

NTC thermistors, high-temperature sensors

2322 633 5/7/8....

FEATURES

- Small diameter
- Quick response to temperature change
- High stability over a long life
- Wide temperature range from -40 to +300 °C
- Resistant to corrosive atmospheres and harsh environments.

APPLICATION

- High temperature measurement control:
 - Domestic appliances
 - Automotive systems
 - Industrial process control.

DESCRIPTION

These thermistors have a negative temperature coefficient and are mounted in a glass envelope:

2322 633 5.... (SOD80) without leads and suitable for surface mounting

2322 633 7.... (SOD27) with nickel-plated copper-clad iron leads

2322 633 8.... (SOD27) with tinned copper-clad iron leads.

QUICK REFERENCE DATA

PARAMETER	VALUE
Temperature range:	
2322 633 5....	-40 to +200 °C
2322 633 7....	-40 to +300 °C
2322 633 8....	-40 to +200 °C
Resistance value at 25 °C (R ₂₅)	10 to 100 kΩ
Tolerance on R ₂₅ -value	±5% and ±10%
B _{25/85} -value	3977 K
Tolerance on B _{25/85} -value	±1.3%
Rated dissipation	100 mW
Dissipation factor	2.5 mW/K
Response time	0.9 s
Thermal time constant τ	6 s
Temperature coefficient at 25 °C	-4.38%/K
Climatic category:	
2322 633 5....	40/155/56
2322 633 7....	40/300/56
2322 633 8....	40/200/56
Mass:	
2322 633 5....	≈0.03 g
2322 633 7....	≈0.14 g
2322 633 8....	≈0.14 g

MECHANICAL DATA

Marking

None.

Mounting

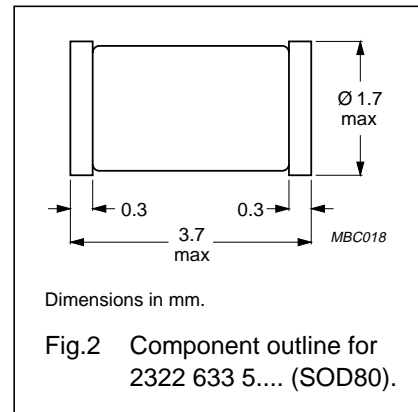
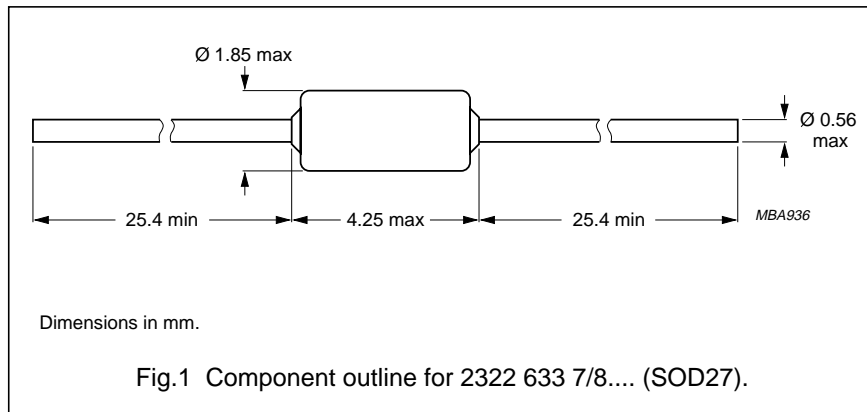
By soldering (633 5...., 633 8....).

By clamping (633 7....).

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Outlines



ORDERING INFORMATION

Table 1 Catalogue numbers and packaging quantities

CATALOGUE NUMBER	BULK	BLISTER	TAPE
2322 633 3....; note 1	–	–	10000
2322 633 4....; note 2	–	–	10000
2322 633 5....	–	2500	–
2322 633 7....	1000	–	–
2322 633 8....	1000	–	–

Notes

1. Catalogue number 2322 633 3.... is the series 2322 633 8.... on tape.
2. Catalogue number 2322 633 4.... is the series 2322 633 7.... on tape.

Table 2 R₂₅-values, B_{25/85}-values and catalogue numbers

The thermistors have a 12-digit catalogue number starting with 2322 633 5..../7..../8....; the subsequent 4 digits indicate the resistance value and tolerance.

R ₂₅ (kΩ)	B _{25/85} -VALUE	CATALOGUE NUMBER 2322 633					
		SOD27 (leaded)				SOD80 (SMD) ⁽²⁾ 5....	
		8.... tinned-copper		7.... ⁽¹⁾ nickel-plated			
		R ₂₅ ±10%	R ₂₅ ±5%	R ₂₅ ±10%	R ₂₅ ±5%	R ₂₅ ±10%	R ₂₅ ±5%
10	3977 K ±1.3%	2103	3103	–	–	2103	3103
20	3977 K ±1.3%	2203	3203	–	–	2203	3203
30	3977 K ±1.3%	2303	3303	–	–	2303	3303
100	3977 K ±1.3%	2104	3104	2104	3104	2104	3104

Notes

1. 2322 633 7.... only available at 100 kΩ.
2. Only available in blister tape.

