

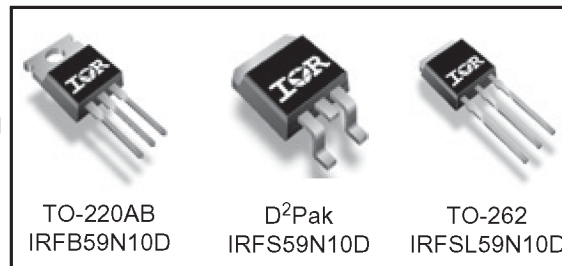
Applications

- High frequency DC-DC converters
- UPS / Motor Control Inverters
- Lead-Free

| | | |
|------------------------|-------------------------------|----------------------|
| V_{DSS} | R_{DS(on)} max | I_D |
| 100V | 0.025Ω | 59A |

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



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|------------------------|-------|
| I _D @ T _C = 25°C | Continuous Drain Current, V _{GS} @ 10V | 59 | A |
| I _D @ T _C = 100°C | Continuous Drain Current, V _{GS} @ 10V | 42 | |
| I _{DM} | Pulsed Drain Current ① | 236 | |
| P _D @ T _A = 25°C | Power Dissipation ② | 3.8 | W |
| P _D @ T _C = 25°C | Power Dissipation | 200 | |
| | Linear Derating Factor | 1.3 | W/°C |
| V _{GS} | Gate-to-Source Voltage | ± 30 | V |
| dv/dt | Peak Diode Recovery dv/dt ③ | 3.3 | 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 torque, 6-32 or M3 screw④ | 10 lbf•in (1.1N•m) | |

Typical SMPS Topologies

- Half-bridge and Full-bridge DC-DC Converters
- Full-bridge Inverters

Notes ① through ④ are on page 11

IRFB/IRFS/IRFSL59N10DPbF

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

International
IR Rectifier

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|--|--------------------------------------|------|------|-------|-------|---|
| V _{(BR)DSS} | Drain-to-Source Breakdown Voltage | 100 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔV _{(BR)DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 0.11 | — | V/°C | Reference to 25°C, I _D = 1mA |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | — | 0.025 | Ω | V _{GS} = 10V, I _D = 35.4A 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} = 100V, V _{GS} = 0V |
| | | — | — | 250 | | V _{DS} = 80V, 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 | 18 | — | — | S | V _{DS} = 50V, I _D = 35.4A |
| Q _g | Total Gate Charge | — | 76 | 114 | nC | I _D = 35.4A |
| Q _{gs} | Gate-to-Source Charge | — | 24 | 36 | | V _{DS} = 80V |
| Q _{gd} | Gate-to-Drain ("Miller") Charge | — | 36 | 54 | | V _{GS} = 10V, ④ |
| t _{d(on)} | Turn-On Delay Time | — | 16 | — | ns | V _{DD} = 50V |
| t _r | Rise Time | — | 90 | — | | I _D = 35.4A |
| t _{d(off)} | Turn-Off Delay Time | — | 20 | — | | R _G = 2.5Ω |
| t _f | Fall Time | — | 12 | — | | V _{GS} = 10V ④ |
| C _{iss} | Input Capacitance | — | 2450 | — | pF | V _{GS} = 0V |
| C _{oss} | Output Capacitance | — | 740 | — | | V _{DS} = 25V |
| C _{rss} | Reverse Transfer Capacitance | — | 190 | — | | f = 1.0MHz⑥ |
| C _{oss} | Output Capacitance | — | 3370 | — | | V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 390 | — | | V _{GS} = 0V, V _{DS} = 80V, f = 1.0MHz |
| C _{oss eff.} | Effective Output Capacitance | — | 690 | — | | V _{GS} = 0V, V _{DS} = 0V to 80V ⑤ |

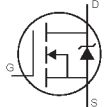
Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|-----------------|--------------------------------|------|------|-------|
| E _{AS} | Single Pulse Avalanche Energy② | — | 510 | mJ |
| I _{AR} | Avalanche Current③ | — | 35.4 | A |
| E _{AR} | Repetitive Avalanche Energy③ | — | 20 | mJ |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|------------------|---------------------------------------|------|------|-------|
| R _{θJC} | Junction-to-Case | — | 0.75 | °C/W |
| R _{θCS} | Case-to-Sink, Flat, Greased Surface ⑥ | 0.50 | — | |
| R _{θJA} | Junction-to-Ambient⑦ | — | 62 | |
| R _{θJA} | Junction-to-Ambient⑦ | — | 40 | |

Diode Characteristics

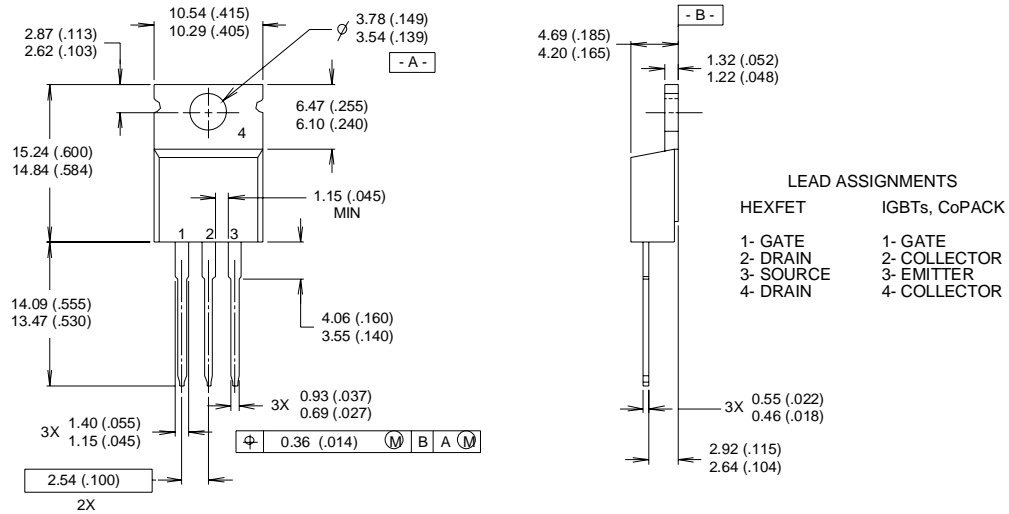
| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|--|------|------|-------|--|
| I _S | Continuous Source Current (Body Diode) | — | — | 59 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | 236 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.3 | V | T _J = 25°C, I _S = 35.4A, V _{GS} = 0V ④ |
| t _{rr} | Reverse Recovery Time | — | 130 | 200 | ns | T _J = 25°C, I _F = 35.4A |
| Q _{rr} | Reverse Recovery Charge | — | 0.75 | 1.1 | 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) | | | | |

IRFB/IRFS/IRFSL59N10DPbF



TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



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"

