

### Features

- Low forward voltage drop
- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low thermal resistance
- -40°C minimum operating  $T_j$
- Insulated package: TO-220FPAB
  - Insulating voltage: 2000 V DC
  - Capacitance: 45 pF
- ECOPACK<sup>®</sup>2 compliant component

### Description

This device is a dual center tap 200 V Schottky rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in TO-220AB, TO-220AB narrow-leads, TO-220FPAB and D<sup>2</sup>PAK, it is especially intended for use as secondary rectification in SMPS and is also ideal for all LED lighting applications.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 10 A
$V_{RRM}$	200 V
$T_{j(max)}$	175 °C
$V_{F(typ)}$	0.64 V

# 1 Characteristics

**Table 2. Absolute ratings (limiting values, per diode, unless otherwise stated)**

Symbol	Parameter			Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage			200	V	
I <sub>F(RMS)</sub>	Forward rms current			30	A	
I <sub>F(AV)</sub>	Average forward current, δ = 0.5, square wave	TO-220AB, D <sup>2</sup> PAK, TO 220AB narrow leads	T <sub>c</sub> = 160 °C	Per device	20	A
		TO-220FPAB	T <sub>c</sub> = 105 °C	Per device	20	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal, T <sub>amb</sub> = 25 °C			180	A
T <sub>stg</sub>	Storage temperature range			-65 to +175	°C	
T <sub>j</sub>	Operating junction temperature range <sup>(1)</sup>			-40 to +175	°C	

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

**Table 3. Thermal parameters**

Symbol	Parameter			Value	Unit
R <sub>th(j-c)</sub>	Junction to case	D <sup>2</sup> PAK, TO-220AB, TO-220AB narrow leads	Per diode	1.30	°C/W
			Per device	0.75	
		TO-220FPAB	Per diode	5.00	
	Per device	4.15			
R <sub>th(c)</sub>	Coupling	D <sup>2</sup> PAK, TO-220AB, TO-220AB narrow leads		0.20	
		TO-220FPAB		3.30	

General formula to calculate T<sub>J</sub>(diode1) and T<sub>J</sub>(diode2):

$$T_j(\text{diode1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode2}) \times R_{th(c)} + T_{case}$$

$$T_j(\text{diode2}) = P(\text{diode2}) \times R_{th(j-c)}(\text{per diode}) + P(\text{diode1}) \times R_{th(c)} + T_{case}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$			15	$\mu\text{A}$
		$T_j = 125\text{ °C}$			7	$\text{mA}$
		$T_j = 125\text{ °C}$	$V_R = 150\text{ V}$		4.5	
$V_F^{(1)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$		0.86	V
		$T_j = 125\text{ °C}$		0.64	0.70	V

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

To evaluate the maximum conduction losses use the following equation:

$$P = 0.6 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$$

Note: *More information is available in the application notes:*

*AN604 Calculation of conduction losses in a power rectifier*

*AN4021 Calculation of reverse losses in a power diode*

Figure 1. Average forward power dissipation versus average forward current (per diode)

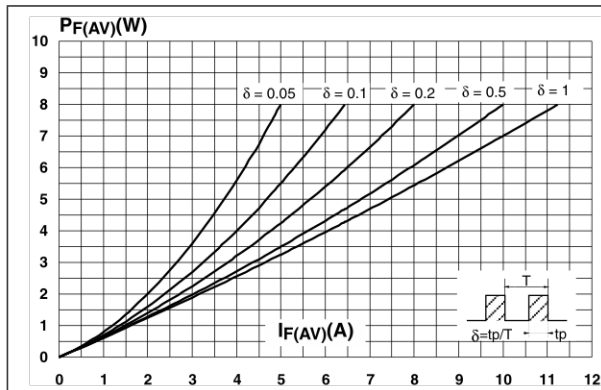


Figure 2. Forward voltage drop versus forward current (per diode)

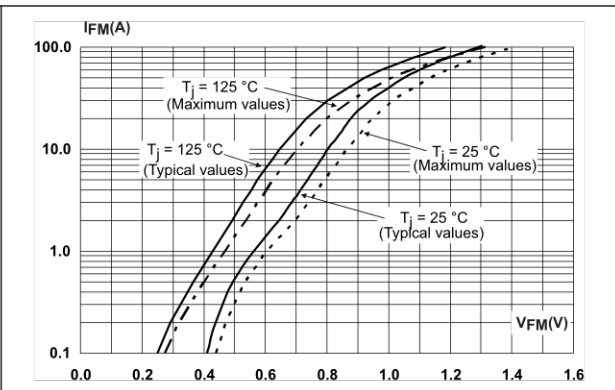


Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)

