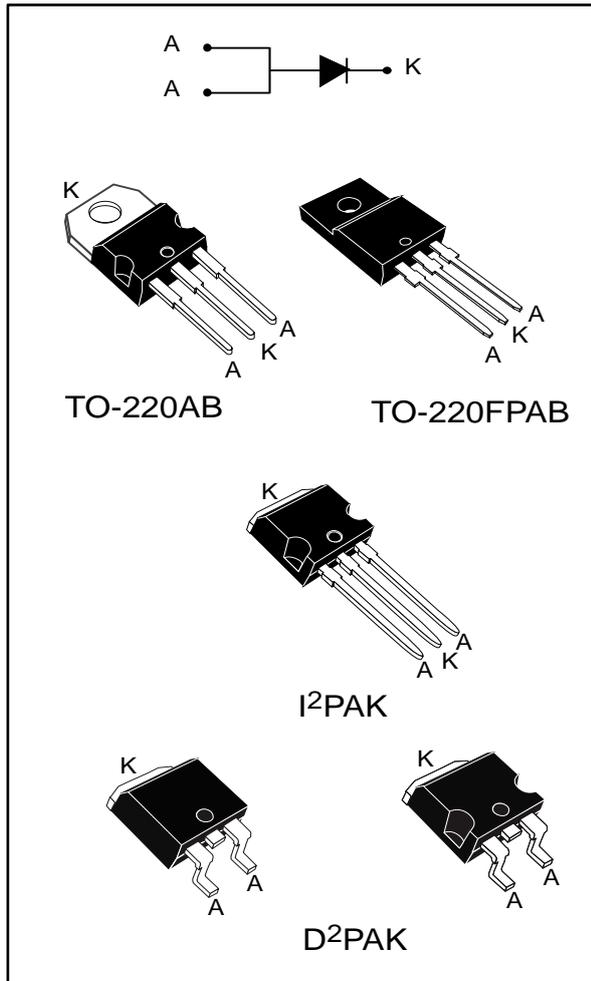


Power Schottky rectifier

Datasheet - production data



Description

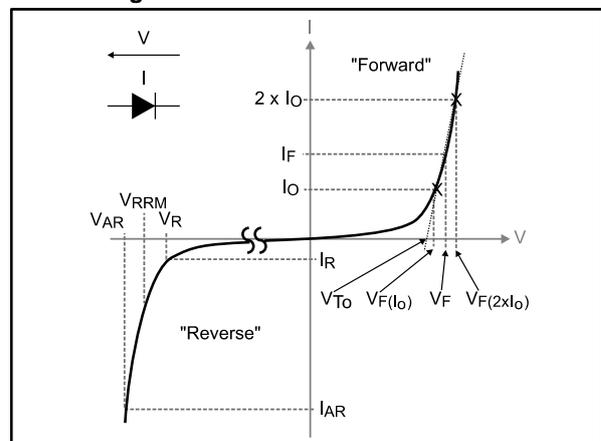
This single Schottky rectifier is suited for high frequency switch mode power supply.

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)

