

## Power Schottky rectifier

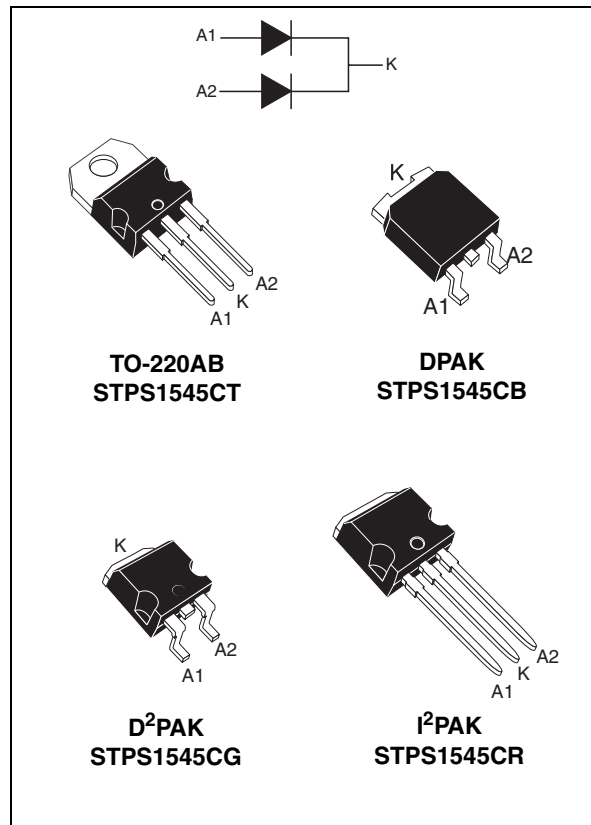
### Features

- very small conduction losses
- negligible switching losses
- extremely fast switching
- avalanche capability specified

### Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters.

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



**Table 1. Device summary**

$I_{F(AV)}$	2 x 7.5 A
$V_{RRM}$	45 V
$T_j$ (max)	175 °C
$V_F$ (max)	0.57 V

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter			Value	Unit	
V <sub>R</sub> RM	Repetitive peak reverse voltage			45	V	
I <sub>F</sub> (RMS)	Forward rms current			20	A	
I <sub>F</sub> (AV)	Average forward current $\delta = 0.5$	T <sub>c</sub> = 157 °C	Per diode	7.5	A	
I <sub>F</sub> SM	Surge non repetitive forward current			t <sub>p</sub> = 10 ms sinusoidal	150	A
I <sub>R</sub> RM	Peak repetitive reverse current	t <sub>p</sub> = 2 $\mu$ s square F = 1 kHz		1	A	
I <sub>R</sub> SM	Non repetitive peak reverse current			t <sub>p</sub> = 100 $\mu$ s square	2	A
P <sub>ARM</sub>	Repetitive peak avalanche power			t <sub>p</sub> = 1 $\mu$ s T <sub>j</sub> = 25 °C	2700	W
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>			175	°C	
dV/dt	Critical rate of rise of reverse voltage			10000	V/ $\mu$ s	

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 resistances**

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode Total	3.0 1.7	°C/W
R <sub>th(c)</sub>	Coupling		0.35	

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode2}) \times R_{th(c)}$$

**Table 4. Static electrical characteristics (per diode)**

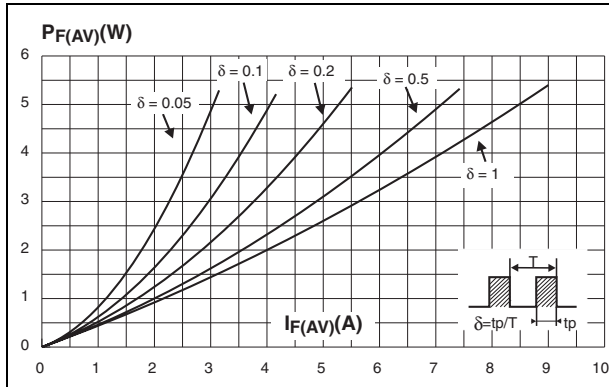
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>R</sub> RM	-	-	100	$\mu$ A
		T <sub>j</sub> = 125 °C		-	5	15	mA
V <sub>F</sub> <sup>(1)</sup>	Forward voltage drop	T <sub>j</sub> = 125°C	I <sub>F</sub> = 7.5A	-	0.5	0.57	V
		T <sub>j</sub> = 25°C	I <sub>F</sub> = 15 A	-	-	0.84	
		T <sub>j</sub> = 125 °C	I <sub>F</sub> = 15 A	-	0.65	0.72	

