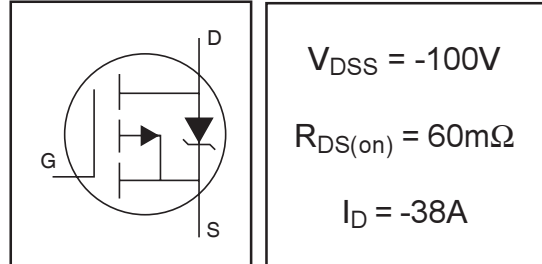


IRF5210SPbF
IRF5210LPbF

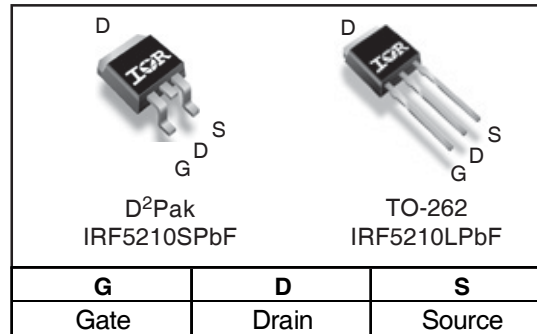
HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- 150°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to T_{jmax}
- Some Parameters are Different from IRF5210S/L
- P-Channel
- Lead-Free



Description

Features of this design are a 150°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in a wide variety of other applications.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-38	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-24	
I_{DM}	Pulsed Drain Current ①	-140	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation	3.1	W
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	170	
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current ①	-23	A
E_{AR}	Repetitive Avalanche Energy ①	0.017	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-7.4	V/ns
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.75	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ④	—	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	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.11	—	V/°C	Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	60	m Ω	$V_{GS} = 10V, I_D = -38A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	—	-4.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
gfs	Forward Transconductance	9.5	—	—	S	$V_{DS} = -50V, I_D = -23A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	-50	μA	$V_{DS} = -100V, V_{GS} = 0V$ $V_{DS} = -80V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -20V$
Q_g	Total Gate Charge	—	150	230	nC	$I_D = -23A$
Q_{gs}	Gate-to-Source Charge	—	22	33	nC	$V_{DS} = -80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	81	120	nC	$V_{GS} = -10V$ ④
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = -50V$
t_r	Rise Time	—	63	—	ns	$I_D = -23A$
$t_{d(off)}$	Turn-Off Delay Time	—	72	—	ns	$R_G = 2.4\Omega$
t_f	Fall Time	—	55	—	ns	$V_{GS} = -10V$ ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—	nH	
C_{iss}	Input Capacitance	—	2780	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	800	—	pF	$V_{DS} = -25V$
C_{rss}	Reverse Transfer Capacitance	—	430	—	pF	$f = 1.0\text{MHz}$, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-38	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-140	A	
V_{SD}	Diode Forward Voltage	—	—	-1.6	V	$T_J = 25^\circ\text{C}, I_S = -23A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	170	260	ns	$T_J = 25^\circ\text{C}, I_F = -23A, V_{DD} = -25V$
Q_{rr}	Reverse Recovery Charge	—	1180	1770	nC	$di/dt = -100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

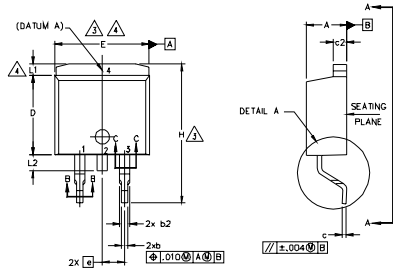
- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.46\text{mH}$
 $R_G = 25\Omega, I_{AS} = -23A$. (See Figure 12)
- ③ $I_{SD} \leq -23A, di/dt \leq -650A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$.

- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

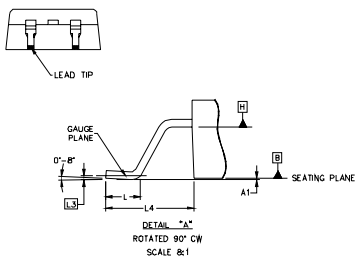
IRF5210S/LPbF

D²Pak (TO-263AB) Package Outline

Dimensions are shown in millimeters (inches)

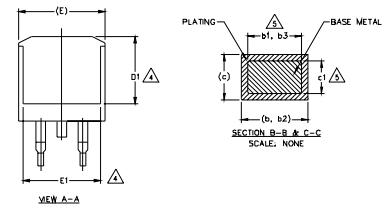


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
 4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
 5. DIMENSION D1 AND c1 APPLY TO BASE METAL ONLY.
 6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
 7. CONTROLLING DIMENSION: INCH.
 8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270	-	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245	-	4
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	-	1.65	-	.066	4
L2	1.27	1.78	-	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	

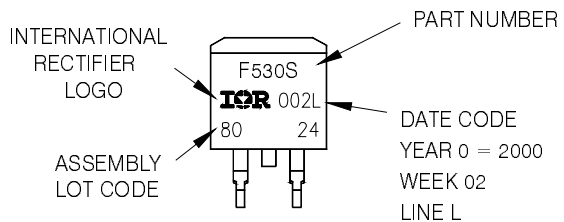
- LEAD ASSIGNMENTS
- HEXFET
- 1.- GATE
 - 2, 4.- DRAIN
 - 3.- SOURCE
- IGBTs_CoPACK
- 1.- GATE
 - 2, 4.- COLLECTOR
 - 3.- EMITTER
- DIODES
- 1.- ANODE *
 - 2, 4.- CATHODE
 - 3.- ANODE
- * PART DEPENDENT.