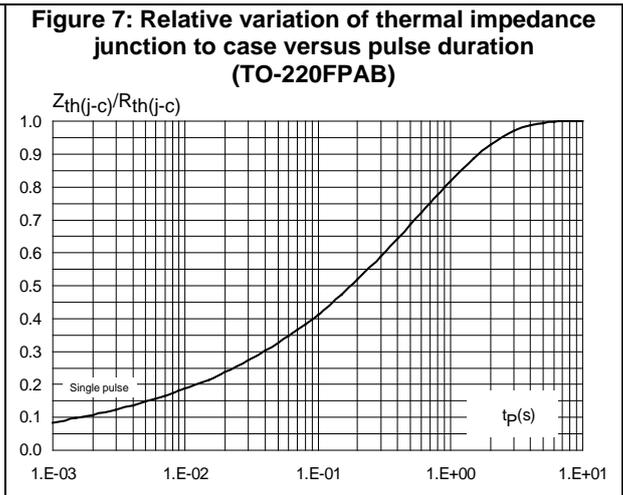
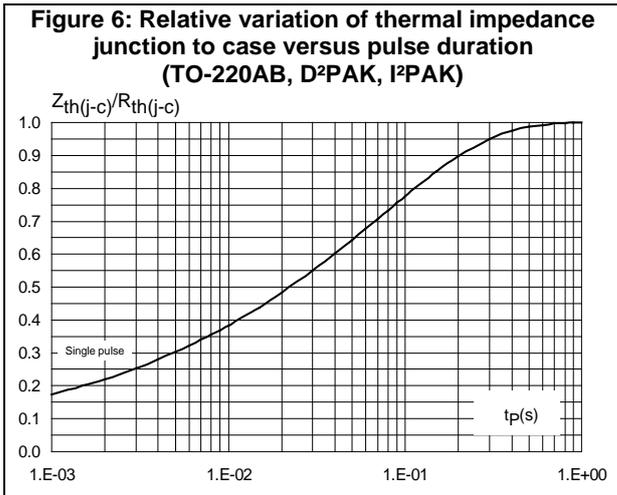
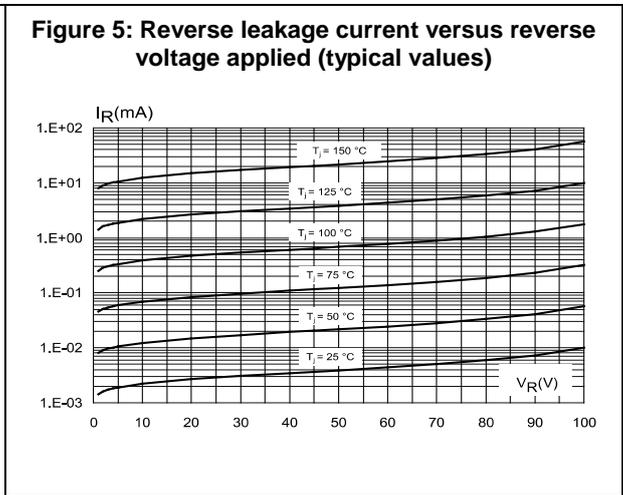
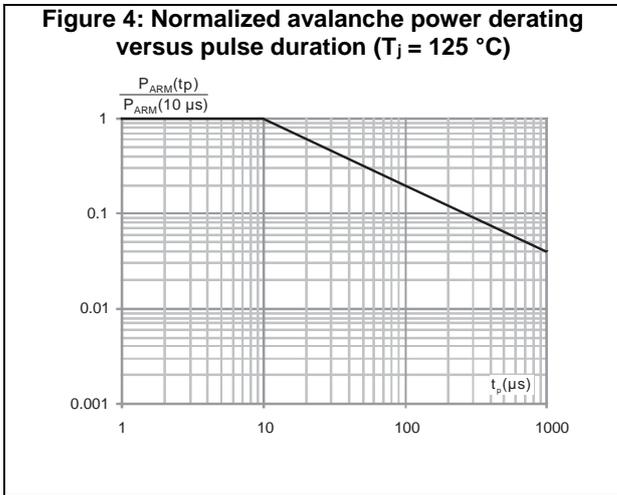
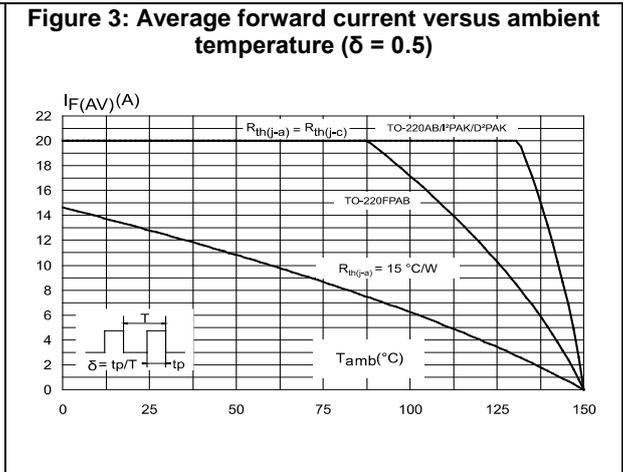
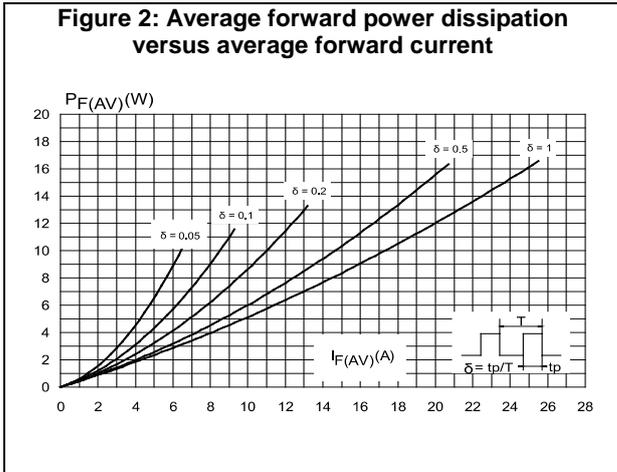


