

## HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	200 V
$T_j(\text{max})$	150 °C
$V_F(\text{max})$	0.85 V
$t_{rr}(\text{max})$	25 ns

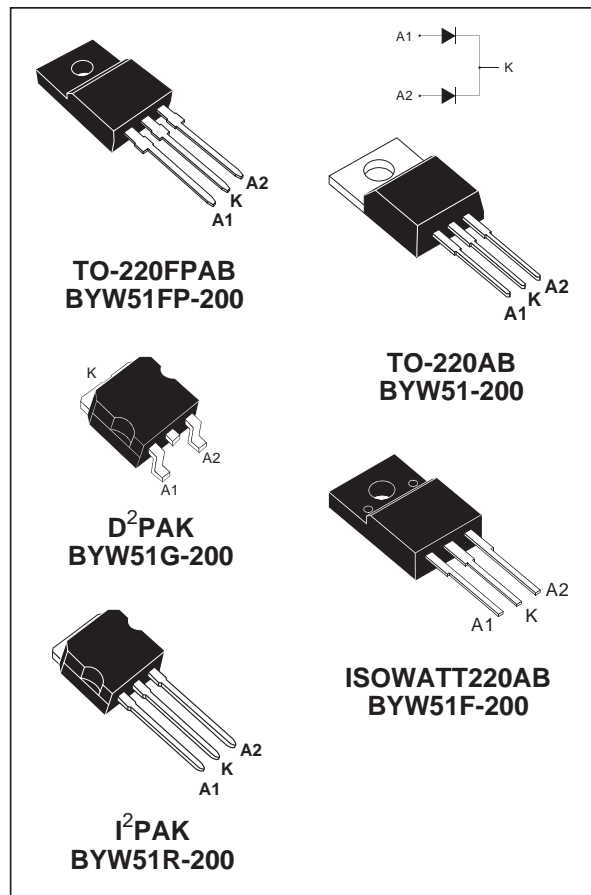
### FEATURES AND BENEFITS

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- INSULATED PACKAGES (ISOWATT220AB / TO-220FP):  
Insulation voltage = 2000 V DC  
Capacitance = 12 pF

### DESCRIPTION

Dual center tap rectifier suited for Switched Mode Power Supplies and high frequency DC to DC converters.

Packaged in TO-220AB, ISOWATT220AB, TO-220FP, D<sup>2</sup>PAK or I<sup>2</sup>PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



### ABSOLUTE RATINGS (limiting values, per diode)

Symbol	Parameter			Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage			200	V	
$I_{F(RMS)}$	RMS forward current			20	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D <sup>2</sup> PAK I <sup>2</sup> PAK	$T_c=120^\circ\text{C}$	Per diode	10	A
				Per device	20	
		ISOWATT220AB	$T_c=95^\circ\text{C}$	Per diode	10	
				Per device	20	
		TO-220FPAB	$T_c=85^\circ\text{C}$	Per diode	10	
				Per device	20	
$I_{FSM}$	Surge non repetitive forward current		$t_p=10\text{ms}$ sinusoidal	100	A	
$T_{stg}$	Storage temperature range			- 65 to + 150	°C	
$T_j$	Maximum operating junction temperature			150	°C	

## BYW51/F/G/FP/R-200

### THERMAL RESISTANCES

Symbol	Parameter			Value	Unit
R <sub>th(j-c)</sub>	Junction to case	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	Per diode	2.5	°C/W
			Total	1.4	
		ISOWATT220AB	Per diode	5.1	
			Total	4.05	
		TO-220FPAB	Per diode	5.7	
			Total	4.6	
R <sub>th(c)</sub>	Coupling	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK		0.25	°C/W
		ISOWATT220AB		3.0	
		TO-220FPAB		3.5	

When diodes 1 and 2 are used simultaneously :

$$\Delta T_c (\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)} (\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

### STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> *	Reverse leakage current	T <sub>j</sub> = 25°C	V <sub>R</sub> = V <sub>RRM</sub>			15	μA
		T <sub>j</sub> = 100°C				1	mA
V <sub>F</sub> **	Forward voltage drop	T <sub>j</sub> = 125°C	I <sub>F</sub> = 8 A			0.85	V
		T <sub>j</sub> = 125°C	I <sub>F</sub> = 16 A			1.05	
		T <sub>j</sub> = 25°C	I <sub>F</sub> = 16 A			1.15	

