



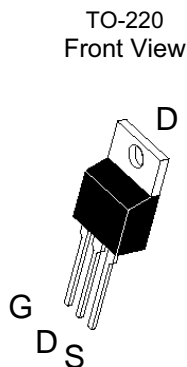
# IRFZ44N 55A 50V N CHANNEL POWER MOSFET

## APPLICATION

- ◆ Buck Converter High Side Switch
- ◆ DC motor control , Ups ...etc , & other Application

$V_{DSS}$	$R_{DS(ON)}$ Max.	$I_D$
55V	17.5m $\Omega$	50A

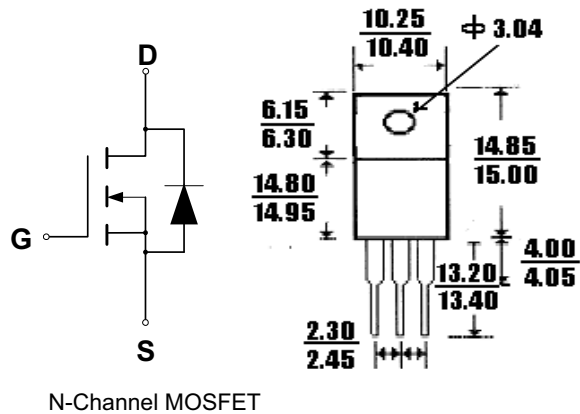
## PIN CONFIGURATION



## FEATURES

- ◆ Ultra Low ON Resistance
- ◆ Low Gate Charge
- ◆ Dynamic dv/dt Rating
- ◆ Inductive Switching Curves
- ◆ Peak Current vs Pulse Width Curve

## SYMBOL



DIMENSION IN MM

## ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Source Voltage	$V_{DSS}$	55	V
Drain to Current — Continuous $T_c = 25^\circ\text{C}$ , $V_{GS}@10\text{V}$	$I_D$	50	A
— Continuous $T_c = 100^\circ\text{C}$ , $V_{GS}@10\text{V}$	$I_D$	35	
— Pulsed $T_c = 25^\circ\text{C}$ , $V_{GS}@10\text{V}$ (Note 1)	$I_{DM}$	160	
Gate-to-Source Voltage — Continue	$V_{GS}$	$\pm 20$	V
Total Power Dissipation	$P_D$	94	W
Derating Factor above $25^\circ\text{C}$		0.63	W/ $^\circ\text{C}$
Peak Diode Recovery dv/dt (Note 3)	dv/dt	5.0	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	9.4	mJ
Maximum Lead Temperature for Soldering Purposes	$T_L$	300	$^\circ\text{C}$
Maximum Package Body for 10 seconds	$T_{PKG}$	260	$^\circ\text{C}$
Avalanche Current (Note 1)	$I_{AR}$	25	A

## THERMAL RESISTANCE

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
$R_{\theta JC}$	Junction-to-case			1.5	$^\circ\text{C}/\text{W}$	Water cooled heatsink, $P_D$ adjusted for a peak junction temperature of $+175^\circ\text{C}$
$R_{\theta JA}$	Junction-to-ambient			62	$^\circ\text{C}/\text{W}$	1 cubic foot chamber, free air



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## ELECTRICAL CHARACTERISTICS

