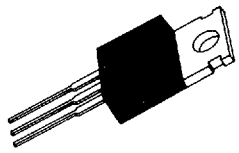
IRFZ44/45
IRFZ40/42

N-CHANNEL POWER MOSFETS

FEATURES

- Lower $R_{DS\ (ON)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

TO-220



IRFZ44/IRFZ45
IRFZ40/IRFZ42

2

PRODUCT SUMMARY

Part Number	V_{DS}	$R_{DS(on)}$	I_D
IRFZ44	60V	0.028Ω	35A
IRFZ45	60V	0.035Ω	35A
IRFZ40	50V	0.028Ω	35A
IRFZ42	50V	0.035Ω	35A

* Current limited by wire & pin diameter

MAXIMUM RATINGS

Characteristic	Symbol	IRFZ44	IRFZ45	IRFZ40	IRFZ42	Unit
Drain-Source Voltage (1)	V_{DSS}	60		50		Vdc
Drain-Gate Voltage (R_{GS}=1.0MΩ)(1)	V_{DGR}	60		50		Vdc
Gate-Source Voltage	V_{GS}	±20				Vdc
Continuous Drain Current T_C=25°C	I_D	35	35	35	35	Adc
Continuous Drain Current T_C=100°C	I_D	35	33	35	33	Adc
Drain Current—Pulsed (3)	I_{DM}	210	190	210	190	Adc
Gate Current—Pulsed	I_{GM}	±1.5				Adc
Single Pulsed Avalanche Energy (4)	E_{AS}	53				mJ
Avalanche Current	I_{AS}	35				A
Total Power Dissipation at T_C=25°C Derate above 25°C	P_D	150 1.2				Watts W/°C
Operating and Storage Junction Temperature Range	T_J, Tstg	−55 to 175°				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300				°C

Notes: (1) T_J=25°C to 175°C
(2) Pulse test. Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating: Pulse with limited by max. junction temperature
(4) L=50μH, V_{dd}=25V, R_G=25Ω, Starting T_J=25°C

IRFZ44/45
IRFZ40/42

N-CHANNEL POWER MOSFETS

ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

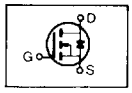
Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage IRFZ44/45 IRFZ40/42	 60 50	 — —	 — —	 V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	Gate-Source Leakage Forward	—	—	100	nA	V_{GS}=20V
I_{GSS}	Gate-Source Leakage Reverse	—	—	−100	nA	V_{GS}=−20V
I_{DSS}	Zero Gate Voltage Drain Current	— —	— —	250 1000	μA μA	V_{DS}=Max. Rating V_{GS}=0V V_{DS}=0 8Max. Rating, V_{GS}=0V, T_C=150°C
$I_{D(on)}$	On-State Drain-Source Current (2)	35	—	—	A	V_{DS}≥1 2V VGS=10V
$R_{DS(on)}$	Static Drain-Source IRFZ44/40 On-State Resistance IRFZ45/42	— —	— —	0.028 0.035	Ω	V_{GS}=10V, I_D=33A
g_{fs}	Forward Transconductance (2)	15	—	—	℧	V_{DS}≥50V, I_D=33A
C_{iss}	Input Capacitance	—	2450	—	pF	V_{GS}=0V
C_{oss}	Output Capacitance	—	740	—	pF	V_{DS}=25V
C_{rss}	Reverse Transfer Capacitance	—	360	—	pF	f=1.0MHz
$t_{d(on)}$	Turn-On Delay Time	—	—	32	ns	V_{DD}=0.5 BV_{DSS}, I_D=52A, Z_O=9.1Ω (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	—	—	210	ns	
$t_{d(off)}$	Turn-Off Delay Time	—	—	75	ns	
t_f	Fall Time	—	—	130	ns	
Q_g	Total Gate Charge (Gate-Source Pulse Gate-Drain)	—	—	100	nC	V_{GS}=10V, I_D=52A, V_{DS}=0.8Max Rating (Gate charge is essentially independent of operating temperature)
Q_{gs}	Gate-Source Charge	—	—	21	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	—	—	58	nC	

