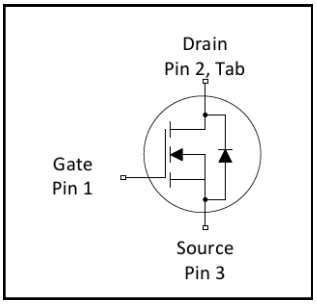
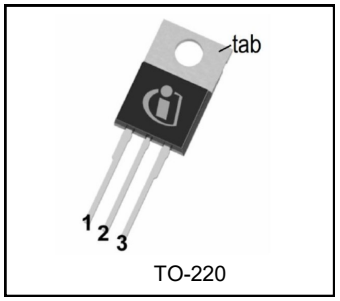
$V_{(BR)DSS}$	55V
$R_{DS(on)}$ max.	4.7mΩ
I_D	75A





G	D	S
Gate	Drain	Source

Typical Applications
- Industrial motor drive

Features
- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free

Description

This HEXFET Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating . These features combine to make this design an extremely efficient and reliable device for use in a wide variety of applications.

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRF2805PbF	TO-220	Tube	50	IRF2805PbF

Absolute Maximum Rating

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	175	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V (See Fig.9)	120	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	75	
I_{DM}	Pulsed Drain Current ①	700	
P_D @T_C = 25°C	Maximum Power Dissipation	330	W
	Linear Derating Factor	2.2	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	450	mJ
E_{AS} (6 sigma)	Single Pulse Avalanche Energy Tested Value ⑦	1220	
I_{AR}	Avalanche Current	See Fig. 12a,12b,15,16	A
E_{AR}	Repetitive Avalanche Energy ⑦		mJ
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.45	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

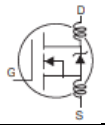
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Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.06	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.9	4.7	Ω	V_{GS} = 10V, I_D = 104A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
gfs	Forward Trans conductance	91	—	—	S	V_{DS} = 25V, I_D = 104A
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 55V,V_{GS} = 0V,T_J =150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V_{GS} = -20V

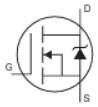
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Q_g	Total Gate Charge	—	150	230	nC	I_D = 104A
Q_{gs}	Gate-to-Source Charge	—	38	57		V_{DS} = 44V
Q_{gd}	Gate-to-Drain Charge	—	52	78		V_{GS} = 10V④
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	V_{DD} = 28V
t_r	Rise Time	—	120	—		I_D = 104A
$t_{d(off)}$	Turn-Off Delay Time	—	68	—		R_G= 2.5Ω
t_f	Fall Time	—	110	—		V_{GS} = 10V ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.)
L_S	Internal Source Inductance	—	7.5	—		from package and center of die contact
C_{iss}	Input Capacitance	—	5110	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	1190	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	210	—		f = 1.0MHz, See Fig.5
C_{oss}	Output Capacitance	—	6470	—		V_{GS} = 0V,V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	860	—		V_{GS} = 0V,V_{DS} = 44V, f = 1.0MHz
$C_{oss\ eff.}$	Effective Output Capacitance	—	1600	—		V_{GS} = 0V,V_{DS} = 0V to 44V



Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	175	A	MOSFET symbol showing the
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	700		integral reverse p-n junction diode.
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C,I_S = 104A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	80	120	ns	T_J = 25°C ,I_F = 104A
Q_{rr}	Reverse Recovery Charge	—	290	430	nC	di/dt = 100A/µs ④



Notes:

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

② Starting T_J = 25°C, L = 0.08mH, R_G = 25Ω, I_{AS} = 104A. (See fig. 12)

③ I_{SD} ≤ 104A, di/dt ≤ 240A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.

④ Pulse width ≤ 400µs; 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} .

⑥ Limited by T_{Jmax} , see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.

⑦ This value determined from sample failure population. 100% tested to this value in production.

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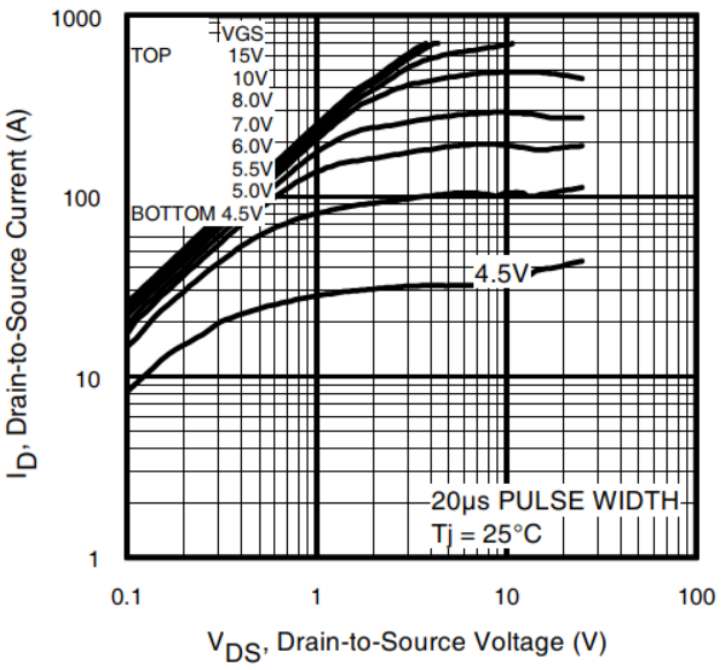


