



# STPS2045CT/CF/CG/CFP/CR

## POWER SCHOTTKY RECTIFIER

### MAIN PRODUCT CHARACTERISTICS

$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	45 V
$T_j(\max)$	175 °C
$V_F(\max)$	0.57 V

### FEATURES AND BENEFITS

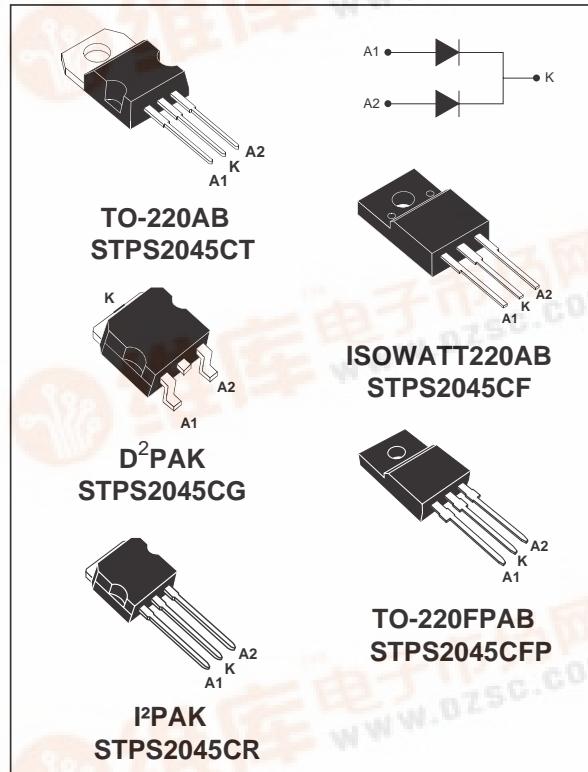
- VERY SMALL CONDUCTION LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- EXTREMELY FAST SWITCHING
- INSULATED PACKAGE: ISOWATT220AB, TO-220FPAB  
Insulating voltage = 2000V DC  
Capacitance = 12pF
- AVALANCHE CAPABILITY SPECIFIED

### DESCRIPTION

Dual center tap Schottky rectifier suited for SwitchMode Power Supply and high frequency DC to DC converters.

Packaged either in TO-220AB, D<sup>2</sup>PAK, ISOWATT220AB, TO-220FPAB or D<sup>2</sup>PAK, this device is especially 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				45	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	$T_c = 155^\circ\text{C}$	Per diode	10	A
		ISOWATT220AB TO-220FPAB	$T_c = 125^\circ\text{C}$	Per device	20	
$I_{FSM}$	Surge non repetitive forward current				180	A
$I_{RRM}$	Repetitive peak reverse current				1	A
$I_{RSM}$	Non repetitive peak reverse current				2	A
$P_{ARM}$	Repetitive peak avalanche power				4000	W
$T_{stg}$	Storage temperature range				-65 to +175	°C
$T_j$	Maximum operating junction temperature *				175	°C
$dV/dt$	Critical rate of rise of reverse voltage				10000	V/μs

\* :  $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th}(j - a)}$  thermal runaway condition for a diode on its own heatsink

## STPS2045CT/CF/CG/CFP/CR

### THERMAL RESISTANCES

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / D <sup>2</sup> PAK I <sup>2</sup> PAK	Per diode Total	2.2 1.3	°C/W
		ISOWATT220AB TO-220FPAB	Per diode Total	4.5 3.5	
$R_{th(c)}$		TO-220AB / D <sup>2</sup> PAK I <sup>2</sup> PAK	Coupling	0.3	
		ISOWATT220AB TO-220FPAB		2.5	

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j \text{ (diode 1)} = P \text{ (diode1)} \times R_{th(j-c)} \text{ (per diode)} + P \text{ (diode 2)} \times R_{th(c)}$$

