

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value		Unit
				TN805 TN815 TS820	TYNx08	
$I_{T(RMS)}$	On-state rms current (180° conduction angle)	$T_c = 110\text{ °C}$		8		A
$I_{T(AV)}$	Average on-state current (180° conduction angle)	$T_c = 110\text{ °C}$		5		A
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 ² 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/ μ 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 TN8xx and TYNx08 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 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} = 220 Ω	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} = 16 A, t _p = 380 μs	T _j = 25 °C	MAX.	1.6	V
V ₁₀	Threshold voltage	T _j = 125 °C	MAX.	0.85	V
R _d	Dynamic resistance	T _j = 125 °C	MAX.	46	mΩ
I _{DRM} I _{RRM}	V _{DRM} = V _{RRM} , R _{GK} = 220 Ω	T _j = 25 °C	MAX.	5	μA
		T _j = 125 °C		1	mA

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

Symbol	Test conditions			TN805	TN815	TYNx08	Unit
I _{GT}	V _D = 12 V, R _L = 33 Ω		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 kΩ	T _j = 125 °C	MIN.	0.2			V
I _H	I _T = 100 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 °C	MIN.	50	150	150	V/μs
V _{TM}	I _{TM} = 16 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.	46			mΩ
I _{DRM} I _{RRM}	V _{DRM} = V _{RRM}	T _j = 25 °C	MAX.	5			μA
		T _j = 125 °C		2			mA

Table 5. Thermal resistance

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

1. S = Copper surface under tab

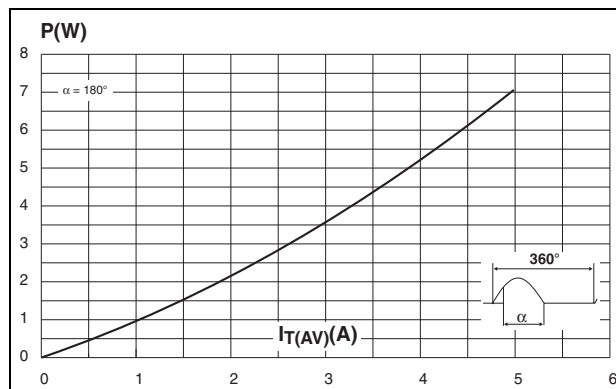
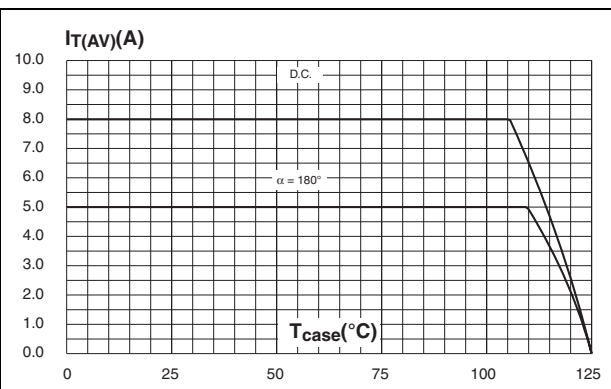
Figure 1. Maximum average power dissipation versus average on-state current**Figure 2. Average and DC on-state current versus case temperature**

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

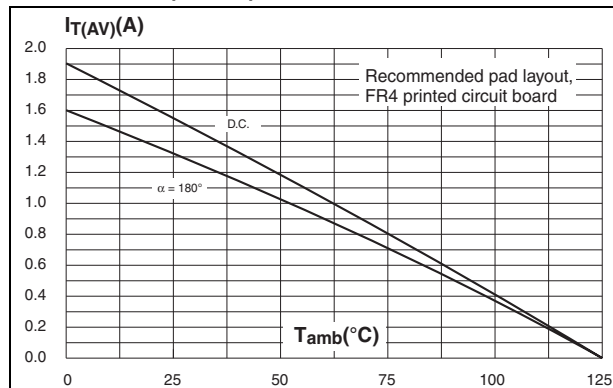


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

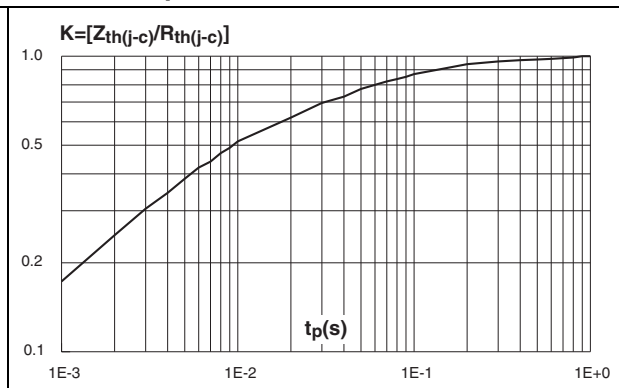


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration (DPAK)

