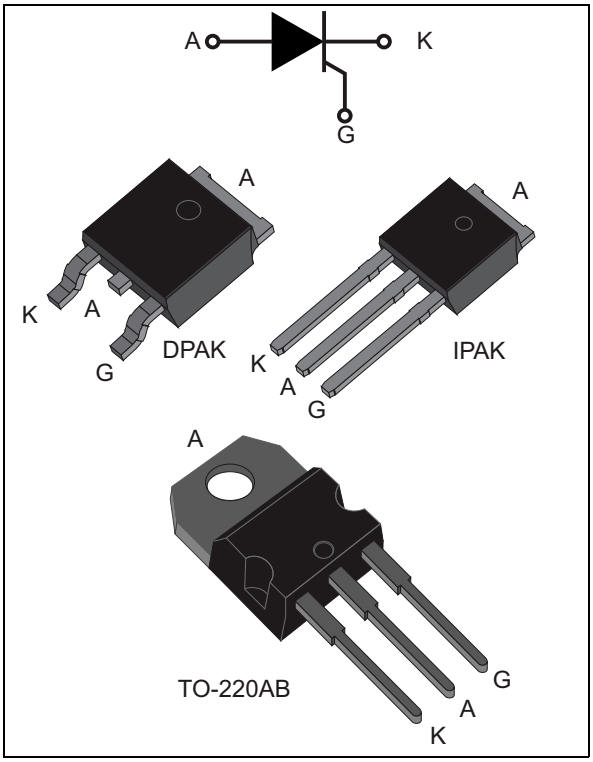
TS1220

Sensitive 12 A SCRs

Datasheet - production data



Features

- On-state rms current, $I_{T(RMS)}$ 12 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 V
- Triggering gate current, I_{GT} 200 µA

Description

Thanks to highly sensitive triggering levels, the 12 A SCR series is suitable to fit all modes of control, found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.

Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space.

Table 1. Device summary

Order code	V_{DRM}/V_{RRM}	I_{GT}	Package
TS1220-xxxB	600 V	0.2 mA	DPAK
TS1220-xxxH		0.2 mA	IPAK
TS1220-xxxT		0.2 mA	TO-220AB

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
				TS1220	
$I_{T(RMS)}$	On-state rms current (180° conduction angle)		T_c = 105 °C	12	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		T_c = 105 °C	8	A
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j = 25 °C	115	A
		t_p = 10 ms		110	
I^2t	I^2t value for fusing	t_p = 10 ms	T_j = 25 °C	60	A^2S
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, $t_r \leq$ 100 ns	F = 60 Hz	T_j = 125 °C	50	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1	W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

Table 3. Sensitive electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Test conditions				Unit
I_{GT}	V_D = 12 V, R_L = 140 Ω		MAX.	200	µA
V_{GT}			MAX.	0.8	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ, R_{GK} = 220 Ω	T_j = 125 °C	MIN.	0.1	V
V_{RG}	I_{RG} = 10 µA		MIN.	8	V
I_H	I_T = 50 mA, R_{GK} = 1 kΩ		MAX.	5	mA
I_L	I_G = 1 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} = 24 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.	30	mΩ
I_{DRM} I_{RRM}	V_{DRM} = V_{RRM}, R_{GK} = 1 kΩ	T_j = 25 °C	MAX.	5	µA
		T_j = 125 °C		1	mA

Table 4. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	DPAK, IPAK, TO-220AB	1.3	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)}$ = 0.5 cm^2 DPAK	70	°C/W
		IPAK	100	
		TO-220AB	60	