### STATIC ELECTRICAL CHARACTERISTICS (Per diode)

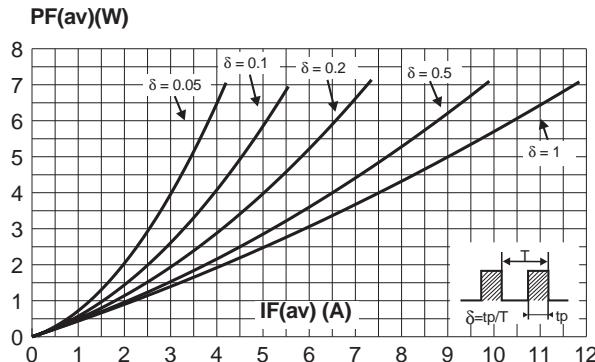
Symbol	Parameter	Tests Conditions		Min.	Typ.	Max.	Unit
$I_R$ *	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			100	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$			7	15	$\text{mA}$
$V_F$ *	Forward voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 10 \text{ A}$		0.5	0.57	V
		$T_j = 25^\circ\text{C}$	$I_F = 20 \text{ A}$			0.84	
		$T_j = 125^\circ\text{C}$	$I_F = 20 \text{ A}$		0.65	0.72	

Pulse test : \*  $t_p = 380 \mu\text{s}$ ,  $\delta < 2\%$

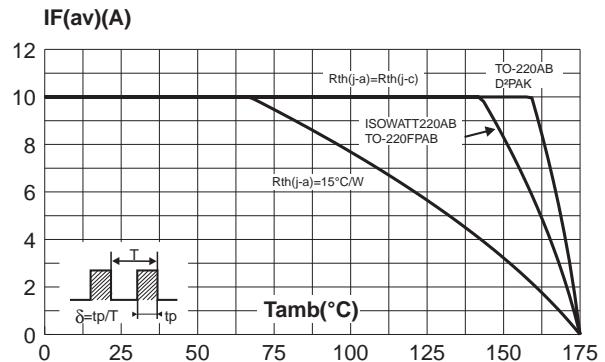
To evaluate the conduction losses use the following equation :

$$P = 0.42 \times I_{F(AV)} + 0.015 I_F^2 \text{ (RMS)}$$

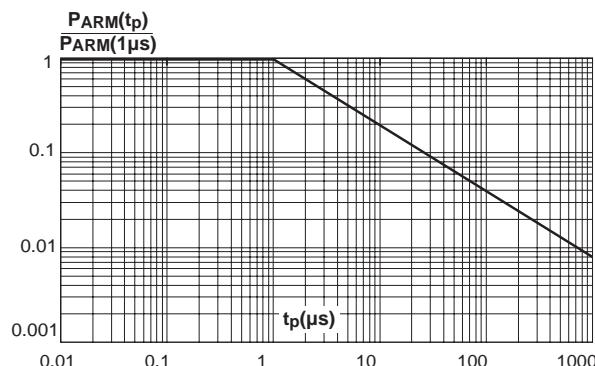
**Fig. 1:** Average forward power dissipation versus average forward current (per diode).



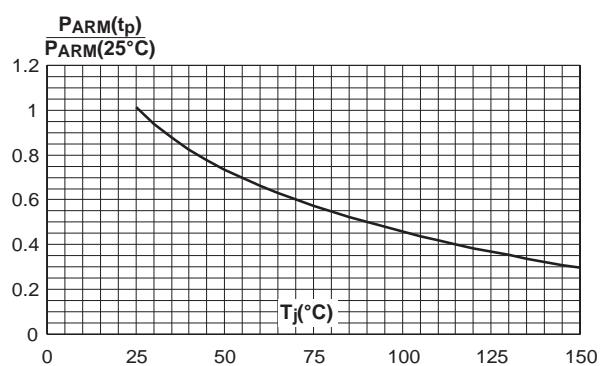
**Fig. 2:** Average current versus ambient temperature ( $\delta=0.5$ , per diode).



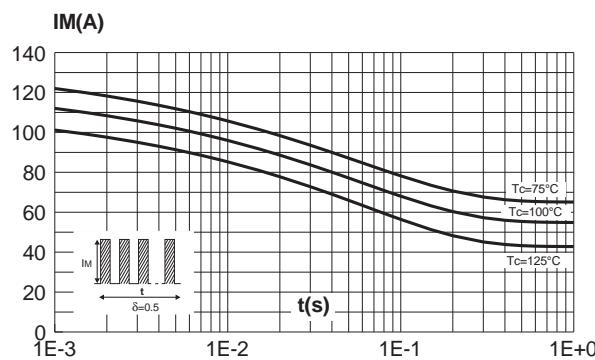
**Fig. 3:** Normalized avalanche power derating versus pulse duration.



