



NTC thermistors for temperature measurement

NTC chip thermistors, bondable S860 series

Series/Type: S860
Ordering code: B57860S
Date: January 2015

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EPCOS AG is a TDK Group Company.

Application

- Temperature measurement

Features

- NTC chip with termination on top and bottom side (silver or gold metallization)
- Category temperature up to 150 °C

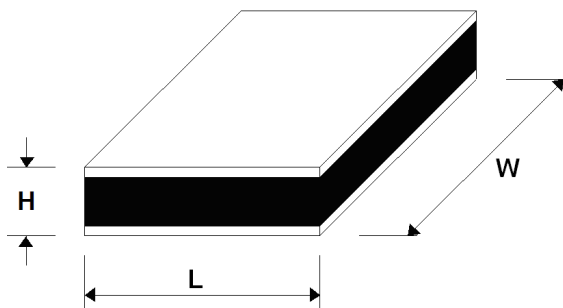
General technical data

Climatic category (IEC 60068-1)			: 40/150/21
Max. power (at 25 °C)	P_{25}	[mW]	: Depending on mounting situation
Rated temperature	T_R	[°C]	: 100
Dissipation factor (in air)	δ_{th}	[mW/K]	: Depending on mounting situation
Thermal cooling time constant (in air)	τ_C	[s]	: Depending on mounting situation
Heat capacity	C_{th}	[mJ/K]	: Depending on mounting situation
B-value tolerance	$\Delta B/B$	[%]	: ± 1

Delivery mode

On carrier tape (plastic foil) on 8-inch frame. For details see page 6.

Dimensional drawings



Ordering code	Chip size L [mm]	Chip size W [mm]	Chip size H [mm]
B57860S0502J000	1.50 ... 1.70	1.50 ... 1.70	0.35 ... 0.55
B57860S0103J000	0.45 ... 0.60	0.45 ... 0.60	0.25 ... 0.45
B57860S0223J000	1.25 ... 1.40	1.25 ... 1.40	0.55 ... 0.75
Upon request	0.80 ... 1.10	0.80 ... 1.10	0.45 ... 0.65
B57860S0853J000	0.45 ... 0.65	0.45 ... 0.65	0.25 ... 0.40
Upon request	0.50 ... 0.60	0.50 ... 0.60	0.45 ... 0.65

Electrical specification and ordering codes

Ordering code	RT curve	$B_{25/100}$ [K]	R_{25} [Ω°]	R_{125} [Ω°]	ΔT_{125} [$\pm K^{\circ}$]	Metallization
B57860S0502J000	8016	3988	5000	170.9	2.2	Ag
B57860S0103J000	7003	3625	10000	464.3	2.4	Au
B57860S0223J000	8018	3964	21511	742.7	2.2	Ag
Upon request	8018	3964	30000	1036	2.2	Ag
B57860S0853J000	8304	4092	85000	2639	2.1	Au
Upon request	8018	3964	100000	3453	2.2	Au

* Further resistance values and tighter tolerances upon request.

Reliability Data

Test	Standard	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	IEC 60068-2-2	Storage at upper category temperature Temperature: 150 °C Duration: 1000 h	< 3%	No visible damage
Storage in damp heat, steady state with test voltage	IEC 60068-2-78	Temperature of air: 85 °C Relative humidity of air: 85% Duration: 1000 h	< 2%	No visible damage
Rapid change of temperature	IEC 60068-2-14	Lower test temperature: -40 °C Upper test temperature: 150 °C Number of cycles: 100	< 2%	No visible damage