1. Pulse test: t<sub>p</sub> = 380  $\mu$ s,  $\delta < 2\%$

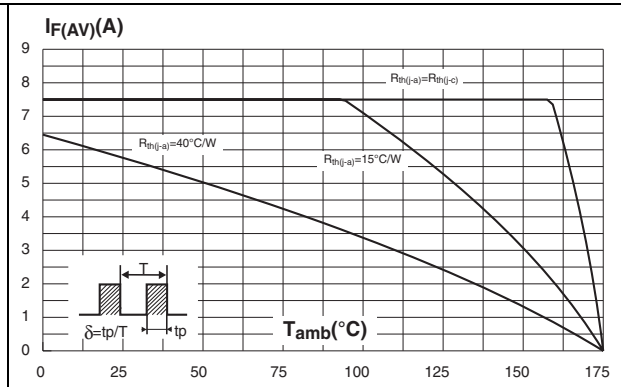
To evaluate the conduction losses use the following equation:

$$P = 0.42 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$$

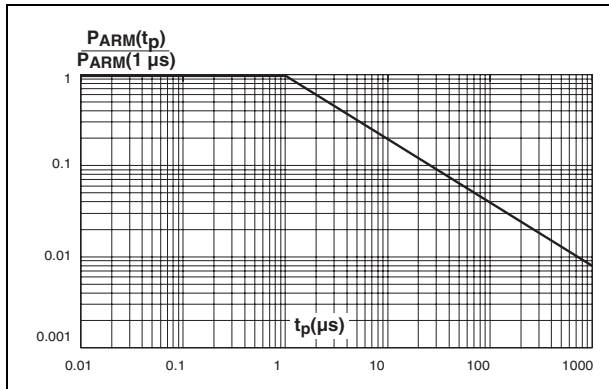
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



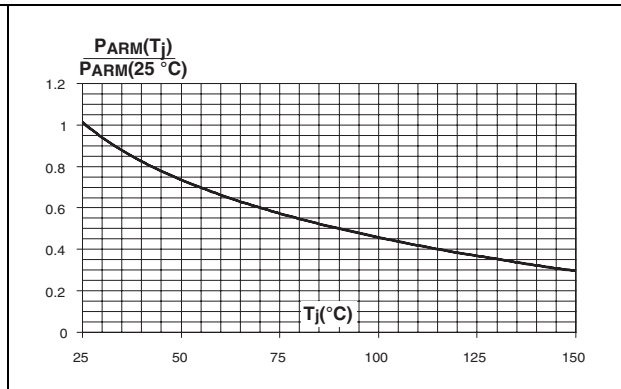
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



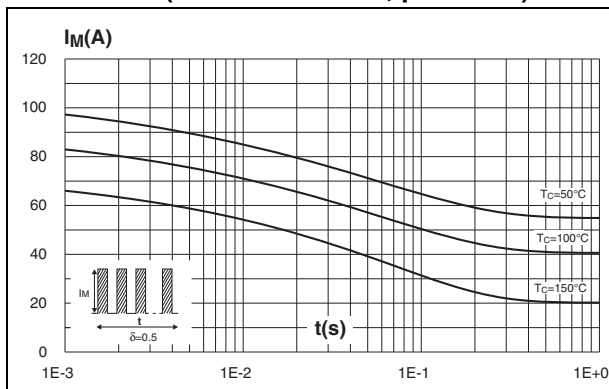
**Figure 3. Normalized avalanche power derating versus pulse duration**