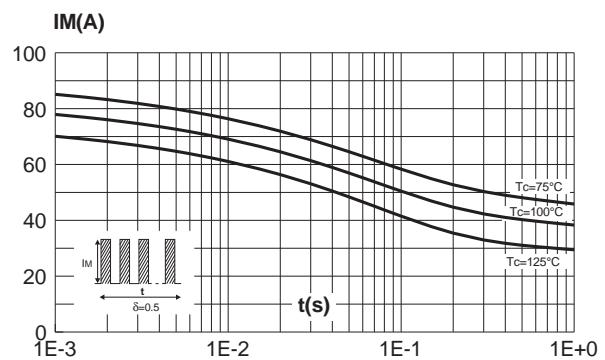
**Fig. 4:** Normalized avalanche power derating versus junction temperature.



**Fig. 5-1:** Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (TO-220AB, D<sup>2</sup>PAK and I<sup>2</sup>PAK).

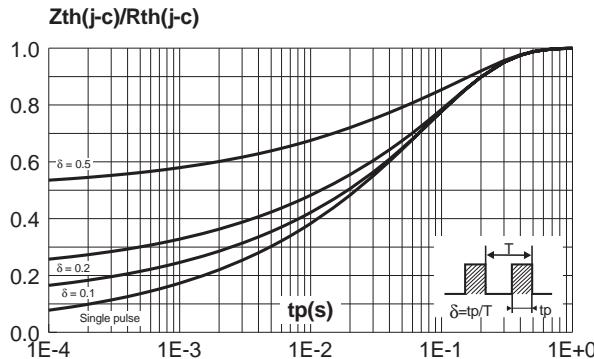


**Fig. 5-2:** Non repetitive surge peak forward current versus overload duration (maximum values, per diode) (ISOWATT220AB, TO-220FPAB).

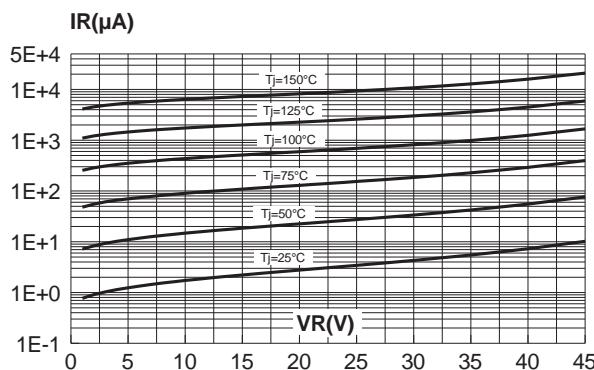


## STPS2045CT/CF/CG/CFP/CR

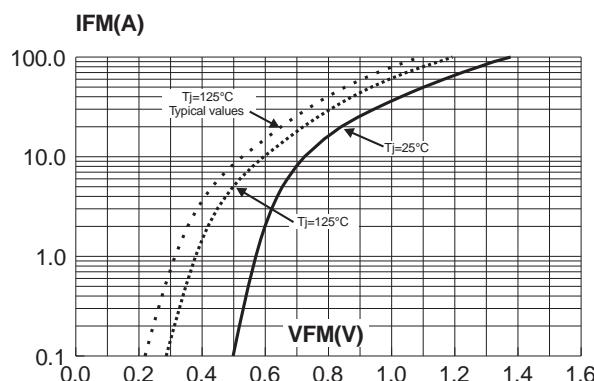
**Fig. 6-1:** Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220AB, D<sup>2</sup>PAK and I<sup>2</sup>PAK).



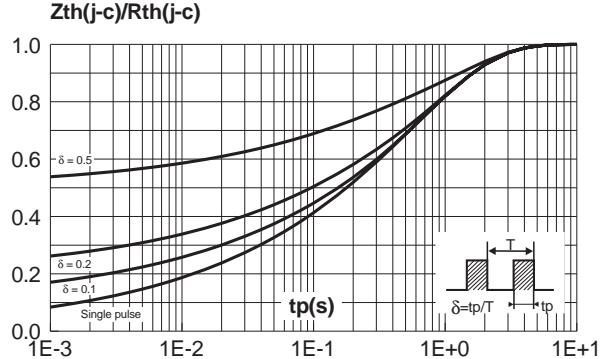
**Fig. 7:** Reverse leakage current versus reverse voltage applied (typical values, per diode).



