

APPLICATION

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

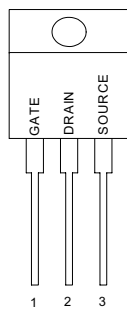
V_{DSS}	$R_{DS(ON)}$ Max.	I_D
55V	17.5mΩ	50A

FEATURES

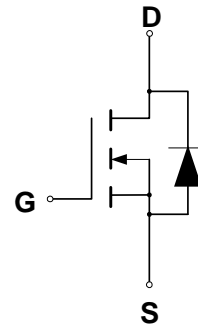
- ◆ Ultra Low ON Resistance
- ◆ Low Gate Charge
- ◆ Dynamic dv/dt Rating
- ◆ Inductive Switching Curves
- ◆ Peak Current vs Pulse Width Curve

PIN CONFIGURATION

TO-220
Front View



SYMBOL



N-Channel MOSFET

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}	± 20	V
Total Power Dissipation	P_D	94	W
Derating Factor above 25°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

ORDERING INFORMATION

Part Number	Package
IRFZ44N	TO-220

ELECTRICAL CHARACTERISTICS

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

Characteristic		Symbol	IRFZ44N			Units
			Min	Typ	Max	
OFF Characteristics						
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°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	μA
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
ON Characteristics						
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
Dynamic Characteristics						
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
Resistive Switching Characteristics						
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
Source-Drain Diode Characteristics						
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	$(I_F = 25\text{A}$, $V_{GS} = 0\text{ V}$,	t_{rr}		63	95.	ns
Reverse Recovery Charge	$d_i/d_t = 100\text{A}/\mu\text{s}$) (Note 4)	Q_{rr}		170	260	nC

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 1)
- ② Essentially independent of operating temperature
- ③ $I_{SD} \leq 25\text{A}$, $di/dt \leq 230\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.

