

## Description

The standard (TN1215 / TYNX12) 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	Voltage (x00) $V_{DRM}/V_{RRM}$				$I_{GT}$	Package
	600	700	800	1000		
TN1215-xxxB	X		X		15 mA	DPAK
TN1215-xxxG	X		X		15 mA	D <sup>2</sup> PAK
TN1215-xxxH	X		X		15 mA	IPAK
TYNx12RG	X		X	X	15 mA	TO-220AB
TYNx12TRG	X		X	X	5 mA	TO-220AB

## Features

- On-state RMS current,  $I_{T(RMS)}$  12 A
- Repetitive peak off-state voltage,  $V_{DRM}/V_{RRM}$  600 V, 800 V and 1000 V
- Triggering gate current,  $I_{GT}$  5 mA to 15 mA

# 1 Characteristics

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

Symbol	Parameter		Value		Unit
			TN1215 / TYNx12		
$I_{T(RMS)}$	On-state RMS current (180° conduction angle)		$T_c = 105\text{ °C}$	12	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		$T_c = 105\text{ °C}$	8	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	145	A
		$t_p = 10\text{ ms}$		140	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	98	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	$t_p = 20\text{ }\mu\text{s}$	$T_j = 125\text{ °C}$	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			5	V

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

Symbol	Test conditions		TN1215		TYN		Unit	
			B/G	G	x12T	x12		
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$		MIN.	2	0.5	2	mA	
			MAX.	15	5	15		
$V_{GT}$			MAX.	1.3		V		
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ °C}$	MIN.	0.2		V		
$I_H$	$I_T = 500\text{ mA}$ , gate open		MAX.	40	30	15	30	mA
$I_L$	$I_G = 1.2 I_{GT}$		MAX.	80	60	30	60	mA
$dV/dt$	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ °C}$	MIN.	200	40	200	V/ $\mu$ s	
$V_{TM}$	$I_{TM} = 24\text{ A}$ $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ °C}$	MAX.	1.6		V		
$V_{t0}$	Threshold voltage		$T_j = 125\text{ °C}$	0.85		V		
$R_d$	Dynamic resistance		$T_j = 125\text{ °C}$	30		m $\Omega$		
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$		$T_j = 25\text{ °C}$	5		$\mu$ A		
			$T_j = 125\text{ °C}$	2		mA		

Table 4. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)		1.3	$^{\circ}\text{C}/\text{W}$
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)} = 0.5 \text{ cm}^2$	70	$^{\circ}\text{C}/\text{W}$
		$S^{(1)} = 1.0 \text{ cm}^2$	45	
			100	
			60	

1. S = Copper surface under tab

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

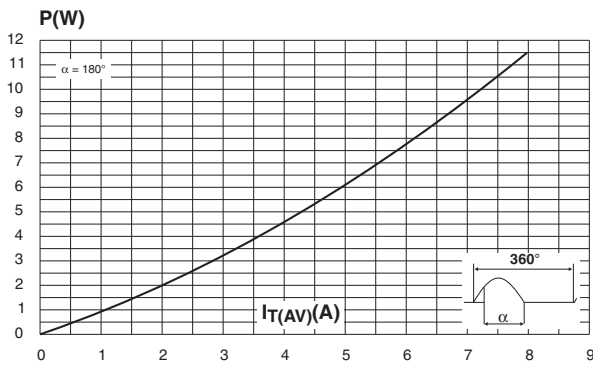


Figure 2. Average and DC on-state current versus case temperature

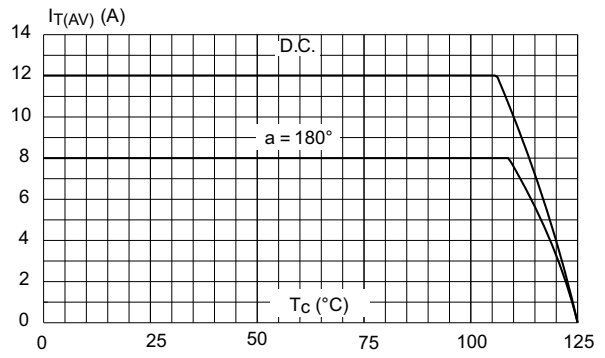


Figure 3. Average and DC on-state current versus ambient temperature (DPAK)

