

## HIGH FREQUENCY SECONDARY RECTIFIER

### MAJOR PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	300 V
$T_j$ (max)	175 °C
$V_F$ (max)	1 V
$t_{rr}$ (max)	35 ns

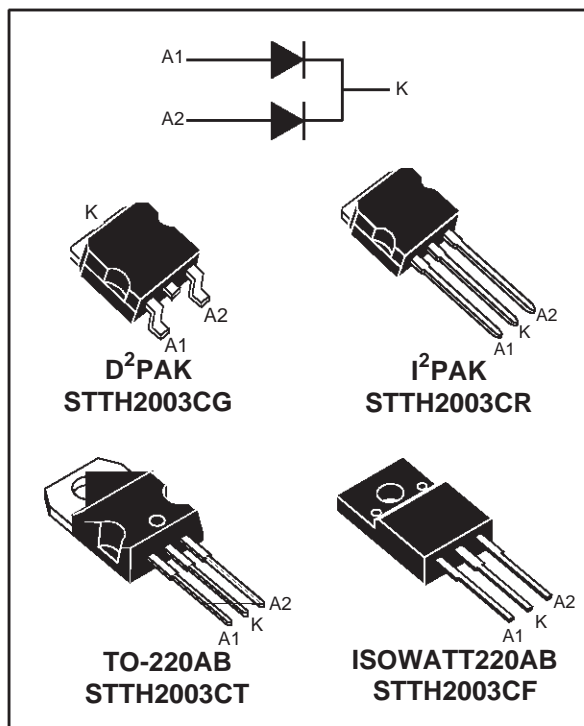
### FEATURES AND BENEFITS

- COMBINES HIGHEST RECOVERY AND REVERSE VOLTAGE PERFORMANCE
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY

### DESCRIPTION

Dual center tap Fast Recovery Epitaxial Diodes suited for Switch Mode Power Supply and high frequency DC/DC converters.

Packaged in TO-220AB, ISOWATT220AB, I<sup>2</sup>PAK or D<sup>2</sup>PAK, this device is especially intended for secondary rectification.



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

Symbol	Parameter			Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage			300	V	
$I_{F(RMS)}$	RMS forward current			30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	$T_c = 140^\circ\text{C}$	Per diode Per device	10 20	A
		ISOWATT220AB	$T_c = 125^\circ\text{C}$			
$I_{FSM}$	Surge non repetitive forward current		$t_p = 10 \text{ ms}$ sinusoidal	110	A	
$I_{RSM}$	Non repetitive avalanche current		$t_p = 20 \mu\text{s}$ square	5	A	
$T_{stg}$	Storage temperature range			-65 + 175	°C	
$T_j$	Maximum operating junction temperature			175	°C	

**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	1.3	
		ISOWATT220AB	Per diode	3.9	
			Total	3.2	
R <sub>th(c)</sub>		TO-220AB / D <sup>2</sup> PAK / I <sup>2</sup> PAK	Coupling	0.1	
		ISOWATT220AB	Coupling	2.5	

**STATIC ELECTRICAL CHARACTERISTICS (per diode)**

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>*</sup>	Reverse leakage current	V <sub>R</sub> = 300 V	T <sub>j</sub> = 25°C			20	μA
			T <sub>j</sub> = 125°C		30	300	
V <sub>F</sub> <sup>**</sup>	Forward voltage drop	I <sub>F</sub> = 10 A	T <sub>j</sub> = 25°C			1.25	V
			T <sub>j</sub> = 125°C		0.85	1	

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

\*\* t<sub>p</sub> = 380 μs, δ < 2%

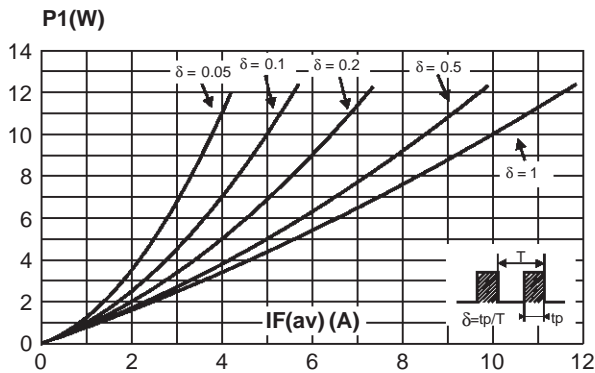
To evaluate the maximum conduction losses use the following equation :

