## 1 Characteristics

Table 2. Absolute ratings (limiting values)

				Value	
Symbol	Pa	value	Unit		
Cy		TN1215 / TYNx12			
I <sub>T(RMS)</sub>	On-state RMS current (180° condu	ction angle)	T <sub>c</sub> = 105 °C	12	Α
I <sub>T(AV)</sub>	Average on-state current (180° cor	nduction angle)	T <sub>c</sub> = 105 °C	8	А
1 .	Non repetitive surge peak	$t_p = 8.3 \text{ ms}$	T 05.00	145	Α
I <sub>TSM</sub>	on-state current	t <sub>p</sub> = 10 ms	T <sub>j</sub> = 25 °C	140	
l <sup>2</sup> t	$I^2$ t value for fusing $t_p = 10 \text{ ms}$		T <sub>j</sub> = 25 °C	98	A <sup>2</sup> S
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \le 100 \text{ ns}$ $F = 60 \text{ Hz}$		T <sub>j</sub> = 125 °C	50	A/µ s
I <sub>GM</sub>	Peak gate current	t <sub>p</sub> = 20 μs	T <sub>j</sub> = 125 °C	4	Α
P <sub>G(AV)</sub>	Average gate power dissipation	1	W		
T <sub>stg</sub> T <sub>j</sub>	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C
$V_{RGM}$	Maximum peak reverse gate voltag	је		5	V

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

				<u> </u>				
Symbol	Symbol Test conditions			TN1	215	TY	ſN	Unit
Symbol	rest condition	Olis		B/G	G	x12T	x12	Oille
1.			MIN.	2	2	0.5	2	mA
I <sub>GT</sub>	$V_D = 12 \text{ V}, R_L = 33 \Omega$		MAX.	1	5	5	15	IIIA
V <sub>GT</sub>			MAX.	1.3				V
V <sub>GD</sub>	$V_D = V_{DRM}$ , $R_L = 3.3 \text{ k}\Omega$	MIN.		(	0.2		V	
I <sub>H</sub>	I <sub>T</sub> = 500 mA, gate open	MAX.	40	30	15	30	mA	
IL	$I_G = 1.2 I_{GT}$		MAX.	80	60	30	60	mA
dV/dt	V <sub>D</sub> = 67% V <sub>DRM,</sub> gate open	T <sub>j</sub> =125 °C	MIN.	200 40 200		200	V/µs	
V <sub>TM</sub>	$I_{TM} = 24 \text{ A}$ $t_p = 380  \mu\text{s}$	T <sub>j</sub> = 25 °C	MAX.	1.6				V
V <sub>t0</sub>	Threshold voltage $T_j = 125 ^{\circ}\text{C}$		MAX.	0.85			V	
R <sub>d</sub>	Dynamic resistance $T_j = 125 ^{\circ}\text{C}$		MAX.	30			mΩ	
I <sub>DRM</sub>	V -V	T <sub>j</sub> = 25 °C	MAX.	5				μA
I <sub>RRM</sub>	$V_{DRM} = V_{RRM}$ $T_j = 125 °C$		IVIAA.	2			mA	

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Table 4. Thermal resistance

Symbol	Parameter				Unit
R <sub>th(j-c)</sub>	Junction to case (DC)		DPAK, IPAK, TO-220AB	1.3	°C/W
	R <sub>th(j-a)</sub> Junction to ambient (DC)	$S^{(1)} = 0.5 \text{ cm}^2$	DPAK	70	
B		$S^{(1)} = 1.0 \text{ cm}^2$	D²PAK	45	°C/W
Kth(j-a)			IPAK	100	- C/VV
			TO-220AB	60	

1. S = Copper surface under tab

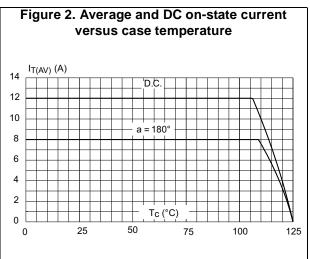


Figure 3. Average and DC on-state current versus ambient temperature (DPAK)  $I_{\mathsf{T}(\mathsf{AV})}\left(\mathsf{A}\right)$ 3.0 Device mounted on FR4 with recommended pad layout D.C. 2.0 D<sup>2</sup>PAK 1.5 1.0 0.5 Ta(°C) 0.0 52 125 05 57 100

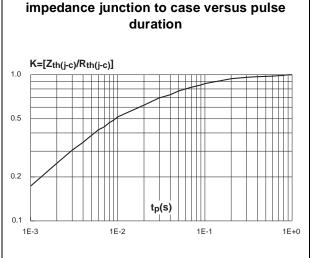
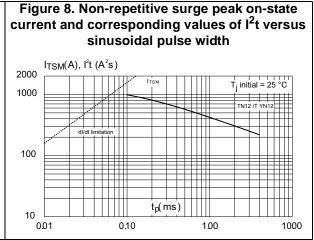
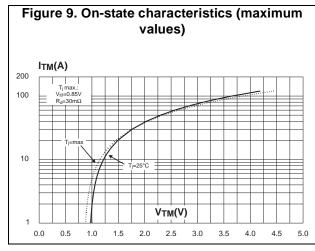
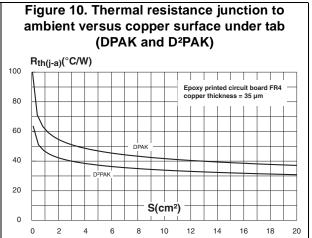