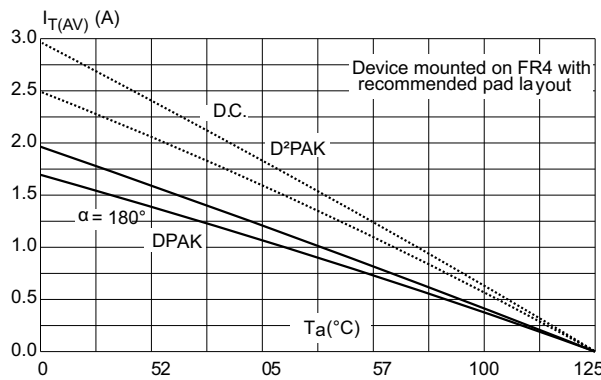
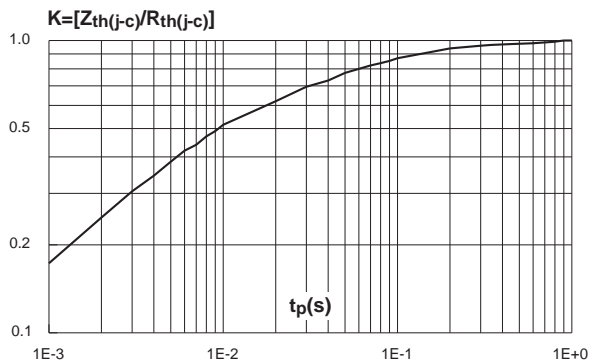
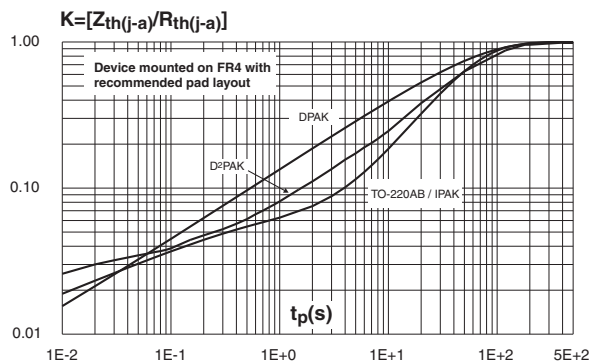


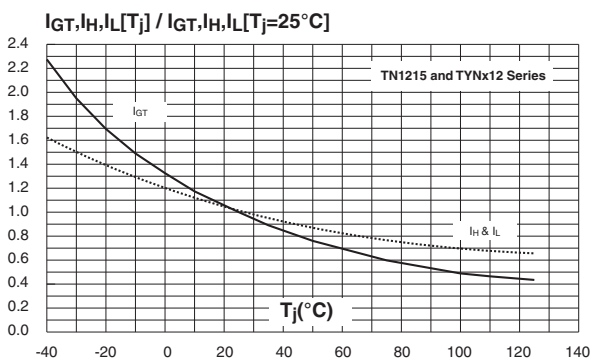
Figure 4. [Relative variation of thermal impedance junction to case versus pulse duration



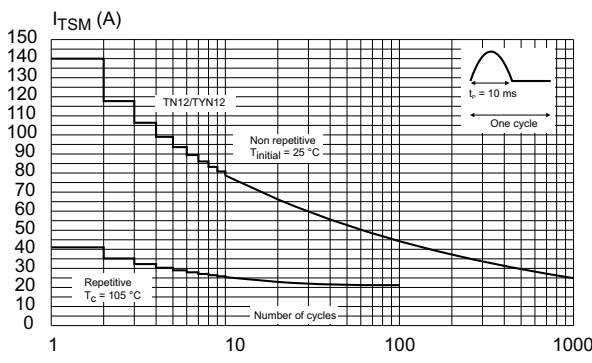
**Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration**



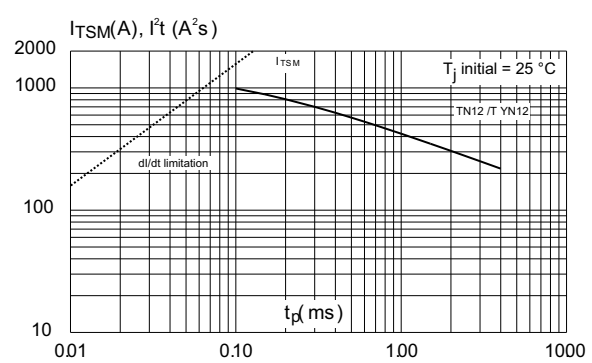
**Figure 6. Relative variation of gate trigger and holding current versus junction temperature**



