

1 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
I _{T(RMS)}	RMS on-state current (180 ° conduction angle)		T _C = 115°C	4	A
I _{T(AV)}	Average on-state current (180 ° conduction angle)		T _C = 115°C	2.5	A
I _{TSM}	Non repetitive surge peak on-state current	t _p = 8.3 ms	T _{j initial} = 25 °C	33	A
		t _p = 10 ms		30	
I ² t	I ² t value for fusing	t _p = 10 ms	T _j = 25 °C	4.5	A ² s
di/dt	Critical rate of rise of on-state current I _G = 10 mA, dI _G / dt = 0.1 A/μs	f = 60 Hz	T _j = 125 °C	50	A/μs
I _{GM}	Peak gate current	t _p = 20 μs		1.2	A
P _{G(AV)}	Average gate power dissipation			0.2	W
V _{RGM}	Maximum peak reverse gate voltage			5	V
T _{stg}	Storage junction temperature range			-40 to +150	°C
T _j	Maximum operating junction temperature			-40 to +125	°C

Table 3: Device timings

Symbol	Parameter	Test conditions	Value	Unit
t_{GT}	Gate controlled turn on time	$I_{TM} = 10 \text{ A}$, $T_j = 25^{\circ}\text{C}$, $V_D = V_{DRM(max.)}$, $I_{GT} = 10 \text{ mA}$, $dI_G/dt = 0.2 \text{ A}/\mu\text{s}$, $R_G = 1 \text{ k}\Omega$	0.5 (typ.)	μs
t_Q	Circuit controlled turn off time	$I_{TM} = 8 \text{ A}$, $T_j = 125^{\circ}\text{C}$, $V_D = 67\% V_{DRM(max.)}$, $V_R = 10 \text{ V}$, $dI_T/dt = 10 \text{ A}/\mu\text{s}$, $dV_D/dt = 2 \text{ V}/\mu\text{s}$, $R_G = 1 \text{ k}\Omega$	60 (typ.)	

Table 4: Electrical characteristics ($T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Test Conditions		Value	Unit	
I _{GT}	V _D = 12 V, R _L = 33 Ω		Max.	200	μA
V _{GT}			Max.	0.8	V
V _{GD}	V _D = V _{DRM} , R _L = 33 kΩ, R _{GK} = 220 Ω	T _j = 125 °C	Min.	0.1	V
I _H	I _T = 50 mA, R _{GK} = 1 kΩ		Max.	5	mA
I _L	I _G = 2 mA, R _{GK} = 1 kΩ		Max.	6	mA
dV/dt	V _D = 67 % V _{DRM} , R _{GK} = 220 Ω	T _j = 125 °C	Min.	5	V/μs
V _{TM}	I _{TM} = 8 A, t _P = 380 μs	T _j = 25 °C	Max.	1.6	V
V _{T0}	Threshold voltage	T _j = 125 °C	Max.	0.85	V
R _D	Dynamic resistance	T _j = 125 °C	Max.	90	mΩ
I _{DRM}	V _D = V _R =V _{DRM} = V _{RRM} ; R _{GK} = 220 Ω	T _j = 25 °C	Max.	5	μA
I _{RRM}		T _j = 125 °C		1	mA

Table 5: Thermal parameters

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)			3.0	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)} = 0.5\text{ cm}^2$	DPAK	70	
			IPAK	100	
			TO-220AB	60	

