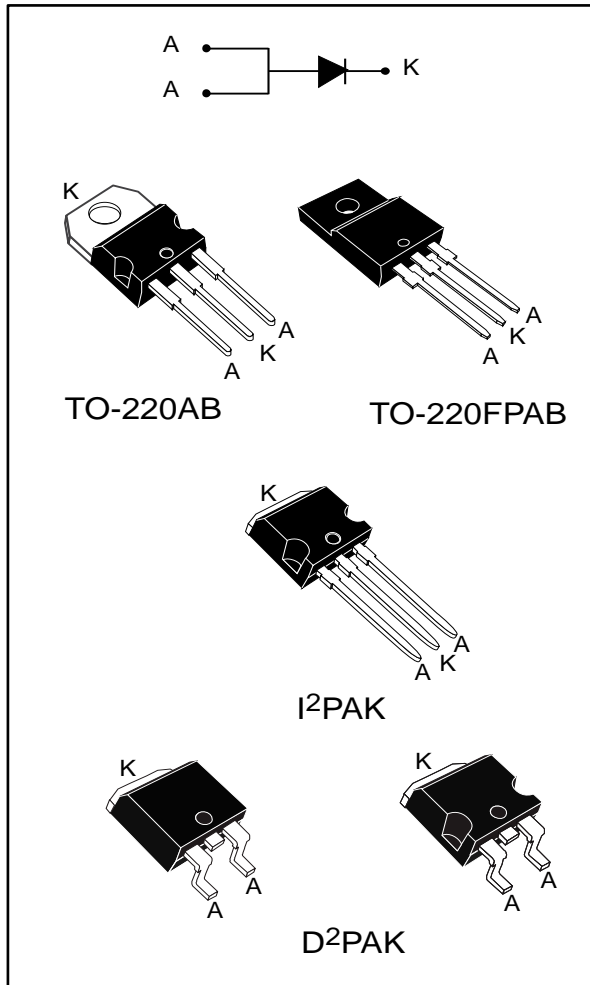


Power Schottky rectifier

Datasheet - production data



Description

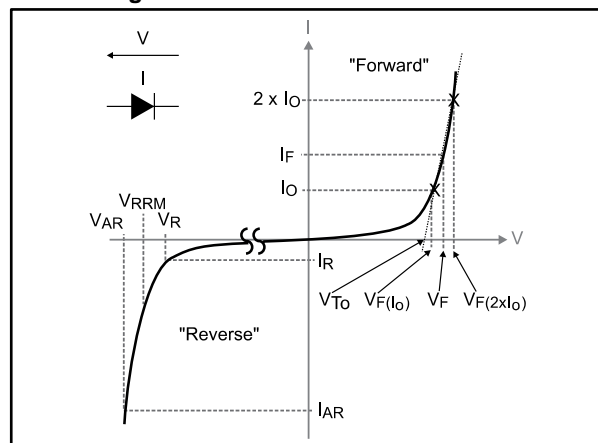
This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220FPAB, 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
$I_{F(AV)}$	20 A
V_{RRM}	100 V
V_F (typ.)	0.455 V
T_j (max.)	150 °C

Figure 1: Electrical characteristics



Features

- Low forward voltage drop meaning very small conduction losses
- Avalanche rated
- High frequency operation
- High current capability
- Insulated package:
 - Insulating voltage = 2000 V_{RMS} sine
- ECOPACK[®]2 compliant component for D²PAK on demand

 V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in Figure 11. 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		30	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$, square wave	TO-220AB D ² PAK I ² PAK	$T_C = 130\text{ °C}$	20	A
		TO-220FPAB	$T_C = 85\text{ °C}$		
I_{FSM}	Surge non repetitive forward current		$t_p = 10\text{ ms}$ sinusoidal	530	A
$P_{ARM}^{(1)}$	Repetitive peak avalanche power		$t_p = 10\text{ }\mu\text{s}$, $T_j = 125\text{ °C}$	1150	W
$V_{ARM}^{(2)}$	Maximum repetitive peak avalanche voltage		$t_p < 1\text{ }\mu\text{s}$, $T_j < 150\text{ °C}$, $I_{AR} < 40\text{ A}$	120	V
$V_{ASM}^{(2)}$	Maximum single pulse peak avalanche voltage				
T_{stg}	Storage temperature range		-65 to +175	°C	
T_j	Maximum operating junction temperature ⁽³⁾		150		

