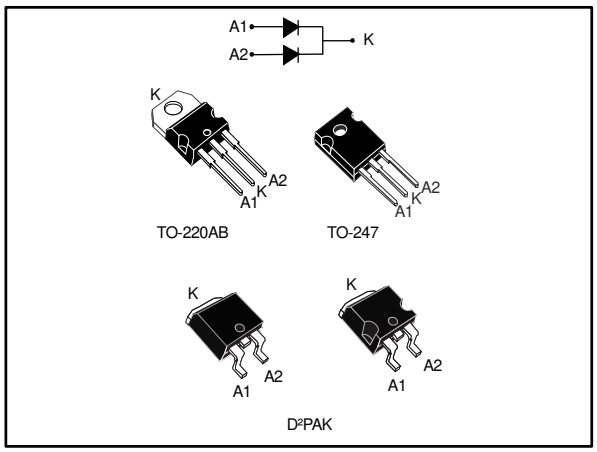
STPS3045C

Power Schottky rectifier

Datasheet - production data



Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Avalanche rated
- ECOPACK®2 compliant component for D²PAK on demand

Description

Dual center tap Schottky rectifier suited for switch mode power supply and high frequency DC to DC converters. Packaged either in TO-220AB, TO-247, or D²PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	45 V
V_F (typ.)	0.5 V
T_j (max.)	175 °C (up to 200 °C in forward mode for D²PAK)

This is information on a product in full production.

1 Characteristics

Table 2: Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_C = 155 °C	Per diode	15	A
			Per device	30	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal	220	A
P_{ARM} (1)	Repetitive peak avalanche power		t_p = 10 µs, T_j = 125 °C	430	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature (2)			175	
	Maximum operating junction temperature (DC forward current without reverse bias, t = 1 hour for D²PAK			200	

Notes:

(1)For pulse time duration deratings, please refer to Figure 3. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the STMicroelectronics Application notes AN1768, “Admissible avalanche power of Schottky diodes” and AN2025, “Converter improvement using Schottky rectifier avalanche specification”.

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

Table 3: Thermal parameters

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB / D²PAK	Per diode	1.60	°C/W
			Total	0.95	
		TO-247	Per diode	1.5	
			Total	0.9	
$R_{th(c)}$	Coupling	TO-220AB / D²PAK/ TO-247		0.3	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

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	$V_R = V_{RRM}$	-		200	µA
		T_j = 125 °C		-	11	40	mA
V_F (1)	Forward voltage drop	T_j = 125 °C	I_F = 15 A	-	0.5	0.57	V
		T_j = 25 °C	I_F = 30 A	-		0.84	
		T_j = 125 °C		-	0.65	0.72	

Notes:

(1)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.42 \times I_{F(AV)} + 0.01 \times I_{F^2(RMS)}$

1.2 Characteristics (curves)

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

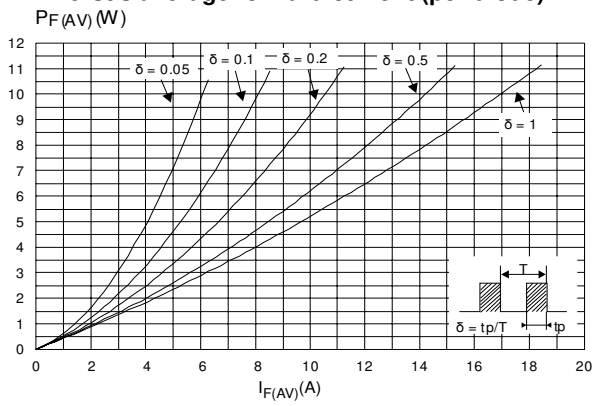


Figure 2: Average forward current versus ambient temperature (δ = 0.5, per diode)