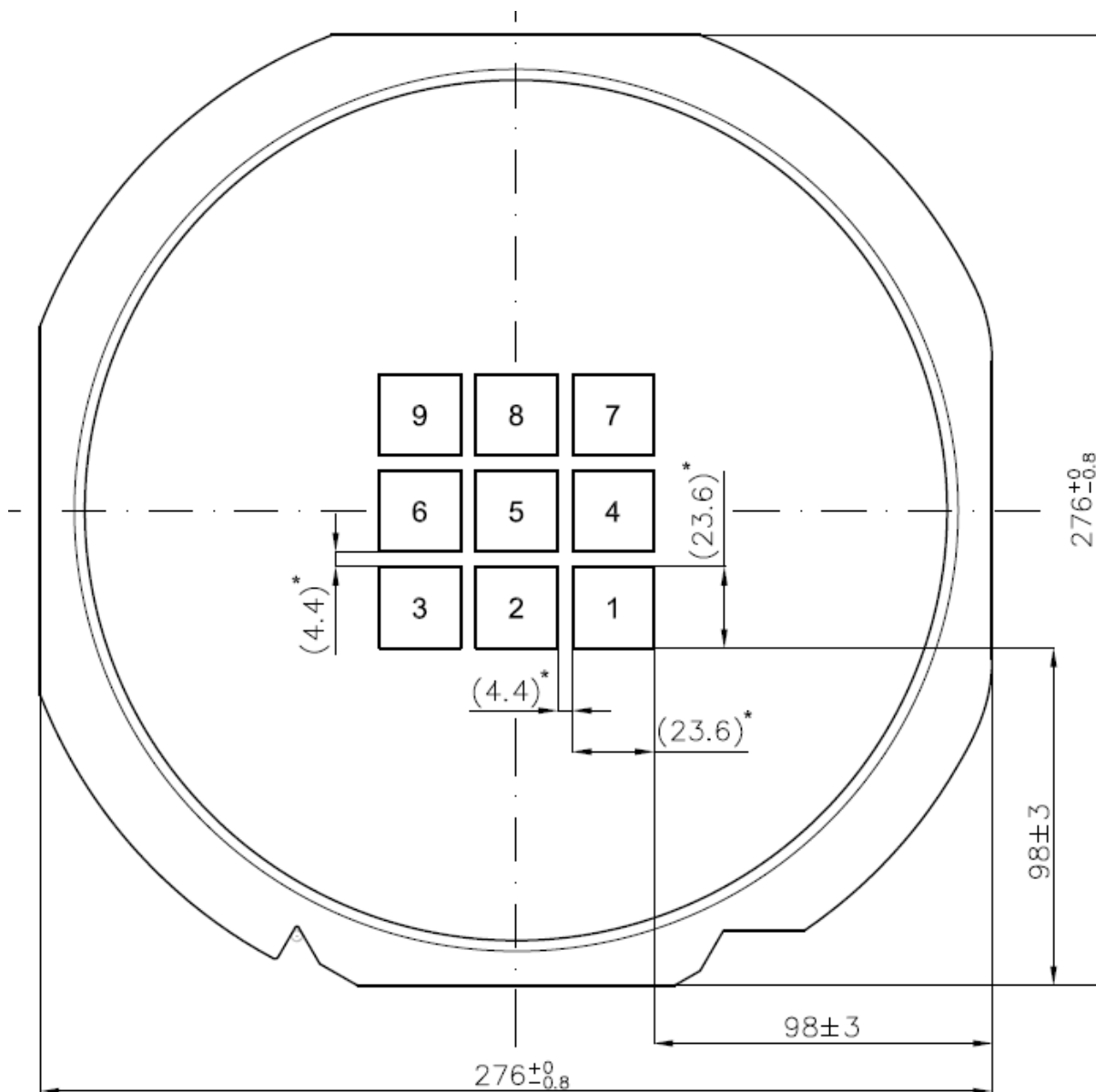
Storage of NTC in original packaging units.

Note: It is strongly recommended to mount the NTC thermistor elements within one week of opening the package, depending on storage conditions.

