

### Description

Available either in sensitive (TS8) or standard (TN8 / TYN) gate triggering levels, the 8 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	Voltage (x00) $V_{DRM}/V_{RRM}$		Sensitivity $I_{GT}$	Package
	600 V	800 V		
TS820-600B	X		0.2 mA	DPAK
TS820-600H	X		0.2 mA	IPAK
TS820-600T	X		0.2 mA	TO-220AB
TS820-600FP	X		0.2 mA	TO-220FPAB
TN805-600B	X		5 mA	DPAK
TN815-x00B	X	X	15 mA	DPAK
TYN608RG	X		15 mA	TO-220AB

### Features

- On-state rms current,  $I_{T(RMS)}$  8 A
- Repetitive peak off-state voltage,  $V_{DRM}/V_{RRM}$  600 and 800 V
- Triggering gate current,  $I_{GT}$  0.2 to 15 mA

# 1 Characteristics

**Table 2. Absolute ratings (limiting values)**

Symbol	Parameter		Value		Unit	
			TN805 TN815 TS820	TYN608		
$I_{T(RMS)}$	On-state rms current (180° conduction angle)		$T_c = 110\text{ °C}$	8	A	
			T0-220FPAB, $T_c = 91\text{ °C}$			
$I_{T(AV)}$	Average on-state current (180° conduction angle)		$T_c = 110\text{ °C}$	5	A	
			T0-220FPAB, $T_c = 91\text{ °C}$			
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	73	100	A
		$t_p = 10\text{ ms}$		70	95	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	24.5	45	A <sup>2</sup> S
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	$F = 60\text{ Hz}$	$T_j = 125\text{ °C}$	50		A/ $\mu$ s
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu$ s	$T_j = 125\text{ °C}$	4		A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	1		W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125		°C
$V_{RGM}$	Maximum peak reverse gate voltage (for TN8x5 and TYN608 only)			5		V

**Table 3. Sensitive electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Test conditions			TS820	Unit	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 140\text{ }\Omega$		MAX.	200	$\mu$ A	
$V_{GT}$			MAX.	0.8	V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $R_{GK} = 220\text{ }\Omega$	$T_j = 125\text{ °C}$	MIN.	0.1	V	
$V_{RG}$	$I_{RG} = 10\text{ }\mu$ A		MIN.	8	V	
$I_H$	$I_T = 50\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$		MAX.	5	mA	
$I_L$	$I_G = 1\text{ mA}$ , $R_{GK} = 1\text{ k}\Omega$		MAX.	6	mA	
$dV/dt$	$V_D = 65\% V_{DRM}$ , $R_{GK} = 220\text{ }\Omega$	$T_j = 125\text{ °C}$	MIN.	5	V/ $\mu$ s	
$V_{TM}$	$I_{TM} = 16\text{ A}$ , $t_p = 380\text{ }\mu$ s		$T_j = 25\text{ °C}$	MAX.	1.6	V
$V_{t0}$	Threshold voltage		$T_j = 125\text{ °C}$	MAX.	0.85	V
$R_d$	Dynamic resistance		$T_j = 125\text{ °C}$	MAX.	46	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$ , $R_{GK} = 220\text{ }\Omega$		$T_j = 25\text{ °C}$	MAX.	5	$\mu$ A
			$T_j = 125\text{ °C}$		1	mA

**Table 4. Standard electrical characteristics ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified)**

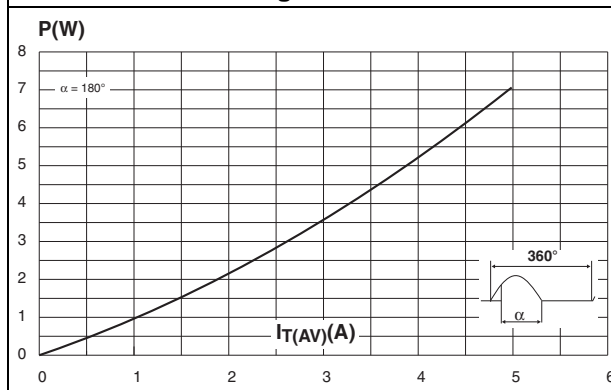
Symbol	Test conditions		TN805	TN815	TYN608	Unit	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\ \Omega$	MIN.	0.5	2	2	mA	
		MAX.	5	15	15		
$V_{GT}$		MAX.	1.3			V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ }^\circ\text{C}$	MIN.	0.2		V	
$I_H$	$I_T = 100\text{ mA}$ , gate open		MAX.	25	40	30	mA
$I_L$	$I_G = 1.2\ I_{GT}$		MAX.	30	50	70	mA
dV/dt	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ }^\circ\text{C}$	MIN.	50	150	150	V/ $\mu\text{s}$
$V_{TM}$	$I_{TM} = 16\text{ A}$ , $t_p = 380\ \mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	1.6		V	
$V_{t0}$	Threshold voltage	$T_j = 125\text{ }^\circ\text{C}$	MAX.	0.85		V	
$R_d$	Dynamic resistance	$T_j = 125\text{ }^\circ\text{C}$	MAX.	46		m $\Omega$	
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	5		$\mu\text{A}$	
		$T_j = 125\text{ }^\circ\text{C}$		2		mA	

