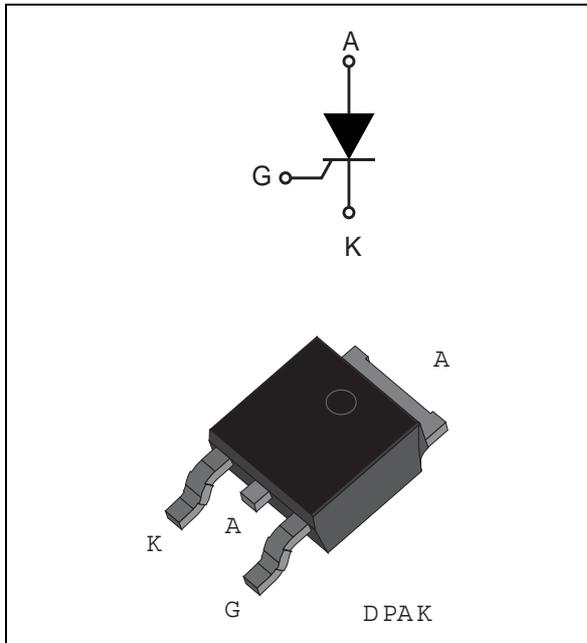


Sensitive gate 4 A SCRs

Datasheet – production data


Description

Thanks to highly sensitive triggering levels, the TS420-600BC is suitable for all applications where the available gate current is limited, such as motor control for hand tools, kitchen aids, overvoltage crowbar protection for low power supplies among others.

Available in DPAK, this device provides an optimized performance in a limited space area.

Table 1. Device summary

Symbol	Value	Unit
$I_{T(RMS)}$	4	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	100	μA

Features

- On-state rms current, 4 A
- Repetitive peak off-state voltage (V_{DRM} , V_{RRM}) 600 V
- Maximum triggering gate current, 100 μA

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	On-state rms current (180° conduction angle)		$T_c = 100^\circ\text{C}$	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		$T_c = 100^\circ\text{C}$	
I_{TSM}	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_{jinitial} = 25^\circ\text{C}$	
		$t_p = 10\text{ ms}$		
I^2t	I^2t value for fusing	$t_p = 10\text{ ms}$	$T_j = 25^\circ\text{C}$	A^2s
di/dt	Critical rate of rise of on-state current, $I_G = 10\text{ mA}$, $di_G/dt = 0.1\text{ A}/\mu\text{s}$	$F = 60\text{ Hz}$	$T_j = 125^\circ\text{C}$	$\text{A}/\mu\text{s}$
I_{GM}	Peak gate current	$t_p = 20\text{ }\mu\text{s}$		A
V_{DRM} , V_{RRM}	Repetitive peak off-state voltage, gate shorted		600	V
$P_{G(AV)}$	Average gate power dissipation		0.2	W
P_{GM}	Peak gate power dissipation	$t_p = 20\text{ }\mu\text{s}$	3	
T_{stg}	Storage junction temperature range		- 40 to + 150	$^\circ\text{C}$
T_j	Operating junction temperature range		- 40 to + 110	

Table 3. Electrical characteristics⁽¹⁾

Symbol	Test conditions		Value	Unit	
I_{GT}	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	Max.	100	μA	
V_{GT}		Max.	1.5	V	
I_H	$I_T = 50\text{ mA}$, $R_{GK} = 1\text{ k}\Omega$		Max.	5	mA
I_L	$I_G = 2\text{ mA}$, $R_{GK} = 1\text{ k}\Omega$		Max.	10	mA
V_{t0}	Threshold voltage	$T_j = 110^\circ\text{C}$	Max.	0.85	V
R_d	Dynamic resistance	$T_j = 110^\circ\text{C}$	Max.	90	$\text{m}\Omega$
dV/dt	$V_D = 67\% V_{DRM}$, $R_{GK} = 220\text{ }\Omega$	$T_j = 110^\circ\text{C}$	Min.	5	$\text{V}/\mu\text{s}$
V_{GD}	$V_D = V_{DRM}$, $R_L = 33\text{ k}\Omega$, $R_{GK} = 220\text{ }\Omega$	$T_j = 110^\circ\text{C}$	Min.	0.1	V
V_{RG}	$I_{RG} = 20\text{ }\mu\text{A}$		Min.	14	V
	$I_{RG} = 150\text{ }\mu\text{A}$		Max.	20	
V_{TM}	$I_{TM} = 5\text{ A}$, $t_p = 380\text{ }\mu\text{s}$		Max.	1.6	V
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$, gate shorted	$T_j = 25^\circ\text{C}$	Max.	10	μA
		$T_j = 110^\circ\text{C}$		1	mA

