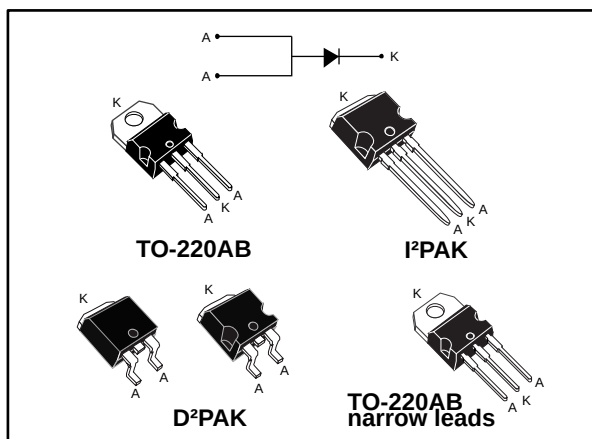


Power Schottky rectifier

Datasheet - production data



Features

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

Description

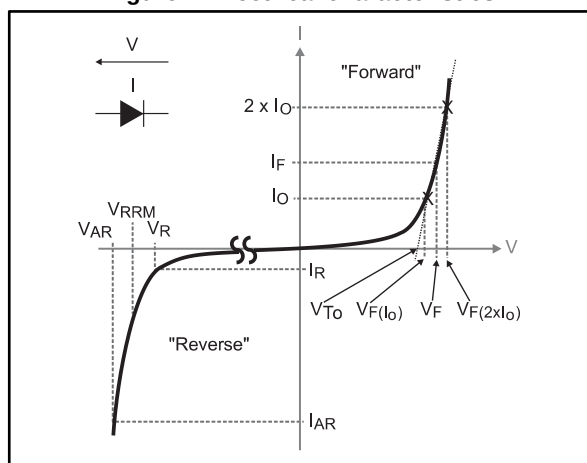
This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220AB narrow leads, D²PAK and I²PAK, 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.

Table 1: Device summary

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

Figure 1: Electrical characteristics



V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in Figure 9. V_{AR} and I_{AR} are pulse measurements ($t_p < 1 \mu s$). 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, 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 $\delta = 0.5$, square wave	$T_C = 125\text{ °C}$	30	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	530	A
$P_{ARM}^{(1)}$	Repetitive peak avalanche power	$t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$	1545	W
$V_{ARM}^{(2)}$	Maximum repetitive peak avalanche voltage	$t_p < 1\text{ }\mu\text{s}$, $T_j < 150\text{ °C}$, $I_{AR} < 53.8\text{ A}$	120	V
$V_{ASM}^{(2)}$	Maximum single pulse peak avalanche voltage	$t_p < 1\text{ }\mu\text{s}$, $T_j < 150\text{ °C}$, $I_{AR} < 53.8\text{ A}$	120	V
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature ⁽³⁾		150	°C

Notes:

⁽¹⁾For pulse time duration deratings, please refer to figure 4. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.

⁽²⁾See Figure 9

⁽³⁾ $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3: Thermal parameters

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

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

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

Notes:

⁽¹⁾Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

⁽²⁾Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

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

1.1 Characteristics (curves)

Figure 2: Average forward power dissipation versus average forward current

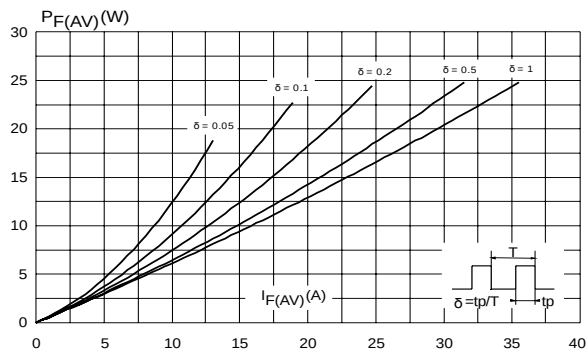


Figure 3: Average forward current versus ambient temperature ($\delta = 0.5$)

