IRFZ44V

N-CHANNEL Power MOSFET

APPLICATION

- DC motor control
- UPS
- Class D Amplifier

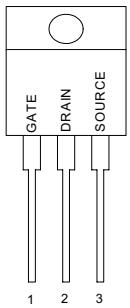
FEATURES

- Low ON Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- Inductive Switching Curves

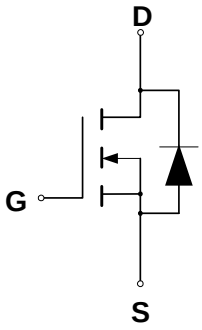
V_{DSS}	$R_{DS(ON)}$	I_D
60V	16.5mΩ	60A

PIN CONFIGURATION

TO-220
Front View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Source Voltage (Note 1)	V_{DSS}	60	V
Drain to Current — Continuous Tc = 25℃, V_{GS}@10V	I_D	60	A
— Continuous Tc = 100℃, V_{GS}@10V	I_D	43	
— Pulsed Tc = 25℃, V_{GS}@10V (Note 2)	I_{DM}	241	
Gate-to-Source Voltage — Continue	V_{GS}	±20	V
Total Power Dissipation	P_D	150	W
Derating Factor above 25℃		1.0	W/℃
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	℃
Single Pulse Avalanche Energy L=144μH,I_D=40 Amps	E_{AS}	500	mJ
Maximum Lead Temperature for Soldering Purposes	T_L	300	℃
Maximum Package Body for 10 seconds	T_{PKG}	260	℃
Pulsed Avalanche Rating	I_{AS}	60	A

THERMAL RESISTANCE

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
$R_{\theta JC}$	Junction-to-case			1.0	℃/W	Water cooled heatsink, P_D adjusted for a peak junction temperature of +175℃
$R_{\theta JA}$	Junction-to-ambient			62	℃/W	1 cubic foot chamber, free air

ORDERING INFORMATION

Part Number	Package
IRFZ44V	TO-220

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

			IRFZ44V			
Characteristic		**Symbol**	**Min**	**Typ**	**Max**	**Units**
OFF Characteristics						
Drain-to-Source Breakdown Voltage (V_{GS} = 0 V, I_D = 250 μA)		V_{DSS}	60			V
Breakdown Voltage Temperature Coefficient (Reference to 25℃, I_D = 250 μA)		$\Delta V_{DSS}/\Delta T_J$		0.069		mV/℃
Drain-to-Source Leakage Current (V_{DS} = 60 V, V_{GS} = 0 V, T_J = 25℃) (V_{DS} = 48 V, V_{GS} = 0 V, T_J = 150℃)		I_{DSS}			25 250	μA
Gate-to-Source Forward Leakage (V_{GS} = 20 V)		I_{GSS}			100	nA
Gate-to-Source Reverse Leakage (V_{GS} = -20 V)		I_{GSS}			-100	nA
ON Characteristics						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 250 μA)		$V_{GS(th)}$	1.0	2.0	3.0	V
Static Drain-to-Source On-Resistance (Note 4) (V_{GS} = 10 V, I_D = 60A)		$R_{DS(on)}$			16.5	mΩ
Forward Transconductance (V_{DS} = 15 V, I_D = 60A) (Note 4)		g_{FS}		36		S
Dynamic Characteristics						
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		1430		pF
Output Capacitance		C_{oss}		420		pF
Reverse Transfer Capacitance		C_{rss}		88		pF
Total Gate Charge (V_{GS} = 10 V)	(V_{DS} = 30 V, I_D = 60 A, V_{GS} = 10 V) (Note 5)	Q_g		37.7		nC
Gate-to-Source Charge		Q_{gs}		8.4		nC
Gate-to-Drain (“Miller”) Charge		Q_{gd}		9.8		nC
Resistive Switching Characteristics						
Turn-On Delay Time	(V_{DD} = 30 V, I_D = 60 A, V_{GS} = 10 V, R_G = 9.1Ω) (Note 5)	$t_{d(on)}$		12.1		ns
Rise Time		t_{rise}		64		ns
Turn-Off Delay Time		$t_{d(off)}$		69		ns
Fall Time		t_{fall}		39		ns
Source-Drain Diode Characteristics						
Continuous Source Current (Body Diode)	Integral pn-diode in MOSFET	I_S			60	A
Pulse Source Current (Body Diode)		I_{SM}			241	A
Diode Forward On-Voltage	(I_S = 60 A, V_{GS} = 0 V)	V_{SD}			1.5	V
Reverse Recovery Time	(I_F = 60A, V_{GS} = 0 V, d_i/d_t = 100A/μs)	t_{rr}		55		ns
Reverse Recovery Charge		Q_{rr}		110		nC

Note 1: T_J = +25℃ to +175℃
Note 2: Repetitive rating; pulse width limited by maximum junction temperature.
Note 3: I_{SD} = 60A, di/dt ≤100A/μs, V_{DD} ≤ BV_{DSS}, T_J = +175℃
Note 4: Pulse width ≤ 250μs; duty cycle≤2%
Note 5: Essentially independent of operating temerpature.

