NTC thermistors for temperature measurement

Surface temperature sensor

Series/Type:	**Battery temperature sensor**
Ordering code:	**B58101A0022A000**
Date:	2025-03-20
Version:	2

Application

Battery surface temperature measurement

Features

- High accuracy
- Fast response
- NTC element qualified acc. to AEC-Q200 REV D

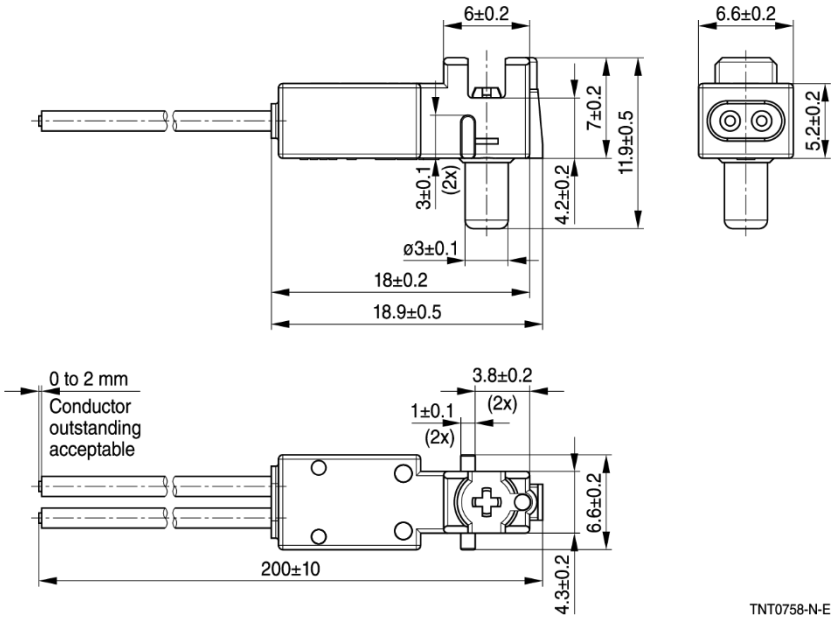
Delivery mode

- Bulk, bundled in plastic bags in cardboard box
- Agreed prior to the first delivery

Special remarks

The sensors undergo a 100% electrical check after production.

Dimensional drawings



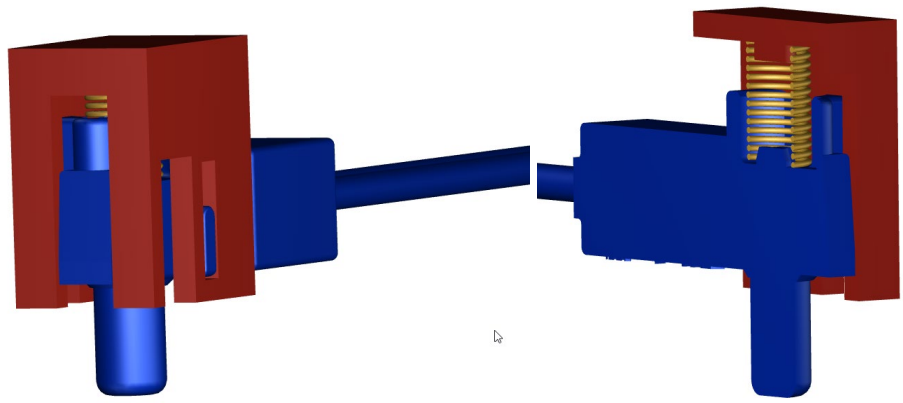
General technical data

Climatic category	(IEC 60068-1)		40/90/42	
Lower category temperature			-40	°C
Upper category temperature			+90	°C
Maximum operating temperature		$T_{op,max}$	+90	°C
Max. power	(at +25 °C)	P_{25}	32	mW
Rated temperature		T_R	+40	°C
Rated resistance		R_R	5642	Ω
Resistance tolerance[1)]		$\Delta R_R/R_R$	±1.5	%
B-value[1)]		$B_{25/100}$	3625 ±1%	K
No. of R/T characteristic			7003	
Thermal time constant	(in water)	τ_a	< 10	s
Insulation resistance		R_{ins}	100	MΩ
Test voltage	(t = 60 s)	V_{test}	500	V DC
Sensor accuracy[2)]	(-40 °C ≤ T ≤ +90 °C)	ΔT	±5	K
Recommended contact force		F	5 … 10	N