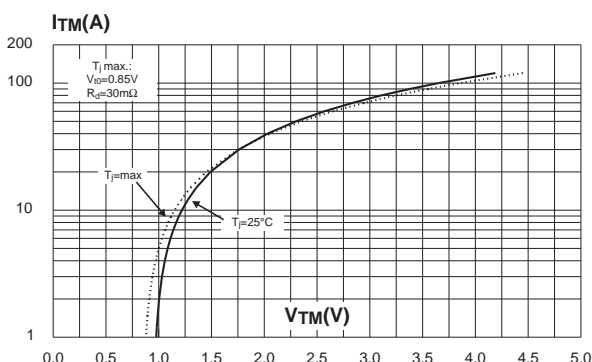
**Figure 7. Surge peak on-state current versus number of cycles**



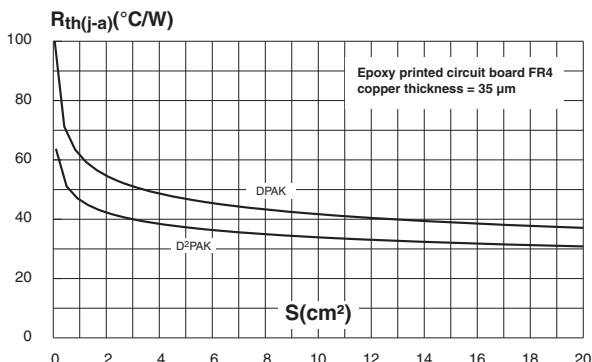
**Figure 8. Non-repetitive surge peak on-state current and corresponding values of I<sup>2</sup>t versus sinusoidal pulse width**



