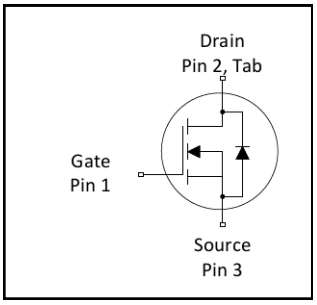
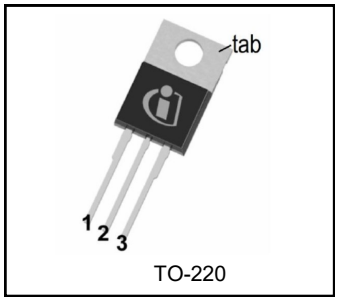
IRFZ46NPbF

$V_{(BR)DSS}$	55V
$R_{DS(on)}$ max.	16.5mΩ
I_D	53A⑦





G	D	S
Gate	Drain	Source

Features

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free

Description

Advanced HEXFET Power MOSFETs utilizes the advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

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

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFZ46NPbF	TO-220	Tube	50	IRFZ46NPbF

Absolute Maximum Rating

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	53⑦	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	37	
I_{DM}	Pulsed Drain Current ①	180	
P_D @T_C = 25°C	Maximum Power Dissipation	107	W
	Linear Derating Factor	0.71	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current ①	28	A
E_{AR}	Repetitive Avalanche Energy ①	11	mJ
dv/dt	Peak Diode Recovery dv/dt③	5.0	V/ns
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	—	1.4	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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	—	0.057	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	16.5	mΩ	V_{GS} = 10V, I_D = 28A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
gfs	Forward Trans conductance	19	—	—	S	V_{DS} = 25V, I_D = 28A ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 44V,V_{GS} = 0V,T_J =150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V

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

Q_g	Total Gate Charge	—	—	72	nC	I_D = 28A
Q_{gs}	Gate-to-Source Charge	—	—	11		V_{DS} = 44V
Q_{gd}	Gate-to-Drain Charge	—	—	26		V_{GS} = 10V, See Fig. 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	V_{DD} = 28V
t_r	Rise Time	—	76	—		I_D = 28A
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		R_G= 12Ω
t_f	Fall Time	—	57	—		V_{GS} = 10V, See Fig. 10 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	—	1696	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	407	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	110	—		f = 1.0MHz, See Fig.5
E_{AS}	Single Pulse Avalanche Energy②	—	583⑤	152⑥	mJ	I_{AS} = 28A, L = 389µH

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	53	A	MOSFET symbol showing the
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	180		integral reverse p-n junction diode.
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C,I_S = 28A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	67	101	ns	T_J = 25°C ,I_F = 28A
Q_{rr}	Reverse Recovery Charge	—	208	312	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 = 389µH , R_G = 25Ω, I_{AS} = 28A . (See fig. 12)
③ I_{SD} ≤ 28A, di/dt ≤ 220A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.
④ Pulse width ≤ 400µs; duty cycle ≤ 2%.
⑤ This is a typical value at device destruction and represents operation outside rated limits.
⑥ This is a calculated value limited to T_J = 175°C.
⑦ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 39A.