Fig. 1 Typical Output Characteristics

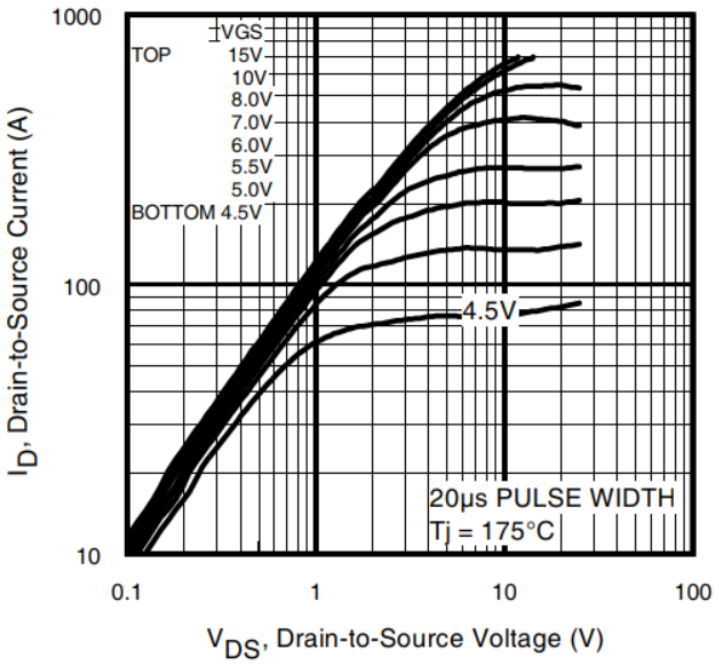


Fig. 2 Typical Output Characteristics

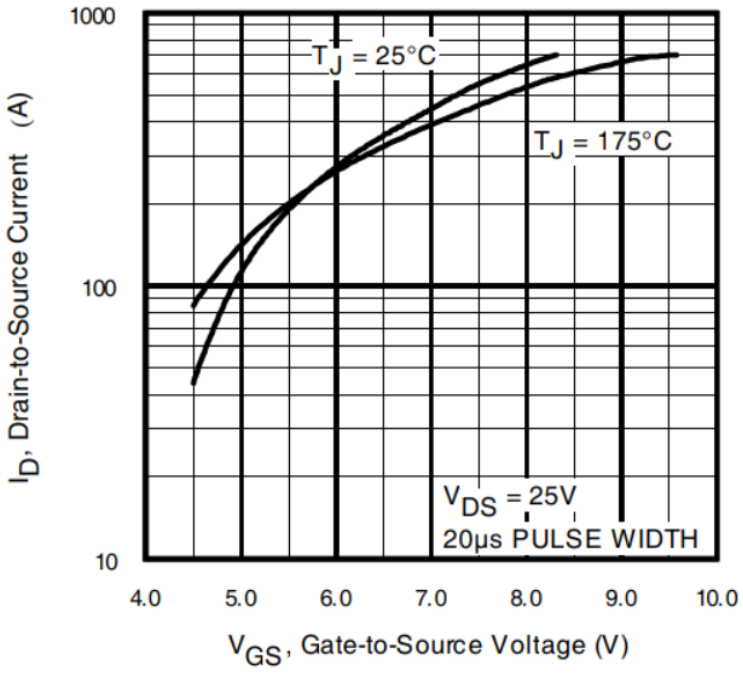


Fig. 3 Typical Transfer Characteristics

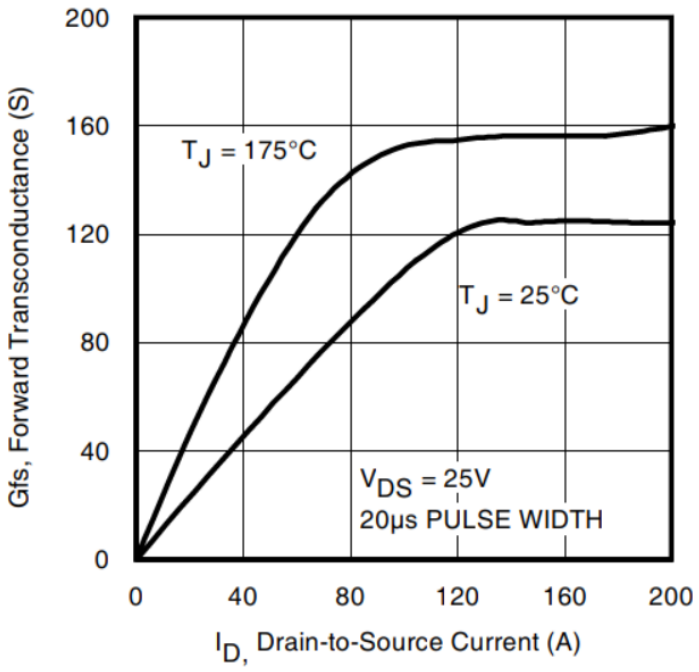


Fig. 4 Typical Forward Transconductance vs. Drain Current

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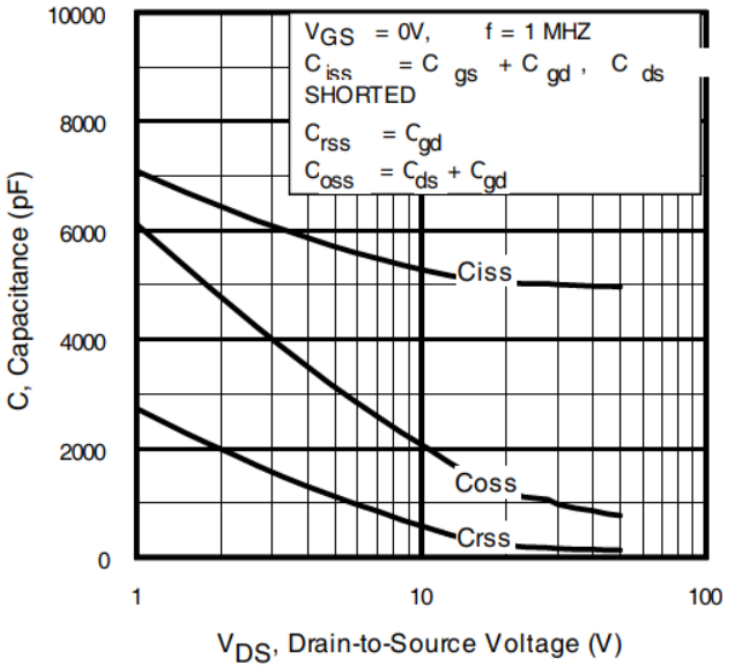


