STPS1545C

Power Schottky rectifier

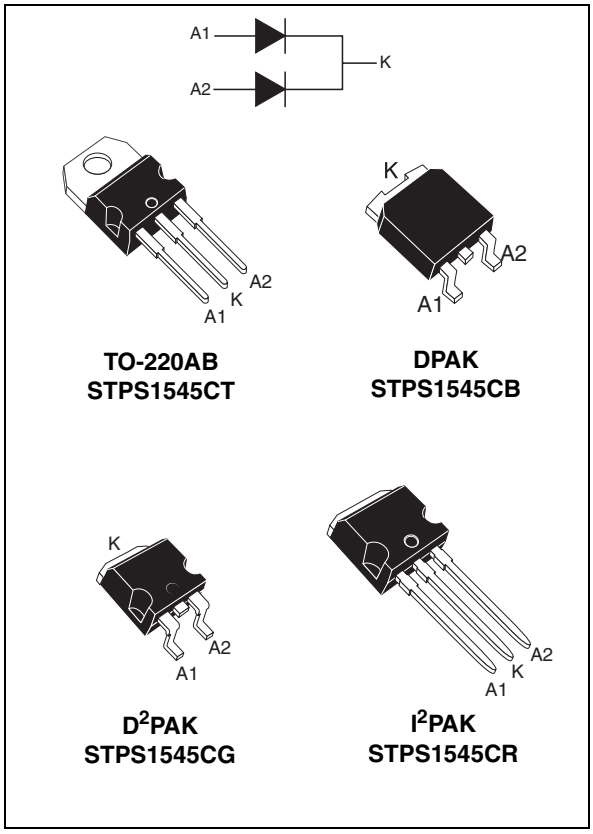
Features

- 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^2PAK, I^2PAK, or DPAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



TO-220AB
STPS1545CT

DPAK
STPS1545CB

D^2PAK
STPS1545CG

I^2PAK
STPS1545CR

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_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			20	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	T_c = 157 °C	Per diode	7.5	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		150	A
I_{RRM}	Peak repetitive reverse current	t_p = 2 µs square F = 1 kHz		1	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square		2	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C		2700	W
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature (1)			175	°C
dV/dt	Critical rate of rise of reverse voltage			10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode Total	3.0 1.7	°C/W
$R_{th(c)}$	Coupling		0.35	

When the diodes 1 and 2 are used simultaneously:
ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	-	100	µA
		T_j = 125 °C		-	5	15	mA
V_F (1)	Forward voltage drop	T_j = 125°C	I_F = 7.5A	-	0.5	0.57	V
		T_j = 25°C	I_F = 15 A	-	-	0.84	
		T_j = 125 °C	I_F = 15 A	-	0.65	0.72	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.42 \times I_{F(AV)} + 0.020\ I_F{}^2{}_{(RMS)}$

