International
IOR Rectifier

PD - 93936C

SMPS MOSFET

IRF3706
IRF3706S
IRF3706L

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	I_D
20V	8.5mΩ	77A⑥

Applications

- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power

Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Fully Characterized Avalanche Voltage and Current

TO-220AB IRF3706 | D^2Pak IRF3706S | TO-262 IRF3706L

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 12	V
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	77⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	54	
I_{DM}	Pulsed Drain Current ①	280	
P_D @T_C = 25°C	Maximum Power Dissipation③	88	W
P_D @T_C = 100°C	Maximum Power Dissipation③	44	W
	Linear Derating Factor	0.59	W/°C
T_J,T_{STG}	Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case⑦	—	1.7	°C/W
$R_{\theta cs}$	Case-to-Sink, Flat, Greased Surface ④	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient ④⑦	—	62	
$R_{\theta JA}$	Junction-to-Ambient(PCB mount)⑤⑦	—	40	

Notes ① through ⑦ are on page 11

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltag	20	–––	–––	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coeffic	–––	0.021	–––	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resista	–––	6.0	8.5	mΩ	V_{GS} = 10V, I_D = 15A③
		–––	7.3	10.5		V_{GS} = 4.5V, I_D = 12A③
		–––	11	22		V_{GS} = 2.8V, I_D = 7.5A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.6	–––	2	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	20	µA	V_{DS} = 16V, V_{GS} = 0V
		–––	–––	100		V_{DS} = 16V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	–––	–––	200	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	–––	–––	-200		V_{GS} = -12V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	53	–––	–––	S	V_{DS} = 16V, I_D = 57A
Rg	Gate Resistance	–––	1.8	–––	Ω	
Q_g	Total Gate Charge	–––	23	35	nC	I_D = 28A
Q_{gs}	Gate-to-Source Charge	–––	8.0	12		V_{DS} = 10V
Q_{gd}	Gate-to-Drain ("Miller") Charge	–––	5.5	8.3		V_{GS} = 4.5V ③
Q_{oss}	Output Gate Charge	–––	16	24		V_{GS} = 0V, V_{DS} =10V
$t_{d(on)}$	Turn-On Delay Time	–––	6.8	–––	ns	V_{DD} = 10V
t_r	Rise Time	–––	87	–––		I_D = 28A
$t_{d(off)}$	Turn-Off Delay Time	–––	17	–––		R_G = 1.8Ω
t_f	Fall Time	–––	4.8	–––		V_{GS} = 4.5V ③
C_{iss}	Input Capacitance	–––	2410	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	1070	–––		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	–––	140	–––		f = 1.0MHz

Avalanche Characteristics

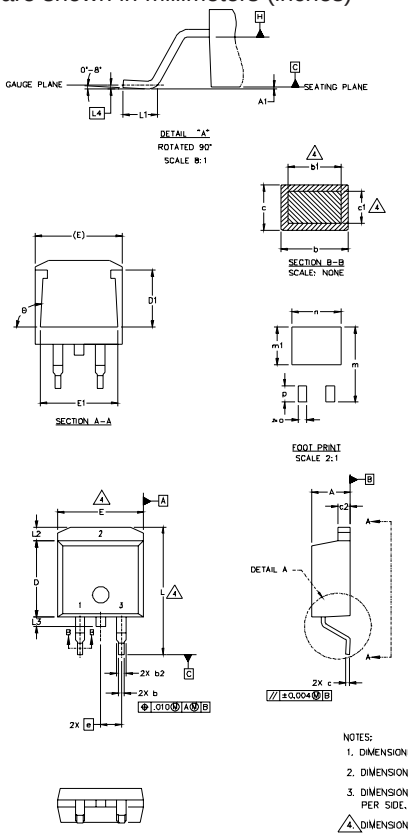
	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	–––	220	mJ
I_{AR}	Avalanche Current ①	–––	28	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	77⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	280		
V_{SD}	Diode Forward Voltage	–––	0.88	1.3	V	T_J = 25°C, I_S = 36A, V_{GS} = 0V ③
		–––	0.82	–––		T_J = 125°C, I_S = 36A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	–––	45	68	ns	T_J = 25°C, I_F = 36A, V_R=20V di/dt = 100A/µs③
Q_{rr}	Reverse Recovery Charge	–––	65	98	nC	
t_{rr}	Reverse Recovery Time	–––	49	74	ns	T_J = 125°C, I_F = 36A, V_R=20V di/dt = 100A/µs③
Q_{rr}	Reverse Recovery Charge	–––	78	120	nC	