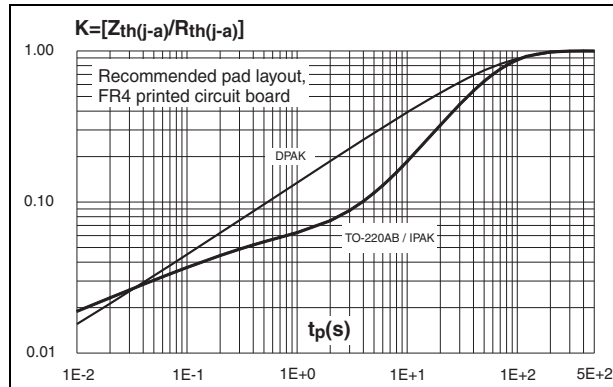


Figure 6. Relative variation of gate trigger current and holding current versus junction temperature for TS820

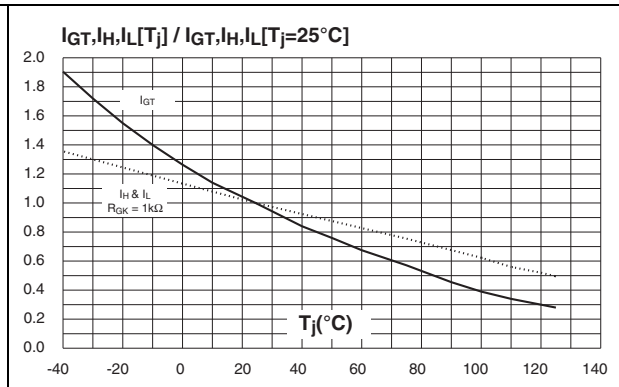


Figure 7. Relative variation of gate trigger and holding current versus junction temperature

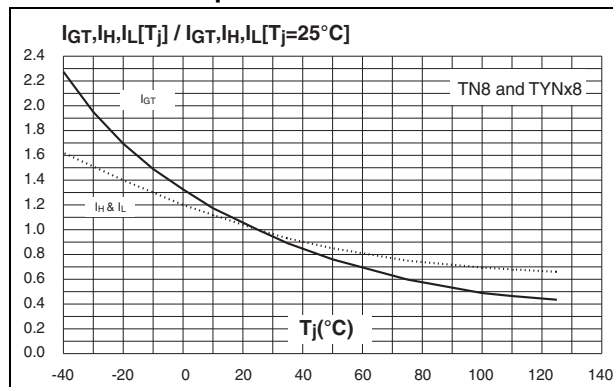


Figure 8. Relative variation of holding current versus gate-cathode resistance (typical values)