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

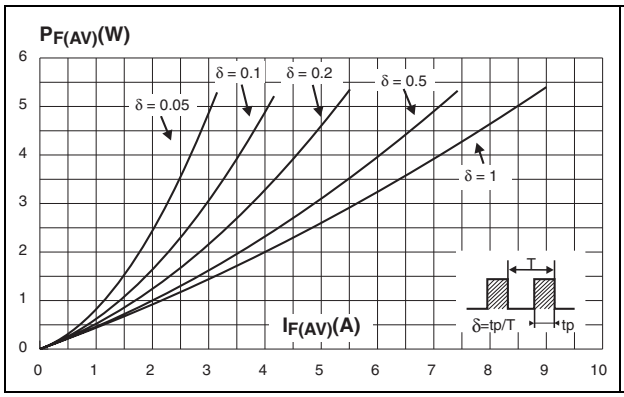


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

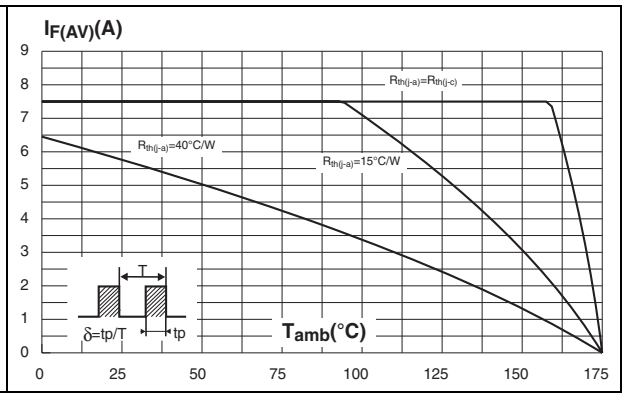


Figure 3. Normalized avalanche power derating versus pulse duration

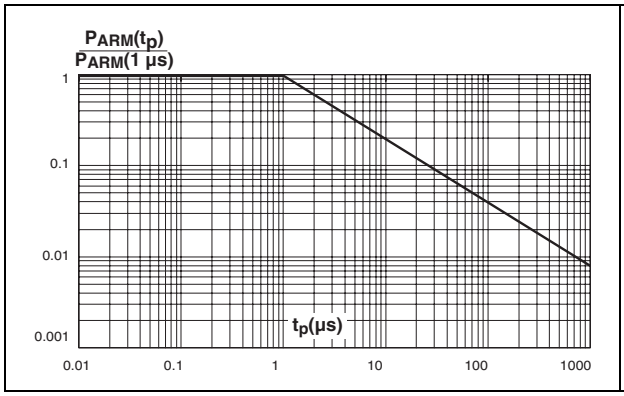


Figure 4. Normalized avalanche power derating versus junction temperature

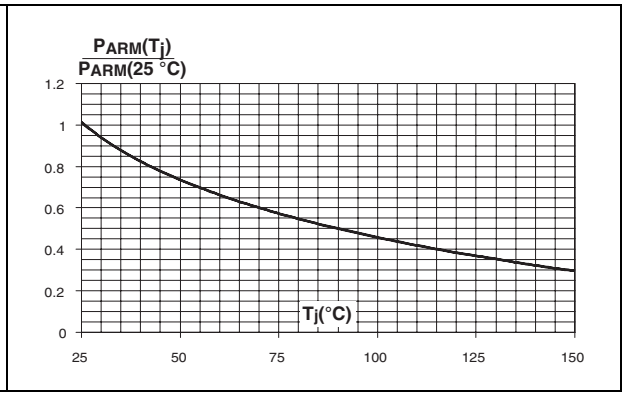


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

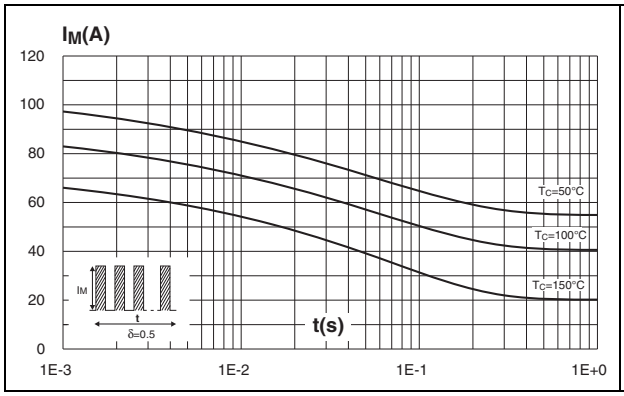


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