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

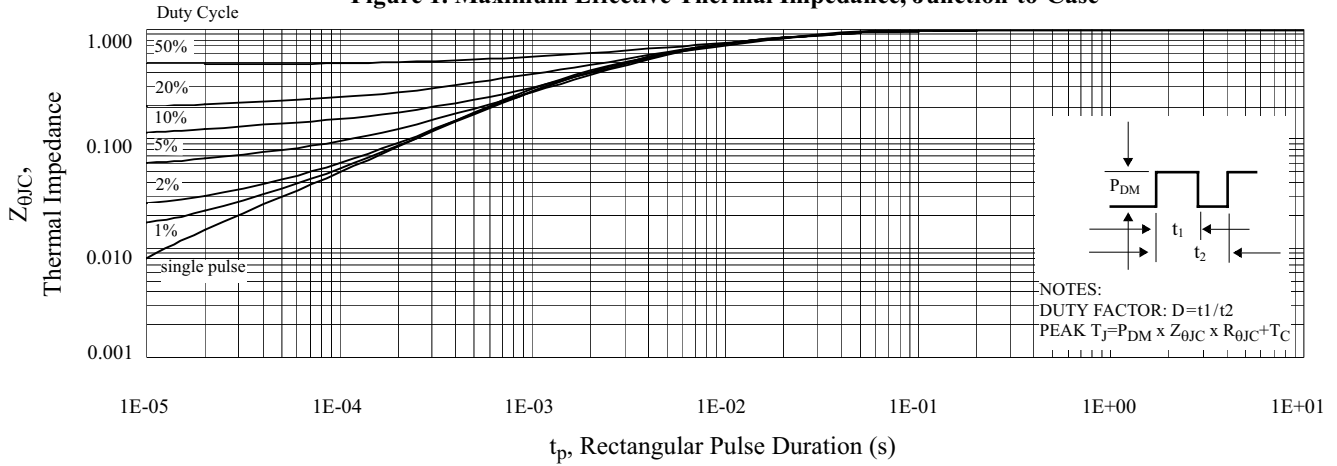


Figure 2. Maximum Power Dissipation vs Case Temperature

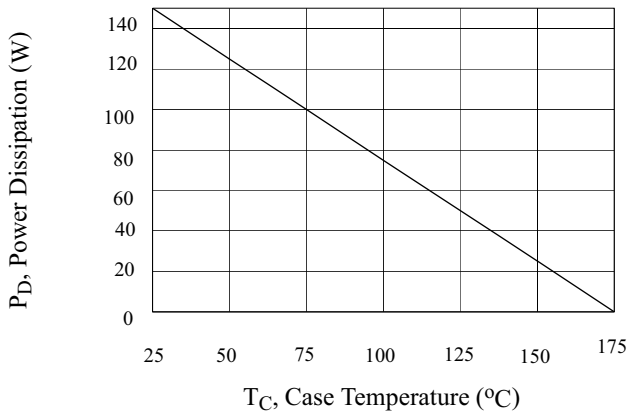


Figure 3. Maximum Continuous Drain Current vs Case Temperature

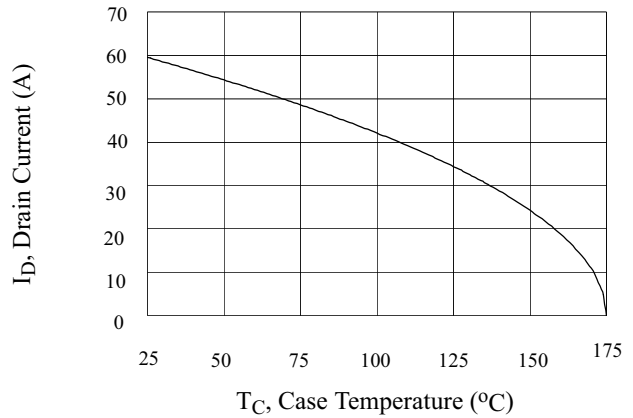


Figure 4. Typical Output Characteristics

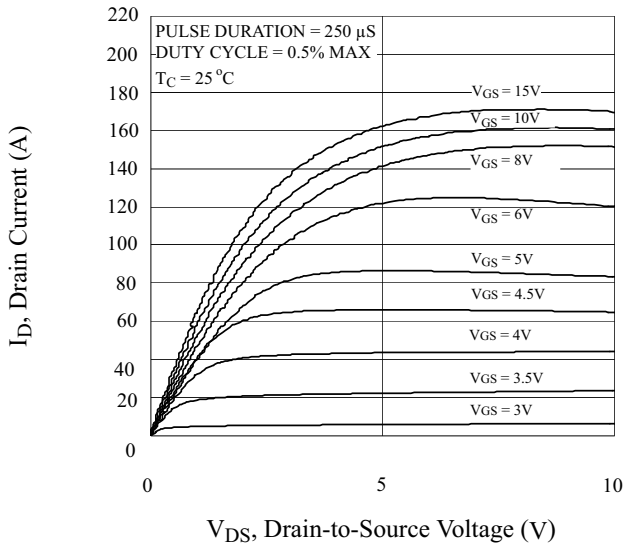


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

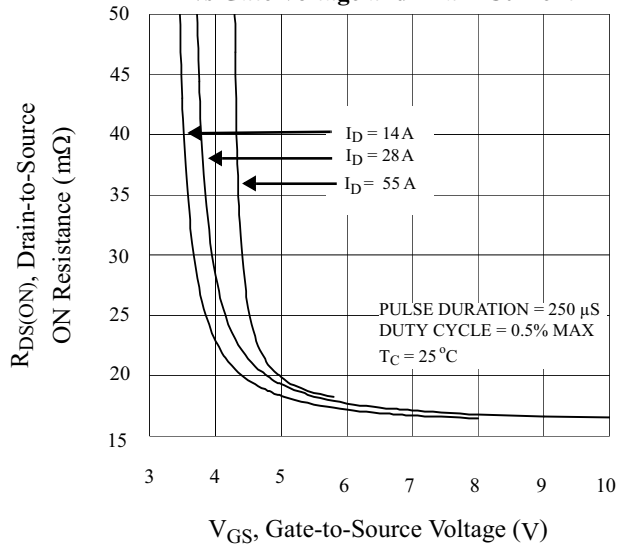


