

IRFZ44NSPBF-VB Datasheet

N-Channel 60-V (D-S) MOSFET

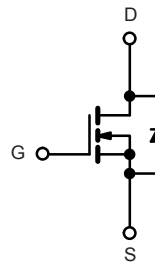
PRODUCT SUMMARY		
V_{DS}	60	V
$R_{DS(on)}$ $V_{GS} = 10\text{ V}$	11	$m\Omega$
$R_{DS(on)}$ $V_{GS} = 4.5\text{ V}$	12	$m\Omega$
I_D	75	A
Configuration	Single	

FEATURES

- 175 °C Junction Temperature
- TrenchFET® Power MOSFET



RoHS
COMPLIANT



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ °C}$, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ($T_J = 175\text{ °C}$) ^b	$T_C = 25\text{ °C}$	I_D	75	A
	$T_C = 100\text{ °C}$		50 ^a	
Pulsed Drain Current		I_{DM}	200	
Continuous Source Current (Diode Conduction)		I_S	50 ^a	
Avalanche Current		I_{AS}	50	
Single Avalanche Energy (Duty Cycle $\leq 1\%$)	$L = 0.1\text{ mH}$	E_{AS}	125	mJ
Maximum Power Dissipation	$T_C = 25\text{ °C}$	P_D	136	W
	$T_A = 25\text{ °C}$		3 ^b , 8.3 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10\text{ sec}$	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	0.85	1.1	

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. $t \leq 10\text{ s}$.

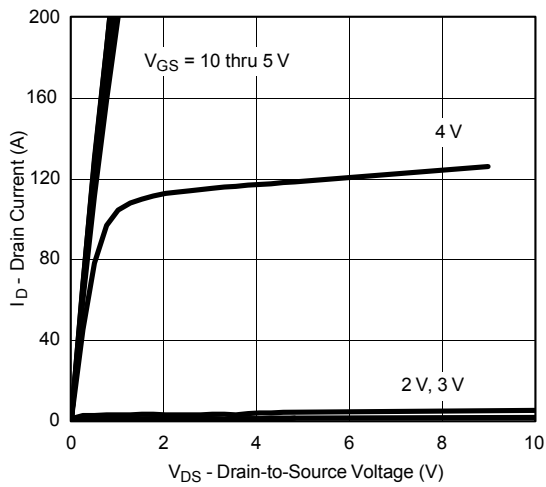
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	60			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.011		Ω
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.016		
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.020		
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		0.012		
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$		60		S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4300		μF
Output Capacitance	C_{oss}			470		
Reverse Transfer Capacitance	C_{rss}			225		
Total Gate Charge ^c	Q_g	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		47		nC
Gate-Source Charge ^c	Q_{gs}			10		
Gate-Drain Charge ^c	Q_{gd}			12		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		10	20	ns
Rise Time ^c	t_r			15	25	
Turn-Off Delay Time ^c	$t_{d(off)}$			35	50	
Fall Time ^c	t_f			20	30	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current	I_{SM}				60	A
Diode Forward Voltage	V_{SD}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		1	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		45	100	ns

Notes:

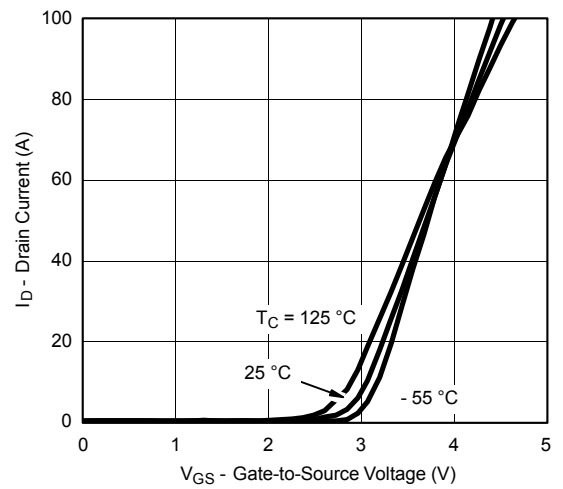
- For design aid only; not subject to production testing.
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

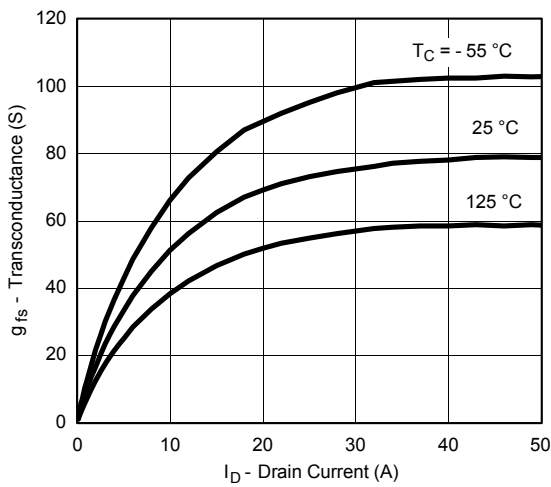
TYPICAL CHARACTERISTICS (25 °C unless noted)