Notes:⁽¹⁾Copper surface under tab

1.1 Characteristics (curves)

Figure 1: Maximum average power dissipation versus average on-state current

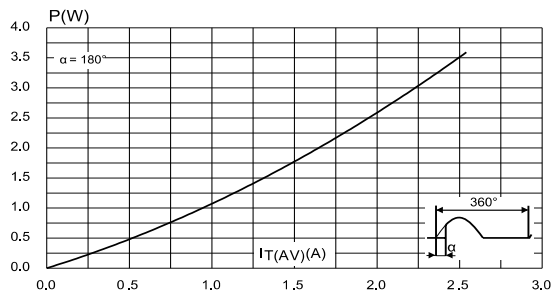


Figure 2: Average and DC on-state current versus case temperature

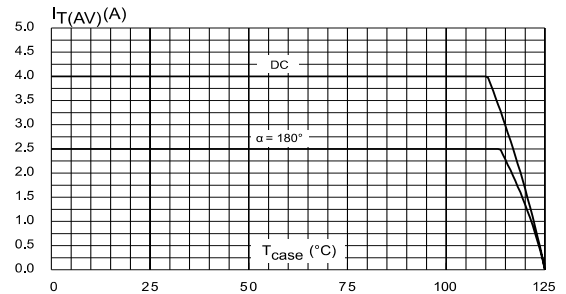


Figure 3: Average and D.C. on state current versus ambient temperature (DPAK)

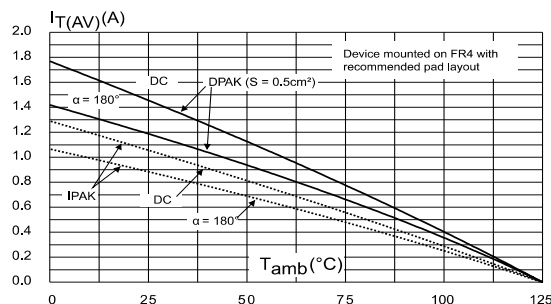


Figure 4: Relative variation of thermal impedance junction to ambient versus pulse duration (DPAK)

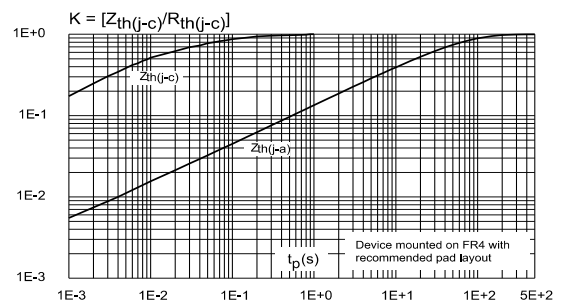


Figure 5: Relative variation of gate trigger current and holding current versus junction temperature

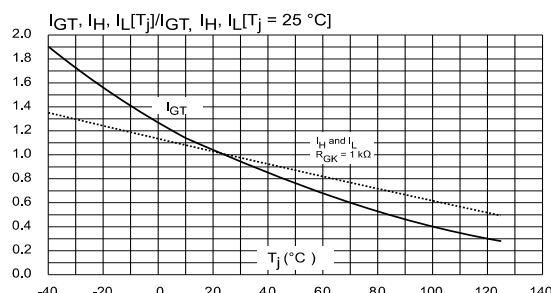


Figure 6: Relative variation of holding current versus gate-cathode resistance (typical values)