Notes:

⁽¹⁾For pulse time duration deratings, 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⁾Refer to [Figure 11](#)

⁽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	TO-220AB, D ² PAK, I ² PAK	1.2
		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	$T_j = 25\text{ °C}$	$V_R = 70\text{ V}$	-	5		μA
		$T_j = 125\text{ °C}$		-	5		mA
		$T_j = 25\text{ °C}$	$V_R = 100\text{ V}$	-	10	40	μA
		$T_j = 125\text{ °C}$		-	10	40	mA
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	550		mV
		$T_j = 125\text{ °C}$		-	455		
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	660	730	
		$T_j = 125\text{ °C}$		-	530	600	
		$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$	-	775	850	
		$T_j = 125\text{ °C}$		-	610	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:

$$P = 0.425 \times I_{F(AV)} + 0.0088 \times I_{F(RMS)}^2$$

1.1 Characteristics (curves)

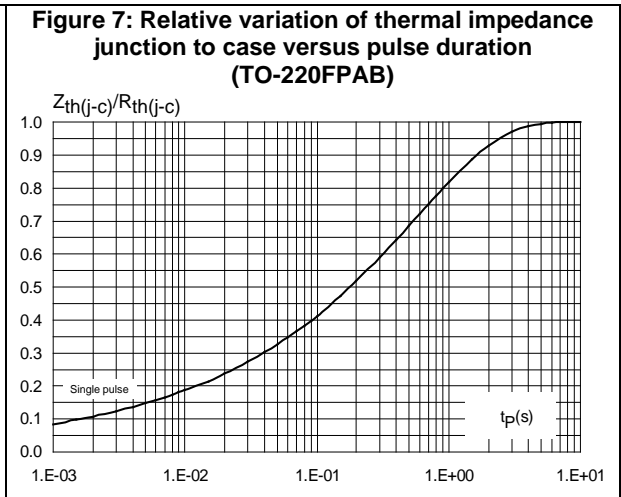
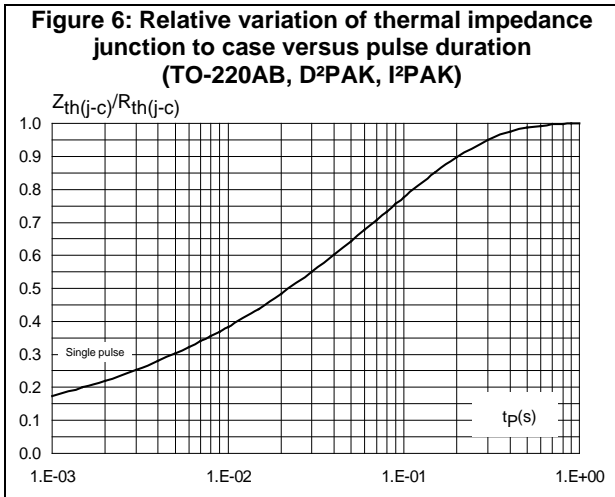
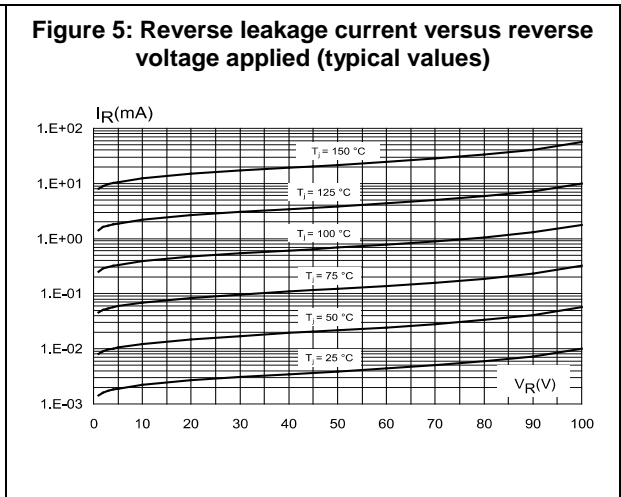
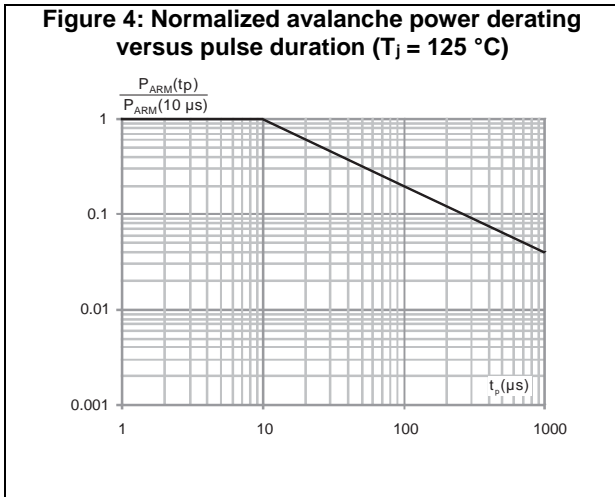
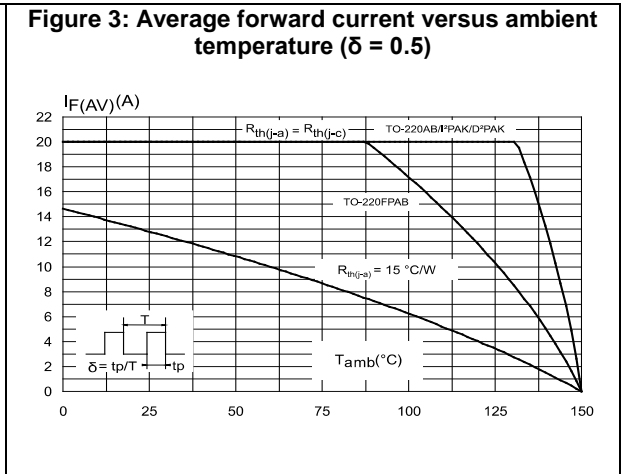
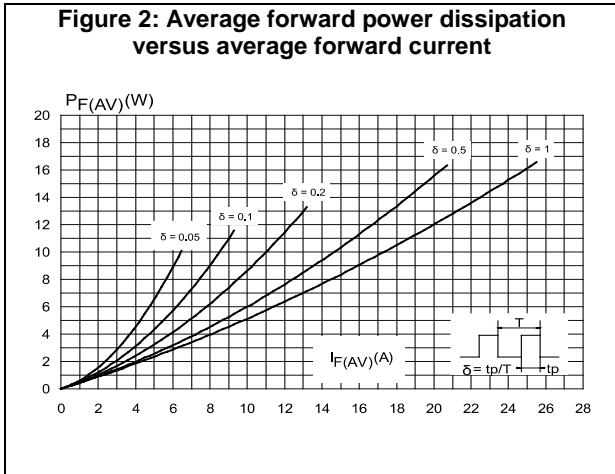