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

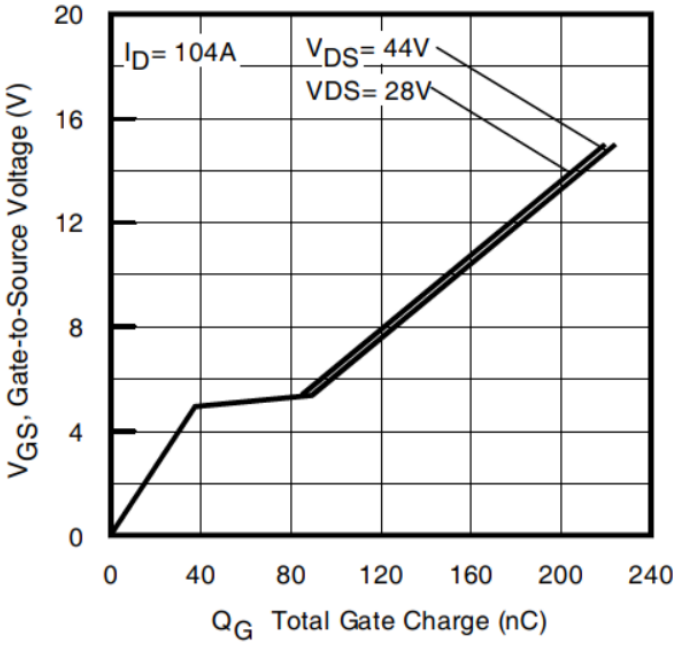


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

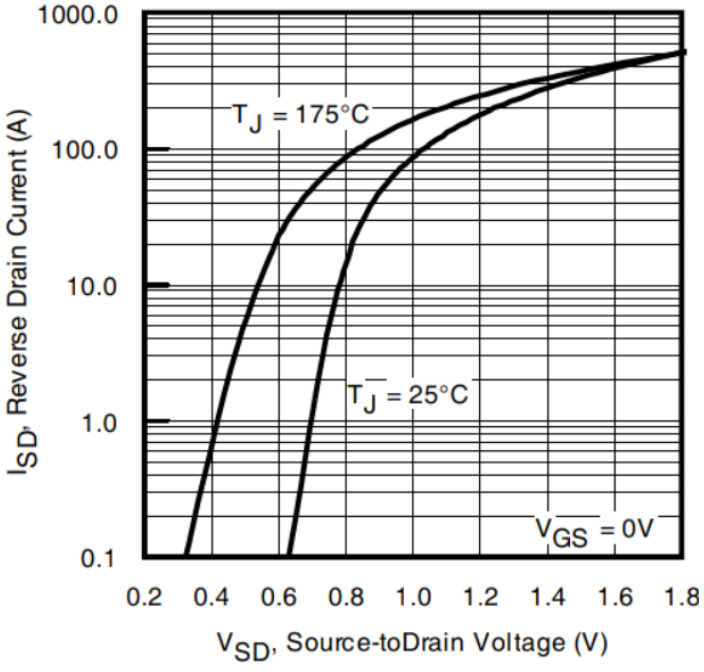


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

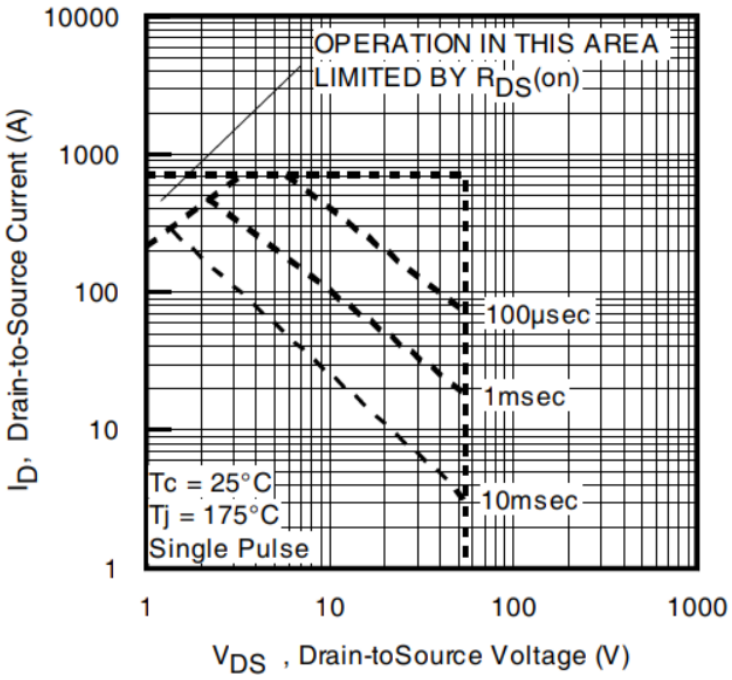


Fig 8. Maximum Safe Operating Area

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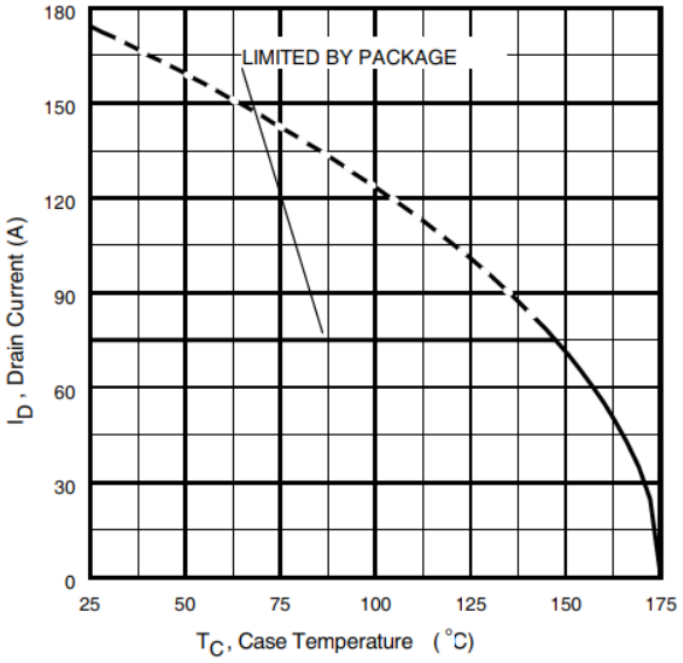