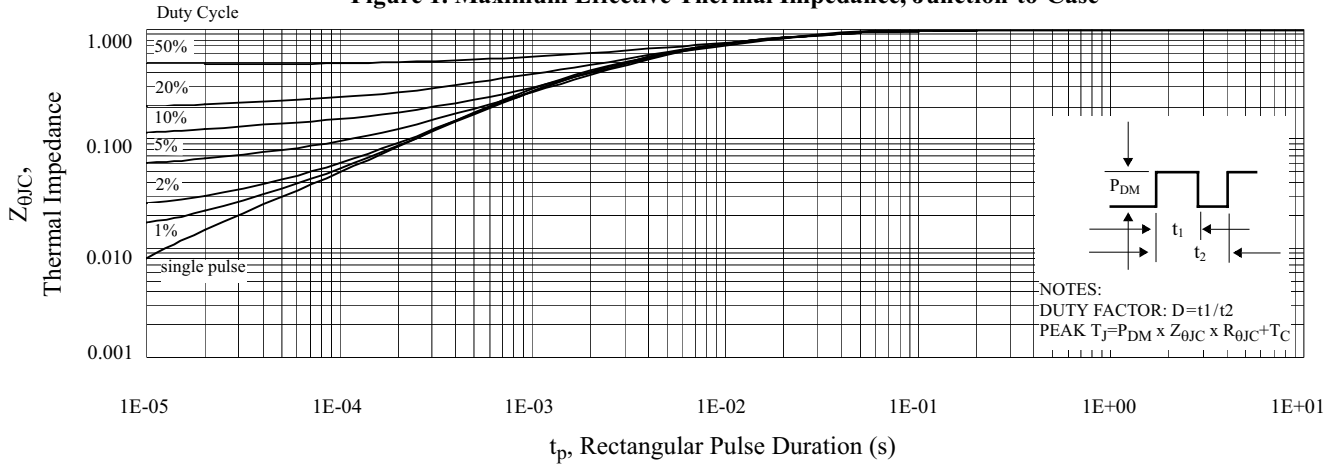
Unless otherwise specified,  $T_J = 25^\circ\text{C}$ .

Characteristic		Symbol	IRFZ44N			Units
			Min	Typ	Max	
<b>OFF Characteristics</b>						
Drain-to-Source Breakdown Voltage ( $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$ )		$V_{DSS}$	55			V
Breakdown Voltage Temperature Coefficient (Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$ )		$\Delta V_{DSS}/\Delta T_J$		0.058		$\text{V}/^\circ\text{C}$
Drain-to-Source Leakage Current ( $V_{DS} = 55\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ ) ( $V_{DS} = 44\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 150^\circ\text{C}$ )		$I_{DSS}$			25 250	$\mu\text{A}$
Gate-to-Source Forward Leakage ( $V_{GS} = 20\text{ V}$ )		$I_{GSS}$			100	nA
Gate-to-Source Reverse Leakage ( $V_{GS} = -20\text{ V}$ )		$I_{GSS}$			-100	nA
<b>ON Characteristics</b>						
Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$ )		$V_{GS(th)}$	2.0		4.0	V
Static Drain-to-Source On-Resistance (Note 4) ( $V_{GS} = 10\text{ V}$ , $I_D = 25\text{A}$ )		$R_{DS(on)}$			17.5	$\text{m}\Omega$
Forward Transconductance ( $V_{DS} = 25\text{ V}$ , $I_D = 25\text{A}$ ) (Note 4)		$g_{FS}$	19			S
<b>Dynamic Characteristics</b>						
Input Capacitance	$(V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$		1470		pF
Output Capacitance		$C_{oss}$		360		pF
Reverse Transfer Capacitance		$C_{rss}$		88		pF
Total Gate Charge	$(V_{DS} = 44\text{ V}$ , $I_D = 25\text{ A}$ , $V_{GS} = 10\text{ V}$ ) (Note 2)	$Q_g$		63		nC
Gate-to-Source Charge		$Q_{gs}$		14		nC
Gate-to-Drain ("Miller") Charge		$Q_{gd}$		23		nC
<b>Resistive Switching Characteristics</b>						
Turn-On Delay Time	$(V_{DD} = 28\text{ V}$ , $I_D = 25\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_G = 12\Omega$ ) (Note 4)	$t_{d(on)}$		12		ns
Rise Time		$t_{rise}$		60		ns
Turn-Off Delay Time		$t_{d(off)}$		44		ns
Fall Time		$t_{fall}$		45		ns
<b>Source-Drain Diode Characteristics</b>						
Continuous Source Current (Body Diode)	Integral pn-diode in MOSFET (Note 1)	$I_S$			50	A
Pulse Source Current (Body Diode)		$I_{SM}$			160	A
Diode Forward On-Voltage	$(I_S = 25\text{A}$ , $V_{GS} = 0\text{ V}$ ) (Note 4)	$V_{SD}$			1.3	V
Reverse Recovery Time	$(I_F = 25\text{A}$ , $V_{GS} = 0\text{ V}$ , $d_I/d_t = 100\text{A}/\mu\text{s}$ ) (Note 4)	$t_{rr}$		63	95.	ns
Reverse Recovery Charge		$Q_{rr}$			170	260

