

IRFP048PbF

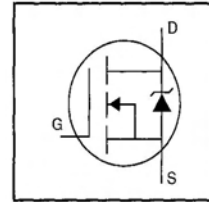
- Dynamic dv/dt Rating
- Isolated Central Mounting Hole
- 175°C Operating Temperature
- Ease of Paralleling
- Simple Drive Requirements

- Lead-Free

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

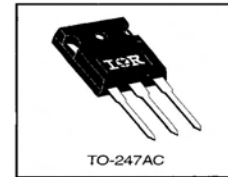
The TO-247 package is preferred for commercial-industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole. It also provides greater creepage distance between pins to meet the requirements of most safety specifications.



$$V_{DS} = 60V$$

$$R_{DS(on)} = 0.018\Omega$$

$$I_D = 70^*A$$



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	70*	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10 V$	52	
I_{DM}	Pulsed Drain Current ①	290	
$P_D @ T_C = 25^\circ C$	Power Dissipation	190	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	200	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J	Operating Junction and	-55 to +175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting Torque, 6-32 or M3 screw		

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	0.80	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	40	

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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60	—	—	V	$V_{GS}=0V$, $I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.060	—	V/°C	Reference to 25°C , $I_D=1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.018	Ω	$V_{GS}=10V$, $I_D=44A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
g_{fs}	Forward Transconductance	20	—	—	S	$V_{DS}=25V$, $I_D=44A$ ③
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS}=60V$, $V_{GS}=0V$
		—	—	250		$V_{DS}=48V$, $V_{GS}=0V$, $T_J=150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS}=20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS}=-20V$
Q_g	Total Gate Charge	—	—	110	nC	$I_D=72A$
Q_{gs}	Gate-to-Source Charge	—	—	29		$V_{DS}=48V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	38		$V_{GS}=10V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	8.1	—	ns	$V_{DD}=30V$
t_r	Rise Time	—	250	—		$I_D=72A$
$t_{d(off)}$	Turn-Off Delay Time	—	210	—		$R_G=9.1\Omega$
t_f	Fall Time	—	250	—		$R_D=0.34\Omega$ See Figure 10 ④
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	13	—		
C_{iss}	Input Capacitance	—	2400	—	pF	$V_{GS}=0V$
C_{oss}	Output Capacitance	—	1300	—		$V_{DS}=25V$
C_{rss}	Reverse Transfer Capacitance	—	190	—		$f=1.0MHz$ See Figure 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	70*	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	290		
V_{SD}	Diode Forward Voltage	—	—	2.0	V	$T_J=25^\circ\text{C}$, $I_S=73A$, $V_{GS}=0V$ ④
t_{rr}	Reverse Recovery Time	—	120	180	ns	$T_J=25^\circ\text{C}$, $I_F=72A$
Q_{rr}	Reverse Recovery Charge	—	0.50	0.80	μC	$di/dt=100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

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

③ $I_{SD} \leq 72A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$

② $V_{DD}=25V$, starting $T_J=25^\circ\text{C}$, $L=43\mu H$, $R_G=25\Omega$, $I_{AS}=73A$ (See Figure 12)

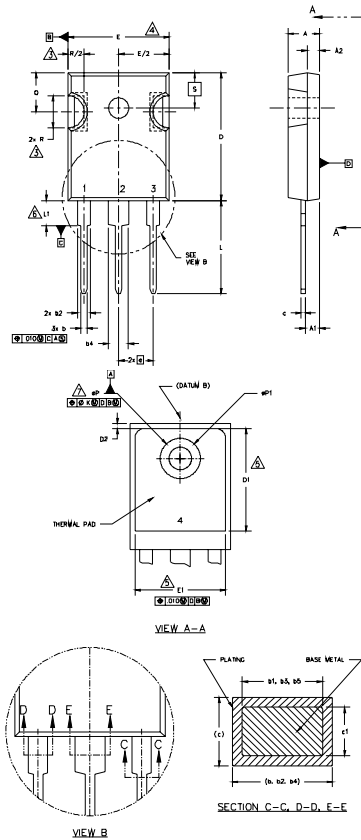
④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

* Current limited by the package, (Die Current = 73A)

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TO-247AC Package Outline Dimensions are shown in millimeters (inches)



NOTES:

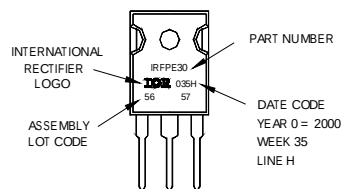
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M 1994.
2. DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS]
3. CONTOUR OF SLOT OPTIONAL.
4. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.
6. LEAD FINISH UNCONTROLLED IN L1.
7. ϕP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5 ° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154" [3.91].
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247 WITH THE EXCEPTION OF DIMENSION c.

SYMBOL	DIMENSIONS				NOTES	
	INCHES		MILLIMETERS			
	MIN.	MAX.	MIN.	MAX.		
A	.183	.209	4.65	5.31		
A1	.087	.102	2.21	2.59		
A2	.059	.098	1.50	2.49		
b	.039	.055	0.99	1.40		
b1	.039	.053	0.99	1.35		
b2	.065	.094	1.65	2.39		
b3	.065	.092	1.65	2.37		
b4	.102	.135	2.59	3.43		
b5	.102	.133	2.59	3.38		
c	.015	.034	0.38	0.86		
c1	.015	.030	0.38	0.76		
D	.776	.815	19.71	20.70		4
D1	.515	—	13.08	—		5
D2	.020	.030	0.51	0.76		4
E	.602	.625	15.29	15.87		
E1	.540	—	13.72	—		
ϕ	.215 BSC		5.46 BSC			
ϕK	.010		2.54			
L	.559	.634	14.20	16.10	DIODES	
L1	.146	.169	3.71	4.29		
N	3		7.62 BSC			
ϕP	.140	.144	3.56	3.66		
$\phi P1$	—	.275	—	6.98	1. — ANODE/OPEN 2. — CATHODE 3. — ANODE	
Q	.209	.224	5.31	5.69		
R	.178	.216	4.52	5.49		
S	.217 BSC		5.51 BSC			

TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFP048PbF
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"

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



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