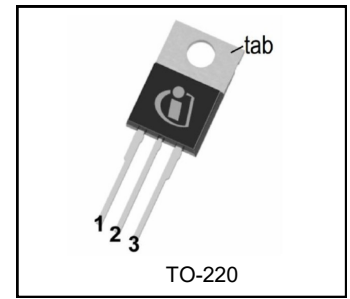
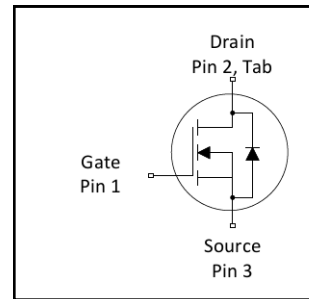


$V_{(BR)DSS}$	100V
$R_{DS(on)}$ max.	0.20Ω
I_D	9.7A

Features

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



G	D	S
Gate	Drain	Source

Description

Fifth generation 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	
IRF520NPbF	TO-220	Tube	50	IRF520NPbF

Absolute Maximum Rating

Symbol	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	9.7	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	6.8	
I_{DM}	Pulsed Drain Current ①	38	
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	48	W
	Linear Derating Factor	0.32	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	91	mJ
I_{AR}	Avalanche Current ①	5.7	A
E_{AR}	Repetitive Avalanche Energy ①	4.8	mJ
dv/dt	Peak Diode Recovery dv/dt③	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	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	—	3.1	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.20	Ω	$V_{GS} = 10V, I_D = 5.7A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Trans conductance	2.7	—	—	S	$V_{DS} = 50V, I_D = 5.7A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 100V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$

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

Q_g	Total Gate Charge	—	—	25	nC	$I_D = 5.7A$ $V_{DS} = 80V$ $V_{GS} = 10V$, See Fig. 6 and 13
Q_{gs}	Gate-to-Source Charge	—	—	4.8		
Q_{gd}	Gate-to-Drain Charge	—	—	11		
$t_{d(on)}$	Turn-On Delay Time	—	4.5	—	ns	$V_{DD} = 50V$ $I_D = 5.7A$ $R_G = 22\Omega$ $R_D = 8.6\Omega$, See Fig. 10 ④
t_r	Rise Time	—	23	—		
$t_{d(off)}$	Turn-Off Delay Time	—	32	—		
t_f	Fall Time	—	23	—		
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	330	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$, See Fig.5
C_{oss}	Output Capacitance	—	92	—		
C_{rss}	Reverse Transfer Capacitance	—	54	—		

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	9.7	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	38		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 5.7A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	99	150	ns	$T_J = 25^\circ\text{C}, I_F = 5.7A$
Q_{rr}	Reverse Recovery Charge	—	390	580	nC	$di/dt = 100A/\mu s$ ④

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Starting $T_J = 25^\circ\text{C}$, $L = 4.7\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 5.7A$, $V_{GS} = 10V$. (See fig. 12)
- ③ $I_{SD} \leq 5.7A$, $di/dt \leq 240A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

