![ST logo]

TN12, TS12 and TYNx12 Series

SENSITIVE & STANDARD

12A SCRS

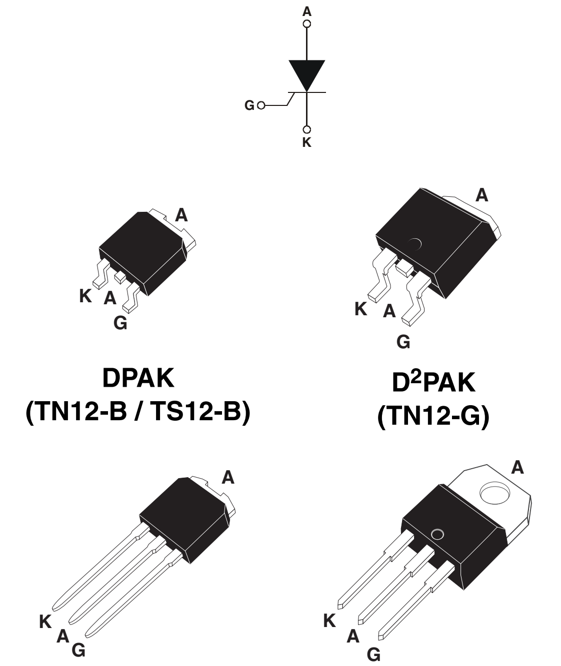
Table 1: Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600 to 1000	V
I_{GT}	0.2 to 15	mA

DESCRIPTION

Available either in sensitive **(TS12)** or standard **(TN12 / TYN)** gate triggering levels, the 12A 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 area.



DPAK (TN12-B / TS12-B)

D^2PAK (TN12-G)

IPAK (TN12-H / TS12-H)

TO-220AB (TYNx12RG)

Table 2: Order Codes

Part Numbers	Marking
TN1215-x00B	TN1215x00
TN1215-x00B-TR	TN1215x00
TN1215-x00G	TN1215x00G
TN1215-x00G-TR	TN1215x00G
TN1215-x00H	TN1215x00
TS1220-x00B	TS1220x00
TS1220-x00B-TR	TS1220x00
TS1220-x00H	TS1220x00
TYNx12RG	TYNx12
TYNx12TRG	TYNx12T

Table 3: Absolute Ratings (limiting values)

Symbol	Parameter			Value		Unit
				TN12-G TYN12	TN12-B/H TS12-B/H	
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)		T_c = 105°C	12		A
$IT_{(AV)}$	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	145	115	A
		t_p = 10 ms		140	110	
I^2t	I^2t Value for fusing	t_p = 10 ms	T_j = 25°C	98	60	A^2s
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100$ 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
V_{RGM}	Maximum peak reverse gate voltage (for **TN12** & **TYN12** only)			5		V

Tables 4: Electrical Characteristics (T_j = 25°C, unless otherwise specified)

■ **SENSITIVE**

Symbol	Test Conditions			TS1220	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} = 1 kΩ	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 = 65 % V_{DRM} R_{GK} = 220 Ω	T_j = 125°C	MIN.	5	V/µs
V_{TM}	I_{TM} = 24 A tp = 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} = 220 Ω	T_j = 25°C	MAX.	5	µA
		T_j = 125°C		2	mA

■ **STANDARD**

Symbol	Test Conditions			TN1215 B / H	TN1215 G	TYN x12T	TYN x12	Unit
I_{GT}	V_D = 12 V R_L = 33 Ω		MIN.	2		0.5	2	mA
			MAX.	15		5	15	mA
V_{GT}			MAX.	1.3				V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ	T_j = 125°C	MIN.	0.2				V
I_H	I_T = 500 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°C	MIN.	200		40	200	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}	$V_{DRM} = V_{RRM}$	T_j = 25°C	MAX.	5				µA
		T_j = 125°C		2				mA

Table 6: Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)			1.3	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	S = 0.5 cm²	DPAK	70	°C/W
		S = 1 cm²	D^2PAK	45	
			IPAK	100	
			TO-220AB	60	

S = Copper surface under tab.

