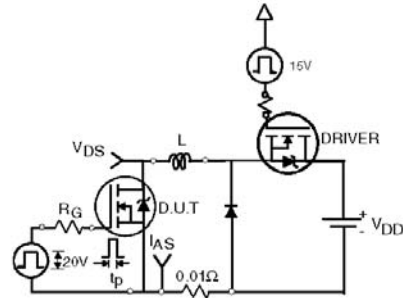


Fig 12c. Unclamped Inductive Test Circuit

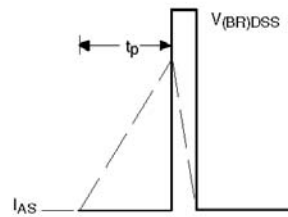


Fig 12d. Unclamped Inductive Waveforms

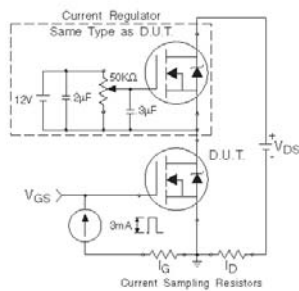


Fig 13a. Gate Charge Test Circuit

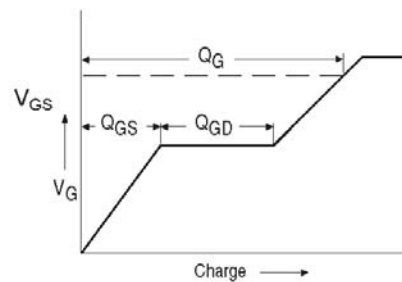
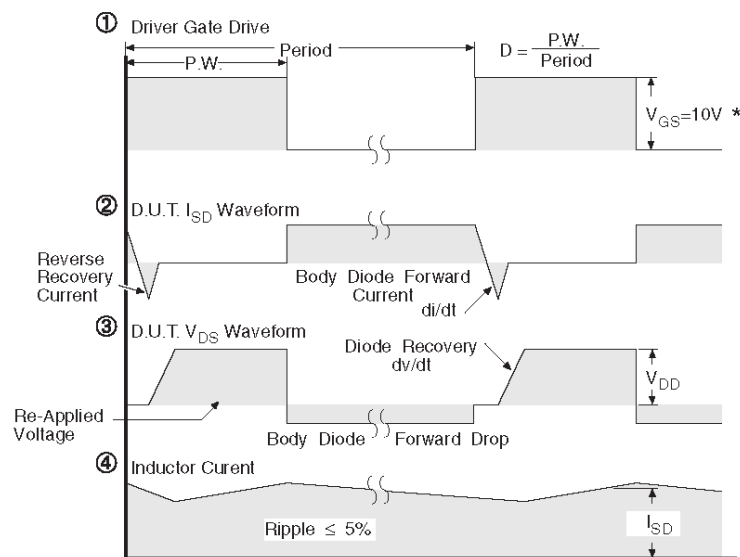
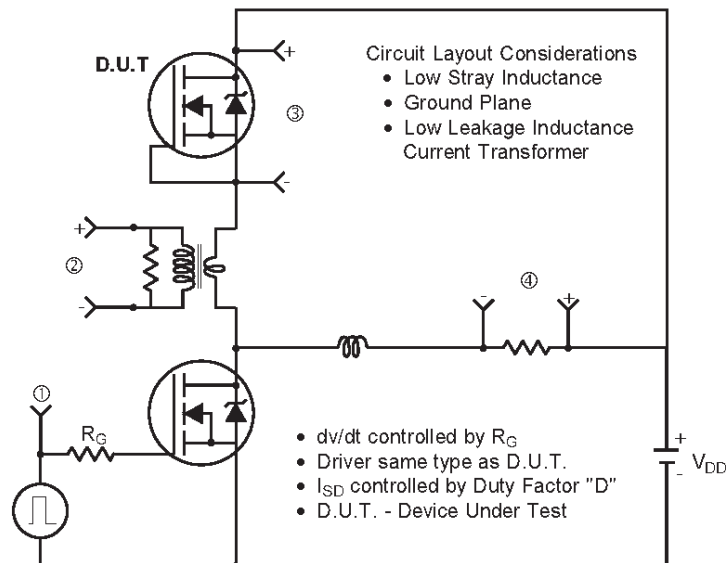


Fig 13b. Basic Gate Charge Waveform

Peak Diode Recovery dv/dt Test Circuit



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

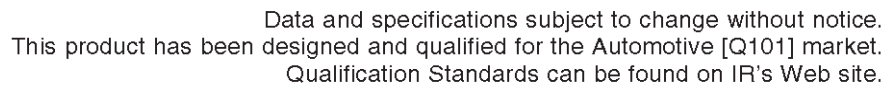
Fig 14. For N-Channel HEXFET® Power MOSFETs

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Dimensions are shown in millimeters (inches)



EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"
Note: "P" in assembly line
position indicates "Lead-Free"



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