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Table 3 Resistance values at intermediate temperatures for 2322 633 5.... series

T _{oper} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)			
				2322 633 (see Table 5, note 1)			
				5.103	5.203	5.303	5.104
-40	33.06	4.65	6.59	330.6	661.2	991.8	3306
-35	23.90	4.21	6.37	239.0	478.1	717.1	2390
-30	17.47	3.79	6.16	174.7	349.4	524.1	1747
-25	12.90	3.38	5.96	129.0	258.0	387.0	1290
-20	9.621	2.99	5.77	96.21	192.4	288.6	962.1
-15	7.242	2.61	5.59	72.42	144.8	217.3	724.2
-10	5.501	2.24	5.41	55.01	110.0	165.0	550.1
-5	4.214	1.89	5.24	42.14	84.28	126.4	421.4
0	3.255	1.55	5.08	32.55	65.09	97.64	325.5
5	2.534	1.22	4.93	25.34	50.67	76.01	253.4
10	1.987	0.90	4.78	19.87	39.74	59.62	198.7
15	1.570	0.59	4.64	15.70	31.40	47.10	157.0
20	1.249	0.29	4.51	12.49	24.98	37.46	124.9
25	1.000	0.00	4.38	10.00	20.00	30.00	100.0
30	0.8059	0.28	4.25	8.059	16.12	24.18	80.59
35	0.6534	0.55	4.13	6.534	13.07	19.60	65.34
40	0.5329	0.82	4.02	5.329	10.66	15.99	53.29
45	0.4371	1.08	3.91	4.371	8.742	13.11	43.71
50	0.3604	1.34	3.80	3.604	7.209	10.81	36.04
55	0.2988	1.58	3.70	2.988	5.976	8.963	29.88
60	0.2489	1.82	3.60	2.489	4.978	7.467	24.89
65	0.2084	2.06	3.51	2.084	4.168	6.251	20.84
70	0.1753	2.29	3.42	1.753	3.505	5.258	17.53
75	0.1481	2.51	3.33	1.481	2.961	4.442	14.81
80	0.1256	2.73	3.24	1.256	2.512	3.769	12.56
85	0.1070	2.95	3.16	1.070	2.141	3.211	10.70
90	0.09156	3.16	3.08	0.9156	1.831	2.747	9.156
95	0.07862	3.36	3.01	0.7862	1.572	2.359	7.862
100	0.06777	3.56	2.93	0.6777	1.355	2.033	6.777
105	0.05863	3.76	2.86	0.5863	1.173	1.759	5.863
110	0.05089	3.95	2.79	0.5089	1.018	1.527	5.089
115	0.04433	4.13	2.73	0.4433	0.8865	1.330	4.433
120	0.03873	4.32	2.66	0.3873	0.7747	1.162	3.873
125	0.03395	4.50	2.60	0.3395	0.6791	1.019	3.395
130	0.02985	4.67	2.54	0.2985	0.5971	0.8956	2.985
135	0.02633	4.84	2.49	0.2633	0.5265	0.7898	2.633
140	0.02328	5.01	2.43	0.2328	0.4656	0.6984	2.328
145	0.02065	5.17	2.38	0.2065	0.4129	0.6194	2.065
150	0.01836	5.33	2.32	0.1836	0.3671	0.5507	1.836

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Table 4 Resistance values at intermediate temperatures for 2322 633 7.... series

T _{oper} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)
				2322 633 (see Table 5, note 1)
				7.104
0	3.255	1.55	5.08	325.5
5	2.534	1.22	4.93	253.4
10	1.987	0.90	4.78	198.7
15	1.570	0.59	4.64	157.0
20	1.249	0.29	4.51	124.9
25	1.000	0.00	4.38	100.0
30	0.8059	0.28	4.25	80.59
35	0.6534	0.55	4.13	65.34
40	0.5329	0.82	4.02	53.29
45	0.4371	1.08	3.91	43.71
50	0.3604	1.34	3.80	36.04
55	0.2988	1.58	3.70	29.88
60	0.2489	1.82	3.60	24.89
65	0.2084	2.06	3.51	20.84
70	0.1753	2.29	3.42	17.53
75	0.1481	2.51	3.33	14.81
80	0.1256	2.73	3.24	12.56
85	0.1070	2.95	3.16	10.70
90	0.09156	3.16	3.08	9.156
95	0.07862	3.36	3.01	7.862
100	0.06777	3.56	2.93	6.777
105	0.05863	3.76	2.86	5.863
110	0.05089	3.95	2.79	5.089
115	0.04433	4.13	2.73	4.433
120	0.03873	4.32	2.66	3.873
125	0.03395	4.50	2.60	3.395
130	0.02985	4.67	2.54	2.985
135	0.02633	4.83	2.49	2.633
140	0.02328	4.98	2.43	2.328
145	0.02065	5.12	2.38	2.065
150	0.01836	5.27	2.32	1.836
155	0.01636	5.40	2.27	1.636
160	0.01455	5.54	2.23	1.455
165	0.01303	5.67	2.18	1.303
170	0.01169	5.80	2.14	1.169
175	0.01052	5.93	2.09	1.052

