STPS30L45C

Low drop power Schottky rectifier

Features

- low forward voltage drop meaning very small conduction losses
- low switching losses allowing high frequency operation
- low thermal resistance
- avalanche rated
- insulated package TO-220FPAB:
  - insulating voltage = 2000 V DC
  - capacitance = 45 pF
- avalanche capability specified

Description

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

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

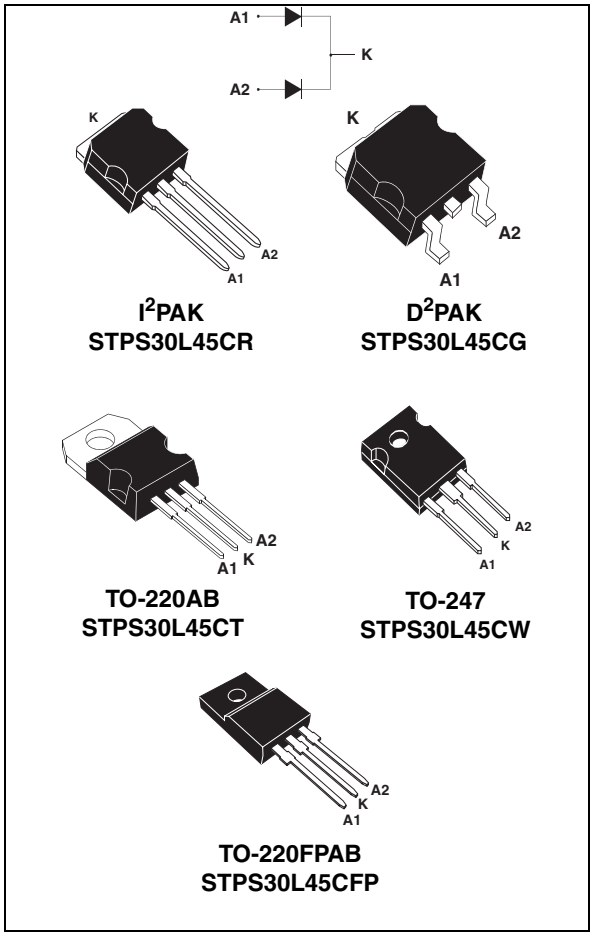


Table 1. Device summary

$I_{F(AV)}$	2 x 15 A
V_{RRM}	45 V
T_j (max)	150 °C
V_F(max)	0.5 V

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 current				30	A
$I_{F(AV)}$	Average forward current	TO-220FPAB	T_c =110 °C, δ = 0.5	Per diode	15	A
		TO-220AB, TO-247, I^2PAK, D_2PAK	T_c = 135 °C, δ = 0.5	Per device	30	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms Sinusoidal		220	A
I_{RRM}	Repetitive peak reverse current		t_p = 2 µs square F = 1 kHz		1	A
I_{RSM}	Non repetitive peak reverse current		t_p = 100 µs square		3	A
P_{ARM}	Repetitive peak avalanche power		t_p = 1 µs T_j = 25 °C		6000	W
T_{stg}	Storage temperature range				-65 to + 150	°C
T_j	Maximum operating junction temperature (1)				150	°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	TO-220FPAB	Per diode	4	°C/W
			Total	3.2	
		TO-220AB, TO-247, I^2PAK, D^2PAK	Per diode	1.60	
			Total	0.85	
$R_{th(c)}$	Coupling	TO-220FPAB		2.5	°C/W
		TO-220AB, TO-247, I^2PAK, D^2PAK		0.10	

When the diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode 2) 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	$V_R = V_{RRM}$			0.4	mA
		T_j = 125 °C			100	200	mA
V_F(1)	Forward voltage drop	T_j = 25 °C	I_F = 15 A			0.55	V
		T_j = 125 °C	I_F = 15 A		0.42	0.50	
		T_j = 25 °C	I_F = 30 A			0.74	
		T_j = 125 °C	I_F = 30 A		0.59	0.67	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation: $P = 0.330 \times I_{F(AV)} + 0.011\ I_F{}^2{}_{(RMS)}$