[1)] Values for initial glass-encapsulated NTC G1561
[2)] Sensor accuracy is criteria for reliability testing

Application example 1: Spiral spring

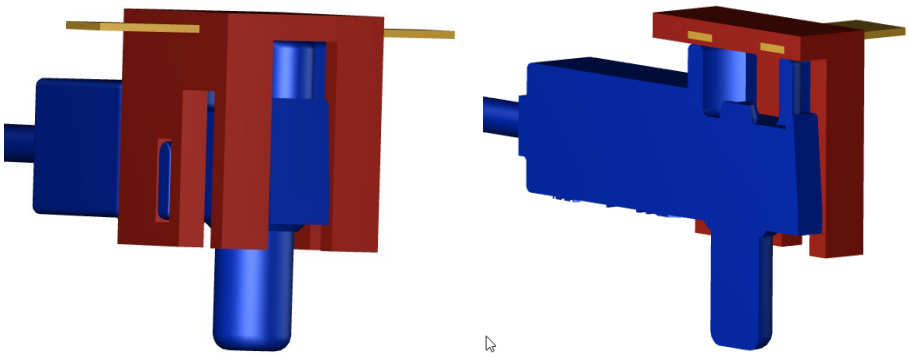
- The spiral spring pushes the sensor to the measurement surface.
- The spring is supported by the customer installation.
- The sensor orientation is guided by the customer installation.



Note: Brown color shows customer installation.

Application example 2: Additional mounting clip with metal flat spring

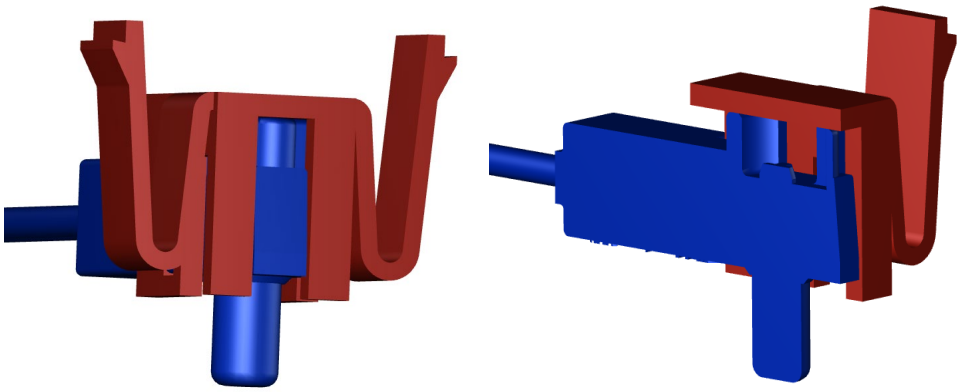
- The flat spring pushes the sensor to the measurement surface.
- The additional mounting clip fixes the flat spring to the sensor.
- The flat spring is supported by the customer installation.
- The sensor position is guided by the customer installation.



Note: Brown color shows additional mounting clip with flat spring supplied by TDK.

Application example 3: Additional mounting clip with plastic hook

- The additional mounting clip contains a hook for clip-on and spring mechanism.
- The hook is supported by the customer installation.
- The sensor orientation is guided by the customer installation.



Note: Brown color shows additional mounting clip with hook supplied by TDK.

Reliability Data

Test	Standard	Test conditions	Criteria	Remarks
Initial RT parameter	LV124 - K02	-40 °C, +25 °C, +90 °C	R(T) acc. R/T curve	No visible damage
Insulation strength		500 V DC (in bath of metal balls, insertion depth: s_{depth} = 50 mm)	R_{iso} > 10 MΩ	No visible damage
Voltage strength		500 V DC for 60 s (in bath of metal balls, insertion depth: s_{depth} = 50 mm)	$I_{short\ circuit}$ < 5 mA no flash over	No visible damage
Response time		+25 °C water to +85 °C water	τ_{63} < 10 s	No visible damage
ESD test	AEC-Q200-002 / ISO / DIS 10605	ESD network 2000 Ω, 330 pF, direct contact discharge up to 8 kV, air discharge 25 kV	R(T) acc. R/T curve	No visible damage
Temperature cycle	LV124 K-05, sequence	-40 °C / +90 °C for 1000 cycles, dwell time 30 min, transition < 30 s	R(T) acc. R/T curve	No visible damage
Mechanical shock test	LV124 M-05, sequence	Acceleration half sine: 50 G / 6 ms, 60 shocks (10 shocks in 6 directions) in operation	R(T) acc. R/T curve	No visible damage
Vibration test	LV124 M-04, sequence (profile D)	-40 °C / +85 °C, 5 Hz … 1000 Hz, 20.9 *g*, 8 h per axis (in total 24 h)	R(T) acc. R/T curve	No visible damage
Damp heat test (steady state)	LV124 K-14	+40 °C / 93% RH in operation for 42 days	R(T) acc. R/T curve	No visible damage
Corrosion test with flow of mixed gas	LV124 K-18, parallel	T_{RT}, 75% RH SO_2 0.2 ppm; H_2S 0.01 ppm, NO_2 0.2 ppm; Cl_2 0.01 ppm, test duration 21 days	R(T) acc. R/T curve	No visible damage
Chemical media test	LV124 C-01	Chemicals acc. LV124-C01	R(T) acc. R/T curve	Printing partially damaged (not readable)
High-temperature endurance test	LV124 L-02	+90 °C for 2000 h, in operation with overvoltage 500 V DC	R(T) acc. R/T curve	No visible damage