Pulse test : \* t<sub>p</sub> = 5 ms, δ < 2 %

\*\* t<sub>p</sub> = 380 μs, δ < 2 %

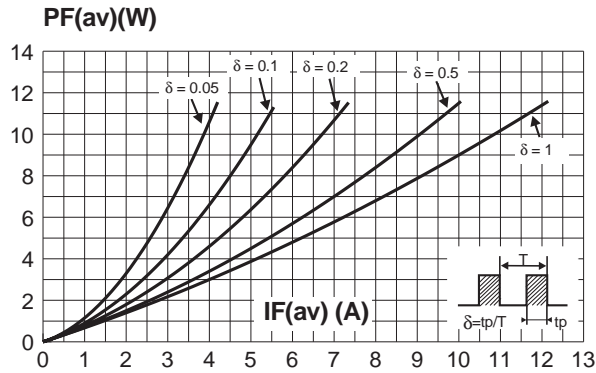
To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.025 \times I_{F(RMS)}^2$$

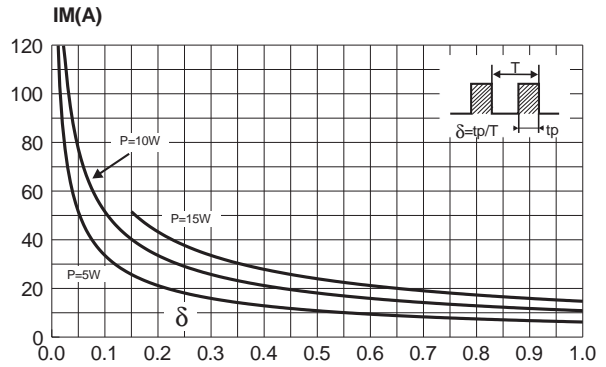
### RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Typ.	Max.	Unit
trr	T <sub>j</sub> = 25°C	I <sub>F</sub> = 0.5A I <sub>R</sub> = 1A	I <sub>rr</sub> = 0.25A		25	ns
		I <sub>F</sub> = 1A V <sub>R</sub> = 30V	dI <sub>F</sub> /dt = -50A/μs		35	
tfr	T <sub>j</sub> = 25°C	I <sub>F</sub> = 1A V <sub>FR</sub> = 1.1 x V <sub>F</sub> max	dI <sub>F</sub> /dt = -50A/μs	15		ns
V <sub>FP</sub>	T <sub>j</sub> = 25°C	I <sub>F</sub> = 1A	dI <sub>F</sub> /dt = -50A/μs	2		V

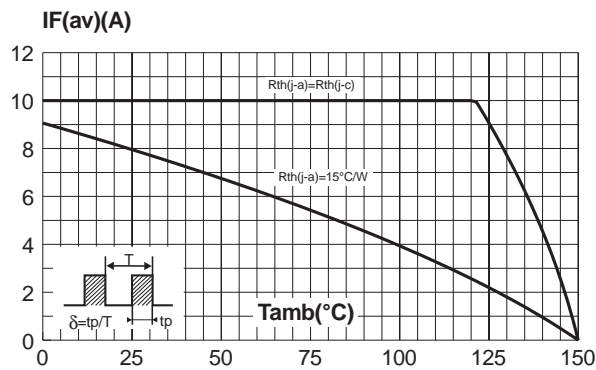
**Fig. 1:** Average forward power dissipation versus average forward current (per diode).



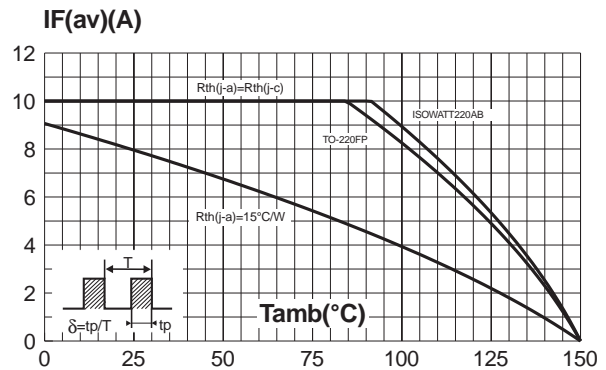
**Fig. 2:** Peak current versus form factor (per diode).



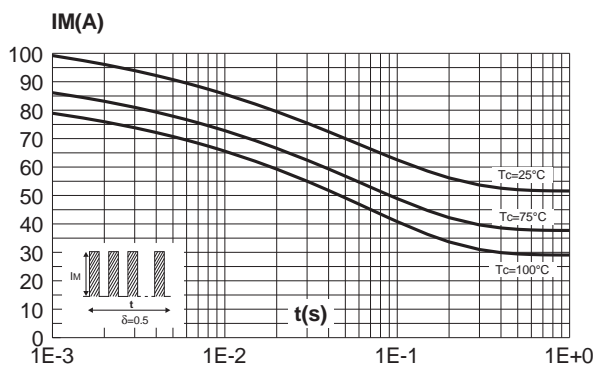
**Fig. 3-1:** Average forward current versus ambient temperature ( $\delta = 0.5$ , D<sup>2</sup>PAK, TO-220AB).