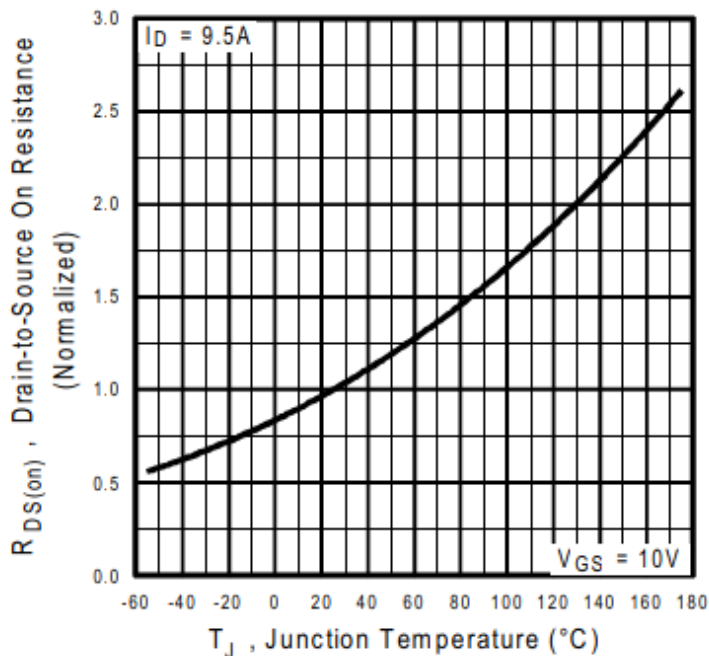
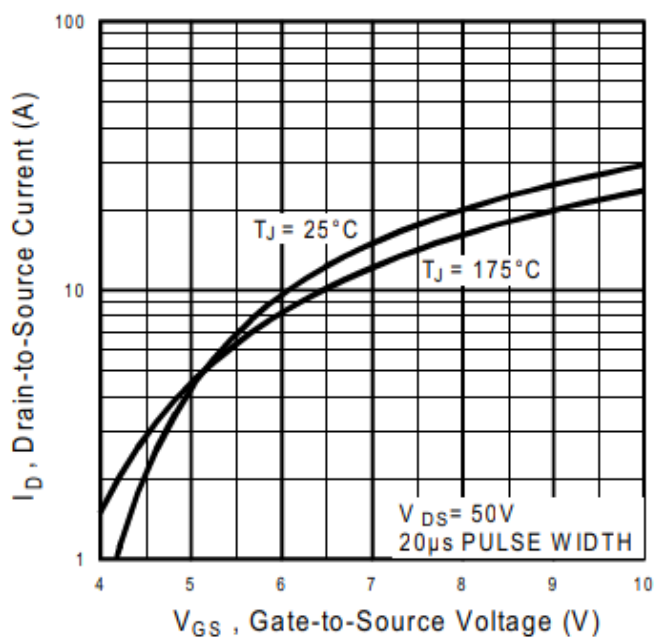
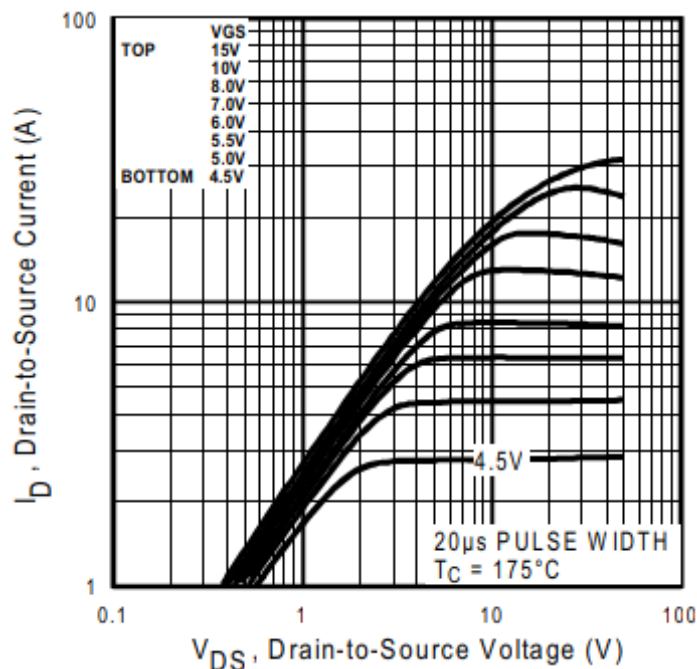
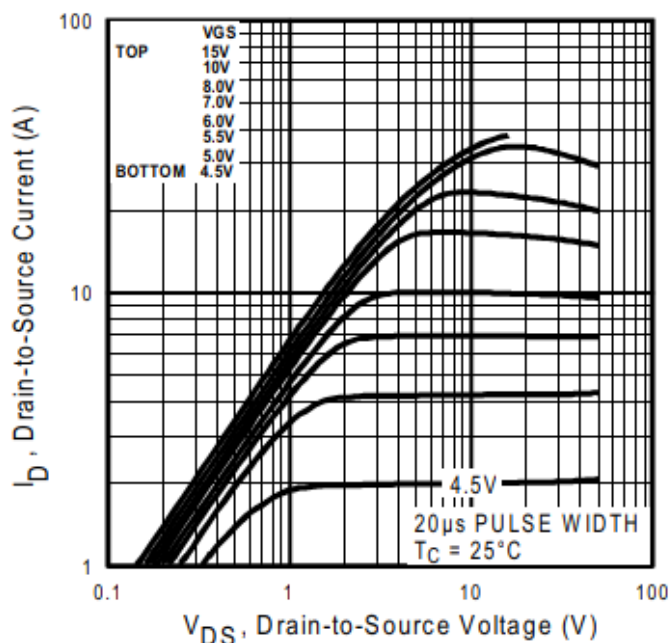