1. S = Copper surface under tab

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

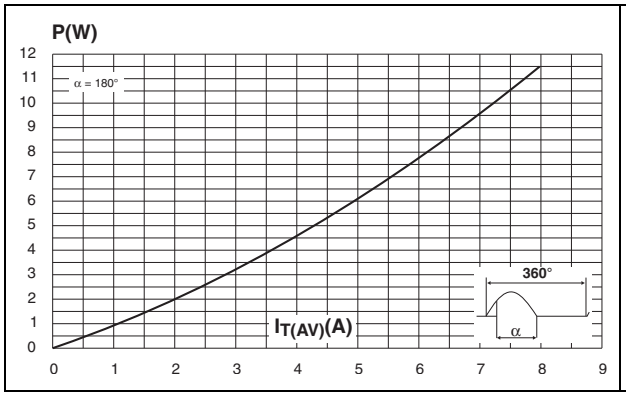


Figure 2. Average and DC on-state current versus case temperature

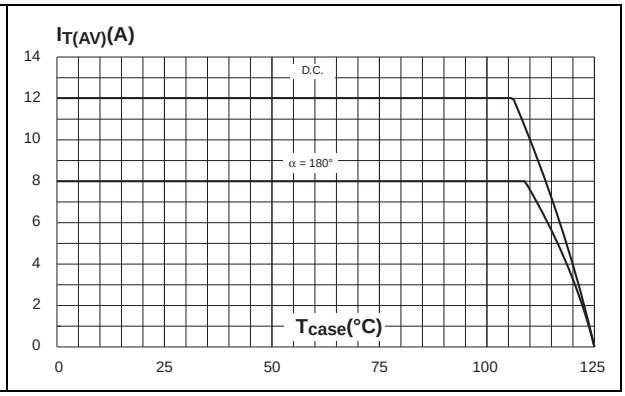


Figure 3. Average and DC on-state current versus ambient temperature (DPAK)

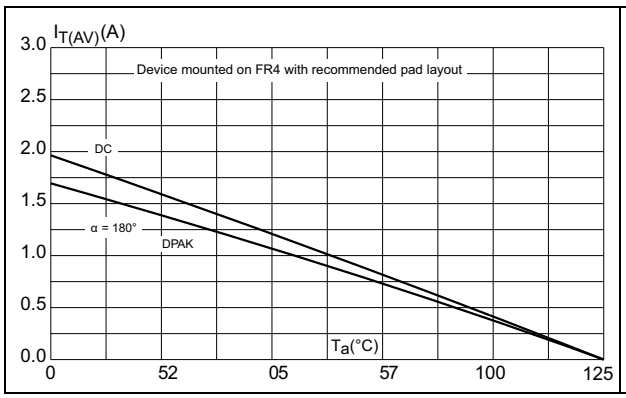


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

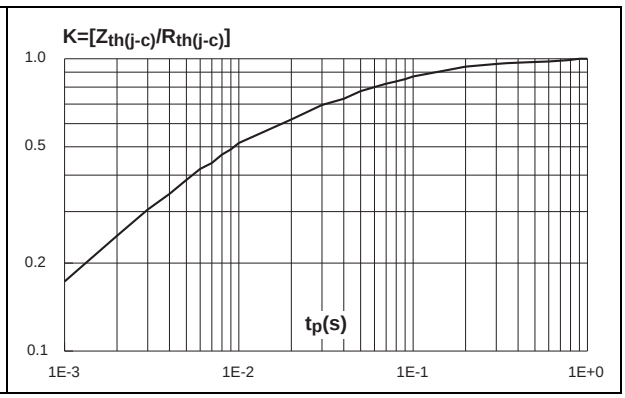


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration

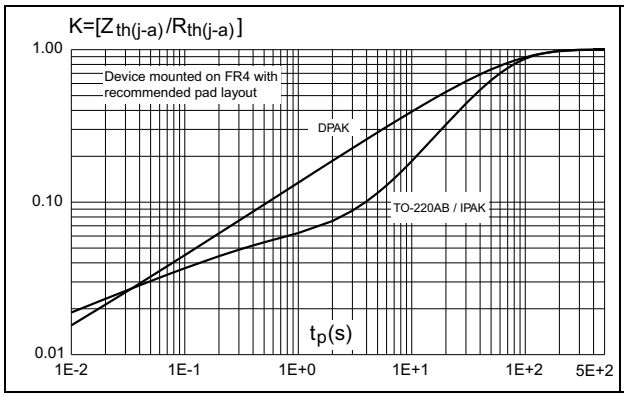


Figure 6. Relative variation of gate trigger and holding current versus junction temperature