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

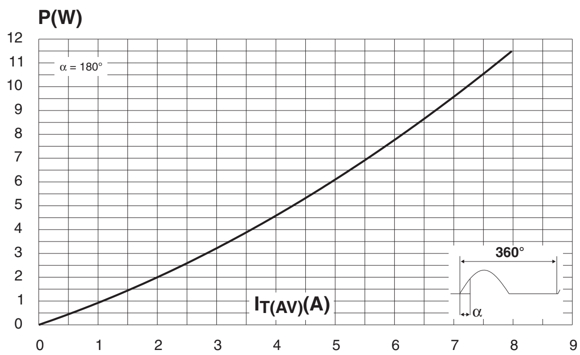


Figure 2: Average and D.C. on-state current versus case temperature

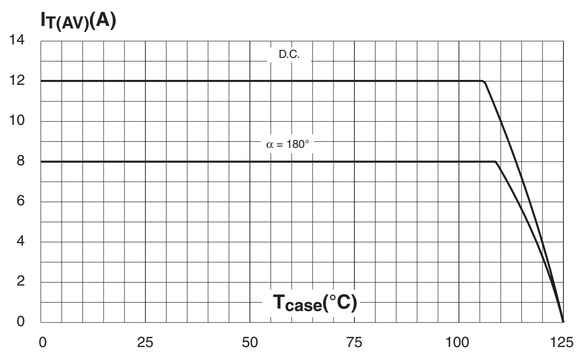


Figure 3: Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout) (DPAK)

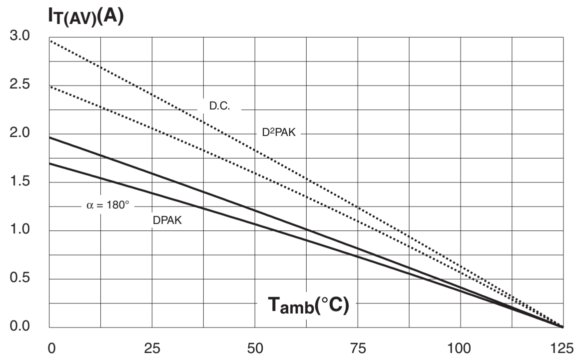


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration

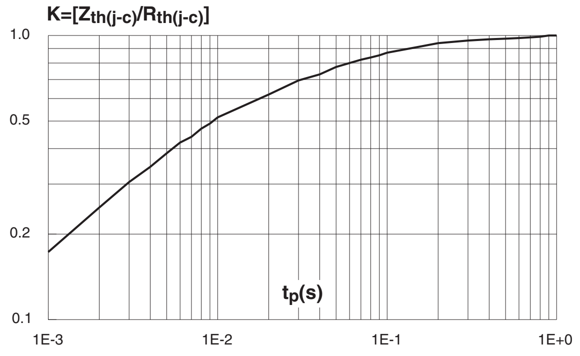


Figure 5: Relative variation of thermal impedance junction to ambient versus pulse duration (recommended pad layout, FR4 PC board for DPAK)

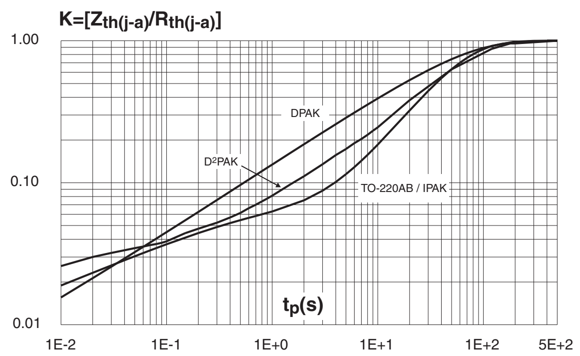


Figure 6: Relative variation of gate trigger current and holding current versus junction temperature for TS8 series