1. $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 4. Device timings

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

Table 5. Thermal resistance

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

1. Copper surface under tab

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

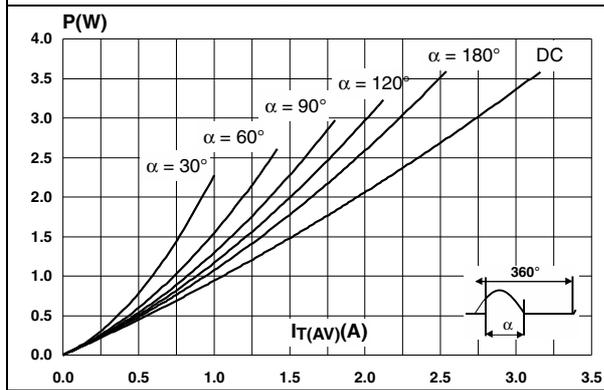


Figure 2. Average and DC on-state current versus case temperature

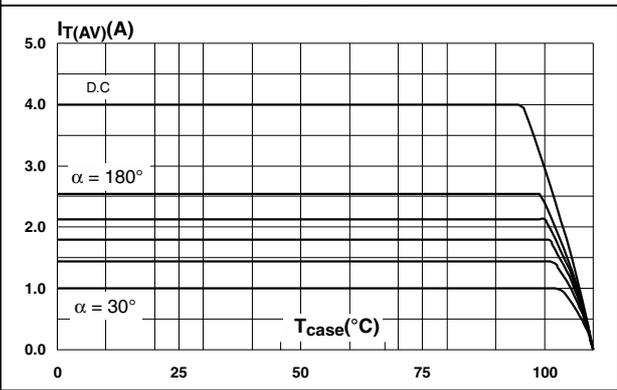


Figure 3. Average and DC on-state current versus ambient temperature

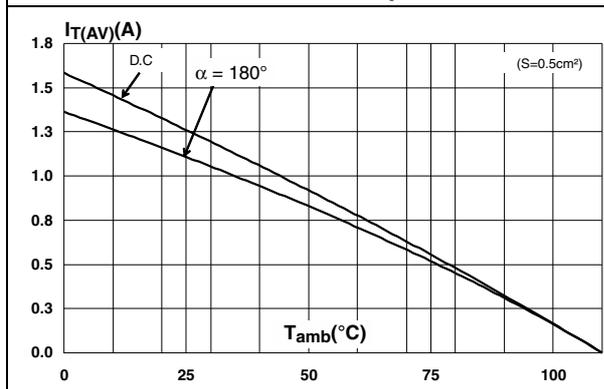


Figure 4. Relative variation of thermal impedance versus pulse duration

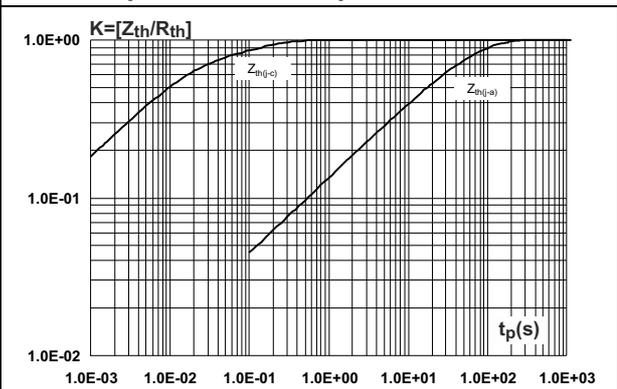


Figure 5. Relative variation of gate trigger current and gate voltage versus junction temperature

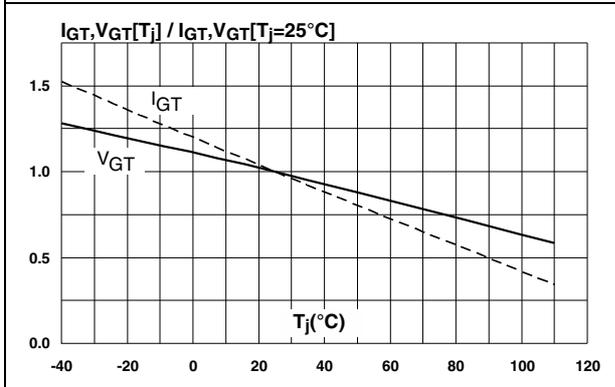


Figure 6. Relative variation of holding and latching current versus junction temperature (typical values)

