STPS30SM100S

Power Schottky rectifier

Features

- High current capability
- Avalanche rated
- Low forward voltage drop current
- High frequency operation
- Insulated package:
  - Insulation voltage 2000 V rms
  - Package capacitance = 12 pF

Description

This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220AB narrow leads, TO-220FPAB, D^2PAK and I^2PAK, this device is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

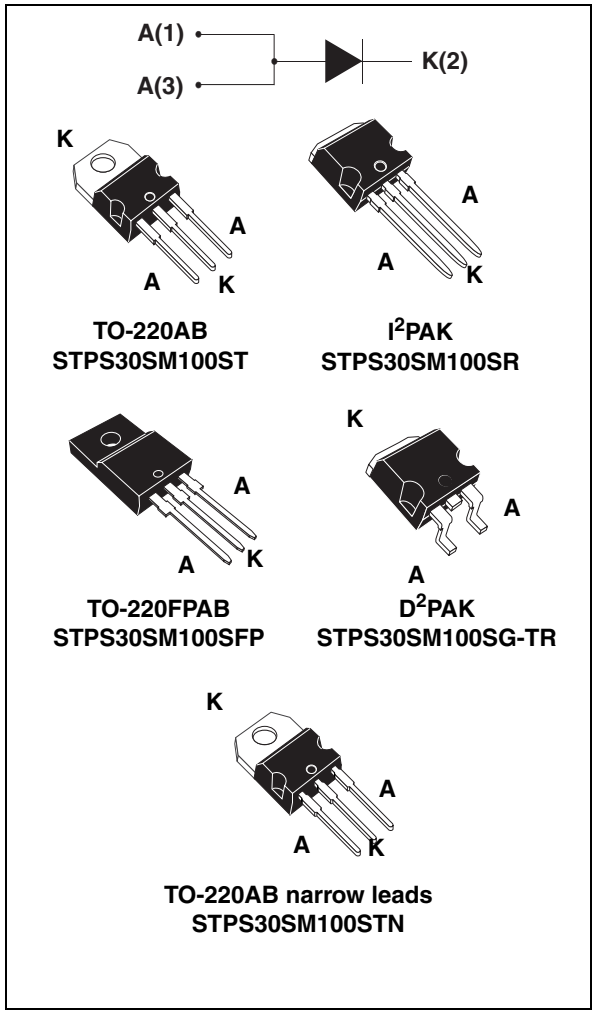


Figure 1. Electrical characteristics (a)

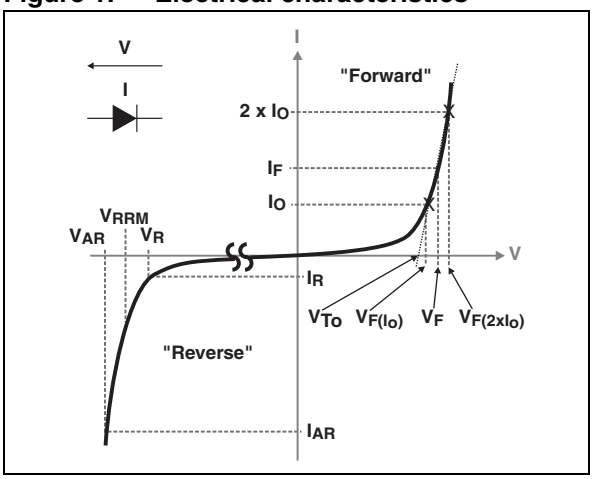


Table 1. Device summary

$I_{F(AV)}$	30 A
V_{RRM}	100 V
T_j (max)	150 °C
V_F(typ)	0.420 V

a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in *Figure 13.* V_{AR} and I_{AR} are pulse measurements (t_p < 1 µs). V_R, I_R, V_{RRM} and V_F, are static characteristics

1 Characteristics

Table 2. Absolute ratings (limiting values with terminals 1 and 3 short circuited)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_{F(RMS)}$	Forward current rms		60	A
$I_{F(AV)}$	Average forward current δ = 0.5	TO-220AB, TO-220AB narrow leads, D^2PAK, I^2PAK, T_c = 125 °C	30	A
		TO-220FPAB, T_c = 80 °C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, terminals 1 and 3 short circuited	530	A
P_{ARM} (1)	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C	21500	W
V_{ARM} (2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs T_j < 150 °C I_{AR} < 53.8 A	120	V
V_{ASM} (2)	Maximum single pulse peak avalanche voltage	t_p < 1 µs T_j < 150 °C I_{AR} < 53.8 A	120	V
T_{stg}	Storage temperature range		-65 to + 175	°C
T_j	Maximum operating junction temperature (3)		150	°C

