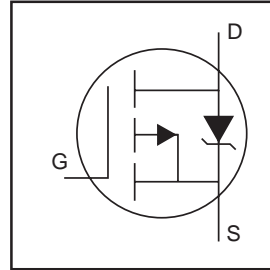


IRF5210S/L

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



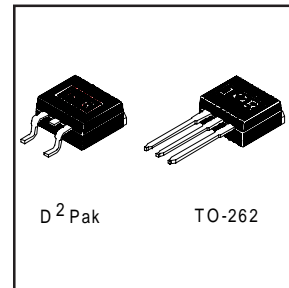
$V_{DS} = -100V$
$R_{DS(on)} = 0.06\Omega$
$I_D = -40A$

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 D²Pak 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 D²Pak 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
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$ ⑤	-40	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$ ⑤	-29	
I_{DM}	Pulsed Drain Current ① ⑤	-140	
$P_D @ T_A = 25^\circ C$	Power Dissipation	3.8	W
$P_D @ T_C = 25^\circ C$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ② ⑤	780	mJ
I_{AR}	Avalanche Current ①	-21	A
E_{AR}	Repetitive Avalanche Energy ①	20	mJ
dv/dt	Peak Diode Recovery dv/dt ③ ⑤	-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)	

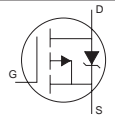
Thermal Resistance

	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 @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-100	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.11	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$ ⑤
$R_{DS(on)}$	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	$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	10	—	—	S	$V_{DS} = -50V, I_D = -21A$ ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	-25	μA	$V_{DS} = -100V, V_{GS} = 0V$
		—	—	-250		$V_{DS} = -80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
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 ④ ⑤
$t_{d(on)}$	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	—		$R_G = 2.5\Omega$
t_f	Fall Time	—	81	—		$R_D = 2.4\Omega$, 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	—		$f = 1.0\text{MHz}$, See Fig. 5 ⑤

Source-Drain Ratings and Characteristics

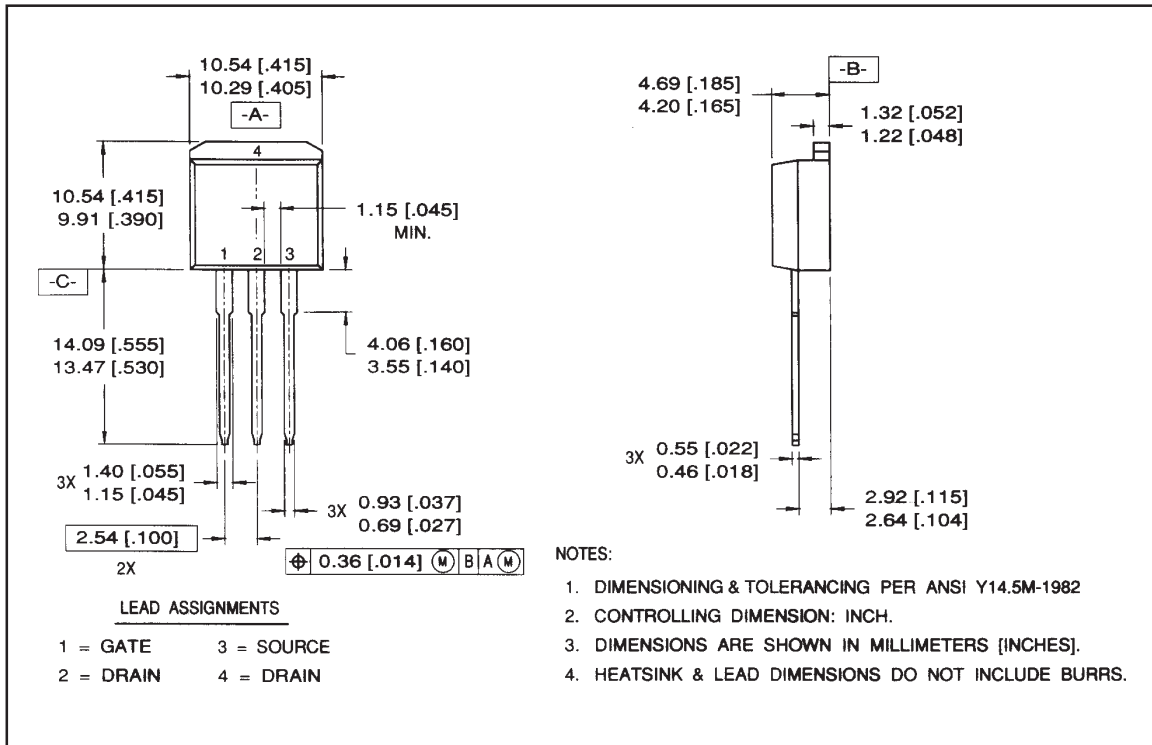
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-40	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-140		
V_{SD}	Diode Forward Voltage	—	—	-1.6	V	$T_J = 25^\circ\text{C}, I_S = -24A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	170	260	ns	$T_J = 25^\circ\text{C}, I_F = -21A$
Q_{rr}	Reverse Recovery Charge	—	1.2	1.8	μC	$di/dt = -100A/\mu s$ ④ ⑤
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 $T_J = 25^\circ\text{C}$, $L = 3.1\text{mH}$, $R_G = 25\Omega$, $I_{AS} = -21A$. (See Figure 12)
 - ③ $I_{SD} \leq -21A$, $di/dt \leq -480A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$
 - ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
 - 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



Part Marking Information

TO-262