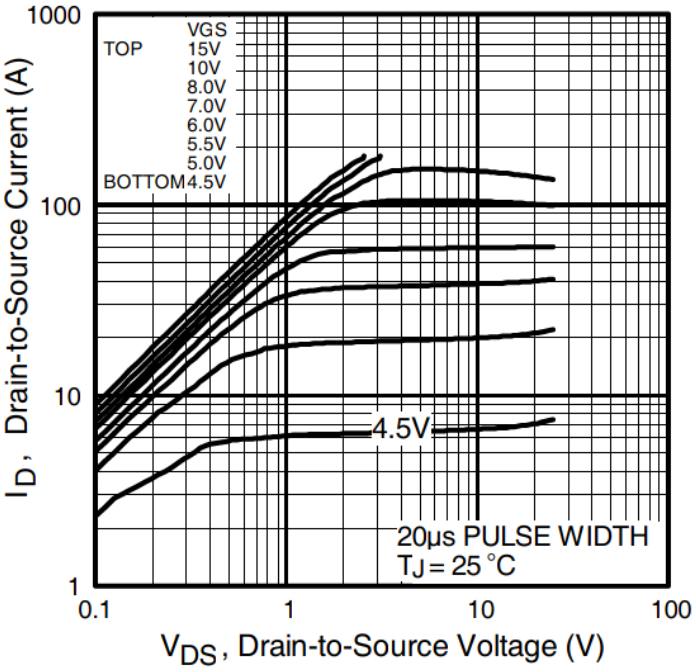


Fig. 1 Typical Output Characteristics

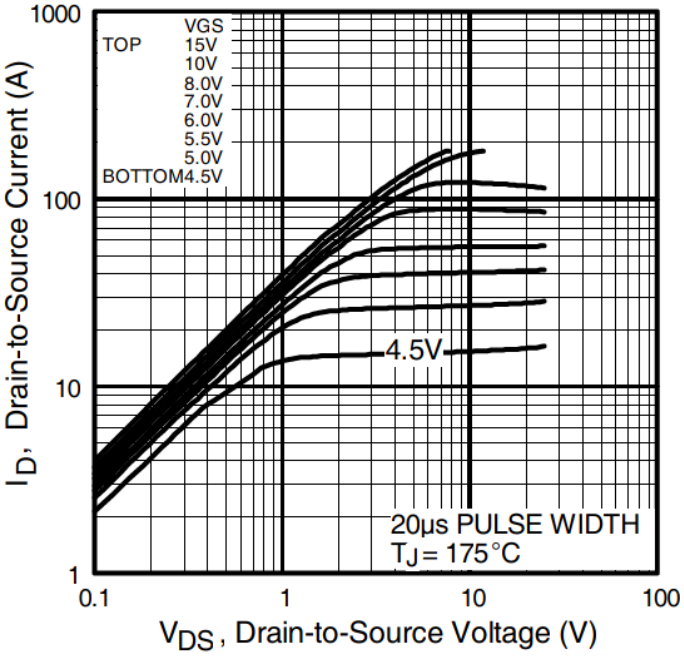


Fig. 2 Typical Output Characteristics

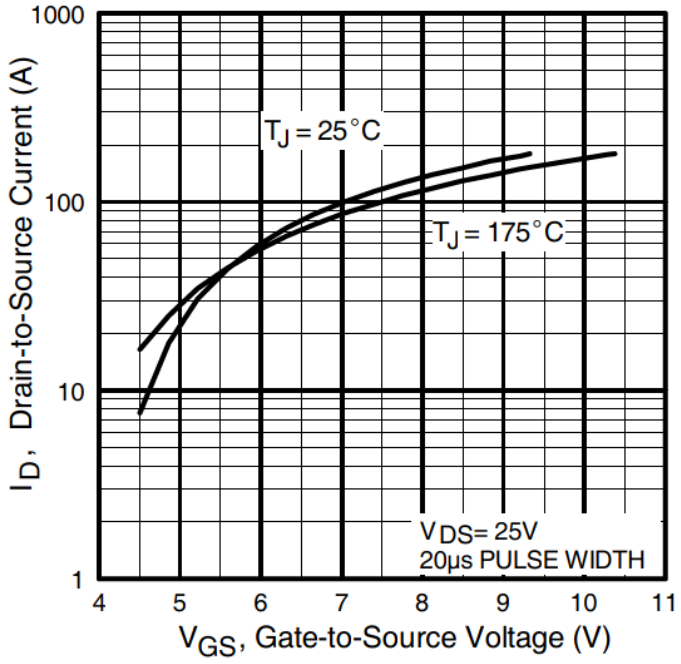


Fig. 3 Typical Transfer Characteristics