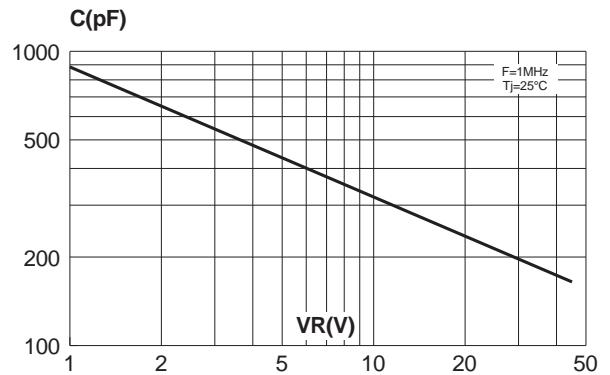
**Fig. 9:** Forward voltage drop versus forward current (maximum values, per diode).



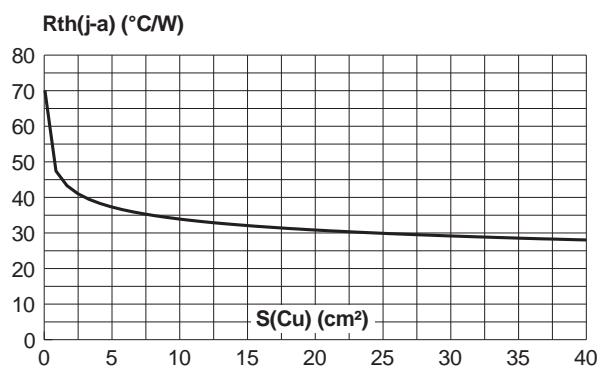
**Fig. 6-2:** Relative variation of thermal transient impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FPAB).



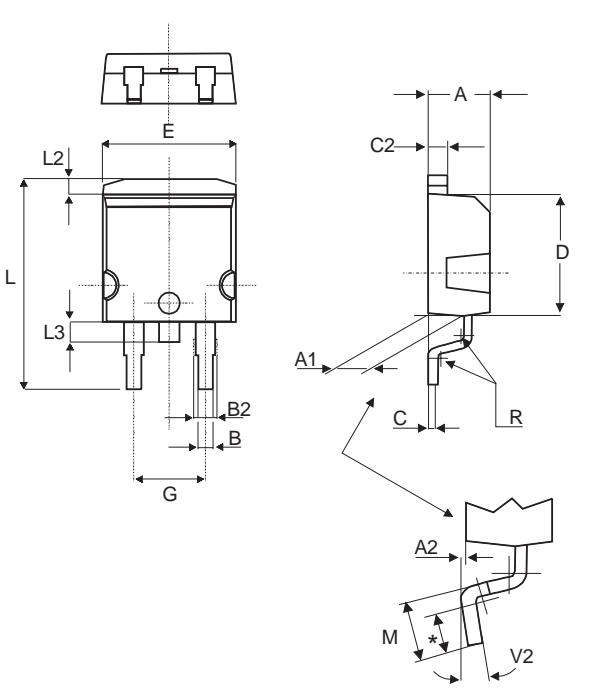
**Fig. 8:** Junction capacitance versus reverse voltage applied (typical values, per diode).



**Fig. 10:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board, copper thickness: 35μm).

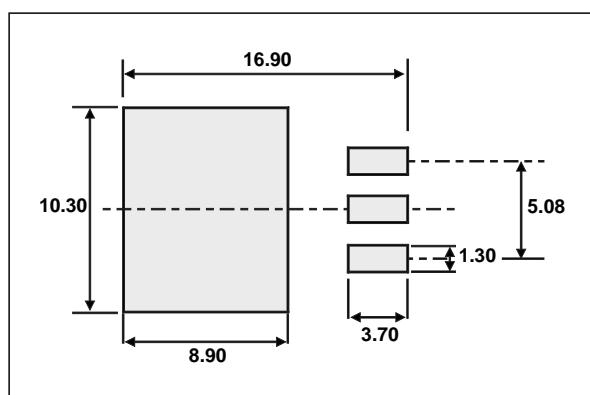


**PACKAGE MECHANICAL DATA**  
D<sup>2</sup>PAK



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
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