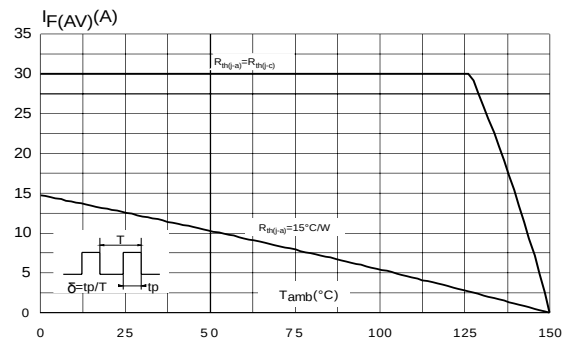


Figure 4: Normalized avalanche power derating versus pulse duration ($T_j = 125^\circ\text{C}$)

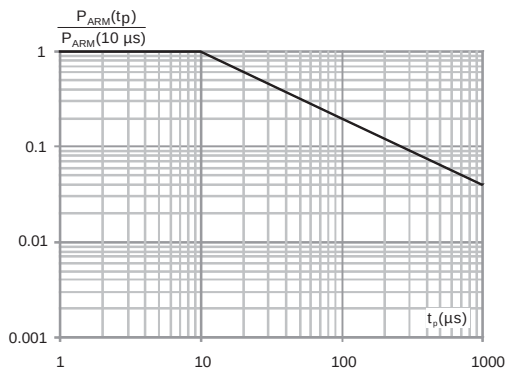


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

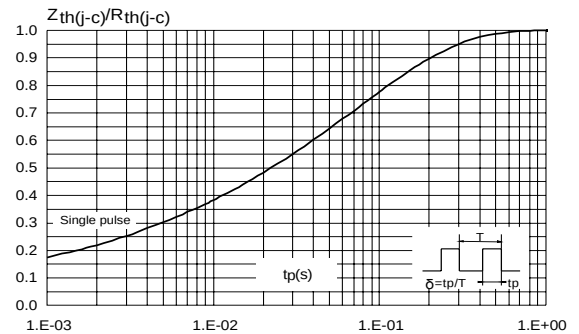


Figure 6: Reverse leakage current versus reverse voltage applied (typical values)

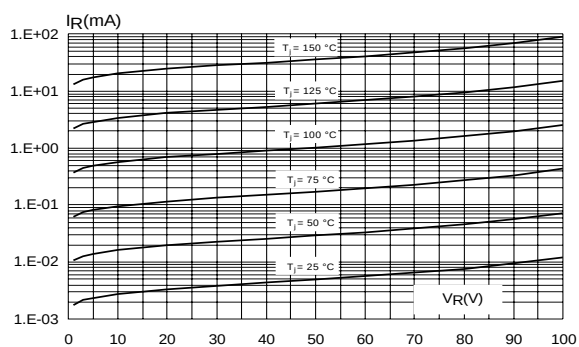


Figure 7: Junction capacitance versus reverse voltage applied (typical values)

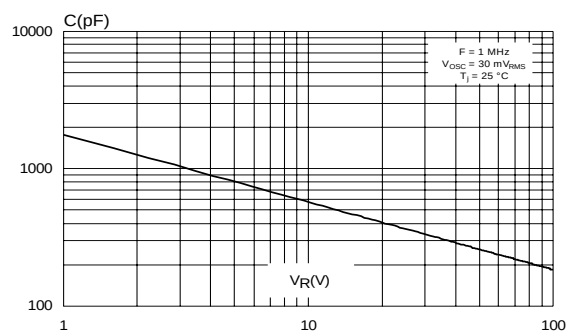
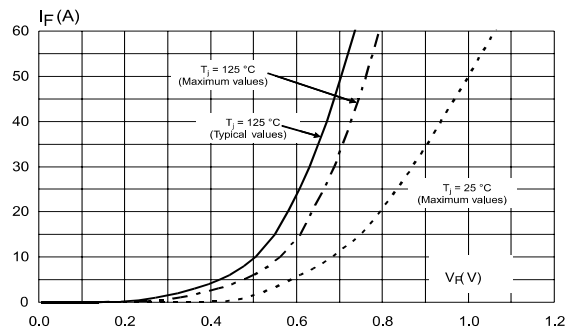
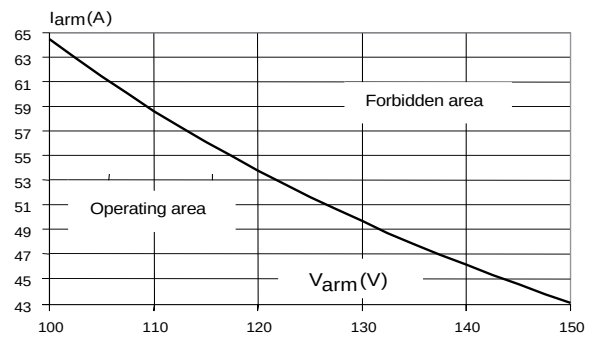