**Table 5. Thermal resistance**

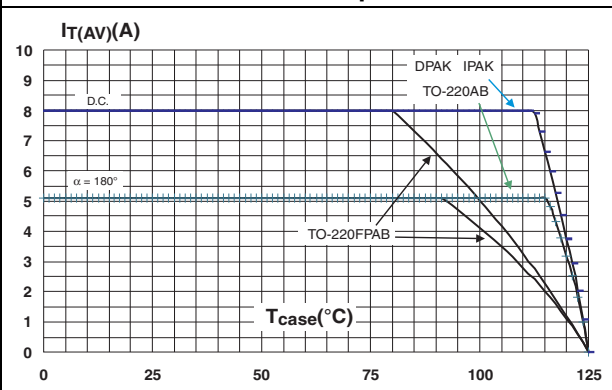
Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case (DC)	DPAK, IPAK, TO-220AB	1.3	$^\circ\text{C/W}$	
		TO-220FPAB	4.6		
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)} = 0.5\text{ cm}^2$	DPAK	70	$^\circ\text{C/W}$
			IPAK	100	
			TO-220AB, TO-220FPAB	60	

1. S = Copper surface under tab

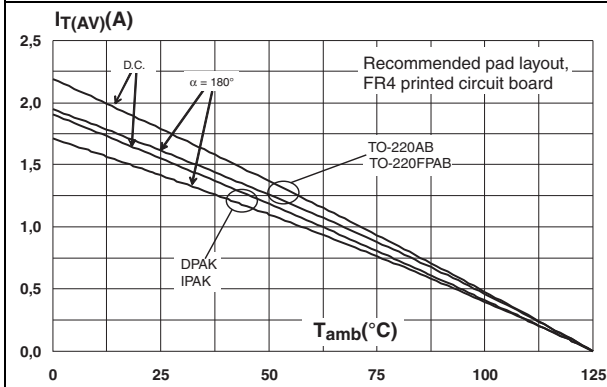
**Figure 1. Maximum average power dissipation versus average on-state current**



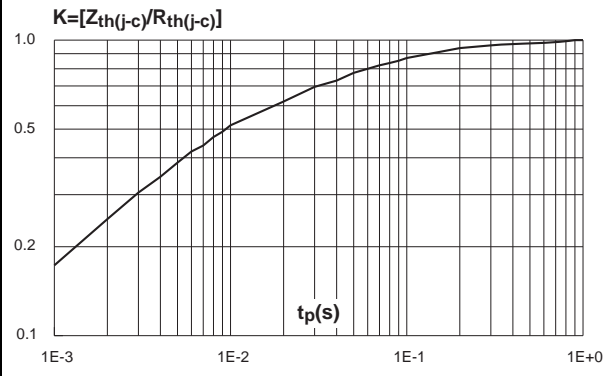
**Figure 2. Average and DC on-state current versus case temperature**



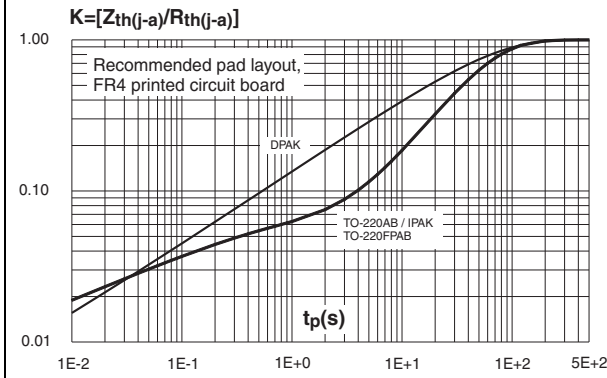
**Figure 3. Average and DC on-state current versus ambient temperature**



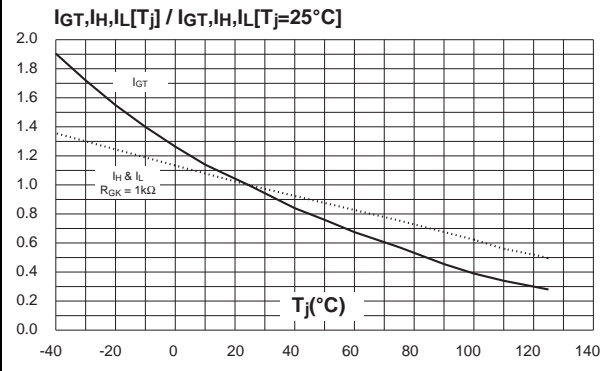
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



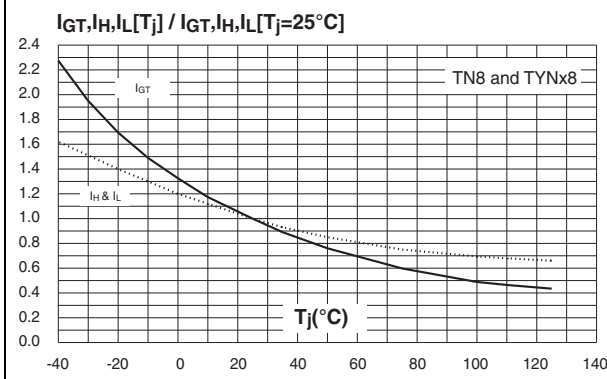
**Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration**