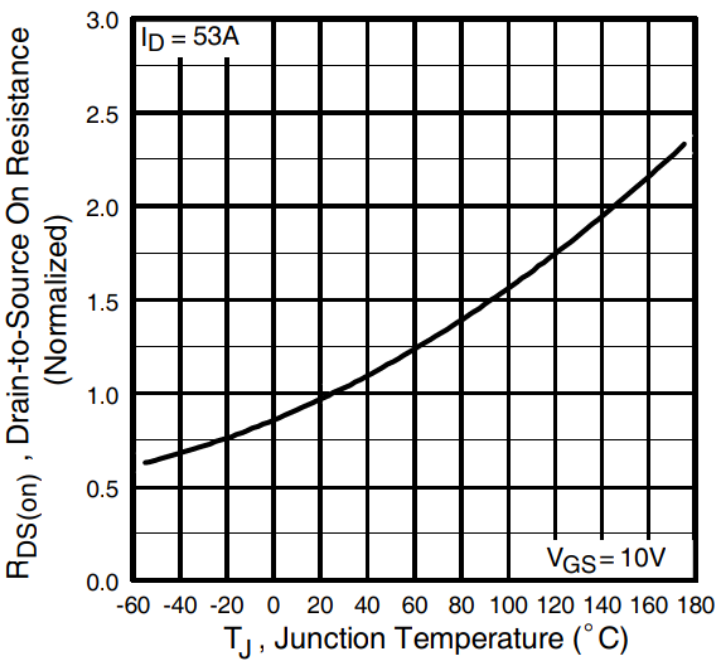


Fig. 4 Normalized On-Resistance vs. Temperature

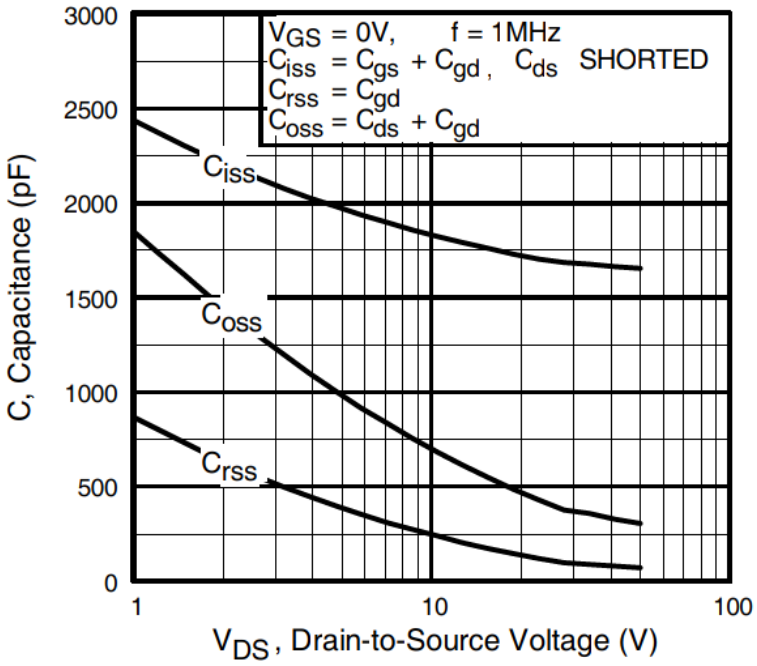


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

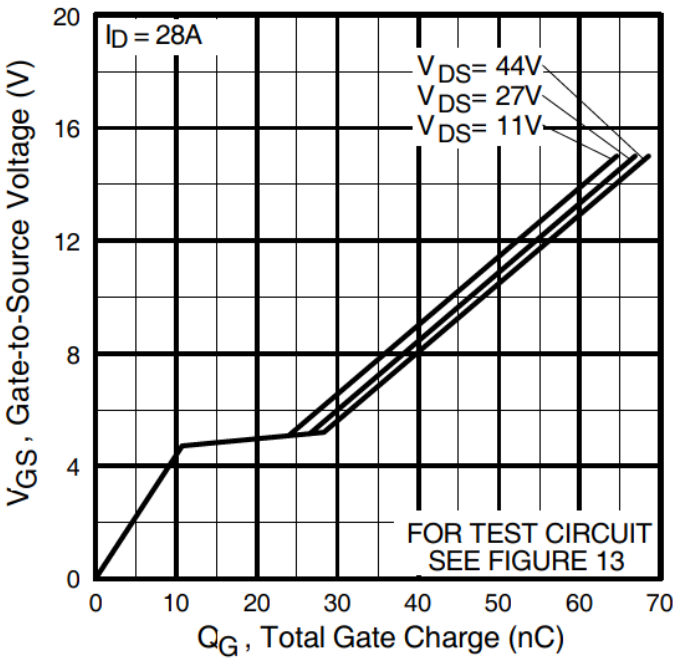


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