Figure 8: Forward voltage drop versus forward current (terminals 1 and 3 short circuited)**Figure 9: Reverse safe operating area ($t_p < 1\text{ }\mu\text{s}$ and $T_J < 150\text{ }^{\circ}\text{C}$)**

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)
- Maximum torque value: 0.7 N·m (for TO-220AB)

2.1 TO-220AB package information

Figure 10: TO-220AB package outline

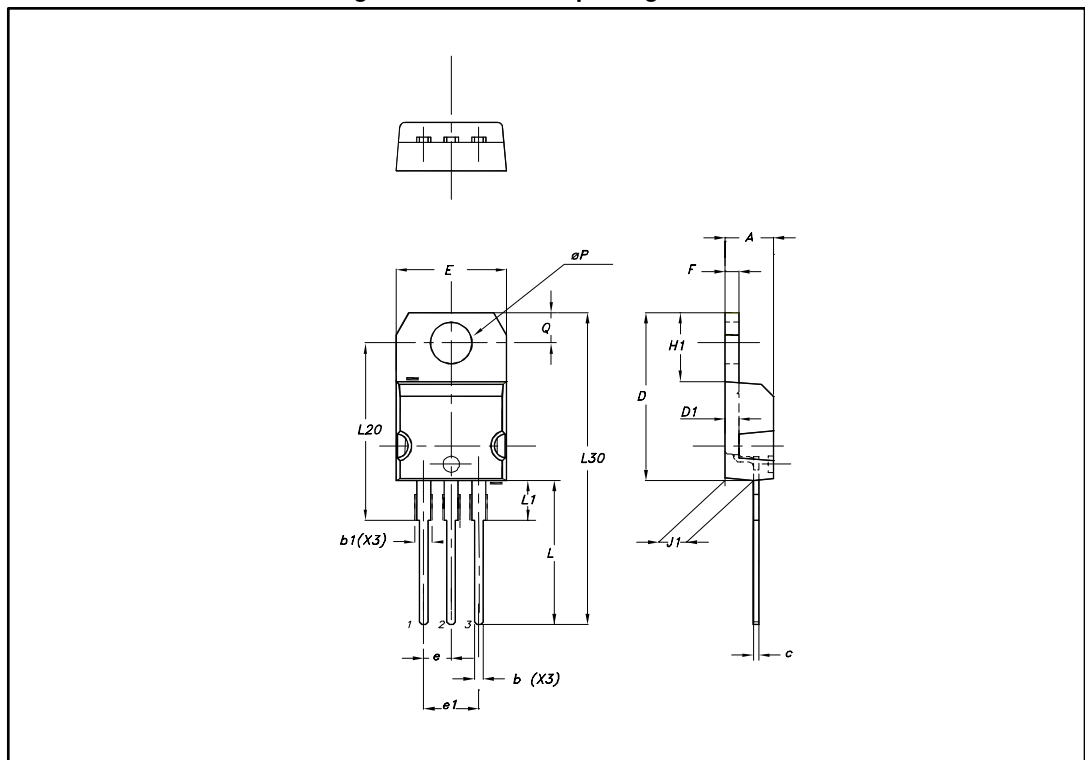


Table 5: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.70	0.045	0.067
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 TO-220AB narrow leads package information