Figure 6. Maximum Peak Current Capability

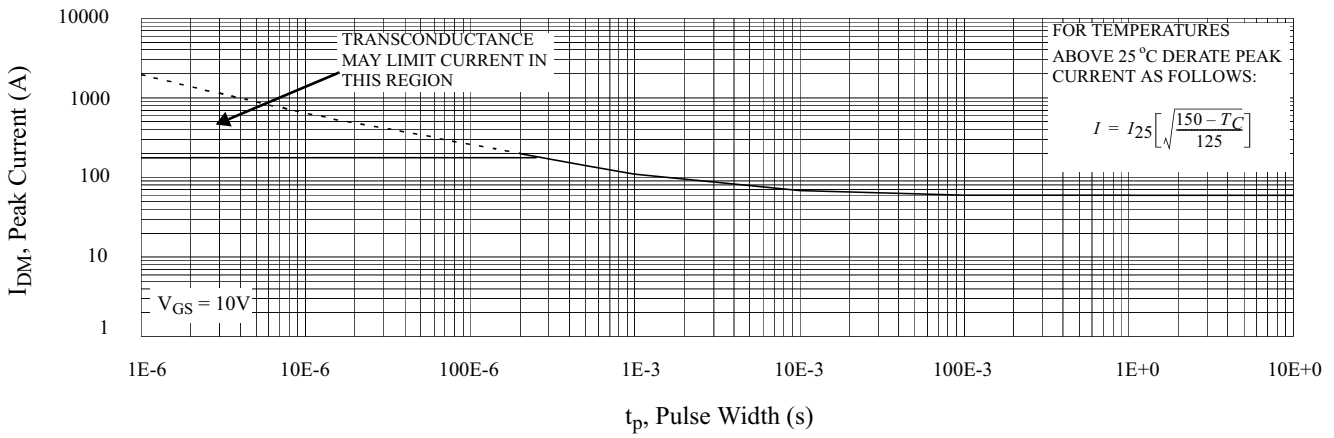


Figure 7. Typical Transfer Characteristics

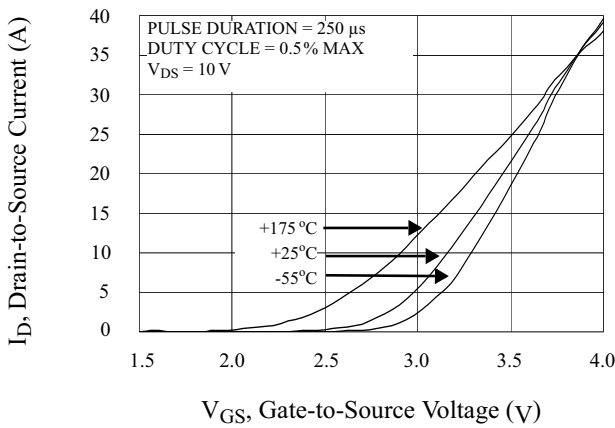


Figure 8. Unclamped Inductive Switching Capability

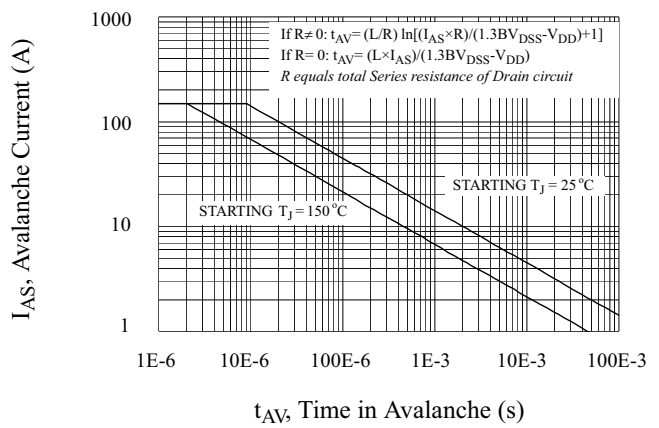


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

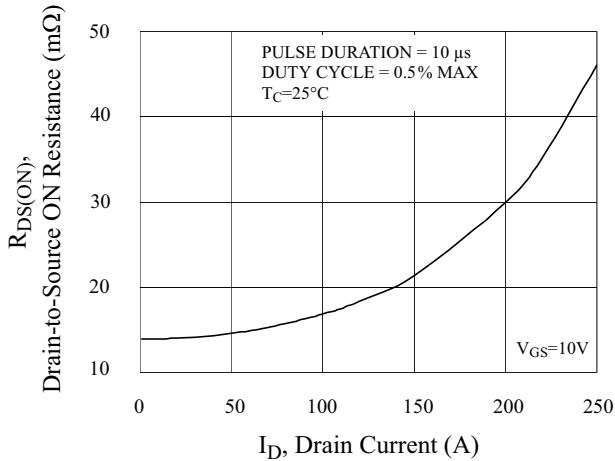


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

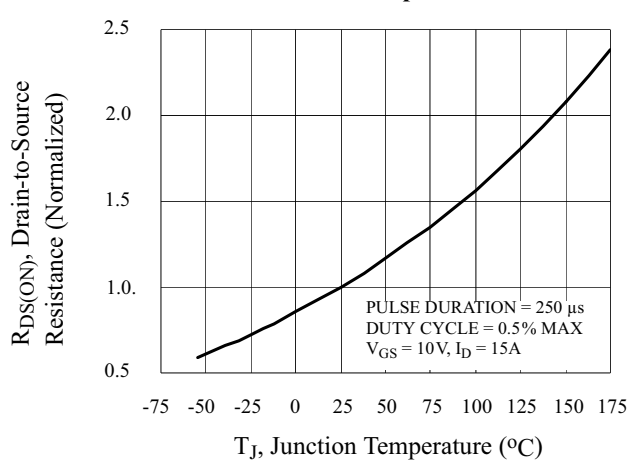


Figure 11. Typical Breakdown Voltage vs Junction Temperature