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

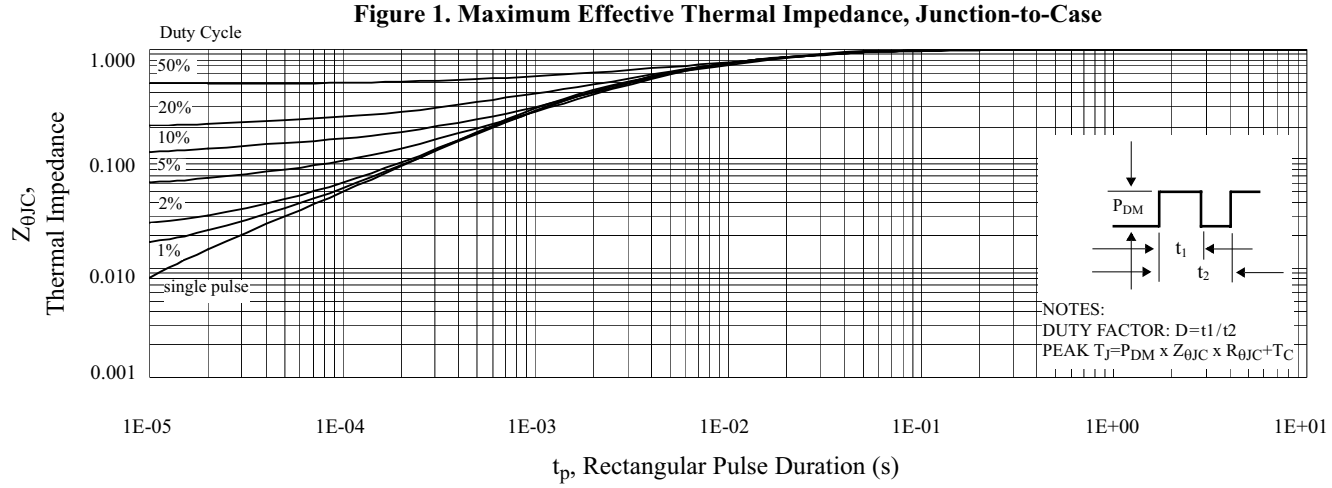


Figure 2. Maximum Power Dissipation vs Case Temperature

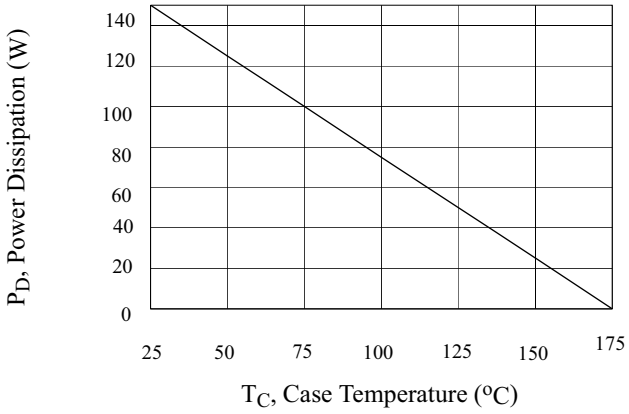


Figure 3. Maximum Continuous Drain Current vs Case Temperature

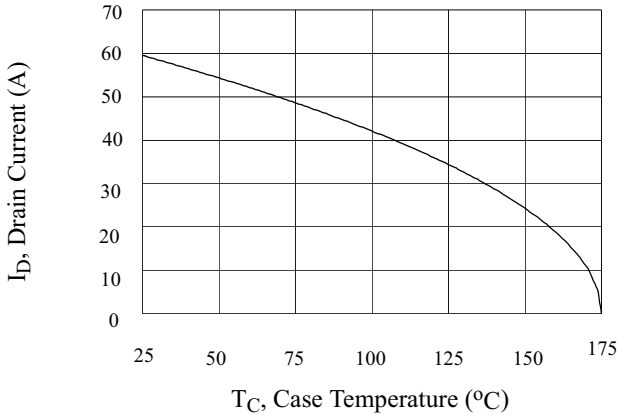


Figure 4. Typical Output Characteristics

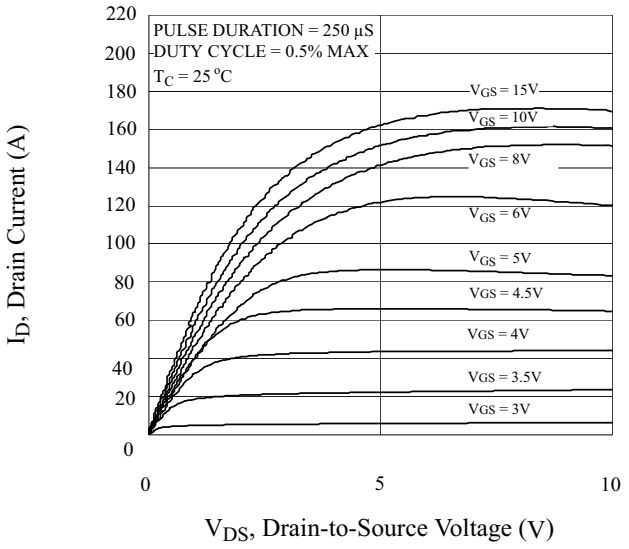