Figure 11: TO-220AB narrow leads package outline

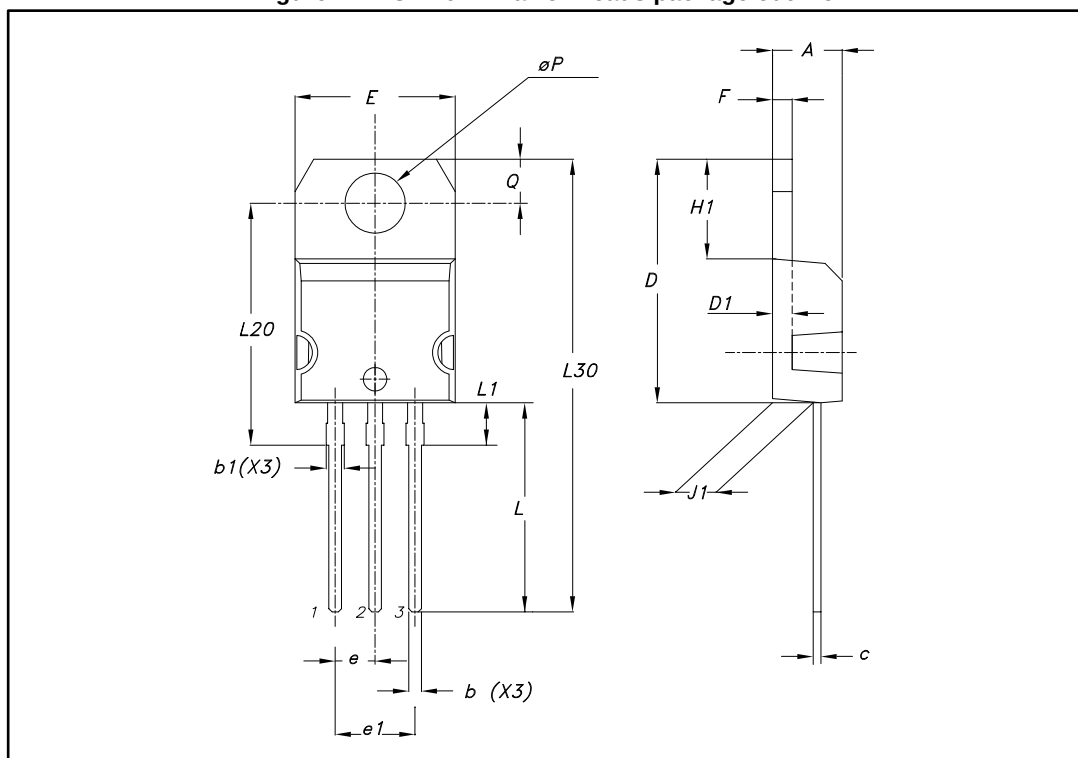
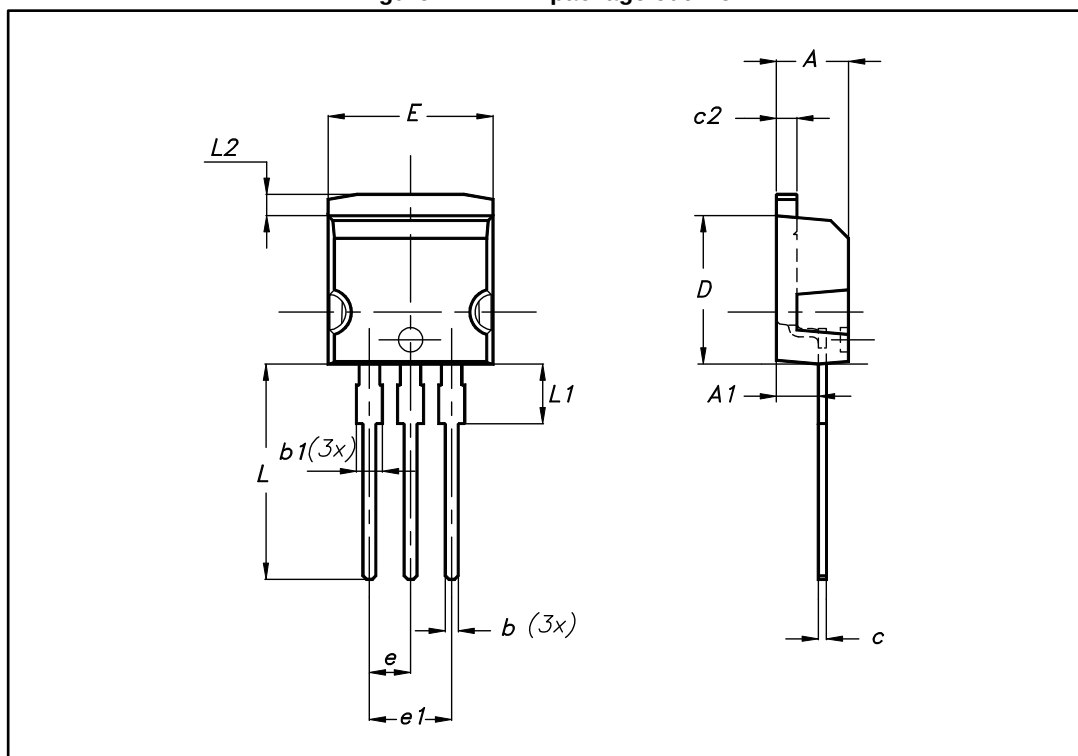


