International
IOR Rectifier

PD - 95545

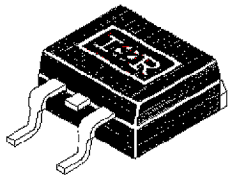
IRFBC40ASPbF

HEXFET® Power MOSFET

V_{DSS}	Rds(on) max	I_D
600V	1.2Ω	6.2A

Applications
- Switch Mode Power Supply (SMPS)
- Uninterruptable Power Supply
- High speed power switching
- Lead-Free

Benefits
- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective Coss Specified (See AN 1001)



D²Pak

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V⑥	6.2	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V⑥	3.9	
I_{DM}	Pulsed Drain Current ①⑥	25	
P_D @T_C = 25°C	Power Dissipation	125	W
	Linear Derating Factor	1.0	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③⑥	6.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Typical SMPS Topology:

- Single transistor Forward

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.66	—	V/°C	Reference to 25°C, I_D = 1mA⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	1.2	Ω	V_{GS} = 10V, I_D = 3.7A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 600V, V_{GS} = 0V
		—	—	250		V_{DS} = 480V, V_{GS} = 0V, T_J = 125°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	3.4	—	—	S	V_{DS} = 50V, I_D = 3.7A
Q_g	Total Gate Charge	—	—	42	nC	I_D = 6.2A
Q_{gs}	Gate-to-Source Charge	—	—	10		V_{DS} = 480V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	20		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	13	—	ns	V_{DD} = 300V
t_r	Rise Time	—	23	—		I_D = 6.2A
$t_{d(off)}$	Turn-Off Delay Time	—	31	—		R_G = 9.1Ω
t_f	Fall Time	—	18	—		R_D = 47Ω,See Fig. 10 ④
C_{iss}	Input Capacitance	—	1036	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	136	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	7.0	—		f = 1.0MHz, See Fig. 5
C_{oss}	Output Capacitance	—	1487	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	36	—		V_{GS} = 0V, V_{DS} = 480V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	48	—		V_{GS} = 0V, V_{DS} = 0V to 480V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	570	mJ
I_{AR}	Avalanche Current①	—	6.2	A
E_{AR}	Repetitive Avalanche Energy①	—	13	mJ

Thermal Resistance

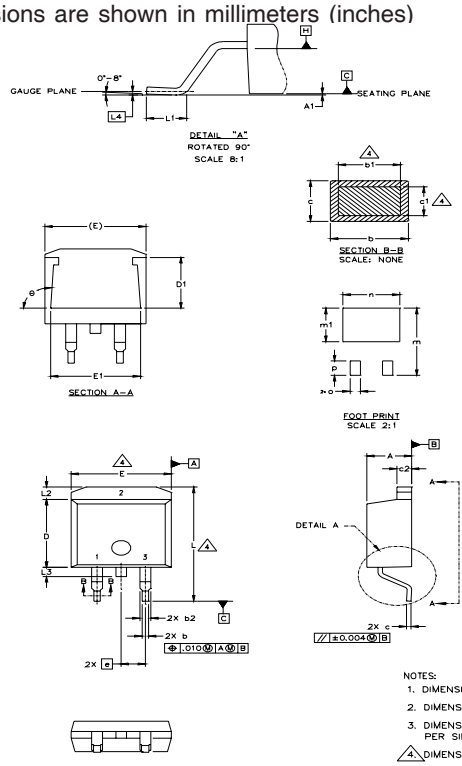
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mounted, steady-state)*	—	40	

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	6.2	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	25		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	T_J = 25°C, I_S = 6.2A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	431	647	ns	T_J = 25°C, I_F = 6.2A
Q_{rr}	Reverse RecoveryCharge	—	1.8	2.8	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)				

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

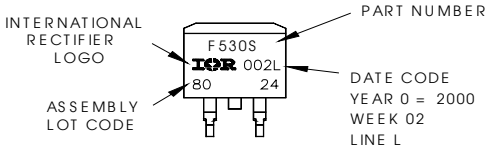
* PART DEPENDENT.

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.

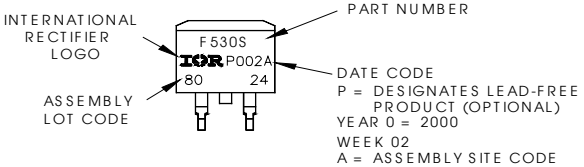
D²Pak Part Marking Information (Lead-Free)

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

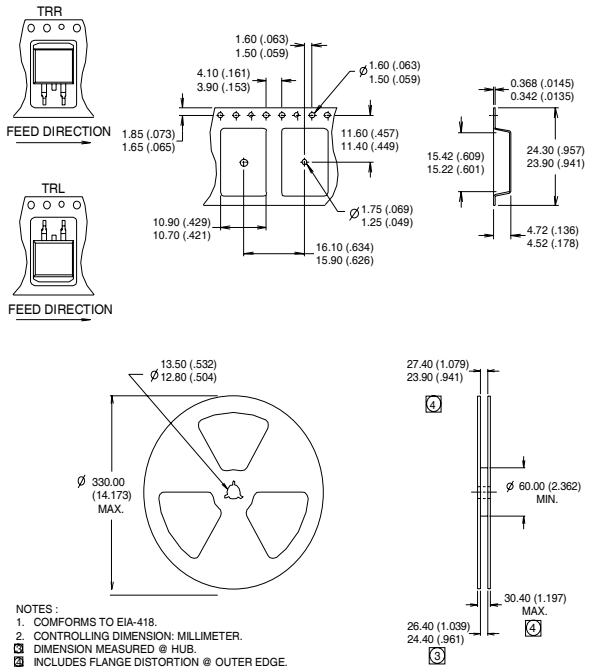
Note: "P" in assembly line position indicates "Lead-Free"



OR



D²Pak Tape & Reel Infomation



Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Starting T_J = 25°C, L = 29.6mH R_G = 25Ω, I_{AS} = 6.2A. (See Figure 12)

③ I_{SD} ≤ 6.2A, di/dt ≤ 88A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

④ Pulse width ≤ 300µs; duty cycle ≤ 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 Uses IRFBC40A data and test conditions

* When mounted on FR-4 board using minimum recommended footprint.
For recommended footprint and soldering techniques refer to application note #AN-994.