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T _{oper} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)
				2322 633 (see Table 5, note 1)
				7.104
180	0.00948	6.06	2.05	0.948
185	0.00857	6.18	2.01	0.857
190	0.00776	6.30	1.97	0.776
195	0.00704	6.41	1.93	0.704
200	0.00640	6.53	1.89	0.640
205	0.00575	6.64	1.87	0.575
210	0.00524	6.75	1.83	0.524
215	0.00479	6.86	1.80	0.479
220	0.00438	6.96	1.76	0.438
225	0.00402	7.07	1.73	0.402
230	0.00369	7.17	1.70	0.369
235	0.00339	7.27	1.66	0.339
240	0.00312	7.36	1.63	0.312
245	0.00288	7.46	1.60	0.288
250	0.00266	7.55	1.57	0.266
255	0.00246	7.64	1.55	0.246
260	0.00228	7.73	1.52	0.228
265	0.00211	7.82	1.49	0.211
270	0.00196	7.91	1.47	0.196
275	0.00182	7.99	1.44	0.182
280	0.00170	8.08	1.42	0.170
285	0.00158	8.16	1.39	0.158
290	0.00148	8.24	1.37	0.148
295	0.00138	8.32	1.35	0.138
300	0.00129	8.40	1.32	0.129

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Table 5 Resistance values at intermediate temperatures for 2322 633 8.... series

T _{oper} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)			
				2322 633 (see note 1)			
				8.103	8.203	8.303	8.104
-40	33.06	4.65	6.59	330.6	661.2	991.8	3306
-35	23.90	4.21	6.37	239.0	478.1	717.1	2390
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-5	4.214	1.89	5.24	42.14	84.28	126.4	421.4
0	3.255	1.55	5.08	32.55	65.09	97.64	325.5
5	2.534	1.22	4.93	25.34	50.67	76.01	253.4
10	1.987	0.90	4.78	19.87	39.74	59.62	198.7
15	1.570	0.59	4.64	15.70	31.40	47.10	157.0
20	1.249	0.29	4.51	12.49	24.98	37.46	124.9
25	1.000	0.00	4.38	10.00	20.00	30.00	100.0
30	0.8059	0.28	4.25	8.059	16.12	24.18	80.59
35	0.6534	0.55	4.13	6.534	13.07	19.60	65.34
40	0.5329	0.82	4.02	5.329	10.66	15.99	53.29
45	0.4371	1.08	3.91	4.371	8.742	13.11	43.71
50	0.3604	1.34	3.80	3.604	7.209	10.81	36.04
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85	0.1070	2.95	3.16	1.070	2.141	3.211	10.70
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95	0.07862	3.36	3.01	0.7862	1.572	2.359	7.862
100	0.06777	3.56	2.93	0.6777	1.355	2.033	6.777
105	0.05863	3.76	2.86	0.5863	1.173	1.759	5.863
110	0.05089	3.95	2.79	0.5089	1.018	1.527	5.089
115	0.04433	4.13	2.73	0.4433	0.8865	1.330	4.433
120	0.03873	4.32	2.66	0.3873	0.7747	1.162	3.873
125	0.03395	4.50	2.60	0.3395	0.6791	1.019	3.395
130	0.02985	4.67	2.54	0.2985	0.5971	0.8956	2.985
135	0.02633	4.84	2.49	0.2633	0.5265	0.7898	2.633

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T _{oper} (°C)	R _T /R ₂₅	ΔR DUE TO B-TOLERANCE (%)	TC (%/K)	R ₂₅ (kΩ)			
				2322 633 (see note 1)			
				8.103	8.203	8.303	8.104
140	0.02328	5.01	2.43	0.2328	0.4656	0.6984	2.328
145	0.02065	5.17	2.38	0.2065	0.4129	0.6194	2.065
150	0.01836	5.33	2.32	0.1836	0.3671	0.5507	1.836
155	0.01636	5.49	2.27	0.1636	0.3273	0.4909	1.636
160	0.01455	5.65	2.23	0.1455	0.2910	0.4365	1.455
165	0.01303	5.80	2.18	0.1303	0.2606	0.3909	1.303
170	0.01169	5.95	2.14	0.1169	0.2339	0.3508	1.169
175	0.01052	6.10	2.09	0.1052	0.2104	0.3156	1.052
180	0.00948	6.24	2.05	0.09484	0.1897	0.2845	0.9484
185	0.00857	6.38	2.01	0.08569	0.1714	0.2571	0.8569
190	0.00776	6.52	1.97	0.07757	0.1551	0.2327	0.7757
195	0.00704	6.66	1.93	0.07037	0.1407	0.2111	0.7037
200	0.00640	6.79	1.89	0.06396	0.1279	0.1919	0.6396

Note

1. Replace dot in last 5-digits of catalogue number by a number according to the following list and depending on tolerance on required R₂₅-value:
 - a) 3 for a tolerance of ±5%.
 - b) 2 for a tolerance of ±10%.

