

**HEXFET® POWER MOSFET
THRU-HOLE (TO-254AA)**

**IRF5M5210
100V, P-CHANNEL**

Product Summary

Part Number	BV _{DSS}	R _{DS(on)}	I _D
IRF5M5210	-100V	0.07Ω	-34A

Fifth Generation HEXFET® power MOSFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon unit area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

These devices are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.



TO-254AA

Features:

- Low R_{DS(on)}
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed
- Light Weight

Absolute Maximum Ratings

	Parameter		Units
I _D @ V _{GS} = -10V, T _C = 25°C	Continuous Drain Current	-34	A
I _D @ V _{GS} = -10V, T _C = 100°C	Continuous Drain Current	-21	
I _{DM}	Pulsed Drain Current ①	-136	
P _D @ T _C = 25°C	Max. Power Dissipation	125	W
	Linear Derating Factor	1.0	W/°C
V _{GS}	Gate-to-Source Voltage	±20	V
E _{AS}	Single Pulse Avalanche Energy ②	520	mJ
I _{AR}	Avalanche Current ①	-21	A
E _{AR}	Repetitive Avalanche Energy ①	12.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.4	V/ns
T _J	Operating Junction	-55 to 150	°C
T _{STG}	Storage Temperature Range		
	Lead Temperature	300 (0.063in./1.6mm from case for 10s)	
	Weight	9.3 (Typical)	g

For footnotes refer to the last page

Electrical Characteristics @ T_j = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	-100	—	—	V	V _{GS} = 0V, I _D = -250μA
ΔBV _{DSS} /ΔT _j	Temperature Coefficient of Breakdown Voltage	—	-0.12	—	V/°C	Reference to 25°C, I _D = -1.0mA
R _{DS(on)}	Static Drain-to-Source On-State Resistance	—	—	0.07	Ω	V _{GS} = -10V, I _D = -21A ④
V _{GS(th)}	Gate Threshold Voltage	-2.0	—	-4.0	V	V _{DS} = V _{GS} , I _D = -250μA
g _{fs}	Forward Transconductance	10	—	—	S (r)	V _{DS} = -15V, I _{DS} = -21A ④
I _{DSS}	Zero Gate Voltage Drain Current	—	—	-25	μA	V _{DS} = -100V, V _{GS} = 0V
		—	—	-250		V _{DS} = -80V, V _{GS} = 0V, T _j = 125°C
I _{GSS}	Gate-to-Source Leakage Forward	—	—	-100	nA	V _{GS} = -20V
I _{GSS}	Gate-to-Source Leakage Reverse	—	—	100		V _{GS} = 20V
Q _g	Total Gate Charge	—	—	180	nC	V _{GS} = -10V, I _D = -21A V _{DS} = -80V
Q _{gs}	Gate-to-Source Charge	—	—	25		
Q _{gd}	Gate-to-Drain ('Miller') Charge	—	—	100		
t _{d(on)}	Turn-On Delay Time	—	—	28	ns	V _{DD} = -50V, I _D = -21A, V _{GS} = -10V, R _G = 2.5Ω
t _r	Rise Time	—	—	150		
t _{d(off)}	Turn-Off Delay Time	—	—	100		
t _f	Fall Time	—	—	120		
L _S + L _D	Total Inductance	—	6.8	—	nH	Measured from drain lead (6mm / 0.25in. from package) to source lead (6mm/0.25in. from package)
C _{iss}	Input Capacitance	—	2730	—	pF	V _{GS} = 0V, V _{DS} = -25V f = 1.0MHz
C _{oss}	Output Capacitance	—	824	—		
C _{rss}	Reverse Transfer Capacitance	—	465	—		

Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I _S	Continuous Source Current (Body Diode)	—	—	-34	A	T _j = 25°C, I _S = -21A, V _{GS} = 0V ④
I _{SM}	Pulse Source Current (Body Diode) ①	—	—	-136		
V _{SD}	Diode Forward Voltage	—	—	-1.6	V	T _j = 25°C, I _F = -21A, di/dt ≥ 100A/μs
t _{rr}	Reverse Recovery Time	—	—	260	ns	V _{DD} ≤ -30V ④
Q _{RR}	Reverse Recovery Charge	—	—	1.8	μC	
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L _S + L _D .				

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R _{thJC}	Junction-to-Case	—	—	1.0	°C/W	

Note: Corresponding Spice and Saber models are available on the G&S Website.