Fig. 3 Typical Transfer Characteristics

Fig. 4 Normalized On-Resistance vs. Temperature

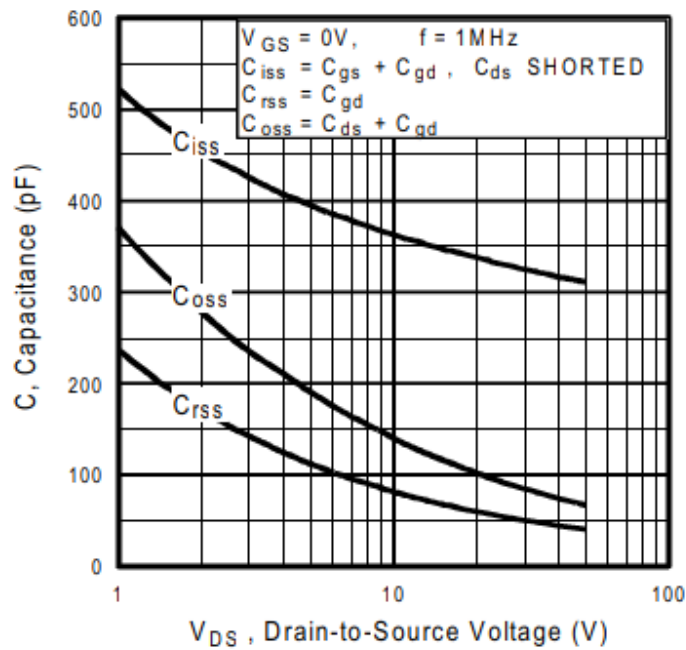


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

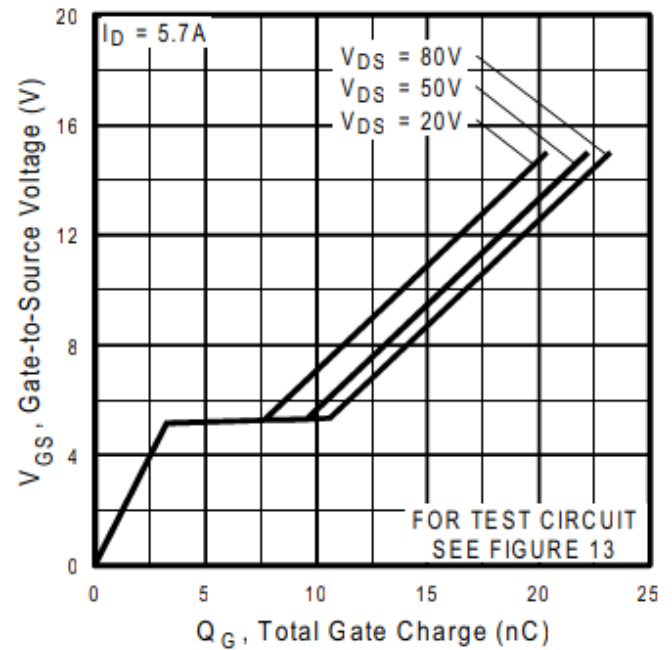


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