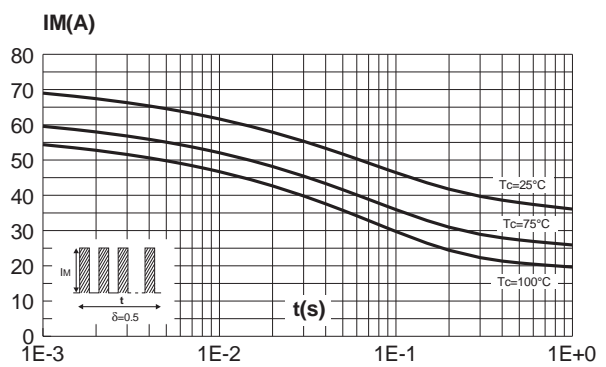
**Fig. 3-2:** Average forward current versus ambient temperature ( $\delta = 0.5$ , ISOWATT220AB, TO-220FPAB).



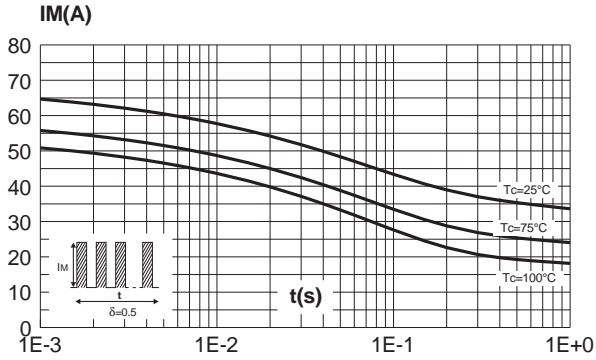
**Fig. 4-1:** Non repetitive surge peak forward current versus overload duration (D<sup>2</sup>PAK, TO-220AB).



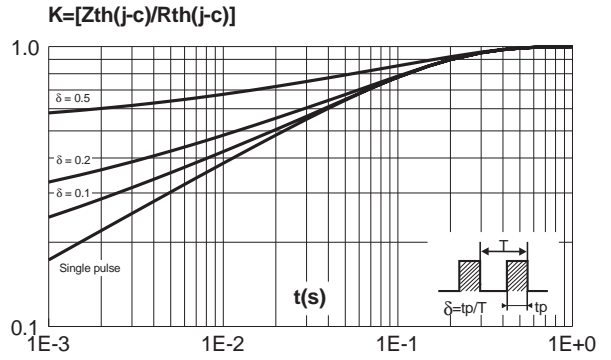
**Fig. 4-2:** Non repetitive surge peak forward current versus overload duration (ISOWATT220AB).



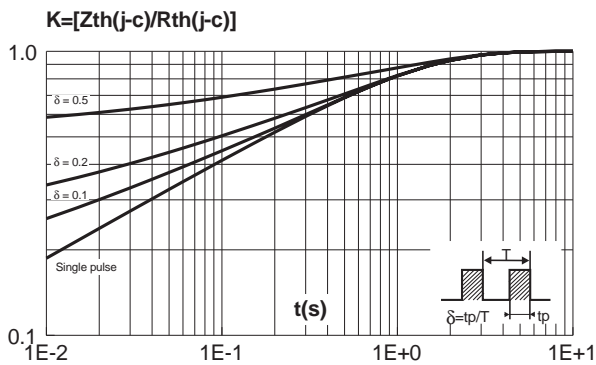
**Fig. 4-3:** Non repetitive surge peak forward current versus overload duration (TO-220FPAB).



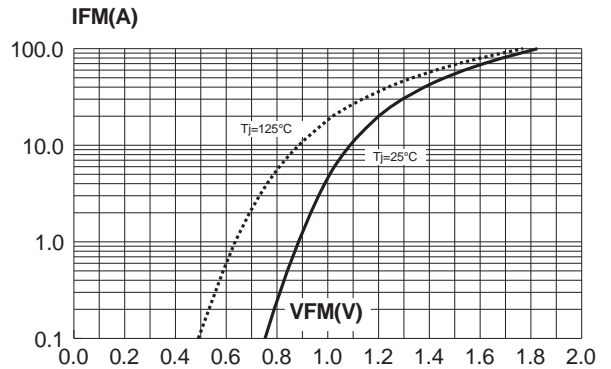
**Fig. 5-1:** Relative variation of thermal impedance junction to case versus pulse duration (D<sup>2</sup>PAK, TO-220AB).