Fig 9. Maximum Drain Current vs. Case Temperature

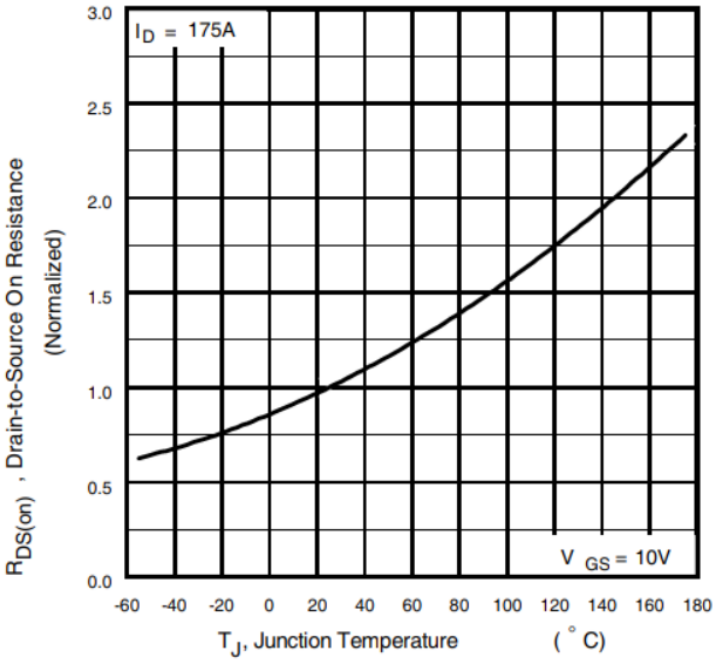


Fig 10. Normalized On-Resistance vs. Temperature

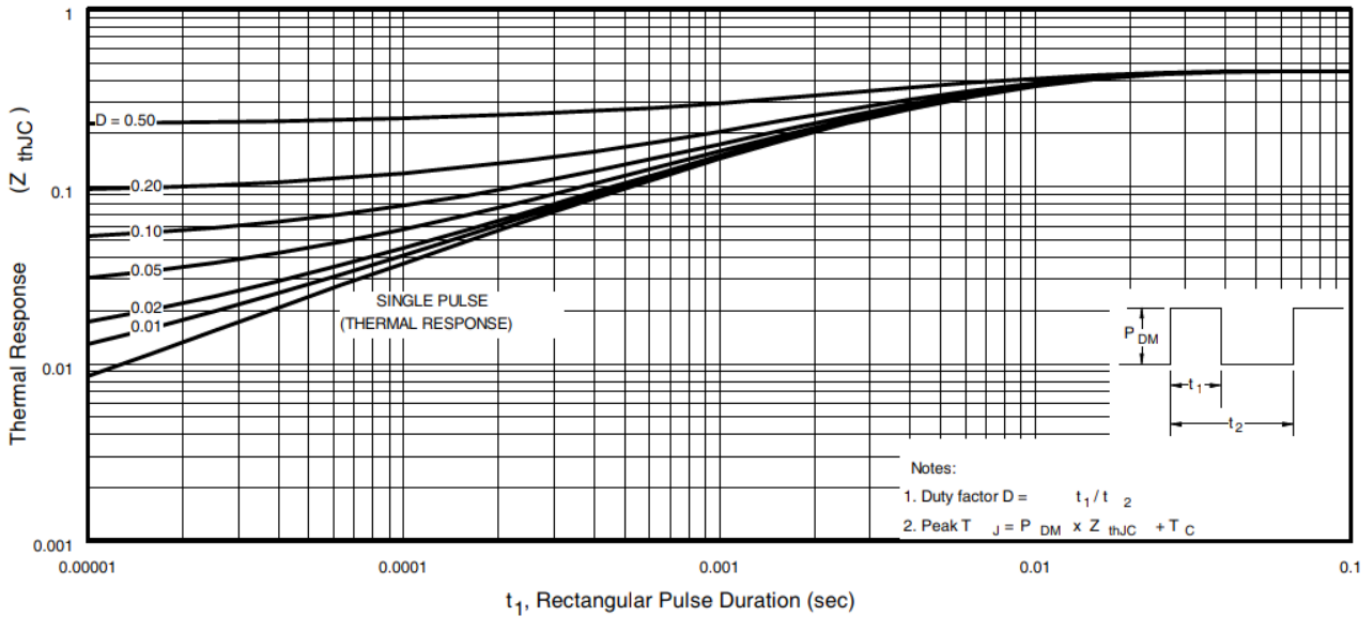


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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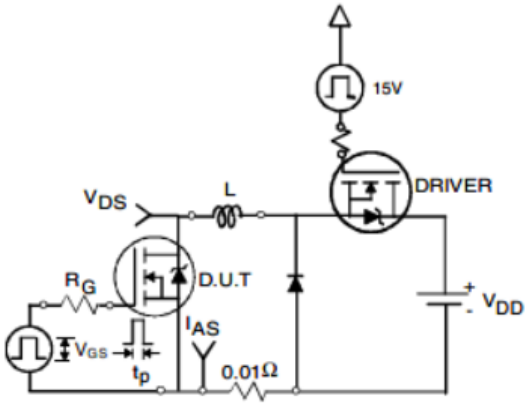