Figure 4. [Relative variation of thermal

Figure 5. Relative variation of thermal Figure 6. Relative variation of gate trigger and holding current versus junction temperature impedance junction to ambient versus pulse duration  $K=[Z_{th(j-a)}/R_{th(j-a)}]$  $I_{GT},I_{H},I_{L}[T_{j}] / I_{GT},I_{H},I_{L}[T_{j}=25^{\circ}C]$ 1.00 2.4 2.2 2.0 1.8 1.6 1.4 0.10 1.2 1.0 0.8 0.6 0.4 0.2 T<sub>j</sub>(°C) t<sub>p</sub>(s) 0.01 -40 1E-1 1E+0 1E+1 5E+2 1E-2 1E+2







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#### **Package information** 2

- 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

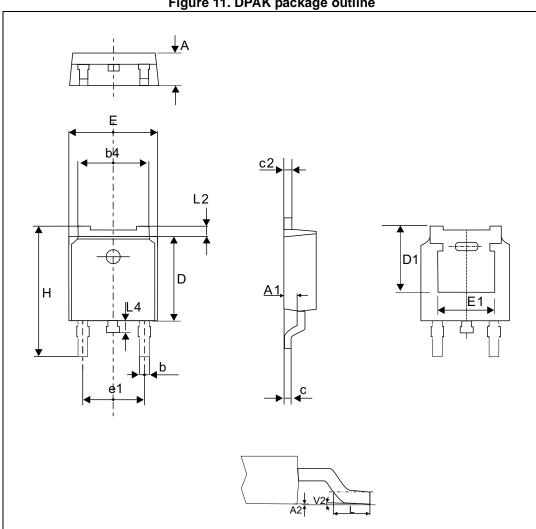


Figure 11. DPAK package outline

Note:

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

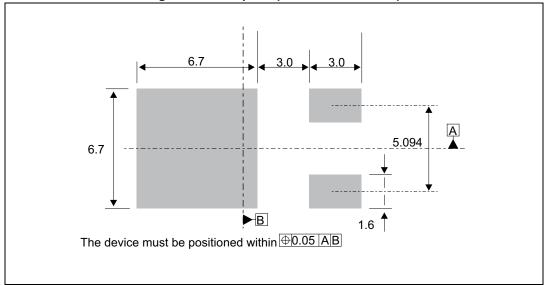


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Table 5. DPAK package mechanical data

			Dime	nsions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	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
С	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		
Е	6.35		6.73	0.250		0.264
E1		4.32			0.170	
e1	4.40		4.70	0.173		0.185
Н	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)



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## 2.2 IPAK package information

 $\begin{bmatrix} E \\ b4 \\ L2 \end{bmatrix}$   $\begin{bmatrix} C \\ D \\ D \end{bmatrix}$   $\begin{bmatrix} D \\ A \\ C2 \\ V_{1} \\ A1 \end{bmatrix}$   $\begin{bmatrix} D \\ A1 \\ A1 \end{bmatrix}$ 

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

			Dimer	nsions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
Α	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
С	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
Е	6.40		6.70	0.252		0.263
е		2.28			0.090	
e1	4.40		4.60	0.173		0.181
Н		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°	

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### 2.3 TO-220AB package information

Ε  $\emptyset P$ Resin gate 0.5 mm max. protrusion(1) **H1** D1 D **L20 L30** J1 L1 b1 b е Resin gate 0.5 mm max. protrusion<sup>(1)</sup> **e**1 (1) Resin gate position accepted in each of the two position shown as well as the symmetrical opposites

Figure 14. TO-220AB package outline

Table 7. TO-220AB package mechanical data

	Dimensions							
Ref.	Millim	neters	Inches					
	Min.	Max.	Min.	Max.				
А	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				
С	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				
е	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				

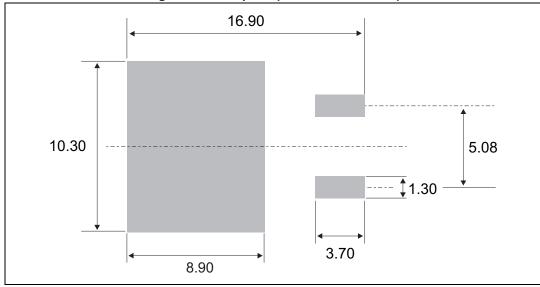
# 2.4 D<sup>2</sup>PAK package information

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

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

			Dime	nsions		
Ref.		Millimeters			Inches	
	Min.	Тур.	Max.	Min.	Тур.	Max.
А	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
В	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
С	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

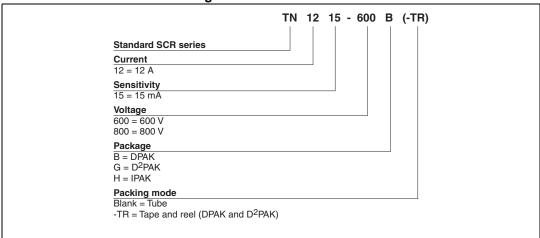


Figure 18. TYNx12 series

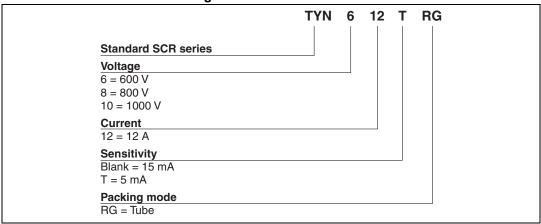


Table 9. Ordering information

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

<sup>1.</sup> 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 <i>Table 1</i> for TYNx12 (30 to 15 mA) and TYNx12T (15 to 5 mA). Added ECOPACK statement.
08-Mar-2007	6	Reformatted to current standard.  Figure 17: TN1215 series 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 Figure 11.



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