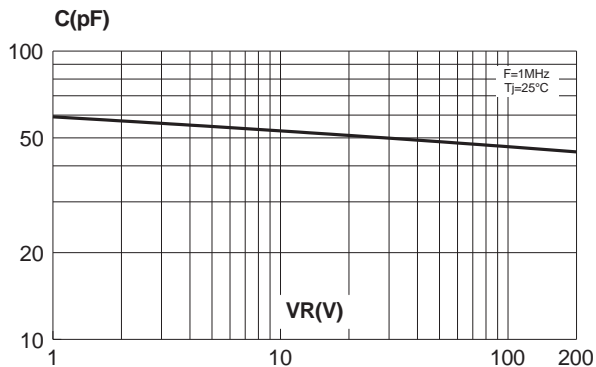
**Fig. 5-2:** Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FPAB).



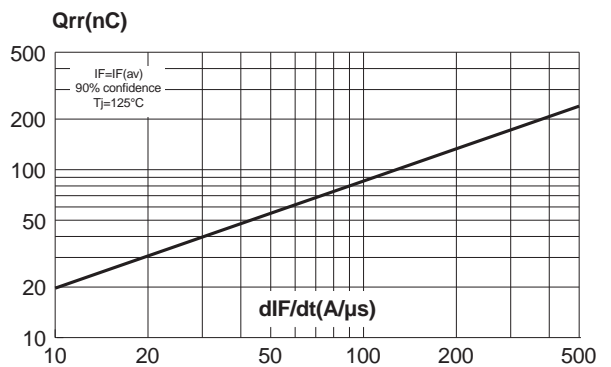
**Fig. 6:** Forward voltage drop versus forward current (maximum values, per diode).



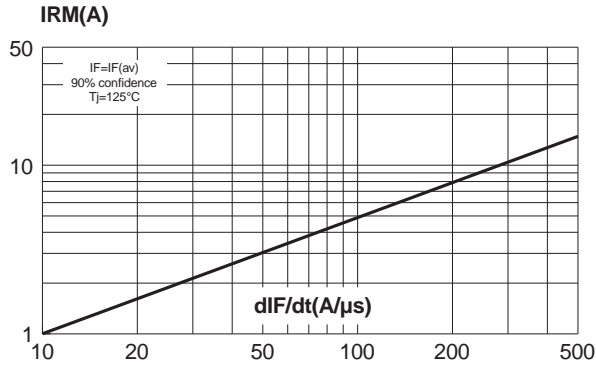
**Fig. 7:** Junction capacitance versus reverse voltage applied (typical values, per diode).



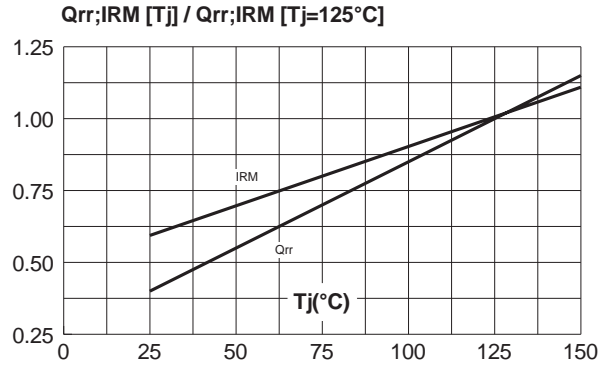
**Fig. 8:** Reverse recovery charges versus dIF/dt (per diode).



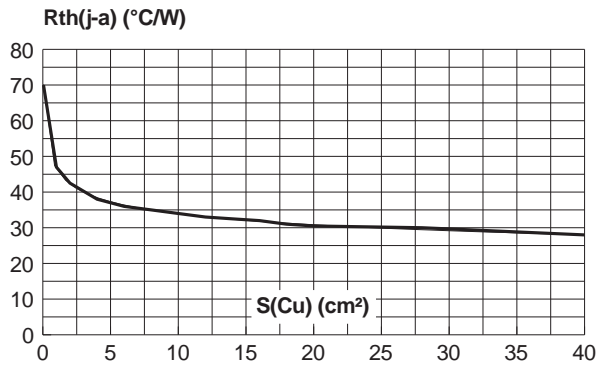
**Fig. 9:** Peak reverse recovery current versus  $di_F/dt$  (per diode).