ELECTRICAL CHARACTERISTICS

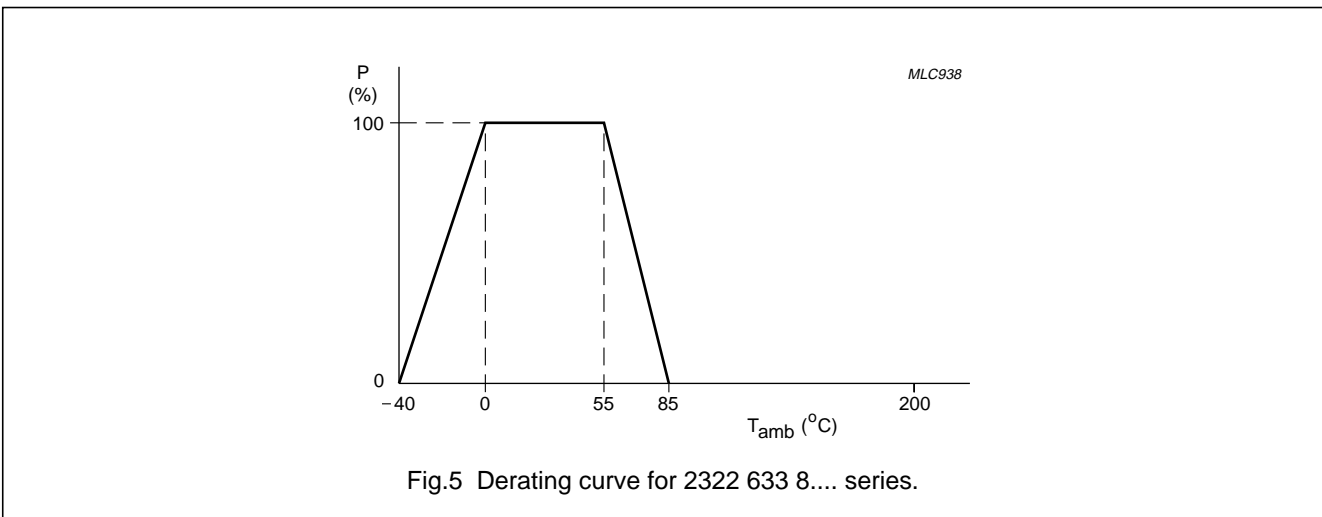
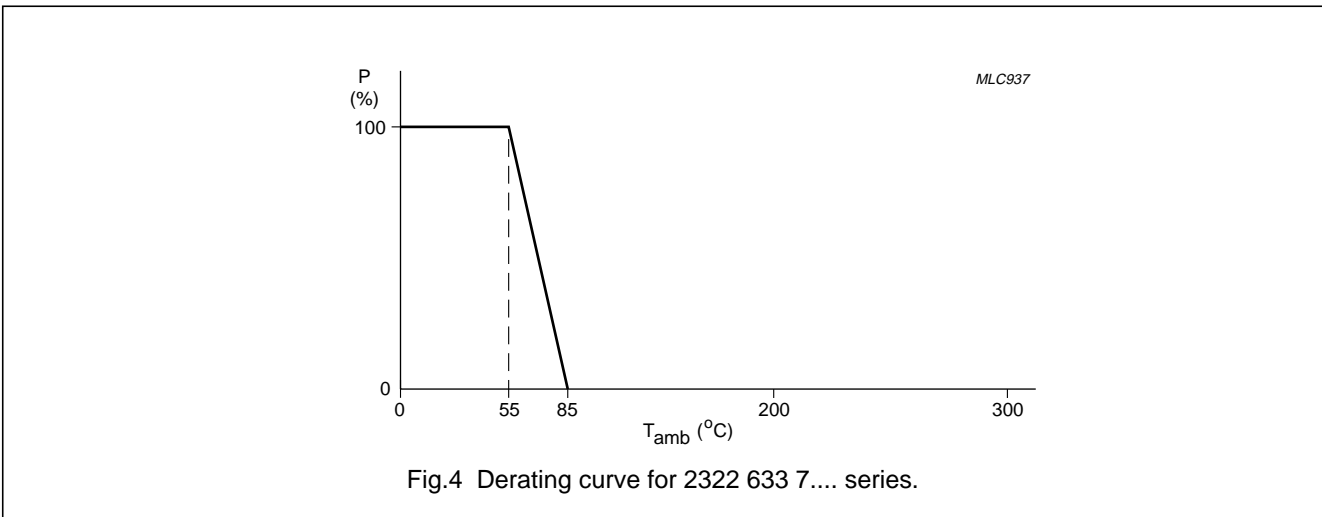
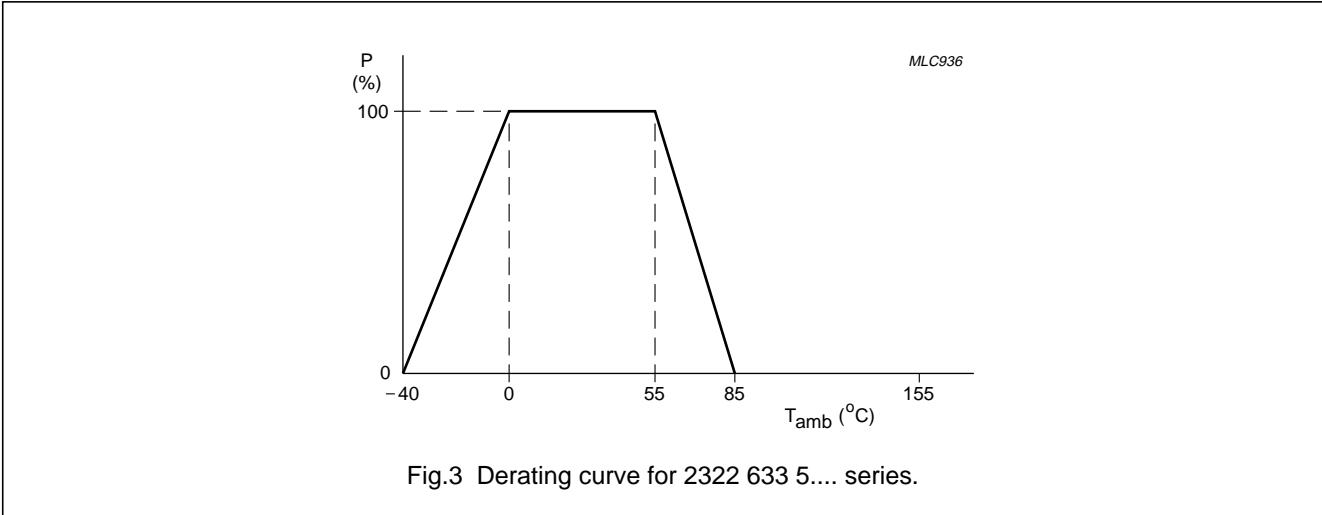
Unless otherwise stated, measurements are in accordance with "IEC publication 60539"; see also Table 2.