Table 6: TO-220AB narrow leads package mechanical data

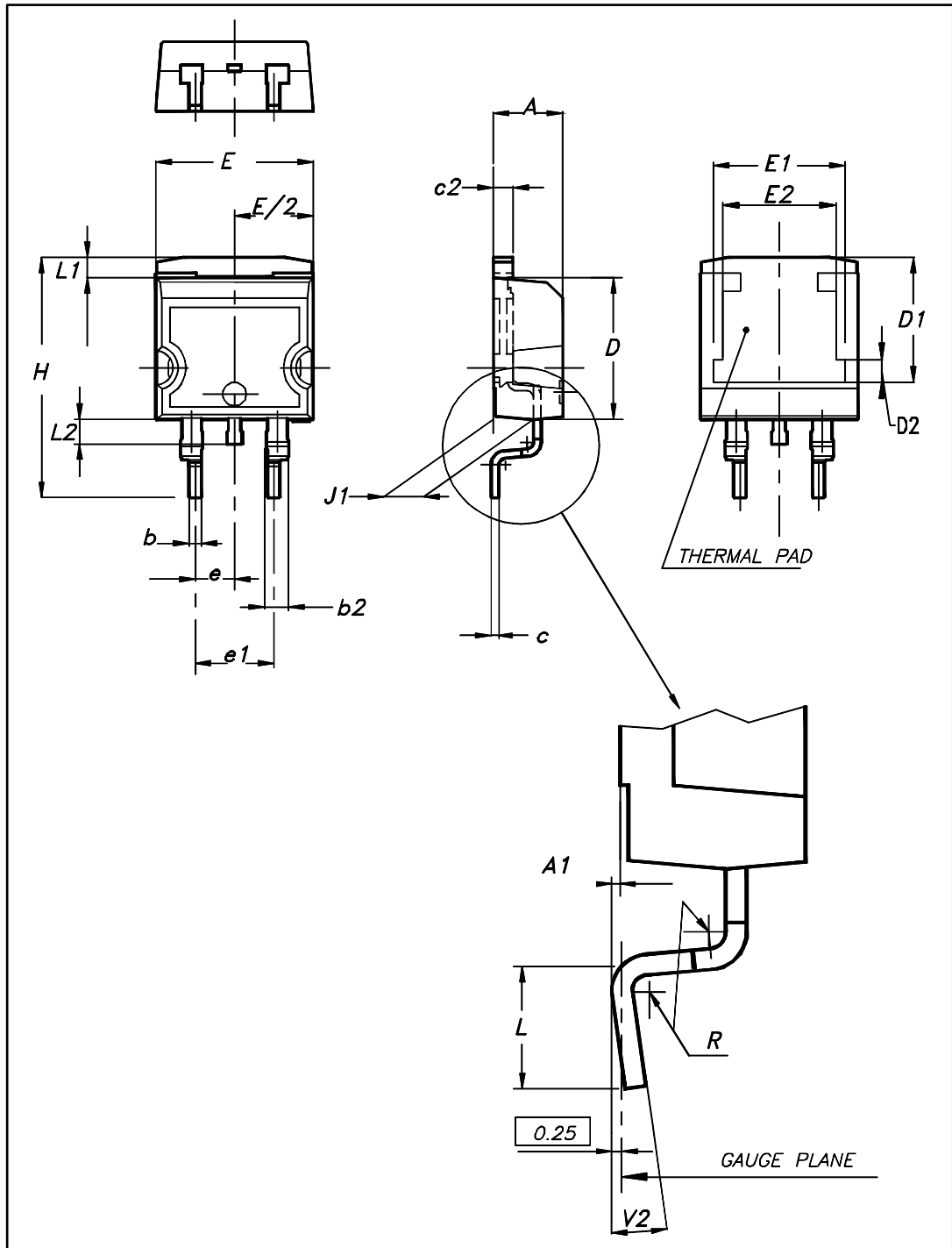
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	0.95	1.20	0.037	0.047
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	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	2.60	2.90	0.102	0.114
L20	15.40 typ.		0.606	
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