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

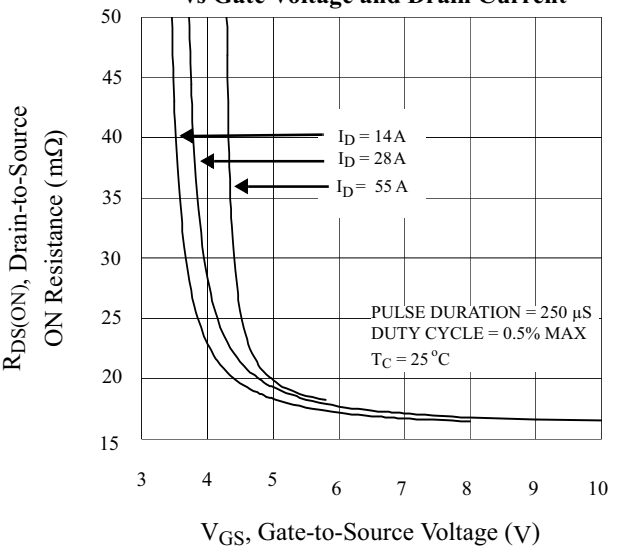


Figure 6. Maximum Peak Current Capability

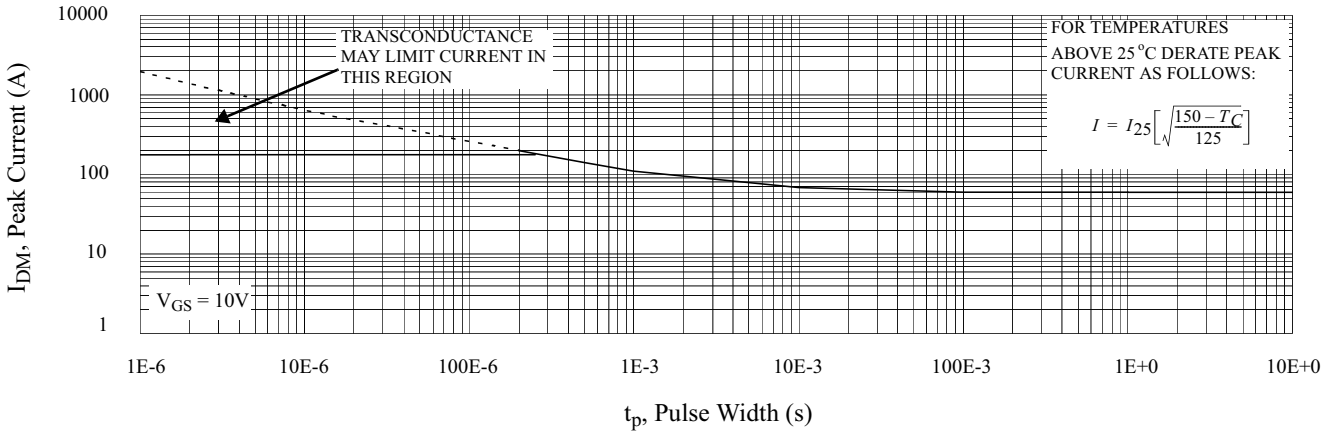


Figure 7. Typical Transfer Characteristics

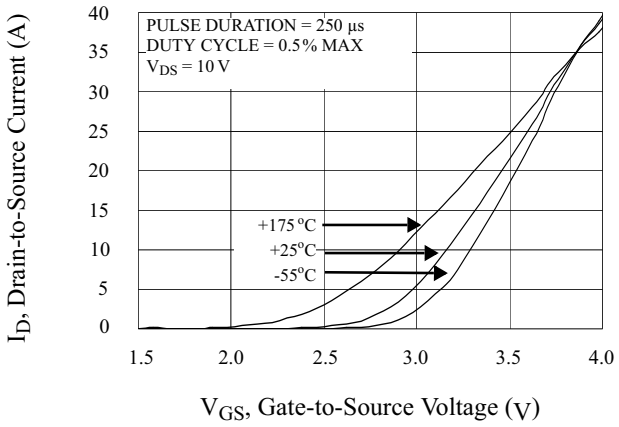


Figure 8. Unclamped Inductive Switching Capability

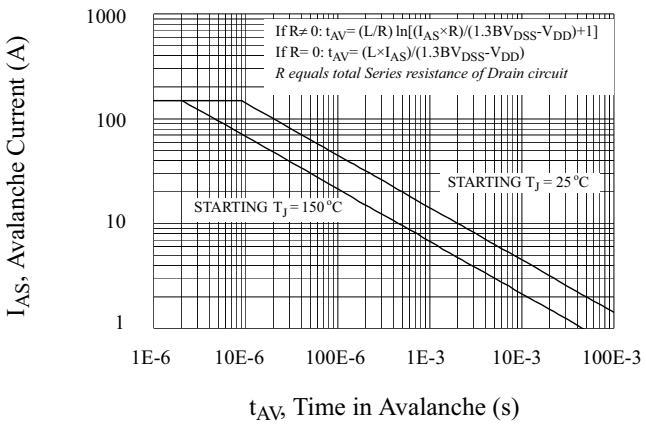