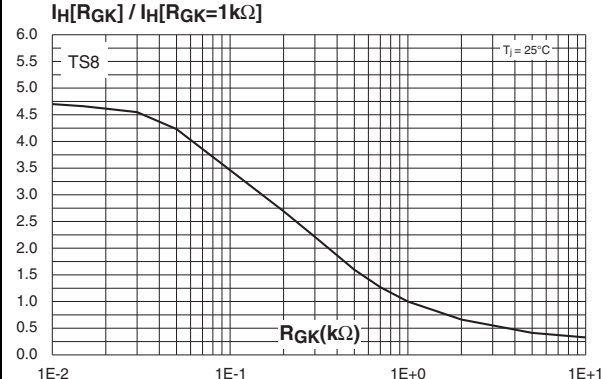
**Figure 6. Relative variation of gate trigger current and holding current versus junction temperature for TS820**



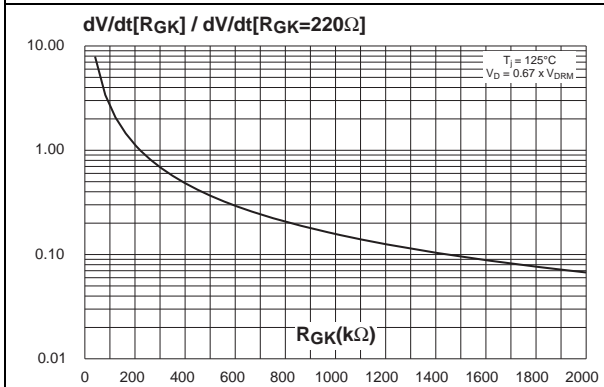
**Figure 7. Relative variation of gate trigger and holding current versus junction temperature**



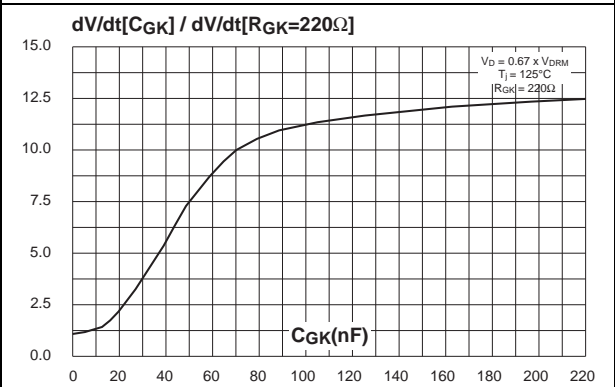
**Figure 8. Relative variation of holding current versus gate-cathode resistance (typical values)**



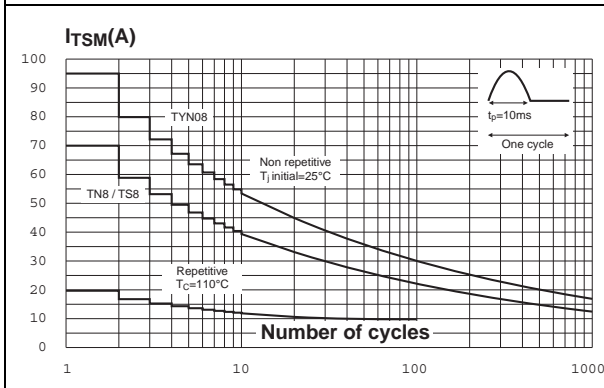
**Figure 9. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS820**



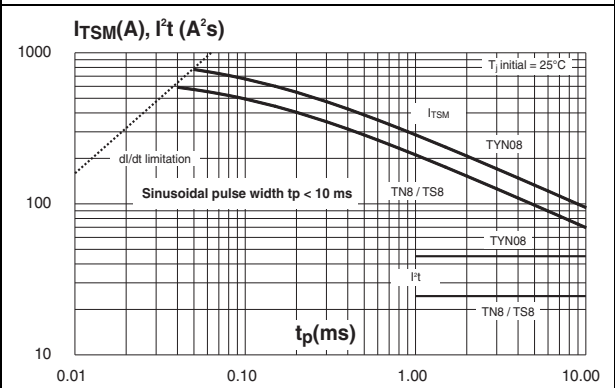
**Figure 10. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS820**



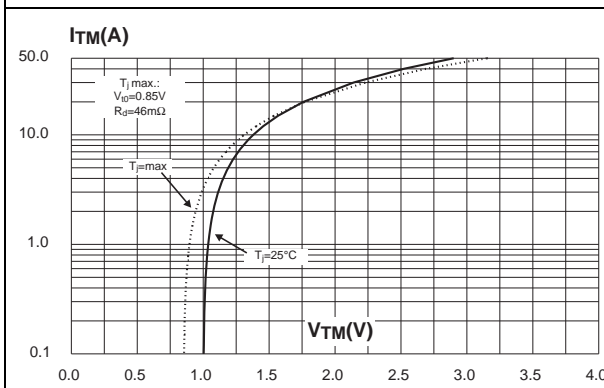
**Figure 11. Surge peak on-state current versus number of cycles**