Figure 8: Junction capacitance versus reverse voltage applied (typical values)

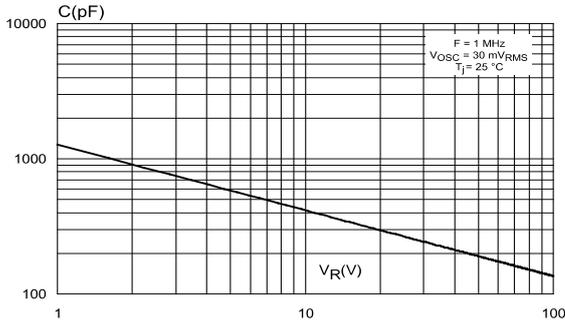


Figure 9: Forward voltage drop versus forward current (terminals 1 and 3 short circuited)

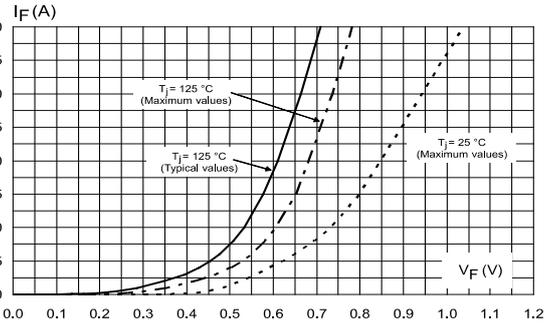


Figure 10: Thermal resistance junction to ambient versus copper surface under tab for D²PAK

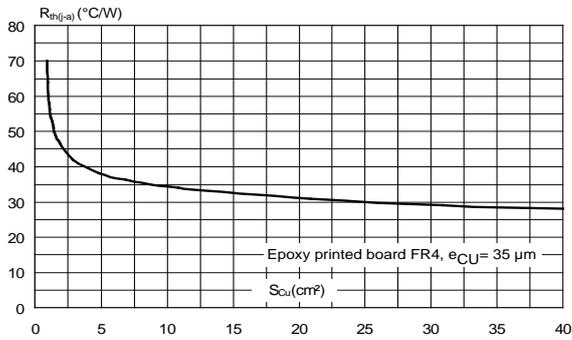
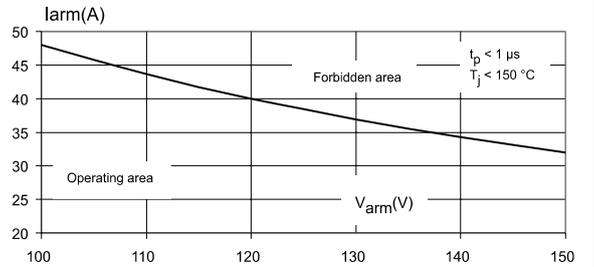


