STPS3045C

Power Schottky rectifier

Datasheet – production data

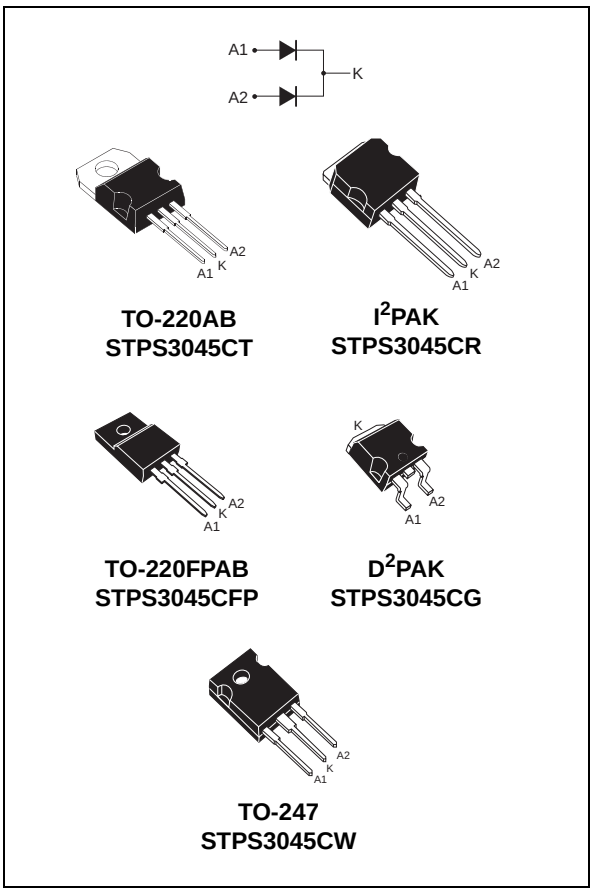


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	45 V
$T_{j\ (max)}$	175 °C (up to 200 °C in forward mode for D^2PAK)
$V_{F\ (max)}$	0.57 V

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Insulated package: TO-220FPAB
  - Insulating voltage = 2000 V DC
  - Capacitance = 12 pF
- Avalanche rated

Description

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

Packaged in TO-220AB, TO-220FPAB, I^2PAK, TO-247 or D^2PAK, this device is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				45	V
$I_{F(RMS)}$	Forward rms voltage				30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AB / D^2PAK / I^2PAK / TO-247	T_c = 155 °C	Per diode Per device	15 30	A
		TO-220FPAB	T_c = 130 °C			
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms sinusoidal		220	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs, T_j = 25 °C		6000	W
T_{stg}	Storage temperature range				-65 to +175	°C
T_j	Maximum operating junction temperature(1)				+175	°C
T_j	Maximum operating junction temperature (DC forward current without reverse bias, t = 1 hour for D^2PAK)(1)				200	°C
dV/dt	Critical rate of rise 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 resistance parameters

Symbol	Parameter			Value	Unit
$R_{th\ (j-c)}$	Junction to case	TO-220AB / D^2PAK / I^2PAK	Per diode Total	1.60 0.95	°C/W
		TO-247	Per diode Total	1.5 0.9	
		TO-220FPAB	Per diode Total	4 3.2	
$R_{th\ (c)}$	Coupling	TO-220AB / D^2PAK / I^2PAK / TO-247		0.30	°C/W
		TO-220FPAB		2.5	

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	Tests 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	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

