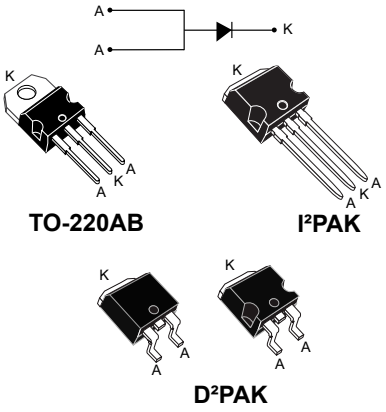
STPS30SM100S

Datasheet

100 V, 30 A power Schottky rectifier



Features

- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation
- ECOPACK®2 compliant components (for D²PAK on demand)

Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Desktop power supply

Description

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

Packaged in TO-220AB, D²PAK and I²PAK, the STPS30SM100S is optimized for use in notebook and game station adapters, providing in these applications a good efficiency at both low and high load.

Product status link
STPS30SM100S

Product summary	
$I_{F(AV)}$	30 A
V_{RRM}	100 V
T_j (max.)	150 °C
V_F (typ.)	0.63 V

1 Characteristics

Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		100	V
$I_{F(RMS)}$	Forward rms current		60	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_c = 125 °C	30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	400	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	1545	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature (1)		150	°C

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

Table 2. Thermal resistance parameter

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	1	°C/W

For more information, please refer to the following application note:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics (with 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 = 10 A	-	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:

$P = 0.580 \times I_{F(AV)} + 0.0033 \times I_{F\ (RMS)}^2$

For more information, please refer to the following application notes related to the power losses:

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (terminals 1 and 3 short circuited)

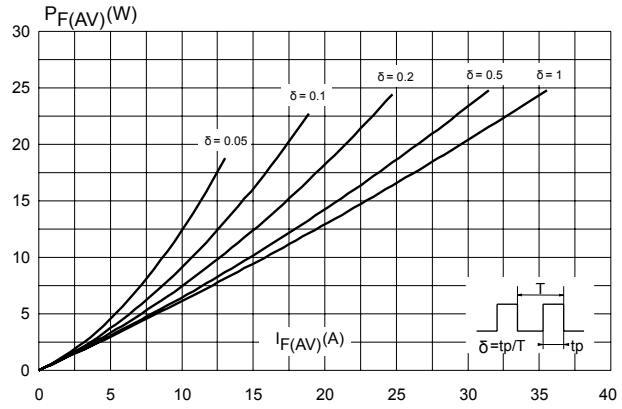


Figure 2. Average forward current versus ambient temperature (δ = 0.5, terminals 1 and 3 short circuited)