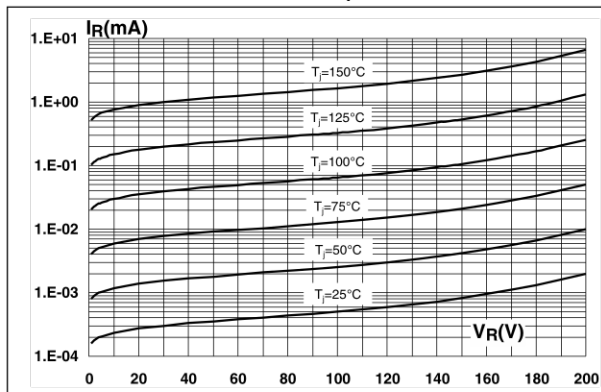


Figure 4. Junction capacitance versus reverse voltage applied (typical values, per diode)

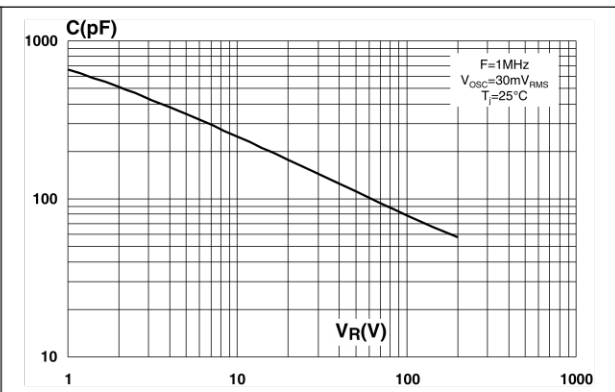


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

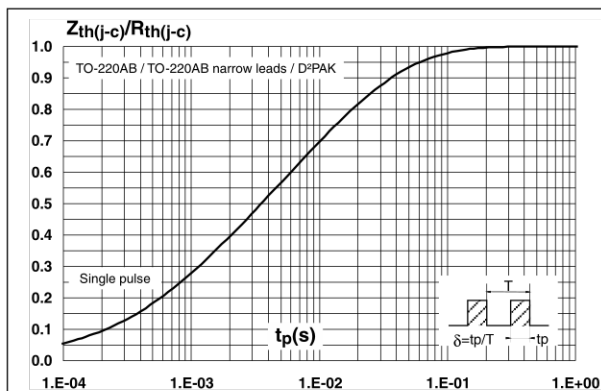


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

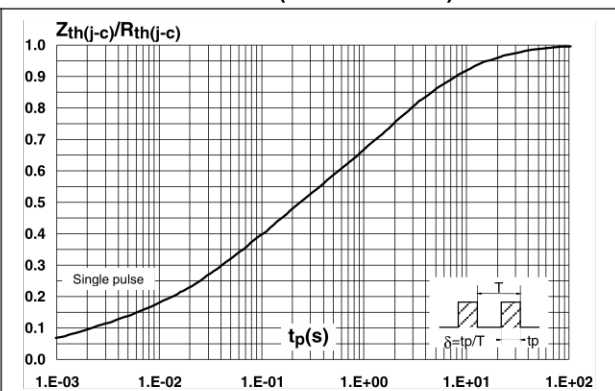
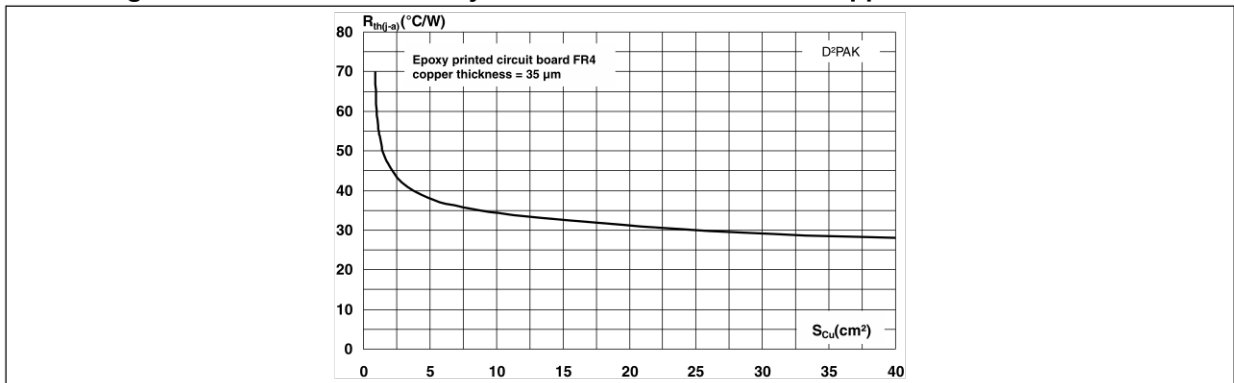