Figure 11: Reverse safe operating area



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

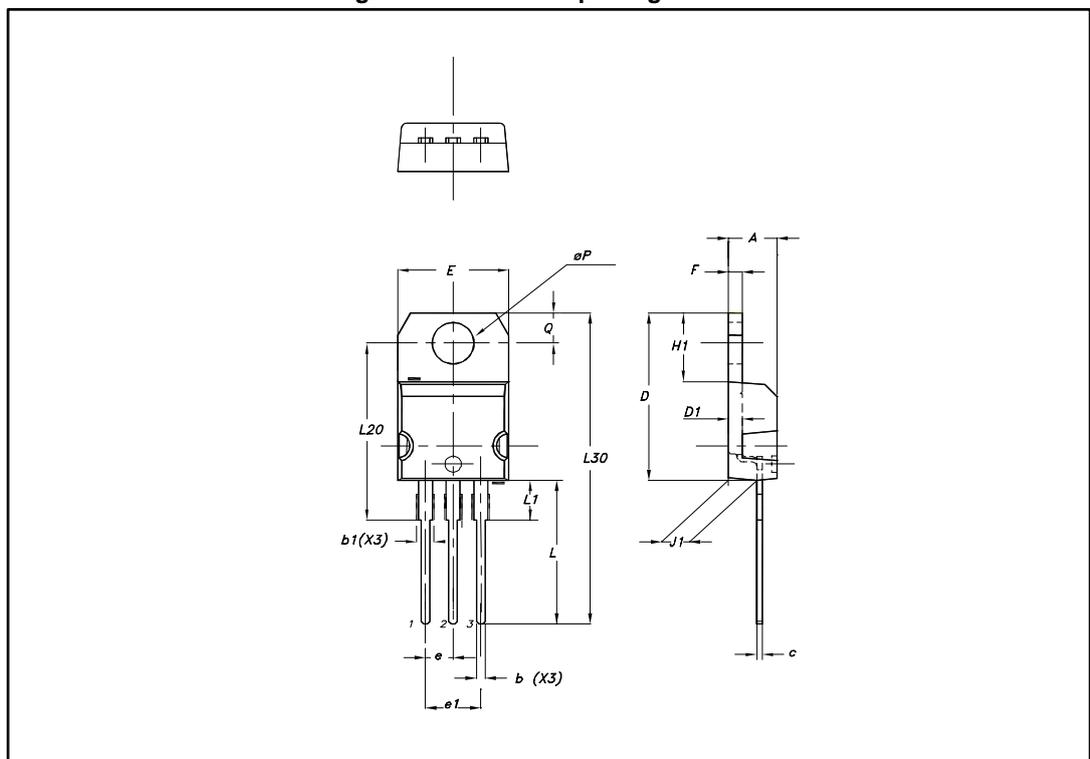


Table 5: TO-220AB package mechanical data

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