**Figure 9. On-state characteristics (maximum values)**



**Figure 10. Thermal resistance junction to ambient versus copper surface under tab (DPAK and D<sup>2</sup>PAK)**



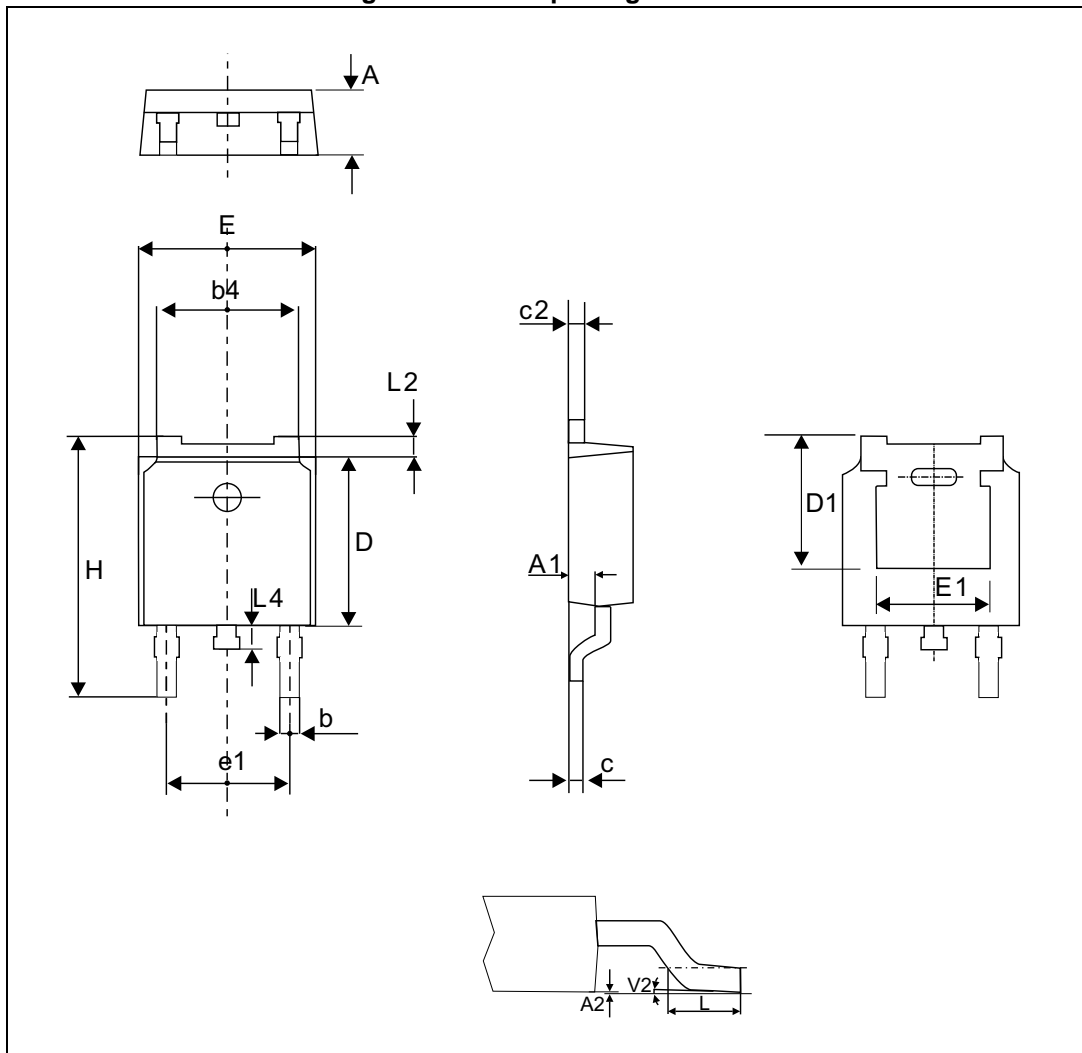
## 2 Package information

- 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](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 DPAK package information

Figure 11. DPAK package outline

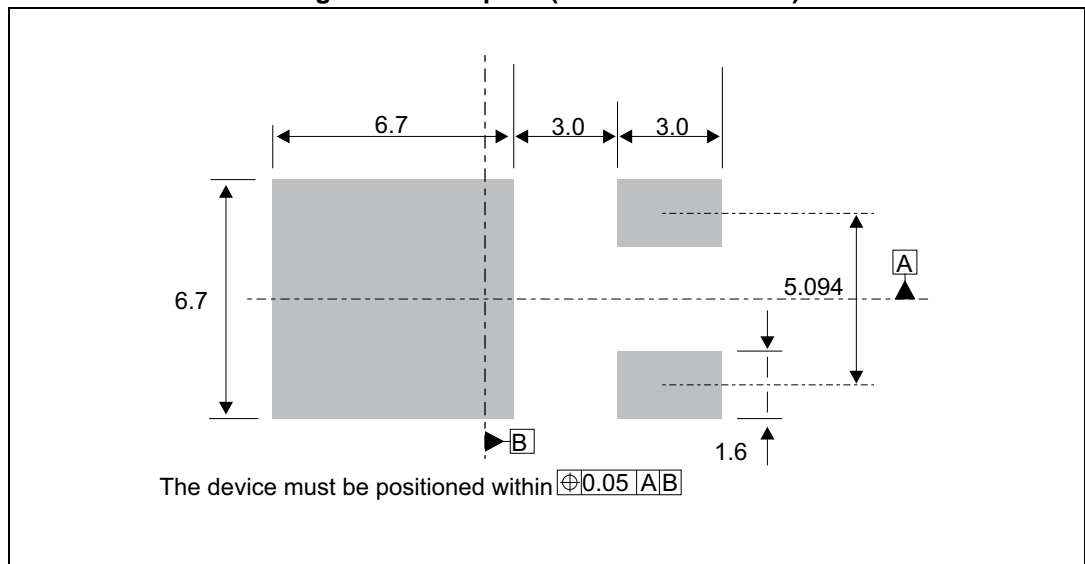


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 5. DPAK package mechanical data