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

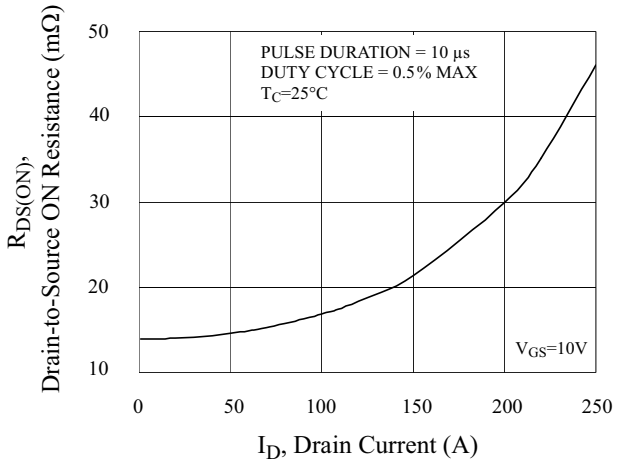


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

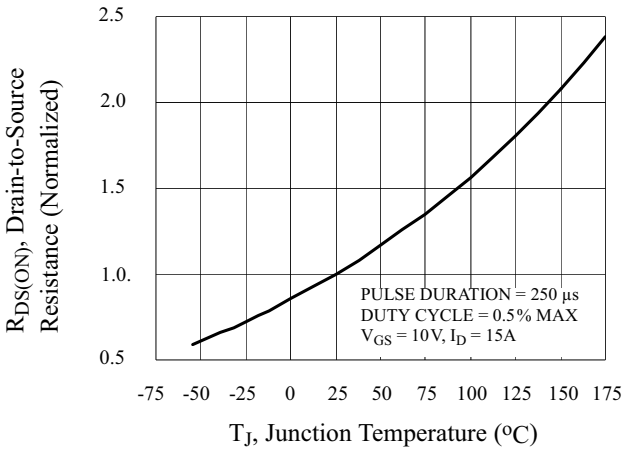


Figure 11. Typical Breakdown Voltage vs Junction Temperature

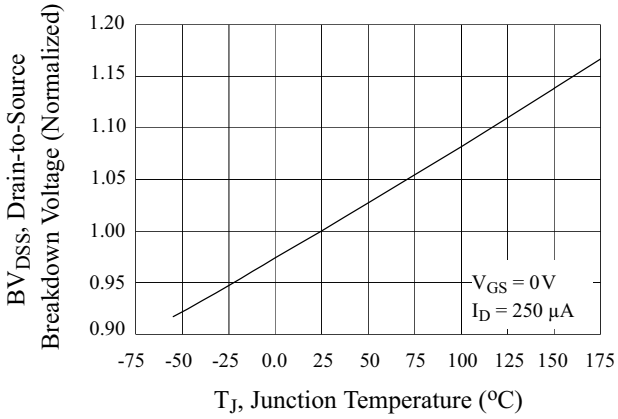


Figure 12. Typical Threshold Voltage vs Junction Temperature