1. For temperature or pulse time duration deratings, refer to *Figure 4.* and *Figure 5.*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. Refer to *Figure 13.*
3. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, TO-220AB narrow leads, D^2PAK, I^2PAK	1	°C/W
		TO-220FPAB	4	

Table 4. Static electrical characteristics (terminals 1 and 3 short circuited)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			45	µA
		T_j = 125 °C			15	45	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A		500		mV
		T_j = 125 °C			420		
		T_j = 25 °C	I_F = 10A		600	670	
		T_j = 125 °C			505	560	
		T_j = 25 °C	I_F = 30 A		780	870	
		T_j = 125 °C			630	690	

1. Pulse test: t_p = 5 ms, δ < 2%
2. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.580 \times I_{F(AV)} + 0.0033 \times I_F{}^2{}_{(RMS)}$

Figure 2. Average forward power dissipation versus average forward current

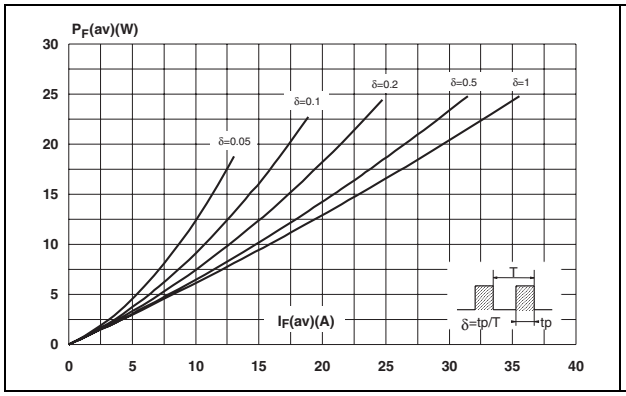


Figure 3. Average forward current versus ambient temperature (δ = 0.5)

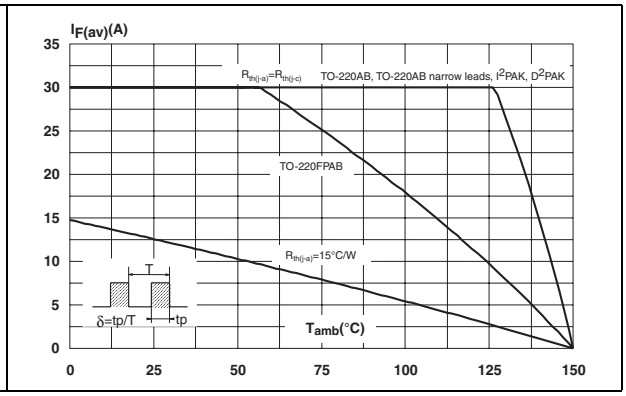


Figure 4. Normalized avalanche power derating versus pulse duration

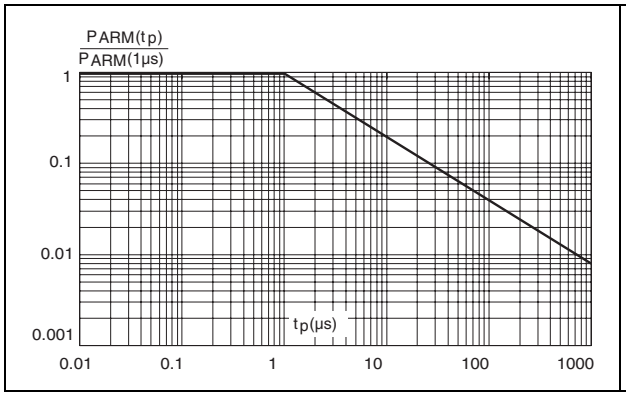


Figure 5. Normalized avalanche power derating versus junction temperature

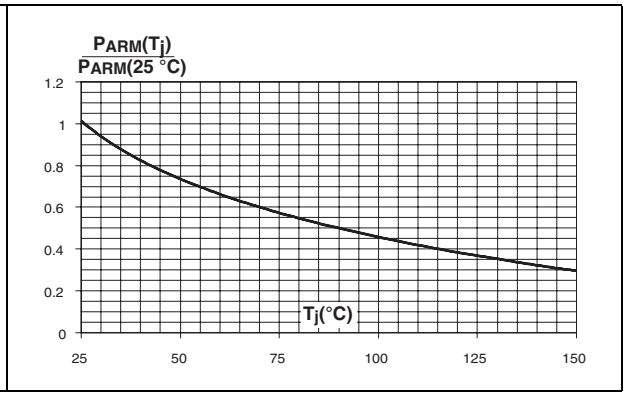


Figure 6. Non repetitive surge peak forward current versus overload duration, maximum values