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

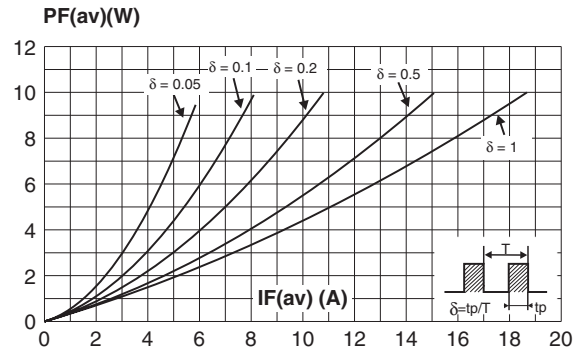


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

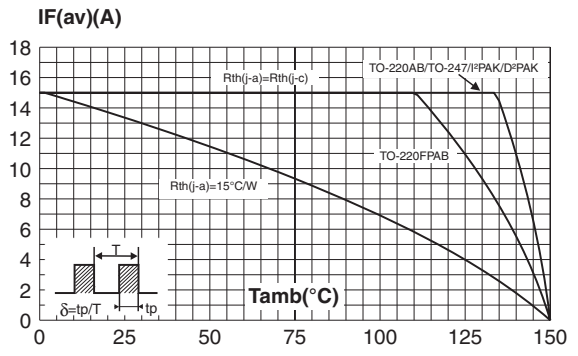


Figure 3. Normalized avalanche power derating versus pulse duration

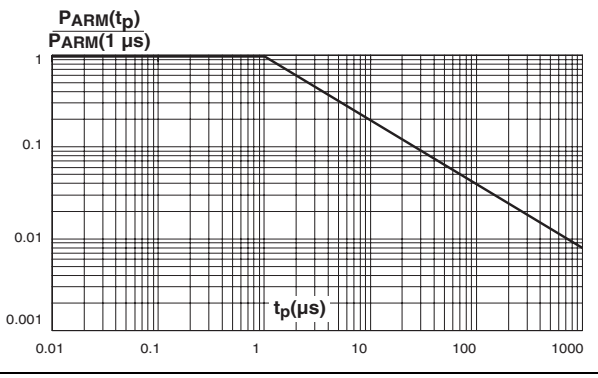


Figure 4. Normalized avalanche power derating versus junction temperature

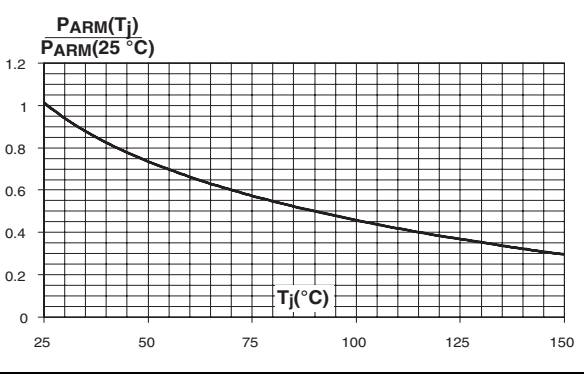


Figure 5. Non repetitive surge peak forward current versus overload duration

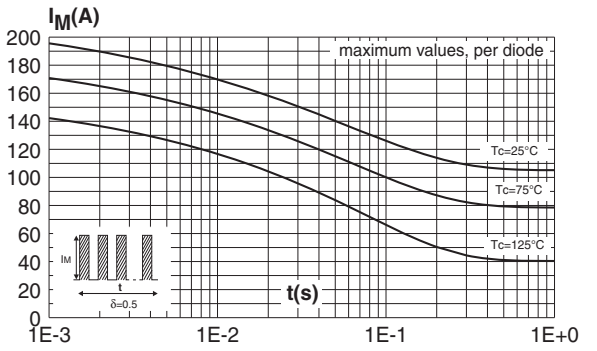


Figure 6. Non repetitive surge peak forward current versus overload duration (TO-220FPAB only)