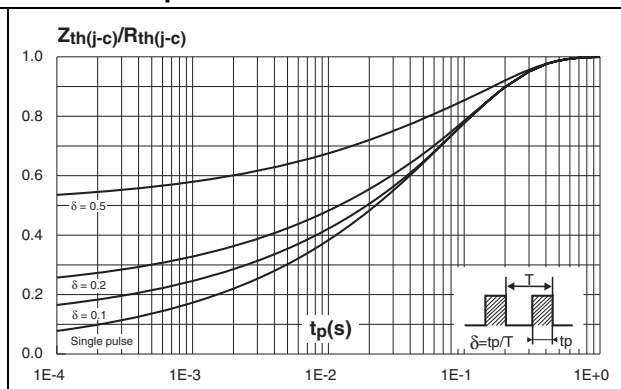
**Figure 4. Normalized avalanche power derating versus junction temperature**



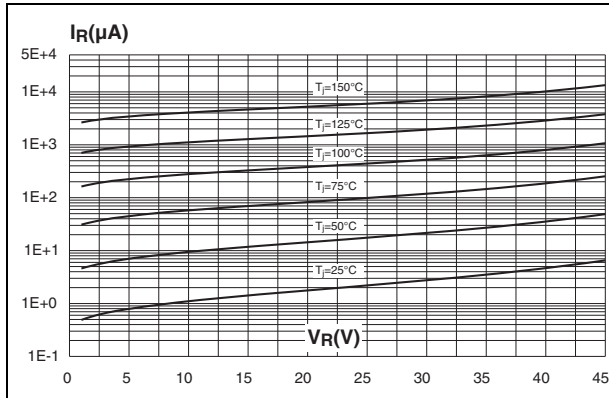
**Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)**



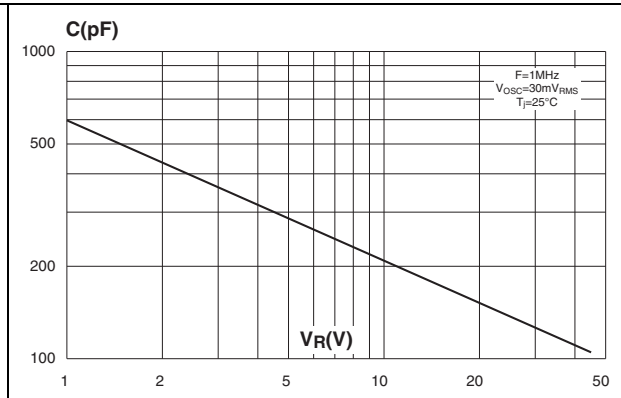
**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**



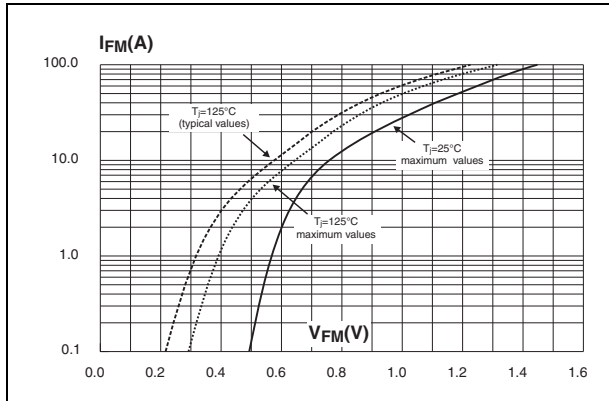
**Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



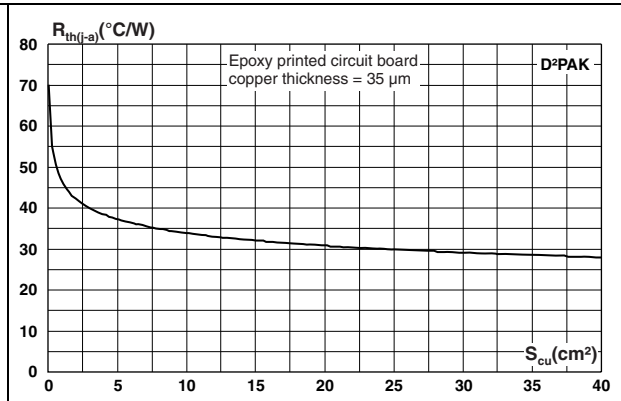
**Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)**