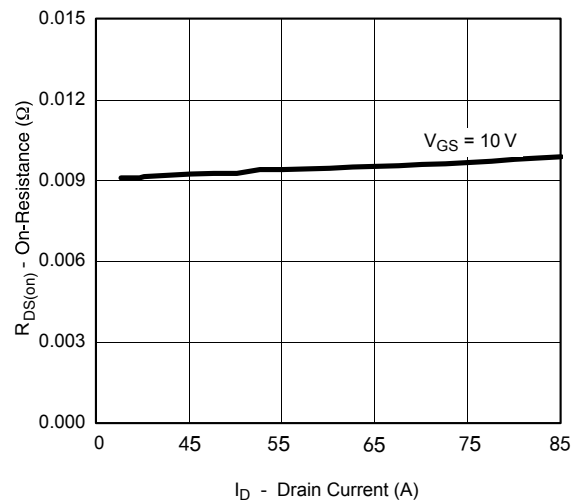
Output Characteristics



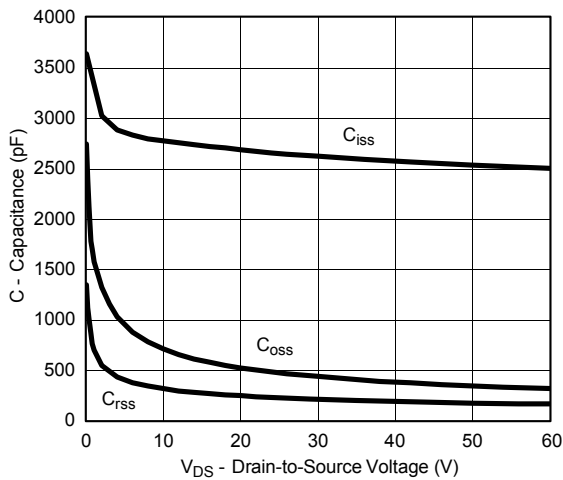
Transfer Characteristics



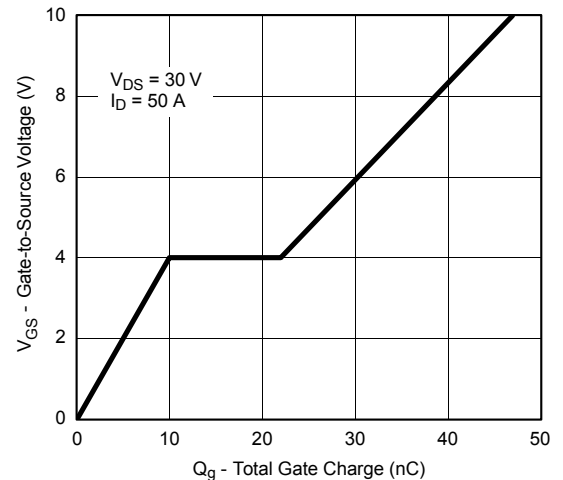
Transconductance



$R_{DS(on)}$ vs. Drain Current

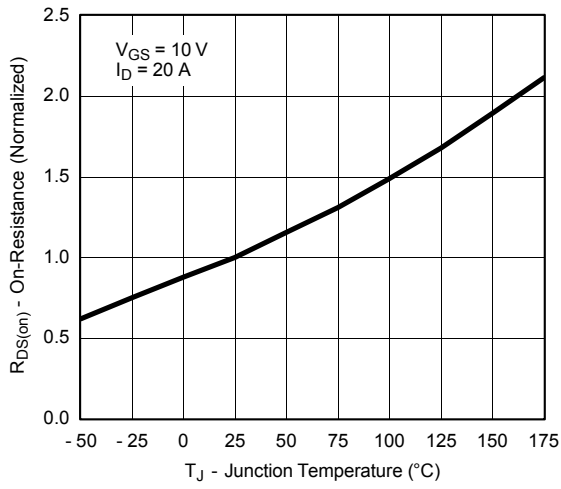


Capacitance

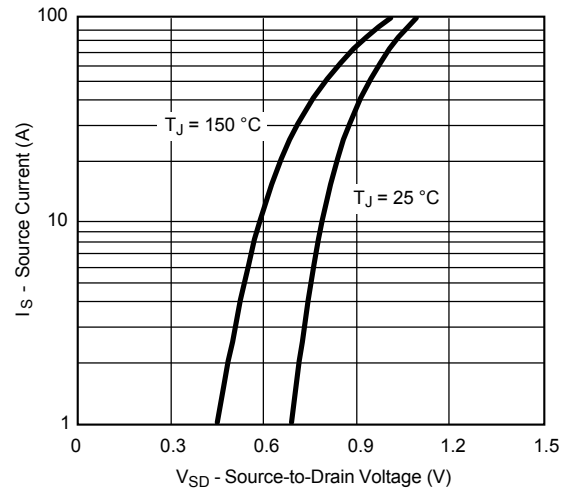


Gate Charge

TYPICAL CHARACTERISTICS (25 °C unless noted)