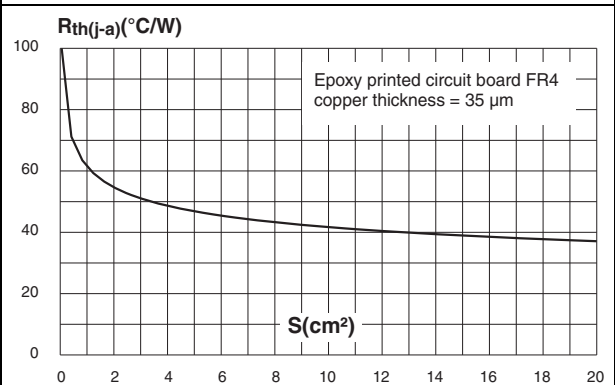
**Figure 12. Non-repetitive surge peak on-state current and corresponding values of I²t**



**Figure 13. On-state characteristics (maximum values)**



**Figure 14. Thermal resistance junction to ambient versus copper surface under tab (DPAK)**

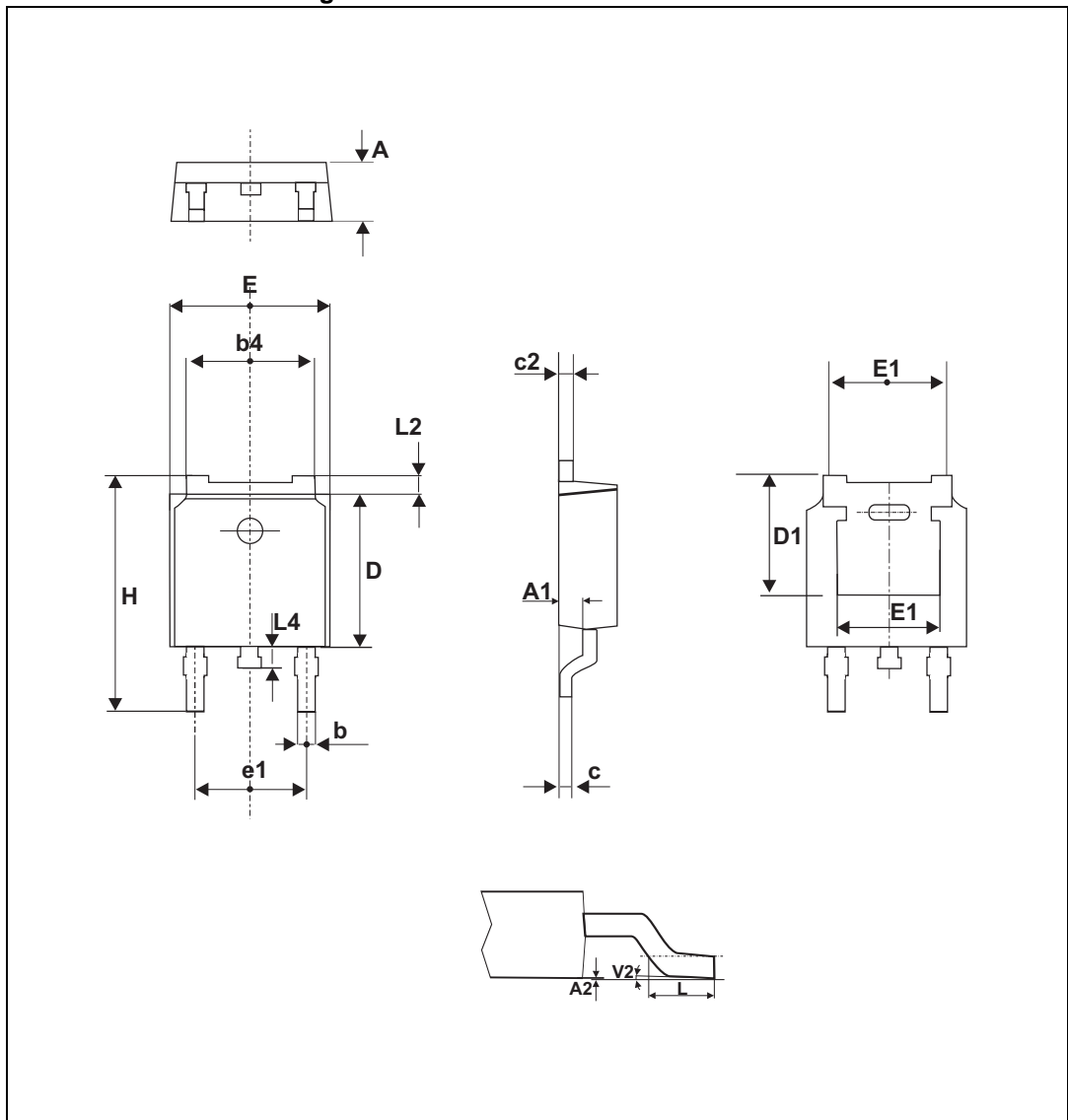


## 2 Package information

- 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<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 15. 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 16. Footprint (dimensions in mm)