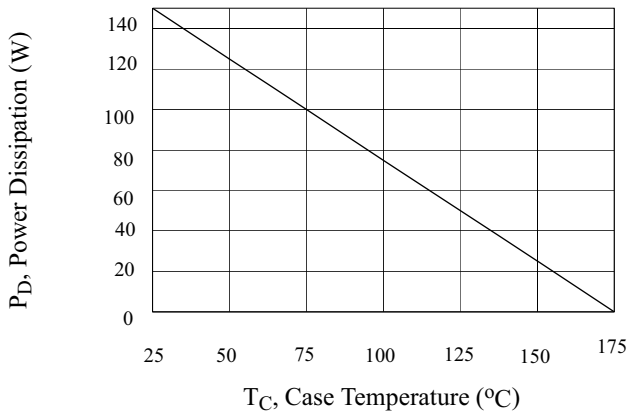


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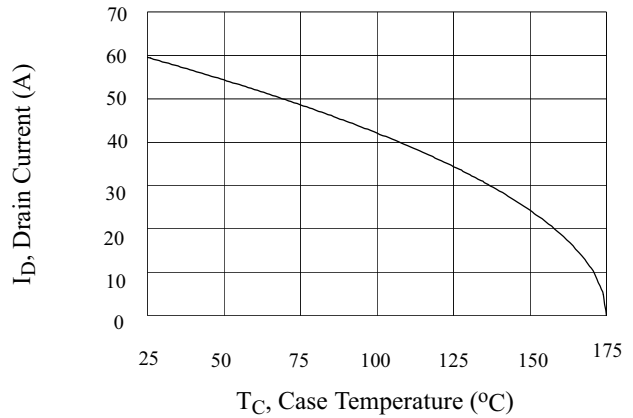
**Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case**



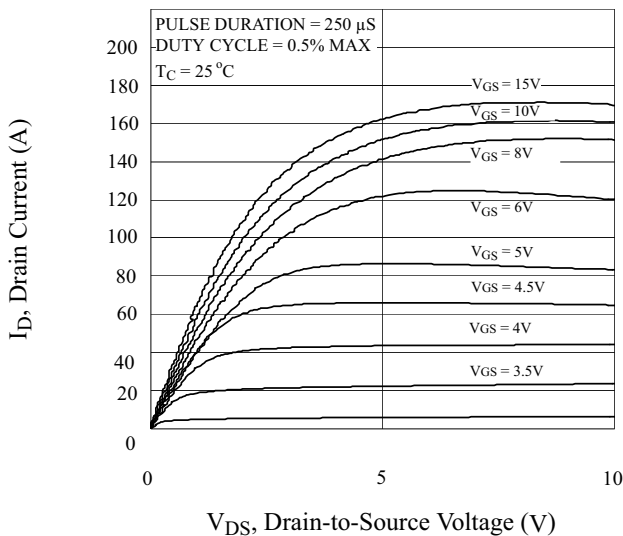
**Figure 2. Maximum Power Dissipation vs Case Temperature**