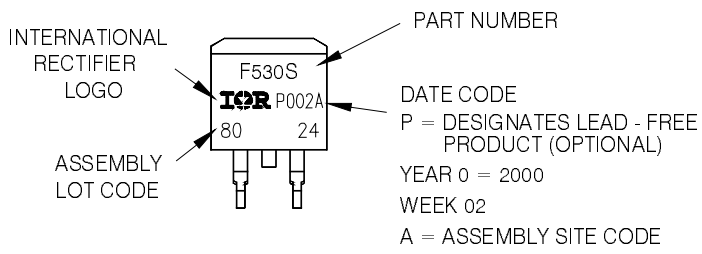
D²Pak (TO-263AB) Part Marking Information

EXAMPLE: THIS IS AN IRF530S WITH
 LOT CODE 8024
 ASSEMBLED ON WW 02, 2000
 IN THE ASSEMBLY LINE "L"

Note: "P" in assembly line position indicates "Lead - Free"



OR

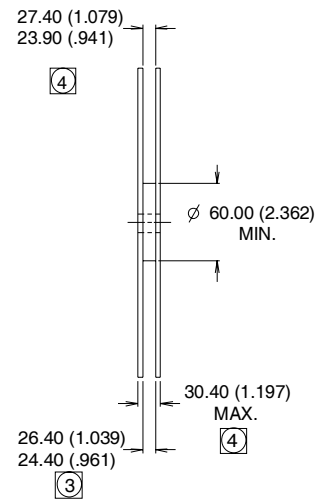
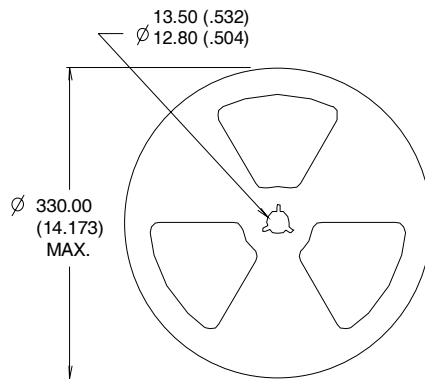
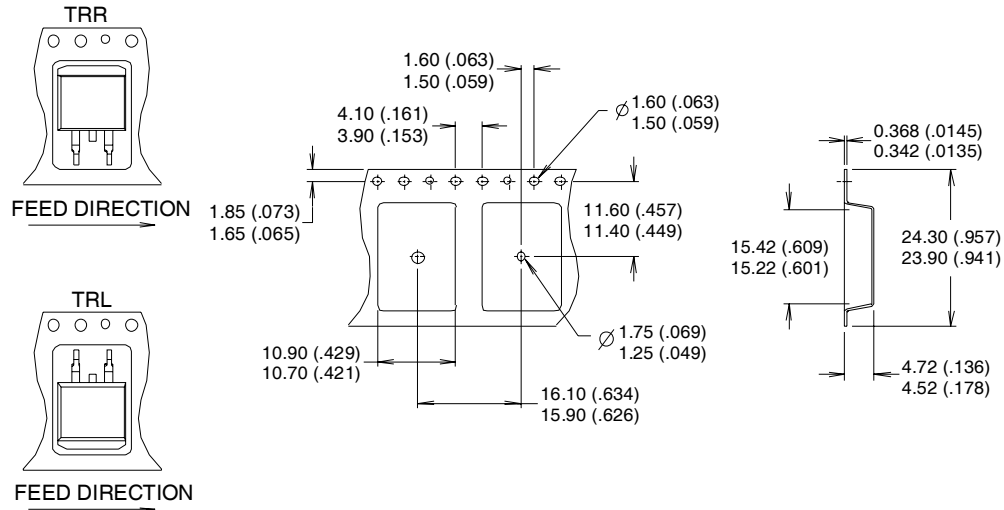


IRF5210S/LPbF



D²Pak (TO-263AB) Tape & Reel Information

Dimensions are shown in millimeters (inches)



- NOTES:
1. CONFORMS TO EIA-418.
 2. CONTROLLING DIMENSION: MILLIMETER.
 - ③ DIMENSION MEASURED @ HUB.
 - ④ INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Data and specifications subject to change without notice.