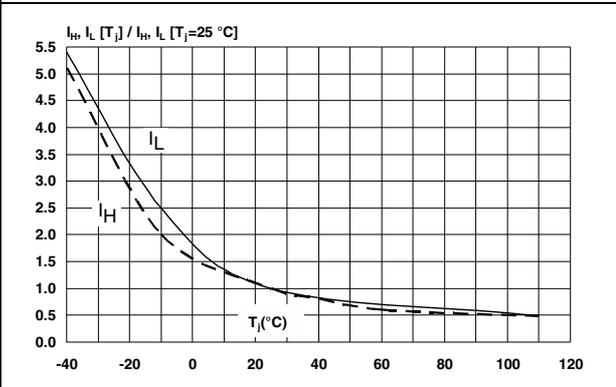


Figure 7. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

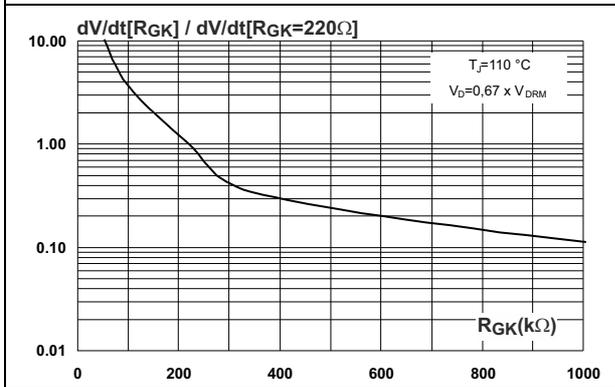


Figure 8. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values)

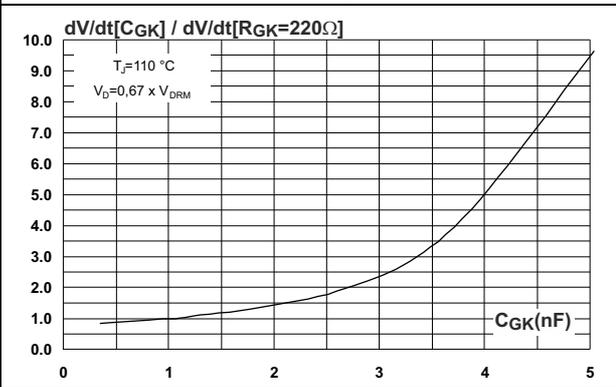


Figure 9. Surge peak on-state current versus number of cycles

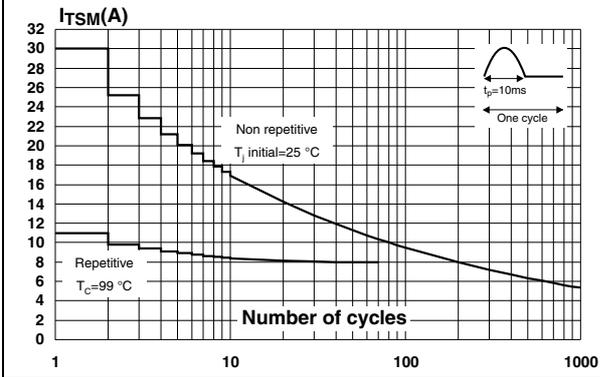


Figure 10. Non-repetitive surge peak on-state current, and corresponding values of I^2t

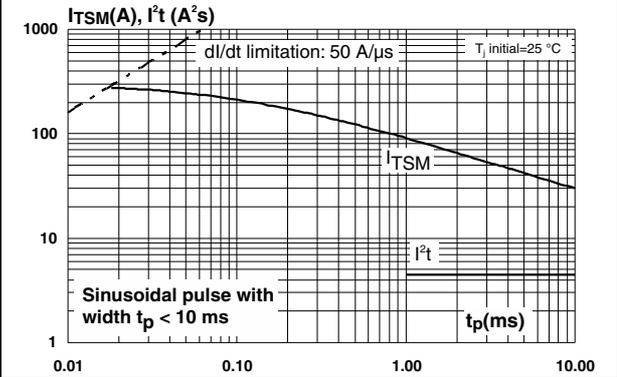


Figure 11. On-state characteristics (maximum values)