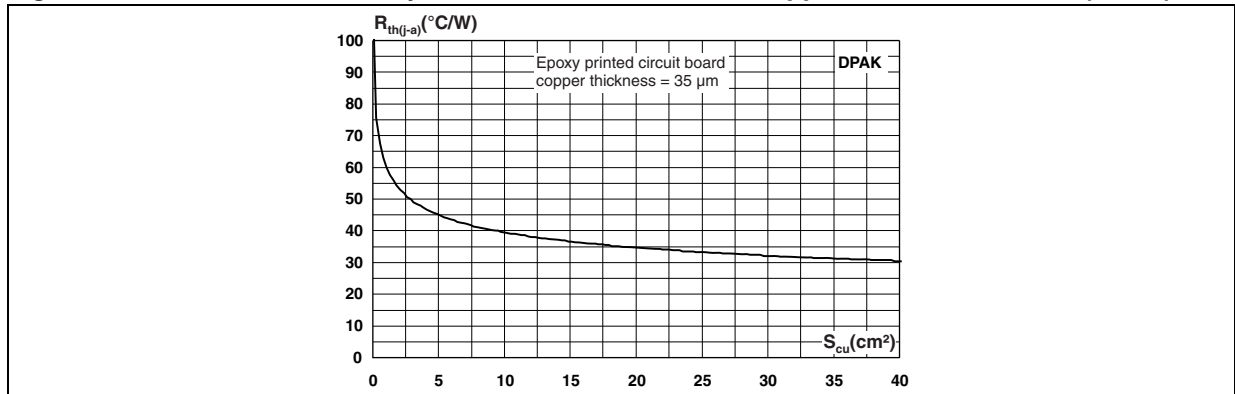
**Figure 9. Forward voltage drop versus forward current (high values, per diode)**



**Figure 10. Thermal resistance junction to ambient versus copper surface under tab (D<sup>2</sup>PAK)**



**Figure 11. Thermal resistance junction to ambient versus copper surface under tab (DPAK)**



## 2 Package information

- Epoxy meets UL94, V0
- 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 12. TO-220AB dimensions