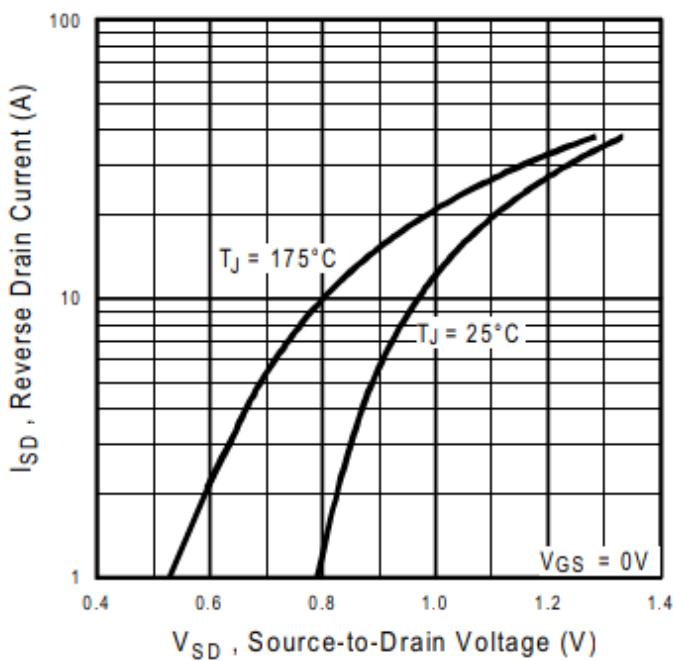


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

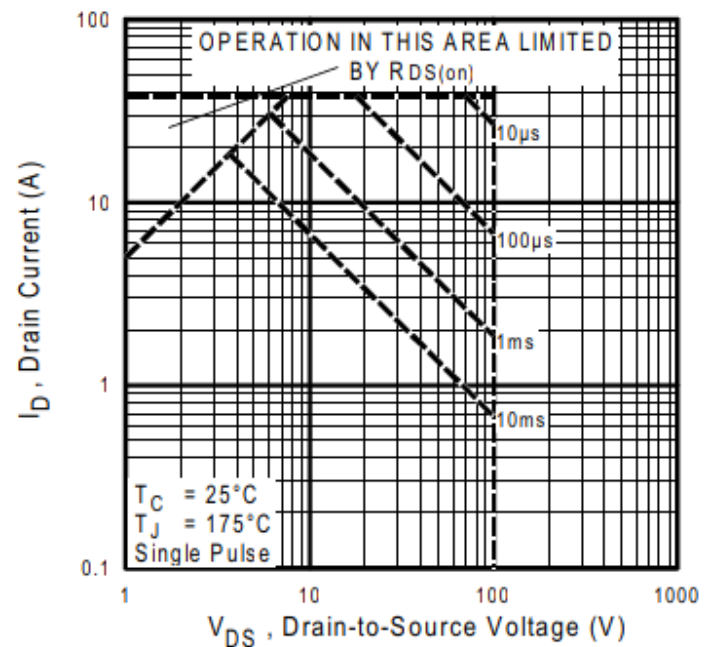


Fig 8. Maximum Safe Operating Area

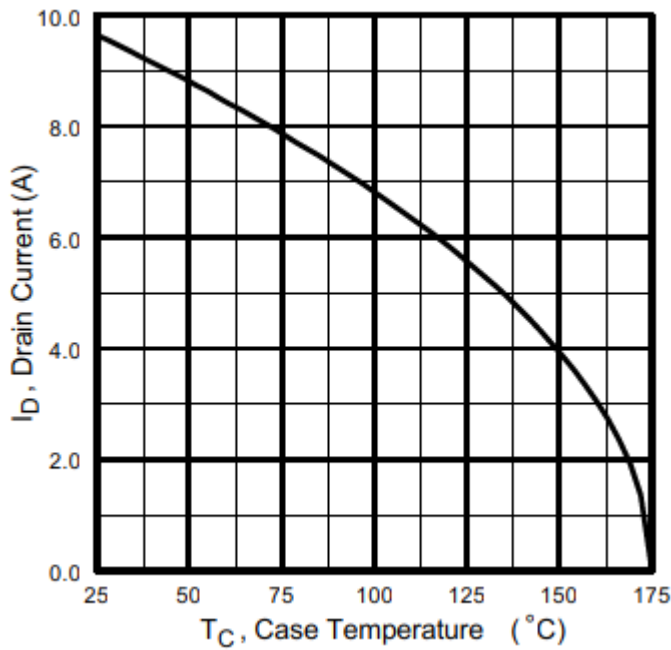


Fig 9. Maximum Drain Current vs. Case Temperature