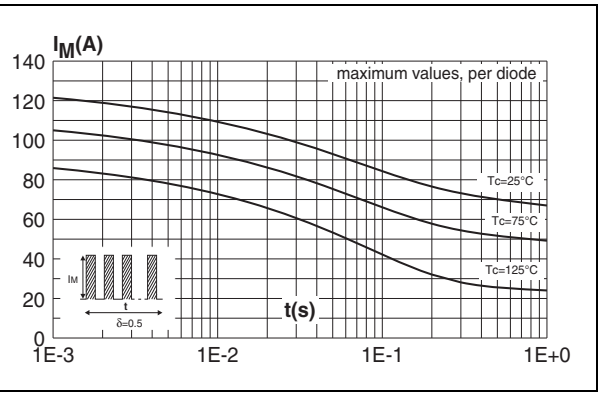


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

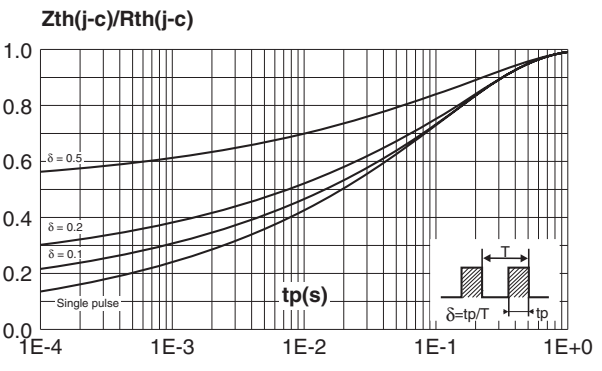


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

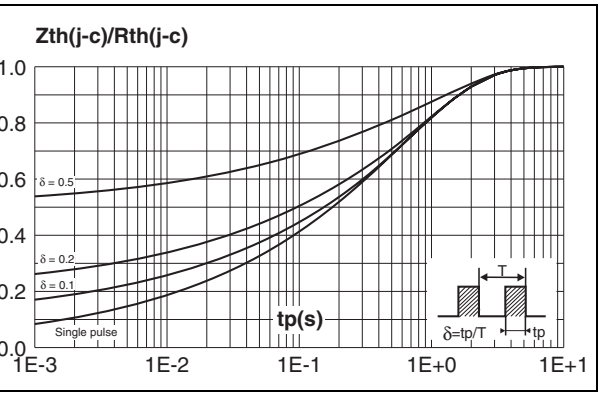


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

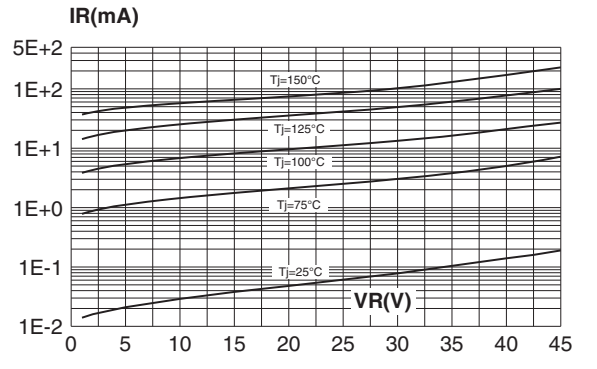


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

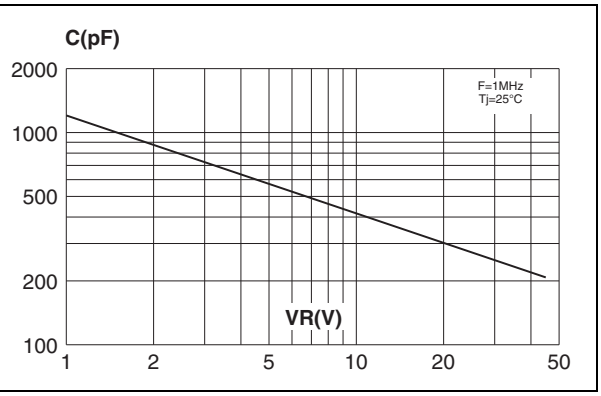