Figure 8: Junction capacitance versus reverse voltage applied (typical values)

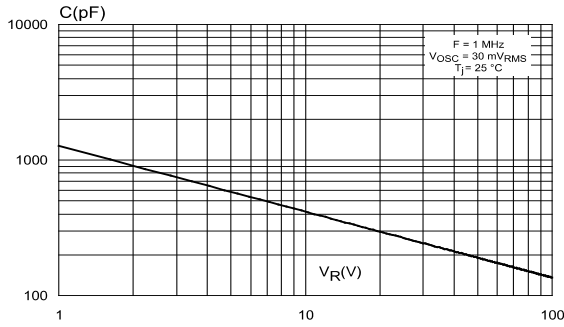


Figure 9: Forward voltage drop versus forward current (terminals 1 and 3 short circuited)

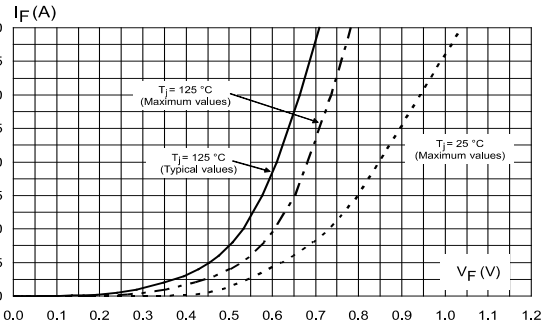


Figure 10: Thermal resistance junction to ambient versus copper surface under tab for D²PAK