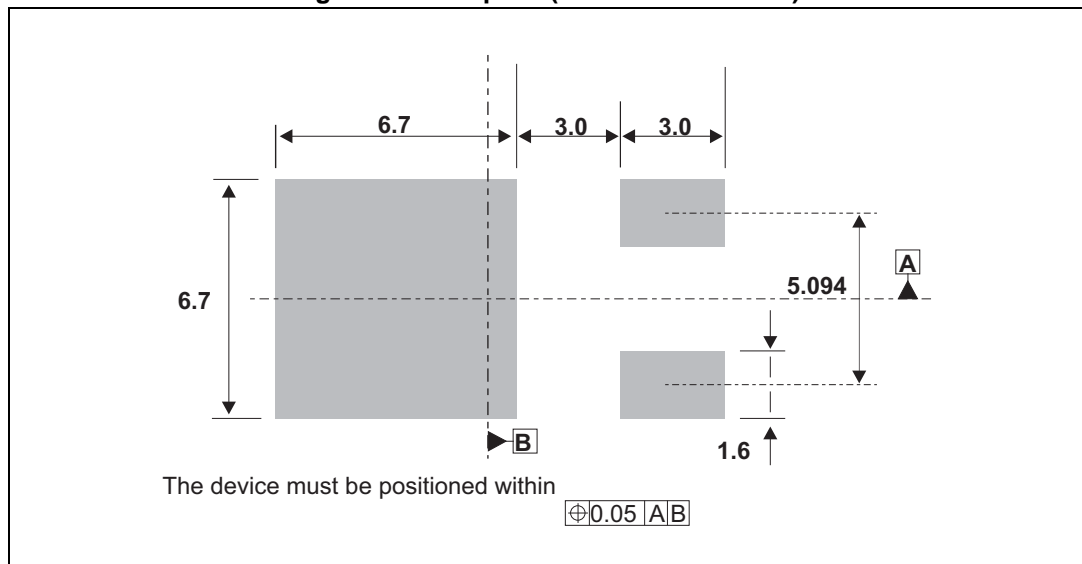
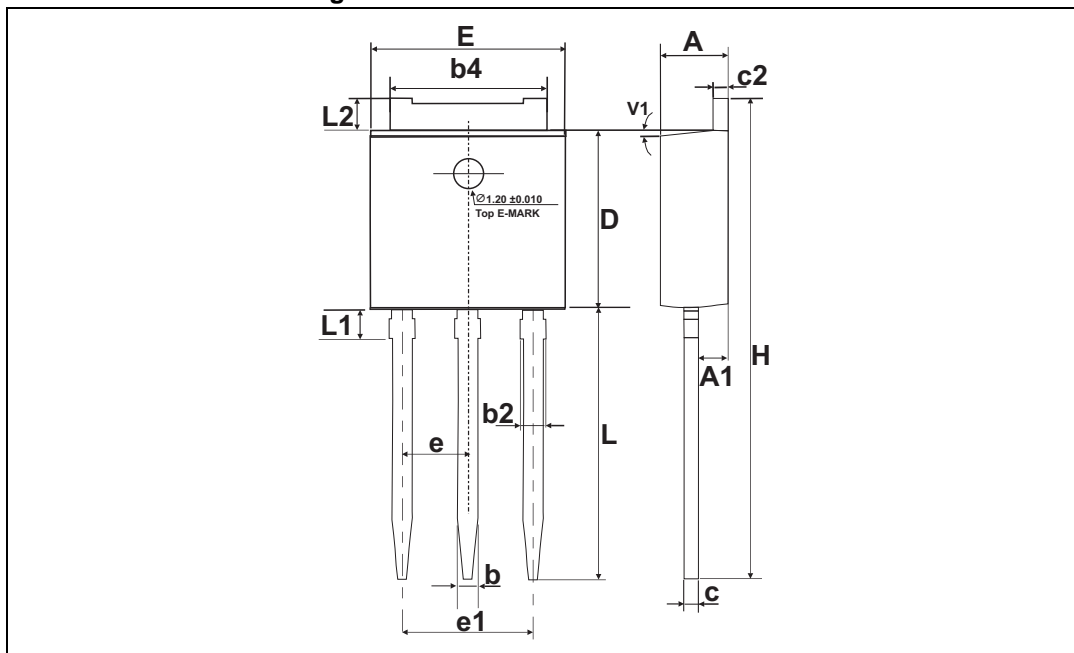