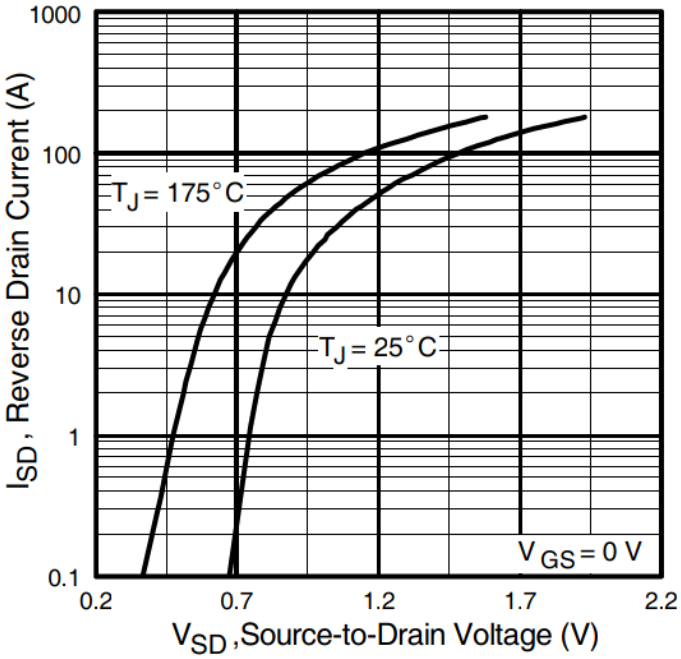


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

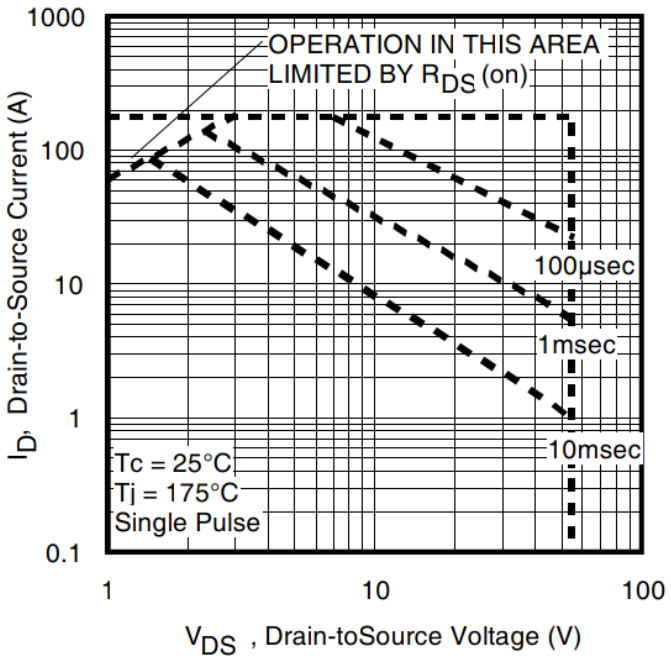


Fig 8. Maximum Safe Operating Area

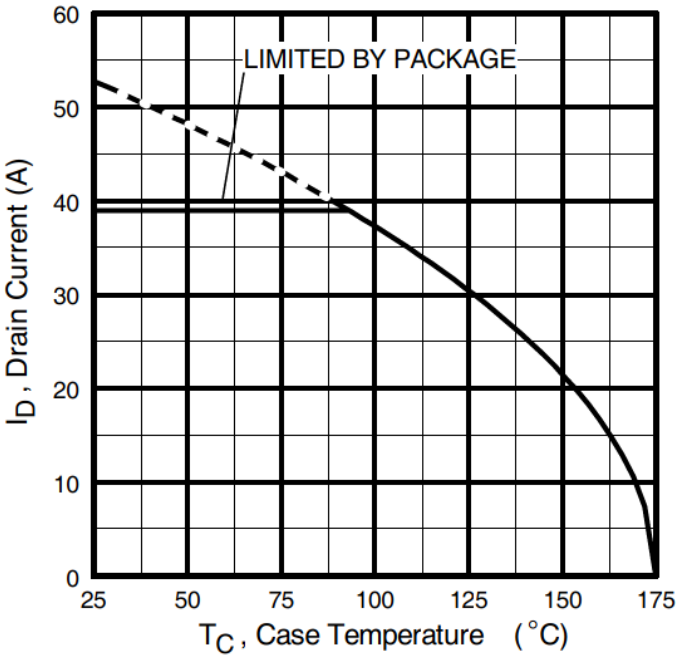


Fig 9. Maximum Drain Current vs. Case Temperature

