

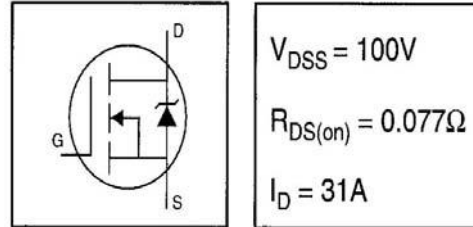
IRFP140PbF

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- 175°C Operating Temperature
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Lead-Free

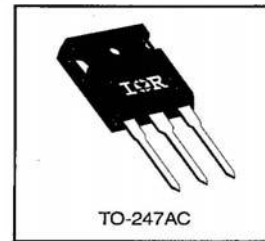
Description

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.



$V_{DSS} = 100V$
 $R_{DS(on)} = 0.077\Omega$
 $I_D = 31A$



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---------------------------|---|-----------------------|-------|
| $I_D @ T_C = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10 V$ | 31 | A |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10 V$ | 22 | |
| I_{DM} | Pulsed Drain Current ① | 120 | |
| $P_D @ T_C = 25^\circ C$ | Power Dissipation | 180 | W |
| | Linear Derating Factor | 1.2 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulse Avalanche Energy ② | 100 | mJ |
| I_{AR} | Avalanche Current ① | 31 | A |
| E_{AR} | Repetitive Avalanche Energy ① | 18 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | 5.5 | V/ns |
| T_J T_{STG} | Operating Junction and Storage Temperature Range | -55 to +175 | °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 | |

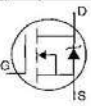
IRFP140PbF

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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 | 100 | — | — | V | $V_{GS}=0V, I_D=250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.13 | — | V/ $^\circ\text{C}$ | Reference to 25°C , $I_D=1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.077 | Ω | $V_{GS}=10V, I_D=19A$ ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | — | 4.0 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| g_{fs} | Forward Transconductance | 9.8 | — | — | S | $V_{DS}=50V, I_D=19A$ ④ |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 25 | μA | $V_{DS}=100V, V_{GS}=0V$ $V_{DS}=80V, V_{GS}=0V, T_J=150^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | $V_{GS}=20V$ |
| | Gate-to-Source Reverse Leakage | — | — | -100 | nA | $V_{GS}=-20V$ |
| Q_g | Total Gate Charge | — | — | 72 | nC | $I_D=17A$ |
| Q_{gs} | Gate-to-Source Charge | — | — | 11 | nC | $V_{DS}=80V$ |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | — | — | 32 | nC | $V_{GS}=10V$ See Fig. 6 and 13 ④ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 11 | — | ns | $V_{DD}=50V$ $I_D=17A$ $R_G=9.1\Omega$ $R_D=2.9\Omega$ See Figure 10 ④ |
| t_r | Rise Time | — | 44 | — | | |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 53 | — | | |
| t_f | Fall Time | — | 43 | — | | |
| 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 | — | 1700 | — | pF | $V_{GS}=0V$ |
| C_{oss} | Output Capacitance | — | 550 | — | | $V_{DS}=25V$ |
| C_{rss} | Reverse Transfer Capacitance | — | 110 | — | | $f=1.0\text{MHz}$ See Figure 5 |

Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|----------|--|---|------|------|---------------|--|
| I_S | Continuous Source Current (Body Diode) | — | — | 31 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | — | — | 120 | | |
| V_{SD} | Diode Forward Voltage | — | — | 2.5 | V | $T_J=25^\circ\text{C}, I_S=31A, V_{GS}=0V$ ④ |
| t_{rr} | Reverse Recovery Time | — | 180 | 360 | ns | $T_J=25^\circ\text{C}, I_F=17A$ |
| Q_{rr} | Reverse Recovery Charge | — | 1.3 | 2.8 | μC | $di/dt=100A/\mu\text{s}$ ④ |
| t_{on} | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D) | | | | |

Notes:

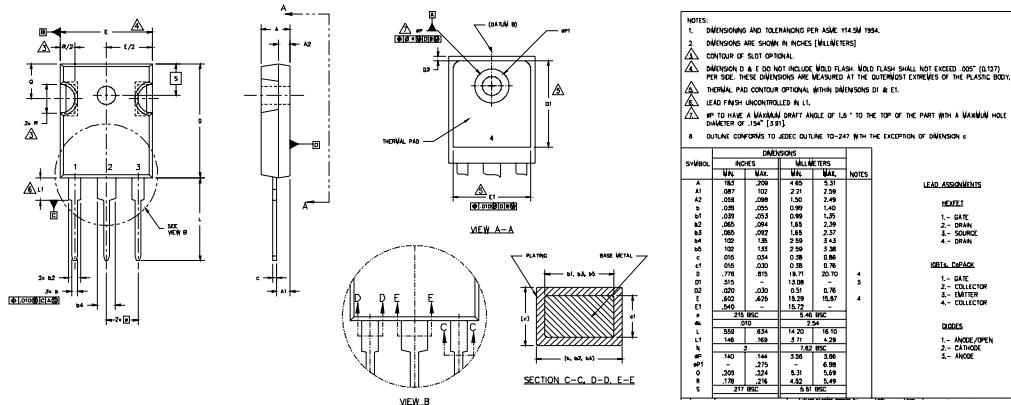
- ① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)
- ② $V_{DD}=25V$, starting $T_J=25^\circ\text{C}$, $L=156\mu\text{H}$
 $R_G=25\Omega, I_{AS}=31A$ (See Figure 12)
- ③ $I_{SD}\leq 28A, di/dt\leq 170A/\mu\text{s}, V_{DD}\leq V_{(BR)DSS}, T_J\leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

IRFP140PbF

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TO-247AC Package Outline

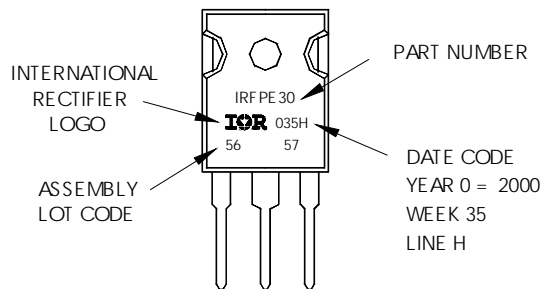
Dimensions are shown in millimeters (inches)



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"



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