Fig. 12a. Unclamped Inductive Test Circuit

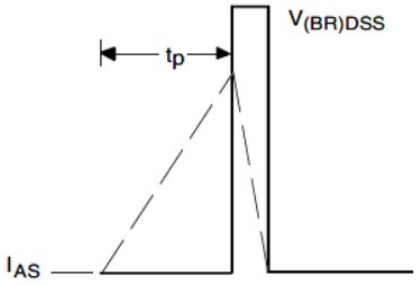


Fig. 12b. Unclamped Inductive Waveforms

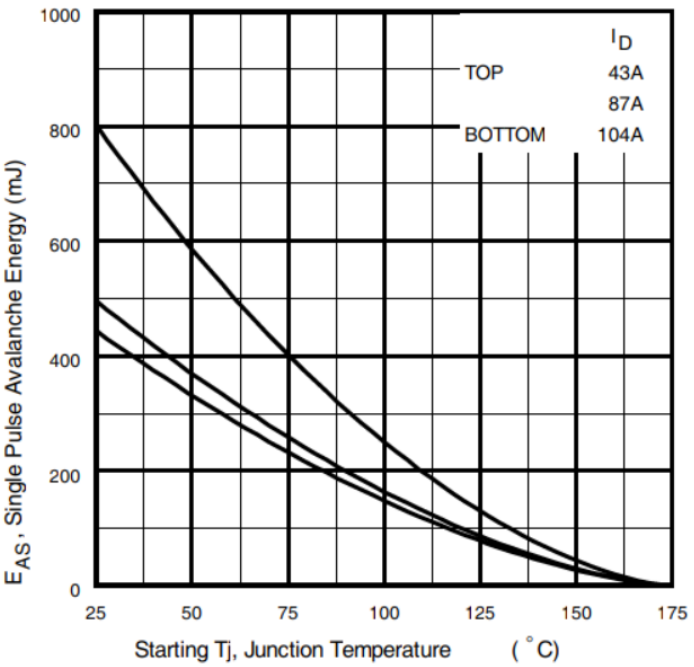


Fig 12c. Maximum Avalanche Energy vs. Drain Current

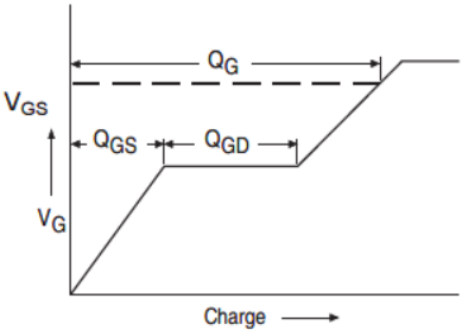