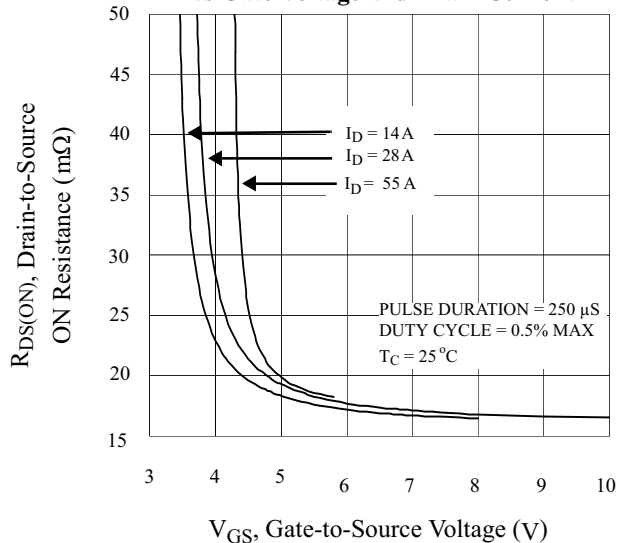
**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



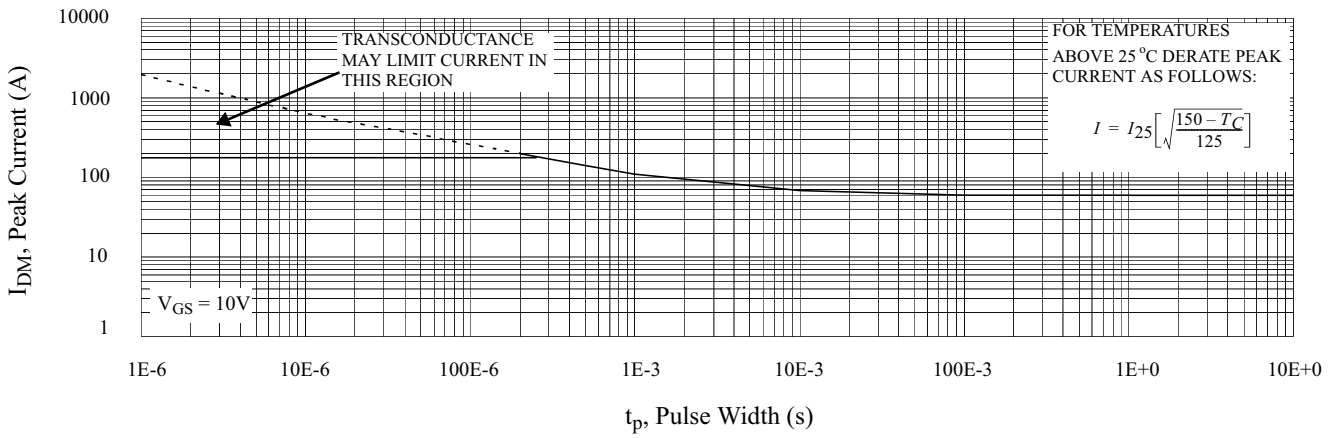
**Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**