THERMAL RESISTANCE

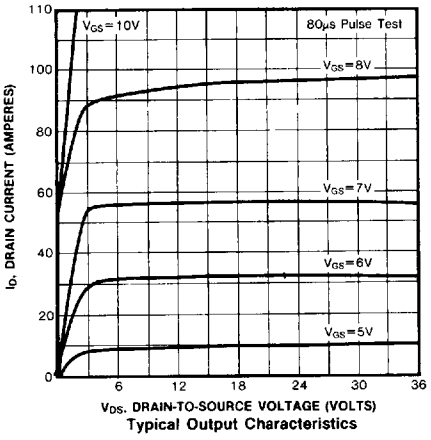
R_{thJC}	Junction-to-Case	MAX	1.0	K/W	
R_{thCS}	Case-to-Sink	TYP	0 5	K/W	Mounting surface flat smooth, and greased
R_{thJA}	Junction-to-Ambient	MAX	80	K/W	Free Air Operation

Notes: (1) T_J=25°C to 175°C
(2) Pulse test Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating Pulse width limited by max junction temperature

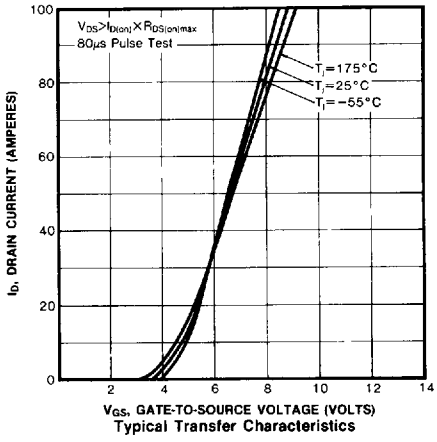
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic		Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFZ44/40	—	—	35	A	Modified MOSFET integral reverse P-N junction rectifier 
		IRFZ45/42	—	—	35	A	
I_{SM}	Pulse-Source Current (3)	IRFZ44/40	—	—	210	A	
		IRFZ45/42	—	—	190	A	
V_{SD}	Diode Forward Voltage	All	—	—	2 5	V	T_C=25°C, I_S=35A, V_{GS}=0V
t_{rr}	Reverse Recovery Time		—	—	250	ns	T_J=25°C, I_F=35A, dI_F/dt=100A/μS

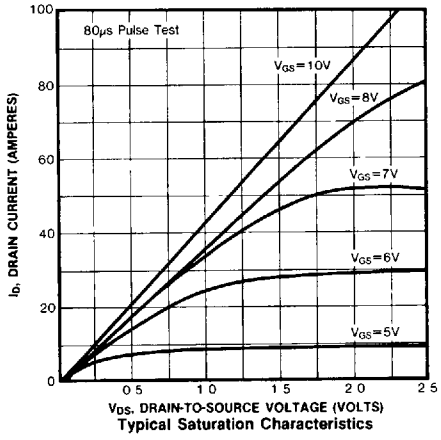
Notes: (1) T_J=25°C to 175°C
(2) Pulse test Pulse width≤300μs, Duty Cycle≤2%
(3) Repetitive rating Pulse with limited by max junction temperature