PARAMETER	VALUE		
	2322 633 5....	2322 633 7....	2322 633 8....
B _{25/85} -values	3977 K		
Tolerance on B-value	±1.3%		
Ratio R _T /R ₂₅	refer to Table 3	refer to Table 4	refer to Table 5
Rated dissipation	100 mW		
Deviation in resistance value due to B-tolerance	refer to Table 3	refer to Table 4	refer to Table 5
Temperature coefficient	refer to Table 3	refer to Table 4	refer to Table 5

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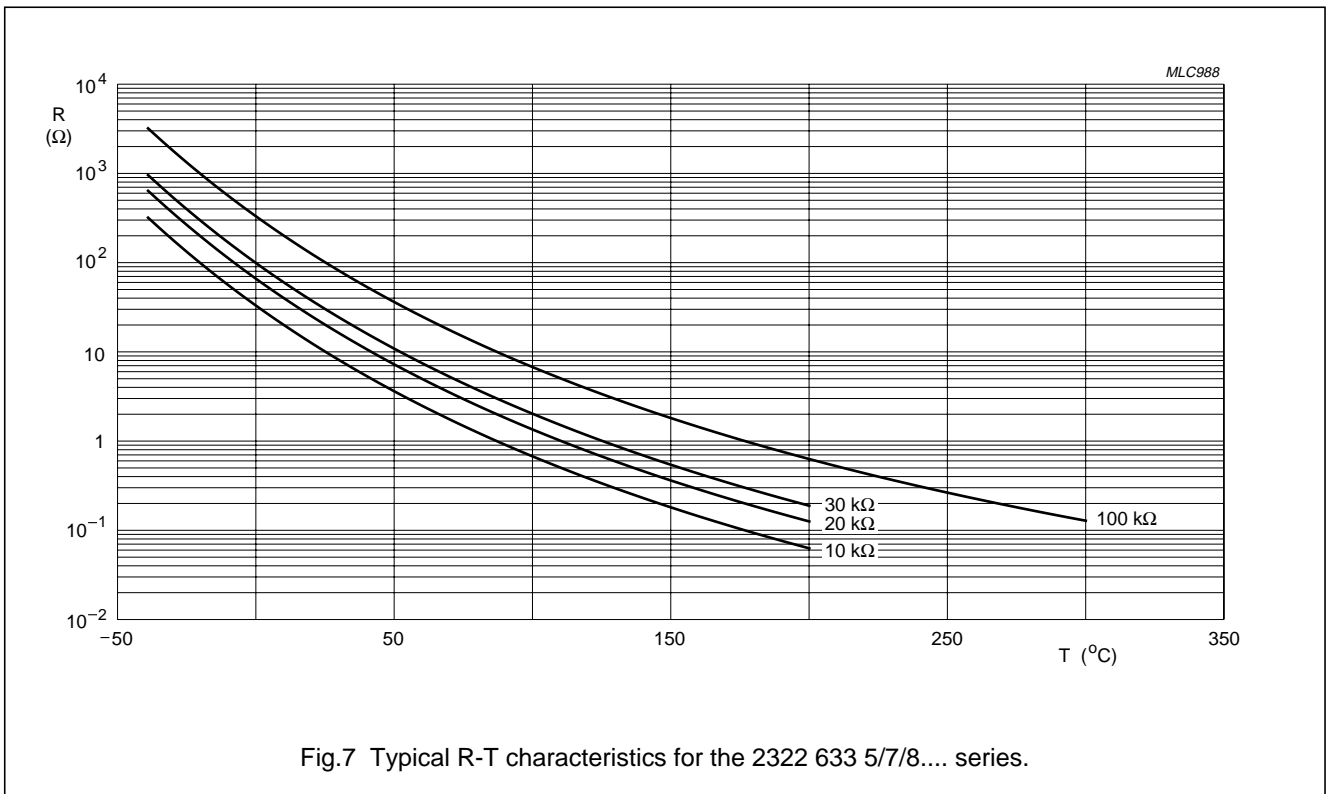
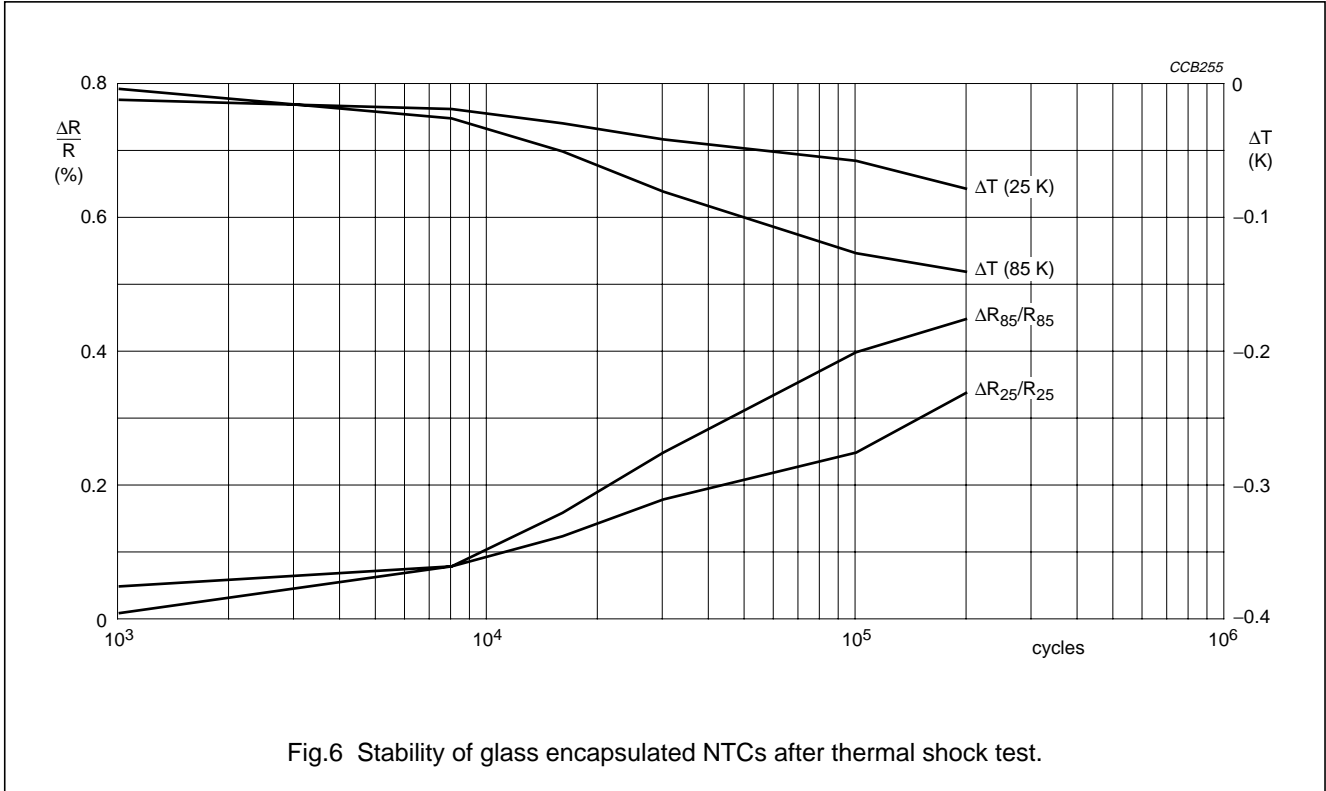
Derating



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Stability and R-T characteristics