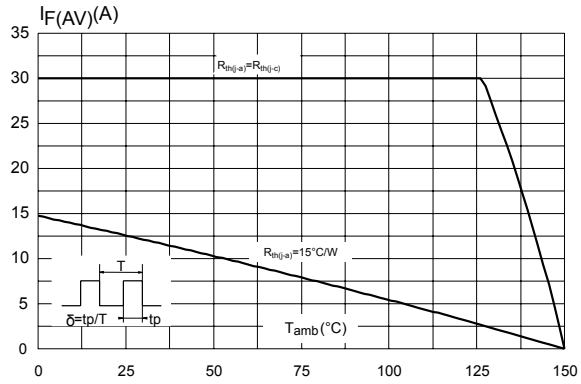


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

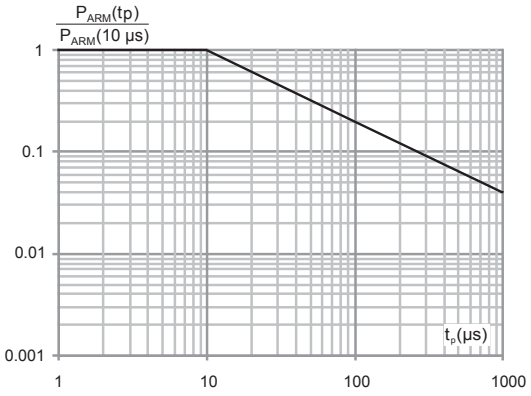


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

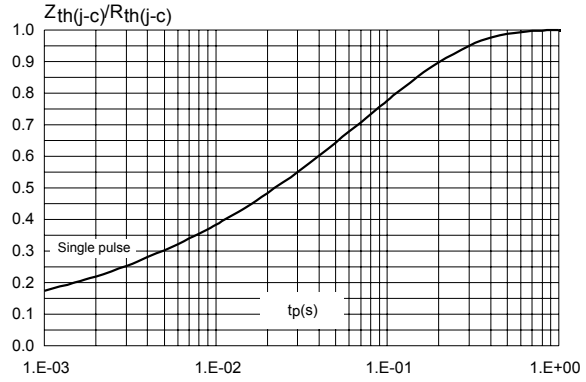


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

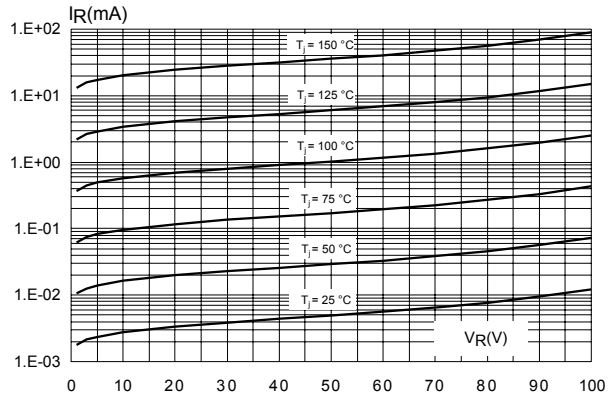


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

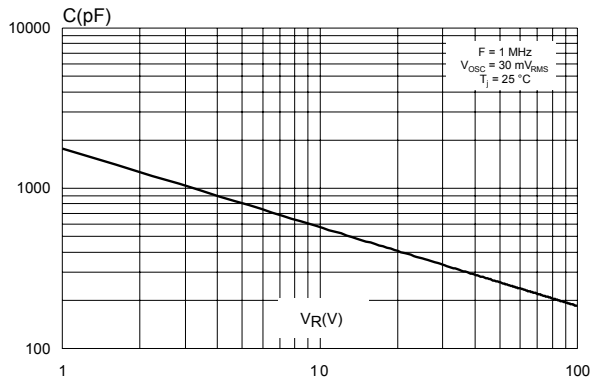
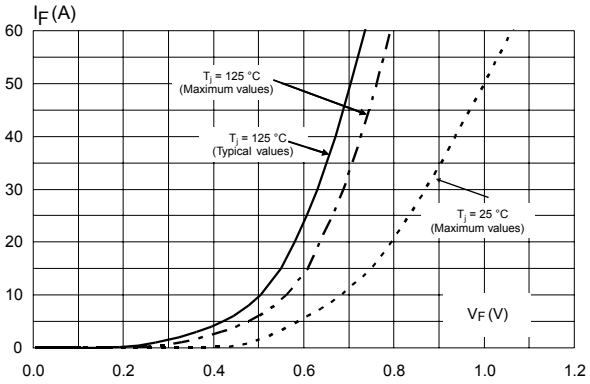


Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)



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.

2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 8. TO-220AB package outline