$$P = 0.75 \times I_{F(AV)} + 0.025 I_{F(RMS)}^2$$

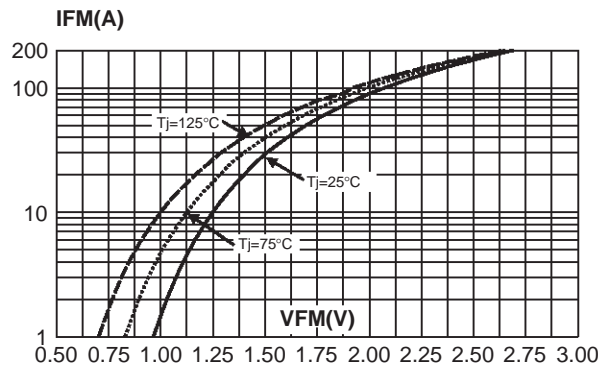
**RECOVERY CHARACTERISTICS**

Symbol	Tests conditions		Min.	Typ.	Max.	Unit
t <sub>rr</sub>	I <sub>F</sub> = 0.5 A    I <sub>rr</sub> = 0.25 A    I <sub>R</sub> = 1 A	T <sub>j</sub> = 25°C			25	ns
	I <sub>F</sub> = 1 A    dI <sub>F</sub> /dt = - 50 A/μs    V <sub>R</sub> = 30 V				35	
t <sub>fr</sub>	I <sub>F</sub> = 10 A    dI <sub>F</sub> /dt = 100 A/μs	T <sub>j</sub> = 25°C			230	ns
V <sub>FP</sub>	V <sub>FR</sub> = 1.1 x V <sub>F</sub> max.				3.5	
S <sub>factor</sub>	V <sub>CC</sub> = 200V    I <sub>F</sub> = 10 A	T <sub>j</sub> = 125°C		0.3		-
I <sub>RM</sub>	dI <sub>F</sub> /dt = 200 A/μs				8	

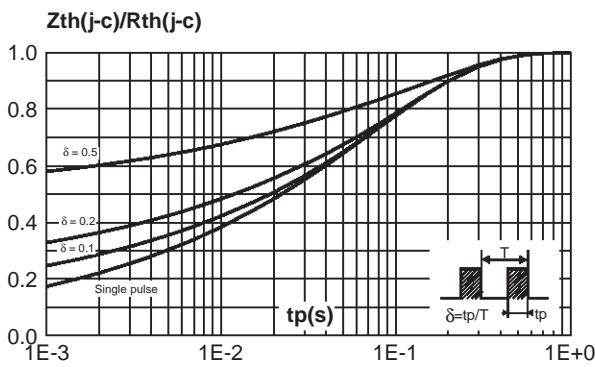
**Fig. 1:** Conduction losses versus average current (per diode).



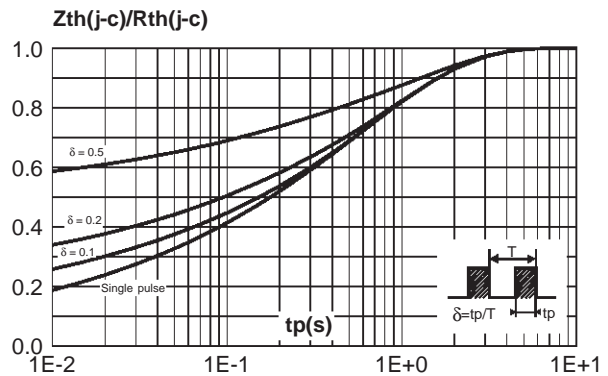
**Fig. 2:** Forward voltage drop versus forward current (maximum values, per diode).



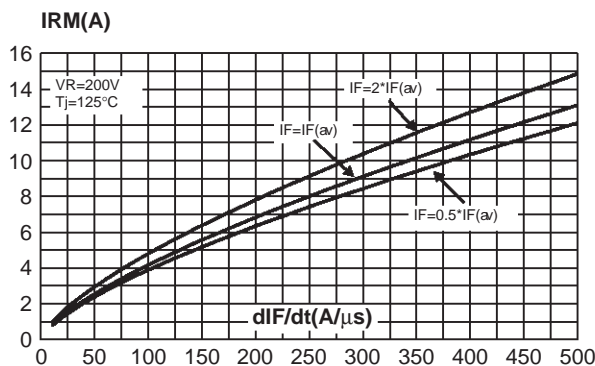
**Fig. 3-1:** Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB / D<sup>2</sup>PAK / I<sup>2</sup>PAK).