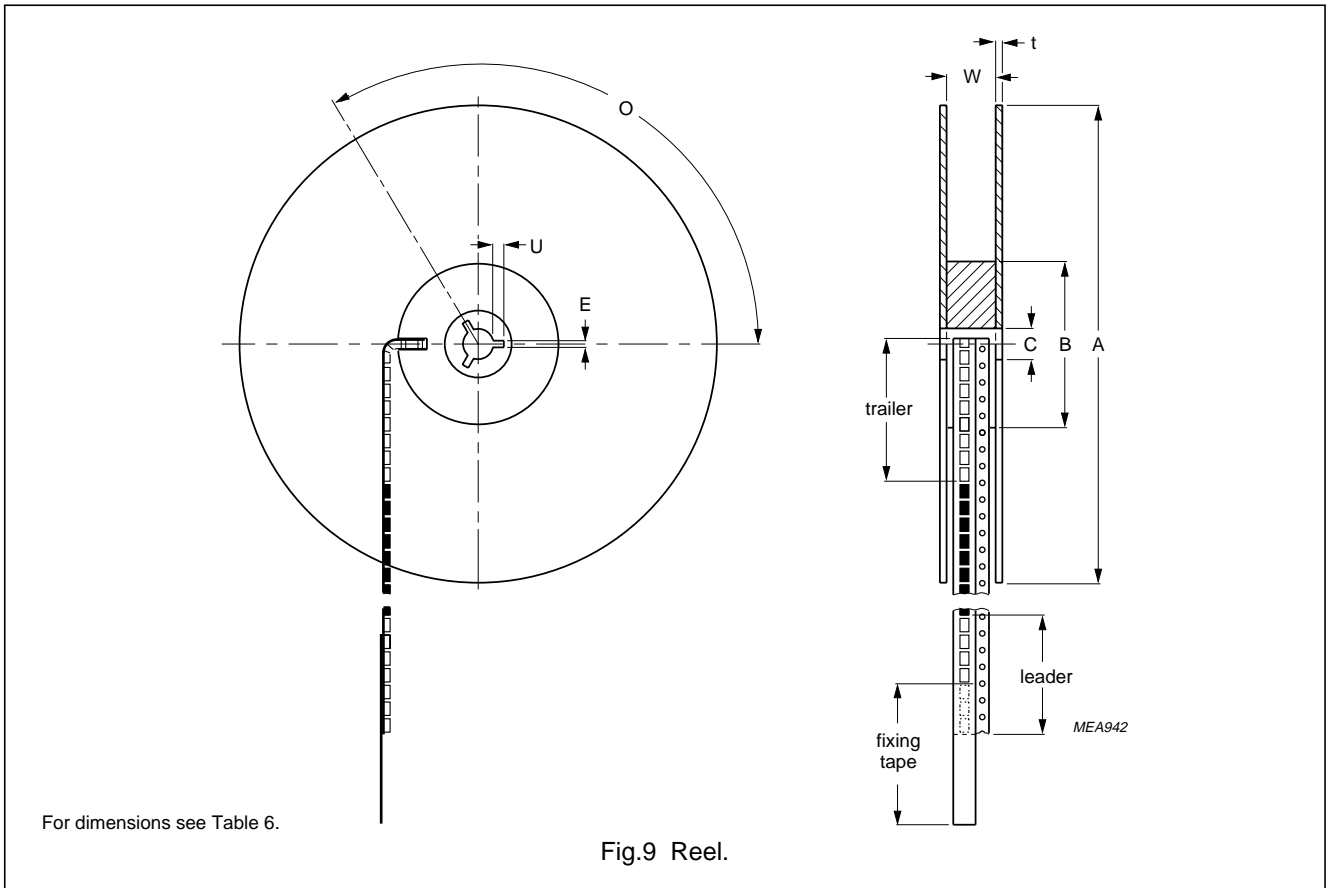
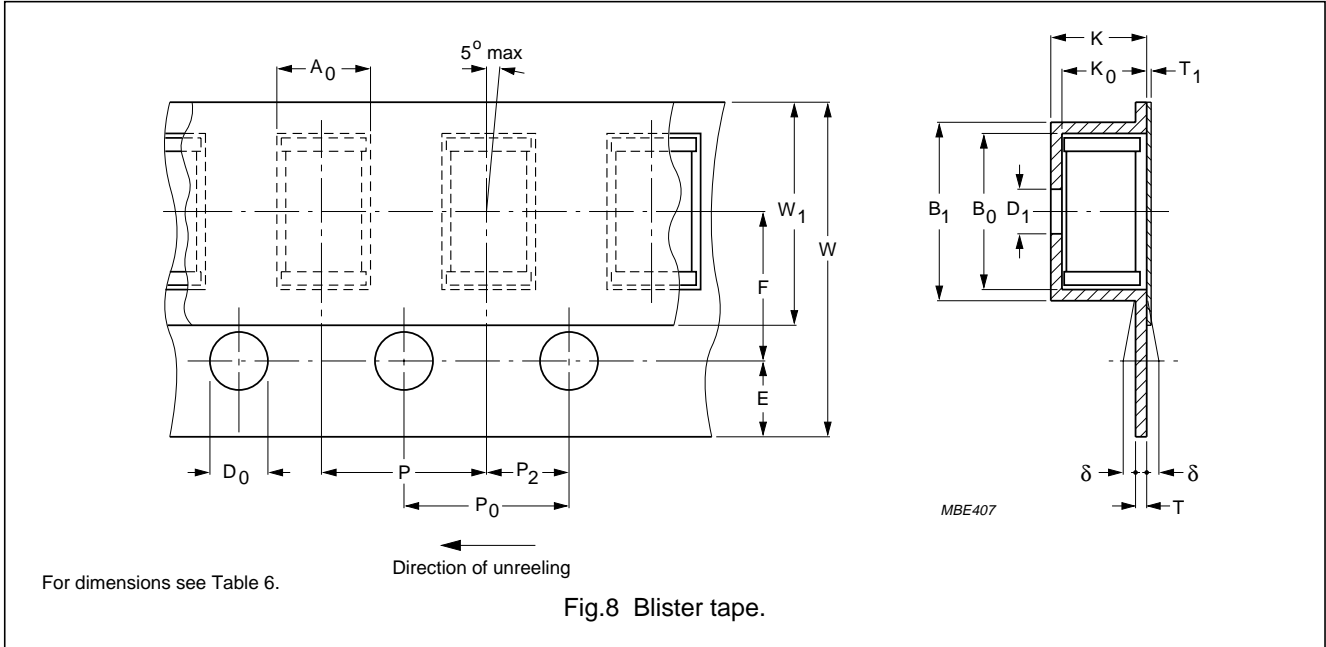