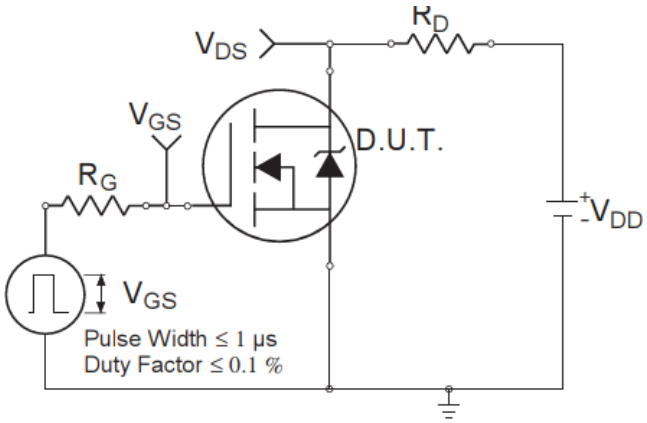


Fig 10b. Switching Time Test Circuit

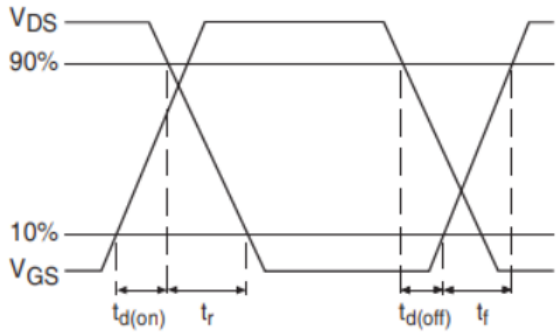


Fig 10b. Switching Time Waveforms

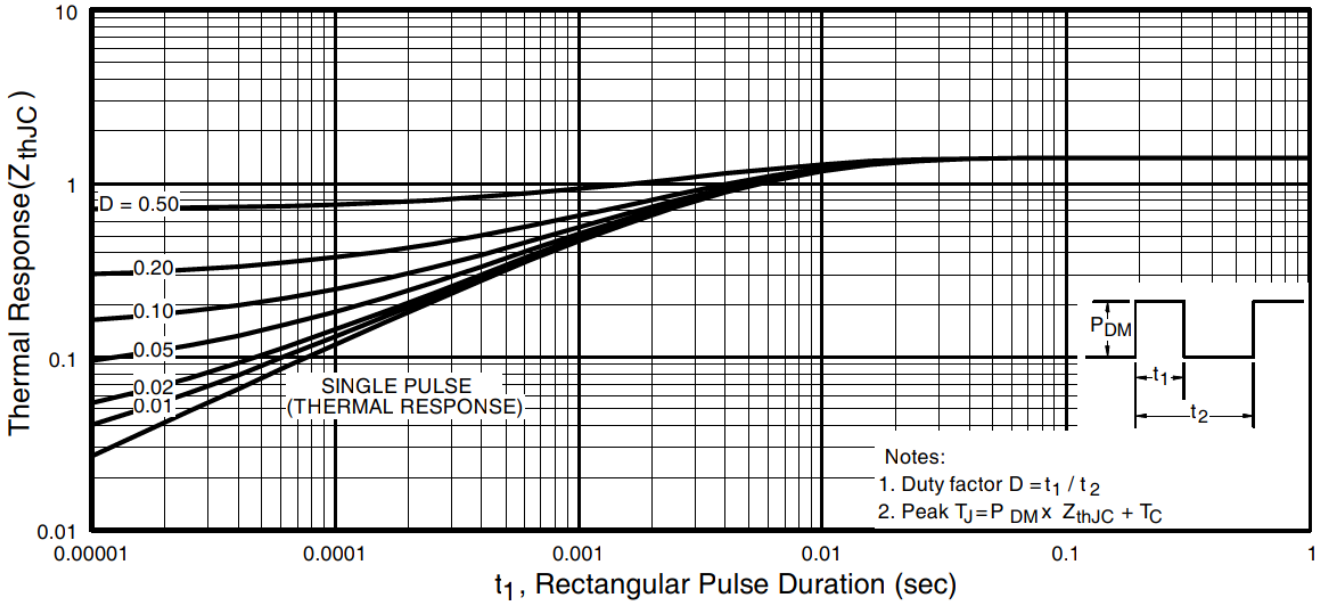


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

