

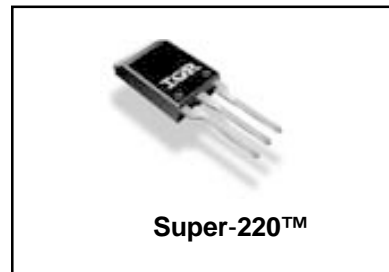
**Applications**

- Telecom and Data-Com off-Line SMPS
- Motor Control
- Uninterruptible Power Supply

<b>V<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub></b>	<b>I<sub>D</sub></b>
<b>500V</b>	<b>0.152Ω</b>	<b>31A</b>

**Benefits**

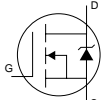
- Low On-Resistance
- High Speed Switching
- Low Gate Drive Current Due to Improved Gate Charge Characteristics
- Built in Fast Recovery Diode
- Improved Avalanche Ruggedness and Dynamic dv/dt, Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

	<b>Parameter</b>	<b>Max.</b>	<b>Units</b>
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	31	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	19	
I <sub>DM</sub>	Pulsed Drain Current ①	124	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Power Dissipation	360	W
	Linear Derating Factor	2.9	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T <sub>J</sub>	Operating Junction and Storage Temperature Range	-55 to + 150	°C
T <sub>STG</sub>			
	Soldering Temperature, for 10 seconds (1.6mm from case )	300	
	Recommended clip force	20	N

**Diode Characteristics**

<b>Symbol</b>	<b>Parameter</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Units</b>	<b>Conditions</b>
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	31	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	124		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.5	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 31A, V <sub>GS</sub> = 0V ④
t <sub>rr</sub>	Reverse Recovery Time	—	180	—	ns	T <sub>J</sub> = 125°C, I <sub>F</sub> = 31A
Q <sub>rr</sub>	Reverse Recovery Charge	—	800	—	nC	di/dt = 100A/μs ④
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

**Typical SMPS Topologies**

- Zero Voltage Switching Full and Half Bridge Circuits

# IRFBA31N50L

PROVISIONAL

International  
IR Rectifier

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.55	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ ⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.152	$\Omega$	$V_{GS} = 10V, I_D = 19A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.5	—	5.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	50	$\mu A$	$V_{DS} = 500V, V_{GS} = 0V$
		—	—	2.0	mA	$V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -30V$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	12	—	—	S	$V_{DS} = 50V, I_D = 19A$
$Q_g$	Total Gate Charge	—	—	195	nC	$I_D = 31A$ $V_{DS} = 400V$ $V_{GS} = 10V, \text{④}$
$Q_{gs}$	Gate-to-Source Charge	—	—	75		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	90		
$t_{d(on)}$	Turn-On Delay Time	—	20	—	ns	$V_{DD} = 250V$ $I_D = 31A$ $R_G = 4.3\Omega$ $V_{GS} = 10V, \text{④}$
$t_r$	Rise Time	—	60	—		
$t_{d(off)}$	Turn-Off Delay Time	—	45	—		
$t_f$	Fall Time	—	40	—		
$C_{iss}$	Input Capacitance	—	5300	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	540	—		
$C_{riss}$	Reverse Transfer Capacitance	—	33	—		

## Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	760	mJ
$I_{AR}$	Avalanche Current①	—	31	A
$E_{AR}$	Repetitive Avalanche Energy①	—	36	mJ

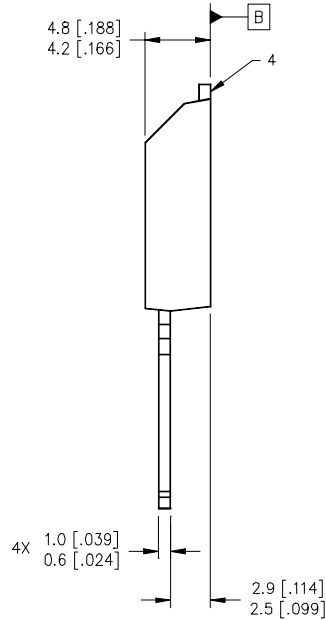
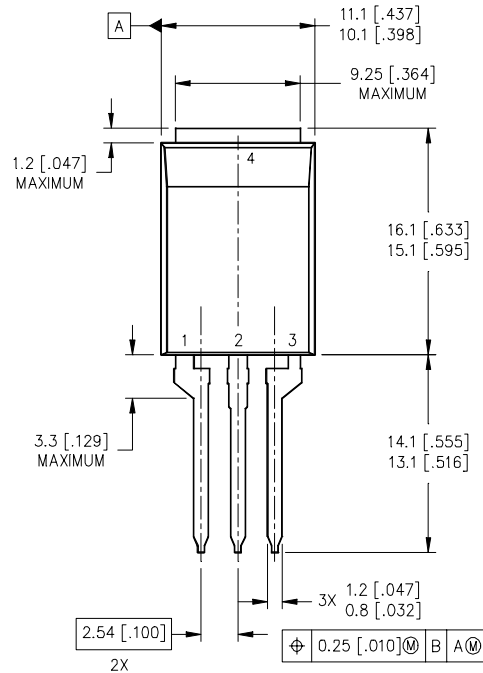
## Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.35	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	58	

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.      ④ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 4.3\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 31A$ ,
- ③  $I_{SD} \leq 31A$ ,  $di/dt \leq \text{TBDA}/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$

## Super-220™ Package Outline



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO-273AA.

LEAD ASSIGNMENTS

MOSFET	IGBT
1 – GATE	1 – GATE
2 – DRAIN	2 – COLLECTOR
3 – SOURCE	3 – EMITTER
4 – DRAIN	4 – COLLECTOR