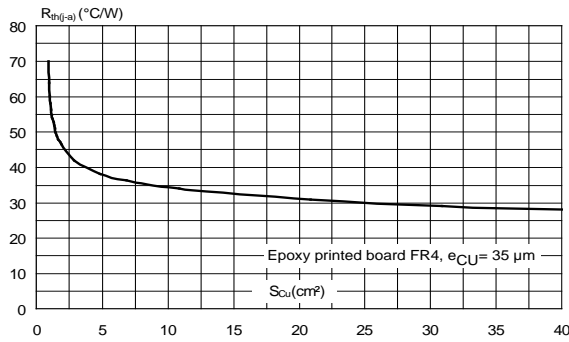
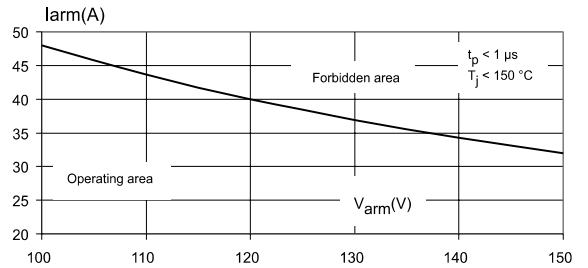


Figure 11: Reverse safe operating area



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

2.1 TO-220AB package information

Figure 12: TO-220AB package outline

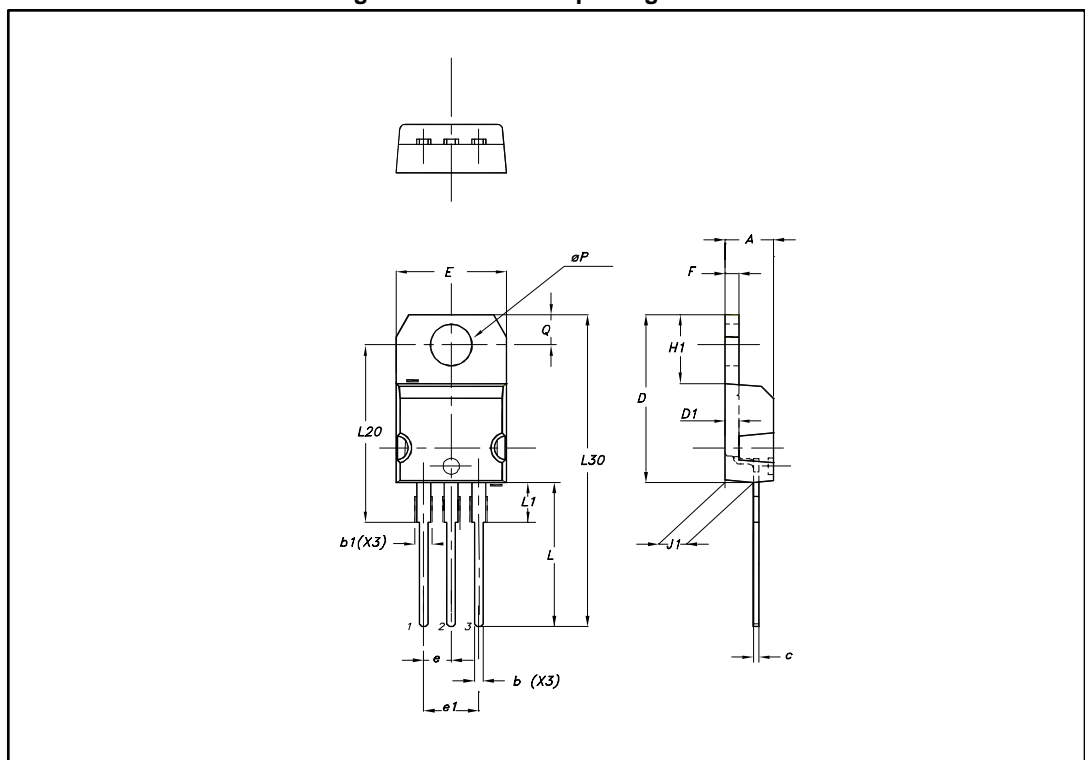


Table 5: TO-220AB package mechanical data

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-220FPAB package information