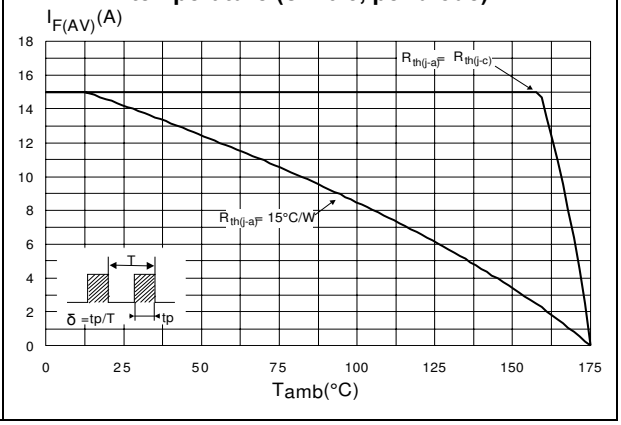


Figure 3: Normalized avalanche power derating versus pulse duration (Tj = 125 °C)

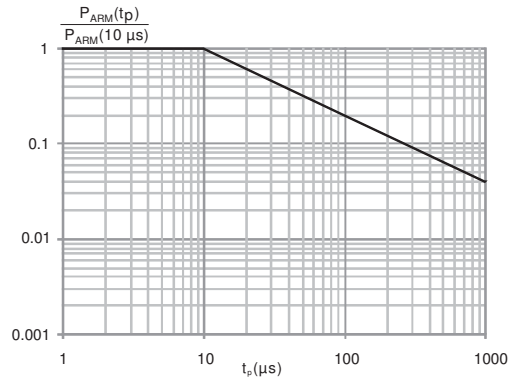


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration

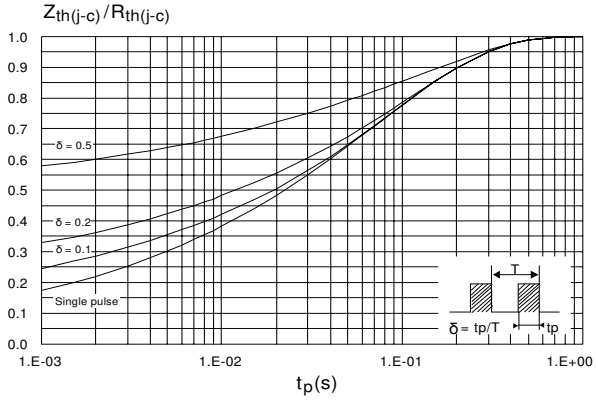


Figure 5: Junction capacitance versus reverse voltage applied (typical values, per diode)

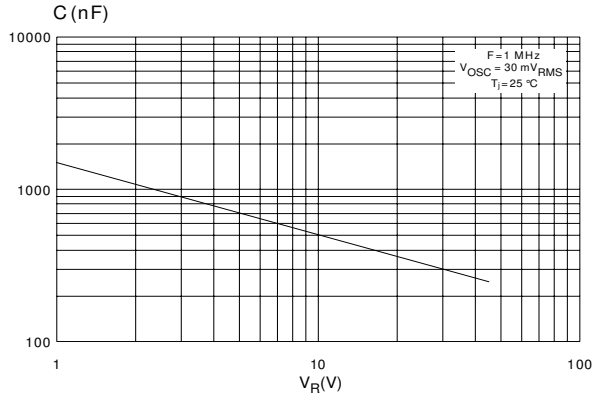


Figure 6: Reverse leakage current versus reverse voltage applied (typical values, per diode)

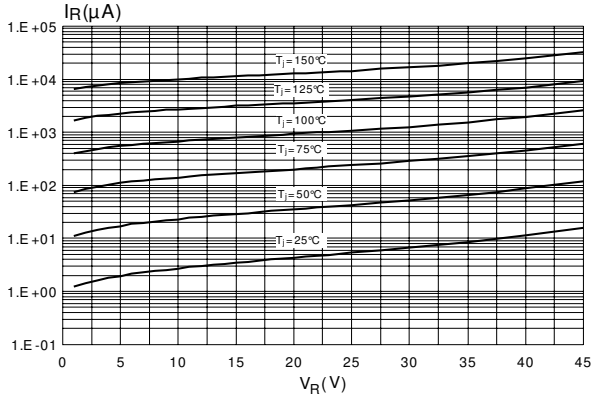


Figure 7: Forward voltage drop versus forward current (maximum values, per diode)