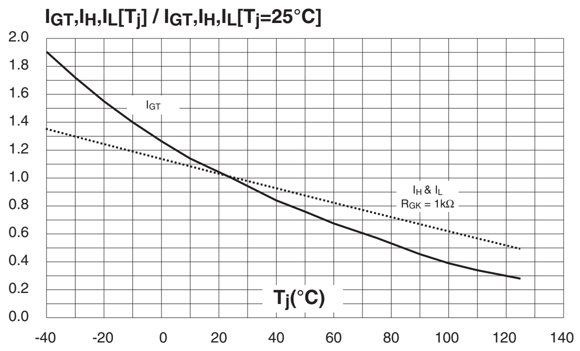


Figure 7: Relative variation of gate trigger current and holding current versus junction temperature for TN8 & TYN08 series

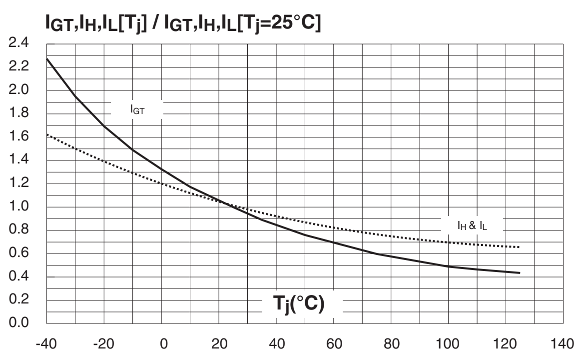


Figure 8: Relative variation of holding current versus gate-cathode resistance (typical values) for TS8 series

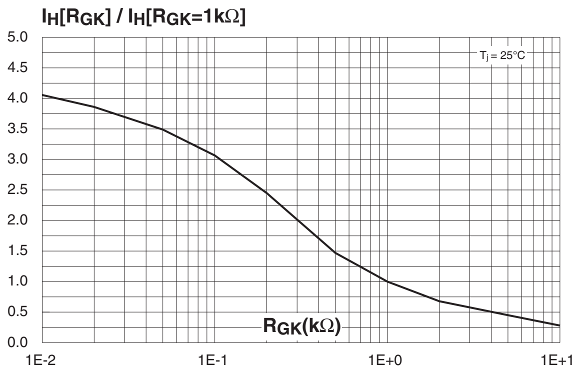


Figure 9: Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS8 series

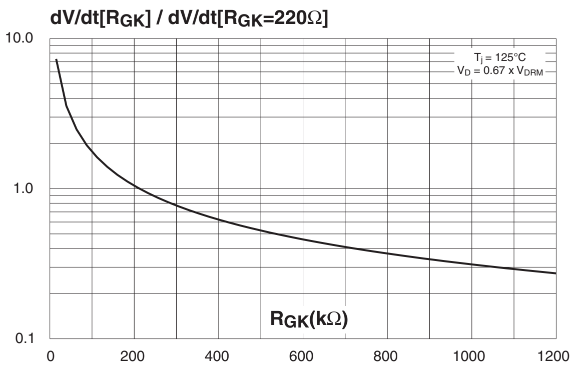


Figure 10: Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS8 series

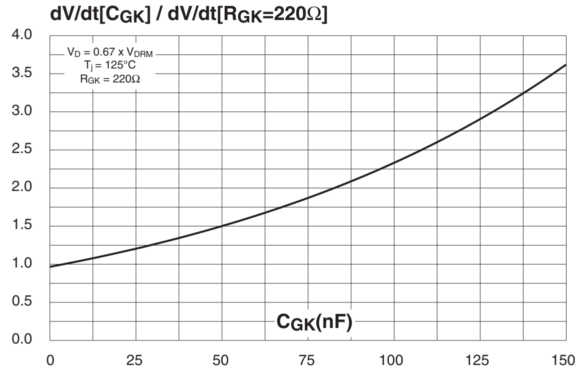


Figure 11: Surge peak on-state current versus number of cycles

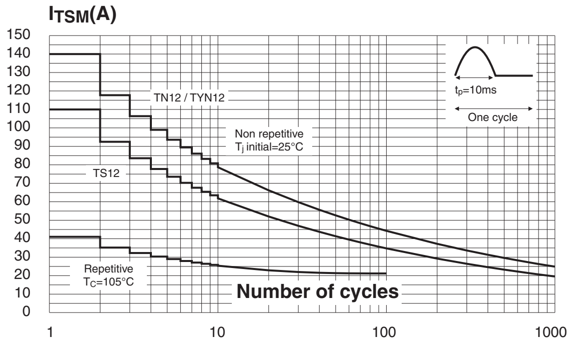


Figure 12: Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms, and corresponding values of I²t