Fig 13a. Basic Gate Charge Waveform

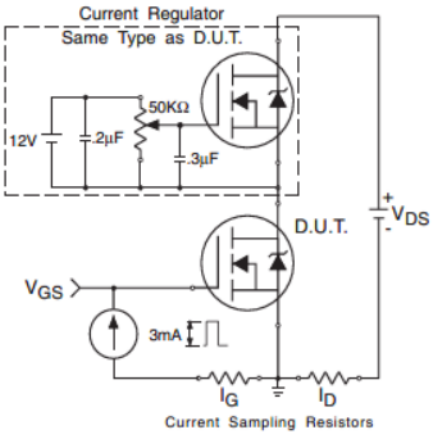


Fig 13b. Gate Charge Test Circuit

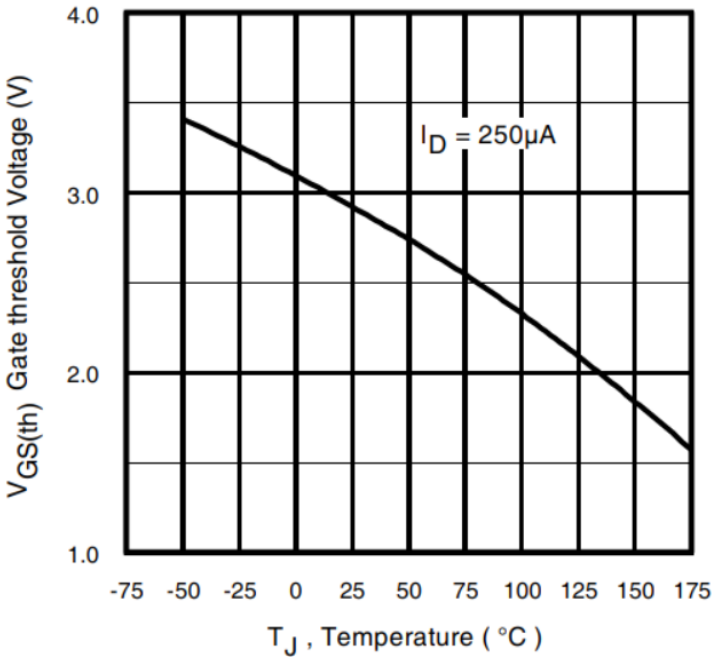


Fig. 14 Threshold Voltage vs. Temperature

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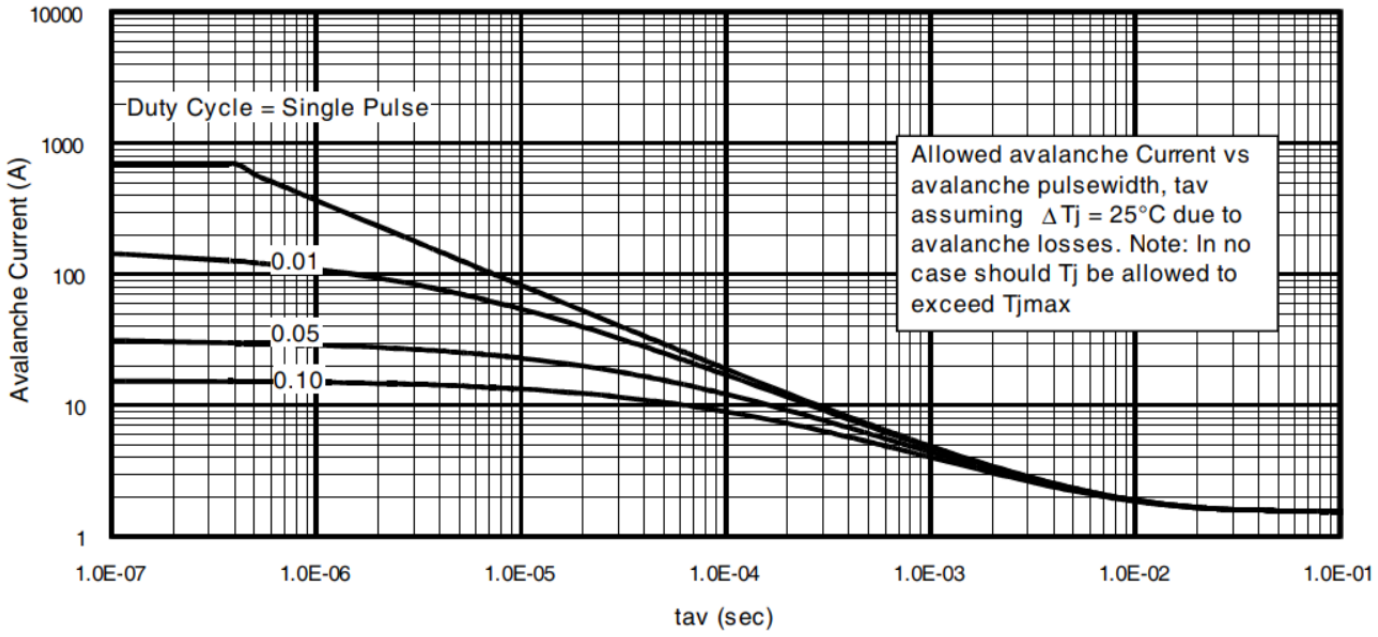