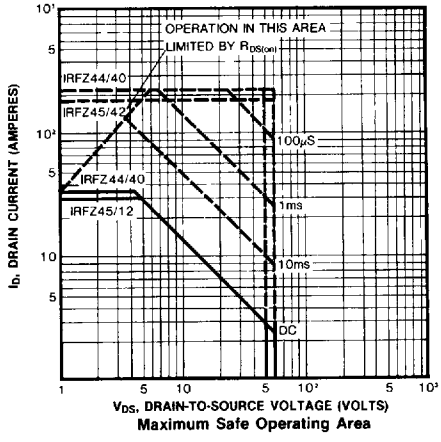
Typical Output Characteristics



Typical Transfer Characteristics

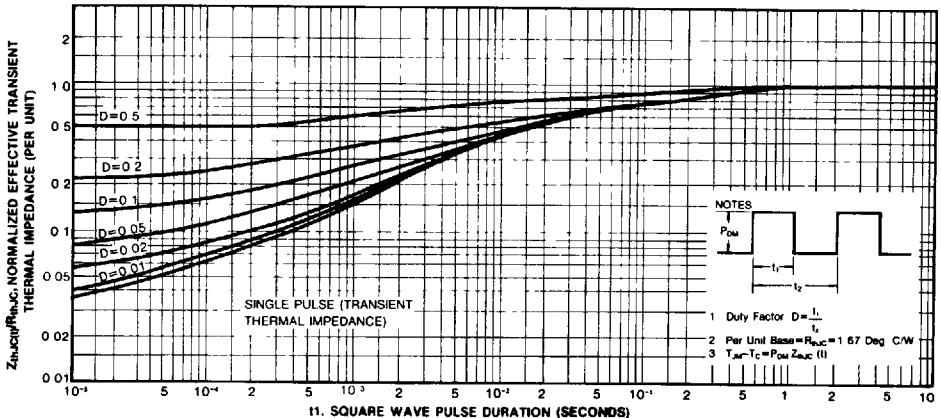


Typical Saturation Characteristics

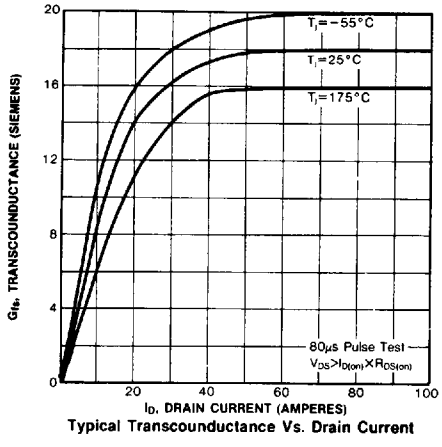


Maximum Safe Operating Area

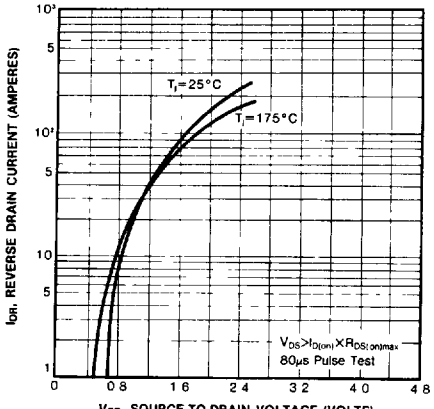
SAMSUNG ELECTRONICS



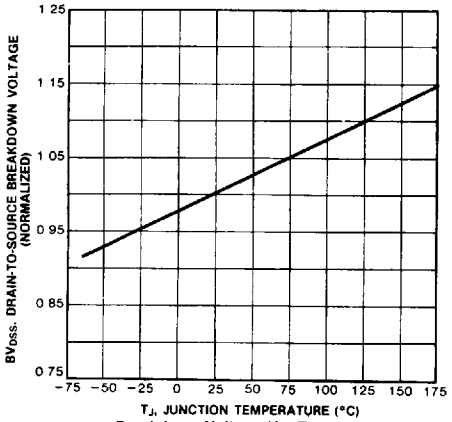
Maximum Effective Transient Thermal Impedance Junction-to-Case Vs. Pulse Duration