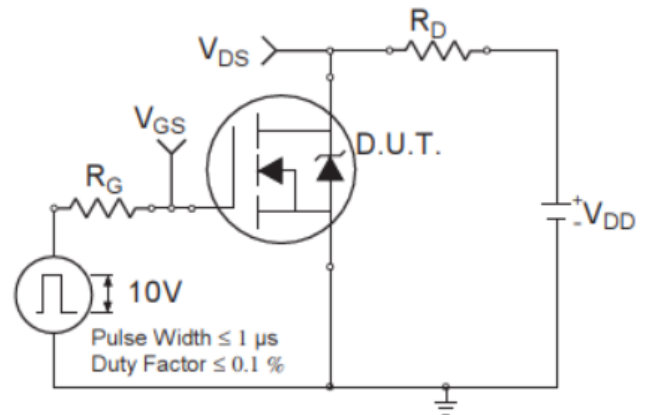


Fig 10b. Switching Time Test Circuit

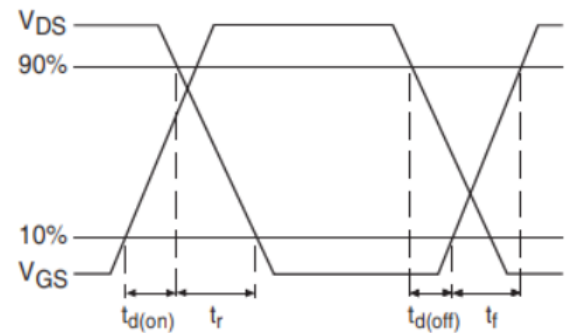


Fig 10b. Switching Time Waveforms

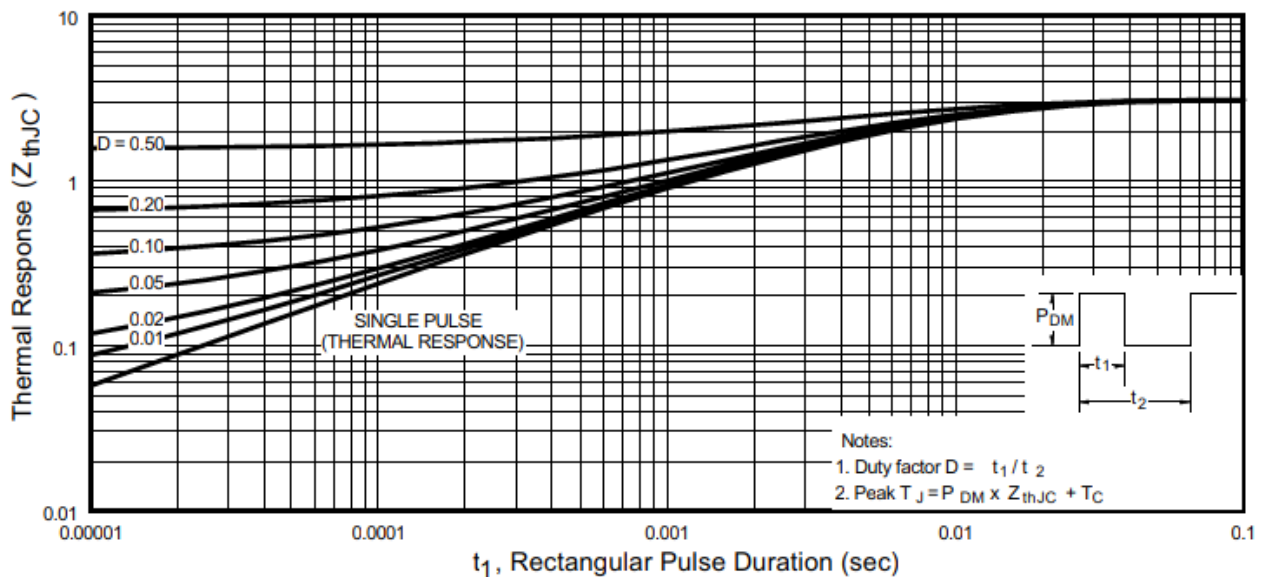


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