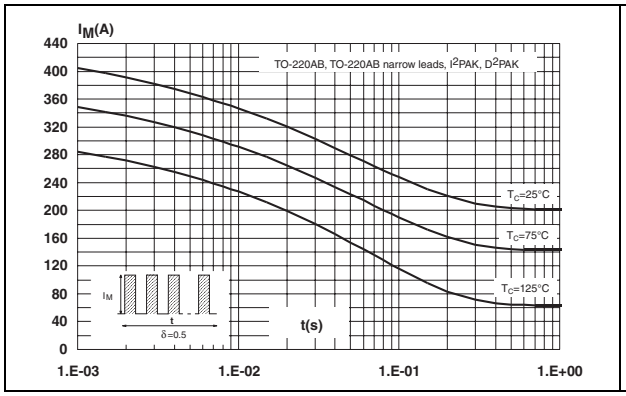


Figure 7. Non repetitive surge peak forward current versus overload duration, maximum values (TO-220FPAB)

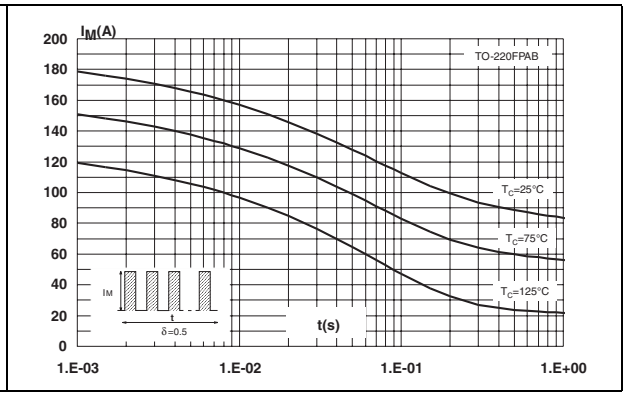


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration

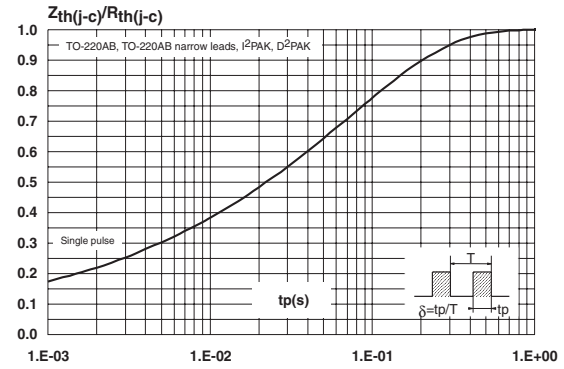


Figure 9. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

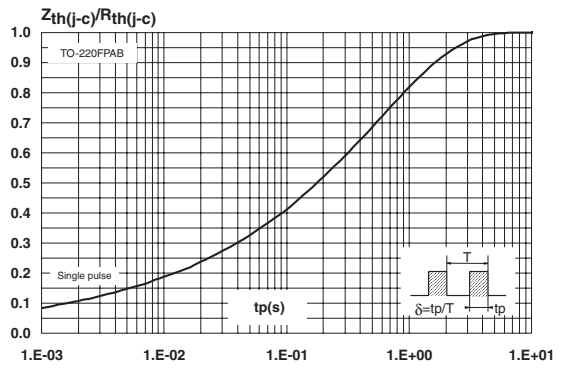


Figure 10. Reverse leakage current versus reverse voltage applied (typical values)