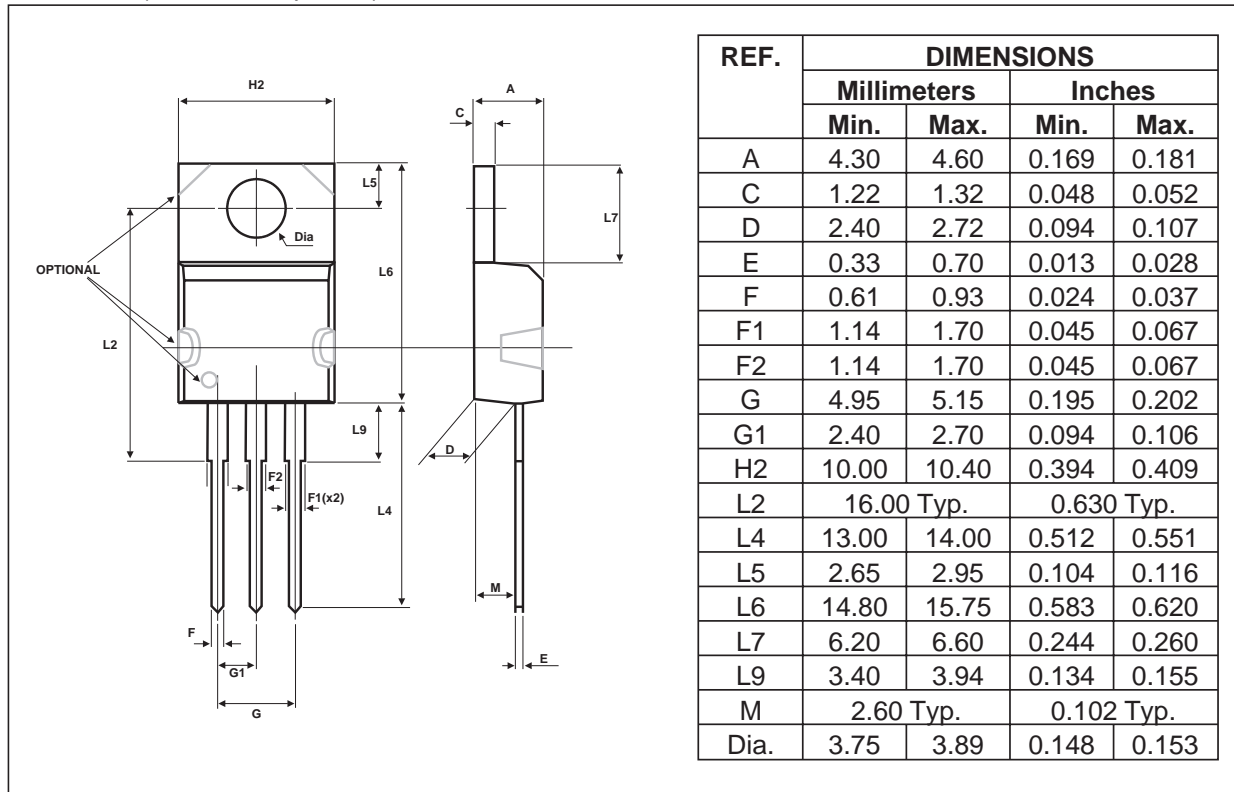
**Fig. 10:** Dynamic parameters versus junction temperature.