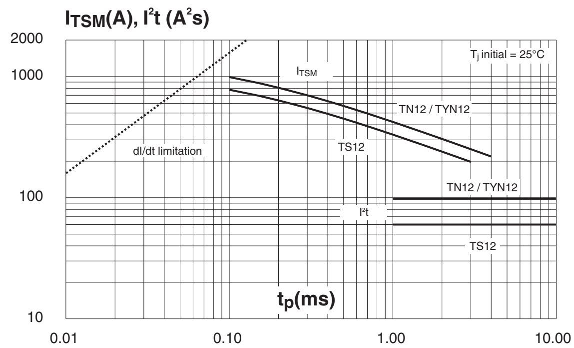


Figure 13: On-state characteristics (maximum values)

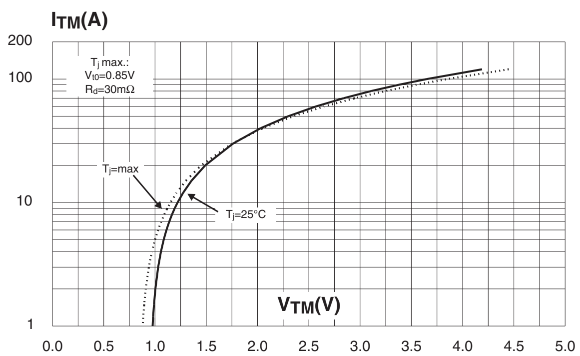


Figure 14: Thermal resistance junction to ambient versus copper surface under tab (epoxy printed circuit board FR4, copper thickness: 35µm) (DPAK and D²PAK)

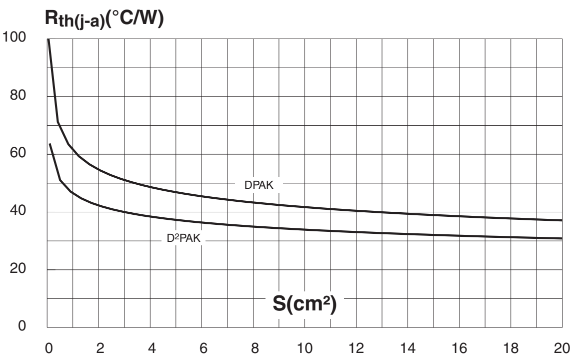


Figure 15: Ordering Information Scheme (TN8 series)

TN 12 15 - 600 B (-TR)

Standard SCR series

Current
12 = 12A

Sensitivity
15 = 15mA

Voltage
600 = 600V
800 = 800V
1000 = 1000V

Package
B = DPAK
G = D^2PAK
H = IPAK

Packing mode
Blanck = Tube
-TR = Tape & Reel (DPAK and D^2PAK)

Figure 16: Ordering Information Scheme (TS8 series)

TS 12 20 - 600 B (-TR)

Sensitive SCR series

Current
12 = 12A

Sensitivity
20 = 200µA

Voltage
600 = 600V
700 = 700V

Package
B = DPAK
H = IPAK

Packing mode
Blanck = Tube
-TR = Tape & Reel

Figure 17: Ordering Information Scheme (TYN08 series)

