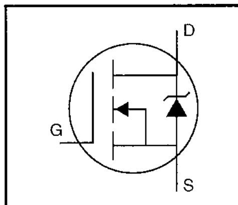
International IOR Rectifier

PD-9.580B

IRFPF40

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



$V_{DSS} = 900V$

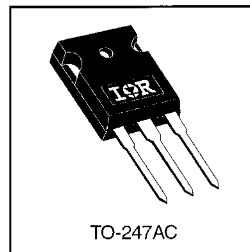
$R_{DS(on)} = 2.5\Omega$

$I_D = 4.7A$

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.



TO-247AC

DATA SHEETS

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25°C$	Continuous Drain Current, V_{GS} @ 10 V	4.7	A
I_D @ $T_C = 100°C$	Continuous Drain Current, V_{GS} @ 10 V	2.9	
I_{DM}	Pulsed Drain Current ①	19	
P_D @ $T_C = 25°C$	Power Dissipation	150	W
	Linear Derating Factor	1.2	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	500	mJ
I_{AR}	Avalanche Current ①	4.7	A
E_{AR}	Repetitive Avalanche Energy ①	15	mJ
dv/dt	Peak Diode Recovery dv/dt ③	1.5	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 Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

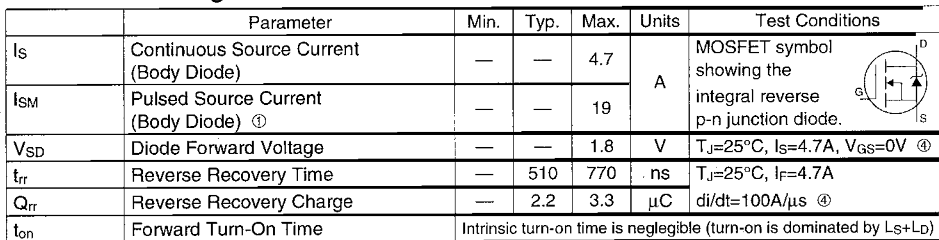
Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	0.83	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	40	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	900	—	—	V	V_{GS}=0V, I_D= 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	1.0	—	V/°C	Reference to 25°C, I_D= 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	2.5	Ω	V_{GS}=10V, I_D=2.8A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, I_D= 250µA
g_{fs}	Forward Transconductance	2.5	—	—	S	V_{DS}=50V, I_D=2.8A ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	100	µA	V_{DS}=900V, V_{GS}=0V
		—	—	500		V_{DS}=720V, 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
Q_g	Total Gate Charge	—	—	120	nC	I_D=4.7A
Q_{gs}	Gate-to-Source Charge	—	—	16		V_{DS}=360V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	67		V_{GS}=10V See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	15	—	ns	V_{DD}=450V
t_r	Rise Time	—	36	—		I_D=4.7A
$t_{d(off)}$	Turn-Off Delay Time	—	110	—		R_G=9.1Ω
t_f	Fall Time	—	32	—		R_D=95Ω 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	—	1600	—	pF	V_{GS}=0V
C_{oss}	Output Capacitance	—	180	—		V_{DS}=25V
C_{rss}	Reverse Transfer Capacitance	—	63	—		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)	—	—	4.7	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	19		
V_{SD}	Diode Forward Voltage	—	—	1.8	V	T_J=25°C, I_S=4.7A, V_{GS}=0V ④
t_{rr}	Reverse Recovery Time	—	510	770	ns	T_J=25°C, I_F=4.7A
Q_{rr}	Reverse Recovery Charge	—	2.2	3.3	µC	di/dt=100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is neglegible (turn-on is dominated by L_S+L_D)				

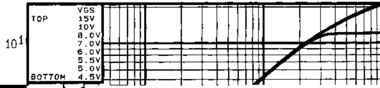
Notes:

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

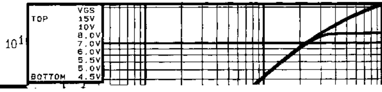
② V_{DD}=50V, starting T_J=25°C, L=42mH R_G=25Ω, I_{AS}=4.7A (See Figure 12)

③ I_{SD}≤4.7A, di/dt≤110A/µs, V_{DD}≤600 , T_J≤150°C

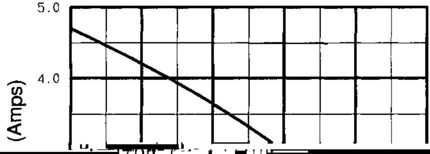
④ Pulse width ≤ 300 µs; duty cycle ≤2%.

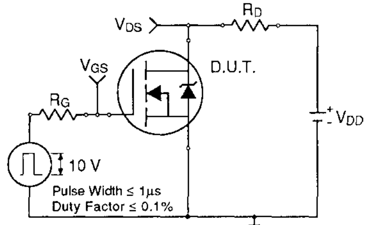

VGS
TOP 15V
10V
8.0V
7.0V
6.0V
5.5V
5.0V
BOTTOM 4.5V
10^1

VGS
TOP 15V
10V
8.0V
7.0V
6.0V
5.5V
5.0V
BOTTOM 4.5V
10^1


VGS
TOP 15V
10V
8.0V
7.0V
6.0V
5.5V
5.0V
BOTTOM 4.5V
10^1

VGS
TOP 15V
10V
8.0V
7.0V
6.0V
5.5V
5.0V
BOTTOM 4.5V
10^1


5.0
4.0
(Amps)


V_{DS}
R_D
V_{GS}
D.U.T.
R_G
V_{DD}
10 V
Pulse Width ≤ 1µs
Duty Factor ≤ 0.1%

Vary t_p to obtain required I_{AS}

V_{DS} L D.U.T. R_G V_{DD}

1200 1000 I_D TOP 2.1A 3.0A BOTTOM 4.7A