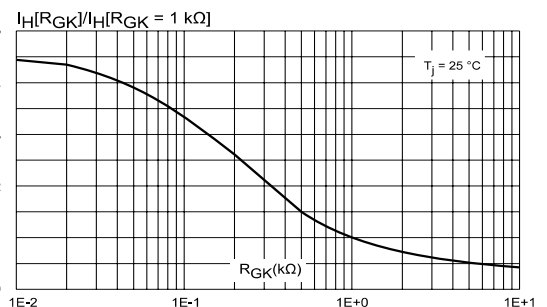


Figure 7: Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

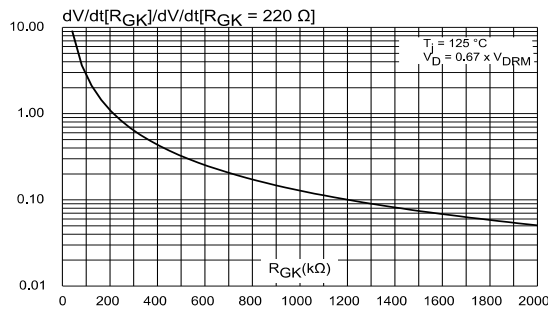


Figure 8: Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

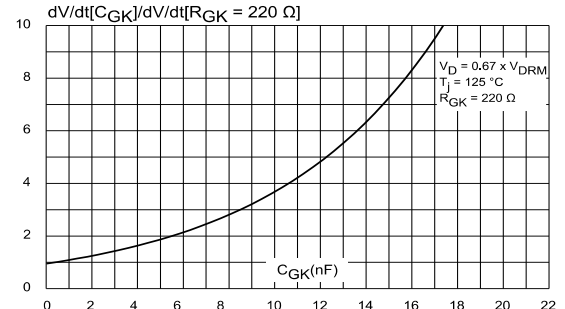


Figure 9: Surge peak on-state current versus number of cycles

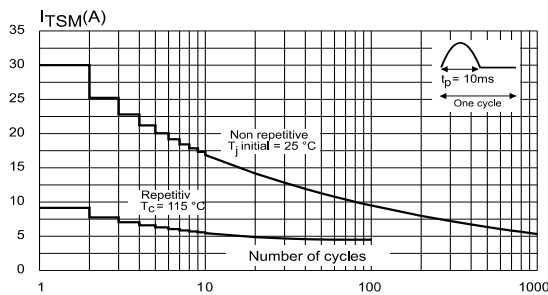


Figure 10: Non-repetitive surge peak on-state current

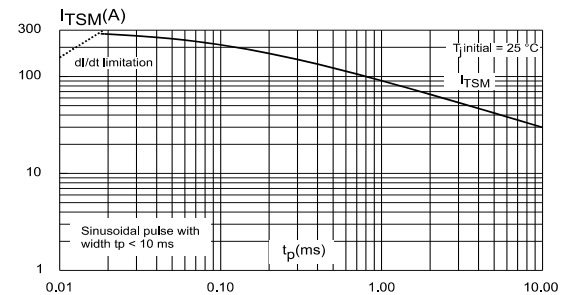


Figure 11: On-state characteristics (maximum values)

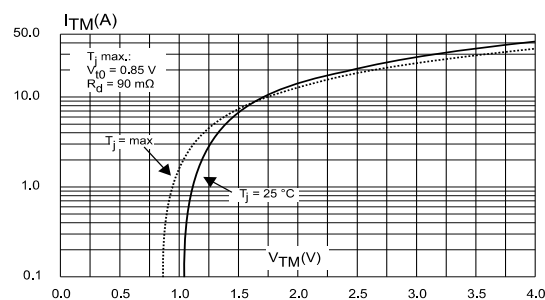
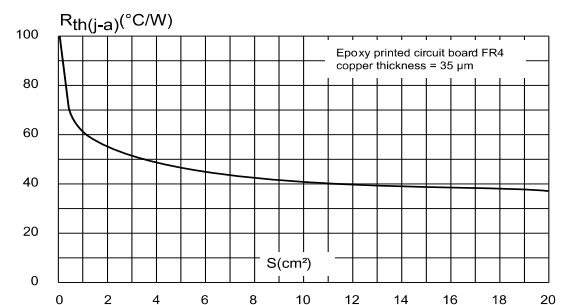


Figure 12: Thermal resistance junction to ambient versus copper surface under tab