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PACKAGING

Blister tape, reel and bandolier data



NTC thermistors, high-temperature sensors

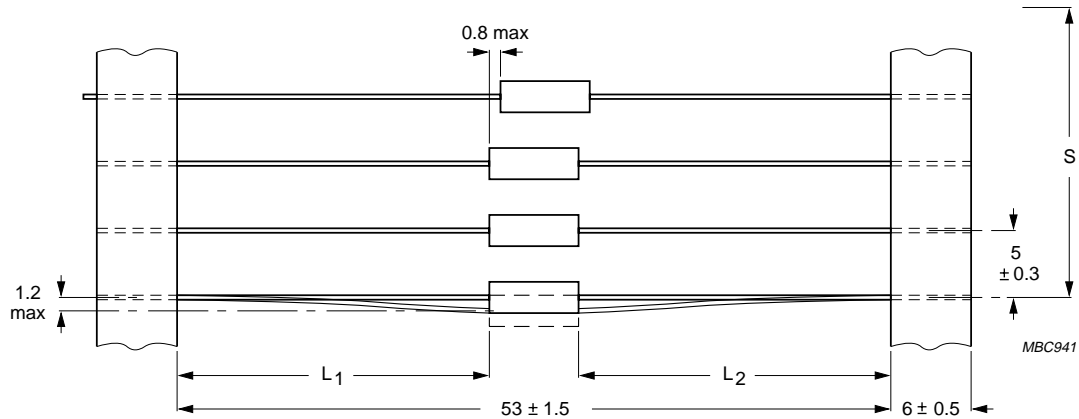
2322 633 5/7/8....

Table 6 Blister tape and reel dimensions; see Figs 8 and 9

SYMBOL	PARAMETER	NOMINAL DIMENSIONS	TOLERANCE	UNIT
Blister tape				
K	overall thickness	<2.5	–	mm
POCKET				
A ₀	length	2.1	+0.3	mm
B ₀	width	>3.8	–	mm
K ₀	depth	2.1	+0.3	mm
B ₁	outside width	<4.5	–	mm
P	pitch	4.0	±0.1	mm
D ₁	hole diameter	1.0	±0.1	mm
FEED-HOLE				
D ₀	diameter	1.5	±0.1	mm
P ₀	pitch	4.0	±0.1	mm
E	distance	1.75	±0.1	mm
	cumulative pitch error over 10 positions	0	±0.1	mm
CENTRE LINE				
P ₂	length	2.0	±0.05	mm
F	width	3.5	±0.1	mm
FIXING TAPE				
W ₁	width	<5.5	–	mm
T ₁	thickness	<0.1	–	mm
CARRIER TAPE				
W	thickness	8.0	±0.2	mm
δ	bending	<0.3	–	mm
T	thickness	<0.4	–	mm
Reel				
FLANGE				
A	diameter	180	+0	mm
t	thickness	1.5	+0.5	mm
W	space between flanges	9.5	±0.5	mm
HUB				
B	diameter	62.0	±1.5	mm
C	spindle hole	12.75	+0.15/–0	mm
KEY SLIT				
E	width	2.0	±0.5	mm
U	depth	4.0	±0.5	mm
O	location	120	–	°

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A black marker is printed on the tape of the bandolier after every 50 units.
 The components are centred so that $|L_1 - L_2| = 1.2 \text{ mm max.}$
 The cumulative space (S) measured over 10 spacings = $50 \pm 2 \text{ mm.}$

Fig.10 Thermistors on bandolier.

Note to Table 6 and Fig.10

The bandolier of a 180 mm reel contains at least 2500 devices with no more than 0.5% empty positions. Three consecutive empty places may be found provided this gap is followed by 6 consecutive devices. The carrier tape starts (leader) and ends (trailer) with at least 75 empty positions (equivalent to 300 mm); the covering foil is at least 300 mm. In order to fix the carrier tape a self-adhesive tape of 20 to 50 mm width is applied.