RT characteristics

R/T No.	7003		8016		8018		8304	
T (°C)	B _{25/100} = 3625 K		B _{25/100} = 3988 K		B _{25/100} = 3964 K		B _{25/100} = 4092 K	
	R _T /R ₂₅	α (%/K)	R _T /R ₂₅	α (%/K)	R _T /R ₂₅	α (%/K)	R _T /R ₂₅	α (%/K)
-40.0	24.324	6.0	33.65	6.7	30.24	6.3	34.853	6.7
-35.0	18.081	5.8	24.26	6.4	22.1	6.1	25.102	6.5
-30.0	13.575	5.6	17.7	6.2	16.32	5.9	18.275	6.2
-25.0	10.29	5.4	13.04	6.0	12.17	5.8	13.443	6.0
-20.0	7.8716	5.3	9.707	5.8	9.153	5.6	9.9853	5.9
-15.0	6.0739	5.1	7.293	5.6	6.945	5.4	7.4867	5.7
-10.0	4.7258	4.9	5.533	5.5	5.313	5.2	5.6636	5.5
-5.0	3.7062	4.8	4.232	5.3	4.097	5.1	4.3212	5.3
0.0	2.9287	4.6	3.265	5.1	3.183	4.9	3.324	5.2
5.0	2.3311	4.5	2.539	5.0	2.491	4.8	2.5769	5.0
10.0	1.8684	4.4	1.99	4.8	1.963	4.7	2.0127	4.9
15.0	1.5075	4.2	1.571	4.7	1.557	4.6	1.5834	4.7
20.0	1.224	4.1	1.249	4.5	1.244	4.4	1.2542	4.6
25.0	1.0000	4.0	1.0000	4.4	1.0000	4.3	1.0000	4.5
30.0	0.82176	3.9	0.8057	4.3	0.8083	4.2	0.80239	4.3
35.0	0.67909	3.8	0.6531	4.1	0.6572	4.1	0.64776	4.2
40.0	0.56422	3.7	0.5327	4.0	0.5373	4.0	0.52598	4.1
45.0	0.47122	3.6	0.4369	3.9	0.4418	3.9	0.4295	4.0
50.0	0.3955	3.5	0.3603	3.8	0.365	3.7	0.35262	3.9
55.0	0.33355	3.4	0.2986	3.7	0.303	3.7	0.291	3.8
60.0	0.2826	3.3	0.2488	3.6	0.2527	3.6	0.24136	3.7
65.0	0.24049	3.2	0.2083	3.5	0.2118	3.5	0.20114	3.6
70.0	0.20553	3.1	0.1752	3.4	0.1783	3.4	0.16841	3.5
75.0	0.17637	3.0	0.1481	3.3	0.1508	3.3	0.14164	3.4
80.0	0.15195	2.9	0.1258	3.2	0.128	3.2	0.11963	3.3
85.0	0.13141	2.9	0.1072	3.2	0.1091	3.2	0.10147	3.3
90.0	0.11406	2.8	0.09177	3.1	0.0933	3.1	0.086407	3.2
95.0	0.099352	2.7	0.07885	3.0	0.08016	3.0	0.073867	3.1
100.0	0.086837	2.7	0.068	2.9	0.0691	2.9	0.063383	3.0
105.0	0.076149	2.6	0.05886	2.9	0.05974	2.9	0.054584	3.0
110.0	0.066989	2.5	0.05112	2.8	0.05183	2.8	0.04717	2.9
115.0	0.059112	2.5	0.04454	2.7	0.04512	2.8	0.040901	2.8
120.0	0.052316	2.4	0.03893	2.6	0.0394	2.7	0.035581	2.8
125.0	0.046433	2.4	0.03417	2.6	0.0345	2.6	0.03105	2.7
130.0	0.041327	2.3	0.03009	2.5	0.03032	2.6	0.027179	2.6
135.0	0.03688	2.3	0.02654	2.5	0.02672	2.5	0.023861	2.6
140.0	0.032998	2.2	0.02348	2.4	0.02361	2.5	0.021008	2.5
145.0	0.029598	2.2	0.02083	2.4	0.02091	2.4	0.018548	2.5
150.0	0.026612	2.1	0.01853	2.3	0.01857	2.4	0.016419	2.4

Frame for delivery: size 8-inch



* approximate distance

Frame loaded with 1 to 9 substrates.

In case of less than 9 substrates the positions are filled beginning from position 1 continuously.

Each position can be empty because of removed parts for resistance or optical check.