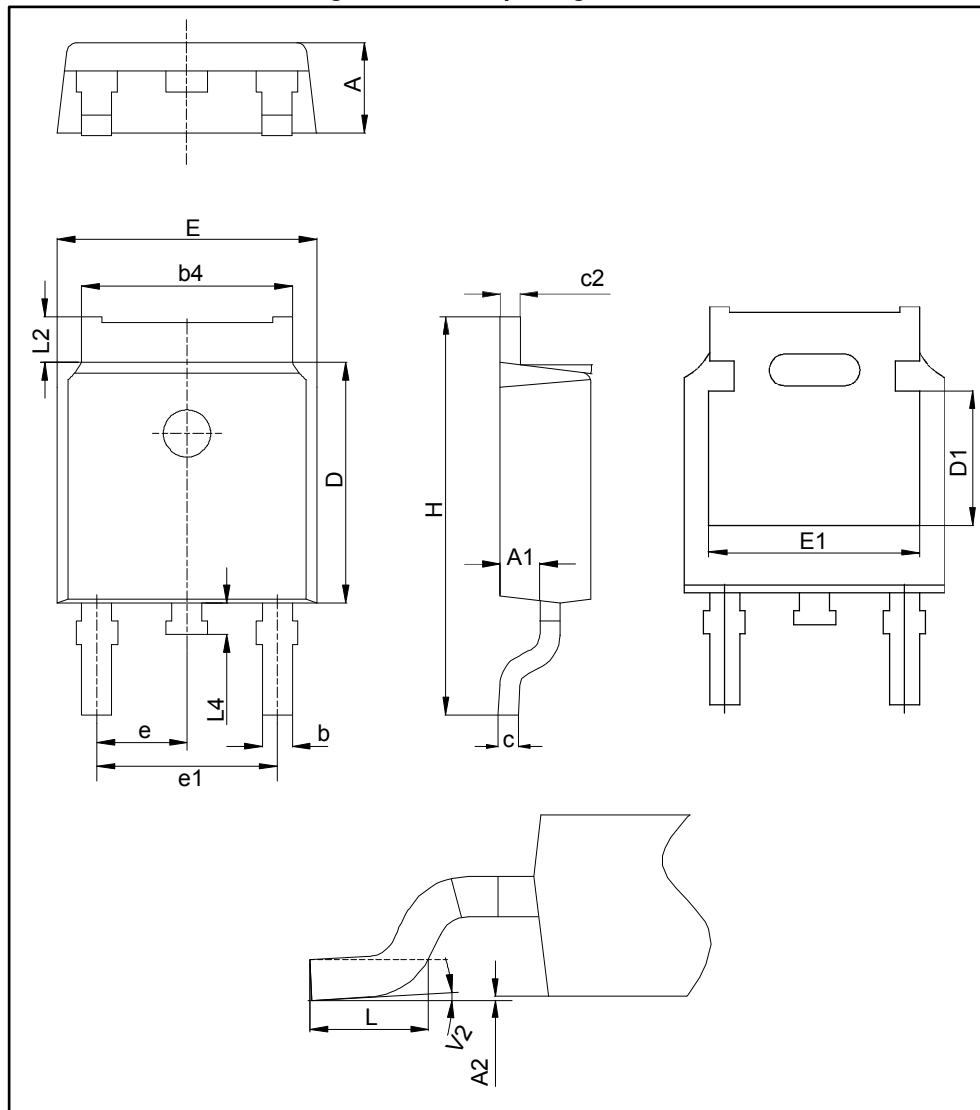
2 Package information

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.

- Epoxy meets UL 94,V0
- Lead-free packages
- Recommended torque value: 0.4 to 0.6 N·m

2.1 DPAK package information

Figure 13: DPAK package outline



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

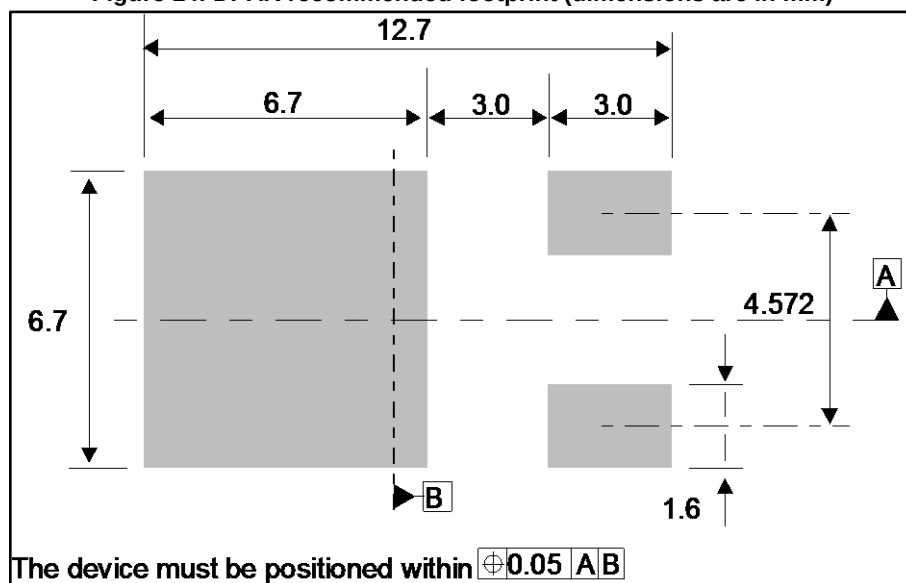
Table 6: DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.90		1.10	0.0354		0.0433
A2	0.03		0.23	0.0012		0.0091
b	0.64		0.90	0.0252		0.354
b4	4.95		5.46	0.1949		0.2150
c	0.46		0.61	0.0181		0.0240
c2	0.46		0.60	0.0181		0.0236
D	5.97		6.22	0.2350		0.2449
D1	5.10			0.2007		
E	6.35		6.73	0.2500		0.2650
E1	4.32			0.1701		
e		2.29			0.0900	
e1		4.57			0.1800	
H	9.35		10.40	0.3681		0.4094
L	1.00		1.78	0.0394		0.0701
L2			1.27			0.0500
L4	0.60		1.02	0.0236		0.0402
V2	0°		+8°	0°		+8°