TYN 6 12 T RG

Standard SCR series

Voltage
6 = 600V
8 = 800V
10 = 100V

Current
12 = 12A

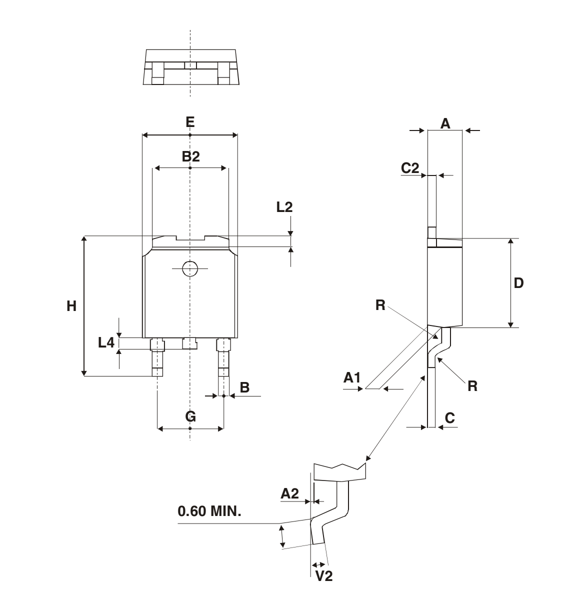
Sensitivity
Blanck = 30mA
T = 15mA

Packing mode
RG = Tube

Table 7: Product Selector

Part Numbers	Voltage (xxx)				Sensitivity	Package
	600 V	700 V	800 V	1000 V		
TN1215-xxxB	X		X		15 mA	DPAK
TN1215-xxxG	X		X	X	15 mA	D^2PAK
TN1215-xxxH	X		X		15 mA	IPAK
TS1220-xxxB	X	X			0.2 mA	DPAK
TS1220-xxxH	X	X			0.2 mA	IPAK
TYNx12	X		X	X	15 mA	TO-220AB
TYNx12T	X		X	X	5 mA	TO-220AB

Figure 18: DPAK Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	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
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 19: DPAK Foot Print Dimensions
(in millimeters)

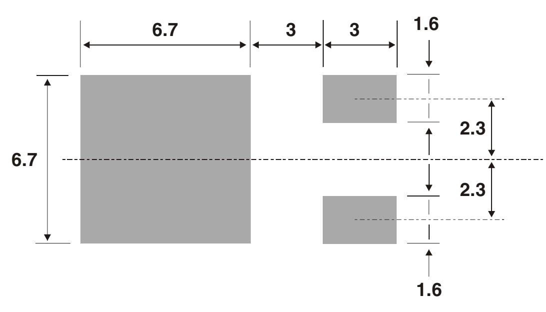
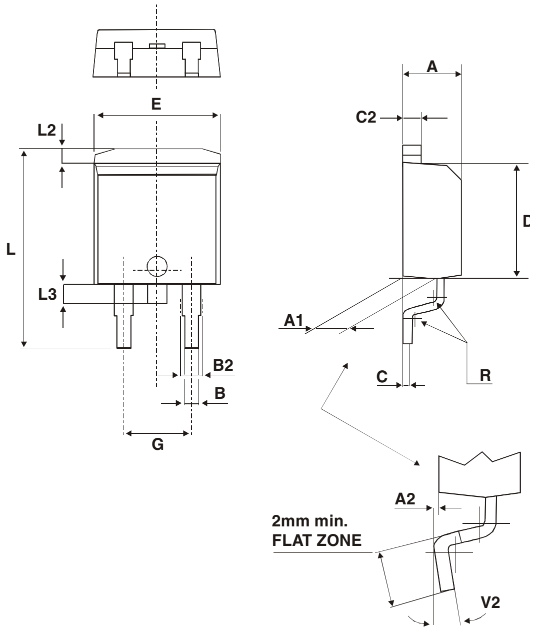


Figure 20: D²PAK Package Mechanical Data



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 21: D²PAK Foot Print Dimensions
(in millimeters)