Figure 13: TO-220FPAB package outline

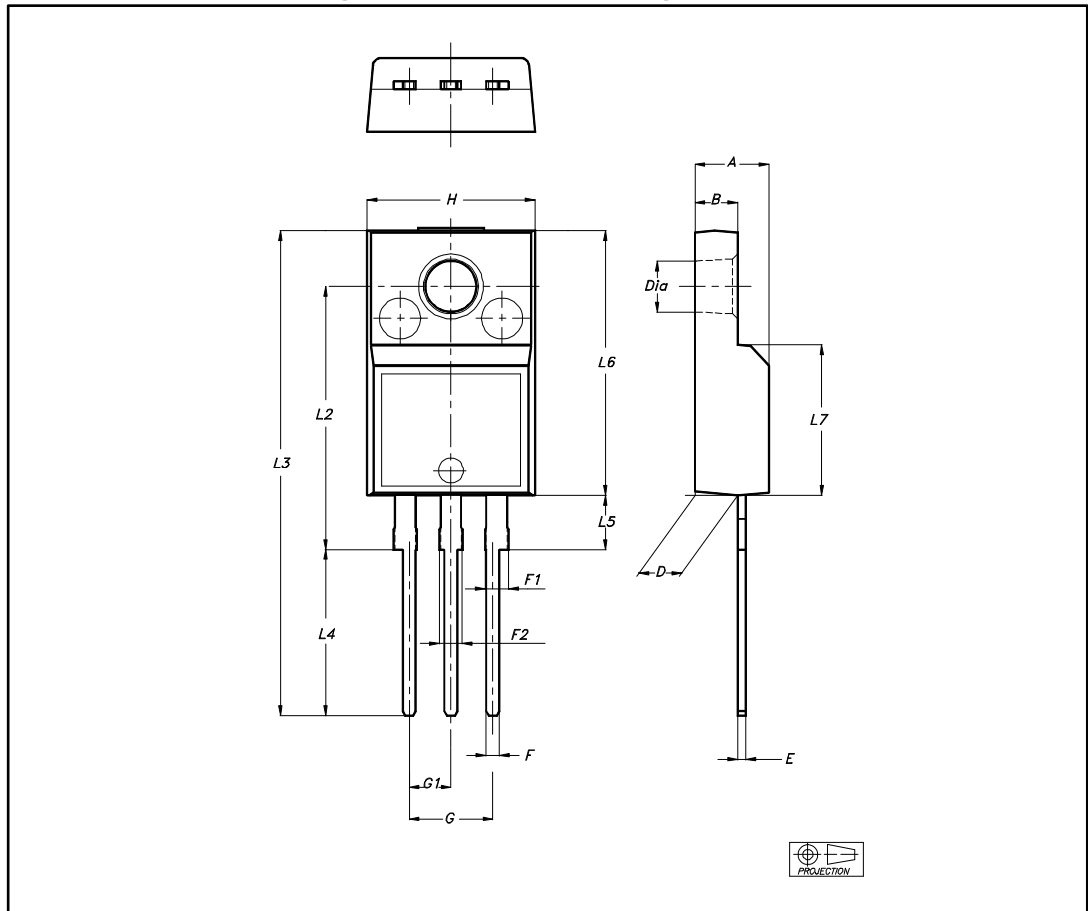


Table 6: TO-220FPAB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	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	0.028
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	5.2	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.394	0.409
L2	16 typ.		0.63 typ.	
L3	28.60	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	9.3	0.354	0.366
Dia	3	3.2	0.118	0.126