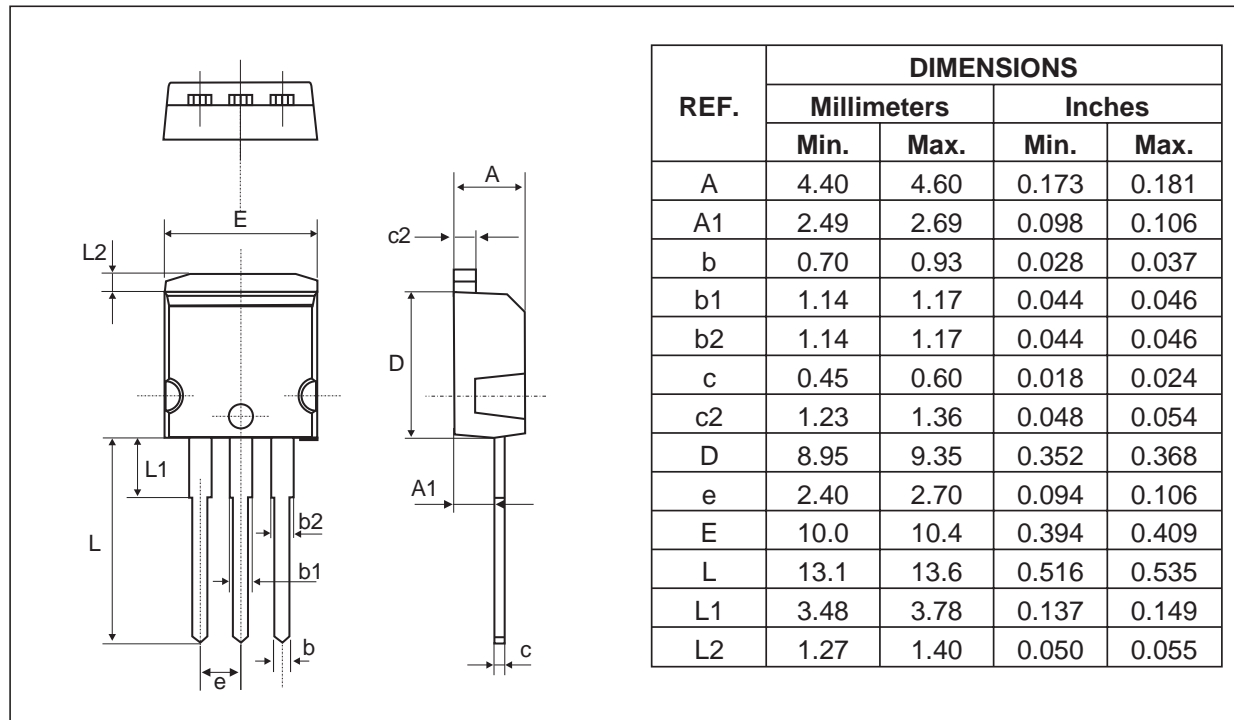
**Fig. 11:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness:  $35\mu m$ ) ( $D^2PAK$ ).