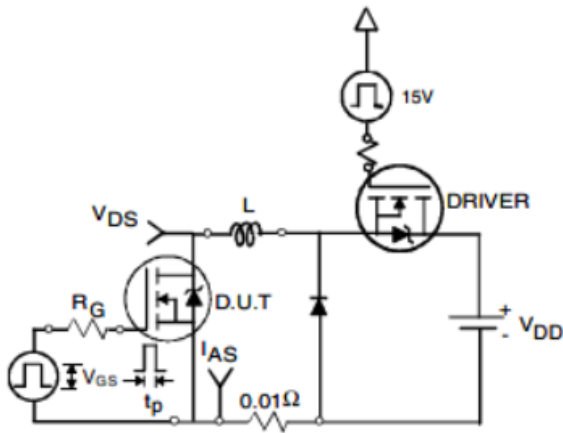


Fig. 12a. Unclamped Inductive Test Circuit

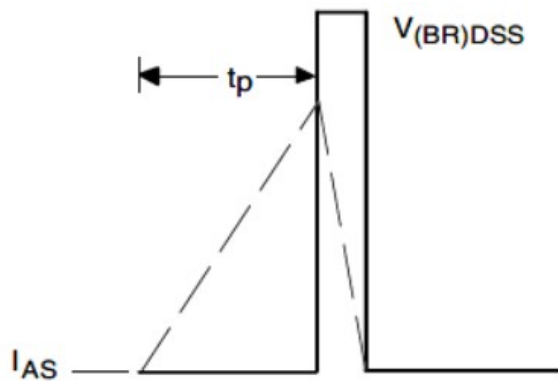


Fig. 12b. Unclamped Inductive Waveforms

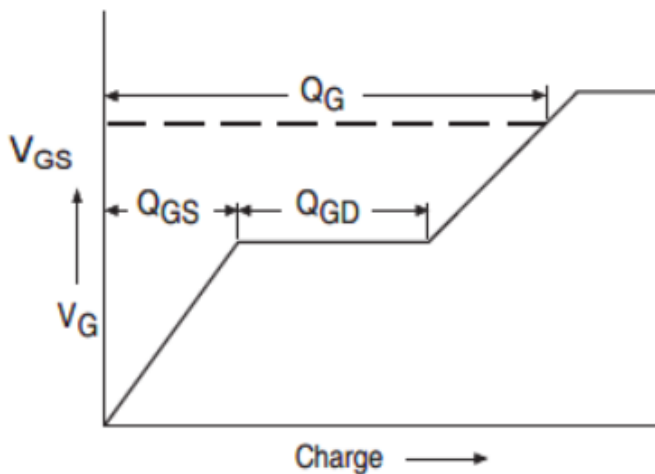


Fig 13a. Basic Gate Charge Waveform

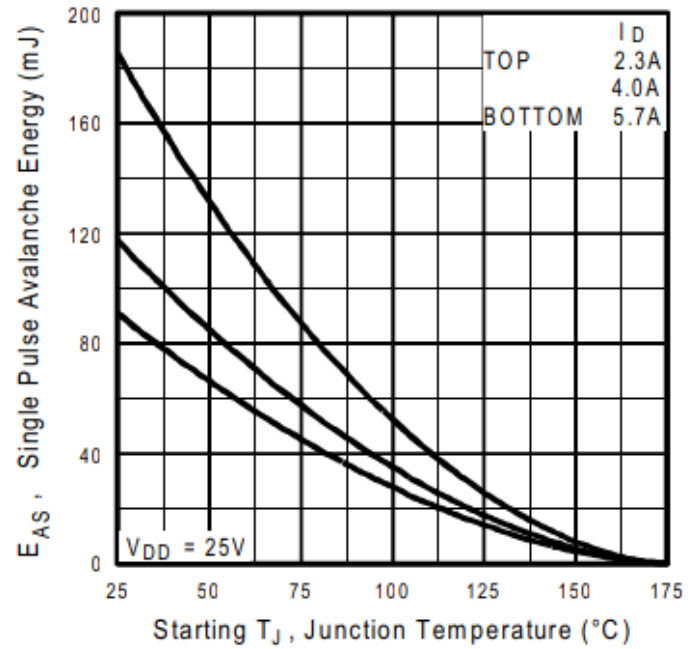