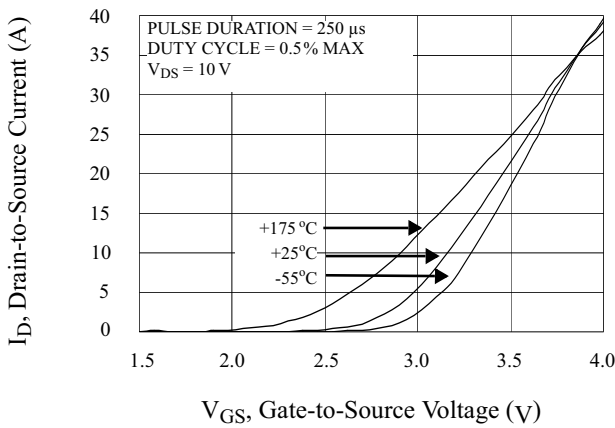


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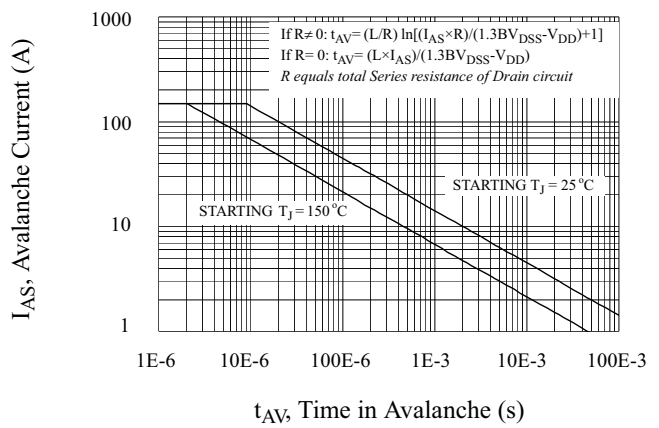
**Figure 6. Maximum Peak Current Capability**



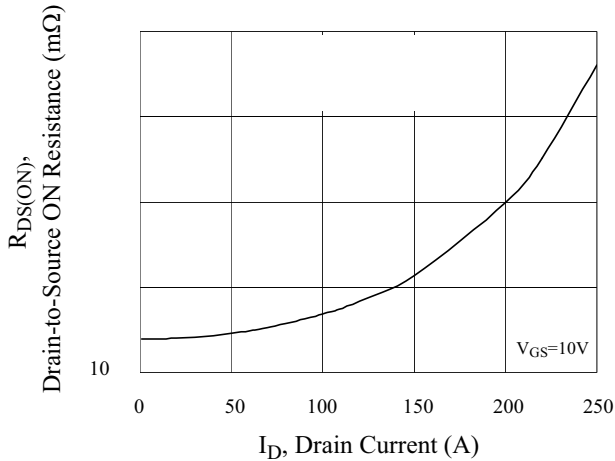
**Figure 7. Typical Transfer Characteristics**



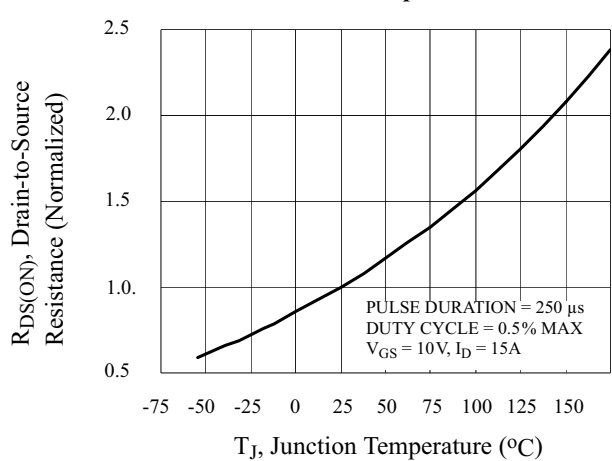
**Figure 8. Unclamped Inductive Switching Capability**



**Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current**



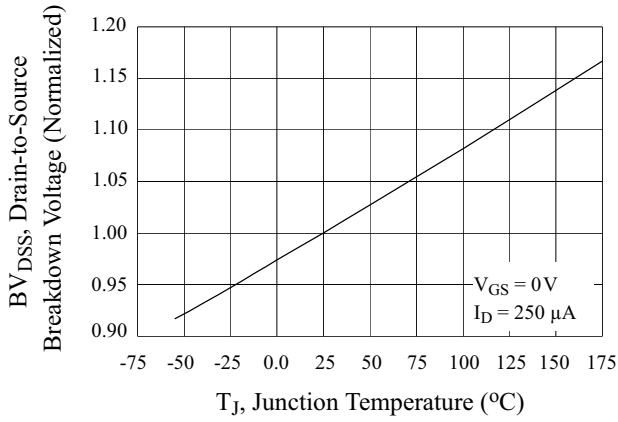
**Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature**



