



# SURFACE MOUNT NTC TEMPERATURE SENSORS FOR SPACE APPLICATIONS

## GENERAL DESCRIPTION

Glass Coated NTC Thermistor Sensors welded to 26AWG wires and encapsulated using thermally conductive epoxy resin on a flat aluminum housing. The NTC thermistor probe construction is based on TE Connectivity's proprietary electro ceramic formulation which has been used in the industry for over 25 years offering proven performance and outstanding reliability.

## SPECIFICATION

- ESCC (European Space Components Coordination) Generic Specification No. 4006: This specification defines the general requirements for the qualification, procurement and delivery of NTC Thermistors for space applications.
- ESCC Detail Specification No. 4006014: This specification details the ratings, physical and electrical characteristics and test and inspection data. It supplements the requirements of, and shall be read in conjunction with, ESCC Generic Specification No. 4006.
- Operating Temperature Range: -60°C to +160°C
- Storage Temperature Range: -60°C to +160°C

## FEATURES

- ESA (European Space Agency) Qualified
- High Reliability and Excellent Stability
- Space Flight Heritage
- Flat Surface for ease of mounting
- Various wire lengths and wire types
- Various Resistance-Temperature curves with nominal resistances at +25°C ranging from 2,000Ω to 100,000Ω

## APPLICATIONS

- Temperature Control
- Temperature Monitoring
- Temperature Compensation
- Solar Panels
- Payload Equipment
- Guidance and Navigation Systems
- Control and Computer Systems

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## PRODUCT OVERVIEW

TE Connectivity Flight Model Part No.	ESCC Component Type	ESCC Component No.	ESCC Variant No.	ESA QPL	Resistance (Ω) at 25°C	Wire Length (mm)	Operating Temperature (°C)	TE Connectivity Engineering Model Part No.
GAG15K4D489	G15K4D489	400601408	08	Yes	15,000	381 ± 25	-60 to +160	11021181-00
GAG10K4D453	G10K4D453	400601409	09	Yes	10,000	525 ± 25	-60 to +160	11021206-00
GAG2K7D411LEVB	G2K7D411	400601410	10	No	2,000	305 ± 25	-40 to +125	11021203-01
GAG4K7D421LEVB	G4K7D421	400601411	11	No	4,000	305 ± 25	-40 to +125	11021203-00
GAG100K6D487LEVB	G100K6D487	400601412	12	No	100,000	305 ± 25	+25 to +160	11021202-00
GAG15K4D589LEVB	G15K4D589	400601413	13	Yes	15,000	381 ± 25	-60 to +160	11024509-00
GAG10K4D451	G10K4D451	400601414	14	No	10,000	525 ± 25	-60 to +160	11021206-01

- **Controlling Specifications:** ESCC Generic Specification No. 4006 and ESCC Detail Specification No. 4006014.
- **Flight Models:** All Flight Model part numbers listed above are tested as per ESCC Generic Specification No. 4006, Chart F2 and Chart F3.
- **Non-Flight Models:** LVT (Lot Validation Testing) as per ESCC Generic Specification No. 4006 Chart F4 can also be ordered. Part numbers not listed on the ESA QPL (Qualified Parts List) are typically ordered with LVT. Parts subjected to LVT are called Non-Flight Models. For more information on ordering LVD and Non-Flight Models please contact a member of TE Connectivity's Sales Team.
- **Engineering Models:** Engineering Model versions of part numbers listed above are available. Engineering Models are typically used for testing and validation purposes. The corresponding Engineering Model part number for each Flight Model is listed in the last column of the table above.
- **Data Report:** A data report including full ESCC Generic Specification No. 4006, Chart F2 and Chart F3 test data is available to order. The orderable Data Report part number is 11016800-00 and the quantity always = 1 per order/batch.
- **Wire Types:** Wire type is 26AWG Fluoropolymer Insulated as per ESCC Detail Specification No. 390101203 for all part numbers listed above except GAG15K4D589LEVB. Wire type is 26AWG Polyimide Insulated as per ESCC Detail Specification No. 390100124 for part no. GAG15K4D589LEVB.
- **Custom Variants:** Certain custom wire lengths and wire type variations of part numbers listed above are available upon request.