2.3 I²PAK package information

Figure 14: I²PAK package outline

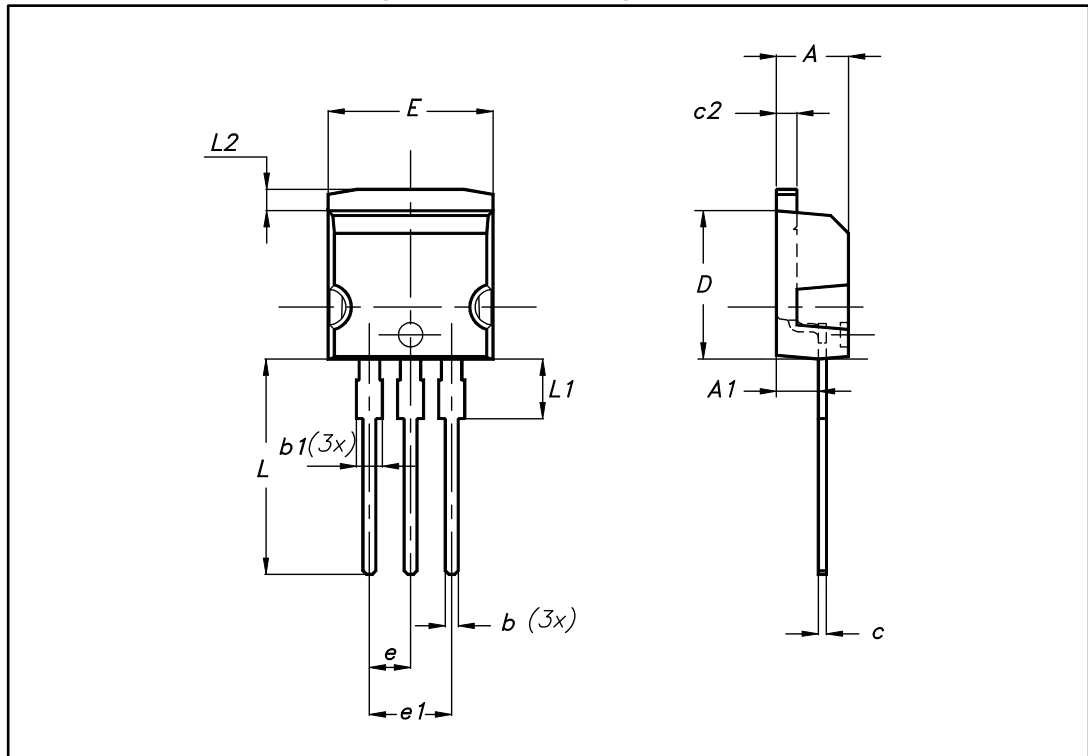
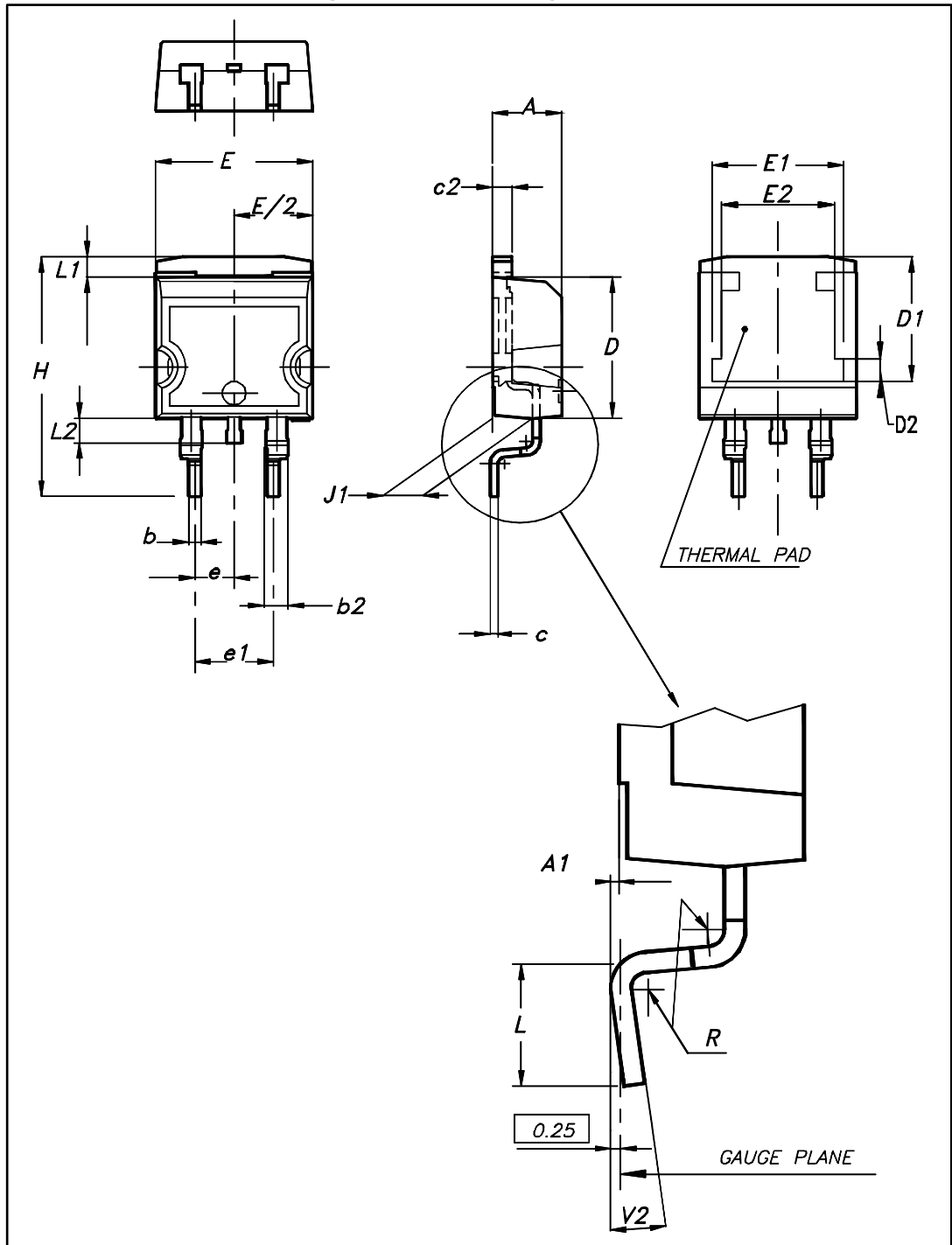


