

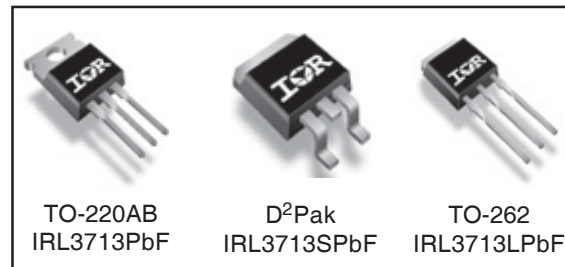
**Applications**

- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power
- 100% R<sub>G</sub> Tested
- Lead-Free

V <sub>DSS</sub>	R <sub>DS(on)</sub> max (mΩ)	I <sub>D</sub>
30V	3.0@V <sub>GS</sub> = 10V	260A <sup>Ⓞ</sup>

**Benefits**

- Ultra-Low Gate Impedance
- Very Low R<sub>DS(on)</sub> at 4.5V V<sub>GS</sub>
- Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

Symbol	Parameter	Max	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	260 <sup>Ⓞ</sup>	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	180 <sup>Ⓞ</sup>	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	1040 <sup>Ⓞ</sup>	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	330	W
P <sub>D</sub> @ T <sub>C</sub> = 100°C	Maximum Power Dissipation	170	
	Linear Derating Factor	2.2	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Junction and Storage Temperature Range	-55 to +175	°C

**Thermal Resistance**

Symbol	Parameter	Typ	Max	Units
R <sub>θJC</sub>	Junction-to-Case <sup>②</sup>	—	0.45*	°C/W
R <sub>θCS</sub>	Case-to-Sink, Flat, Greased Surface <sup>④</sup>	0.50	—	
R <sub>θJA</sub>	Junction-to-Ambient <sup>④⑦</sup>	—	62	
R <sub>θJA</sub>	Junction-to-Ambient (PCB Mount) <sup>⑤⑦</sup>	—	40	

\* R<sub>θJC</sub> (end of life) for D²Pak and TO-262 = 0.50°C/W. This is the maximum measured value after 1000 temperature cycles from -55 to 150°C and is accounted for by the physical wearout of the die attach medium.

Notes <sup>①</sup> through <sup>⑦</sup> are on page 11

# IRL3713/S/LPbF

International  
 Rectifier

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

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.027	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.6	3.0	m $\Omega$	$V_{GS} = 10V, I_D = 38A$ ③
		—	3.3	4.0		$V_{GS} = 4.5V, I_D = 30A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	50	$\mu A$	$V_{DS} = 30V, V_{GS} = 0V$
		—	—	20		$V_{DS} = 24V, V_{GS} = 0V$
		—	—	100		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -20V$

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

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$g_{fs}$	Forward Transconductance	76	—	—	S	$V_{DS} = 15V, I_D = 30A$
$Q_g$	Total Gate Charge	—	75	110	nC	$I_D = 30A$
$Q_{gs}$	Gate-to-Source Charge	—	24	—		$V_{DS} = 15V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	37	—		$V_{GS} = 4.5V$ ④
$Q_{oss}$	Output Gate Charge	—	61	92		$V_{GS} = 0V, V_{DS} = 15V$
$R_G$	Gate Resistance	0.5	—	3.4	$\Omega$	
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	$V_{DD} = 15V$
$t_r$	Rise Time	—	160	—		$I_D = 30A$
$t_{d(off)}$	Turn-Off Delay Time	—	40	—		$R_G = 1.8\Omega$
$t_f$	Fall Time	—	57	—		$V_{GS} = 4.5V$ ④
$C_{iss}$	Input Capacitance	—	5890	—	$\mu F$	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	3130	—		$V_{DS} = 15V$
$C_{rss}$	Reverse Transfer Capacitance	—	630	—		$f = 1.0\text{MHz}$

## Avalanche Characteristics

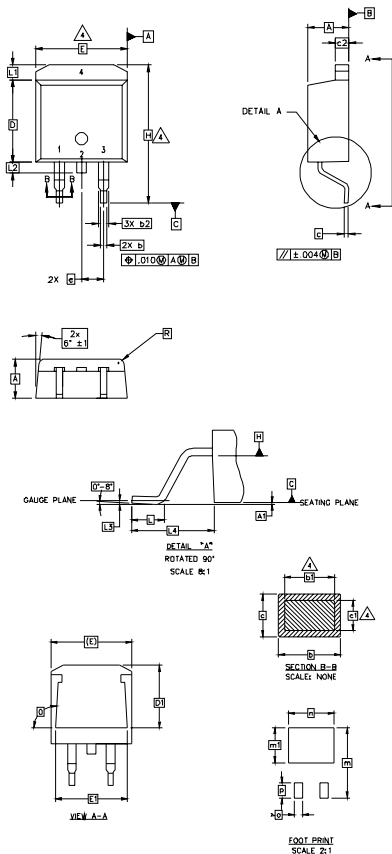
Symbol	Parameter	Typ	Max	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	1530	mJ
$I_{AR}$	Avalanche Current ①	—	46	A