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

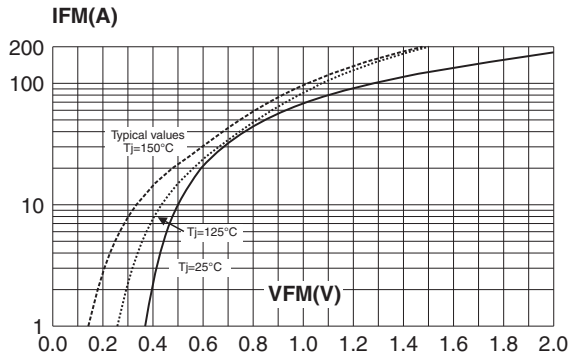
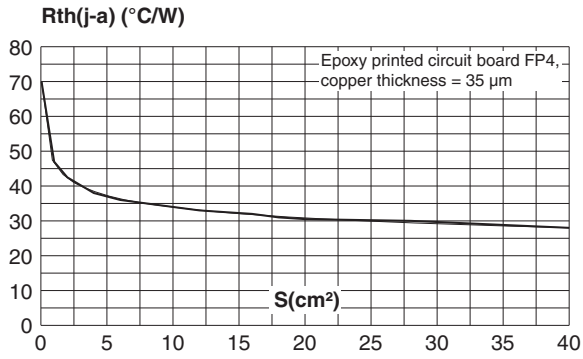


Figure 12. Thermal resistance junction to ambient versus copper surface under tab for D^2PAK

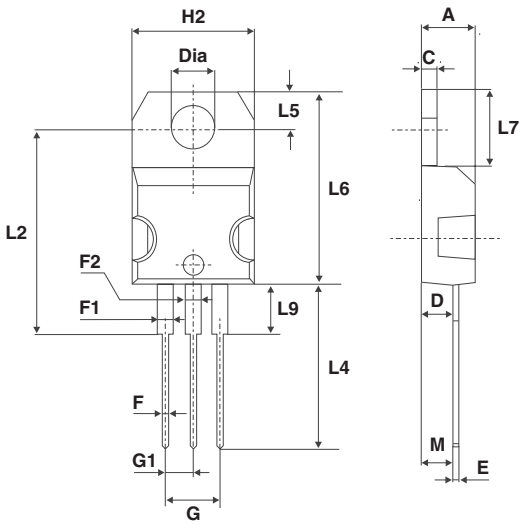


2 Package Information

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

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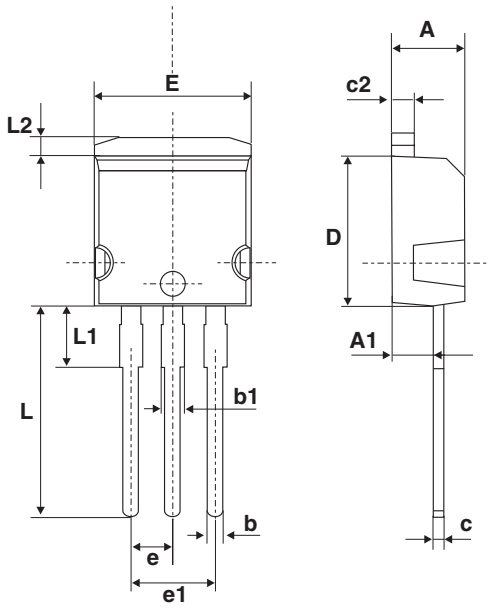
Table 5. TO-220AB package dimensions