**PACKAGE MECHANICAL DATA**  
TO-220AB (JEDEC compatible)

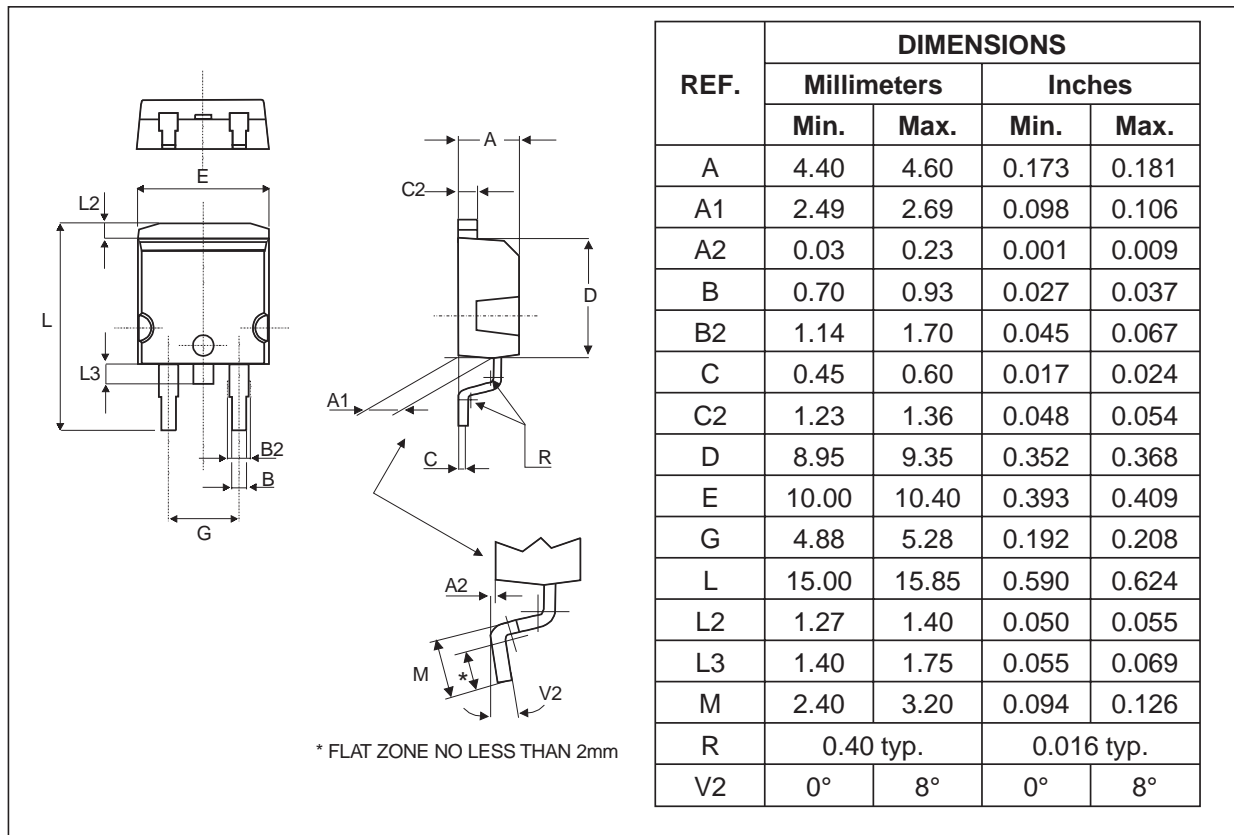


**PACKAGE MECHANICAL DATA**  
I<sup>2</sup>PAK

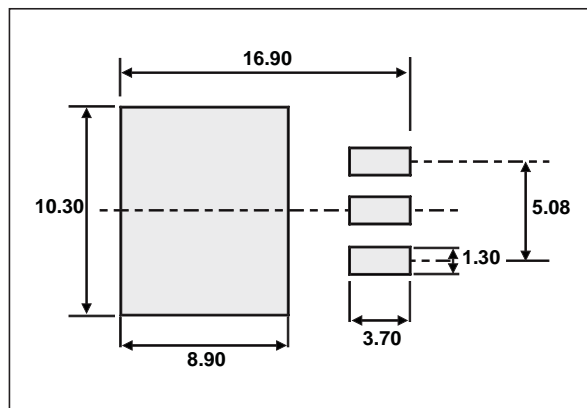


**BYW51/F/G/FP/R-200**

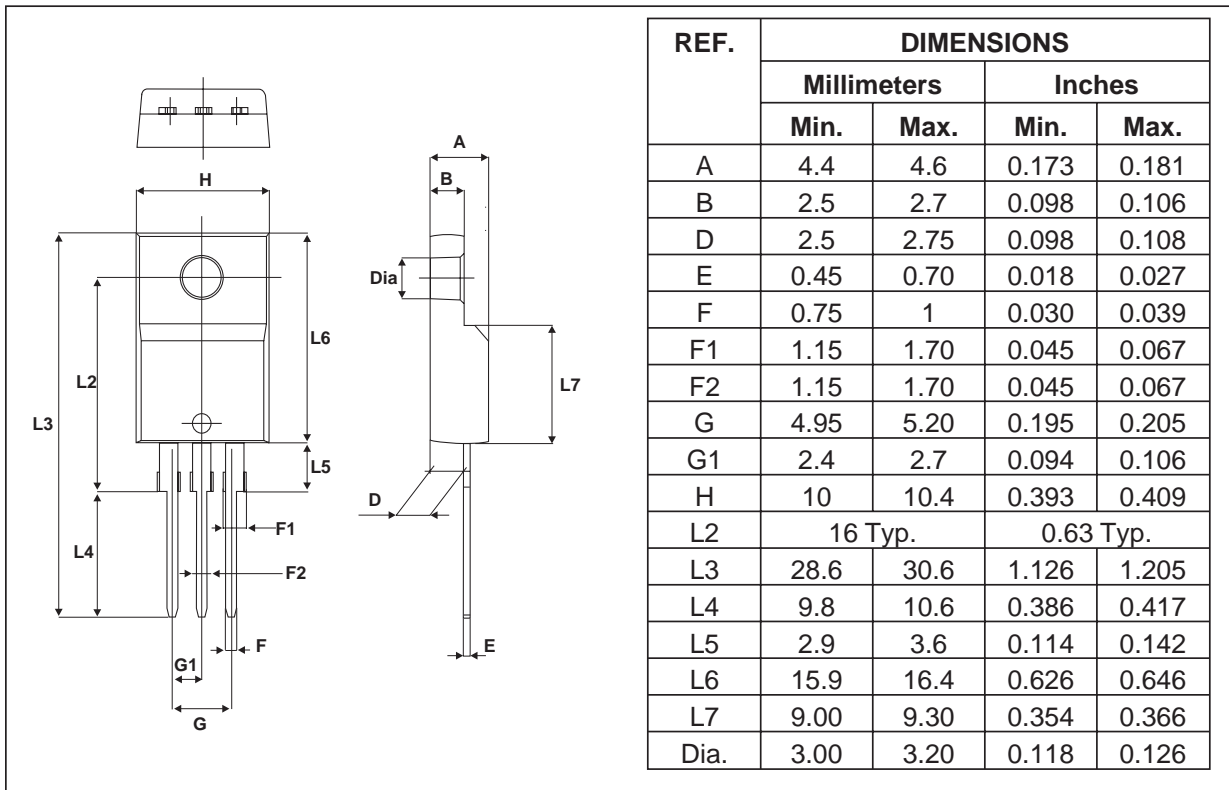
**PACKAGE MECHANICAL DATA**  
D<sup>2</sup>PAK