Notes:

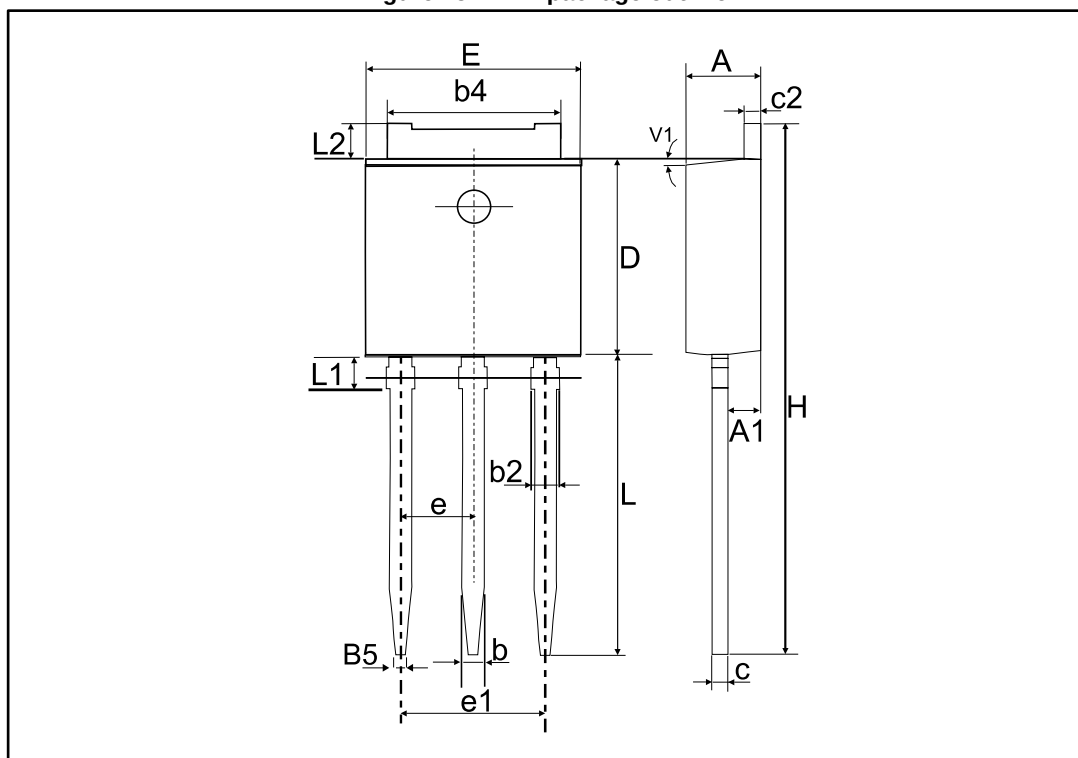
(1) Dimensions in inches are given for reference only

Figure 14: DPAK recommended footprint (dimensions are in mm)



2.2 IPAK package information

Figure 15: IPAK package outline



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

Table 7: IPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.0866		0.0945
A1	0.90		1.10	0.0354		0.0433
b	0.64		0.90	0.0252		0.0354
b2			0.95			0.0374
b4	5.20		5.43	0.2047		0.2138
B5		0.30			0.0118	
c	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6.00		6.20	0.2362		0.2441
E	6.40		6.65	0.2520		0.2618
e		2.28			0.0898	
e1	4.40		4.60	0.1732		0.1811
H		16.10			0.6339	
L	9.00		9.60	0.3545		0.3780
L1	0.80		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

Notes:

(1) Inch dimensions are for reference only.

