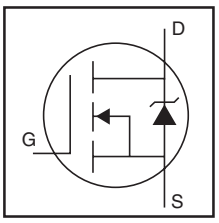
International
IOR Rectifier

PD - 97308A

IRFB3607PbF
IRFS3607PbF
IRFSL3607PbF

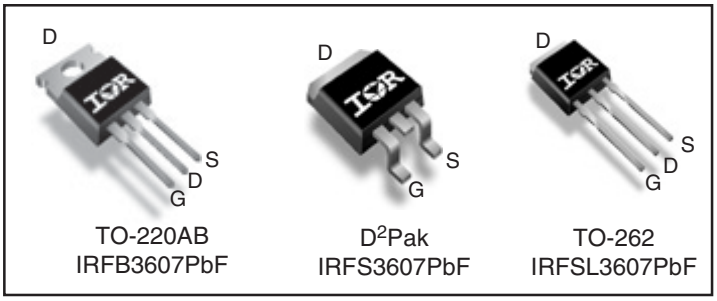
HEXFET® Power MOSFET

Applications
- High Efficiency Synchronous Rectification in SMPS
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits



V_{DSS}		75V
$R_{DS(on)}$	typ.	7.34mΩ
	max.	9.0mΩ
I_D		80A

Benefits
- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche SOA
- Enhanced body diode dV/dt and dI/dt Capability



G	D	S
Gate	Drain	Source

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, VGS @ 10V	80①	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	56①	
I_{DM}	Pulsed Drain Current ②	310	
P_D @T_C = 25°C	Maximum Power Dissipation	140	W
	Linear Derating Factor	0.96	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ④	27	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10lb·in (1.1N·m)	

Avalanche Characteristics

$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy ③	120	mJ
I_{AR}	Avalanche Current ①	46	A
E_{AR}	Repetitive Avalanche Energy ⑤	14	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑨	—	1.045	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat Greased Surface, TO-220	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient, TO-220 ⑧	—	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) , D^2Pak ⑧⑨	—	40	

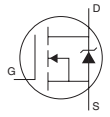
Static @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	75	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.096	—	V/°C	Reference to 25°C, I_D = 5mA②
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	7.34	9.0	mΩ	V_{GS} = 10V, I_D = 46A ⑤
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 100µA
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 75V, V_{GS} = 0V
		—	—	250		V_{DS} = 60V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	170	—	—	S	V_{DS} = 50V, I_D = 46A
Q_g	Total Gate Charge	—	56	84	nC	I_D = 46A
Q_{gs}	Gate-to-Source Charge	—	13	—		V_{DS} = 38V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	16	—		V_{GS} = 10V ⑤
Q_{sync}	Total Gate Charge Sync. (Q_g - Q_{gd})	—	40	—		I_D = 46A, V_{DS} =0V, V_{GS} = 10V
$R_{G(int)}$	Internal Gate Resistance	—	0.55	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	V_{DD} = 49V
t_r	Rise Time	—	110	—		I_D = 46A
$t_{d(off)}$	Turn-Off Delay Time	—	43	—		R_G = 6.8Ω
t_f	Fall Time	—	96	—		V_{GS} = 10V ⑤
C_{iss}	Input Capacitance	—	3070	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	280	—		V_{DS} = 50V
C_{rss}	Reverse Transfer Capacitance	—	130	—		f = 1.0MHz
C_{oss} eff. (ER)	Effective Output Capacitance (Energy Related)⑧	—	380	—		V_{GS} = 0V, V_{DS} = 0V to 60V ⑧
C_{oss} eff. (TR)	Effective Output Capacitance (Time Related)⑥	—	610	—		V_{GS} = 0V, V_{DS} = 0V to 60V ⑥

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	80①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ②	—	—	310		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C, I_S = 46A, V_{GS} = 0V ⑤
t_{rr}	Reverse Recovery Time	—	33	50	ns	T_J = 25°C V_R = 64V,
		—	39	59		T_J = 125°C I_F = 46A
Q_{rr}	Reverse Recovery Charge	—	32	48	nC	T_J = 25°C di/dt = 100A/µs ⑤
		—	47	71		T_J = 125°C
I_{RRM}	Reverse Recovery Current	—	1.9	—	A	T_J = 25°C
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

① Calculated continuous current based on maximum allowable junction temperature. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.