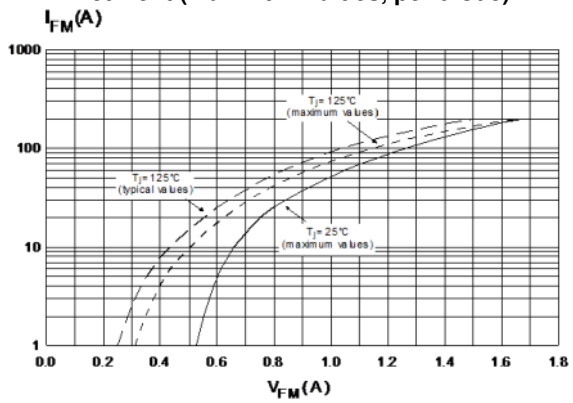
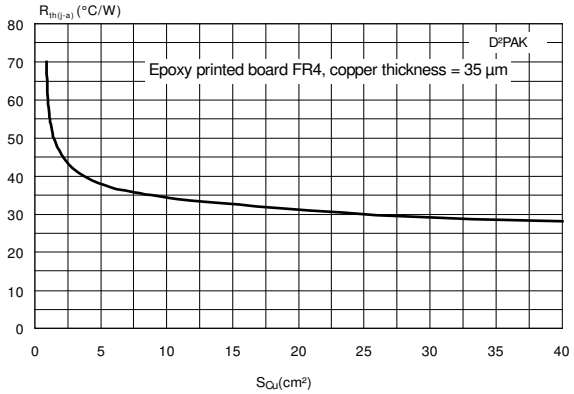


Figure 8: Thermal resistance junction to ambient versus copper surface under tab



2 Package information

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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB and TO-247)
- Maximum torque value: 0.7 N·m (for TO-220AB)
- Maximum torque value: 1.0 N·m (for TO-247)