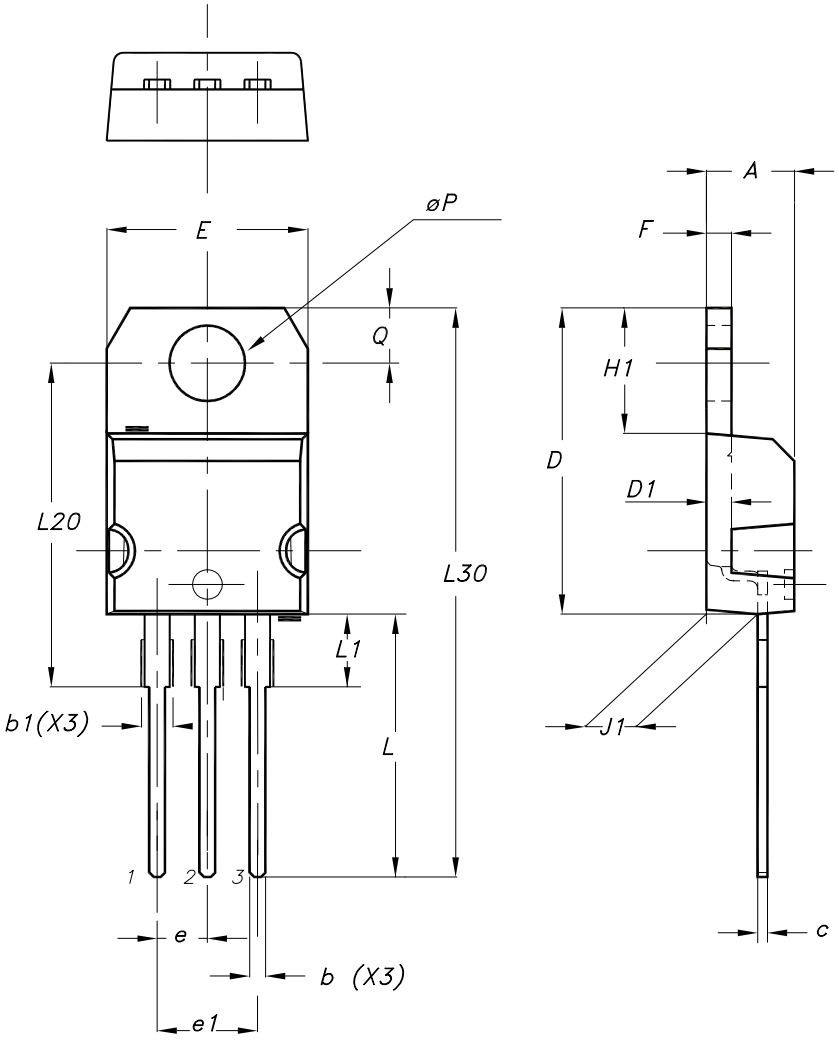


Table 4. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	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.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.2 I²PAK package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