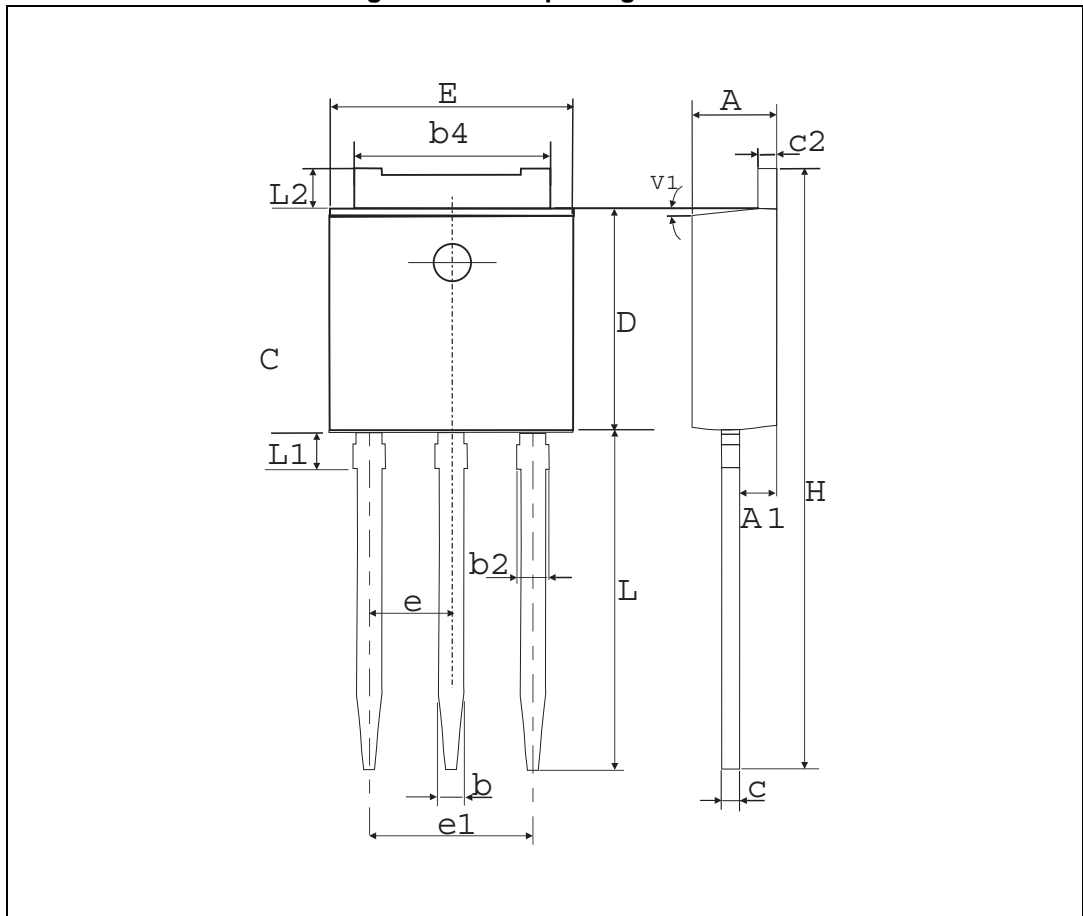
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.023
D	5.97		6.22	0.235		0.244
D1	5.10			0.201		
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 12. Footprint (dimensions in mm)



## 2.2 IPAK package information

Figure 13. 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 14. TO-220AB package outline