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

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

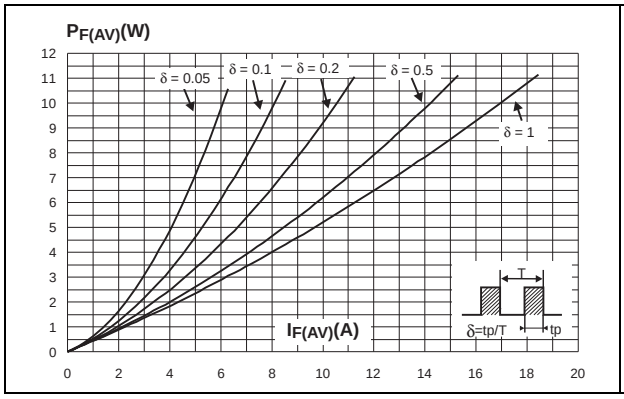


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

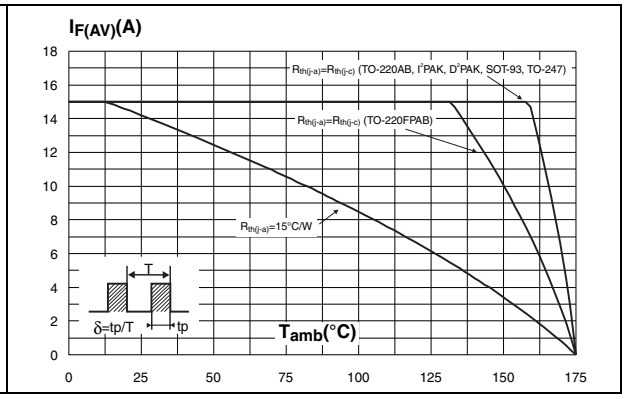


Figure 3. Normalized avalanche power derating versus pulse duration

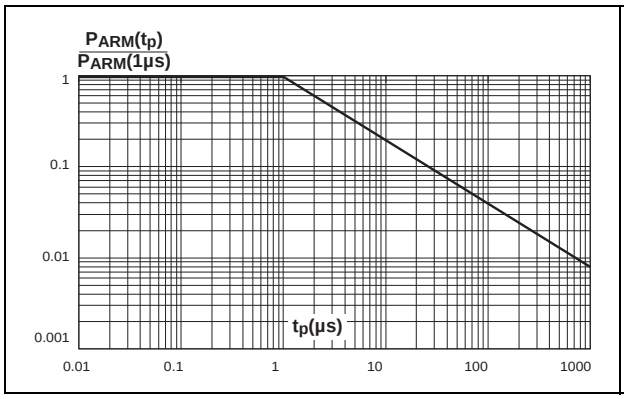


Figure 4. Normalized avalanche power derating versus junction temperature

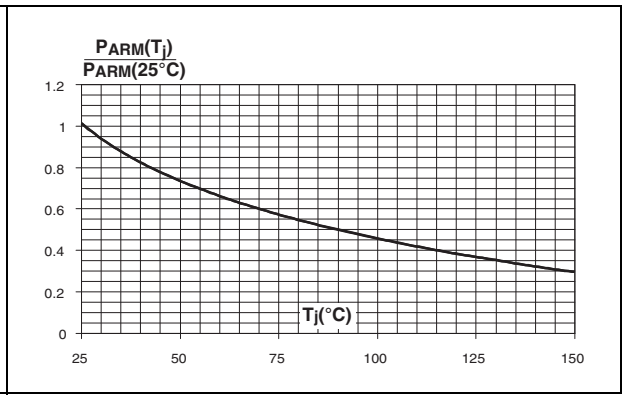


Figure 5. Non repetitive surge peak forward current versus overload duration (max. values, per diode)

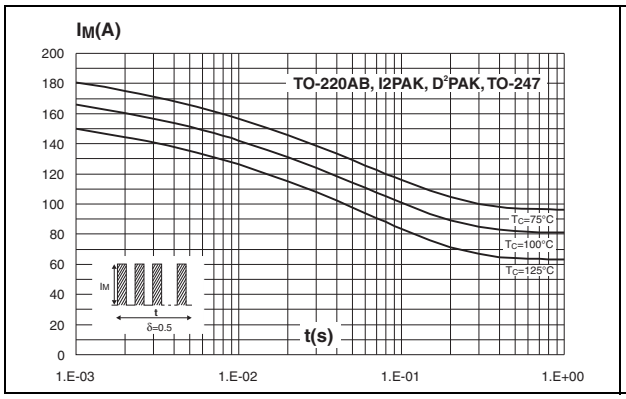


Figure 6. Non repetitive surge peak forward current versus overload duration (max. values, per diode, TO-220FPAB)