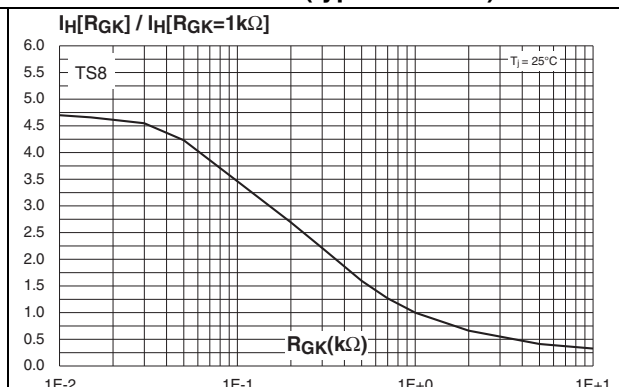


Figure 9. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS820

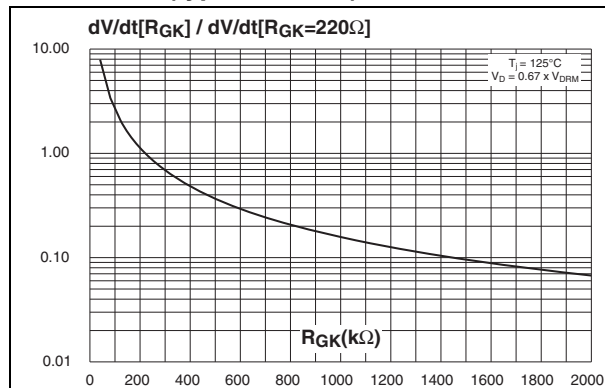


Figure 10. Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS820

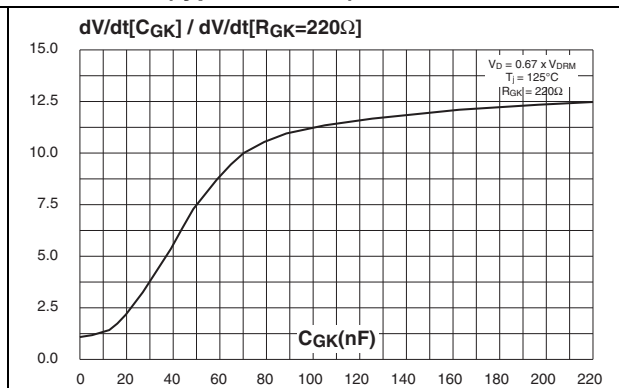


Figure 11. Surge peak on-state current versus number of cycles

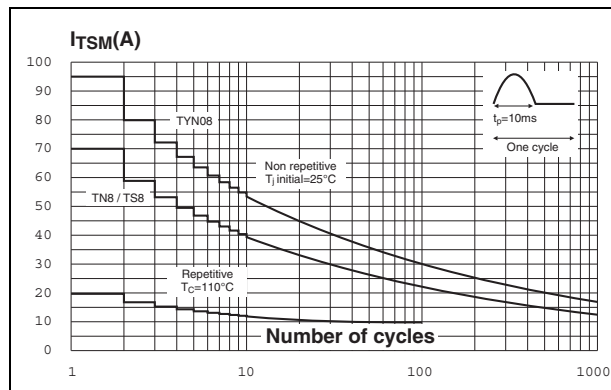


Figure 12. Non-repetitive surge peak on-state current and corresponding values of I^2t

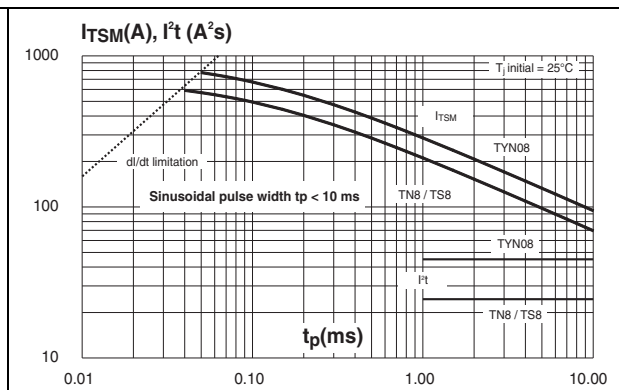


Figure 13. On-state characteristics (maximum values)

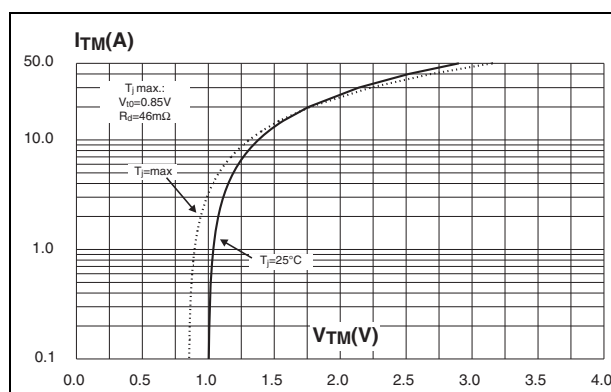
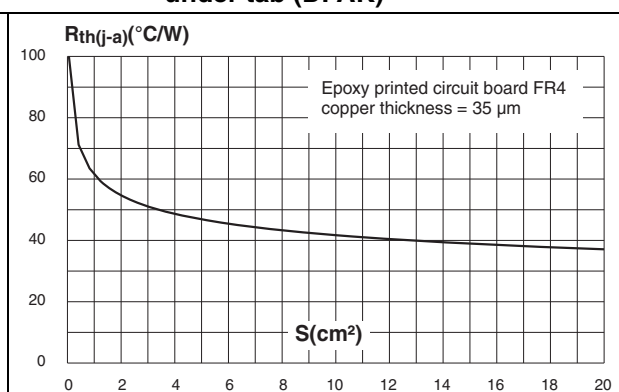


Figure 14. Thermal resistance junction to ambient versus copper surface under tab (DPAK)