NTC TEMPERATURE SENSORS FOR SPACE APPLICATIONS

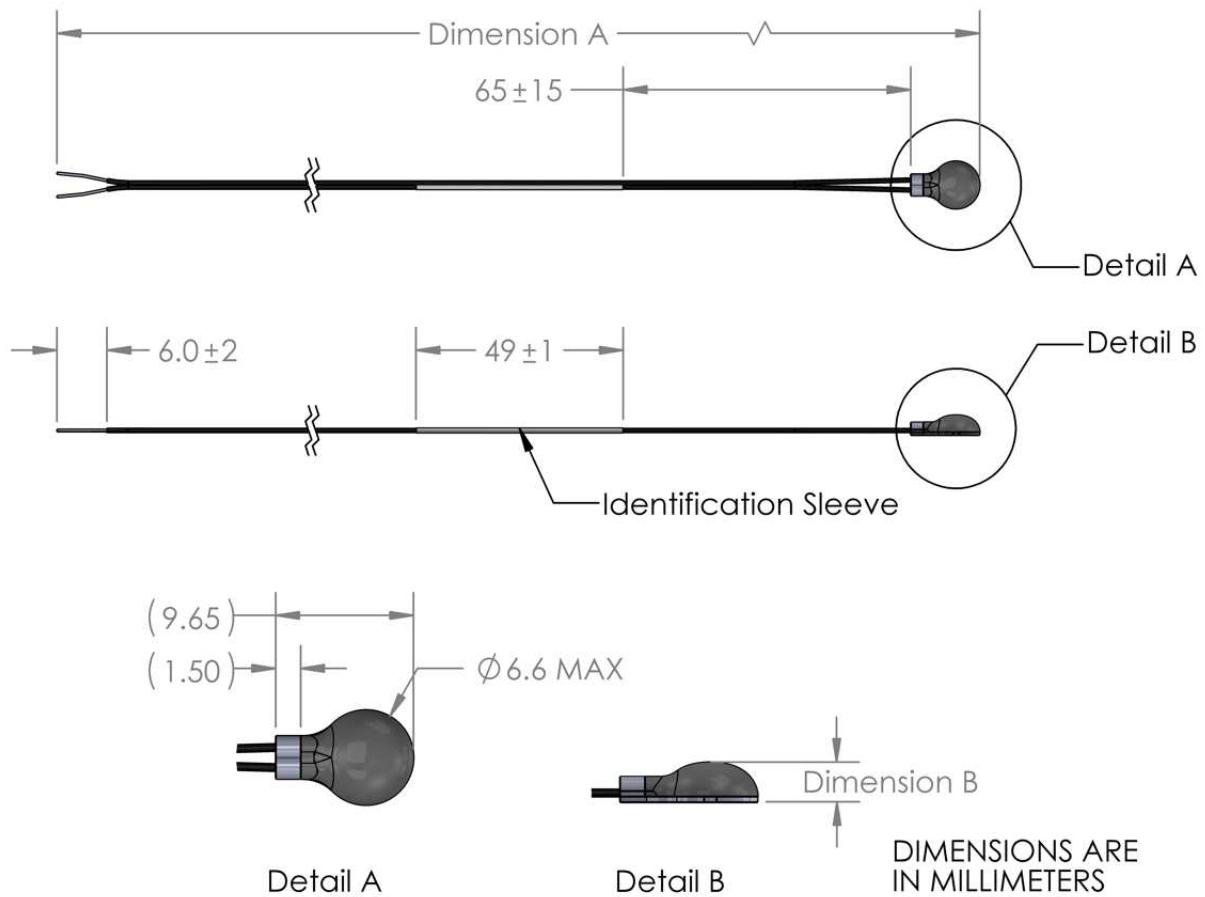
RESISTANCE V TEMPERATURE TABLE

TE Connectivity Part No.	GAG15K4D489 GAG15K4D589LEVB		GAG10K4D453		GAG10K4D451	
	400601408 400601413		400601409		400601414	
Temperature (°C)	Resistance (Ω)	Tolerance (± %)	Resistance (Ω)	Tolerance (± %)	Resistance (Ω)	Tolerance (± %)
-60	1,342,000	10.00	847,284	7.00	847,284	6.00
-40	371,300	6.30	239,768	3.00	239,768	3.00
-20	120,100	3.35	78,930	2.60	78,930	1.30
0	44,420	1.00	29,490	2.00	29,490	0.93
25	15,000	1.01	10,000	2.00	10,000	0.80
50	5,855	1.03	3,893	1.70	3,893	0.80
70	3,009	1.05	1,990	1.60	1,990	0.79
100	1,250	1.01	817.2	3.00	817.2	1.50
125	659.8	2.00	426.0	3.50	426.0	2.50
140	465.50	3.00	298.12	4.00	298.12	3.00
160	302.40	4.00	191.77	4.00	191.77	3.00

TE Connectivity Part No.	GAG2K7D411LEVB		GAG4K7D421LEVB		GAG100K6D487LEVB	
	400601410		400601411		400601412	
Temperature (°C)	Resistance (Ω)	Tolerance (± %)	Resistance (Ω)	Tolerance (± %)	Resistance (Ω)	Tolerance (± %)
-60	n/a	n/a	n/a	n/a	n/a	n/a
-40	43,362	2.90	86,724	2.90	n/a	n/a
-20	14,658	2.54	29,316	2.54	n/a	n/a
0	5,650	1.57	11,300	1.57	n/a	n/a
25	2,000	1.34	4,000	1.34	100,000	1.75
50	815.0	1.17	1,630.0	1.17	n/a	n/a
70	432.0	1.05	864.0	1.05	n/a	n/a
100	187.40	1.50	374.80	1.50	5,574	1.11
125	102.00	2.50	204.00	2.50	2,642.4	1.41
140	n/a	n/a	n/a	n/a	1,756.3	1.32
160	n/a	n/a	n/a	n/a	1,059.0	1.21

## NTC TEMPERATURE SENSORS FOR SPACE APPLICATIONS

### ASSEMBLY DRAWING



TE Connectivity Part No.	ESCC Component No.	Dimension A (mm)	Dimension B (mm)
GAG15K4D489	400601408	$381 \pm 25$	2.4 Max.
GAG10K4D453	400601409	$525 \pm 25$	2.8 Max.
GAG2K7D411LEVB	400601410	$305 \pm 25$	2.8 Max.
GAG4K7D421LEVB	400601411	$305 \pm 25$	2.8 Max.
GAG100K6D487LEVB	400601412	$305 \pm 25$	2.8 Max.
GAG15K4D589LEVB	400601413	$381 \pm 25$	2.4 Max.
GAG10K4D451	400601414	$525 \pm 25$	2.8 Max.

- Identification sleeve on one wire containing TE Connectivity part number, serial number, ESCC Component No. and ESA logo where applicable.

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