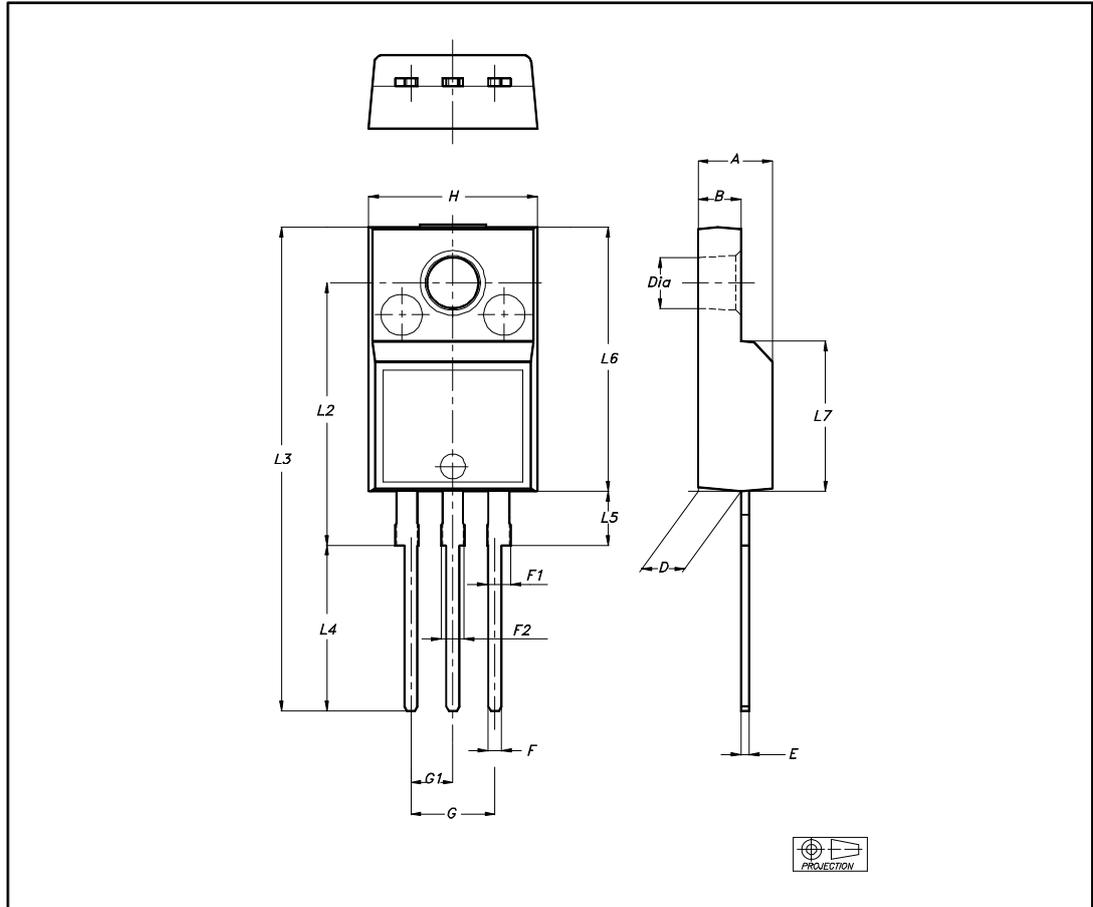


Table 6: TO-220FPAB package mechanical data

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

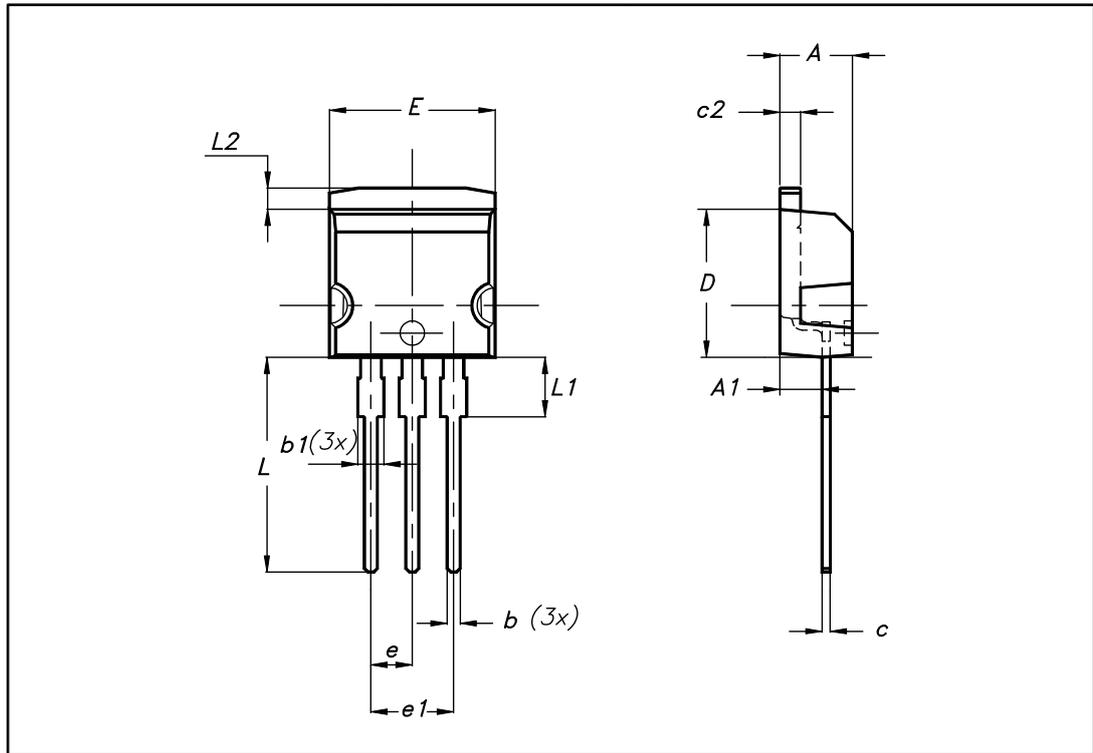


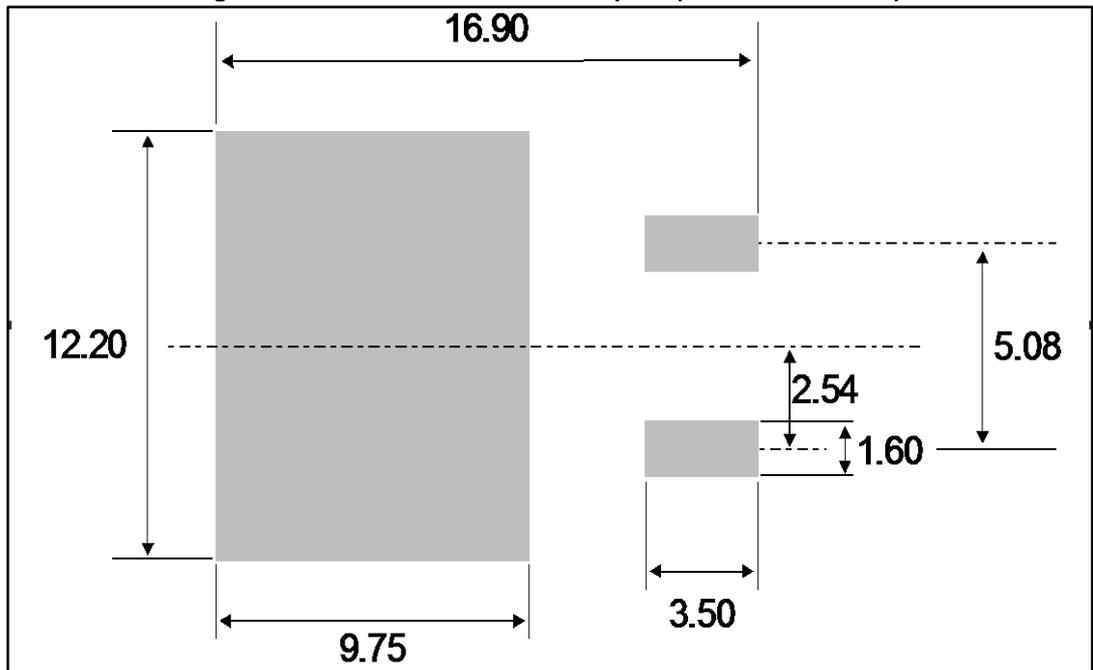
Table 7: I²PAK package mechanical data

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

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" .

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2017 STMicroelectronics – All rights reserved