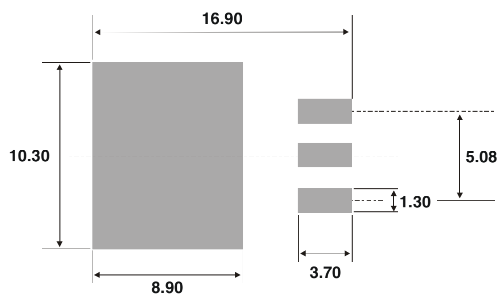
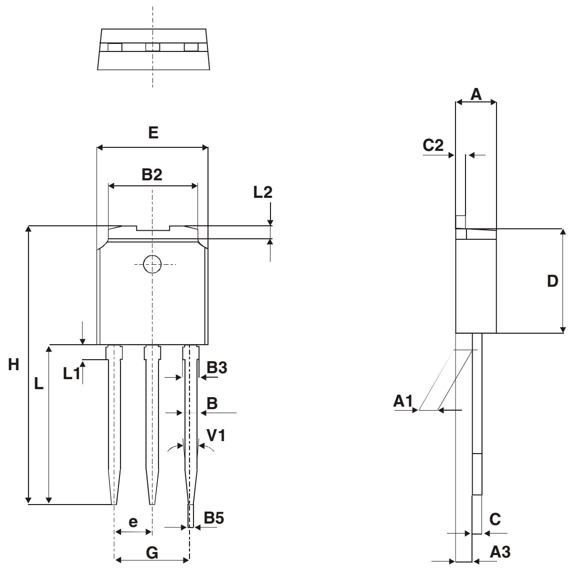
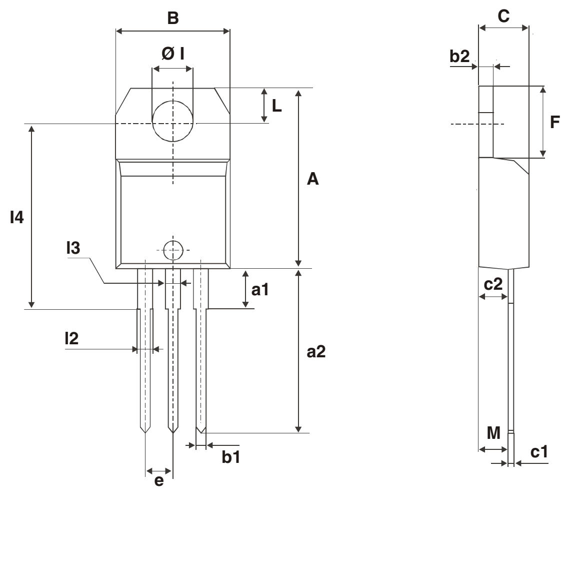


Figure 22: IPAK Package Mechanical Data



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
A3	0.70		1.30	0.027		0.051
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.212
B3			0.95			0.037
B5		0.30			0.035	
C	0.45		0.60	0.017		0.023
C2	0.48		0.60	0.019		0.023
D	6		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
e		2.28			0.090	
G	4.40		4.60	0.173		0.181
H		16.10			0.634	
L	9		9.40	0.354		0.370
L1	0.8		1.20	0.031		0.047
L2		0.80	1		0.031	0.039
V1		10°			10°	

Figure 23: TO-220AB Package Mechanical Data



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
ØI	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Table 8: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
TN1215-x00B	TN1215x00	DPAK	0.3 g	75	Tube
TN1215-x00B-TR	TN1215x00	DPAK	0.3 g	2500	Tape & reel
TN1215-x00G	TN1215x00G	D^2PAK	1.5 g	50	Tube
TN1215-x00G-TR	TN1215x00G	D^2PAK	1.5 g	1000	Tape & reel
TN1215-x00H	TN1215x00	IPAK	0.3 g	75	Tube
TS1220-x00B	TS1220x00	DPAK	0.3 g	75	Tube
TS1220-x00B-TR	TS1220x00	DPAK	0.3 g	2500	Tape & reel
TS1220-x00H	TS1220x00	IPAK	0.3 g	75	Tube
TYNx12RG	TYNx12	TO-220AB	2.3 g	50	Tube
TYNx12TRG	TYNx12T	TO-220AB	2.3 g	50	Tube

Note: x = voltage

Table 9: Revision History

Date	Revision	Description of 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 Table 7 for TYNx12 (30 to 15 mA) and TYNx12T (15 to 5 mA). Added ECOPACK statement

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