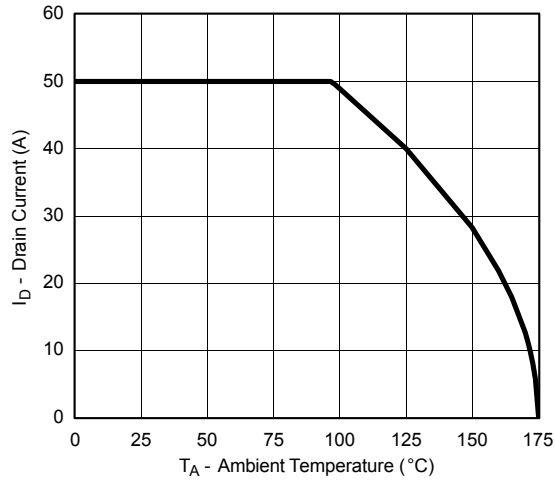


On-Resistance vs. Junction Temperature

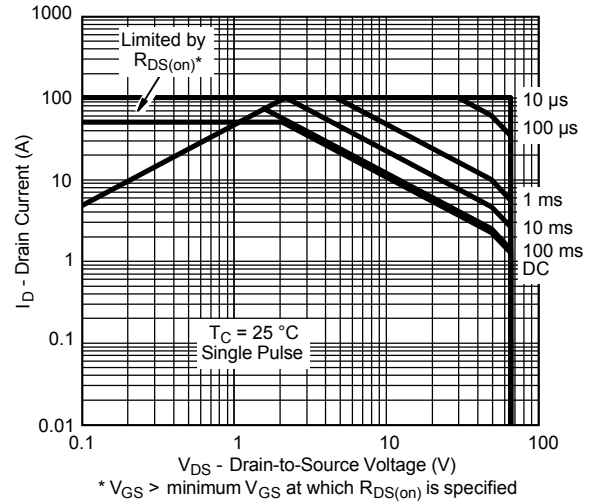


Source-Drain Diode Forward Voltage

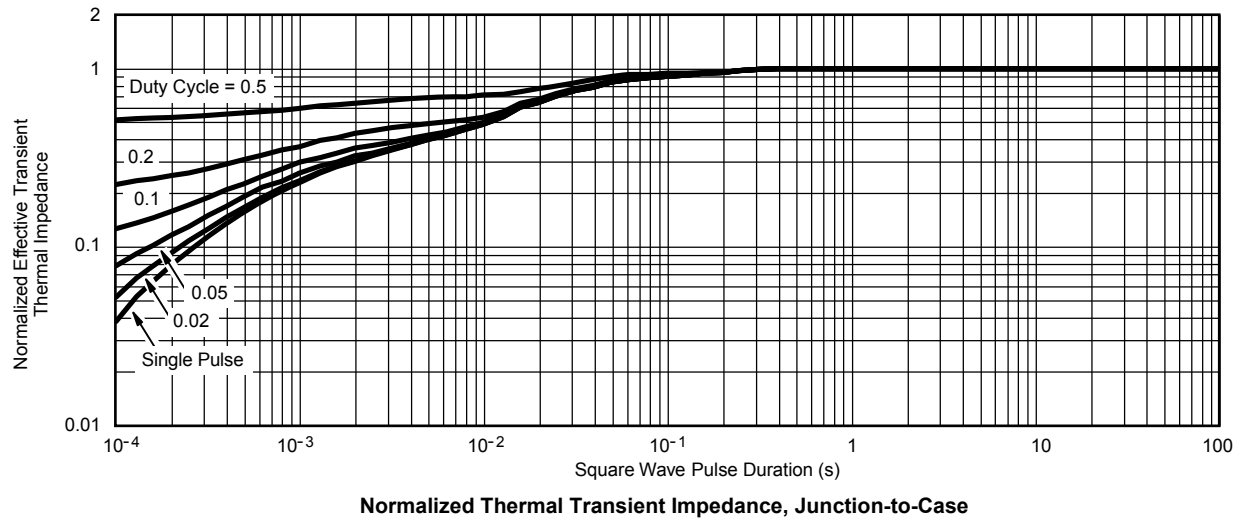
THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-263AB (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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