For footnotes refer to the last page

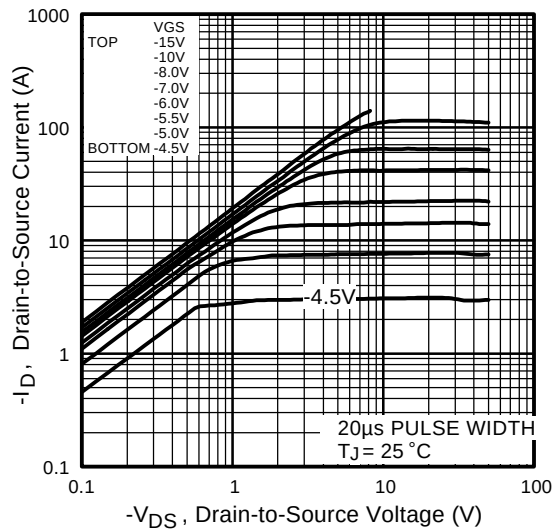


Fig 1. Typical Output Characteristics

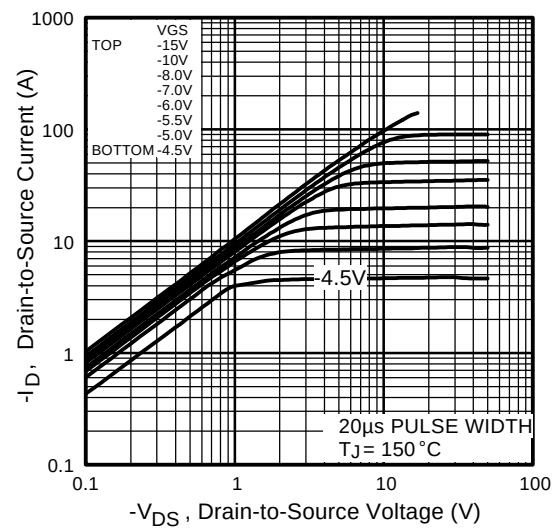


Fig 2. Typical Output Characteristics

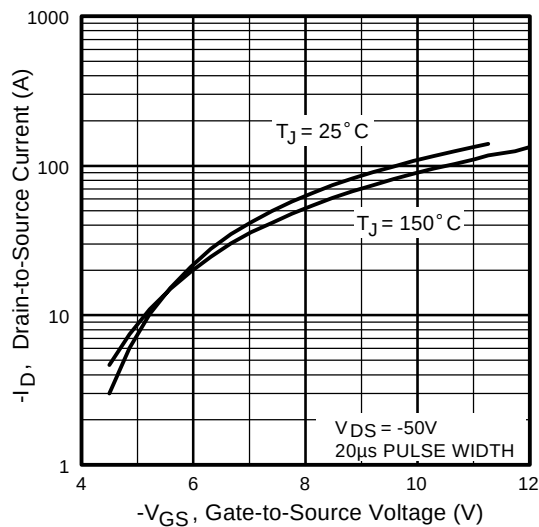


Fig 3. Typical Transfer Characteristics

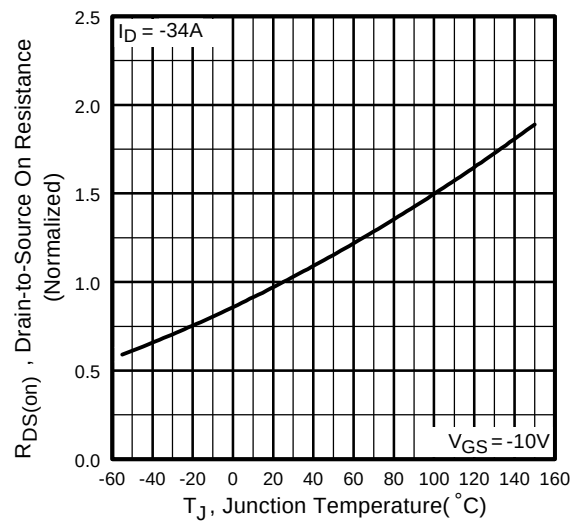


Fig 4. Normalized On-Resistance
Vs. Temperature

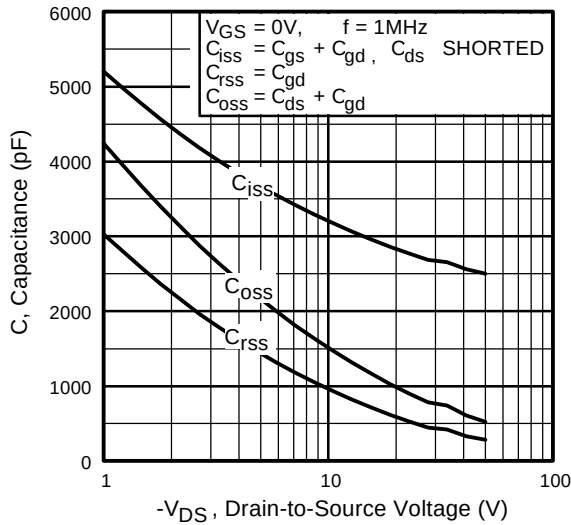


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

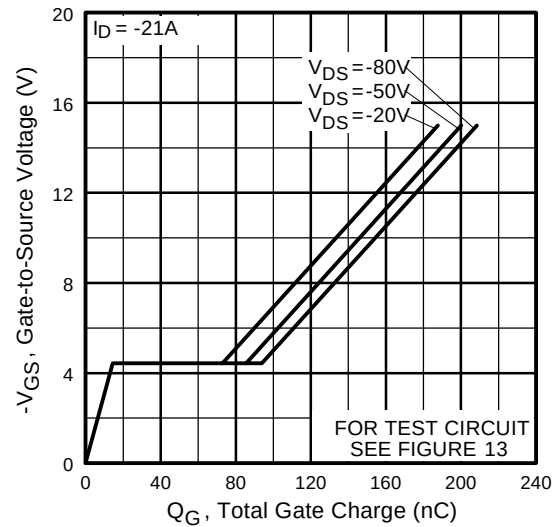


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