2.3 TO-220AB package information

Figure 16: TO-220AB package outline

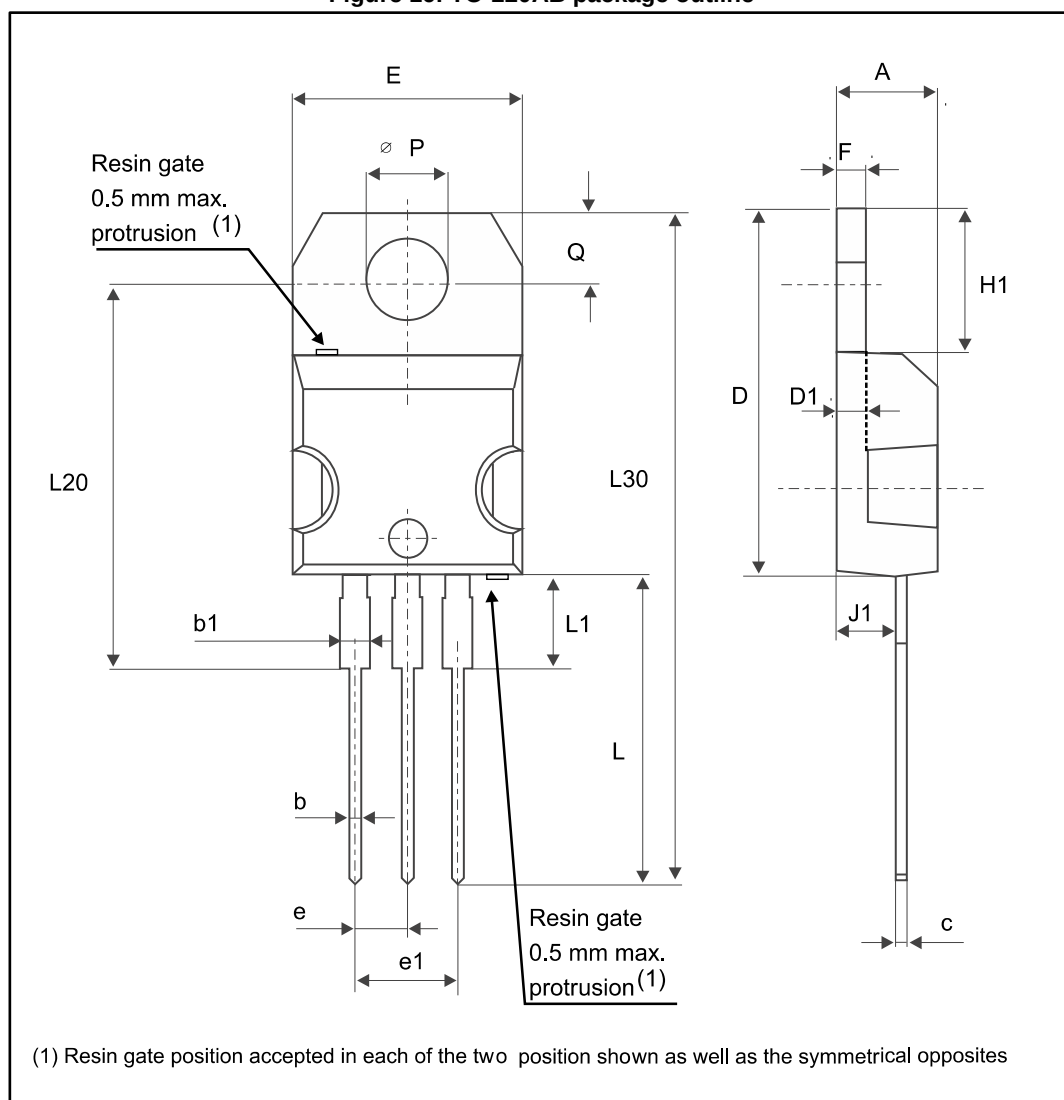


Table 8: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches ⁽¹⁾	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1732	0.1811
b	0.61	0.88	0.0240	0.0346
b1	1.14	1.55	0.0449	0.0610
c	0.48	0.70	0.0189	0.0276
D	15.25	15.75	0.6004	0.6201
D1	1.27 typ.		0.0500 typ.	
E	10.00	10.40	0.3937	0.4094
e	2.40	2.70	0.0945	0.1063
e1	4.95	5.15	0.1949	0.2028
F	1.23	1.32	0.0484	0.0520
H1	6.20	6.60	0.2441	0.2598
J1	2.40	2.72	0.0945	0.1071
L	13.00	14.00	0.5118	0.5512
L1	3.50	3.93	0.1378	0.1547
L20	16.40 typ.		0.6457 typ.	
L30	28.90 typ.		1.1378 typ.	
ØP	3.75	3.85	0.1476	0.1516
Q	2.65	2.95	0.1043	0.1161

Notes:⁽¹⁾Inch dimensions are for reference only.

3 Ordering information

Figure 17: Ordering information scheme

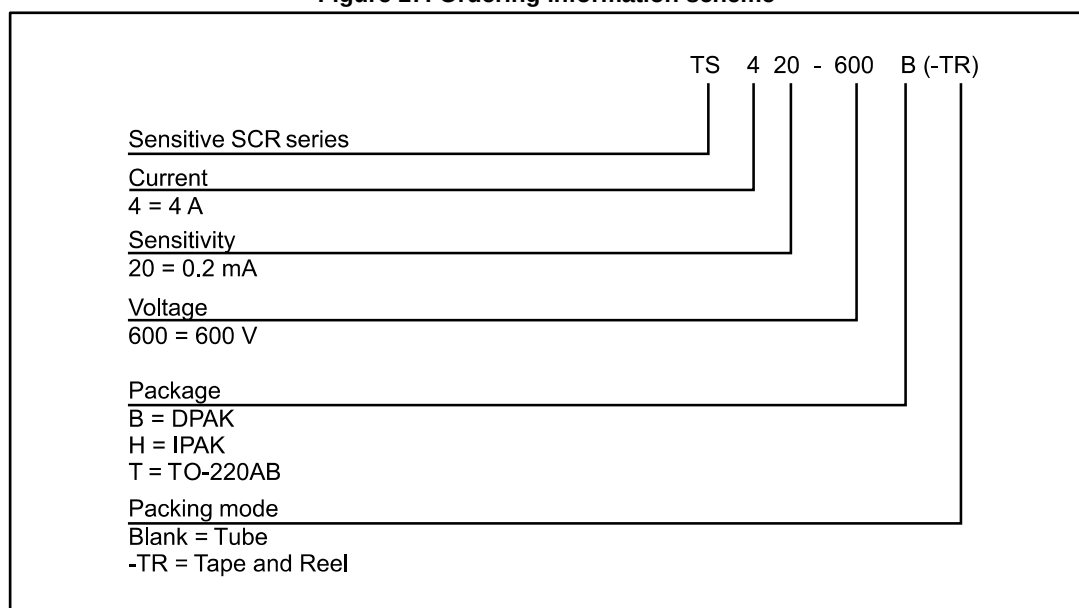


Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TS420-600B	TS420600	DPAK	0.3 g	75	Tube
TS420-600B-TR	TS420600			2500	Tape and reel
TS420-600H	TS420600	IPAK	0.4 g	75	Tube
TS420-600T	TS420600T	TO-220AB	2.3 g	50	Tube

4 Revision history

Table 10: Document revision history

Date	Revision	Changes
Sep-2000	3	Previous release.
26-Jan-2010	4	Updated package illustration for TO-220AB on front page and Table 8. Added Table 5.
28-May-2014	5	Updated DPAK package information and reformatted to current standard.
10-May-2016	6	Updated cover page. Updated Table 4: "Electrical characteristics (T_j = 25 °C unless otherwise specified)" , Figure 10: "Non-repetitive surge peak on-state current " and Table 9: "Ordering information" . Complete update of Package information section.
10-Oct-2017	7	Updated DPAK and D ² PAK package information.

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