2.1 TO-220AB package information

Figure 9: TO-220AB package outline

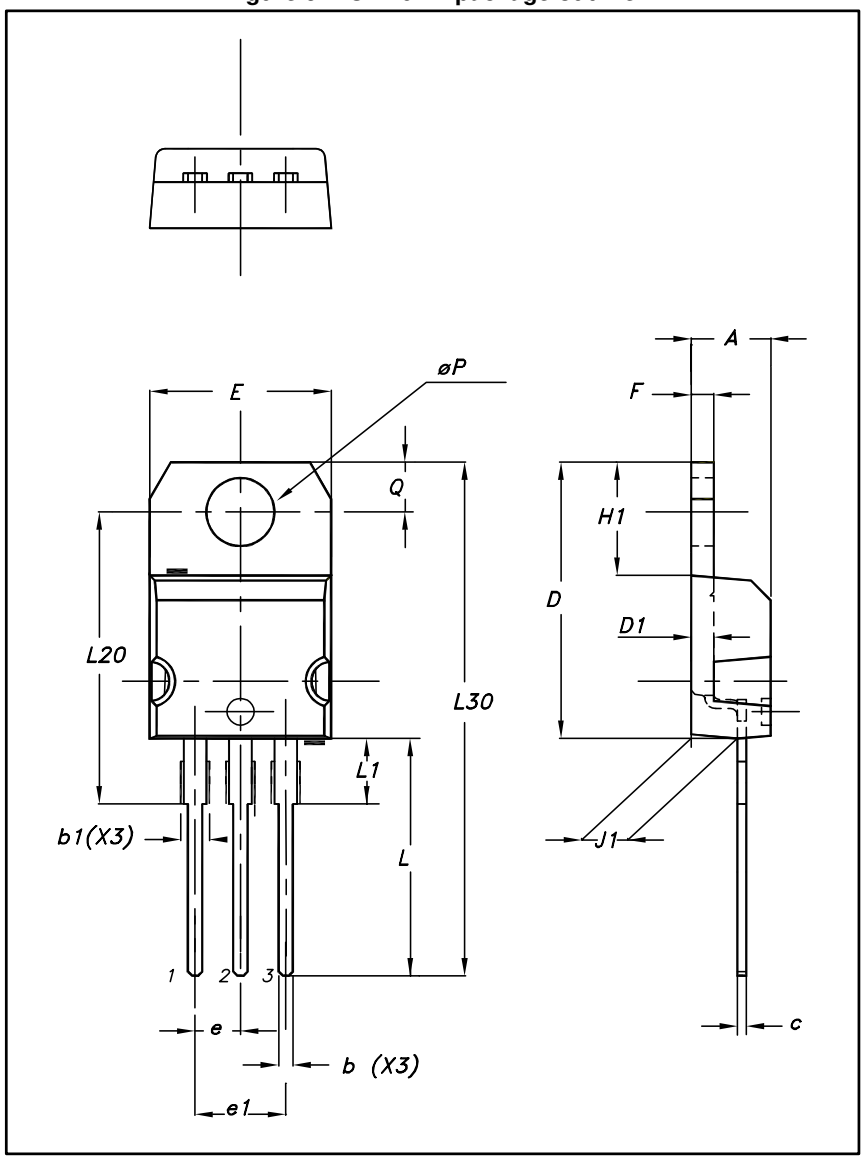


Table 5: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.024	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
ØP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.2 TO-247 package information