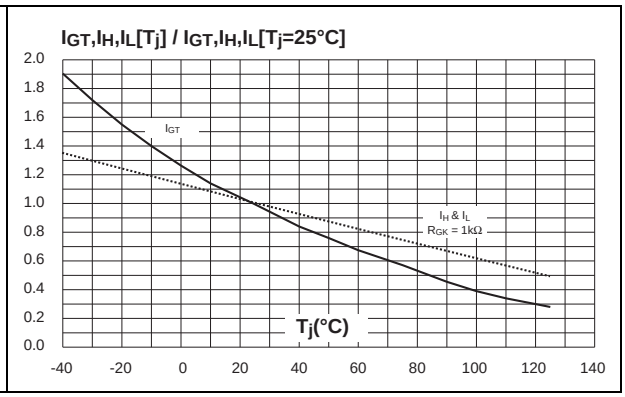


Figure 7. Relative variation of holding current versus gate-cathode resistance (typical values)

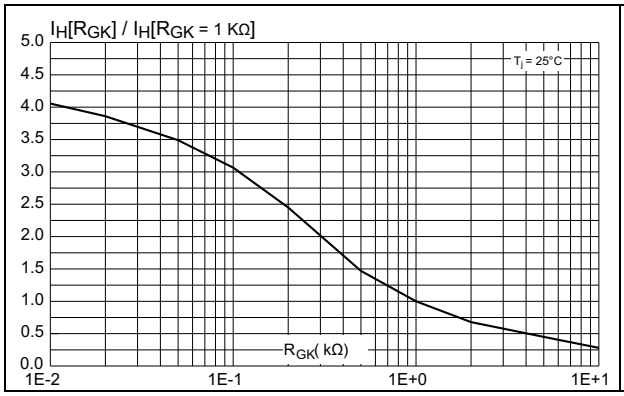


Figure 8. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

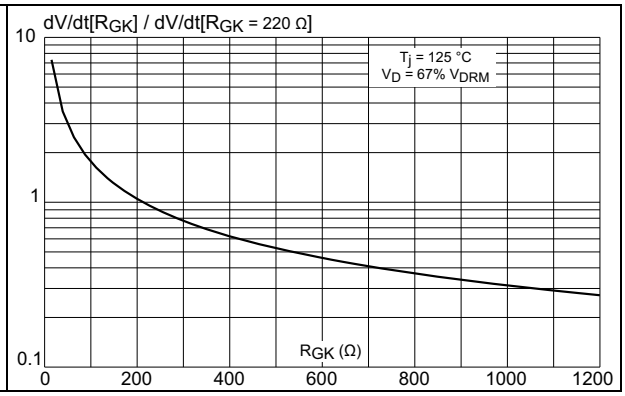


Figure 9. Relative variation of dV/dt immunity current versus gate-cathode capacitance (typical values)

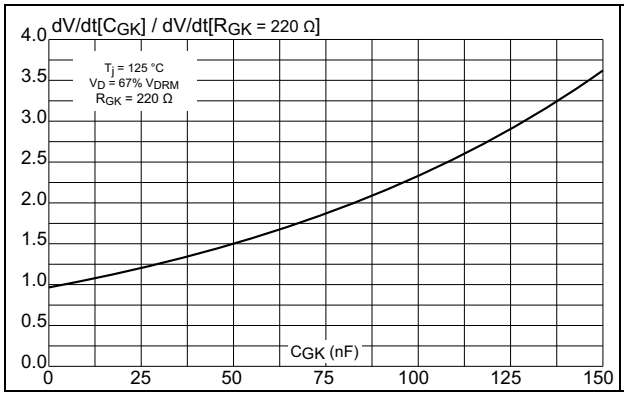


Figure 10. Surge peak on-state current versus number of cycles

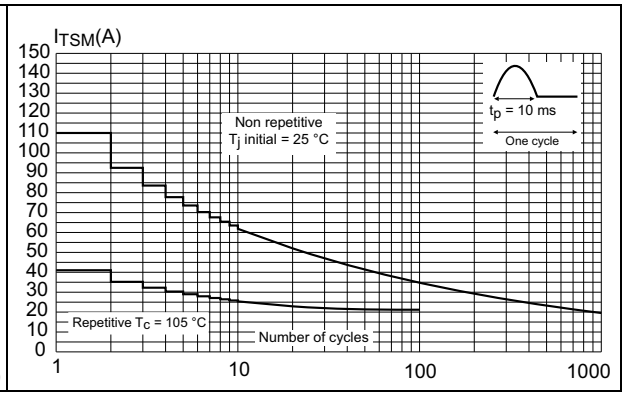


Figure 11. Non-repetitive surge peak on-state current and corresponding values versus sinusoidal pulse width