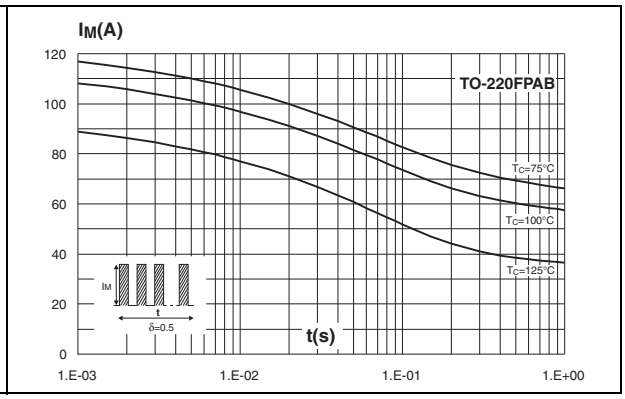


Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration

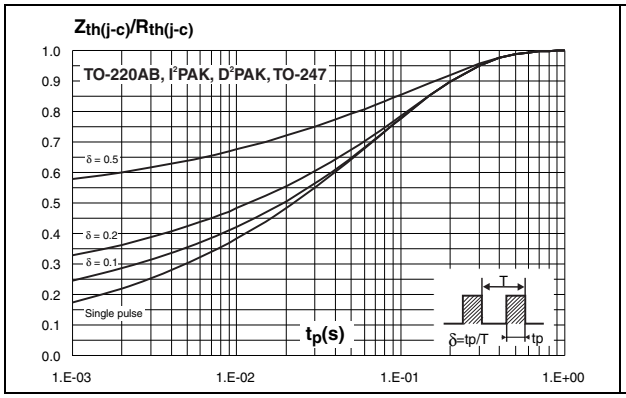


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration (TO-220FPAB)