2 Ordering information scheme

Figure 15. TN8 series

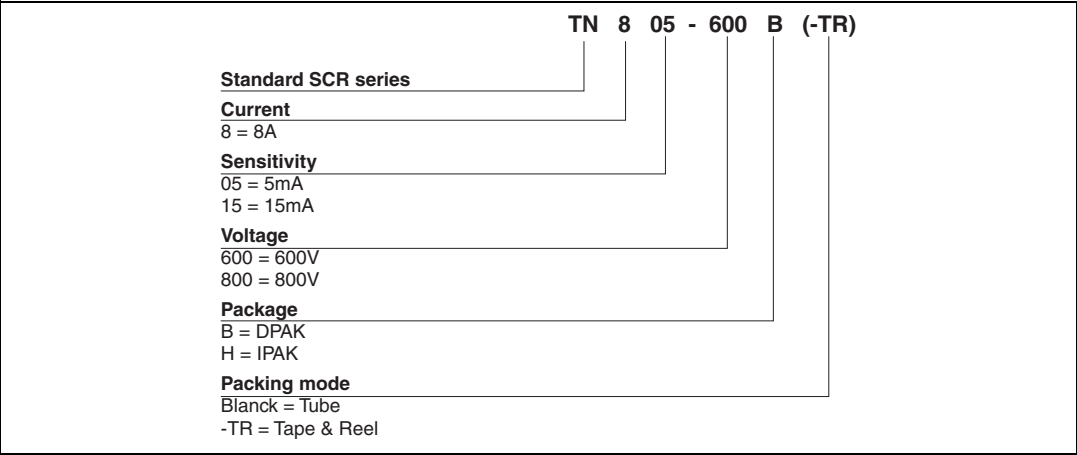


Figure 16. TS8 series

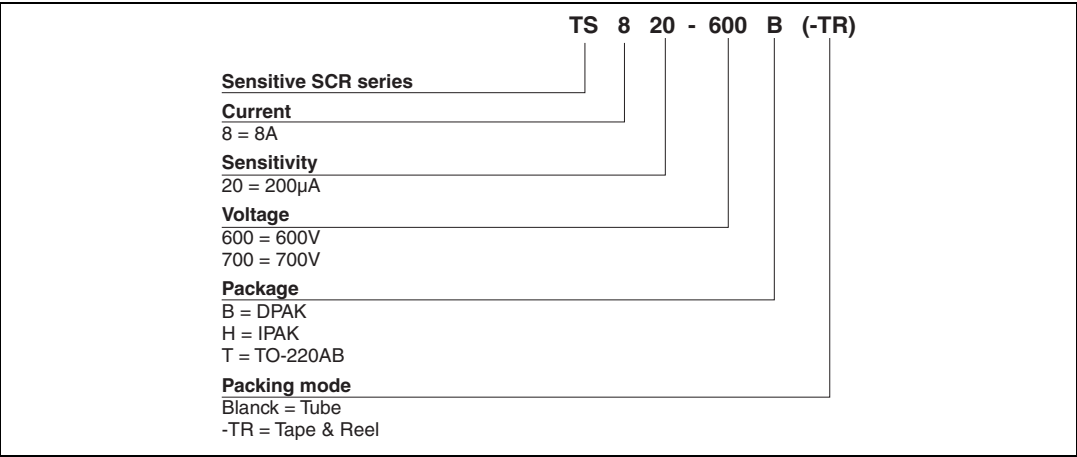
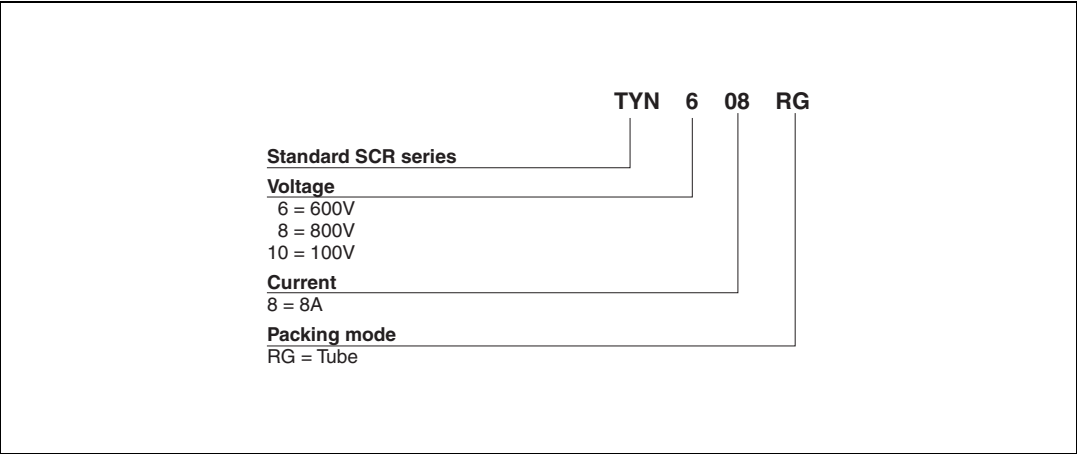


Figure 17. TYNx08 series



3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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.