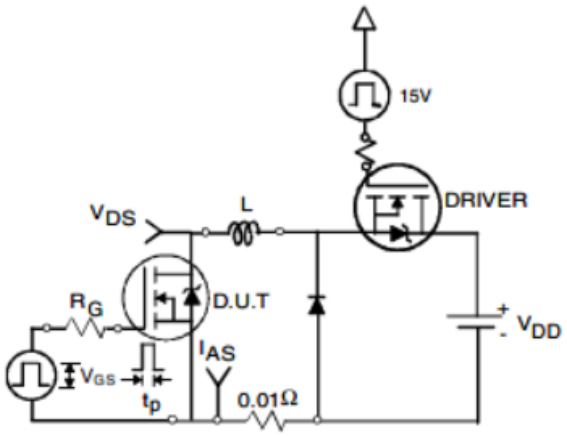


Fig. 12a. Unclamped Inductive Test Circuit

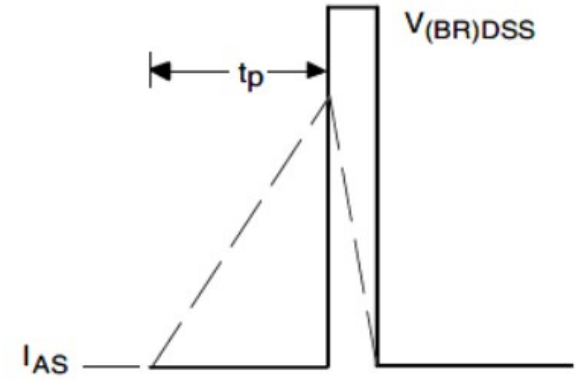


Fig. 12b. Unclamped Inductive Waveforms

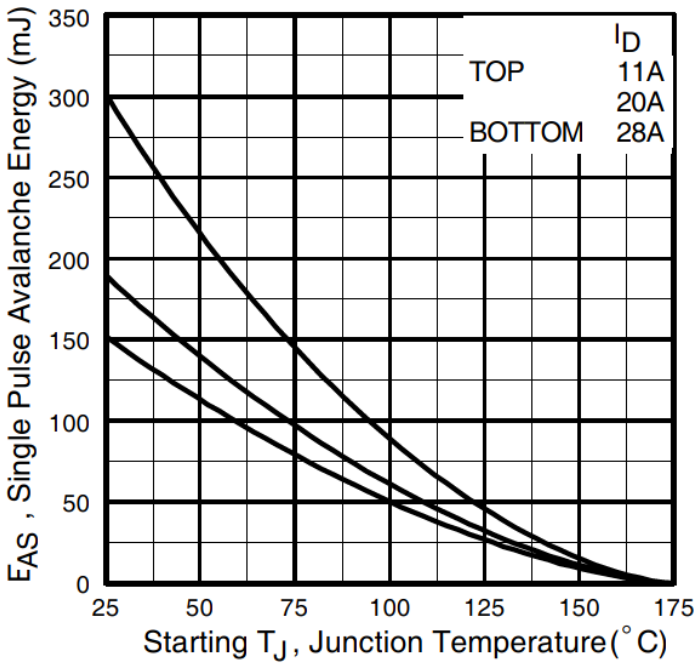


Fig 12c. Maximum Avalanche Energy vs. Drain Current