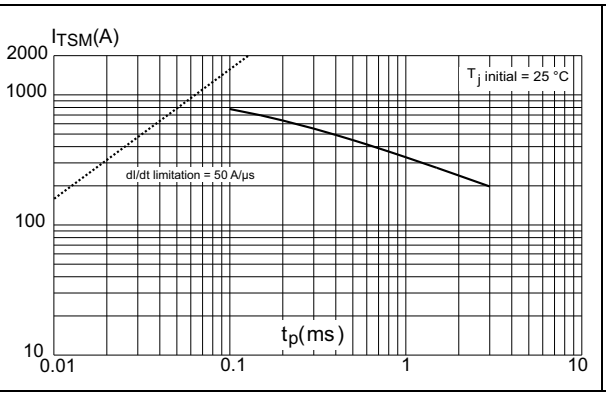


Figure 12. On-state characteristics (maximum values

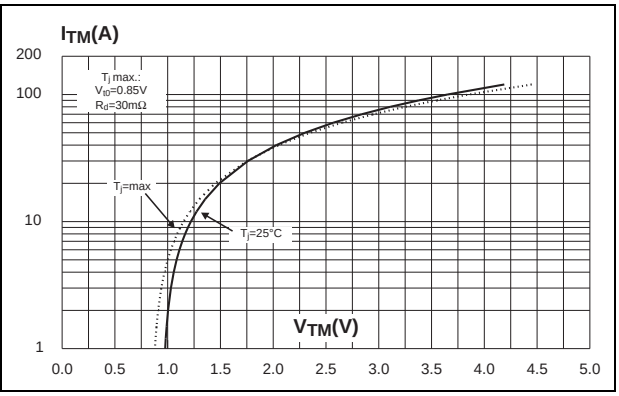
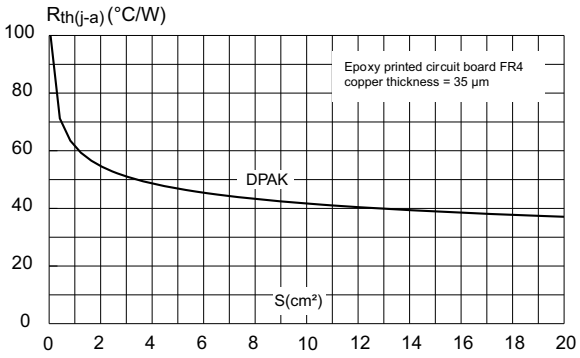


Figure 13. Thermal resistance junction to ambient versus copper surface under tab (DPAK)