Figure 9. I²PAK package outline

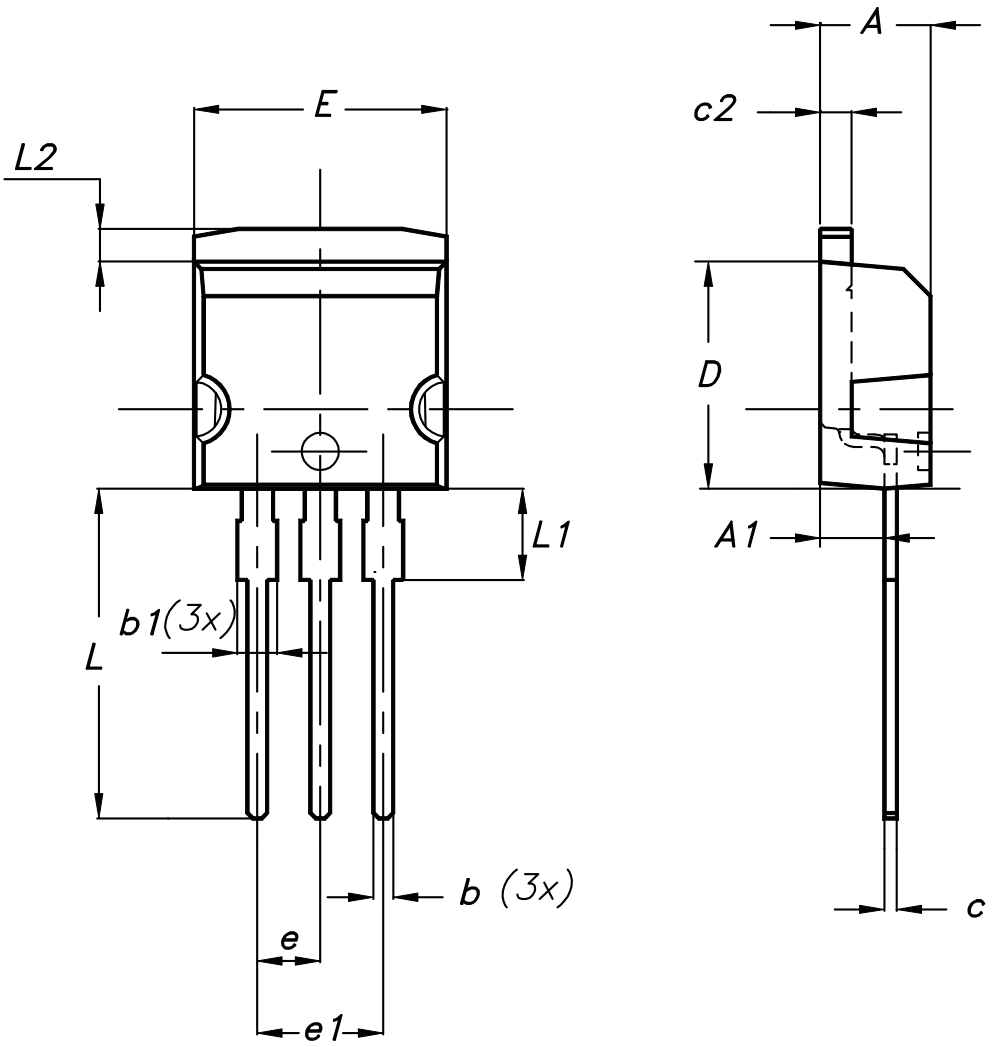
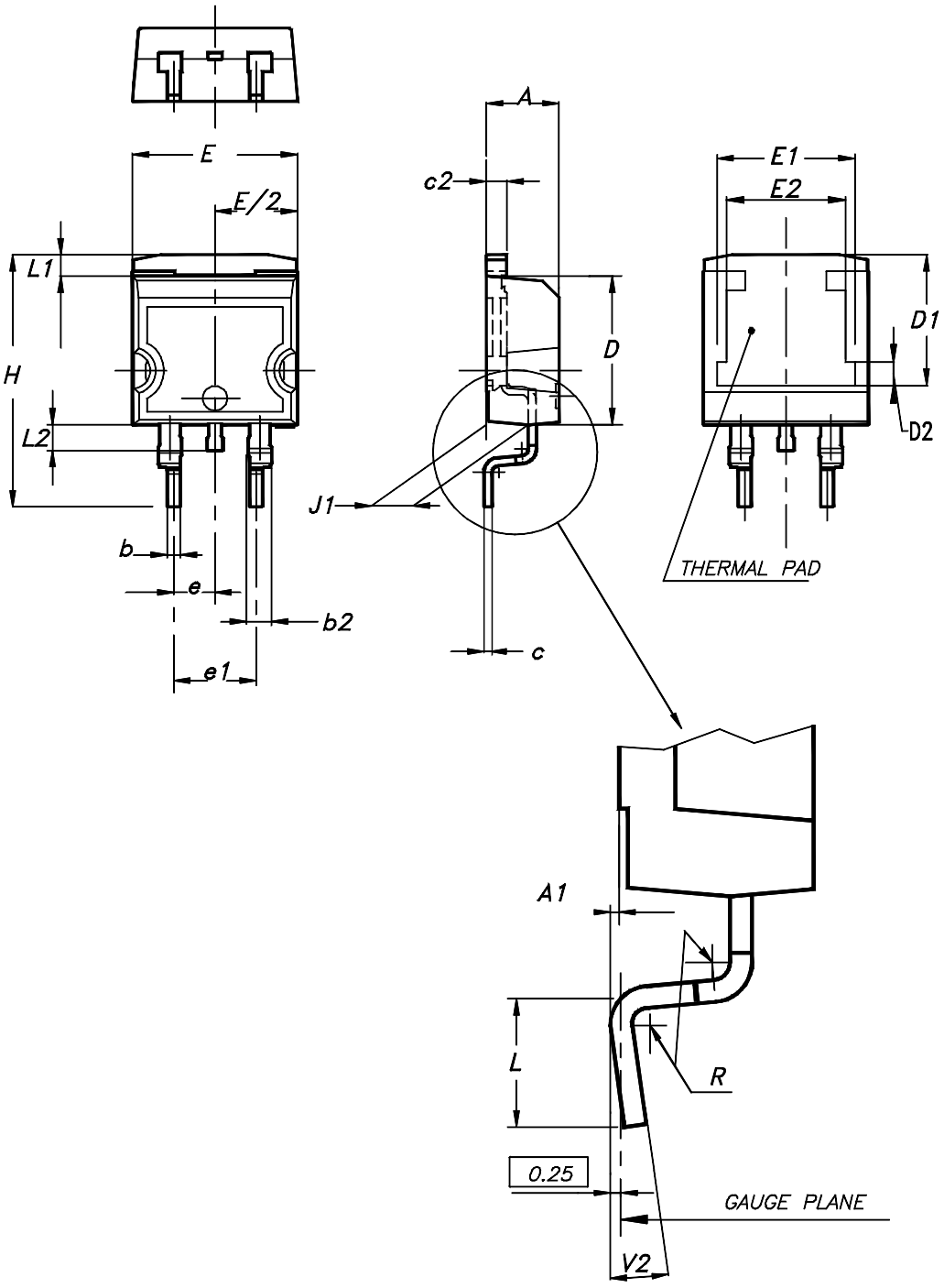