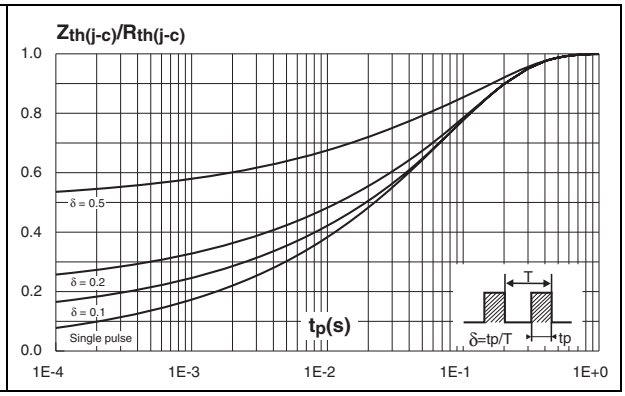


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

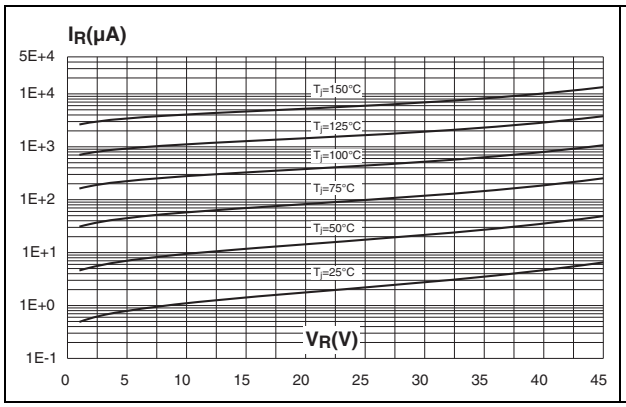


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

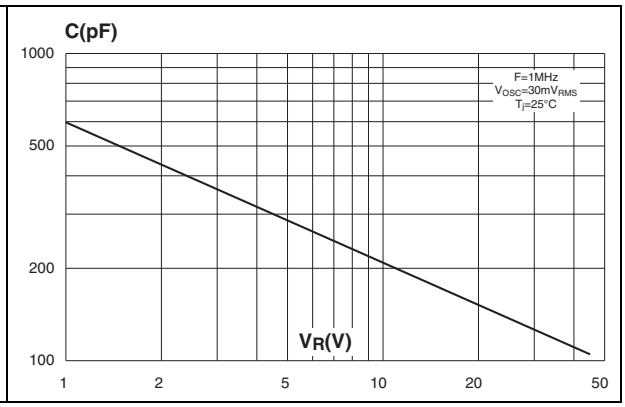


Figure 9. Forward voltage drop versus forward current (high values, per diode)

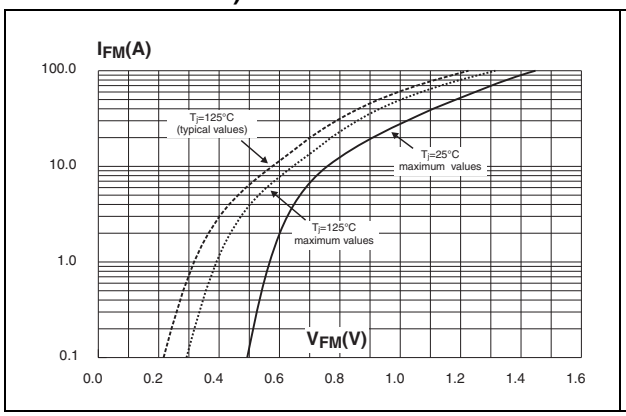


Figure 10. Thermal resistance junction to ambient versus copper surface under tab (D^2PAK)

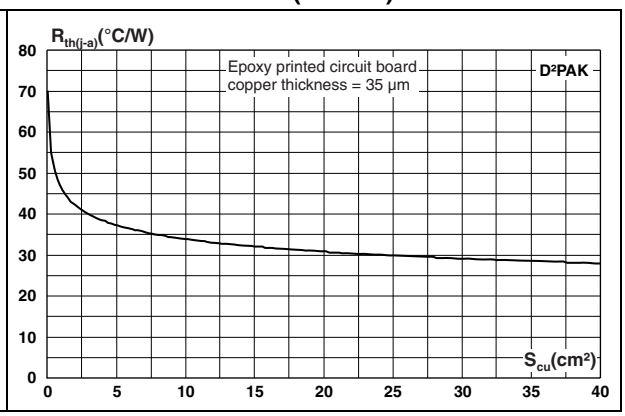
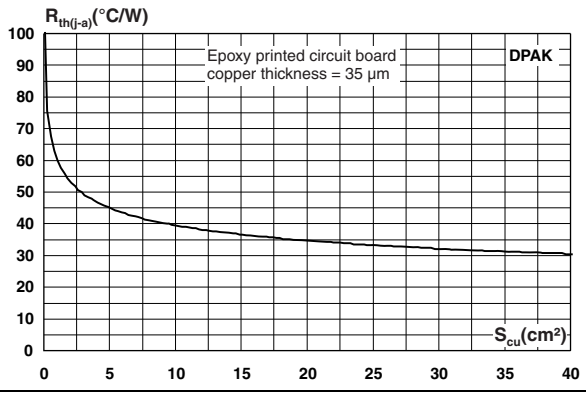


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (DPAK)