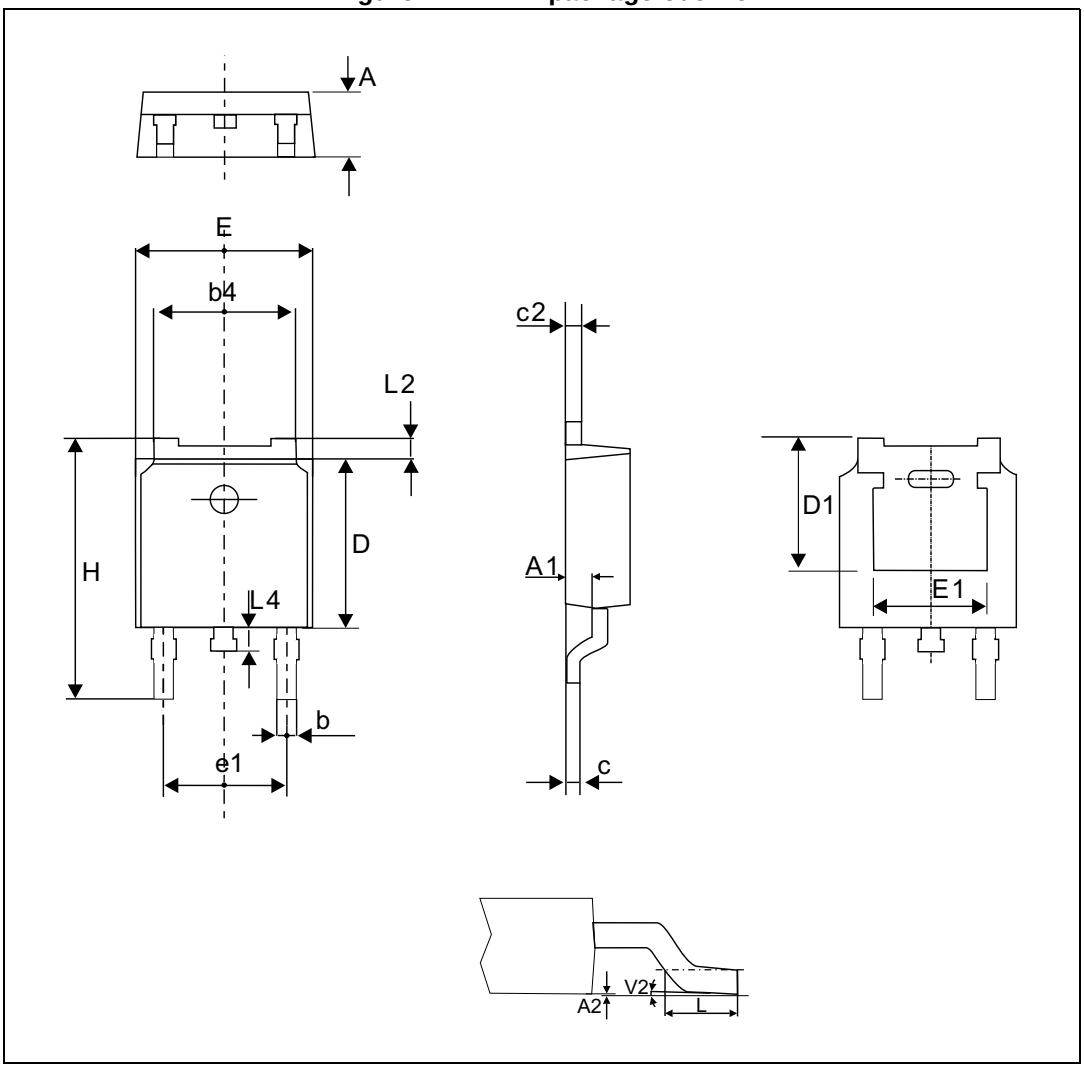
2 Package information

- Epoxy meets UL94, V0
- Lead-free packages
- Recommended torque: 0.4 to 0.6 N·m

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 DPAK package information

Figure 14. DPAK package outline

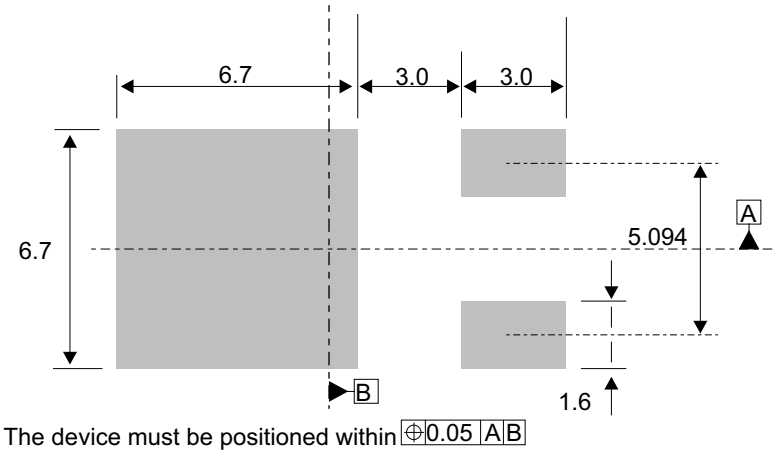


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