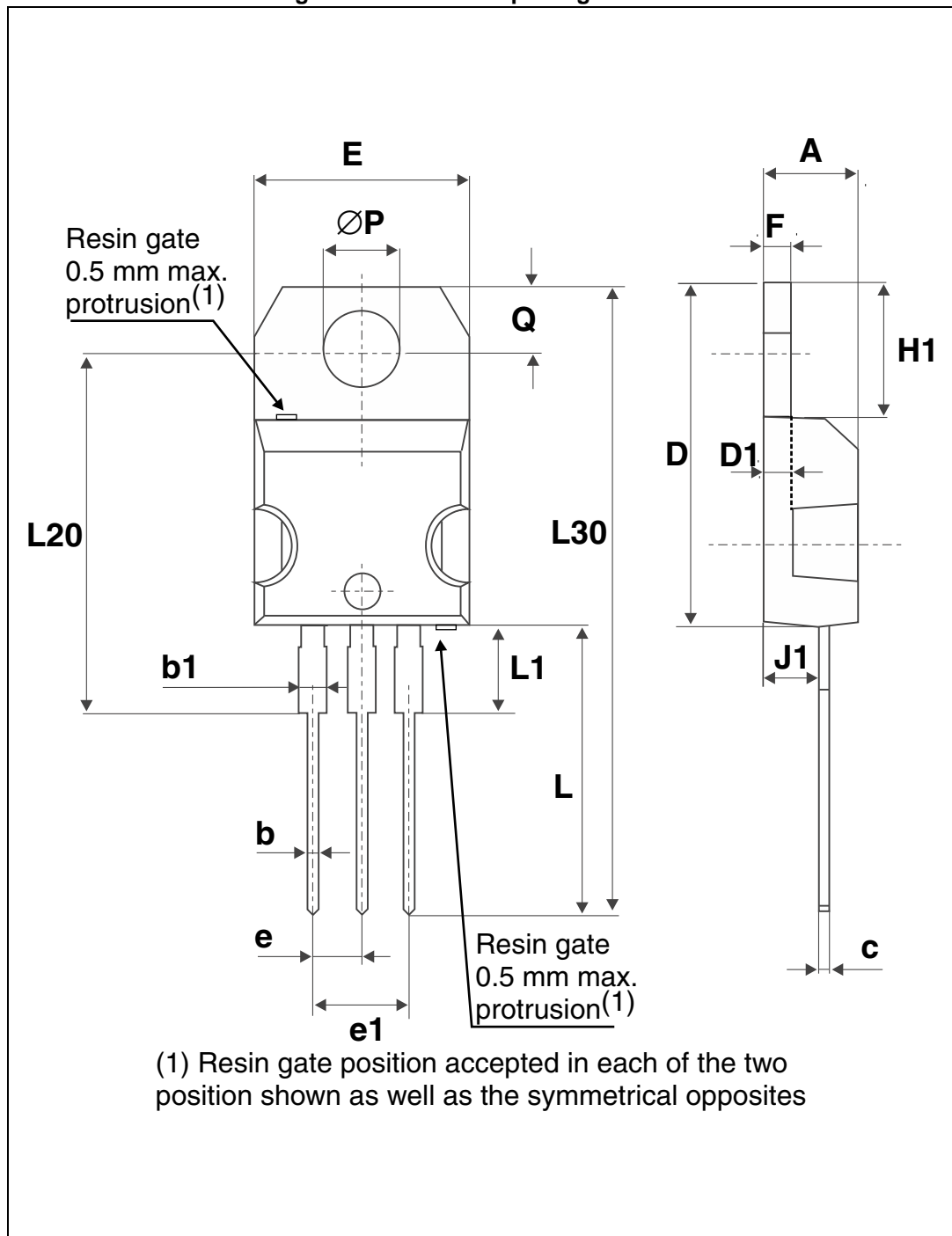


Table 7. TO-220AB package mechanical data

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.	
ØP	3.75	3.85	0.147	0.151
Q	2.65	2.95	0.104	0.116