Table 6. DPAK dimensions

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 18. Footprint (dimensions in mm)

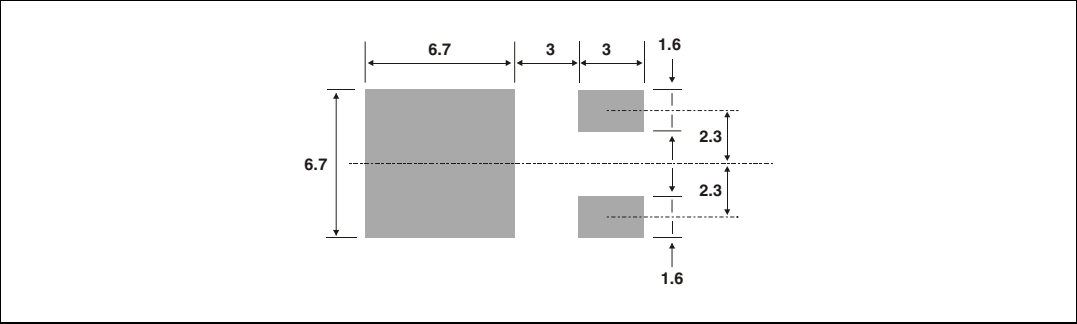


Table 7. IPAK dimensions

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°	

Table 8. TO-220AB dimensions (for TS820-xxxT)

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151

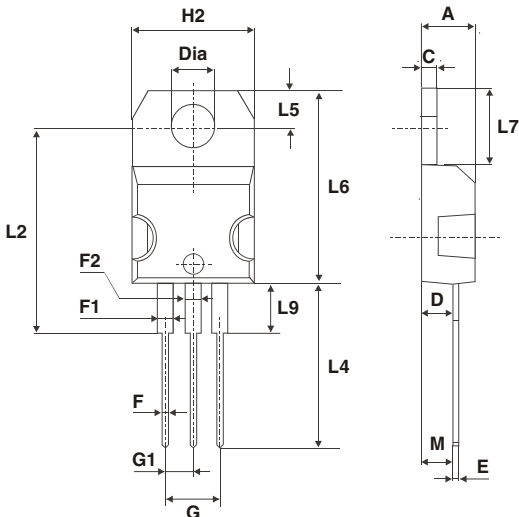
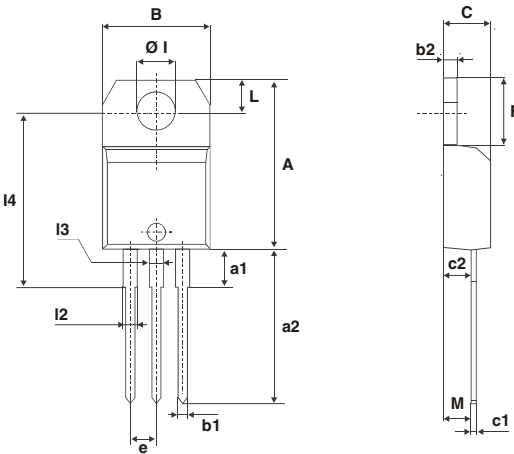


Table 9. TO-220AB dimensions (for TYNx8 series)

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	



4 Ordering information

Table 10. Ordering information

Order code ⁽¹⁾	Marking ⁽¹⁾	Package	Weight	Base qty	Delivery mode
TN805-x00B	TN805x00	DPAK	0.3 g	75	Tube
TN805-x00B-TR	TN805x00	DPAK	0.3 g	2500	Tape and reel
TN805-x00H	TN805x00	IPAK	0.4 g	75	Tube
TN815-x00B	TN815x00	DPAK	0.3 g	75	Tube
TN815-x00B-TR	TN815x00	DPAK	0.3 g	2500	Tape and reel
TN815-x00H	TN815x00	IPAK	0.4 g	75	Tube
TS820-x00B	TS820x00	DPAK	0.3 g	75	Tube
TS820-x00B-TR	TS820x00	DPAK	0.3 g	2500	Tape and reel
TS820-x00H	TS820x00	IPAK	0.4 g	75	Tube
TS820-x00T	TS820x00T	TO-220AB	2.3 g	50	Tube
TYNx08RG	TYNx08	TO-220AB	2.3 g	50	Tube

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

5 Revision history

Table 11. 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 Figure 1 . Thermal resistance, junction to case, updated in Table 5 .

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