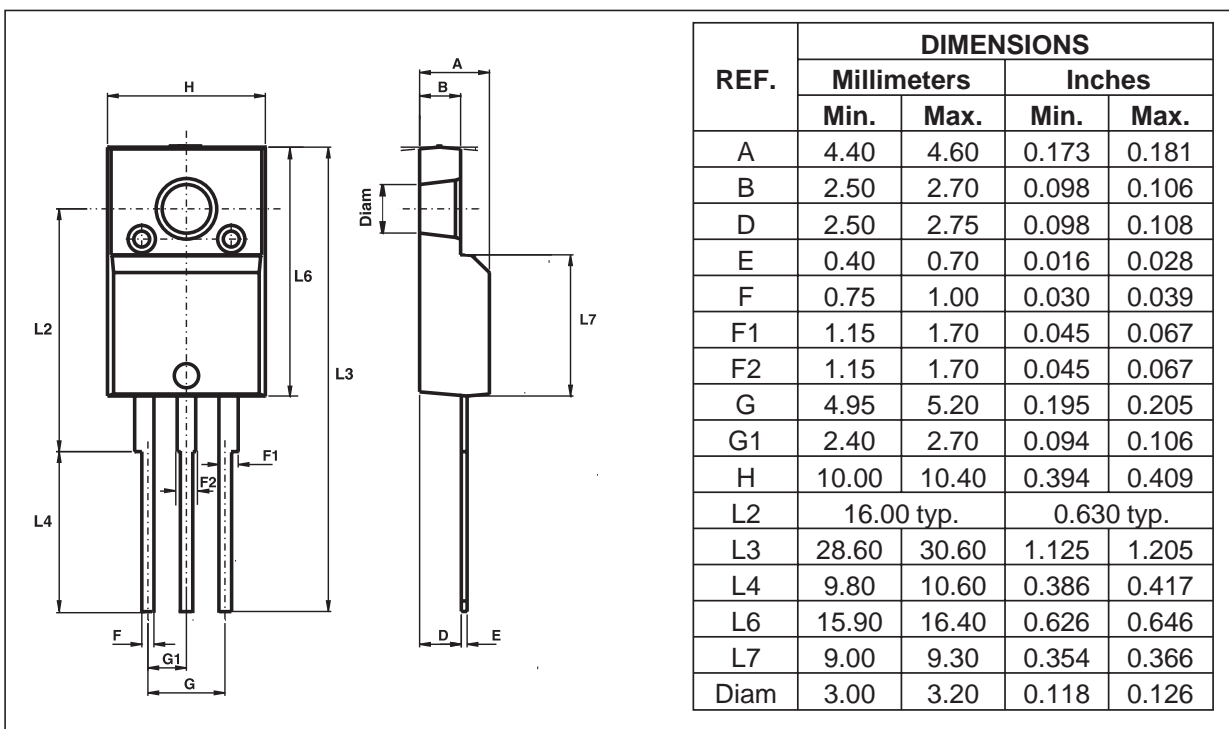
**FOOT PRINT (in millimeters)**  
D<sup>2</sup>PAK



**PACKAGE MECHANICAL DATA**  
TO-220FPAB



**PACKAGE MECHANICAL DATA**  
ISOWATT220AB (JEDEC compatible)





<b>Ordering code</b>	<b>Marking</b>	<b>Package</b>	<b>Weight</b>	<b>Base qty</b>	<b>Delivery mode</b>
BYW51-200	BYW51-200	TO220AB	2.2 g.	50	Tube
BYW51F-200	BYW51F-200	ISOWATT220AB	2.08 g.	50	Tube
BYW51G-200	BYW51G-200	D <sup>2</sup> PAK	1.48 g.	50	Tube
BYW51FP-200	BYW51FP-200	TO-220FPAB	2g	50	Tube
BYW51R-200	BYW51R-200	I <sup>2</sup> PAK	1.49 g	50	Tube

- Recommended torque value (TO-220AB): 0.8 N.m.
- Maximum torque value (TO-220AB): 1.0 N.m.
- Recommended torque value (ISOWATT220AB / TO-220FPAB): 0.55 N.m.
- Maximum torque value (ISOWATT220AB / TO-220FPAB): 0.70 N.m.
- Epoxy meets UL94,V0

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