Figure 7. Thermal resistance junction to ambient versus copper surface under tab



## 2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

Figure 8. TO-220AB dimension definitions

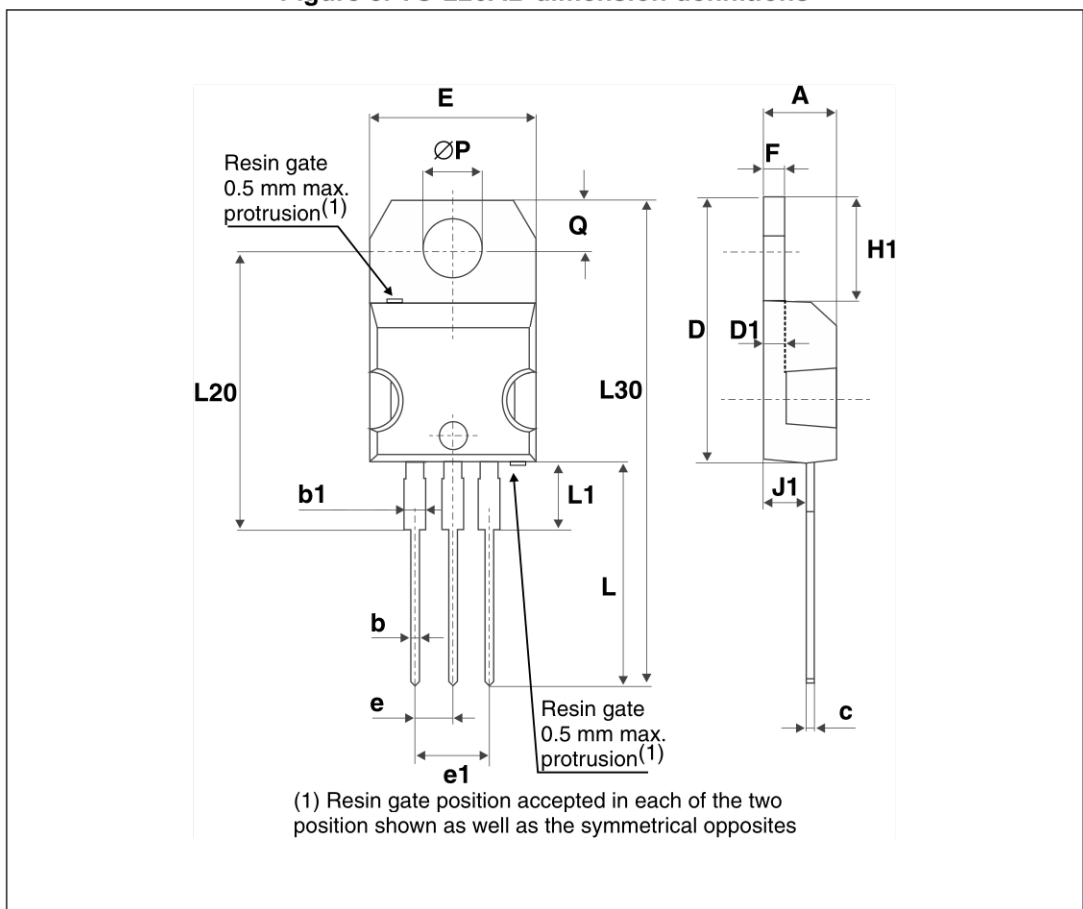


Table 5. TO-220AB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.035
b1	1.14		1.70	0.045		0.067
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1		1.27			0.05	
E	10		10.40	0.39		0.41
e	2.40	0.40	2.70	0.094		0.106
e1	4.95	0.60	5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.094		0.107
L	13		14	0.51		0.55
L1	3.50		3.93	0.137		0.154
L20		16.40			0.64	
L30		28.90			1.13	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95		0.104	