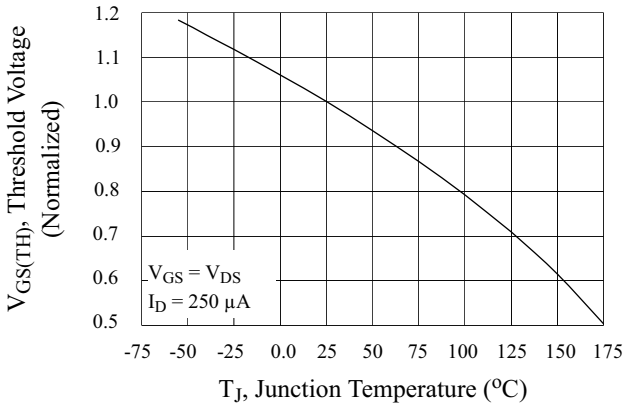


Figure 13. Maximum Forward Bias Safe Operating Area

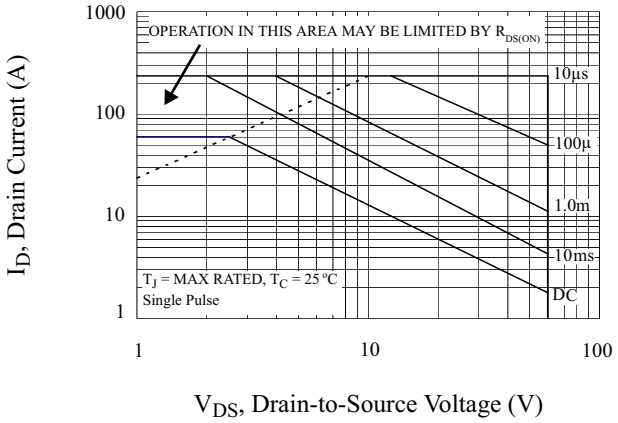


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

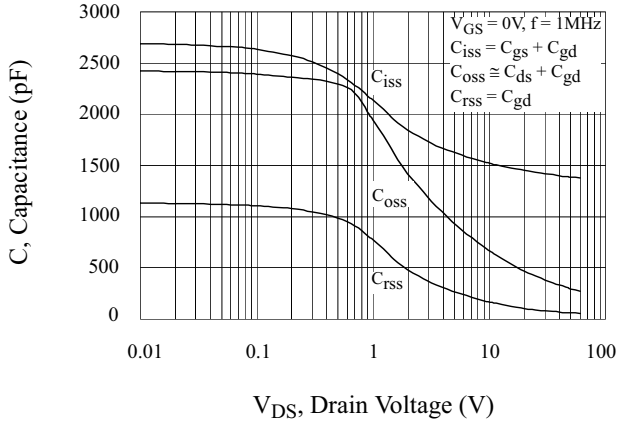


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

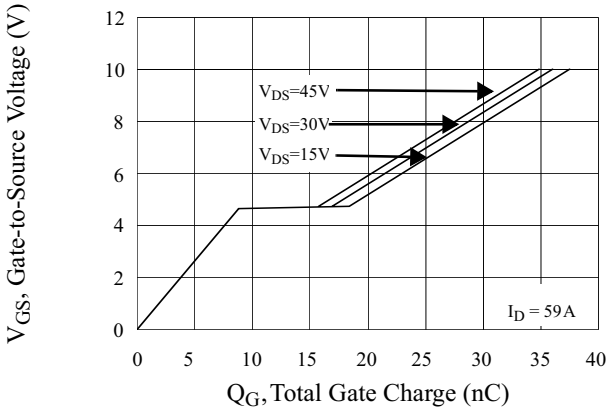


Figure 16. Typical Body Diode Transfer Characteristics