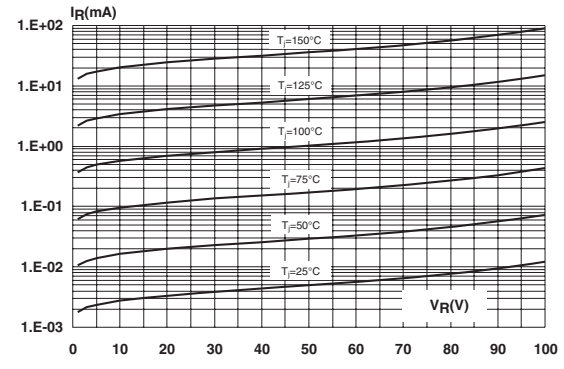


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

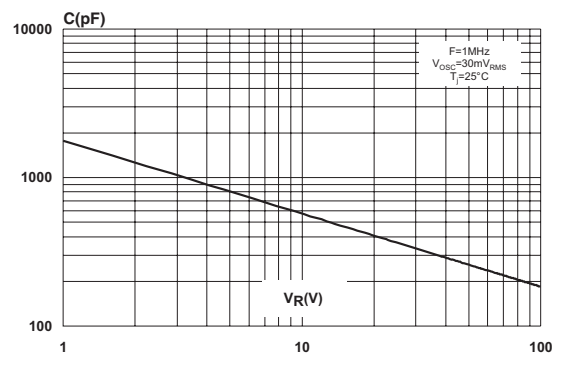


Figure 12. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)

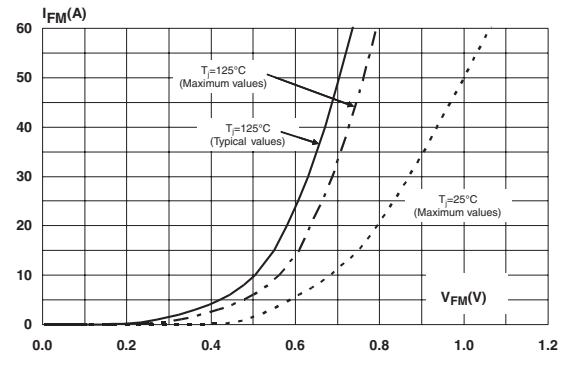
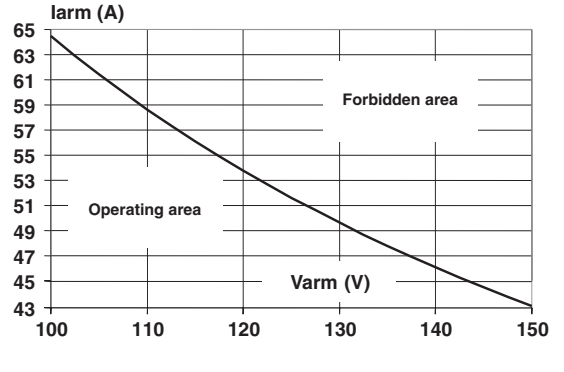


Figure 13. Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)



2 Package information

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

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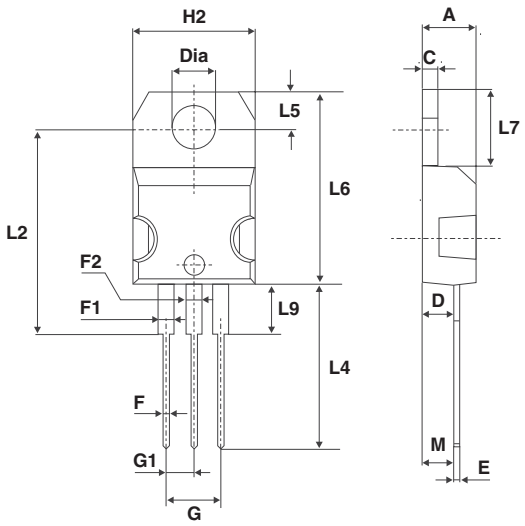
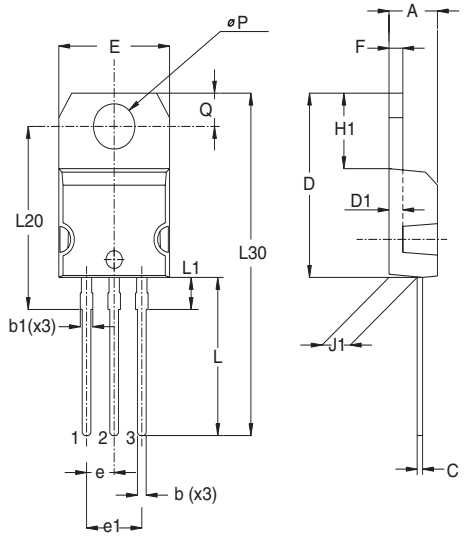
Table 5. TO-220AB dimensions