Figure 9. TO-220AB narrow leads dimension definitions

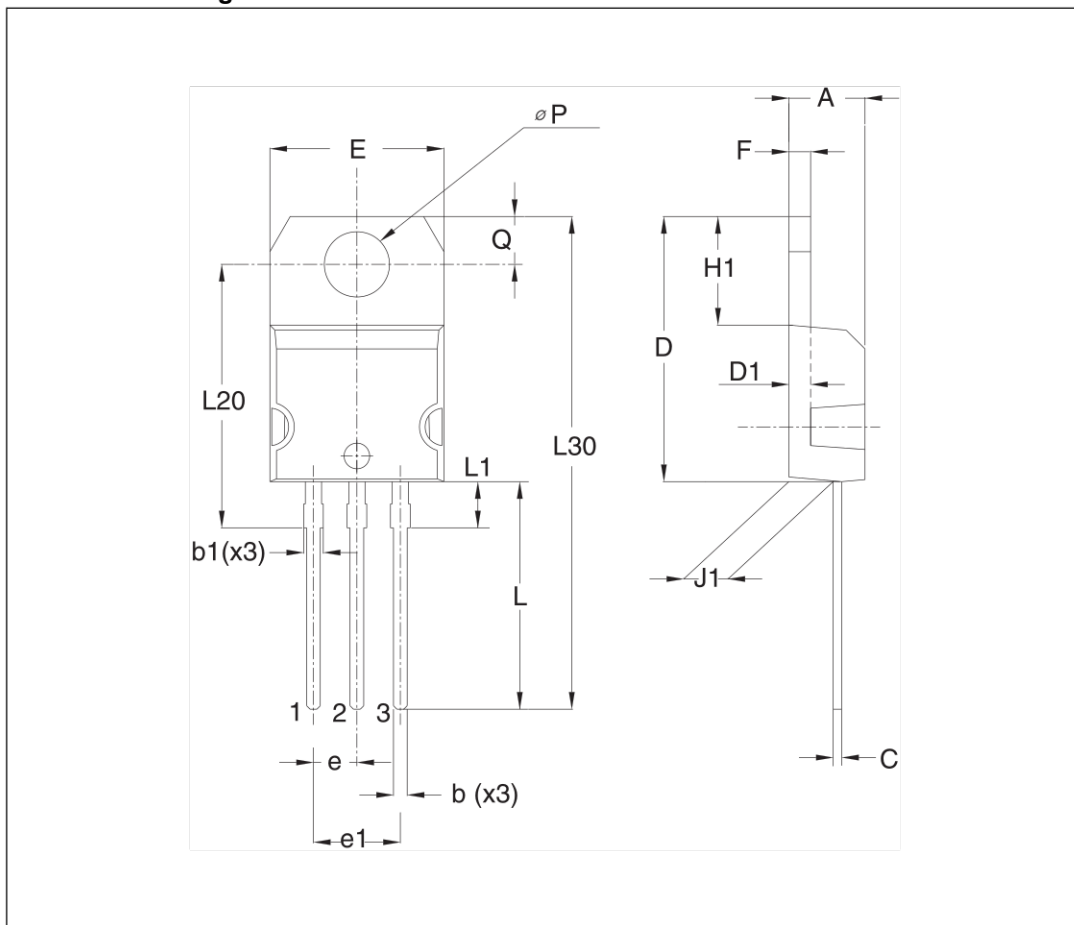




Table 6. TO-220AB narrow leads dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1		1.27			0.05	
E	10.00		10.40	0.39		0.41
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.51		0.55
L1	2.60		2.90	0.102		0.114
L20		15.40			0.61	
L30		28.90			1.14	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