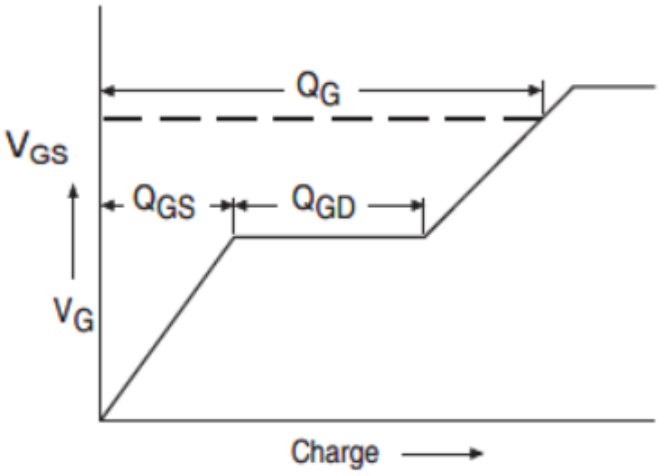


Fig 13a. Basic Gate Charge Waveform

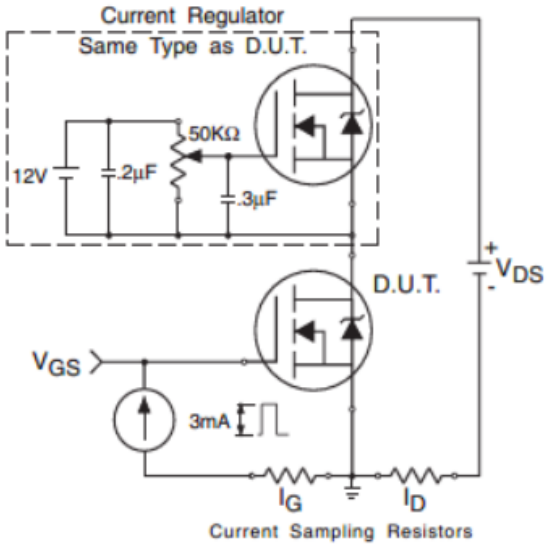


Fig 13b. Gate Charge Test Circuit

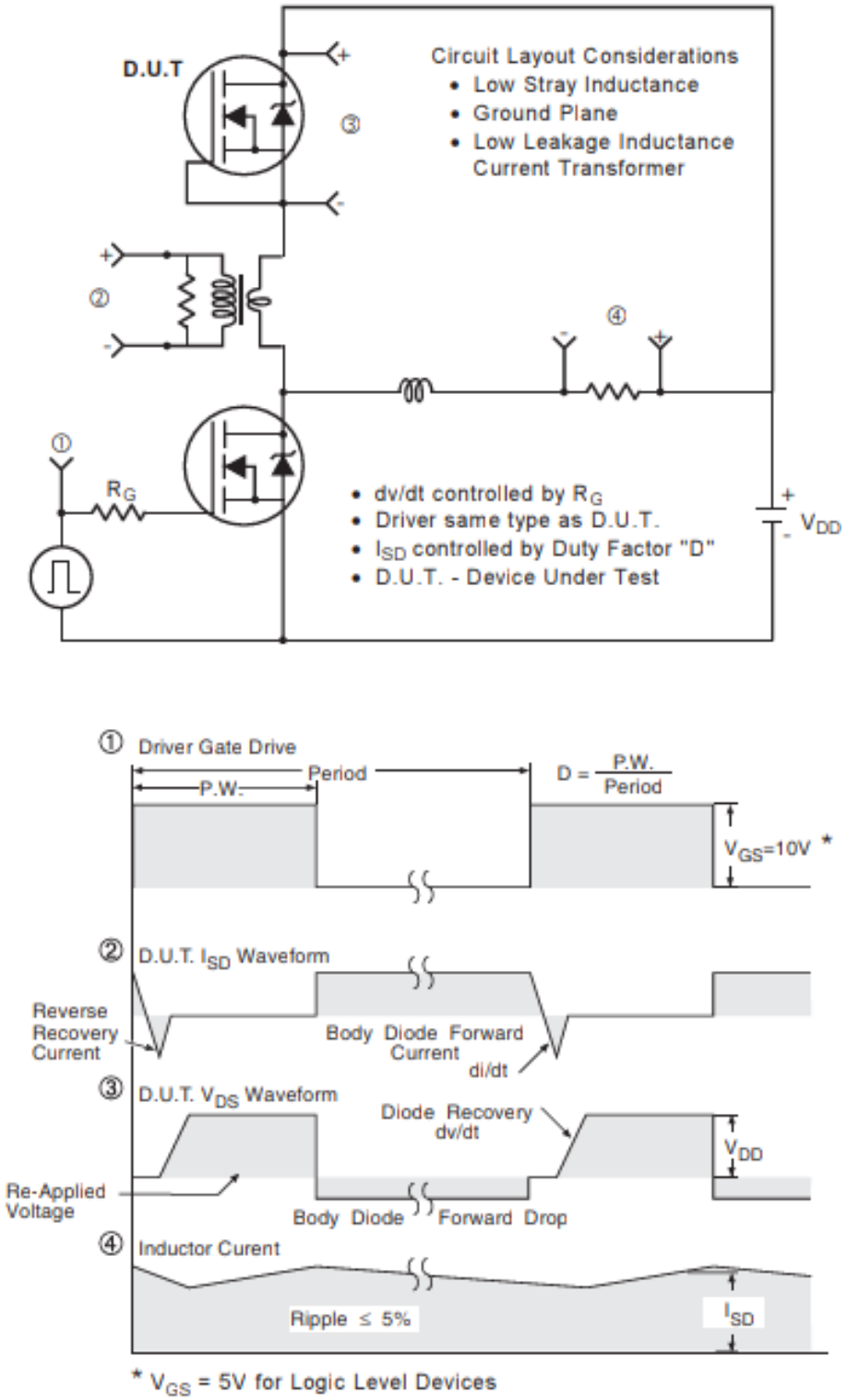
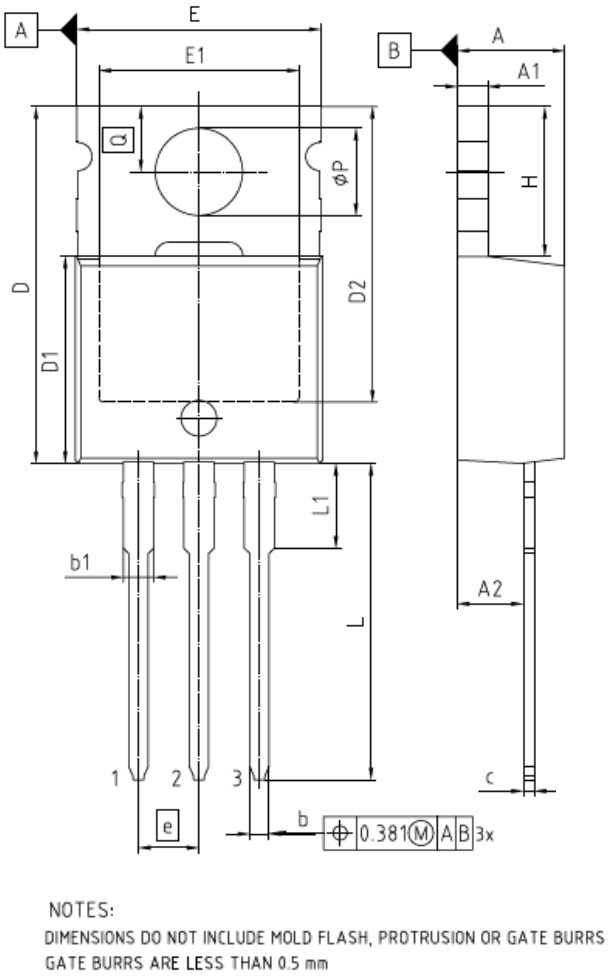