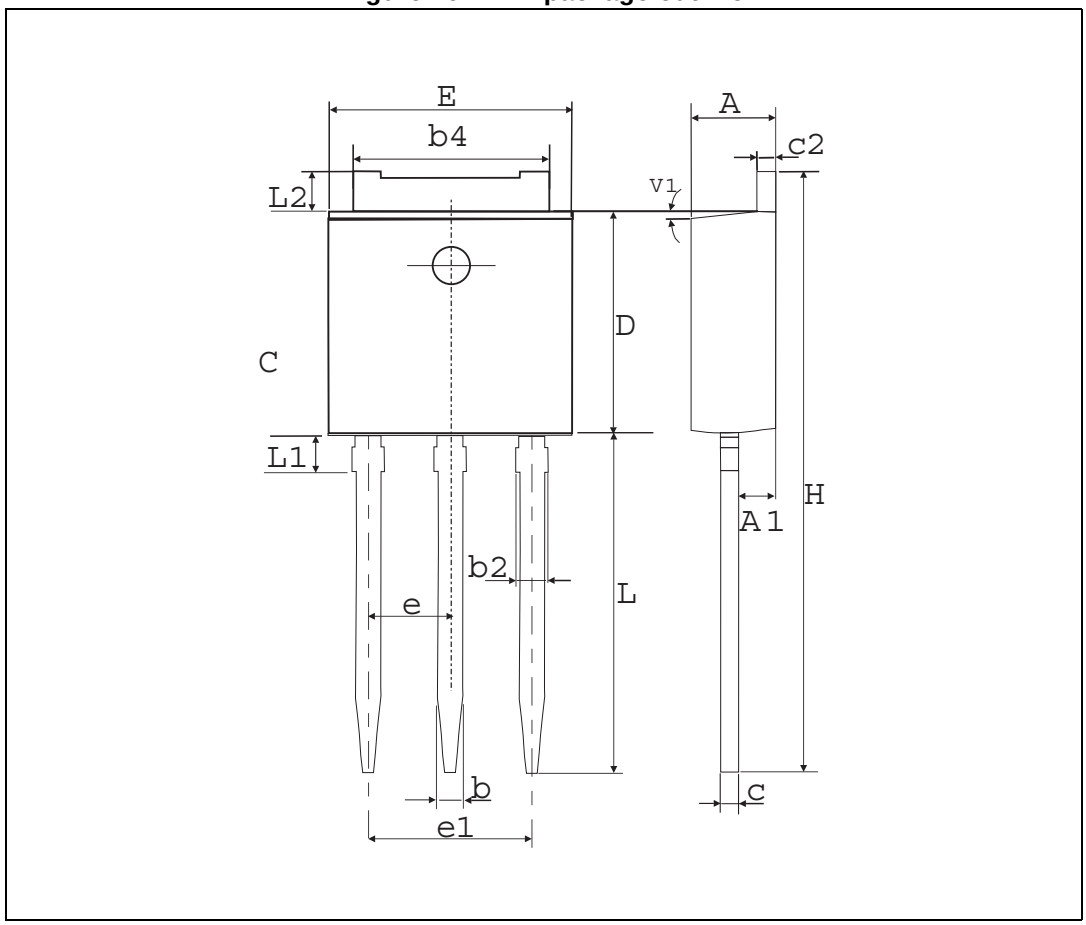
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	5.10			0.201		
E	6.35		6.73	0.250		0.264
E1		4.32			0.170	
e1	4.40		4.70	0.173		0.185
H	9.35		10.40	0.368		0.409
L	1.00		1.78	0.039		0.070
L2			1.27			0.05
L4	0.60		1.02	0.023		0.040
V2	0°		8°	0°		8°

Figure 15. Footprint (dimensions in mm)