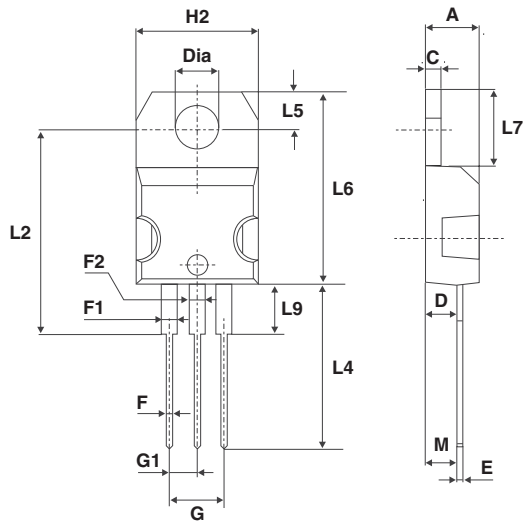


2 Package information

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

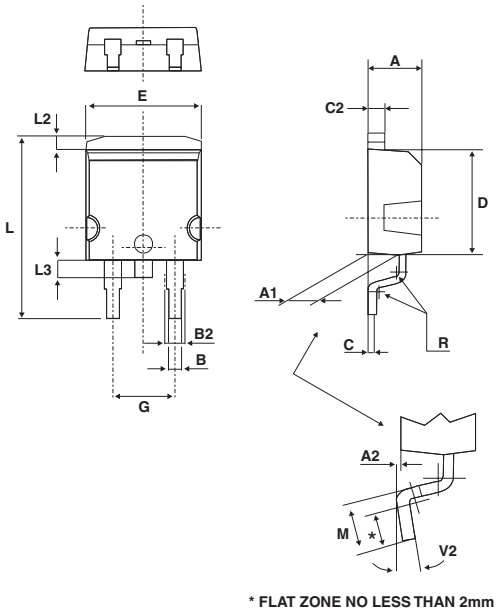
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Figure 12. TO-220AB dimensions



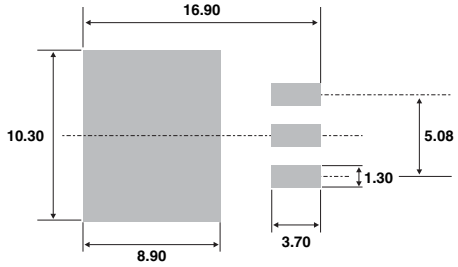
Ref	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
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
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Dia.	3.75	3.85	0.147	0.151

Table 5. D²PAK dimensions



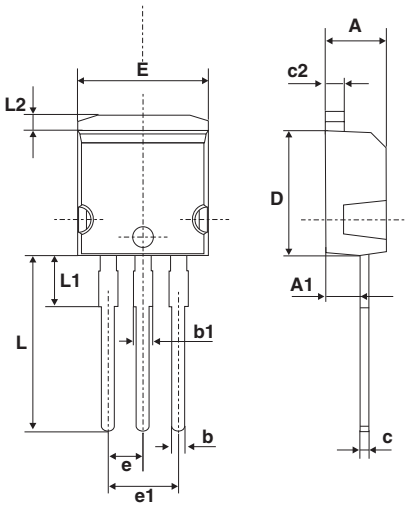
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	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)



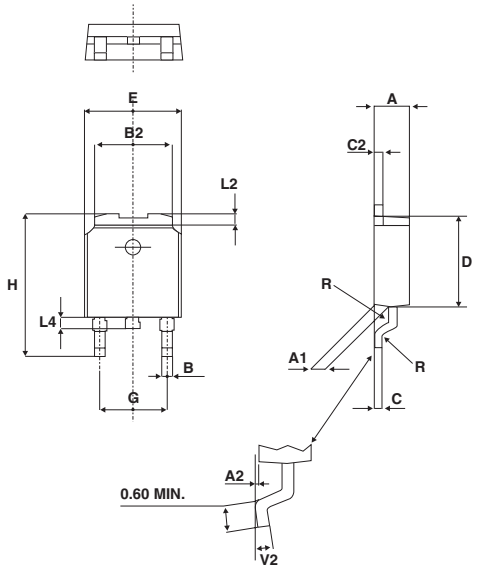
Mounting (soldering) the I^2PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Figure 14. I^2PAK dimensions



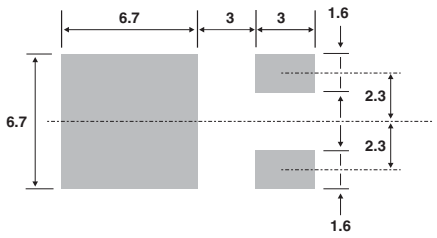
Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40	4.60	0.173	0.181	A	4.40
A1	2.49	2.69	0.098	0.106	A1	2.49
b	0.70	0.93	0.028	0.037	b	0.70
b1	1.14	1.17	0.044	0.046	b1	1.14
b2	1.14	1.17	0.044	0.046	b2	1.14
c	0.45	0.60	0.018	0.024	c	0.45
c2	1.23	1.36	0.048	0.054	c2	1.23
D	8.95	9.35	0.352	0.368	D	8.95
e	2.40	2.70	0.094	0.106	e	2.40
E	10.0	10.4	0.394	0.409	E	10.0
L	13.1	13.6	0.516	0.535	L	13.1
L1	3.48	3.78	0.137	0.149	L1	3.48
L2	1.27	1.40	0.050	0.055	L2	1.27

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^2PAK	1.48 g	50	Tube
STPS1545CG-TR	STPS1545CG	D^2PAK	1.48 g	1000	Tape and reel
STPS1545CR	STPS1545CR	I^2PAK	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.

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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