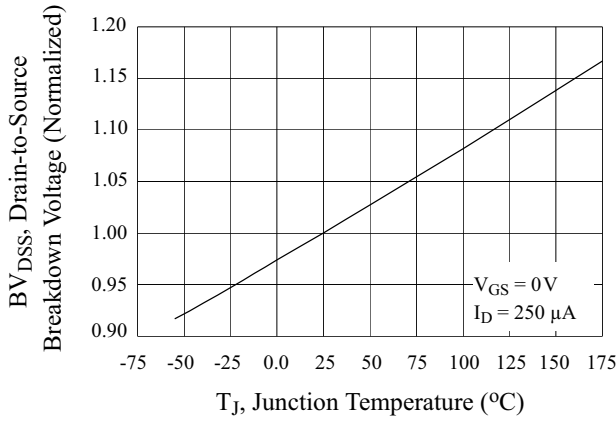


Figure 12. Typical Threshold Voltage vs Junction Temperature

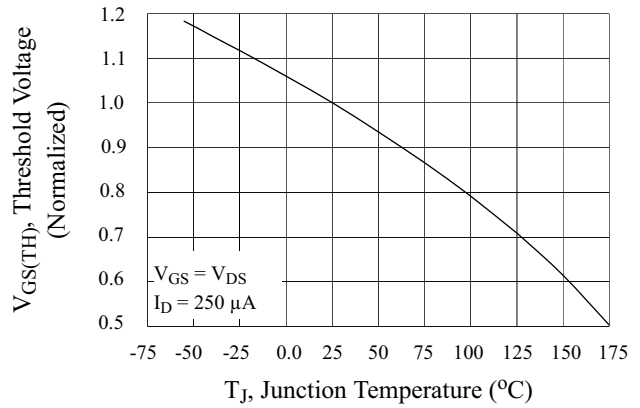


Figure 13. Maximum Forward Bias Safe Operating Area

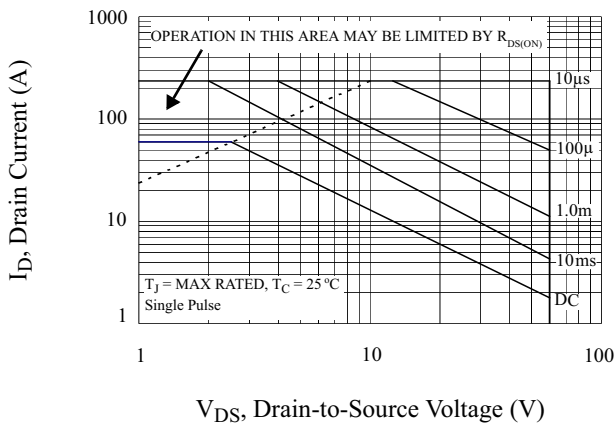


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

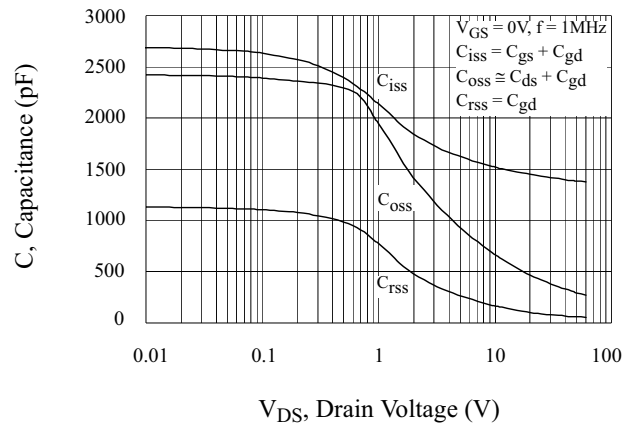


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

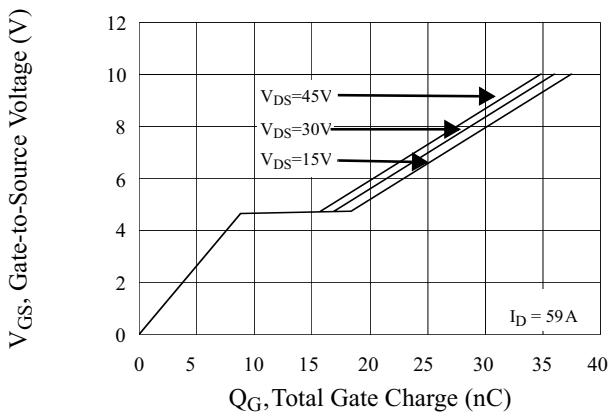


Figure 16. Typical Body Diode Transfer Characteristics