Fig 15. Typical Avalanche Current vs. Pulse Width

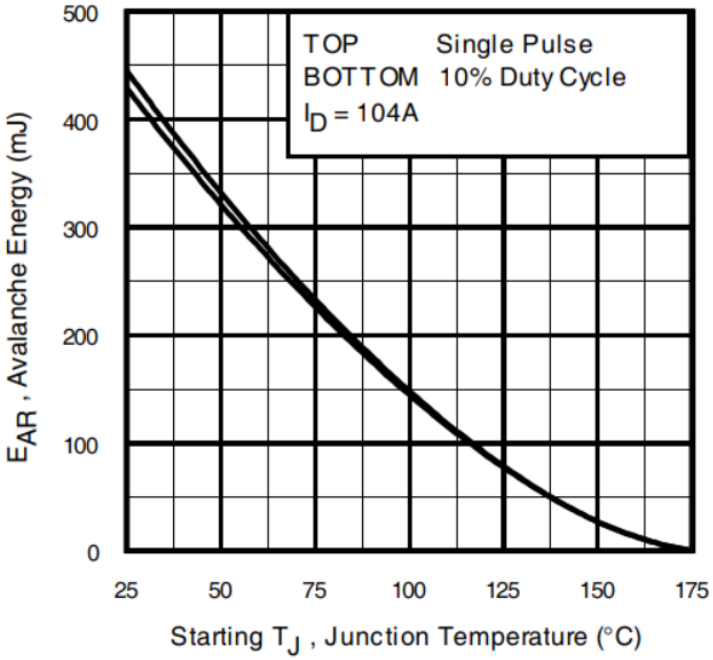


Fig 16. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 15, 16:
(For further info, see AN-1005 at www.irf.com)

1.Avalanche failures assumption:
Purely a thermal phenomenon and failure occurs at a temperature far in excess of T_{jmax}. This is validated for every part type.

2. Safe operation in Avalanche is allowed as long asT_{jmax} is not exceeded.

3. Equation below based on circuit and waveforms shown in Figures 12a, 12b.

4. $P_{D\ (ave)}$ = Average power dissipation per single avalanche pulse.

5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).

6. I_{av} = Allowable avalanche current.

7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 15, 16).

t_{av} = Average time in avalanche.

D = Duty cycle in avalanche = tav ·f

$Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see Figures 14)

$$\mathbf{PD\ (ave) = 1/2\ (\ 1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}}$$

$$\mathbf{I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]}$$

$$\mathbf{E_{AS\ (AR)} = P_{D\ (ave)} \cdot t_{av}}$$

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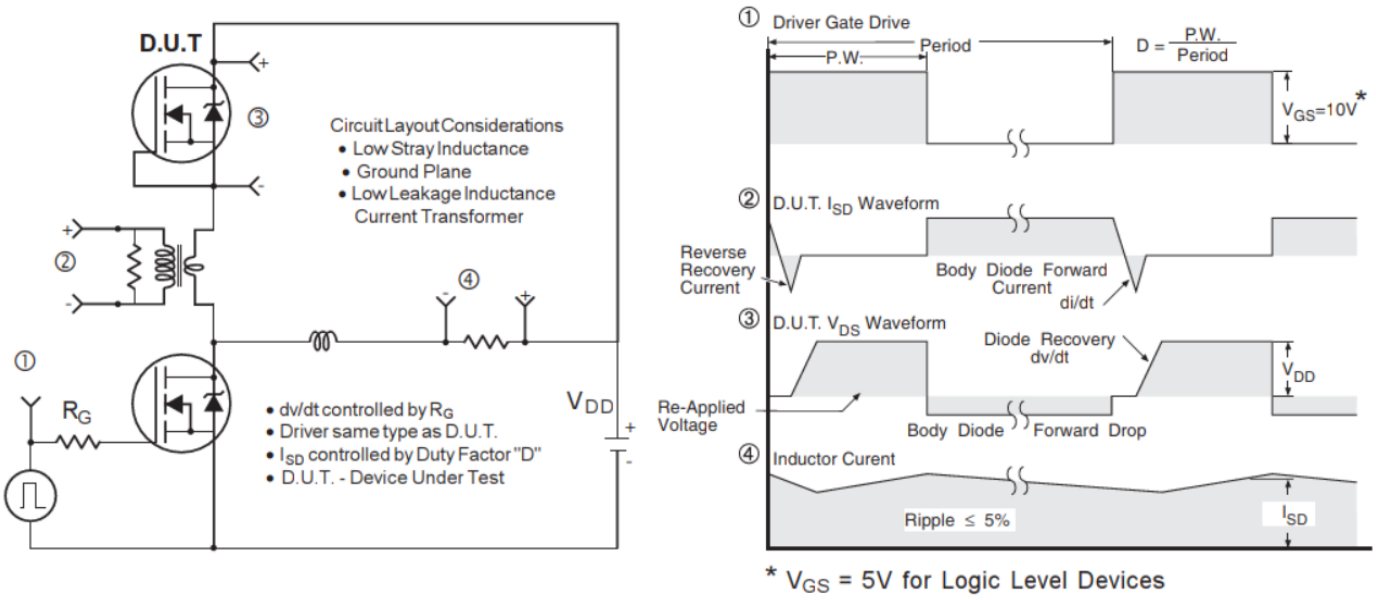


Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

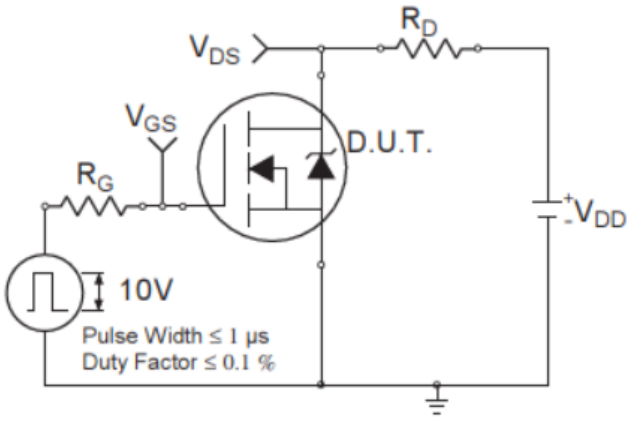


Fig 18b. Switching Time Test Circuit

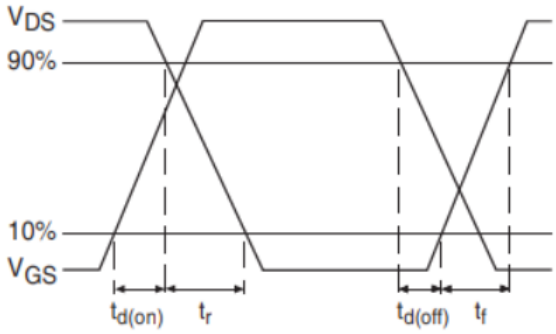
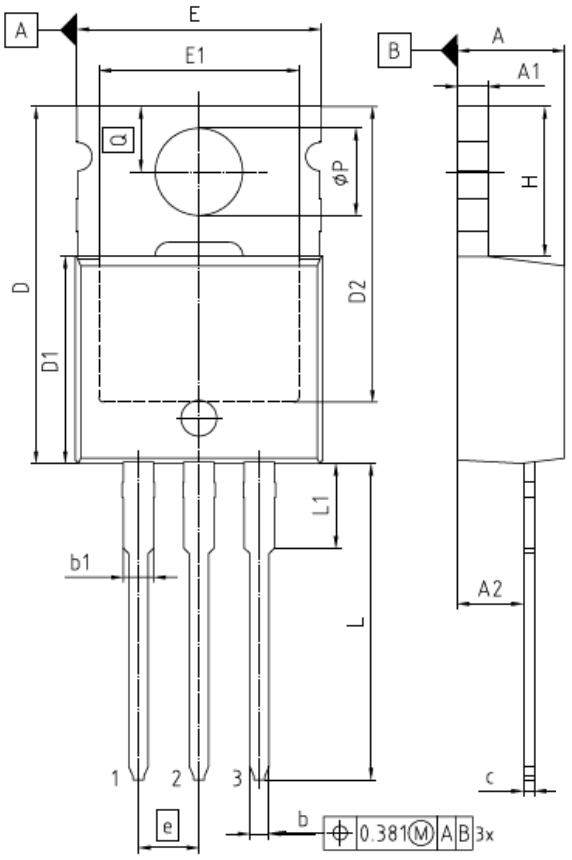


Fig 18b. Switching Time Waveforms

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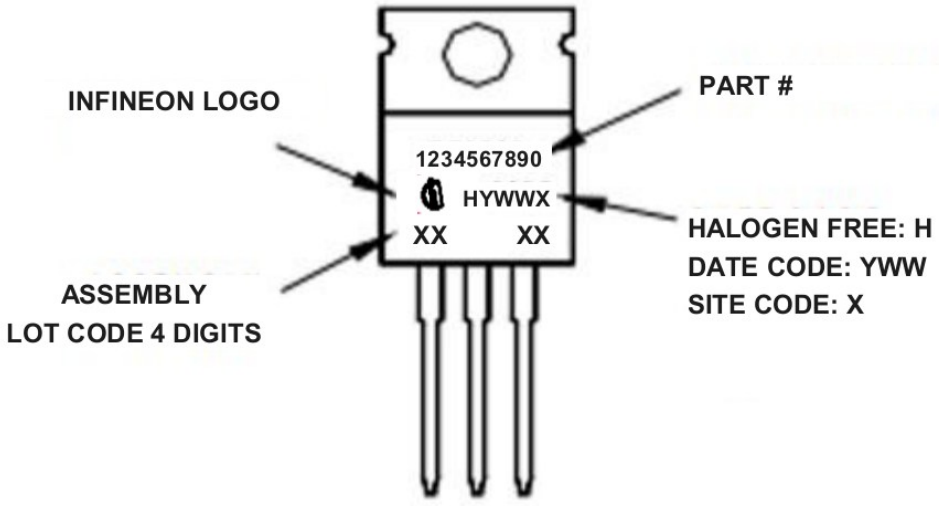
TO-220 Package Outline (Dimensions are shown in millimeters (inches))



NOTES:
DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS
GATE BURRS ARE LESS THAN 0.5 mm

PACKAGE - GROUP NUMBER:	PG-TO220-3-U05	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	3.56	4.83
A1	1.14	1.40
A2	2.03	2.92
b	0.38	1.01
b1	1.14	1.78
c	0.36	0.61
D	14.22	16.51
D1	8.38	9.20
D2	11.68	12.88
E	9.65	10.67
E1	6.86	8.89
e	2.54	
N	3	
H	5.84	6.86
L	12.70	14.73
L1	3.56	4.06
øP	3.54	4.08
Q	2.54	3.42

TO-220 Part Marking Information



TO-220 packages are not recommended for Surface Mount Application.

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Revision History

Date	Rev.	Comments
2026-07-21	2.1	• Update datasheet to Infineon format • Updated Package Outline and Part marking –page 9 • Added disclaimer on last page.

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