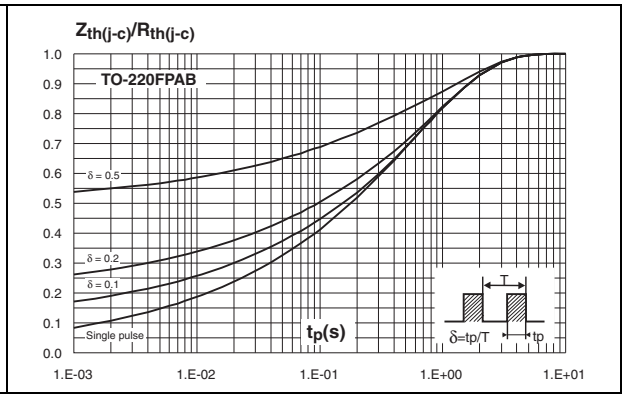


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

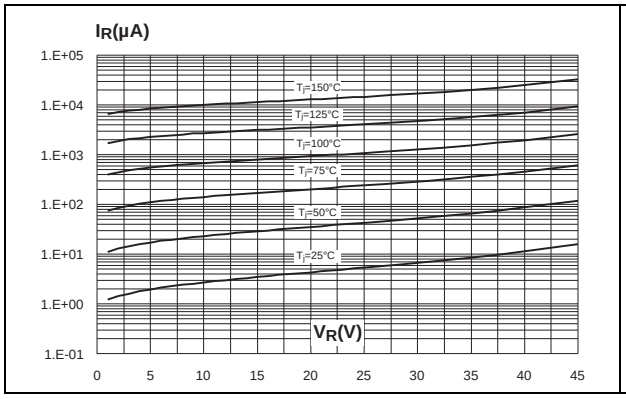


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

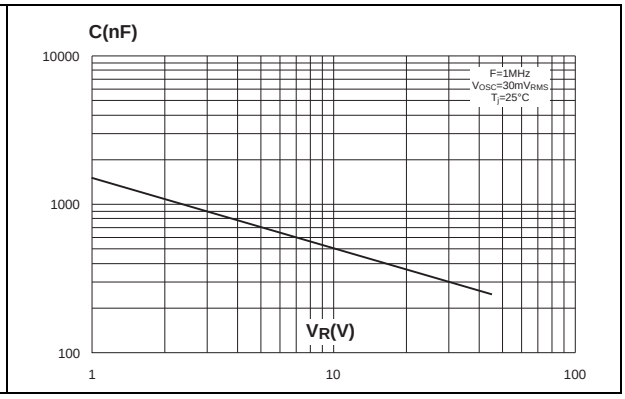


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

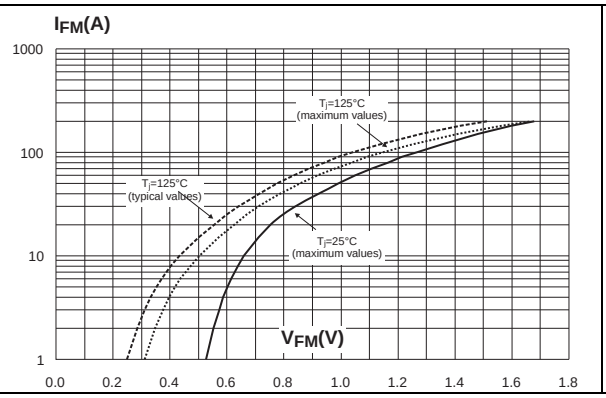
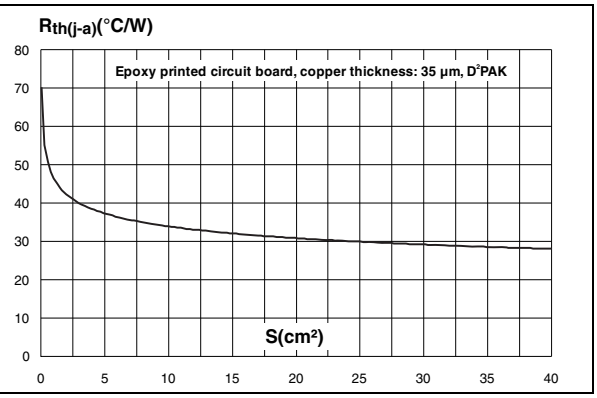


Figure 12. Thermal resistance junction to ambient versus copper surface under tab

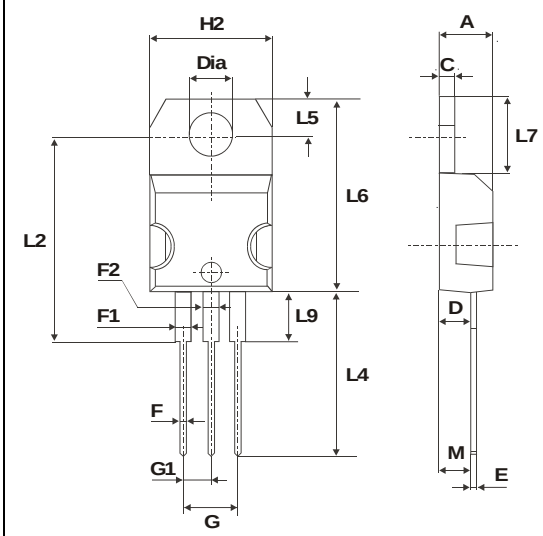


2 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m (TO-220AB, TO-220FPAB)
- Recommended torque value: 0.55 to 1.0 N·m (TO-247)

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.

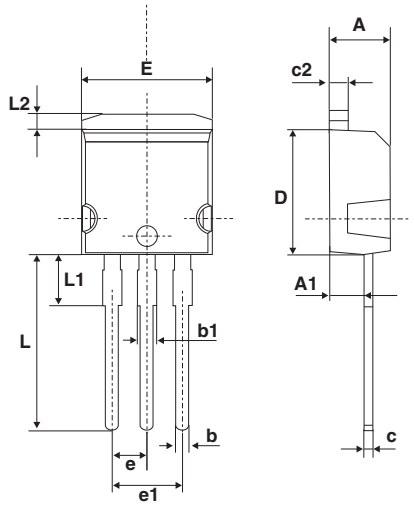
Table 5. TO-220AB dimensions



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.	
Diam.	3.75	3.85	0.147	0.151

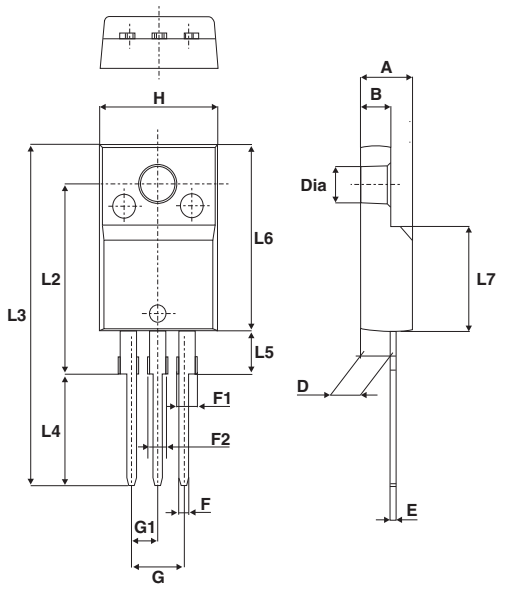
Devices in I^2PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