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

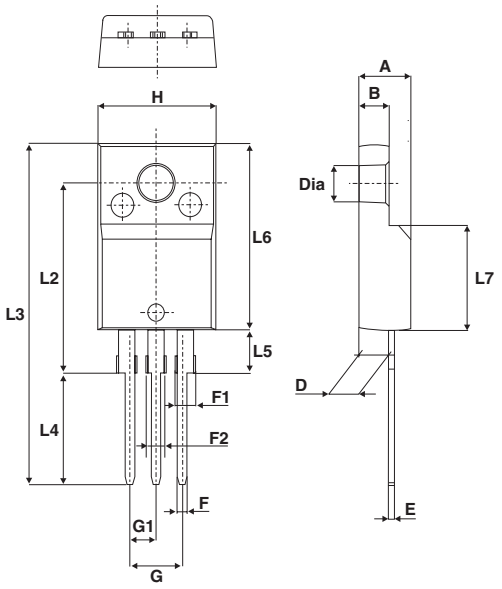
Mounting (soldering) the I^2PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Table 6. I^2PAK dimensions



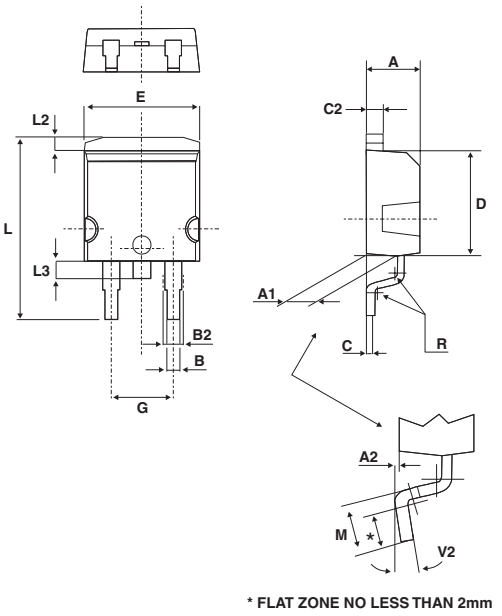
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
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 package 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 package 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. D²PAK footprint dimensions (in millimeters)

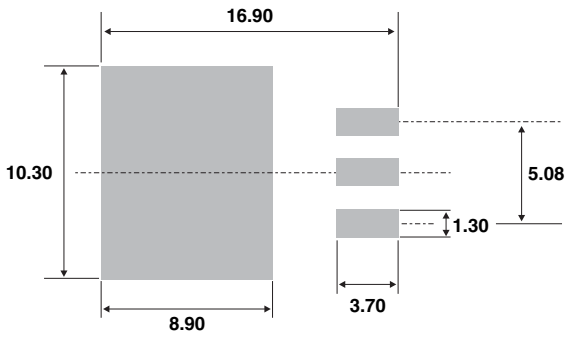
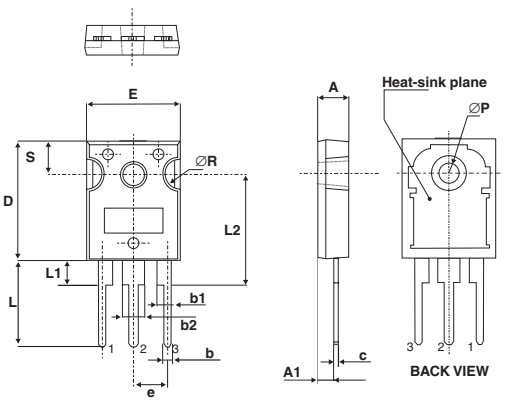


Table 9. TO-247 dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	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	5.45 typ.		0.215 typ.	
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	5.50 typ.		0.216 typ.	

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
STPS30L45CT	STPS30L45CT	TO-220AB	2g	50	Tube
STPS30L45CG	STPS30L45CG	D^2PAK	1.8g	50	Tube
STPS30L45CG-TR	STPS30L45CG	D^2PAK	1.8g	500	Tape and reel
STPS30L45CW	STPS30L45CW	TO-247	4.4g	30	Tube
STPS30L45CR	STPS30L45CR	I^2PAK	1.4g	50	Tube
STPS30L45CFP	STPS30L45CFP	TO-220FPAB	1.9 g	50	Tube

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
Jul-2003	3B	Previous issue
13-Oct-2010	4	Added paragraph above *Table 6* and updated I^2PAK dimensions in *Table 6*. Updated TO-247 dimensions in *Table 9*.

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