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

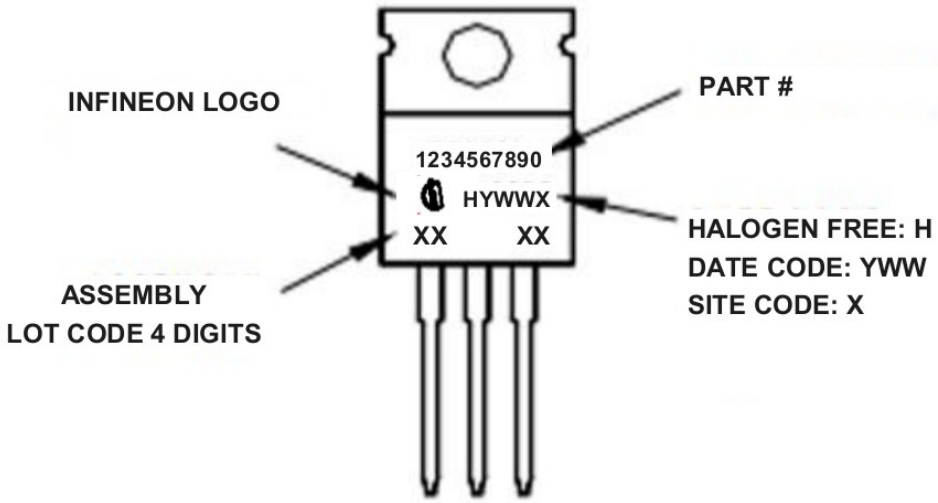
TO-220 Package Outline (Dimensions are shown in millimeters (inches))



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.

Revision History

Date	Rev.	Comments
2026-08-17	2.1	• Update datasheet to Infineon format • Updated Package Outline and Part marking –page 8 • Added disclaimer on last page.

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