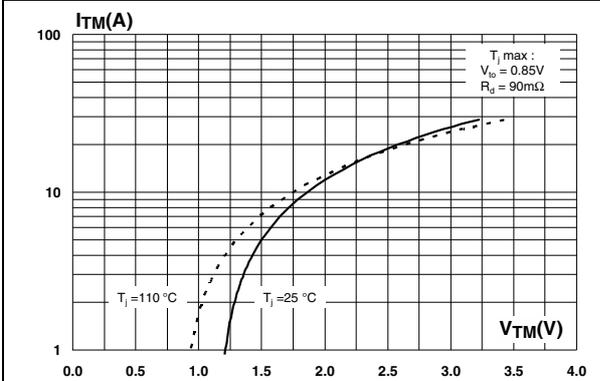
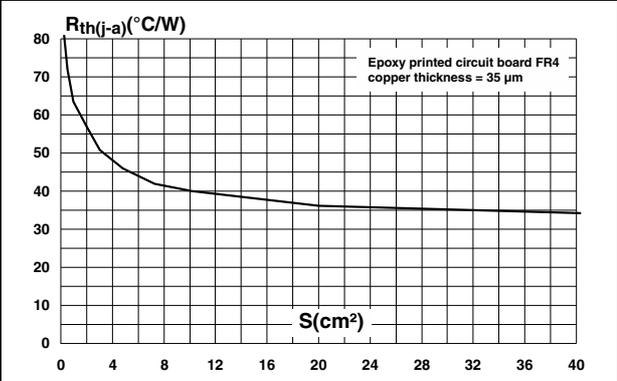


Figure 12. Thermal resistance junction to ambient versus copper surface under tab

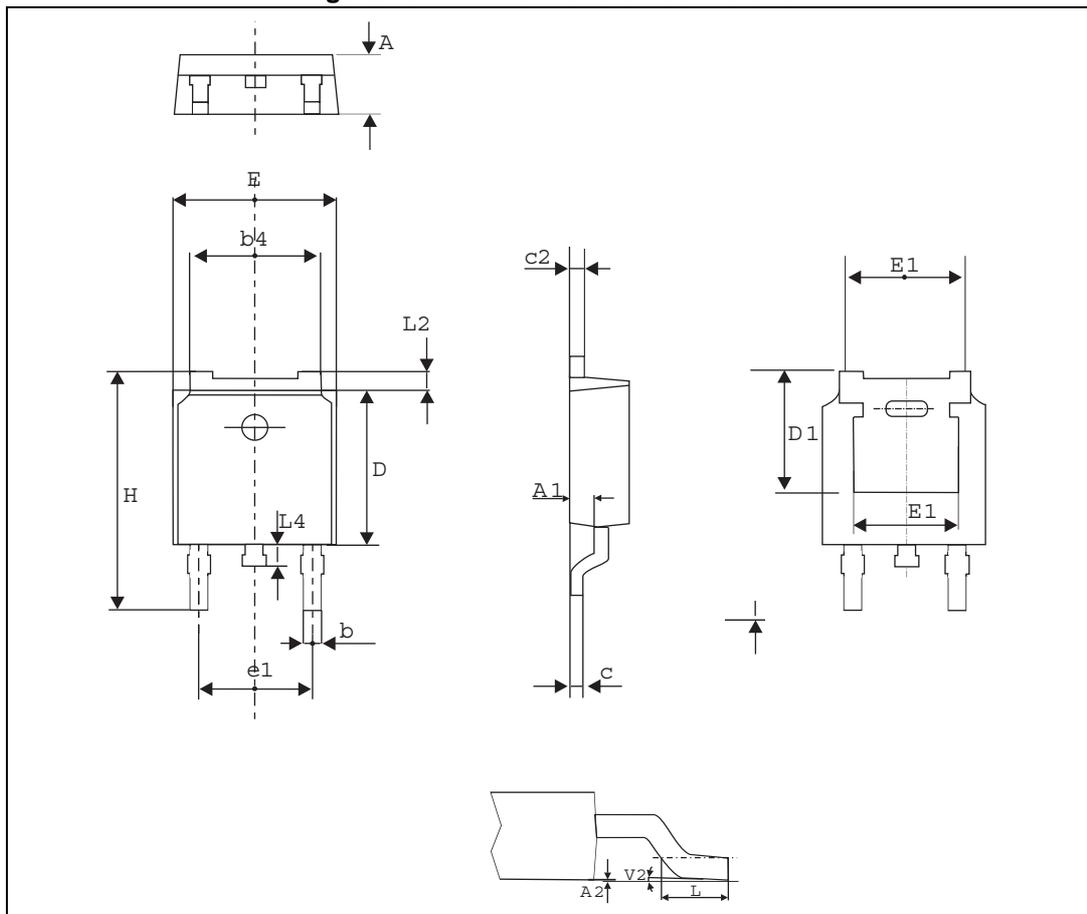


2 Package information

- Epoxy meets UL94, V0
- Lead-free package

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.