Figure 10: TO-247 package outline

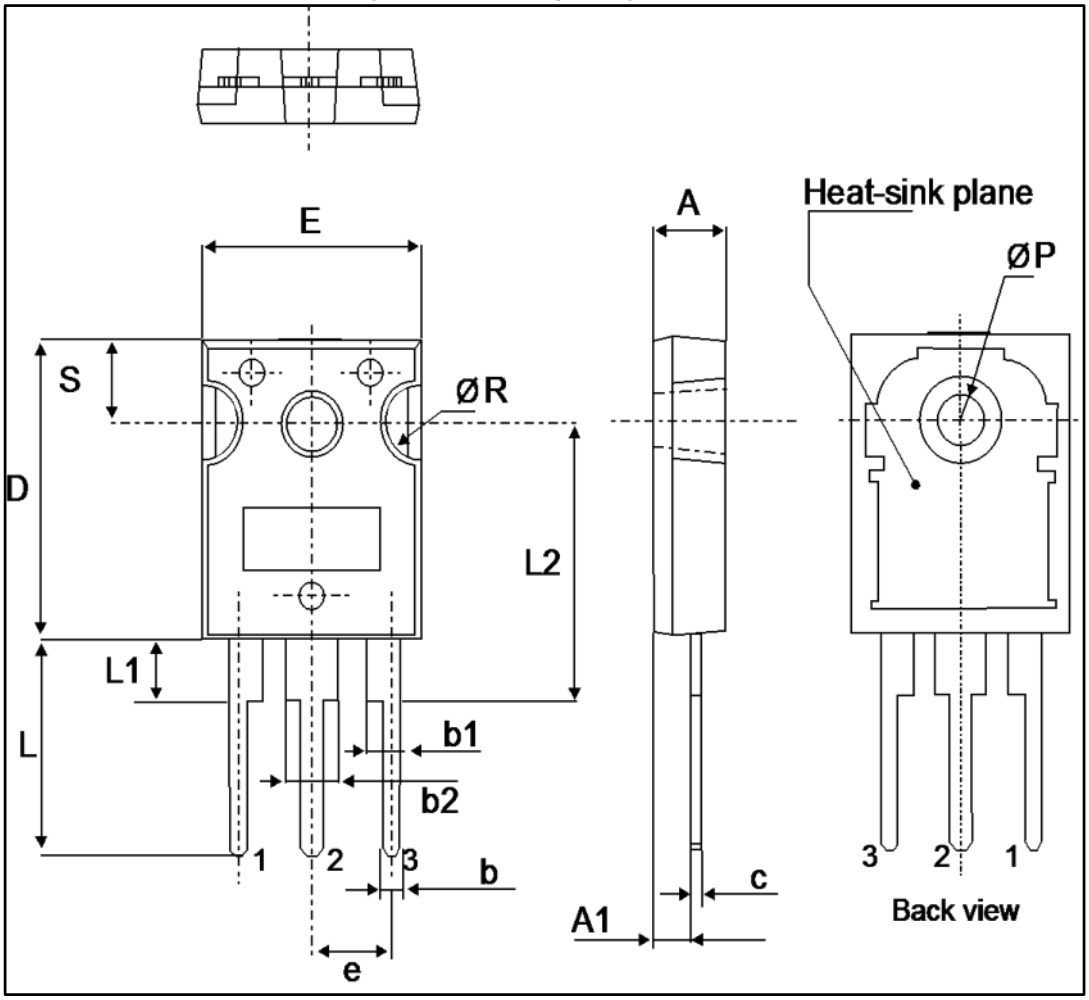


Table 6: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D(1)	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP(2)	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

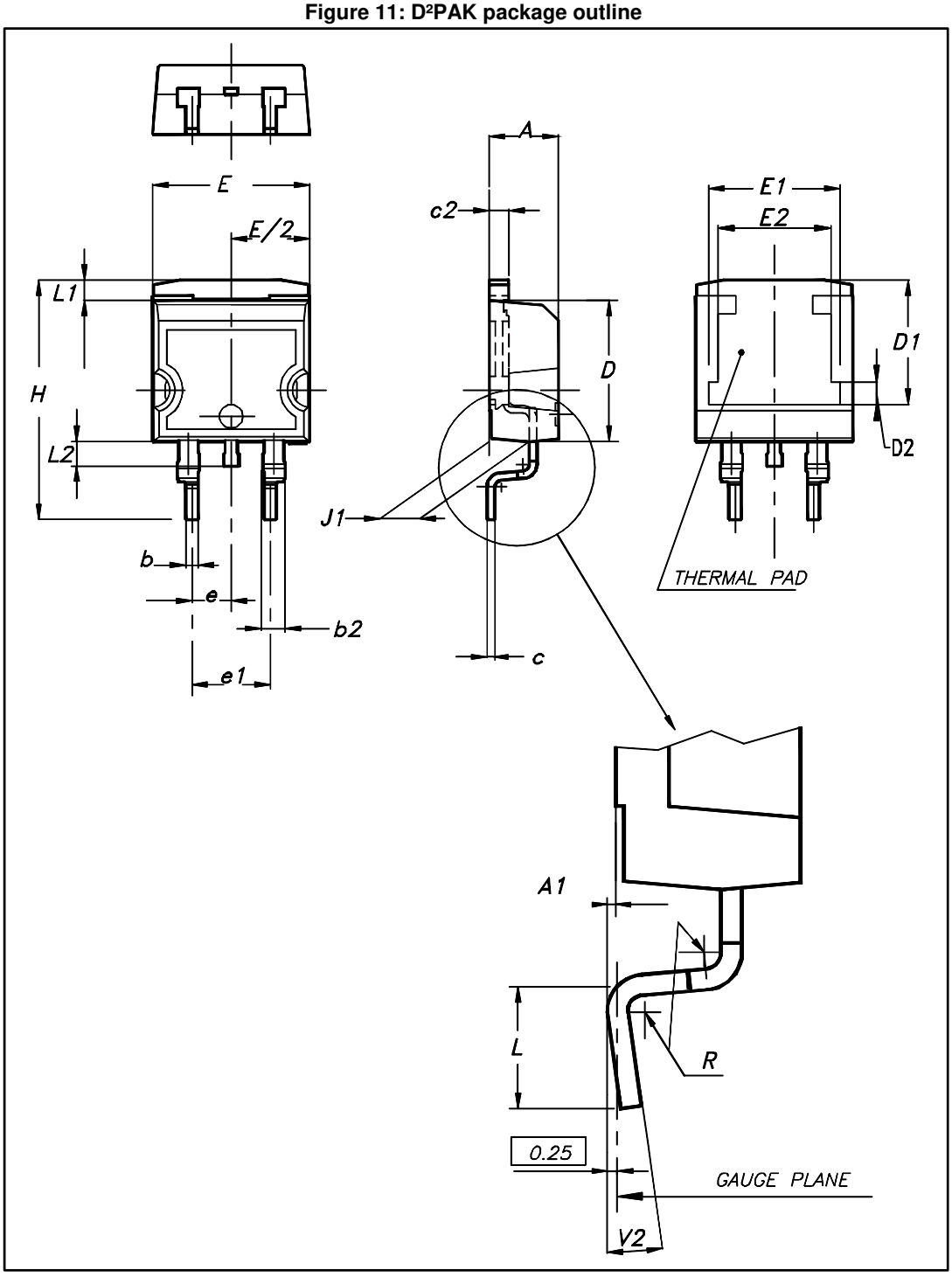
Notes:

(1)Dimension D plus gate protusion does not exceed 20.5 mm

(2)Resin thickness around the mounting hole is not less than 0.9 mm.

2.3 D²PAK package information

Figure 11: D²PAK package outline

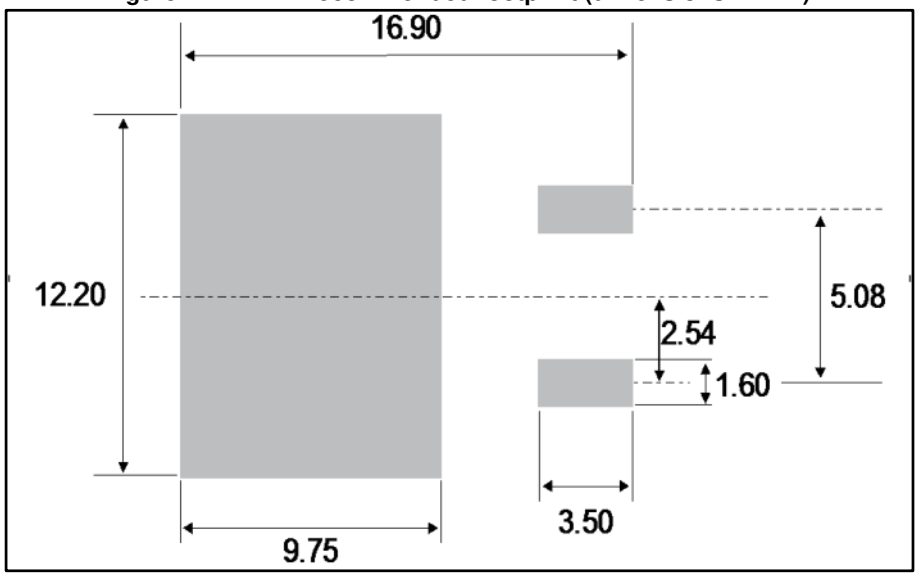


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 7: D²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

Figure 12: D²PAK recommended footprint (dimensions in mm)



3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS3045CT	STPS3045CT	TO-220AB	1.9 g	50	Tube
STPS3045CG	STPS3045CG	D²PAK	1.38 g	50	Tube
STPS3045CG-TR	STPS3045CG			1000	Tape and reel
STPS3045CW	STPS3045CW	TO-247	4.46 g	30	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
Jul-2003	6E	Last update.
06-Nov-2012	7	Removed SOT-93 and TOP-3I packages. Table 2: Operating range (T_j) extension from -40 to +175° C, $I_{F(AV)}$ per diode updated to 15 A. Updated “Total” values in Table 3. Updated tables in Section 2: Package information.
04-Apr-2013	8	Added value for maximum T_j in forward mode. Updated Table 9.
02-Aug-2016	9	Updated D²PAK package information. Removed I²PAK and TO-220FPAB package information.

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