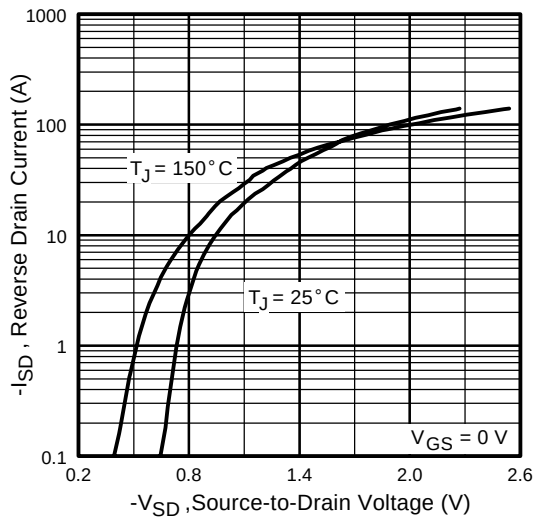


Fig 7. Typical Source-Drain Diode Forward Voltage

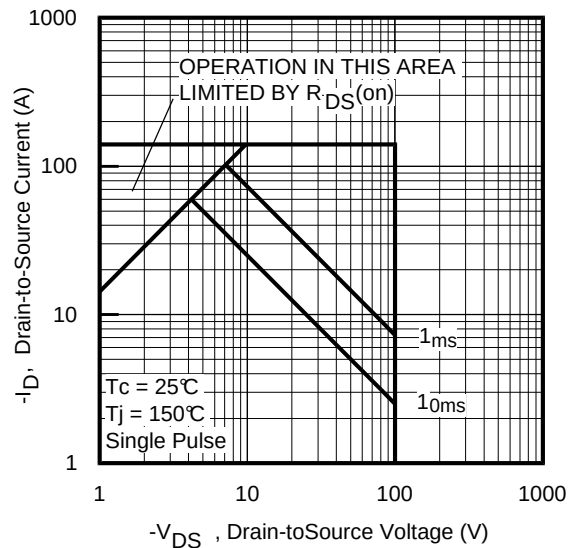


Fig 8. Maximum Safe Operating Area

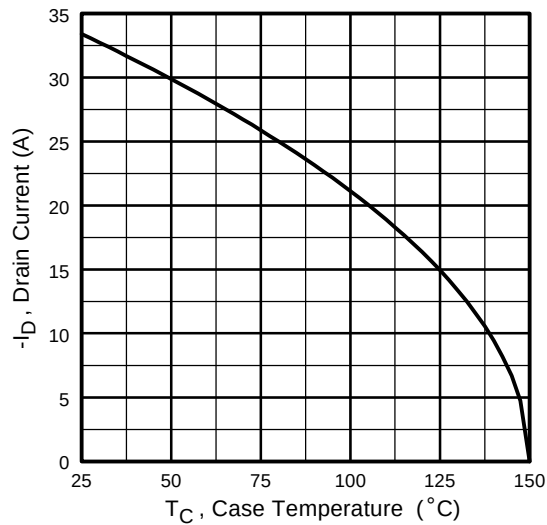


Fig 9. Maximum Drain Current Vs. Case Temperature

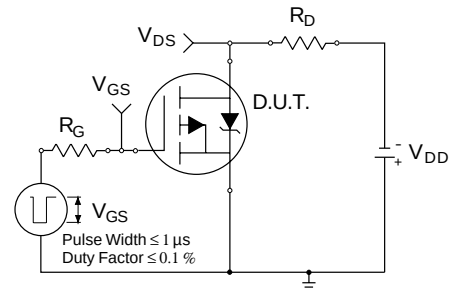


Fig 10a. Switching Time Test Circuit

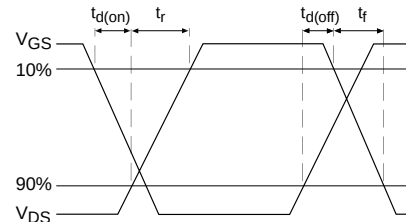


Fig 10b. Switching Time Waveforms

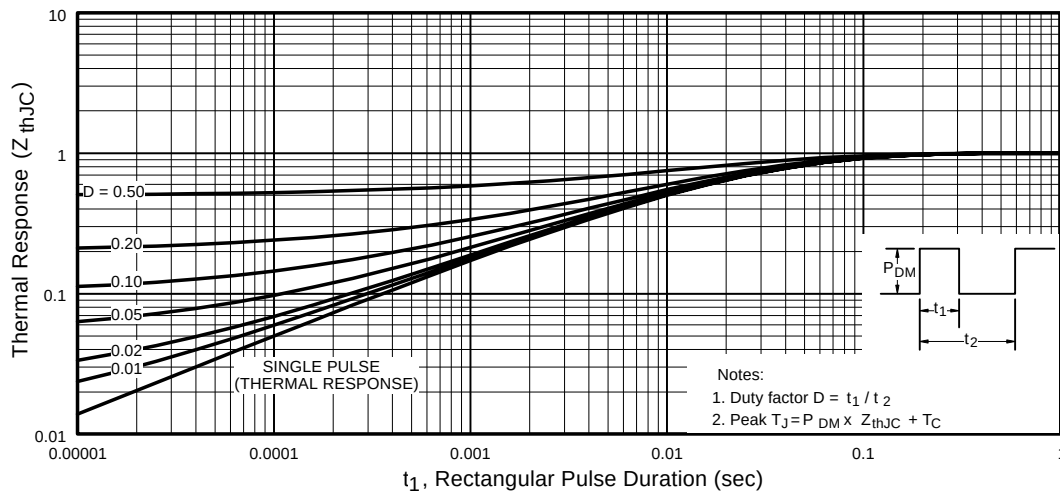


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

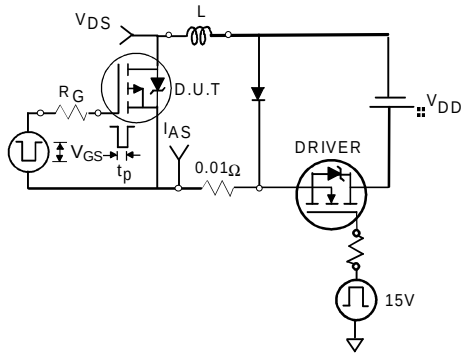


Fig 12a. Unclamped Inductive Test Circuit