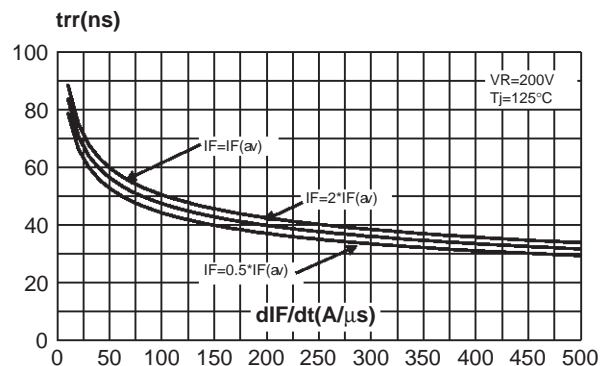
**Fig. 3-2:** Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB).



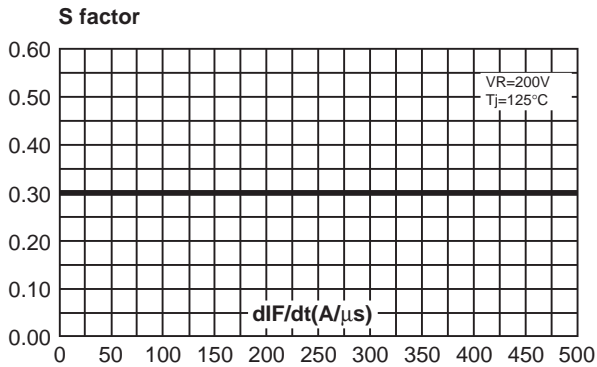
**Fig. 4:** Peak reverse recovery current versus  $dI_F/dt$  (90% confidence, per diode).



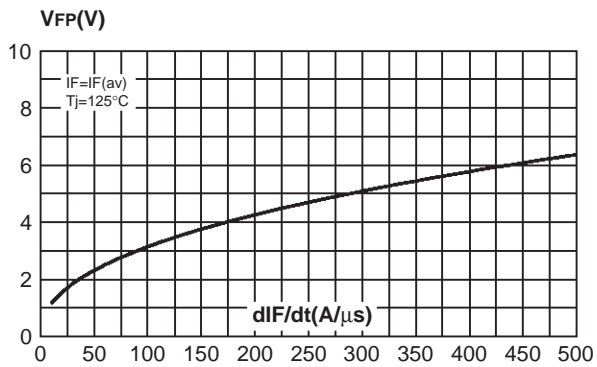
**Fig. 5:** Reverse recovery time versus  $dI_F/dt$  (90% confidence, per diode).



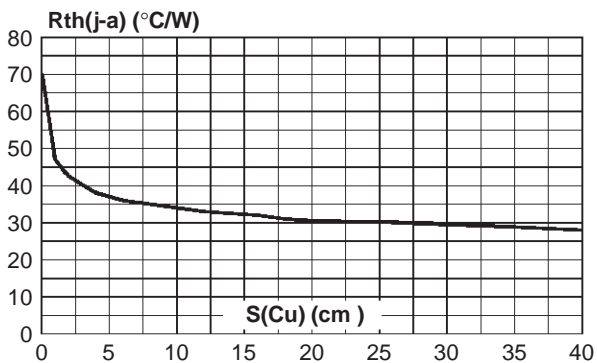
**Fig. 6:** Softness factor ( $t_b/t_a$ ) versus  $dI_F/dt$  (typical values, per diode).