## 2.4 D<sup>2</sup>PAK package information

Figure 15. D<sup>2</sup>PAK package outline

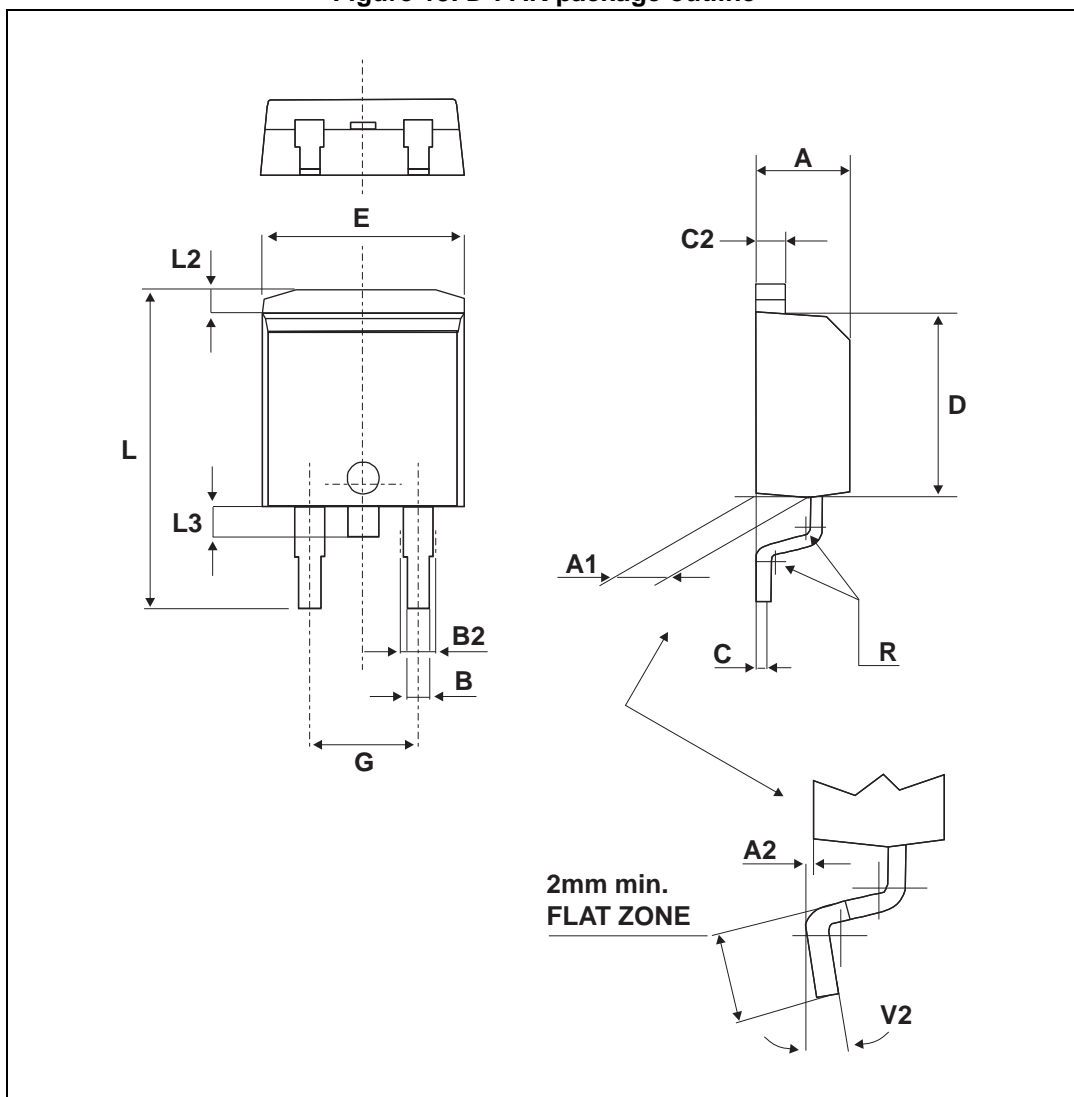
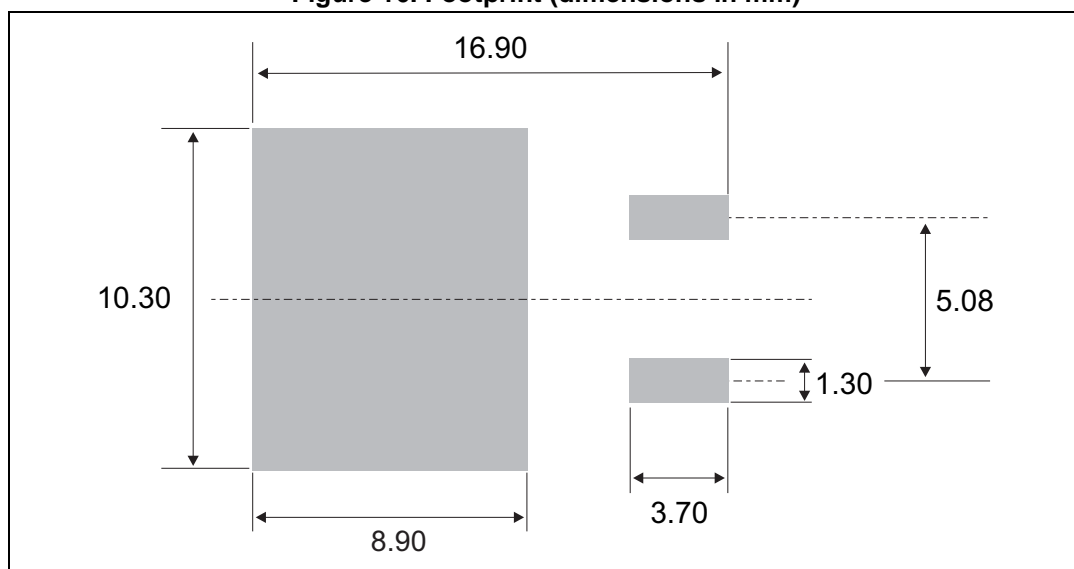


Table 8. D<sup>2</sup>PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R	0.40			0.016		
V2	0°		8°	0°		8°

Figure 16. Footprint (dimensions in mm)