Table 5. I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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	10.00	10.40	0.394	0.409
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

2.3 D²PAK package information

Figure 10. D²PAK package outline

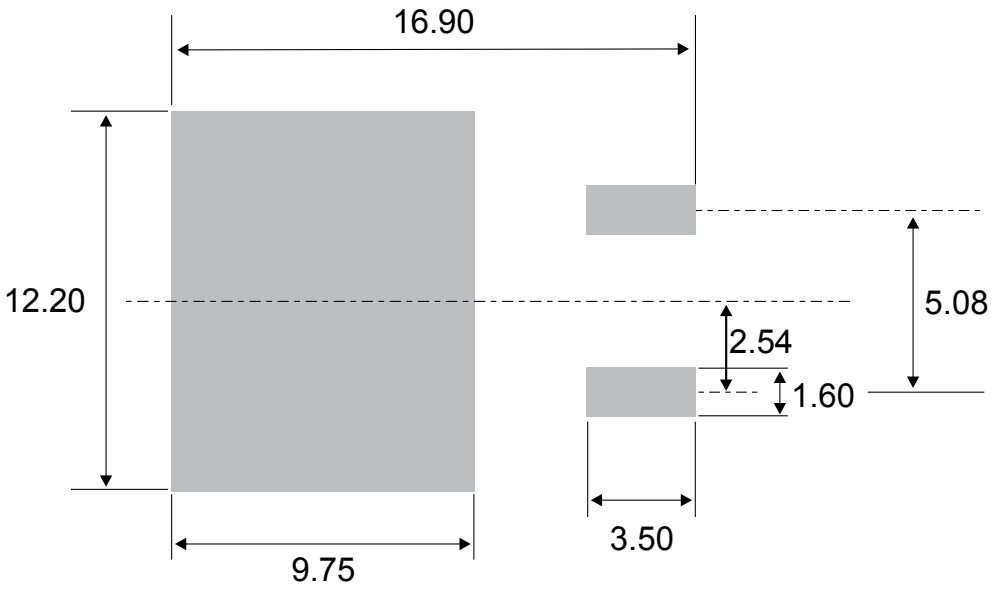


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. **D²PAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	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 11. D²PAK recommended footprint (dimensions in mm)



3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS30SM100ST	PS30SM100ST	TO-220AB	1.95 g	50	Tube
STPS30SM100SR	PS30SM100SR	I²PAK	1.50 g	50	Tube
STPS30SM100SG-TR	PS30SM100SG	D²PAK	1.48 g	1000	Tape and reel

Revision history

Table 8. 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.
12-May-2017	5	Removed TO-220FPAB package. Updated D²PAK section.
05-Oct-2018	6	Updated cover page and Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified). Removed figure 1, figure 9 and TO-220AB narrow leads package. Minor text changes to improve readability.
18-Feb-2019	7	Updated Table 1.

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