D²Pak Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1		0.127		.005	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.40	.045	.055	
c	0.43	0.63	.017	.025	
c1	0.38	0.74	.015	.029	4
c2	1.14	1.40	.045	.055	
D	8.51	9.65	.335	.380	3
D1	5.33		.210		
E	9.65	10.67	.380	.420	3
E1	6.22		.245		
e	2.54 BSC		.100 BSC		
L	14.61	15.88	.575	.625	
L1	1.78	2.79	.070	.110	
L2		1.65		.065	
L3	1.27	1.78	.050	.070	
L4	0.25 BSC		.010 BSC		
m	17.78		.700		
m1	8.89		.350		
n	11.43		.450		
o	2.08		.082		
p	3.81		.150		
θ	90°	93°	90°	93°	

LEAD ASSIGNMENTS

HEXFET	IGBTs, CoPACK	DIODES
1.– GATE	1.– GATE	1.– ANODE *
2.– DRAIN	2.– COLLECTOR	2.– CATHODE
3.– SOURCE	3.– EMITTER	3.– ANODE

* PART DEPENDENT.

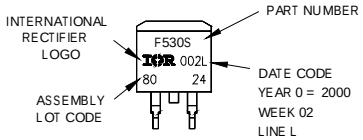
NOTES:

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.

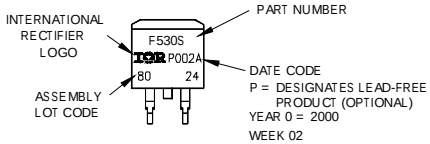
D²Pak Part Marking Information

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"

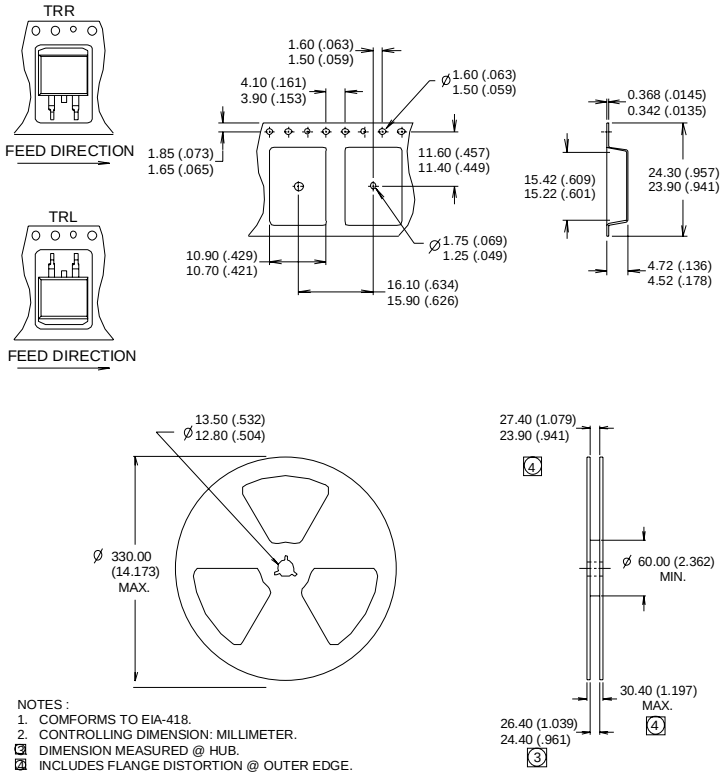


OR



D²Pak 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°C, L = 0.54mH, R_G = 25Ω, I_{AS} = 28A.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ This is only applied to TO-220AB pakcage.

⑤ This is applied to D²Pak, 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_θ is measured at T_J approximately 90°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.

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