PD - 95004

International
IOR Rectifier

IRFP22N50APbF

SMPS MOSFET

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	I_D
500V	0.23Ω	22A

Applications

- Switch Mode Power Supply (SMPS)
- UninterruptIble 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

TO-247AC

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	22	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	14	
I_{DM}	Pulsed Drain Current ①	88	
P_D @T_C = 25°C	Power Dissipation	277	W
	Linear Derating Factor	2.2	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	4.8	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)	
	Mounting torqe, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Typical SMPS Topologies

- Full Bridge Converters
- Power Factor Correction Boost

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.55	—	V/°C	Reference to 25°C, I_D = 1mA⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.23	Ω	V_{GS} = 10V, I_D = 13A 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} = 500V, V_{GS} = 0V
		—	—	250		V_{DS} = 400V, 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	12	—	—	S	V_{DS} = 50V, I_D = 13A
Q_g	Total Gate Charge	—	—	120	nC	I_D = 22A
Q_{gs}	Gate-to-Source Charge	—	—	32		V_{DS} = 400V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	52		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	26	—	ns	V_{DD} = 250V
t_r	Rise Time	—	94	—		I_D = 22A
$t_{d(off)}$	Turn-Off Delay Time	—	47	—		R_G = 4.3Ω
t_f	Fall Time	—	47	—		R_D = 11Ω,See Fig. 10 ④
C_{iss}	Input Capacitance	—	3450	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	513	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	27	—		f = 1.0MHz, See Fig. 5
C_{oss}	Output Capacitance	—	4935	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	137	—		V_{GS} = 0V, V_{DS} = 400V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	264	—		V_{GS} = 0V, V_{DS} = 0V to 400V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	1180	mJ
I_{AR}	Avalanche Current①	—	22	A
E_{AR}	Repetitive Avalanche Energy①	—	28	mJ

Thermal Resistance

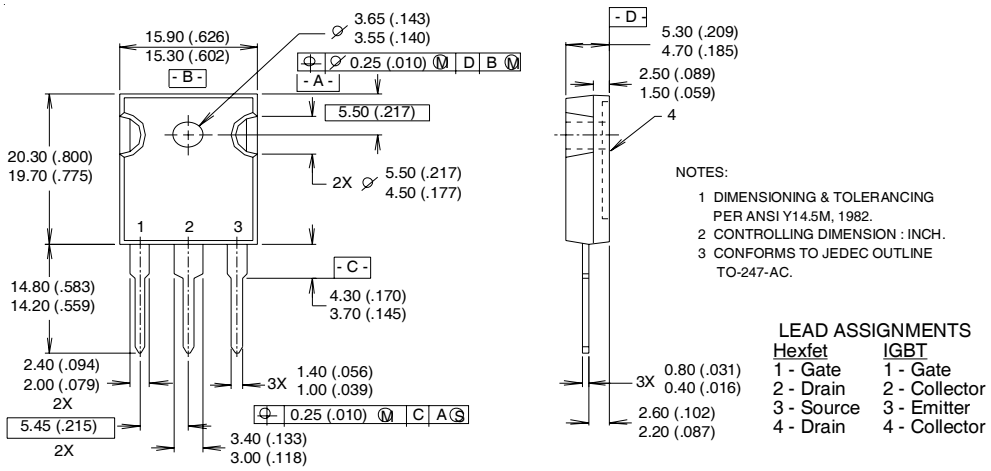
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.45	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	40	

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	22	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	88		
V_{SD}	Diode Forward Voltage	—	—	1.5	V	T_J = 25°C, I_S = 22A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	570	850	ns	T_J = 25°C, I_F = 22A
Q_{rr}	Reverse RecoveryCharge	—	6.1	9.2	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)				

TO-247AC Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE TO-247-AC.

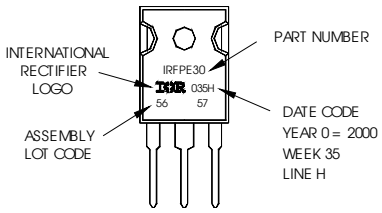
LEAD ASSIGNMENTS

Hexfet	IGBT
1 - Gate	1 - Gate
2 - Drain	2 - Collector
3 - Source	3 - Emitter
4 - Drain	4 - Collector

TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFPE30
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"

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



Notes:

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

② Starting T_J = 25°C, L = 4.87mH R_G = 25Ω, I_{AS} = 22A. (See Figure 12a)

③ $I_{SD} \leq$ 22A, di/dt ≤ 190A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 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}