② Repetitive rating; pulse width limited by max. junction temperature.

③ Limited by T_{Jmax}, starting T_J = 25°C, L = 0.12mH R_G = 25Ω, I_{AS} = 46A, V_{GS} =10V. Part not recommended for use above this value.

④ I_{SD} ≤ 46A, di/dt ≤ 1920A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.

⑤ Pulse width ≤ 400µs; duty cycle ≤ 2%.

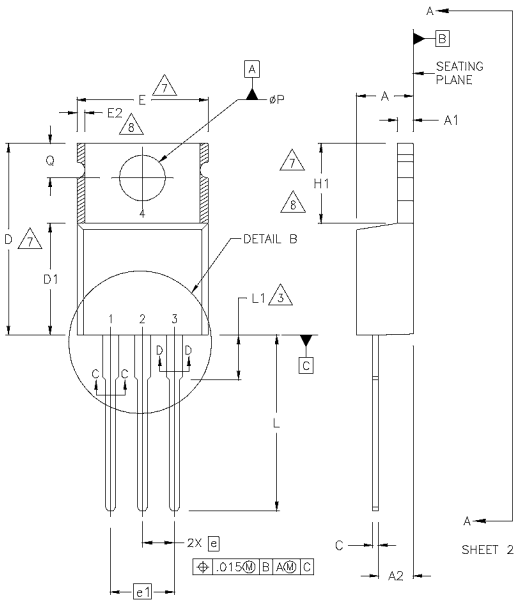
⑥ C_{oss} eff. (TR) is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

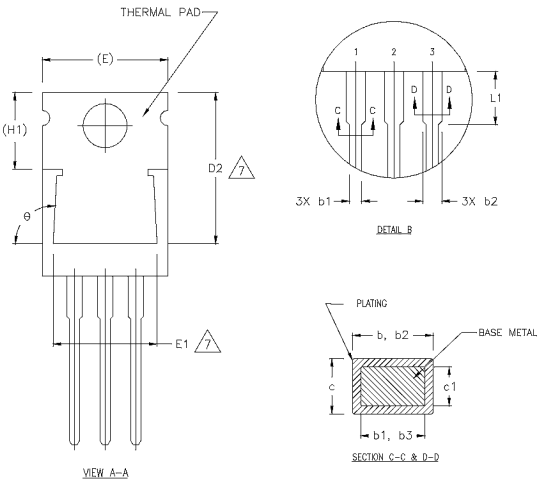
⑦ C_{oss} eff. (ER) is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

⑧ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

⑨ R_θ is measured at T_J approximately 90°C.

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.

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°		

LEAD ASSIGNMENTS

HEXFET
1.– GATE
2.– DRAIN
3.– SOURCE

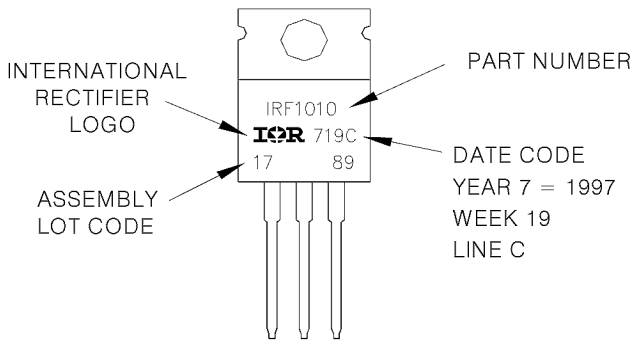
IGBTs, CoPACK
1.– GATE
2.– COLLECTOR
3.– EMITTER

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

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" in assembly line position indicates "Lead-Free"



TO-220AB packages are not recommended for Surface Mount Application.