2.3 I²PAK package information

Figure 12: I²PAK package outlineTable 7: I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	0.72	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

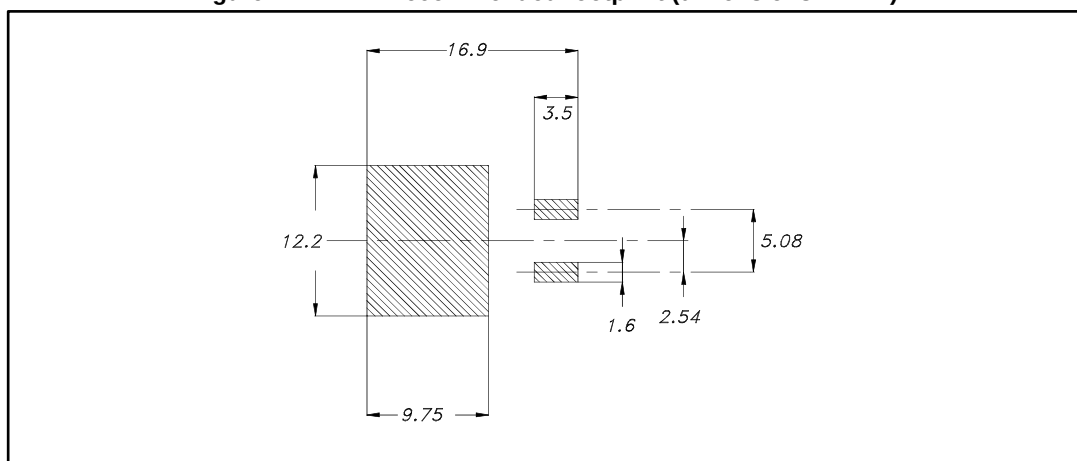
2.4 D2PAK package information

Figure 13: D²PAK package outline

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

Table 8: 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 14: D²PAK recommended footprint (dimensions in mm)

3 Ordering information

Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS30SM100ST	PS30SM100ST	TO-220AB	1.95 g	50	Tube
STPS30SM100SR	PS30SM100SR	I ² PAK	1.5 g	50	Tube
STPS30SM100SG-TR	PS30SM100SG	D ² PAK	1.48 g	1000	Tape and reel
STPS30SM100STN	PS30SM100STN	TO-220AB narrow leads	1.9 g	50	Tube

4 Revision history

Table 10: 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 <i>Table 5</i> .
28-Jan-2011	3	Added warning paragraph above <i>Table 8</i> .
15-Sep-2011	4	Added TO-220AB narrow leads package.
12-May-2017	5	Removed TO-220FPAB package. Updated D ² PAK section.

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