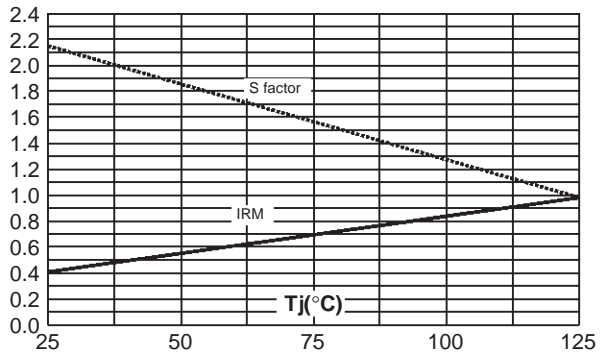
**Fig. 8:** Transient peak forward voltage versus  $dI_F/dt$  (90% confidence, per diode) (TO-220AB).



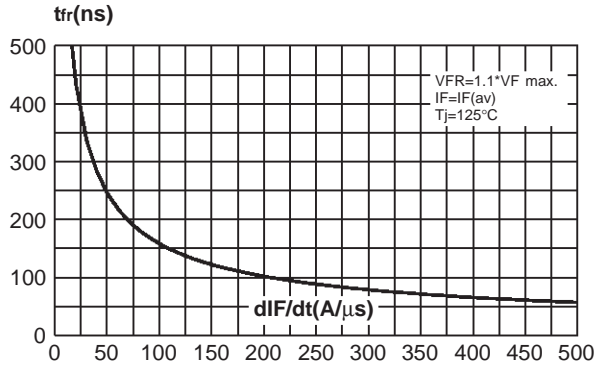
**Fig. 10:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness:  $35\mu m$ ) ( $D^2PAK$ ).



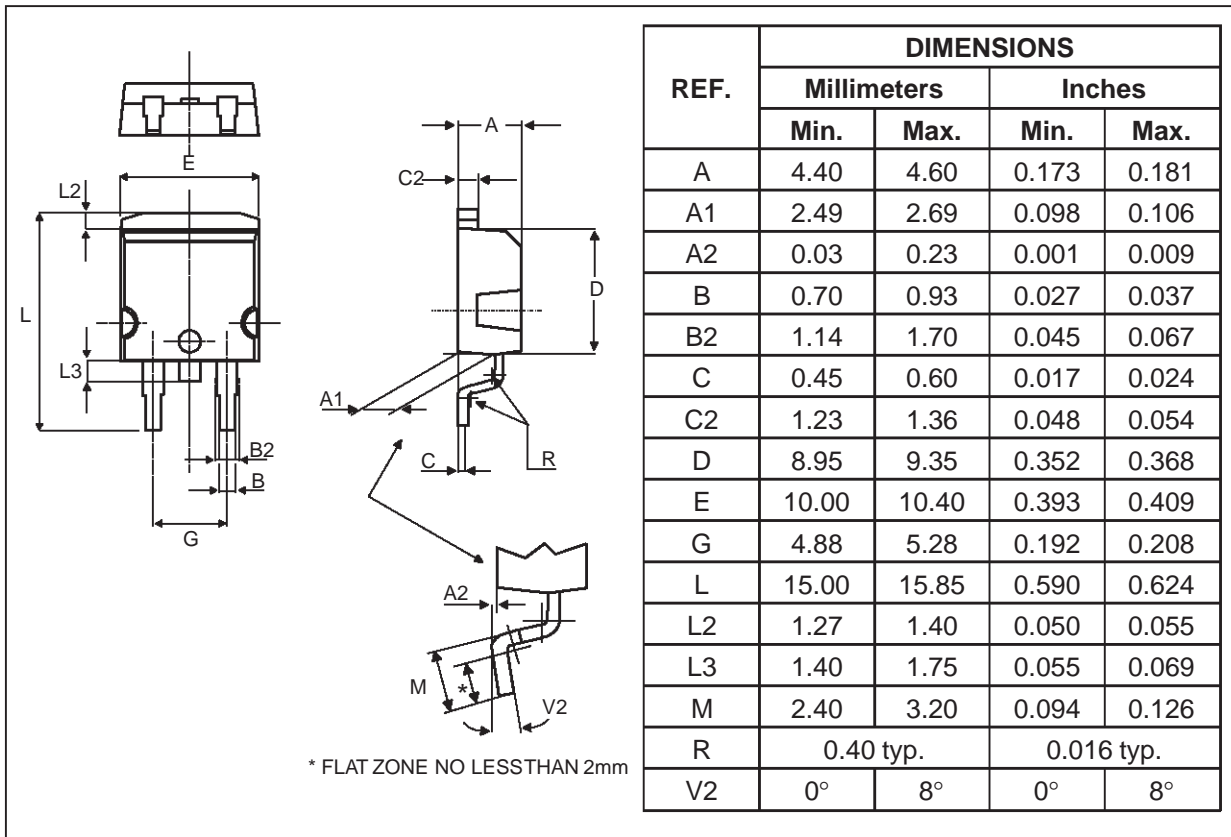
**Fig. 7:** Relative variation of dynamic parameters versus junction temperature (reference:  $T_j = 125^\circ C$ ).