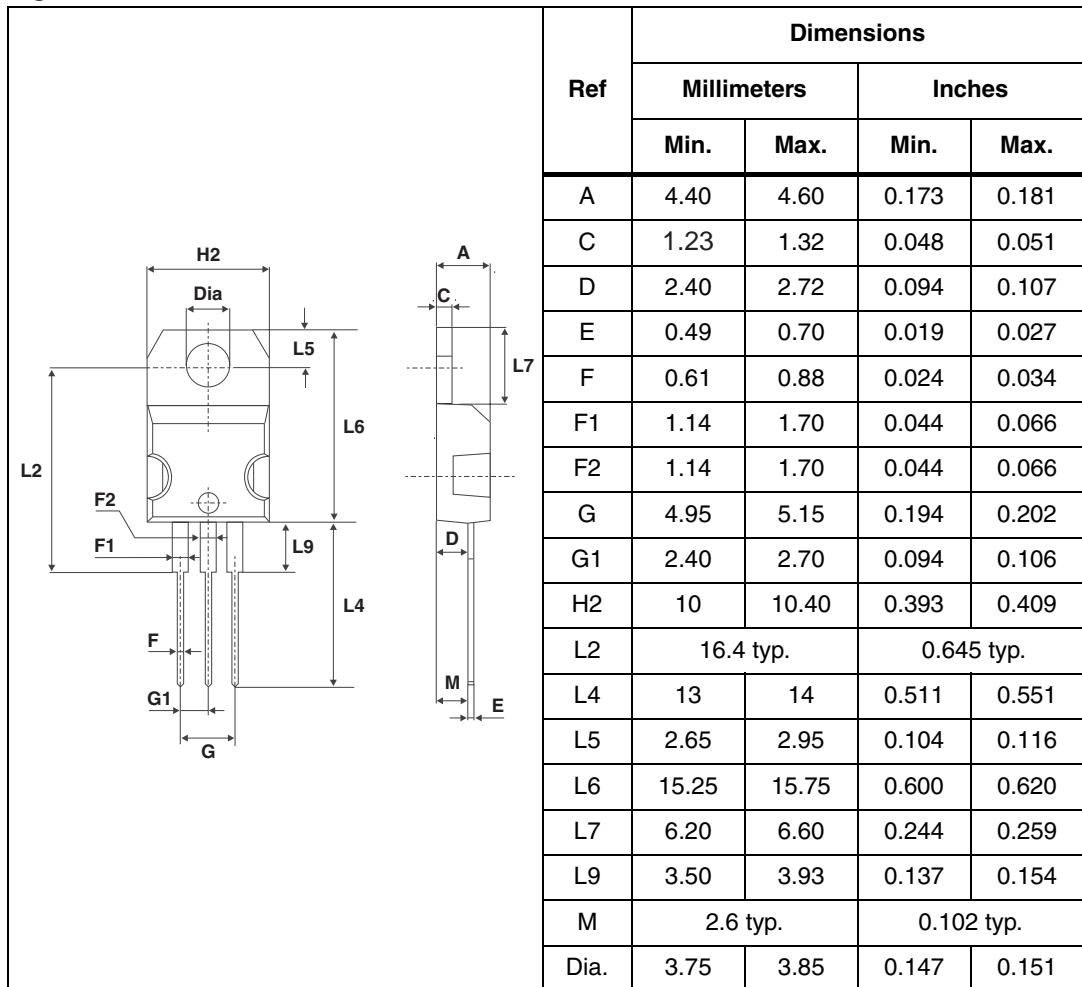
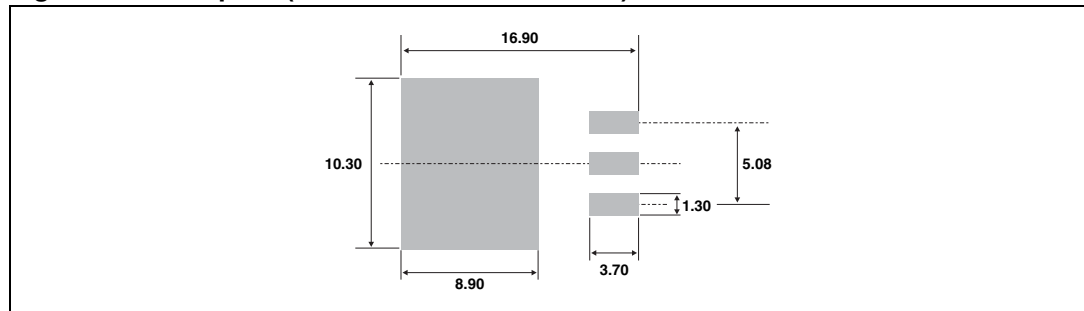


Table 5. D<sup>2</sup>PAK dimensions

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°

Figure 13. Footprint (dimensions in millimeters)



Mounting (soldering) the I<sup>2</sup>PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Figure 14. I<sup>2</sup>PAK dimensions