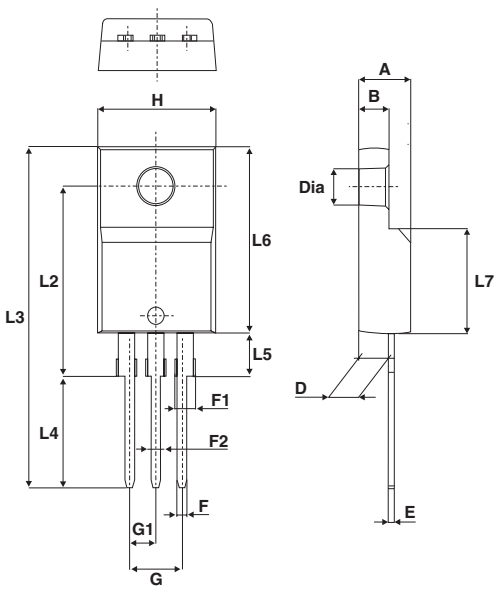
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
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

Table 6. TO-220AB narrow leads dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1	1.27			0.05		
E	10.00		10.40	0.39		0.41
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.51		0.55
L1	2.60		2.90	0.102		0.114
L20	15.40			0.61		
L30	28.90			1.14		
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

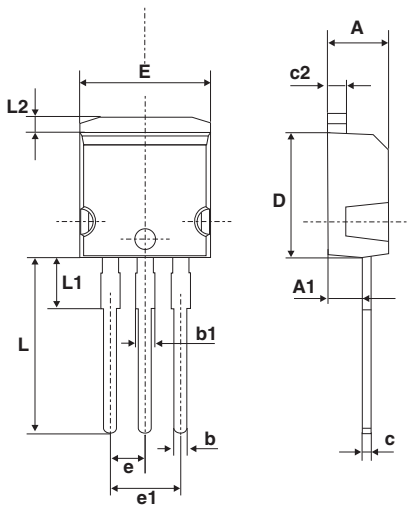
Table 7. TO-220FPAB dimensions



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

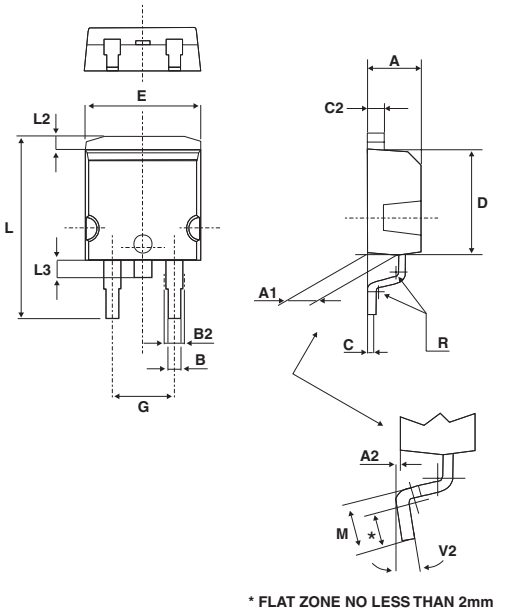
Devices in I^2PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

Table 8. I^2PAK dimensions



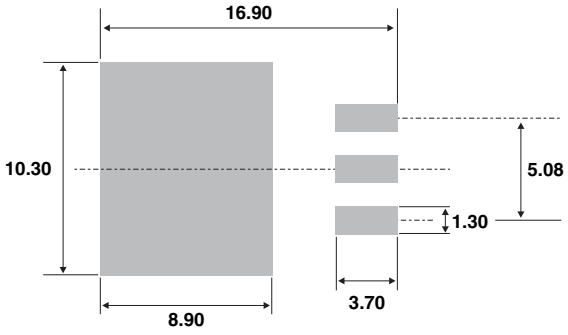
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409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



3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30SM100ST	PS30SM100ST	TO-220AB	2.2 g	50	Tube
STPS30SM100SFP	PS30SM100SFP	TO-220FPAB	1.70 g	50	Tube
STPS30SM100SR	PS30SM100SR	I^2PAK	1.49 g	50	Tube
STPS30SM100SG-TR	PS30SM100SG	D^2PAK	1.48 g	1000	Tape and reel
STPS30SM100STN	PS30SM100STN	TO-220AB narrow leads	1.9 g	50	Tube

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
25-Mar-2009	1	First issue
16-Apr-2010	2	Updated package graphic for TO-220AB on front page and in *Table 5*.
28-Jan-2011	3	Added warning paragraph above *Table 8*.
15-Sep-2011	4	Added TO-220AB narrow leads package.

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