2.2 IPAK package information

Figure 16. IPAK package outline



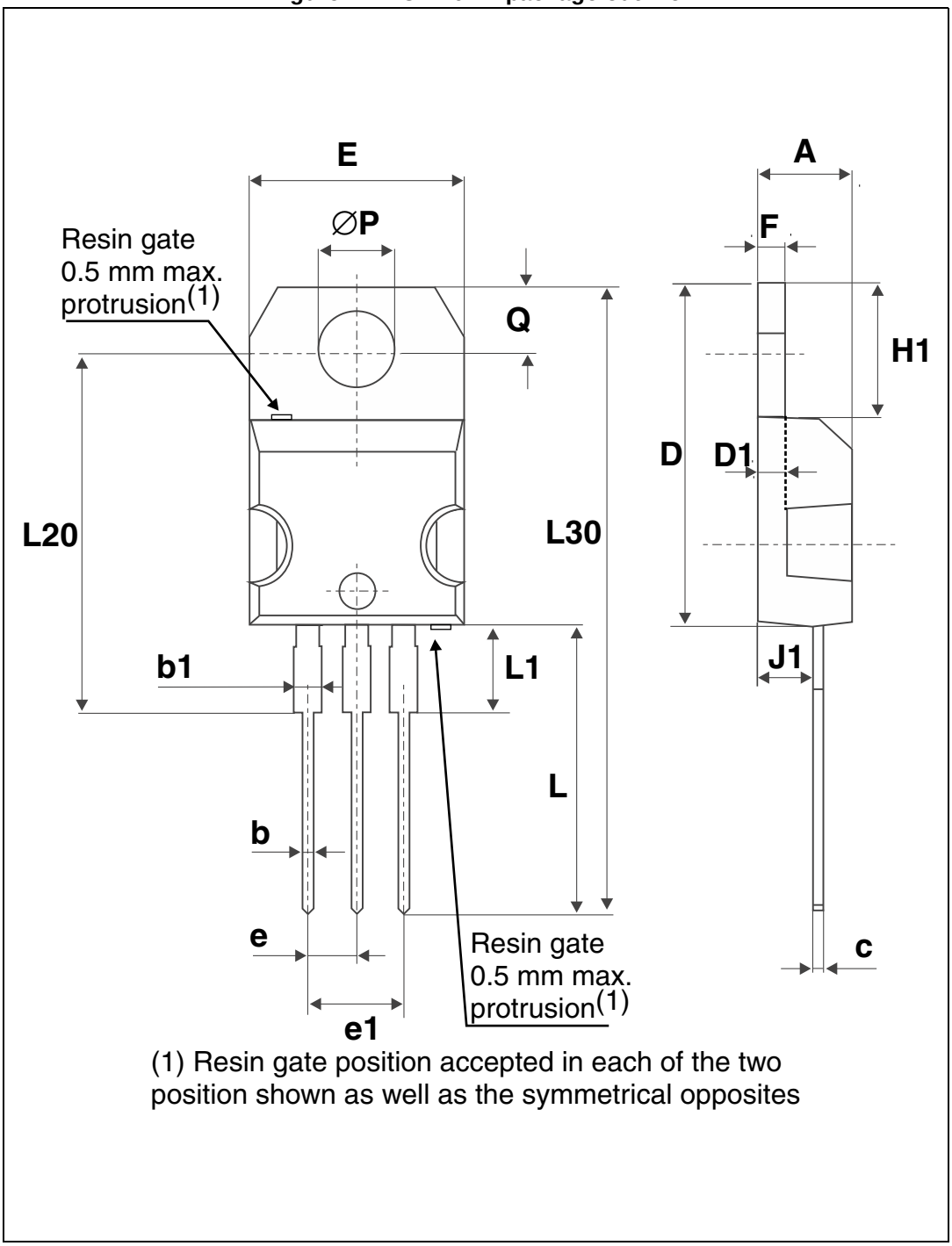
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. IPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
b	0.64		0.90	0.025		0.035
b2			0.95			0.037
b4	5.20		5.43	0.204		0.213
c	0.45		0.60	0.017		0.023
c2	0.46		0.60	0.018		0.023
D	6		6.20	0.236		0.244
E	6.40		6.70	0.252		0.263
e		2.28			0.090	
e1	4.40		4.60	0.173		0.181
H		16.10			0.634	
L	9		9.60	0.354		0.377
L1	0.8		1.20	0.031		0.047
L2		0.80	1.25		0.031	0.049
V1		10°			10°	