### 3 Ordering information

Figure 17. TN1215 series

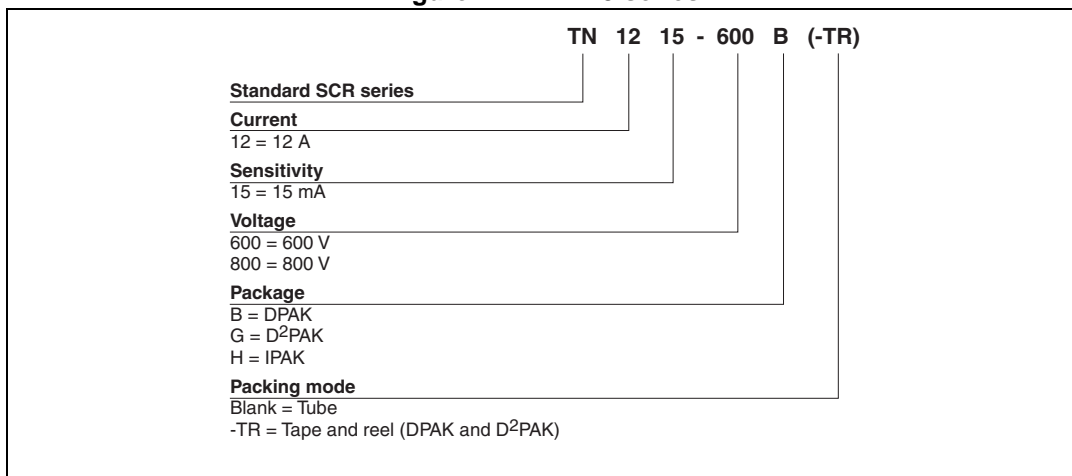


Figure 18. TYNx12 series

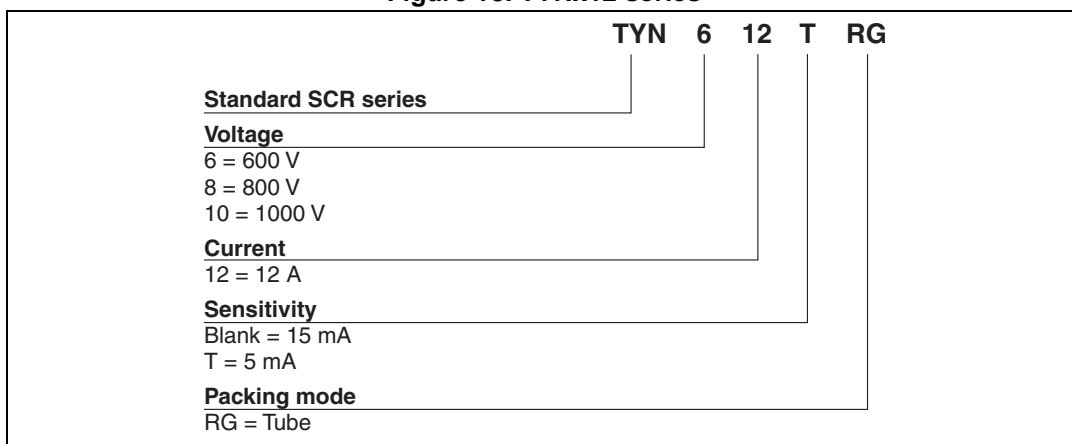


Table 9. Ordering information

Order code <sup>(1)</sup>	Marking <sup>(1)</sup>	Package	Weight	Base qty	Delivery mode
TN1215-x00B	TN12 15x00	DPAK	0.3 g	75	Tube
TN1215-x00B-TR	TN12 15x00	DPAK	0.3 g	2500	Tape and reel
TN1215-x00G	TN1215x00G	D <sup>2</sup> PAK	1.5 g	50	Tube
TN1215-x00G-TR	TN1215x00G	D <sup>2</sup> PAK	1.5 g	1000	Tape and reel
TN1215-x00H	TN12 15x00	IPAK	0.3 g	75	Tube
TYNx12RG	TYNx12	TO-220AB	2.3 g	50	Tube
TYNx12TRG	TYNx12T	TO-220AB	2.3 g	50	Tube

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

## 4 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
Sep-2000	3	Last update.
25-Mar-2005	4	TO-220AB delivery mode changed from bulk to tube.
14-Oct-2005	5	Changed sensitivity values in <a href="#">Table 1</a> for TYNx12 (30 to 15 mA) and TYNx12T (15 to 5 mA). Added ECOPACK statement.
08-Mar-2007	6	Reformatted to current standard. <a href="#">Figure 17: TN1215 series</a> product name corrected. Figure 23: TS1220 series product name corrected.
23-Oct-2009	7	Added TS1220-xxxT device.
03-Jun-2014	8	Updated DPAK and IPAK package information and reformatted to current standard.
25-Fev-2015	9	The part number TS1220 series has been moved to a separate document. Removed TO-220AB insulated package information.
29-Jul-2015	10	Updated <a href="#">Figure 11</a> .

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