**FOOTPRINT DIMENSIONS** (in millimeters)



## STPS2045CT/CF/CG/CFP/CR

### PACKAGE MECHANICAL DATA TO-220AB

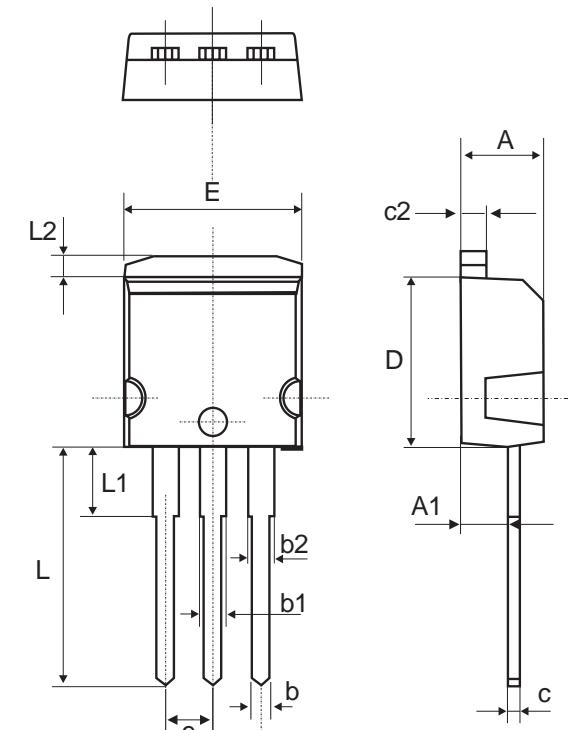
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620

### PACKAGE MECHANICAL DATA TO-220FPAB

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

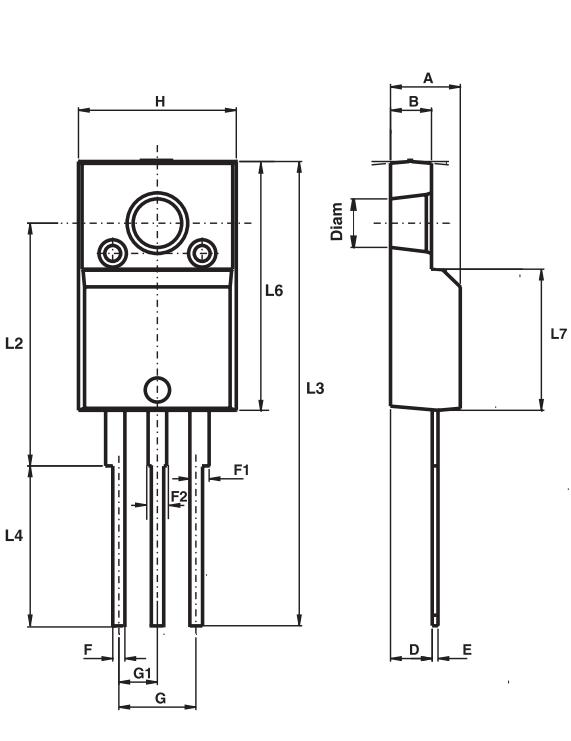
## STPS2045CT/CF/CG/CFP/CR

### 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
L2	1.27	1.40	0.050	0.055

### PACKAGE MECHANICAL DATA ISOWATT220AB



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.40	0.70	0.016	0.028
F	0.75	1.00	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.40	2.70	0.094	0.106
H	10.00	10.40	0.394	0.409
L2	16.00 typ.		0.630 typ.	
L3	28.60	30.60	1.125	1.205
L4	9.80	10.60	0.386	0.417
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Diam	3.00	3.20	0.118	0.126

## STPS2045CT/CF/CG/CFP/CR

Type	Marking	Package	Weight	Base qty	Delivery mode
STPS2045CT	STPS2045CT	TO-220AB	2.25 g.	50	Tube
STPS2045CF	STPS2045CF	ISOWATT220AB	2.08 g.	50	Tube
STPS2045CFP	STPS2045CFP	TO-220FPAB	2.0 g	50	Tube
STPS2045CG	STPS2045CG	D <sup>2</sup> PAK	1.48 g.	50	Tube
STPS2045CG-TR	STPS2045CG	D <sup>2</sup> PAK	1.48 g.	1000	Tape & reel
STPS2045CR	STPS2045CR	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: 0.7 N.m.
- Epoxy meets UL94,V0

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied.  
STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All rights reserved.

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany  
Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore  
Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>