2.3 TO-220AB package information

Figure 17. TO-220AB package outline



(1) Resin gate position accepted in each of the two position shown as well as the symmetrical opposites

Table 7. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.17	0.18
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.027
D	15.25	15.75	0.60	0.62
D1	1.27 typ.		0.05 typ.	
E	10	10.40	0.39	0.41
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.19	0.20
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.24	0.26
J1	2.40	2.72	0.094	0.107
L	13	14	0.51	0.55
L1	3.50	3.93	0.137	0.154
L20	16.40 typ.		0.64 typ.	
L30	28.90 typ.		1.13 typ.	
∅P	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

3 Ordering information

Figure 18. TS1220 series

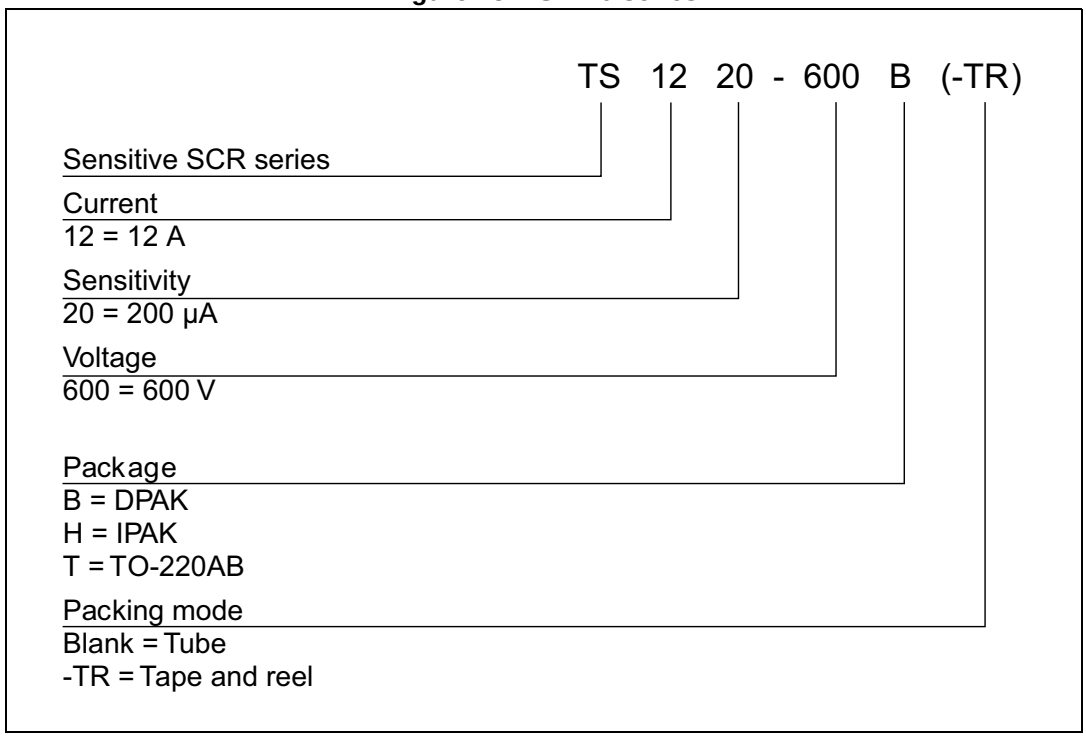


Table 8. Ordering information

Order code[1]	Marking[1]	Package	Weight	Base qty	Delivery mode
TS1220-600B	TS12 20600	DPAK	0.3 g	75	Tube
TS1220-600B-TR	TS12 20600	DPAK	0.3 g	2500	Tape and reel
TS1220-600H	TS12 20600	IPAK	0.3 g	75	Tube
TS1220-600T	TS1220600T	TO-220AB	2.3 g	50	Tube

1. x (6, 7, 8, 10) depends upon voltage

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
08-Apr-2015	1	First issue.