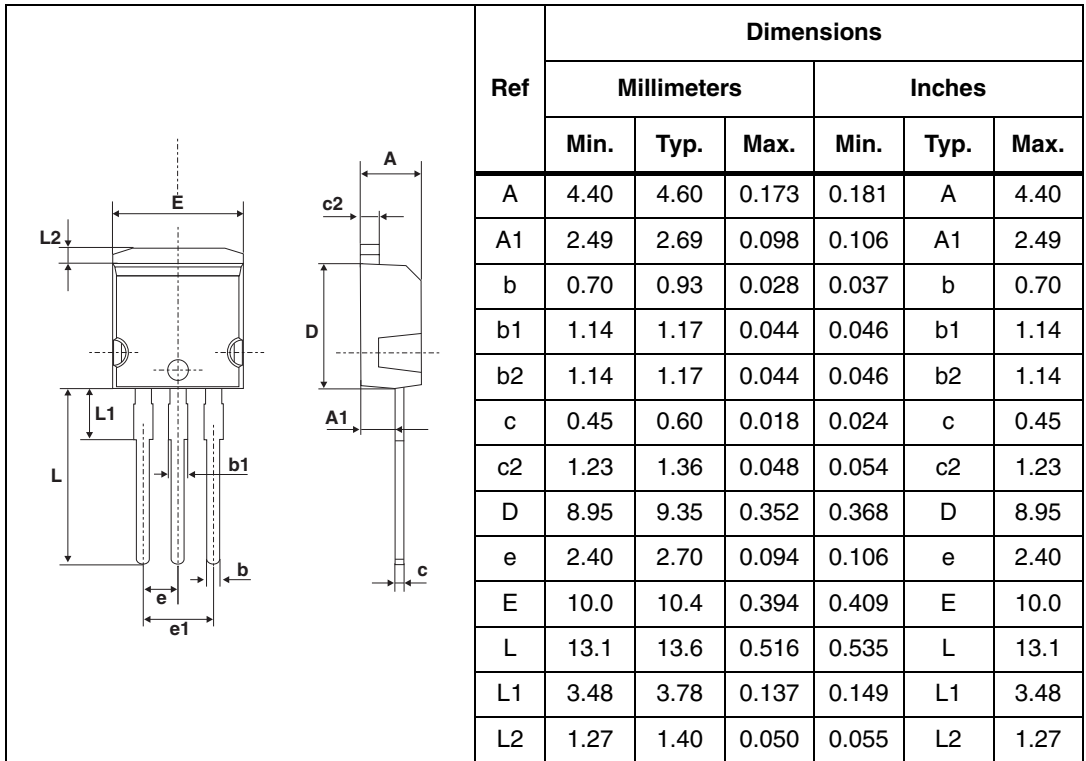
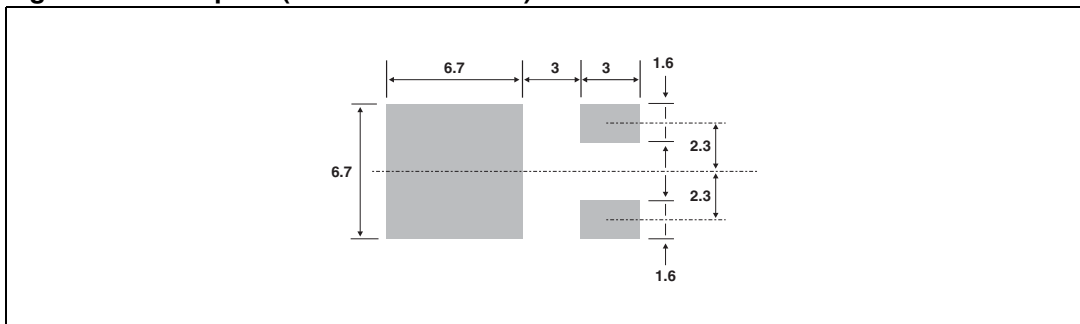


Table 6. DPAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 15. Footprint (dimensions in mm)



### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS1545CT	STPS1545CT	TO-220AB	2.23 g	50	Tube
STPS1545CG	STPS1545CG	D <sup>2</sup> PAK	1.48 g	50	Tube
STPS1545CG-TR	STPS1545CG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel
STPS1545CR	STPS1545CR	I <sup>2</sup> PAK	1.49 g	50	Tube
STPS1545CB-TR	STPS1545CB	DPAK	0.3 g	2500	Tape and reel

For the latest information on available order codes see the product pages on [www.st.com](http://www.st.com).

### 4 Revision history

**Table 8. Document revision history**

Date	Revision	Changes
Jul-2003	5F	Last release.
21-Mar-2007	6	Removed ISOWATT and TO-220FPAB packages.
03-Nov-2010	7	Added DPAK package.

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