## Diode Characteristics

Symbol	Parameter	Min	Typ	Max	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	260 ⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①⑥	—	—	1040 ⑥		
$V_{SD}$	Diode Forward Voltage	—	0.80	1.3	V	$T_J = 25^\circ\text{C}, I_S = 30A, V_{GS} = 0V$ ③
		—	0.68	—		$T_J = 125^\circ\text{C}, I_S = 30A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	75	110	ns	$T_J = 25^\circ\text{C}, I_F = 30A, V_R = 0V$
$Q_{rr}$	Reverse Recovery Charge	—	140	210	nC	$di/dt = 100A/\mu s$ ③
$t_{rr}$	Reverse Recovery Time	—	78	120	ns	$T_J = 125^\circ\text{C}, I_F = 30A, V_R = 20V$
$Q_{rr}$	Reverse Recovery Charge	—	160	240	nC	$di/dt = 100A/\mu s$ ③

## D<sup>2</sup>Pak 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 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
  4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
  5. CONTROLLING DIMENSION: INCH.

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	4
b2	1.14	1.78	.045	.070	
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86		.270		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1		1.65		.065	
L2	1.27	1.78	.050	.070	
L3	0.25 BSC		.010 BSC		
L4	4.78	5.28	.188	.208	
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
R	0.51	0.71	.020	.028	
θ	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**

**HEXFET**

- 1.- GATE
- 2, 4.- DRAIN
- 3.- SOURCE

**IGBTs, CoPACK**

- 1.- GATE
- 2, 4.- COLLECTOR
- 3.- EMITTER

**DIODES**

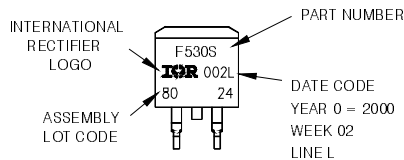
- 1.- ANODE \*
- 2, 4.- CATHODE
- 3.- ANODE

\* PART DEPENDENT.

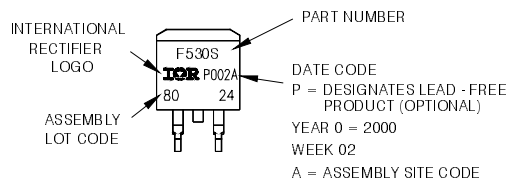
## D<sup>2</sup>Pak Part Marking Information

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"

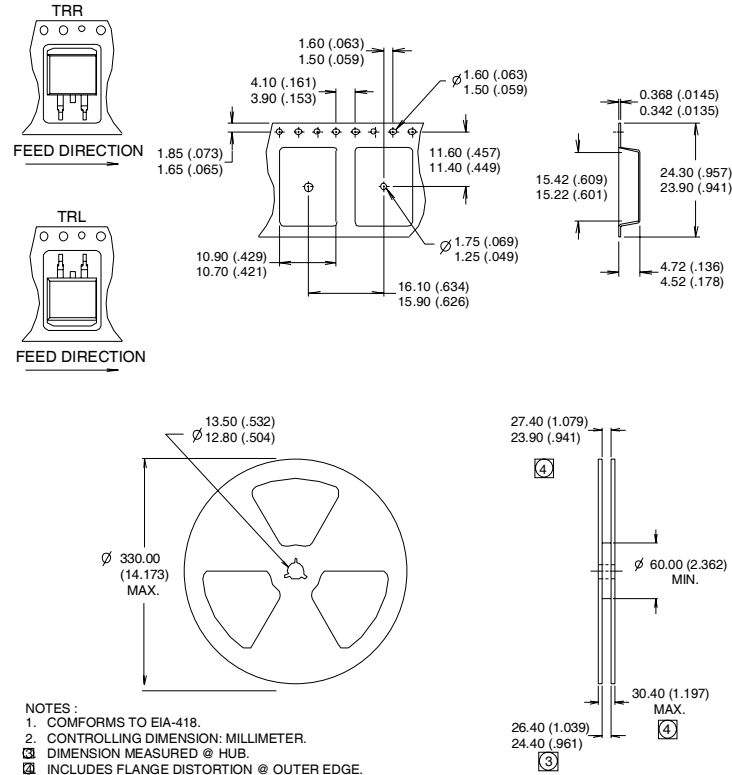


OR



## D<sup>2</sup>Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 1.4\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 46\text{A}$ ,  $V_{GS} = 10\text{V}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ This is only applied to TO-220A package.
- ⑤ This is applied to D<sup>2</sup>Pak, when mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.
- ⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑦  $R_\theta$  is measured at  $T_J$  approximately  $90^\circ\text{C}$ .

Data and specifications subject to change without notice.  
 This product has been designed and qualified for the Industrial market.  
 Qualification Standards can be found on IR's Web site.