Figure 17. IPAK dimension definitions



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

Table 7. IPAK dimension values

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



Table 7. IPAK dimension values

L2		0.80	1.25		0.031	0.049
V1		10°			10°	

Figure 18. TO-220AB dimension definitions

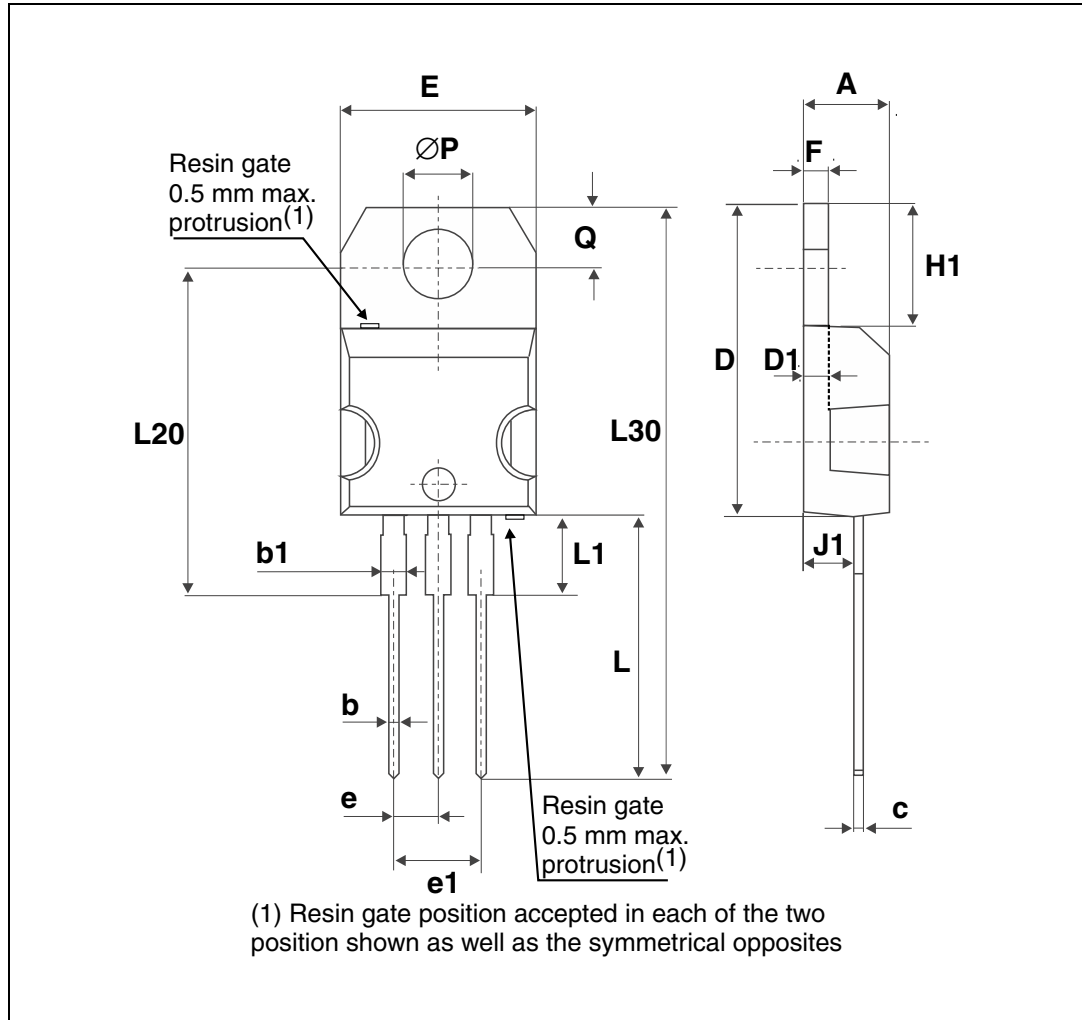


Table 8. TO-220AB dimension values

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.	
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

Figure 19. TO-220AB (Nlns. & Ins. 20-up) dimension definitions

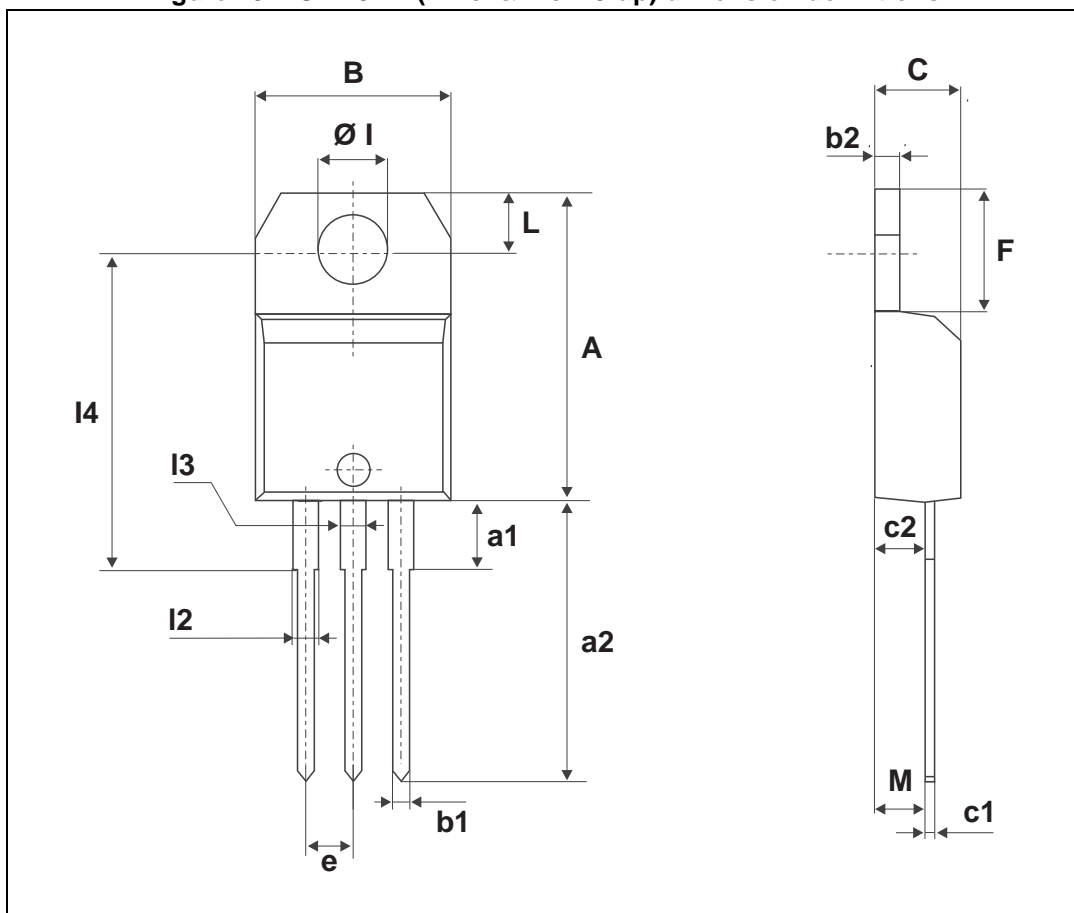


Table 9. TO-220AB (Nlns. &amp; Ins. 20-up) dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
Øl	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