Figure 10. TO-220FPAB dimension definitions

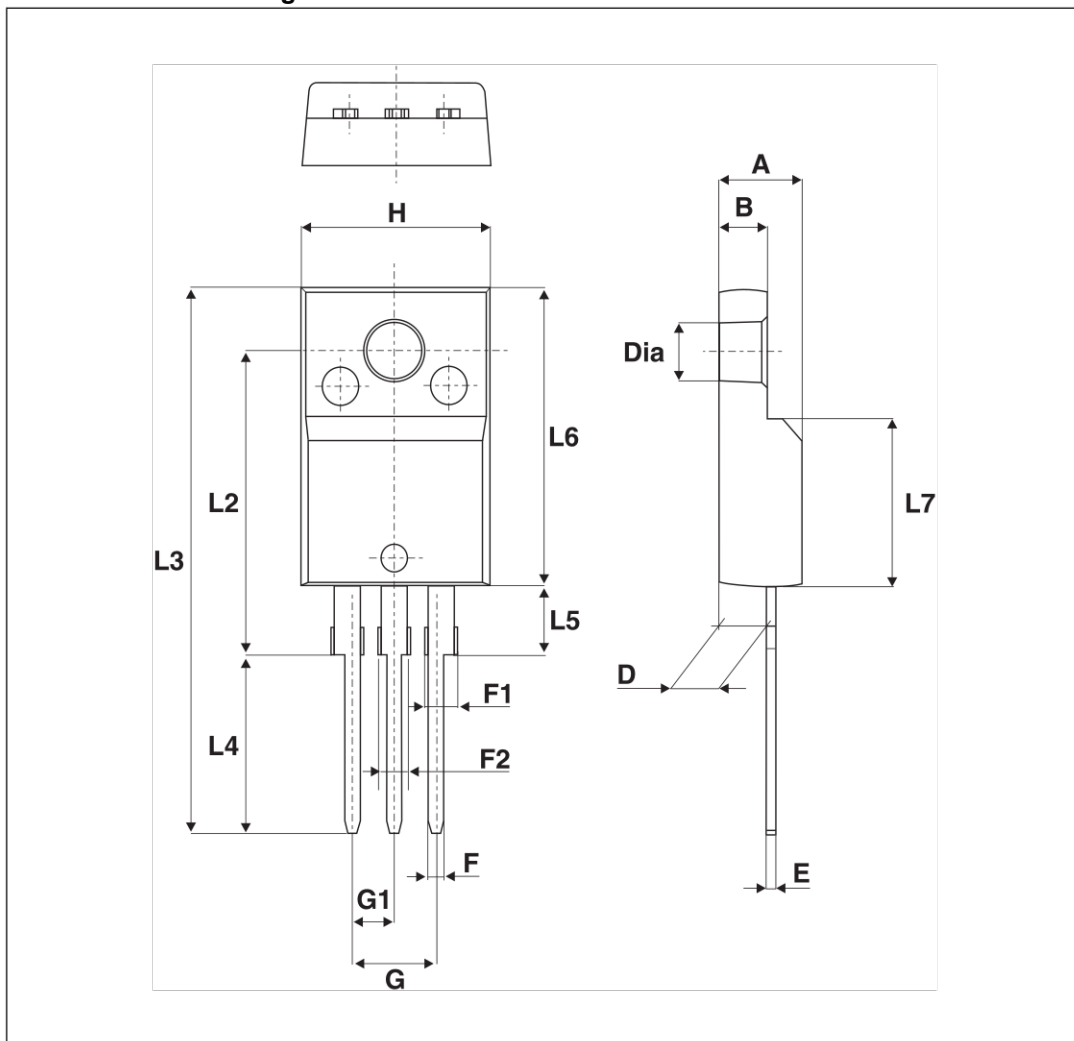


Table 7. TO-220FPAB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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		.	0.63	
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