Figure 13. DPAK dimension definitions

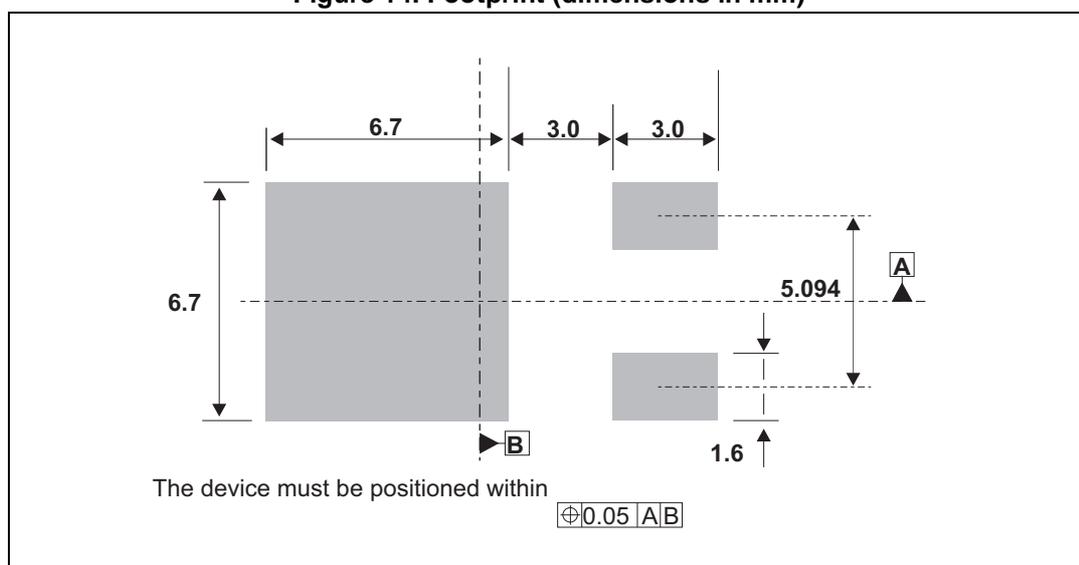


Note: *this package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*

Table 6. DPAK dimension values

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 14. Footprint (dimensions in mm)



3 Ordering information

Figure 15. Ordering information scheme

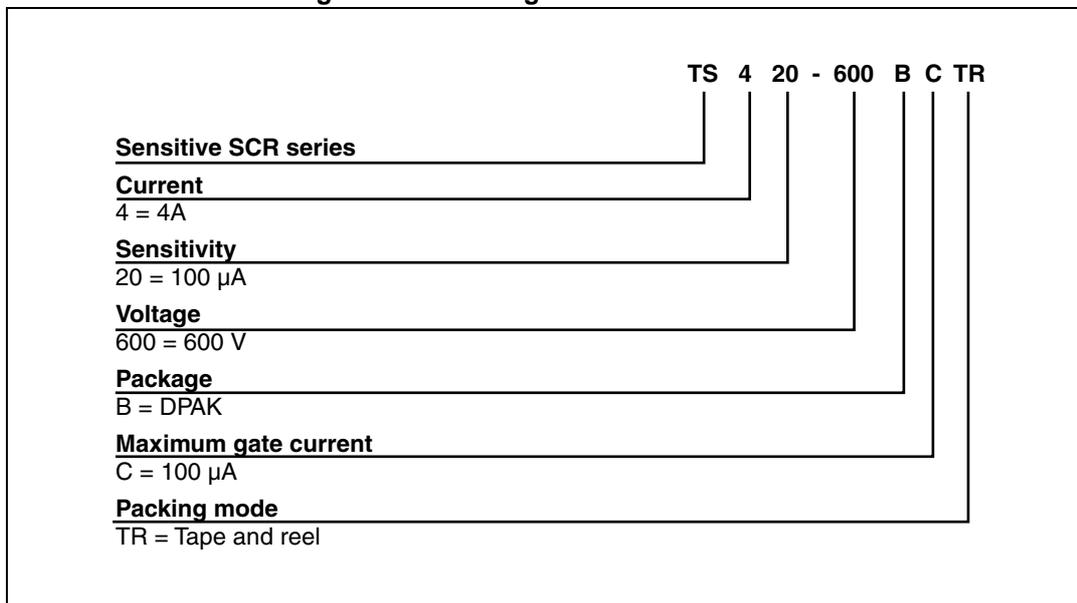


Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
TS420-600BCTR	TS4 2060C	DPAK	0.3 g	2500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
28-May-2014	1	Initial release.

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