Figure 20. TO-220FPAB dimension definitions

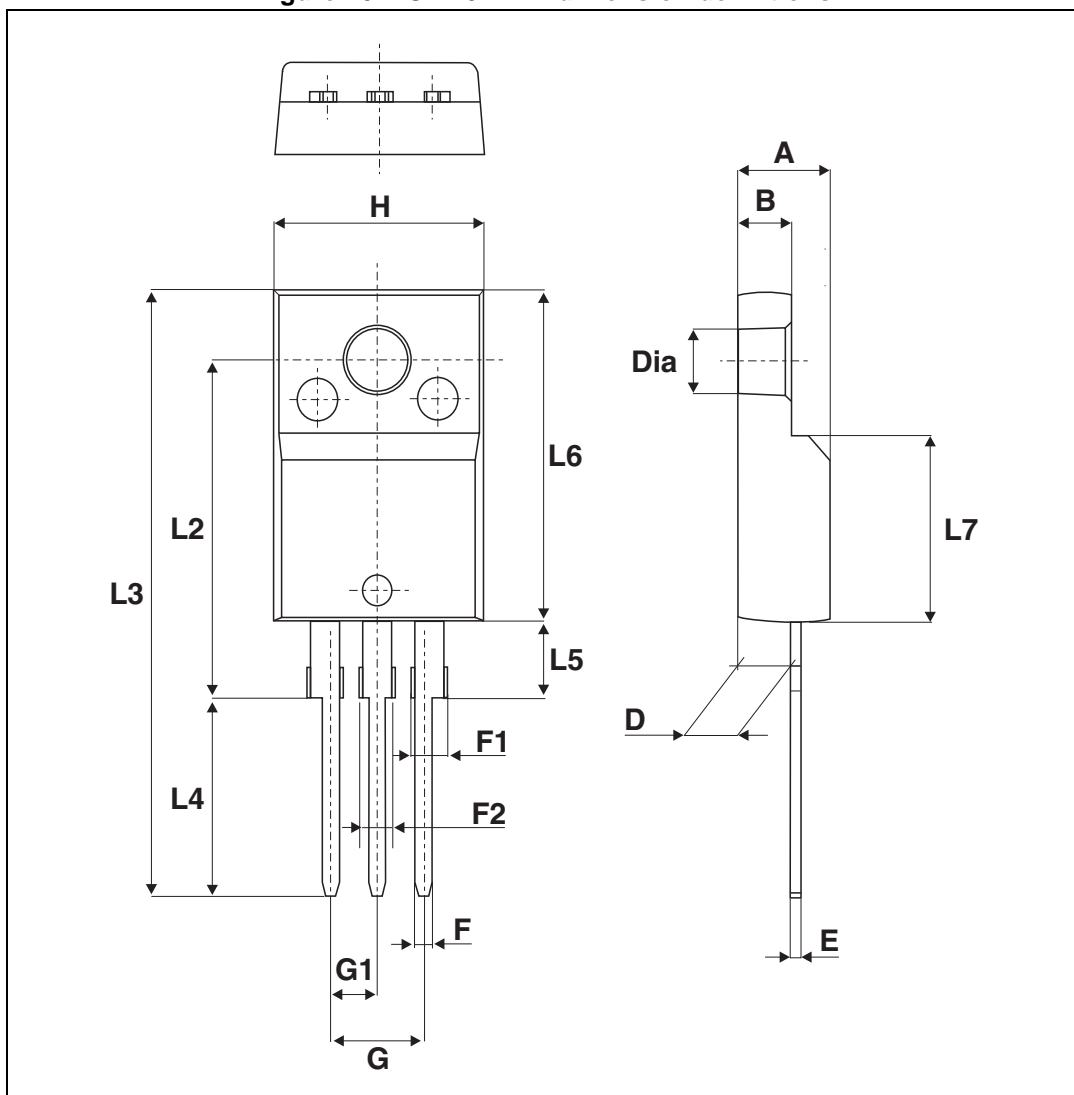


Table 10. TO-220FPAB dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	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		0.027
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		5.20	0.195		0.205
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.63	
L3	28.6		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	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