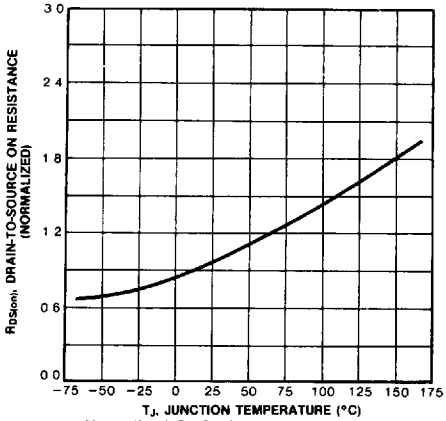
Typical Transconductance Vs. Drain Current



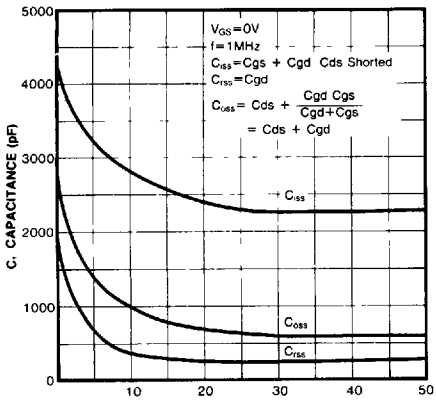
Typical Source—Drain Diode Forward Voltage



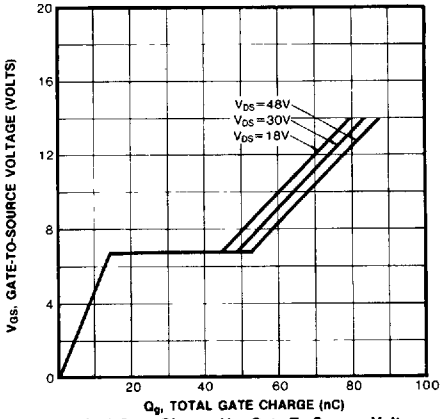
Breakdown Voltage Vs. Temperature



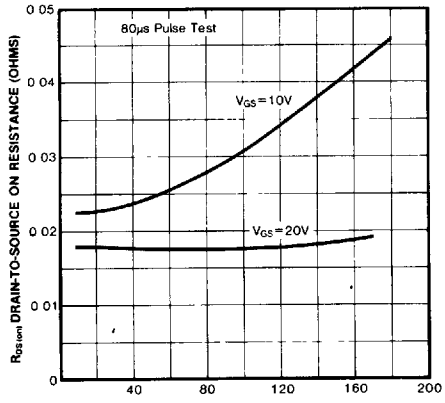
Normalized On-Resistance Vs. Temperature



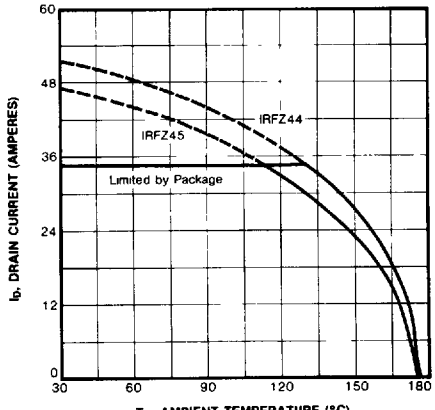
Typical Capacitance Vs. Drain to Source Voltage



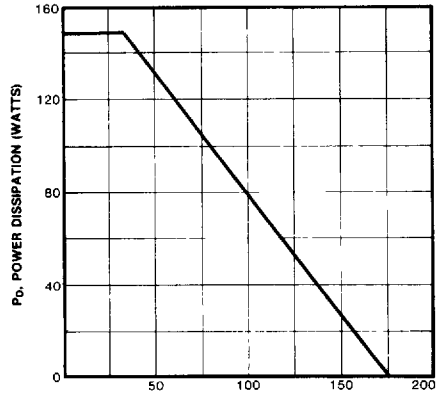
Typical Gate Charge Vs. Gate-To-Source Voltage



Typical On-Resistance Vs. Drain Current



Maximum Drain Current Vs. Case Temperature



Power Vs. Temperature Derating Curve