Table 6. I^2PAK dimensions



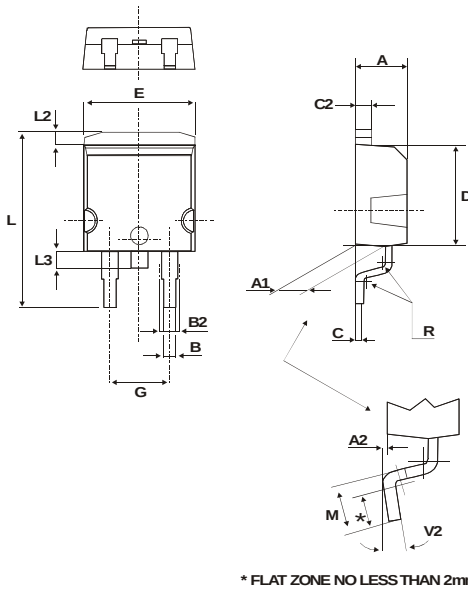
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 7. TO-220FPAB dimensions



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

Table 8. 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 mm)

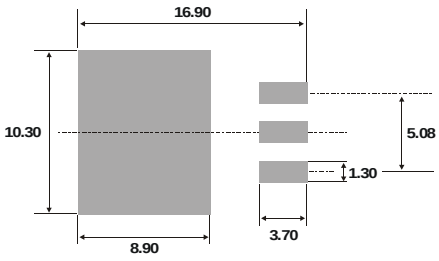
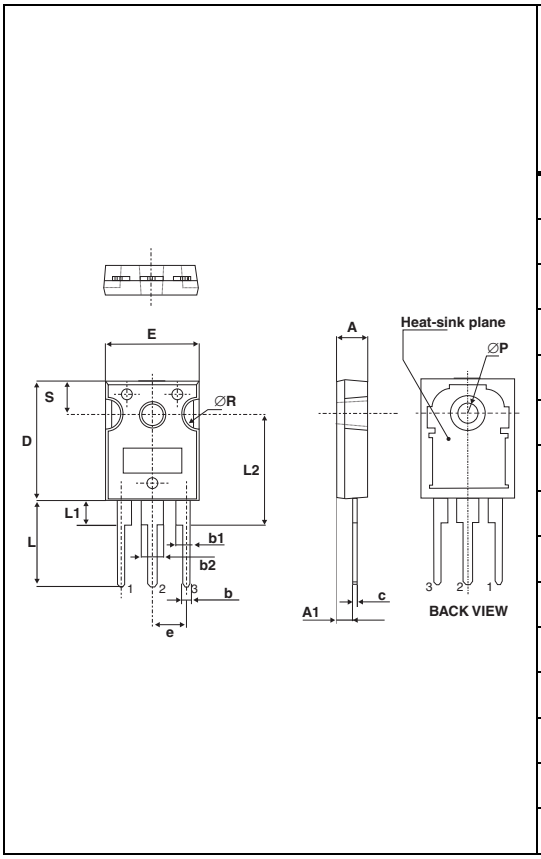


Table 9. TO-247 dimensions



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 typ.			0.728 typ.		
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

1. Dimension D plus gate protrusion does not exceed 20.5 mm
2. Resin thickness around the mounting hole is not less than 0.9 mm

3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS3045CT	STPS3045CT	TO-220AB	2.23 g	50	Tube
STPS3045CR	STPS3045CR	I^2PAK	1.49 g	50	Tube
STPS3045CFP	STPS3045CFP	TO-220FPAB	2.0 g	50	Tube
STPS3045CG	STPS3045CG	D^2PAK	1.48 g	50	Tube
STPS3045CG-TR	STPS3045CG			1000	Tape and reel
STPS3045CW	STPS3045CW	TO-247	4.46 g	30	Tube

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
July-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*.

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