### 3 Ordering information

Figure 21. TN8 series

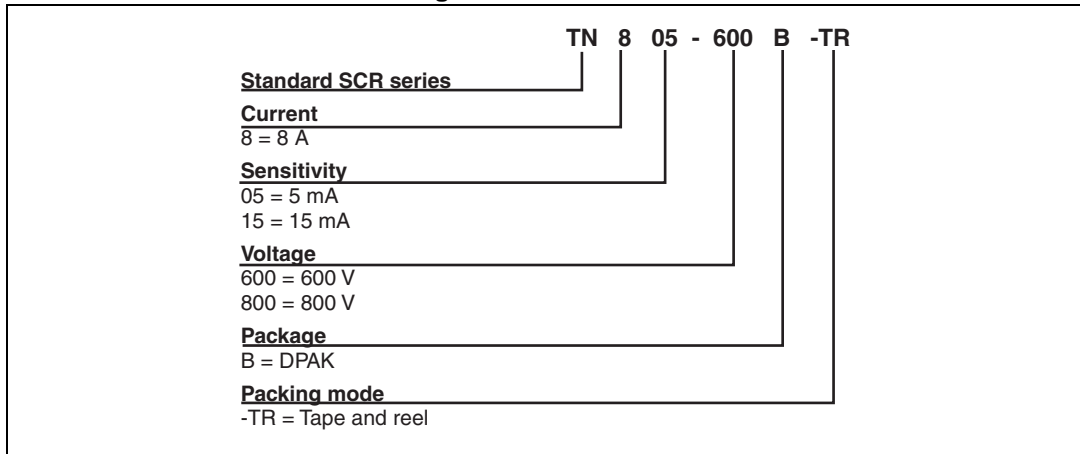


Figure 22. TS8 series

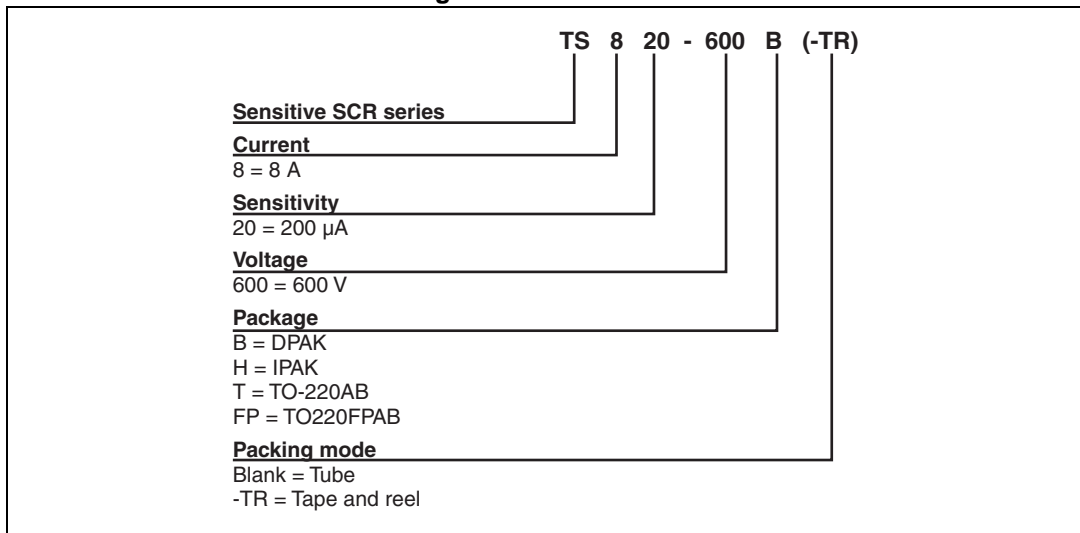


Figure 23. TYNx08 series

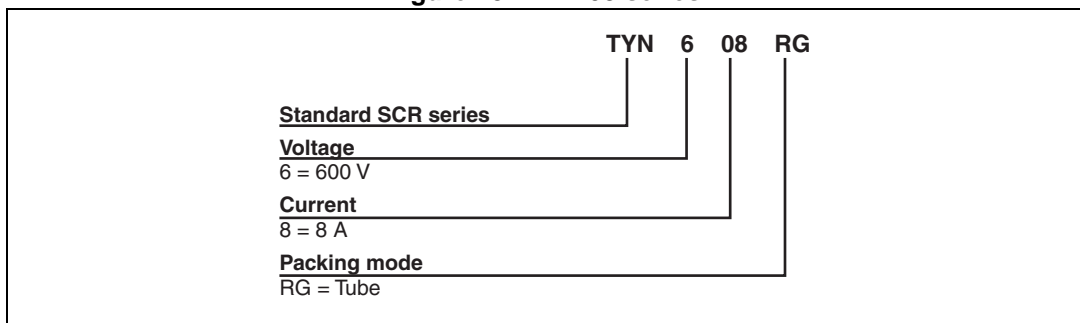


Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
TN805-600B-TR	TN805600	DPAK	0.3 g	2500	Tape and reel
TN815-600B-TR	TN815600	DPAK	0.3 g	2500	Tape and reel
TN815-800B-TR	TN815800	DPAK	0.3 g	2500	Tape and reel
TS820-600B	TS820600	DPAK	0.3 g	75	Tube
TS820-600B-TR	TS820600	DPAK	0.3 g	2500	Tape and reel
TS820-600H	TS820600	IPAK	0.4 g	75	Tube
TS820-600T	TS820600T	TO-220AB	2.3 g	50	Tube
TS820-600FP	TS820600	TO-220FPAB	2.0 g	50	Tube
TYN608RG	TYN608	TO-220AB	2.3 g	50	Tube

## 4 Revision history

Table 12. Document revision history

Date	Revision	Changes
Apr-2002	4A	Last update.
13-Feb-2006	5	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
22-Jan-2010	6	Alpha definition updated in <a href="#">Figure 1</a> . Thermal resistance, junction to case, updated in <a href="#">Table 5</a> .
10-Oct-2011	7	Added TO-220FPAB package. Removed 700 V and 1000 V products.
14-May-2014	8	Updated DPAK and IPAK package information and reformatted to current standard.



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