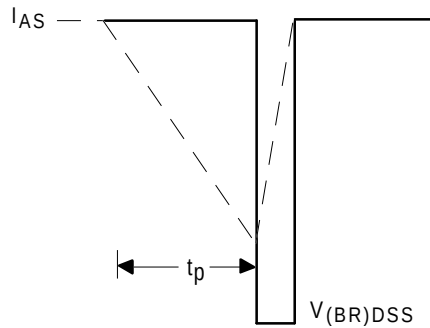


Fig 12b. Unclamped Inductive Waveforms

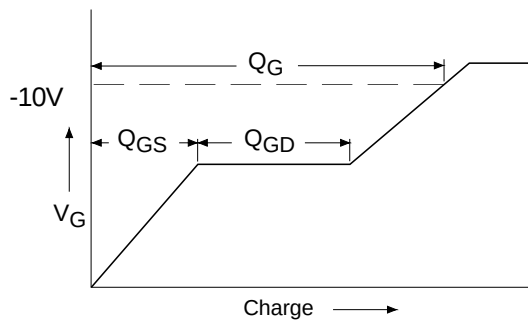


Fig 13a. Basic Gate Charge Waveform

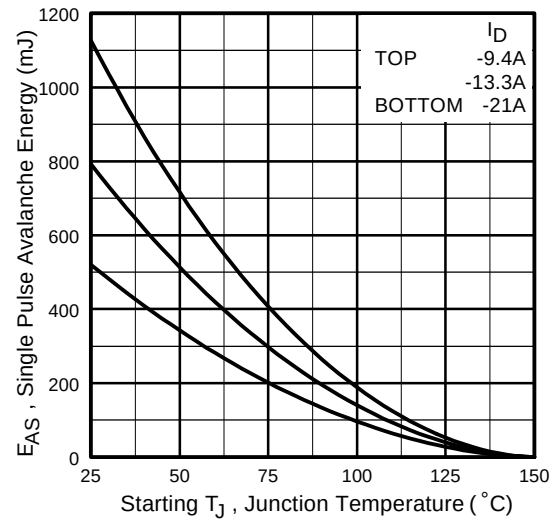


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

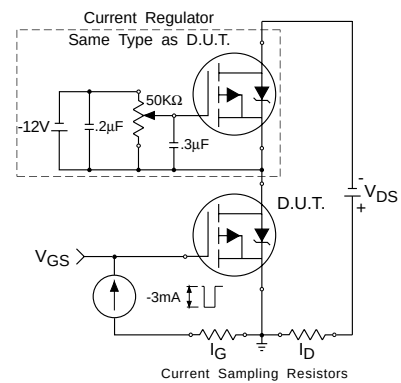
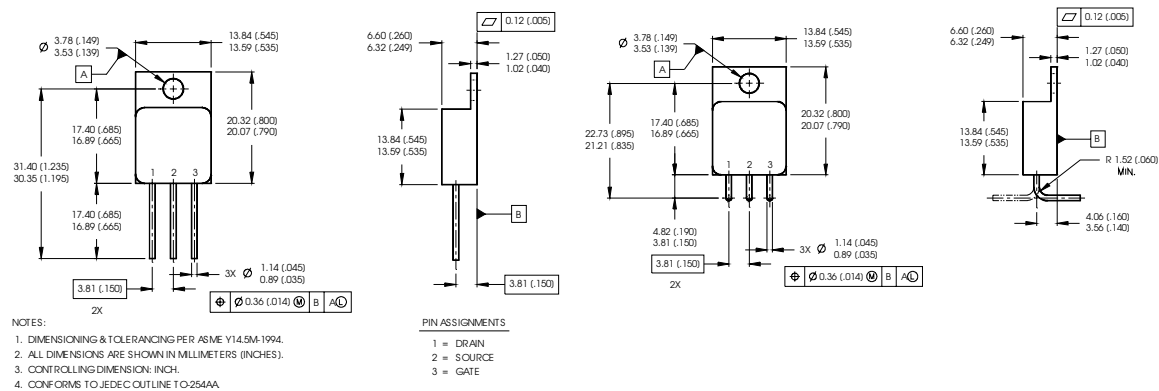


Fig 13b. Gate Charge Test Circuit

Footnotes:

- ① Repetitive Rating; Pulse width limited by maximum junction temperature.
- ② $V_{DD} = -25\text{ V}$, Starting $T_J = 25^\circ\text{C}$, $L = 2.4\text{ mH}$
Peak $I_{AS} = -21\text{ A}$, $V_{GS} = -10\text{ V}$, $R_G = 25\Omega$
- ③ $I_{SD} \leq -21\text{ A}$, $di/dt \leq -400\text{ A}/\mu\text{s}$,
 $V_{DD} \leq -100\text{ V}$, $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\text{ }\mu\text{s}$; Duty Cycle $\leq 2\%$

Case Outline and Dimensions — TO-254AA



CAUTION

BERYLLIA WARNING PER MIL-PRF-19500

Packages containing beryllia shall not be ground, sandblasted, machined, or have other operations performed on them which will produce beryllia or beryllium dust. Furthermore, beryllium oxide packages shall not be placed in acids that will produce fumes containing beryllium.