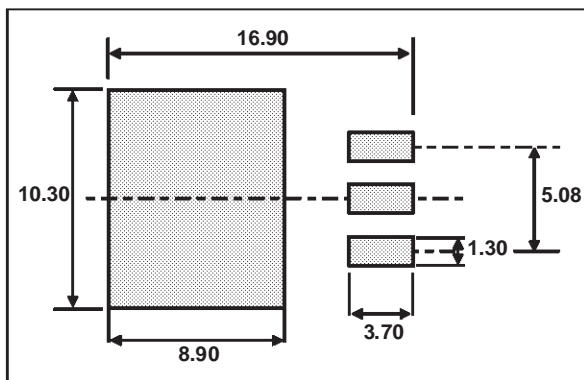
**Fig. 9:** Forward recovery time versus  $dI_F/dt$  (90% confidence, per diode).



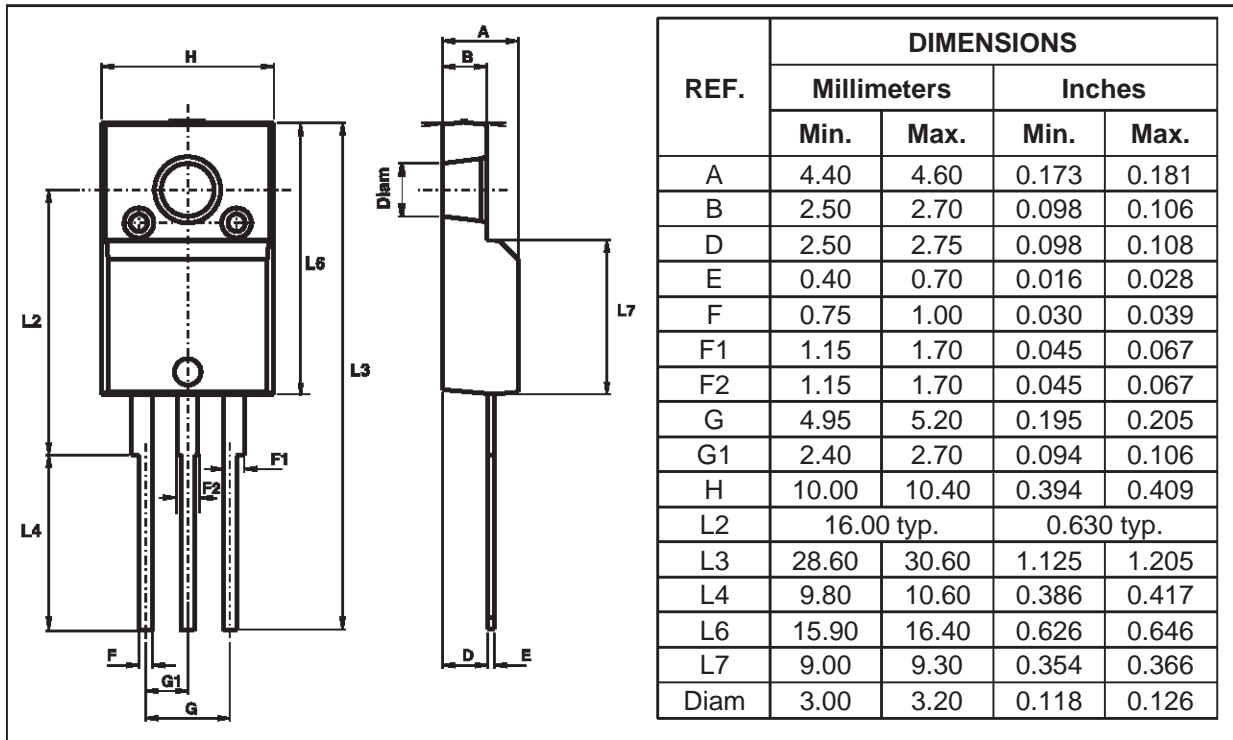
**PACKAGE MECHANICAL DATA**  
D<sup>2</sup>PAK