Fig 12c. Maximum Avalanche Energy vs. Drain Current

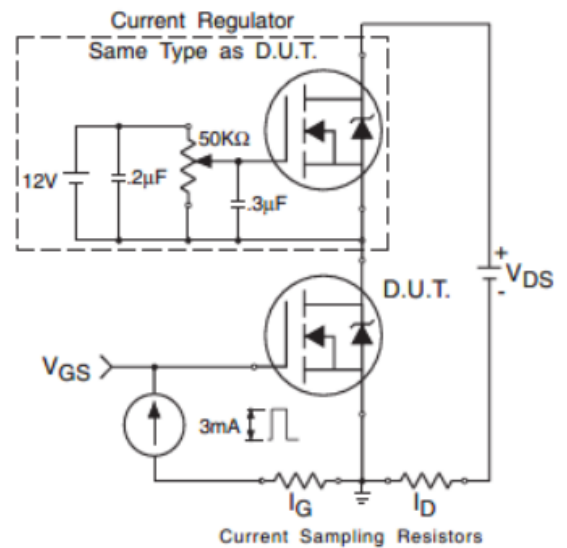


Fig 13b. Gate Charge Test Circuit

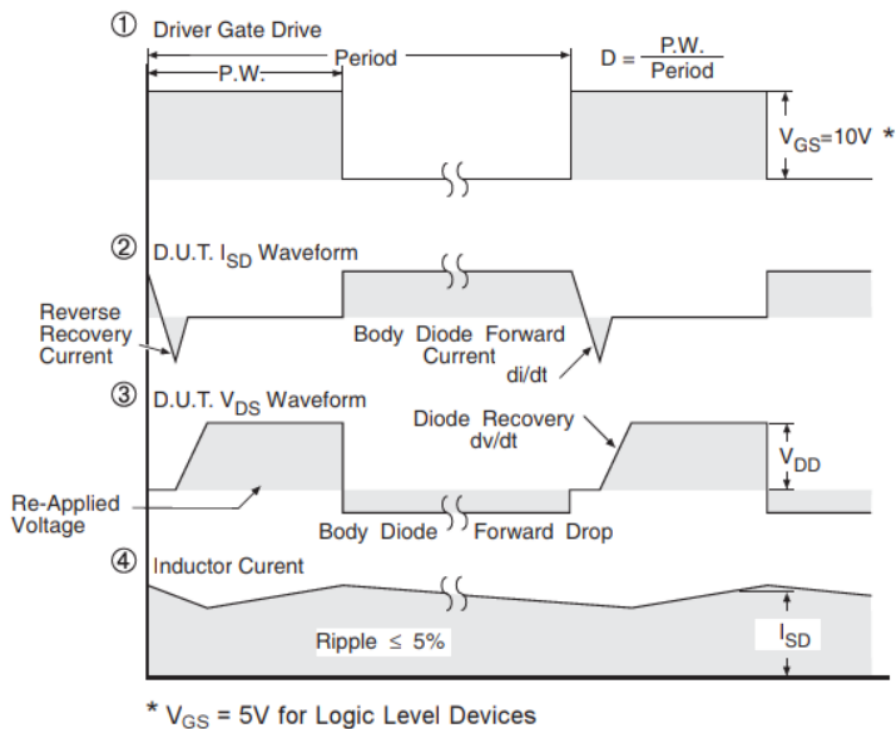
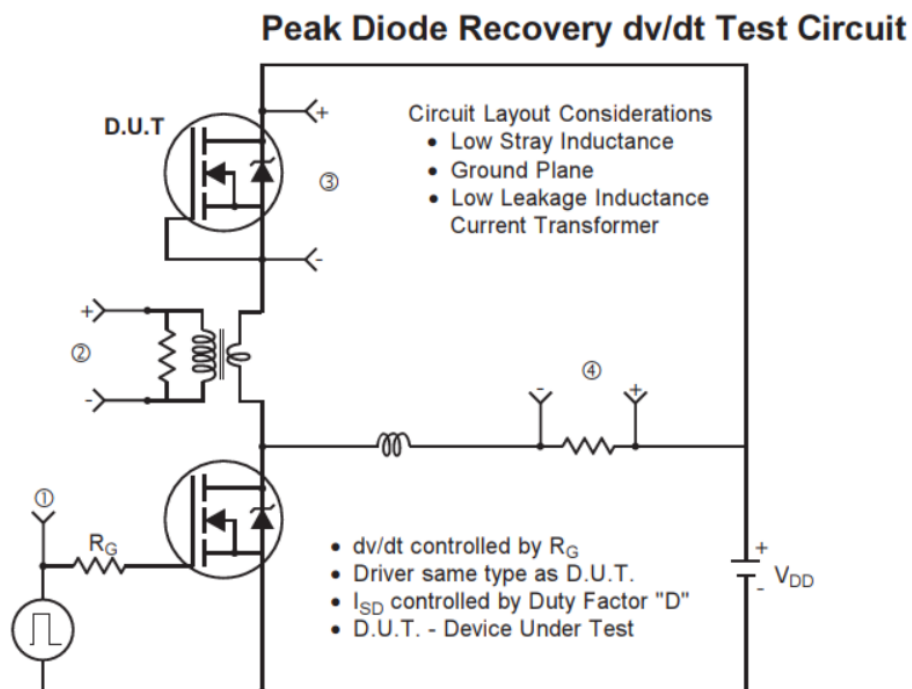
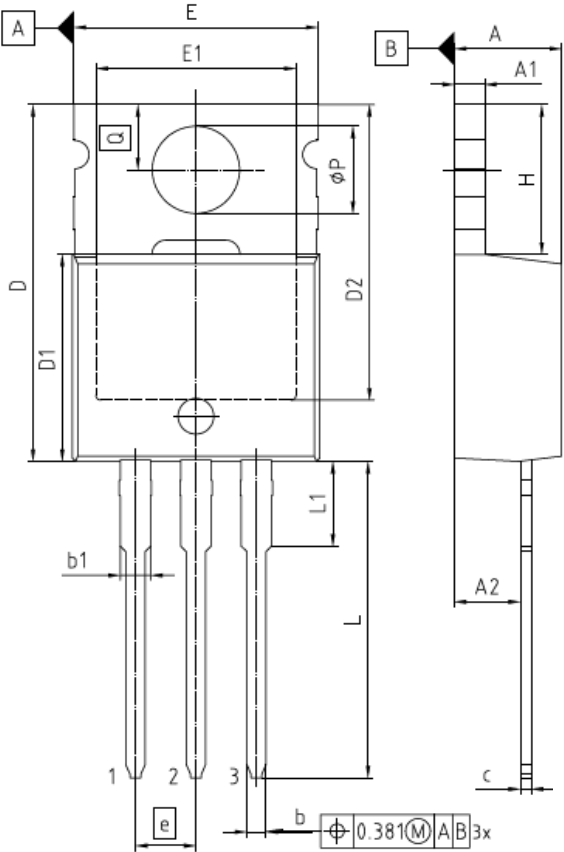