Cautions and warnings

Storage

- Store thermistors only in original packaging. Do not open the package prior to storage.
- Storage conditions in original packaging: storage temperature $-25\text{ °C} \dots +45\text{ °C}$, relative humidity $\leq 75\%$ annual mean, $< 95\%$ maximum 30 days per annum, dew precipitation is inadmissible.
- Do not store thermistors where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed or components may stick together, causing problems during mounting.
- Avoid contamination of thermistor surface during storage, handling and processing.
- Avoid storage of thermistors in harmful environments like corrosive gases (SO_x , Cl etc).
- Use the components as soon as possible after opening the factory seals, i.e. the polyvinyl-sealed packages.
- Solder thermistors within the time specified after shipment from EPCOS.
For leadless components with Au metallization this is 12 months.
For leadless components with Ag metallization this is 6 months.

Handling

- NTC thermistors must not be dropped. Chip-offs or any other damage must not be caused during handling of NTCs.
- Do not touch components with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.
- Washing processes may damage the product due to the possible static or cyclic mechanical loads (e.g. ultrasonic cleaning). They may cause cracks to develop on the product and its parts, which might lead to reduced reliability or lifetime.

Soldering

- Use resin-type flux or non-activated flux.
- Insufficient preheating may cause ceramic cracks.
- Rapid cooling by dipping in solvent is not recommended.
- Complete removal of flux is recommended.

Mounting

- Ensure that no thermo-mechanical stress occurs due to production processes (curing or overmolding processes) when thermistors are sealed, potted or overmolded or during their subsequent operation. The maximum temperature of the thermistor must not be exceeded. Ensure that the materials used (sealing/potting compound and plastic material) are chemically neutral.
- Electrodes/contacts must not be scratched or damaged before/during/after the mounting process.
- Contacts and housing used for assembly with the thermistor must be clean before mounting.
- Ensure that adjacent materials are designed for operation at temperatures comparable to the surface temperature of the thermistor. Be sure that surrounding parts and materials can withstand the temperature.
- Avoid contamination of the thermistor surface during processing.
- Avoid using chemical substances as mounting aids. It must be ensured that no water or other liquids enter the NTC thermistors (e.g. through plug terminals). In particular, water based substances (e.g. soap suds) must not be used as mounting aids for sensors.

Operation

- Use thermistors only within the specified operating temperature range.
- Use thermistors only within the specified power range.
- Environmental conditions must not harm the thermistors. Only use the thermistors under normal atmospheric conditions or within the specified conditions.
- Contact of NTC thermistors with any liquids and solvents shall be prevented. It must be ensured that no water enters the NTC thermistors (e.g. through plug terminals). For measurement purposes (checking the specified resistance vs. temperature), the component must not be immersed in water but in suitable liquids (e.g. Perfluoropolyether such as Galden).
- Avoid dewing and condensation unless thermistor is specified for these conditions.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by malfunction.

This listing does not claim to be complete, but merely reflects the experience of EPCOS AG.

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Symbols and terms

Symbol	English	German
B	B value	B-Wert
$B_{25/100}$	B value determined by resistance measurement at 25 °C and 100 °C	B-Wert, ermittelt durch Widerstandsmessungen bei 25 °C und 100 °C
C_{th}	Heat capacitance	Wärmekapazität
P_{25}	Maximum power at 25 °C	Maximale Leistung bei 25 °C
R_T	Resistance at temperature T (e.g. R_{25} = resistance at 25 °C)	Widerstand bei Temperatur T (z.B. R_{25} = Widerstand bei 25 °C)
T	Temperature	Temperatur
ΔT	Temperature tolerance	Temperaturtoleranz
T_R	Rated temperature	Nenntemperatur

Symbol	English	German
α	Temperature coefficient	Temperaturkoeffizient
Δ	Tolerance, change	Toleranz, Änderung
δ_{th}	Dissipation factor	Wärmeleitwert
τ_c	Thermal cooling time constant	Thermische Abkühlzeitkonstante

Important notes

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