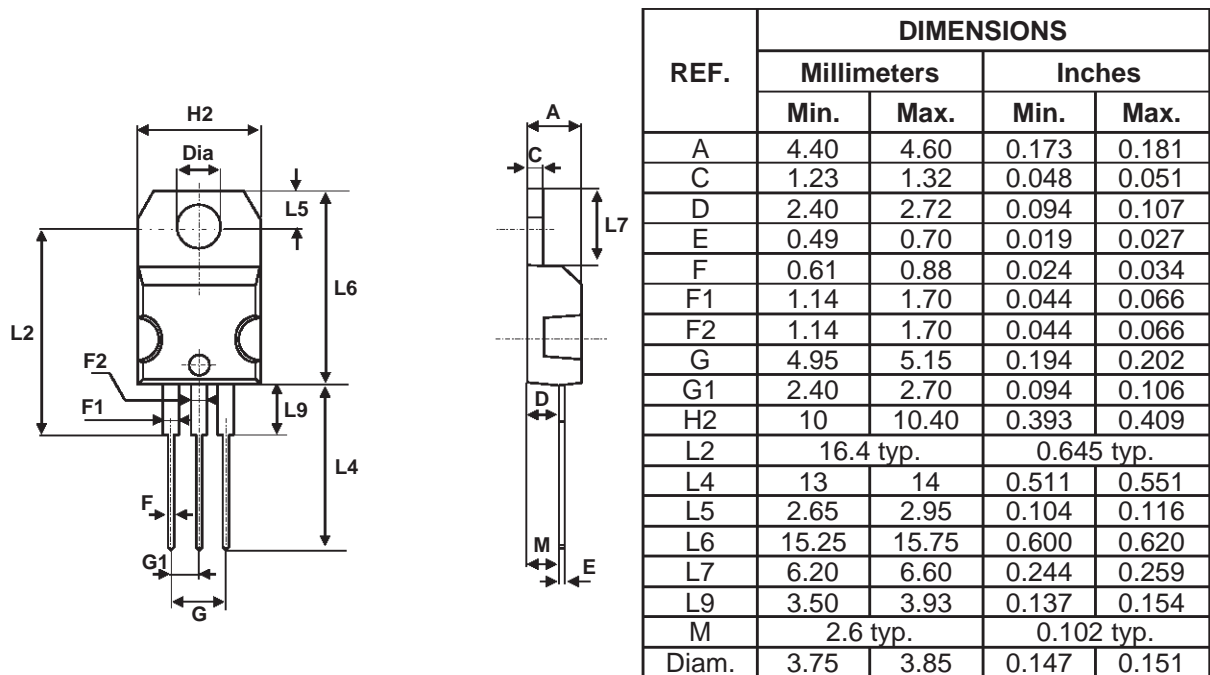
**FOOT PRINT DIMENSIONS (in millimeters)**  
D<sup>2</sup>PAK



**PACKAGE MECHANICAL DATA**  
ISOWATT220AB



**PACKAGE MECHANICAL DATA**  
TO-220AB



## PACKAGE MECHANICAL DATA

I<sup>2</sup>PAK

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
b	0.70	0.93	0.028	0.037
b1	1.14	1.17	0.044	0.046
b2	1.14	1.17	0.044	0.046
c	0.45	0.60	0.018	0.024
c2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
E	10.0	10.4	0.394	0.409
L	13.1	13.6	0.516	0.535
L1	3.48	3.78	0.137	0.149

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
STTH2003CT	STTH2003CT	TO-220AB	2.2 g	50	Tube
STTH2003CG	STTH2003CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH2003CG-TR	STTH2003CG	D2PAK	1.48 g	500	Tape & reel
STTH2003CF	STTH2003CF	ISOWATT220AB	2.08 g	50	Tube
STTH2003CR	STTH2003CR	I <sup>2</sup> PAK	1.49 g	50	Tube

- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N.m.
- Maximum torque value: 0.70 N.m.
- Epoxy meets UL 94,V0

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