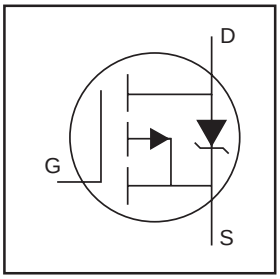
International
IOR Rectifier

IRF5210S/L

HEXFET® Power MOSFET

- Advanced Process Technology
- Surface Mount (IRF5210S)
- Low-profile through-hole (IRF5210L)
- 175°C Operating Temperature
- Fast Switching
- P-Channel
- Fully Avalanche Rated



V_{DSS} = -100V

$R_{DS(on)}$ = 0.06Ω

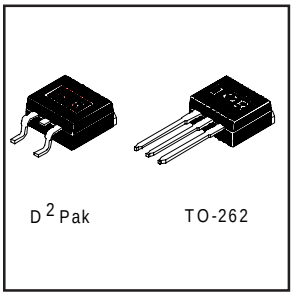
I_D = -40A

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon 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 and reliable device for use in a wide variety of applications.

The D^2Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D^2Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.

The through-hole version (IRF5210L) is available for low-profile applications.



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ -10V⑤	-40	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ -10V⑤	-29	
I_{DM}	Pulsed Drain Current ①⑤	-140	
P_D @T_A = 25°C	Power Dissipation	3.8	W
P_D @T_C = 25°C	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑤	780	mJ
I_{AR}	Avalanche Current①	-21	A
E_{AR}	Repetitive Avalanche Energy①	20	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	-5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

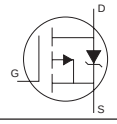
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	0.75	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted,steady-state)**	——	40	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-100	—	—	V	V_{GS} = 0V, I_D = -250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.11	—	V/°C	Reference to 25°C, I_D = -1mA⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.06	Ω	V_{GS} = -10V, I_D = -24A 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	V_{DS} = -50V, I_D = -21A⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	-25	µA	V_{DS} = -100V, V_{GS} = 0V
		—	—	-250		V_{DS} = -80V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	180	nC	I_D = -21A
Q_{gs}	Gate-to-Source Charge	—	—	25		V_{DS} = -80V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	97		V_{GS} = -10V, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	V_{DD} = -50V
t_r	Rise Time	—	86	—		I_D = -21A
$t_{d(off)}$	Turn-Off Delay Time	—	79	—		R_G = 2.5Ω
t_f	Fall Time	—	81	—		R_D = 2.4Ω, See Fig. 10 ④
L_S	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C_{iss}	Input Capacitance	—	2700	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	790	—		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	—	450	—		f = 1.0MHz, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-40	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-140		
V_{SD}	Diode Forward Voltage	—	—	-1.6	V	T_J = 25°C, I_S = -24A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	170	260	ns	T_J = 25°C, I_F = -21A
Q_{rr}	Reverse Recovery Charge	—	1.2	1.8	µC	di/dt = -100A/µs ④⑤
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Starting T_J = 25°C, L = 3.1mH R_G = 25Ω, I_{AS} = -21A. (See Figure 12)

③ I_{SD} ≤ -21A, di/dt ≤ -480A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C

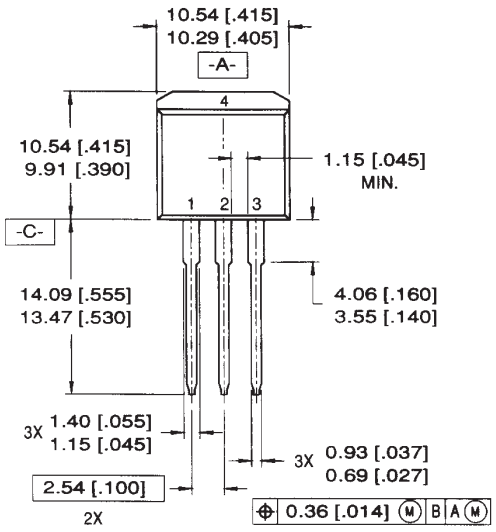
④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ Uses IRF5210 data and test conditions

** When mounted on 1" square PCB (FR-4 or G-10 Material).
For recommended footprint and soldering techniques refer to application note #AN-994.

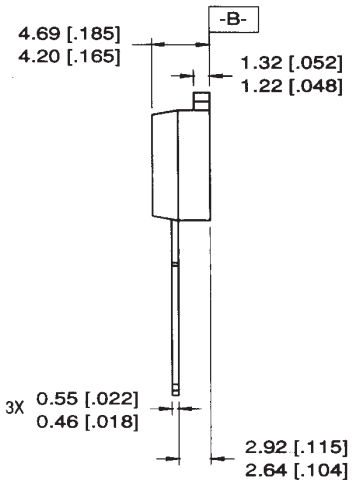
Package Outline

TO-262 Outline



LEAD ASSIGNMENTS

1 = GATE 3 = SOURCE
2 = DRAIN 4 = DRAIN



NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

Part Marking Information

TO-262

EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"