Figure 11. D<sup>2</sup>PAK dimension definitions

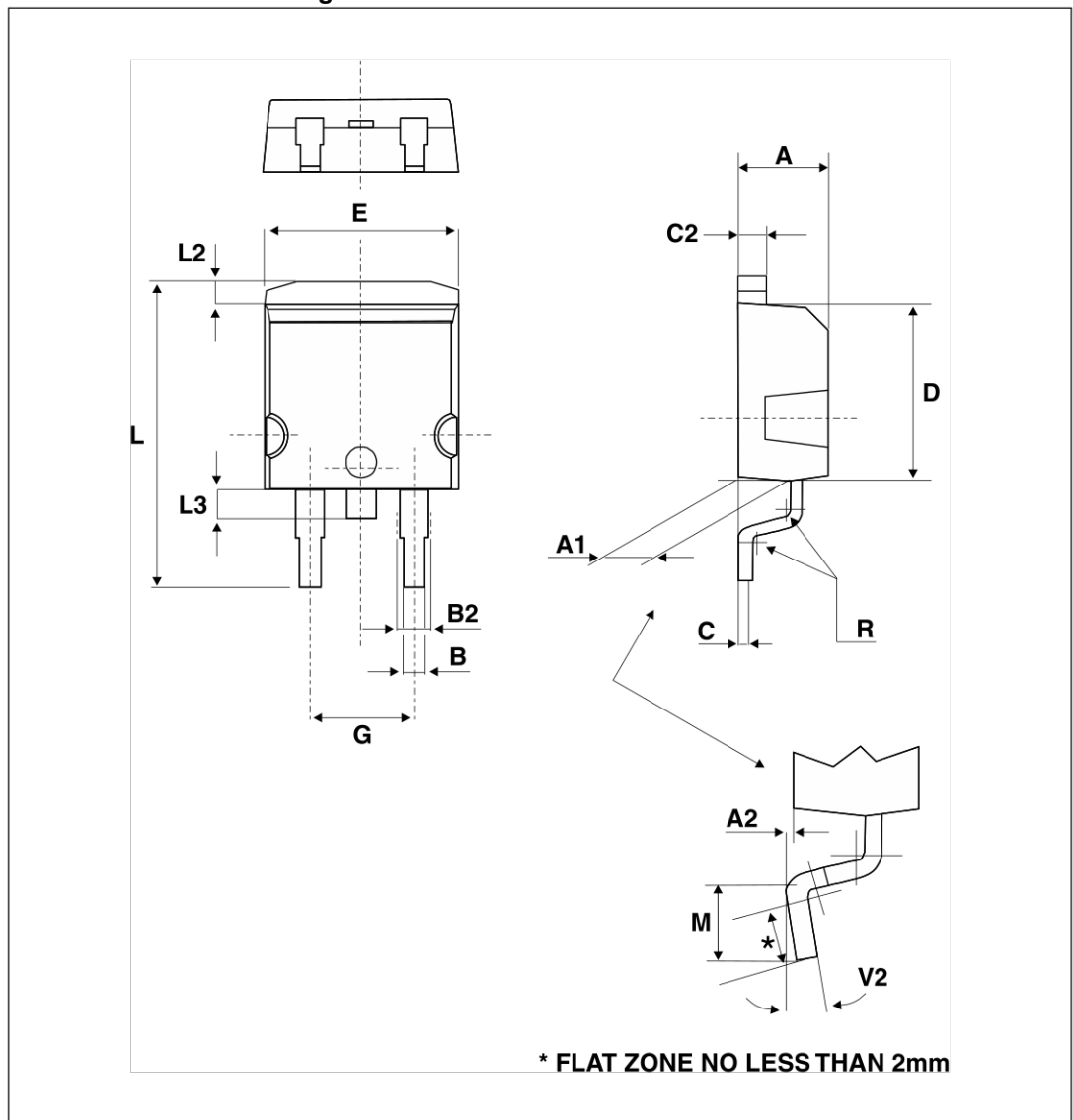
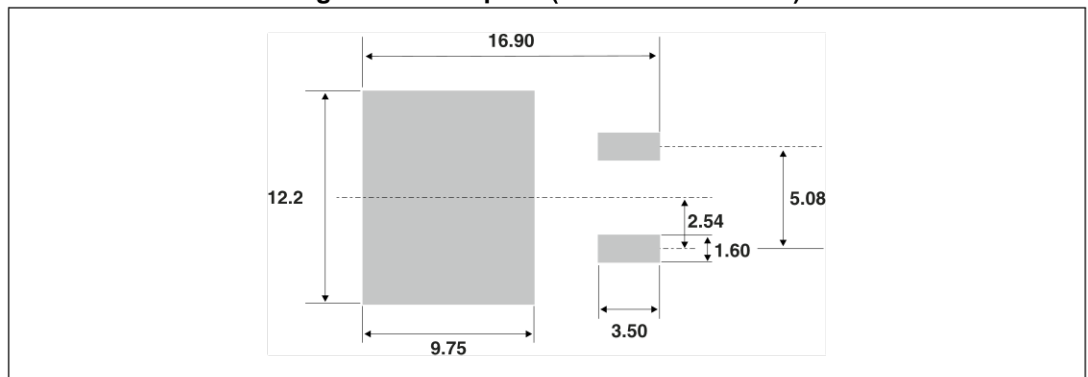


Table 8. D<sup>2</sup>PAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		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	1.30		1.75	0.051		0.069
M	2.29		2.79	0.090		0.110
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 12. Footprint (dimensions in mm)



### 3 Ordering information

**Table 9. Ordering information**

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPS20200CT	STPS20200CT	TO-220AB	2.20 g	50	Tube
STPS20200CTN	STPS20200CTN	TO-220AB narrow leads	1.90 g	50	Tube
STPS20200CFP	STPS20200CFP	TO-220FPAB	2.0 g	50	Tube
STPS20200CG-TR	STPS20200CG	D <sup>2</sup> PAK	1.48g	1000	Tape and reel

### 4 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
11-Apr-2013	1	First issue
16-Oct-2013	2	Updated <a href="#">Table 4</a> .

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2013 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)