International
IOR Rectifier

PD- 95470

**SMPS MOSFET**

# IRFB42N20DPbF

HEXFET® Power MOSFET

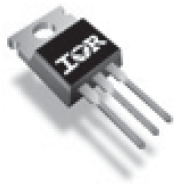
| $V_{DSS}$ | $R_{DS(on)}$ max | $I_D$ |
|---|---|---|
| 200V | 0.055Ω | 44A |

## Applications

- High frequency DC-DC converters
- Motor Control
- Uninterrutible Power Supplies
- Lead-Free

## Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective $C_{OSS}$ to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current




TO-220AB

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 44 | A |
| $I_D$ @ $T_C$ = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V | 31 | |
| $I_{DM}$ | Pulsed Drain Current ① | 180 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation | 2.4 | W |
| $P_D$ @$T_C$ = 25°C | Power Dissipation | 330 | |
| | Linear Derating Factor | 2.2 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 30 | V |
| dv/dt | Peak Diode Recovery dv/dt ③ | 2.5 | V/ns |
| $T_J$ | Operating Junction and | -55 to + 175 | °C |
| $T_{STG}$ | Storage Temperature Range | | |
| | Soldering Temperature, for 10 seconds | 300 (1.6mm from case ) | |
| | Mounting torqe, 6-32 or M3 screw | 10 lbf•in (1.1N•m) | |

## 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 | 0.50 | ––– | |
| $R_{\theta JA}$ | Junction-to-Ambient | ––– | 62 | |

Notes ① through ⑤ are on page 8

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 200 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.26 | — | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.055 | Ω | $V_{GS}$ = 10V, $I_D$ = 26A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 3.0 | — | 5.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 25 | μA | $V_{DS}$ = 200V, $V_{GS}$ = 0V |
| | | — | — | 250 | | $V_{DS}$ = 160V, $V_{GS}$ = 0V, $T_J$ = 150°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 | 21 | — | — | S | $V_{DS}$ = 50V, $I_D$ = 26A |
| $Q_g$ | Total Gate Charge | — | 91 | 140 | nC | $I_D$ = 26A |
| $Q_{gs}$ | Gate-to-Source Charge | — | 24 | 36 | | $V_{DS}$ = 160V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | — | 43 | 65 | | $V_{GS}$ = 10V, |
| $t_{d(on)}$ | Turn-On Delay Time | — | 18 | — | ns | $V_{DD}$ = 100V |
| $t_r$ | Rise Time | — | 69 | — | | $I_D$ = 26A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 29 | — | | $R_G$ = 1.8Ω |
| $t_f$ | Fall Time | — | 32 | — | | $V_{GS}$ = 10V ④ |
| $C_{iss}$ | Input Capacitance | — | 3430 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 530 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 100 | — | | $f$ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | — | 5310 | — | | $V_{GS}$ = 0V, $V_{DS}$ = 1.0V, $f$ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | — | 210 | — | | $V_{GS}$ = 0V, $V_{DS}$ = 160V, $f$ = 1.0MHz |
| $C_{oss}$ eff. | Effective Output Capacitance | — | 400 | — | | $V_{GS}$ = 0V, $V_{DS}$ = 0V to 160V ⑤ |

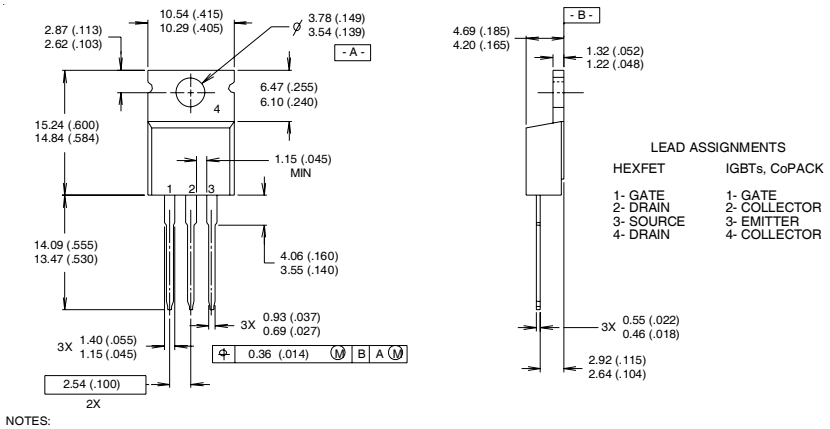
## Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy② | — | 510 | mJ |
| $I_{AR}$ | Avalanche Current① | — | 26 | A |
| $E_{AR}$ | Repetitive Avalanche Energy① | — | 33 | mJ |

## Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 44 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 180 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.3 | V | $T_J$ = 25°C, $I_S$ = 26A, $V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | — | 220 | 330 | ns | $T_J$ = 25°C, $I_F$ = 26A |
| $Q_{rr}$ | Reverse RecoveryCharge | — | 1860 | 2790 | nC | 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-220AB Package Outline

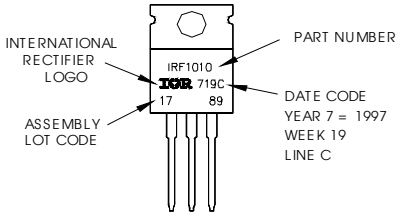



NOTES:
1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH
3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

## 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"




**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting $T_J$ = 25°C, L = 1.45mH $R_G$ = 25Ω, $I_{AS}$ = 26A, $V_{GS}$=10V

③ $I_{SD} \leq 26A$, di/dt ≤ 110A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175°C$

④ Pulse width ≤ 400µs; 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% $V_{DSS}$

Data and specifications subject to change without notice.
This product has been designed and qualified for the Industrial market.

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