Note:

- NTC element qualified acc. AEC-Q200 REV D
- Details of reliability tests available on request.

R/T characteristics

R/T curve	7003 / A01
R at +25 °C	10000 Ω
$B_{25/100}$	3625 K ± 1%
R_R at +40 °C	5642.2 Ω ± 1.5%

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±K]
-40	243240	229810	256670	5.5	0.9
-35	180810	171410	190200	5.2	0.9
-30	135750	129130	142380	4.9	0.9
-25	102900	98188	107620	4.6	0.8
-20	78716	75336	82096	4.3	0.8
-15	60739	58300	63179	4.0	0.8
-10	47258	45486	49030	3.7	0.8
-5	37062	35768	38356	3.5	0.7
0	29287	28336	30237	3.2	0.7
+5	23311	22610	24012	3.0	0.7
+10	18684	18165	19202	2.8	0.6
+15	15075	14690	15460	2.6	0.6
+20	12240	11954	12527	2.3	0.6
+25	10000	9786.8	10213	2.1	0.5
+30	8217.6	8058.8	8376.3	1.9	0.5
+35	6790.9	6672.9	6908.9	1.7	0.5
+40	5642.2	5557.6	5726.8	1.5	0.4
+45	4712.2	4630.5	4793.8	1.7	0.5
+50	3955	3879.6	4030.5	1.9	0.6
+55	3335.5	3266.1	3404.8	2.1	0.6
+60	2826	2762.5	2889.4	2.2	0.7
+65	2404.9	2347	2462.7	2.4	0.8
+70	2055.3	2002.6	2107.9	2.6	0.8
+75	1763.7	1715.8	1811.6	2.7	0.9
+80	1519.5	1476	1562.9	2.9	1.0
+85	1314.1	1274.6	1353.5	3.0	1.0
+90	1140.6	1104.7	1176.4	3.1	1.1

Cautions and warnings

Do not apply continuous pull-force between sensor and wire ends. Pull force requirement of 50 N is for short-term mounting conditions only. Consider metal compliance when mounting the sensor.

Storage

- Store thermistors only in original packaging. Do not open the package prior to storage.
- Storage conditions in original packaging: storage temperature −10 °C to +45 °C, relative humidity 45% up to 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 (SOx, 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 TDK Electronics.
- For leaded components this is 24 months.

Handling

- NTC thermistors must not be dropped. Chip-offs or any other damage must not be caused during handling of NTCs.
- Avoid contamination of thermistor surface during handling. Gloves are recommended.
- 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.

Bending/ twisting leads

- A lead (wire) may be bent at a minimum distance of twice the wire’s diameter plus 4 mm from the component head or housing. When bending ensure the wire is mechanically relieved at the component head or housing. The bending radius should be at least 8 mm (5x wire diameter).

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.
- The connections of sensors (e.g. cable end, wire end, plug terminal) may only be exposed to an environment with normal atmospheric conditions.
- Tensile forces on cables or leads must be avoided during mounting and operation.
- Bending or twisting of cables or leads directly on the thermistor body is not permissible.
- 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.
- Ensure that no significant thermo-mechanical stress occurs during operation due to the mounting situation. Fixtures must not overstress the sensor by an excessive mechanical preload.
- 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. Galden).
- Avoid dewing and condensation unless thermistor is specified for these conditions.
- Bending or twisting of cables and/or wires is not permissible during operation of the sensor in the application.
- 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 TDK Electronics AG.

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Important notes

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