Table 7: I²PAK package mechanical data

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 15: D²PAK package outline

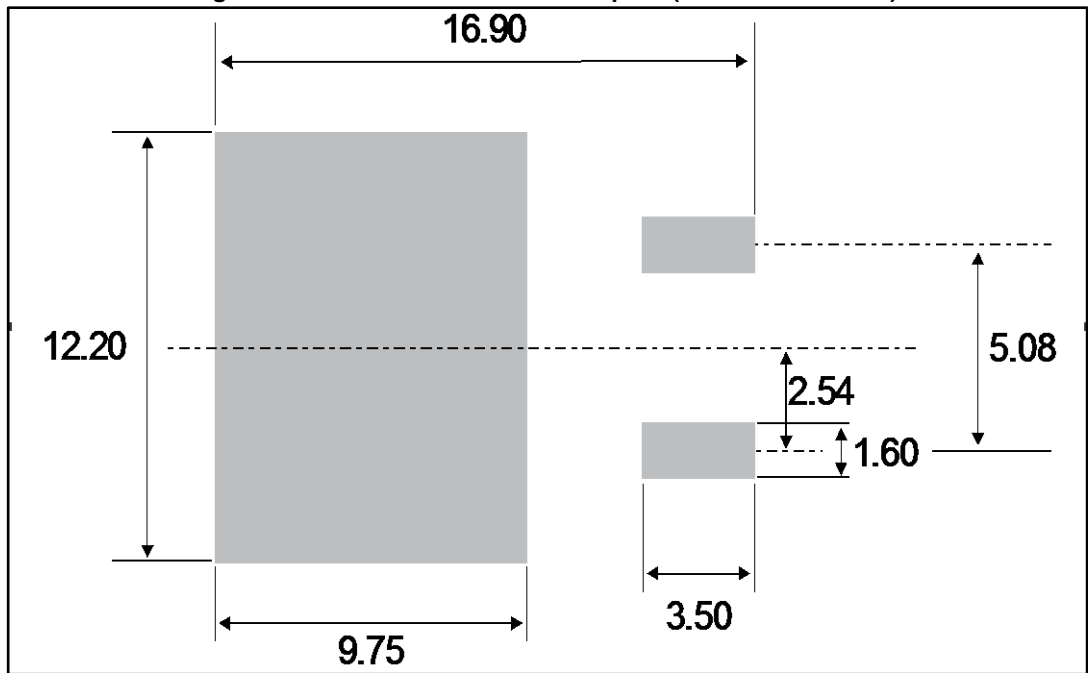


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

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 16: D²PAK recommended footprint (dimensions in mm)



3 Ordering information

Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20M100ST	PS20M100ST	TO-220AB	1.95 g	50	Tube
STPS20M100SFP	PS20M100SFP	TO-220FPAB	1.7 g	50	Tube
STPS20M100SR	PS20M100SR	I ² PAK	1.5 g	50	Tube
STPS20M100SG-TR	PS20M100SG	D ² PAK	1.38 g	1000	Tape and reel

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 Table 5.
05-Jun-2017	3	Updated cover page. Complete Characteristics section update. Updated Section 2.4: "D²PAK package information" and Table 9: "Ordering information" .

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