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel
HEXFET® Power MOSFETs

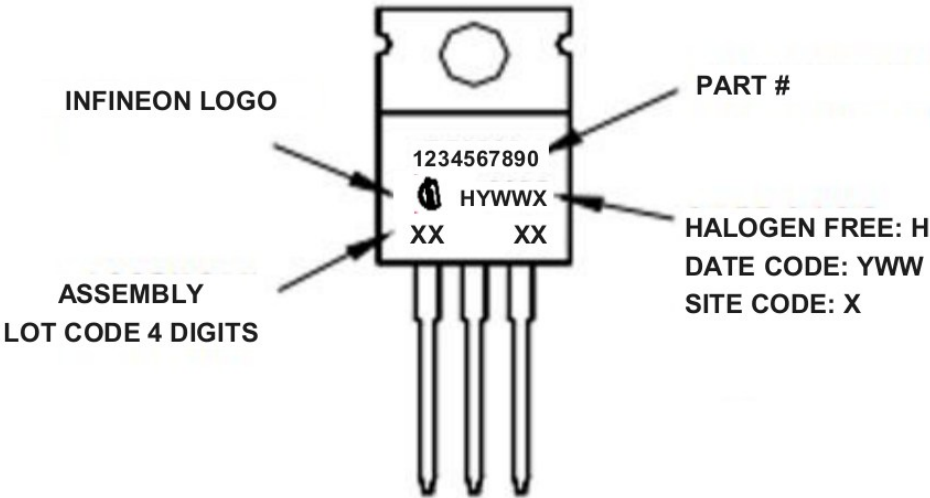
TO-220 Package Outline (Dimensions are shown in millimeters (inches))



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

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

TO-220 Part Marking Information



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

Revision History

Date	Rev.	Comments
2026-07-24	2.1	- Update datasheet to Infineon format - Updated Package Outline and Part marking –page 8 - Added disclaimer on last page.

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