

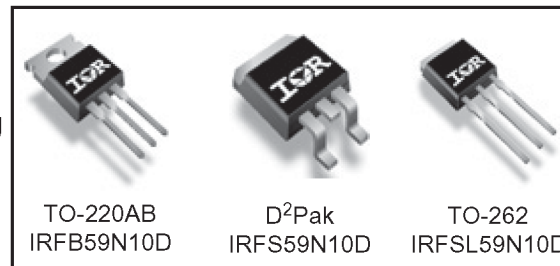
Applications

- High frequency DC-DC converters
- UPS / Motor Control Inverters
- Lead-Free

V_{DSS}	R_{DS(on)} max	I_D
100V	0.025Ω	59A

Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{OSS} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	59	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	42	
I _{DM}	Pulsed Drain Current ①	236	
P _D @ T _A = 25°C	Power Dissipation ②	3.8	W
P _D @ T _C = 25°C	Power Dissipation	200	
	Linear Derating Factor	1.3	W/°C
V _{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	3.3	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)	
	Mounting torque, 6-32 or M3 screw④	10 lbf•in (1.1N•m)	

Typical SMPS Topologies

- Half-bridge and Full-bridge DC-DC Converters
- Full-bridge Inverters

Notes ① through ④ are on page 11

IRFB/IRFS/IRFSL59N10DPbF

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

International
IR Rectifier

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.025	Ω	V _{GS} = 10V, I _D = 35.4A ④
V _{GS(th)}	Gate Threshold Voltage	3.0	—	5.5	V	V _{DS} = V _{GS} , I _D = 250μA
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} = 30V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -30V

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	18	—	—	S	V _{DS} = 50V, I _D = 35.4A
Q _g	Total Gate Charge	—	76	114	nC	I _D = 35.4A
Q _{gs}	Gate-to-Source Charge	—	24	36		V _{DS} = 80V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	36	54		V _{GS} = 10V, ④
t _{d(on)}	Turn-On Delay Time	—	16	—	ns	V _{DD} = 50V
t _r	Rise Time	—	90	—		I _D = 35.4A
t _{d(off)}	Turn-Off Delay Time	—	20	—		R _G = 2.5Ω
t _f	Fall Time	—	12	—		V _{GS} = 10V ④
C _{iss}	Input Capacitance	—	2450	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	740	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	190	—		f = 1.0MHz⑥
C _{oss}	Output Capacitance	—	3370	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance	—	390	—		V _{GS} = 0V, V _{DS} = 80V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance	—	690	—		V _{GS} = 0V, V _{DS} = 0V to 80V ⑤

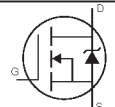
Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	510	mJ
I _{AR}	Avalanche Current③	—	35.4	A
E _{AR}	Repetitive Avalanche Energy④	—	20	mJ

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	0.75	°C/W
R _{θCS}	Case-to-Sink, Flat, Greased Surface ⑥	0.50	—	
R _{θJA}	Junction-to-Ambient⑦	—	62	
R _{θJA}	Junction-to-Ambient⑧	—	40	

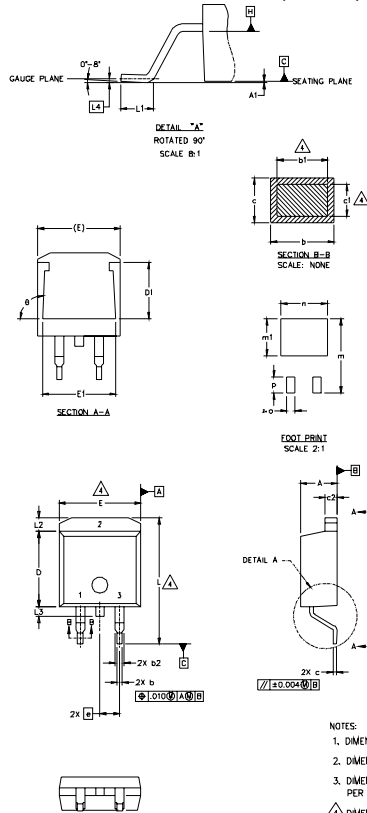
Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	59	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	236		
V _{SD}	Diode Forward Voltage	—	—	1.3	V	T _J = 25°C, I _S = 35.4A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	130	200	ns	T _J = 25°C, I _F = 35.4A
Q _{rr}	Reverse Recovery Charge	—	0.75	1.1	μC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

IRFB/IRFS/IRFSL59N10DPbF

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	4
A1		0.127		.005	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.40	.045	.055	4
c	0.43	0.63	.017	.025	
cl	0.38	0.74	.015	.029	3
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

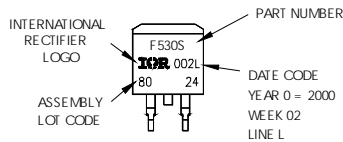
* PART DEPENDENT.

NOTES:

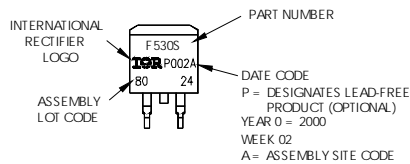
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. DIMENSION b1 AND c1 APPLY 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"

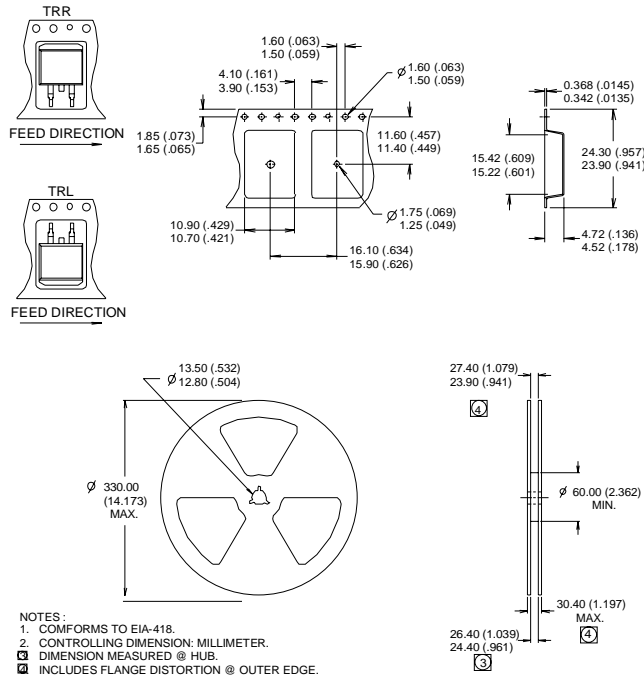


OR



D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.8\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 35.4\text{A}$.
- ③ $I_{SD} \leq 35.4\text{A}$, $di/dt \leq 350\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ C_{OSS} eff. is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS}
- ⑥ This is only applied to TO-220AB package
- ⑦ 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.

Data and specifications subject to change without notice.