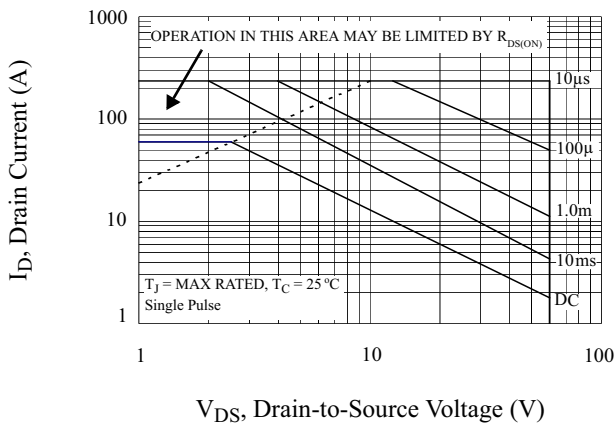
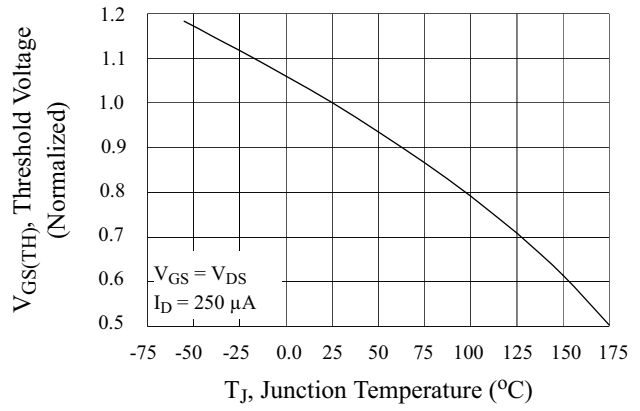


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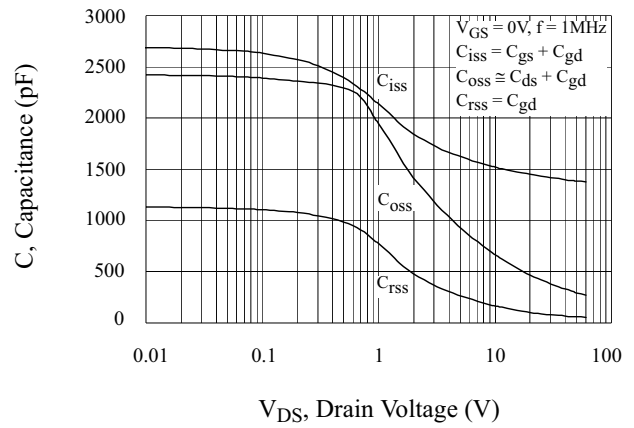
**Figure 11. Typical Breakdown Voltage vs Junction Temperature**



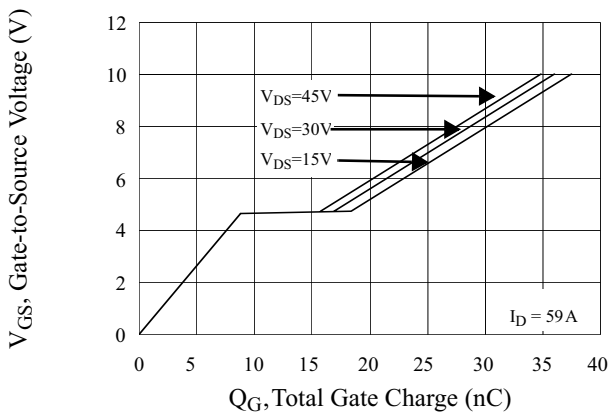
**Figure 12. Typical Threshold Voltage vs Junction Temperature**



**Figure 14. Typical Capacitance vs Drain-to-Source Voltage**



**Figure 15. Typical Gate Charge vs Gate-to-Source Voltage**



**Figure 16. Typical Body Diode Transfer Characteristics**

