International
IOR Rectifier

PROVISIONAL

SMPS MOSFET

PD - 97002

IRFB52N15DPbF
IRFS52N15DPbF
IRFSL52N15DPbF

HEXFET® Power MOSFET

Applications
- High frequency DC-DC converters
- Plasma Display Panel
- Lead-Free

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

Key Parameters		
V_{DS}	150	V
$V_{DS\ (Avalanche)}$ min.	200	V
$R_{DS(ON)}$ max @ 10V	32	mΩ
T_J max	175	°C

TO-220AB IRFB52N15DPbF | D²Pak IRFS52N15DPbF | TO-262 IRFSL52N15DPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V ⑦	51*	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V ⑦	36*	
I_{DM}	Pulsed Drain Current ①	240	
P_D @T_A = 25°C	Power Dissipation ⑦	3.8	W
P_D @T_C = 25°C	Power Dissipation ⑦	230*	
	Linear Derating Factor ⑦	1.5*	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	5.5	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 torqe, 6-32 or M3 screw⑥	10 lbf•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	0.47*	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface ⑥	0.50	–––	
$R_{\theta JA}$	Junction-to-Ambient⑥	–––	62	
$R_{\theta JA}$	Junction-to-Ambient⑦	–––	40	

* $R_{\theta JC}$ (end of life) for D²Pak and TO-262 = 0.65°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 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 Voltage	150	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.16	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	32	mΩ	V_{GS} = 10V, I_D = 36A ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	µA	V_{DS} = 150V, V_{GS} = 0V
		—	—	250		V_{DS} = 120V, 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	19	—	—	S	V_{DS} = 50V, I_D = 36A
Q_g	Total Gate Charge	—	60	89	nC	I_D = 36A
Q_{gs}	Gate-to-Source Charge	—	18	27		V_{DS} = 75V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	28	42		V_{GS} = 10V, ④
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	V_{DD} = 75V
t_r	Rise Time	—	47	—		I_D = 36A
$t_{d(off)}$	Turn-Off Delay Time	—	28	—		R_G = 2.5Ω
t_f	Fall Time	—	25	—		V_{GS} = 10V ④
C_{iss}	Input Capacitance	—	2770	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	590	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	110	—		f = 1.0MHz
C_{oss}	Output Capacitance	—	3940	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	260	—		V_{GS} = 0V, V_{DS} = 120V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	550	—		V_{GS} = 0V, V_{DS} = 0V to 120V ⑤

Avalanche Characteristics

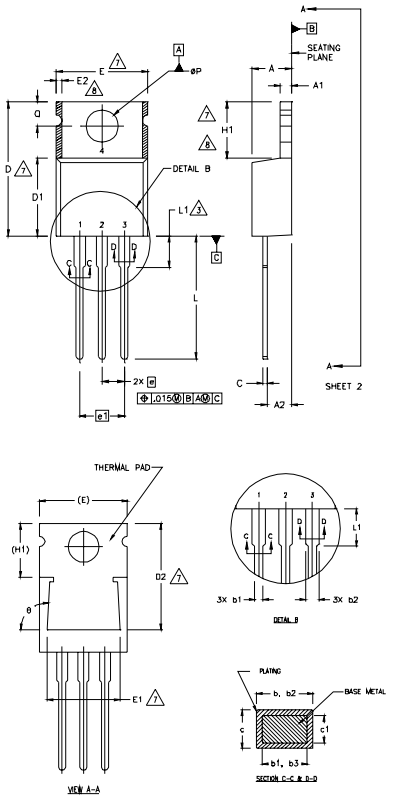
	Parameter	Min.	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②⑥	—	—	470	mJ
I_{AR}	Avalanche Current ①	—	—	36	A
E_{AR}	Repetitive Avalanche Energy ①	—	450	—	mJ
$V_{DS\ (Avalanche)}$	Repetitive Avalanche Voltage ①	200	—	—	V

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	60	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	—	—	240		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	T_J = 25°C, I_S = 36A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	140	210	nS	T_J = 25°C, I_F = 36A
Q_{rr}	Reverse RecoveryCharge	—	780	1170	nC	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)				

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
2 DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5 DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
6 CONTROLLING DIMENSION : INCHES.
7 THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
8 DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.

LEAD ASSIGNMENTS

HEXFET
1.- GATE
2.- DRAIN
3.- SOURCE

IGBTs, CoPACK
1.- GATE
2.- COLLECTOR
3.- EMITTER

DIODES
1.- ANODE/OPEN
2.- CATHODE
3.- ANODE

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.04	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.96	.015	.038	5
b2	1.15	1.77	.045	.070	
b3	1.15	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	12.19	12.88	.480	.507	7
E	9.66	10.66	.380	.420	4,7
E1	8.38	8.89	.330	.350	7
e	2.54 BSC		.100 BSC		
e1	5.08		.200 BSC		
H1	5.85	6.55	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	–	6.35	–	.250	3
øP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	
ø	90°-93°		90°-93°		

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

Note: "P" inassembly line position indicates "Lead - Free"