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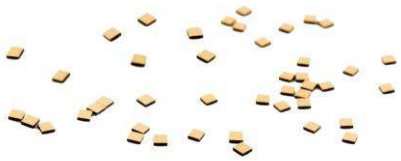

GOLD CHIP THERMISTOR GA100K6CG3

Description

TE Connectivity offers a comprehensive range of Gold terminated leadless NTC chip thermistors for today's hybrid microelectronics needs. With metallization on top and bottom surfaces, attachment to hybrid, IC or PC circuits is accomplished using industry standard die attach and wire bonding techniques. Chips may be soldered or bonded with conductive epoxy to board termination points where space is at a premium. Typical square-chip sizes range from 0.35 mm to 1.2 mm depending on the preferred ceramic system and nominal ohmic resistance. MTTF reliability information is provided for the complete range of gold chip products for customer selection and design-in. Gold terminated NTC thermistors are supplied in "waffle" packs for protection and ease of customer handling.

Features

- Gold electrodes suitable for wire bonding
- Mount directly to substrate for fast time-response
- Temperature range -40°C to +125°C
- High stability performance with additional aging steps
- Delivers advanced electro-ceramic materials with fine grained microstructure
- Packed in waffle trays

Applications

- WDM (Wavelength Division Multiplexing) for advanced frequency control in communications systems and wireless applications
- Thermopile sensors for thermal radiation recognition and infrared sensing
- Thermal protection of sensitive circuits
- Hybrid circuit temperature compensation
- Localized temperature sensing
- Laser diode modules

Specifications

- 100K Ohms Resistance @ +25ºC
- ±5% Resistance Tolerance @ +25ºC
- Rapid Time Response
- Beta $_{25/85}$ = 4261 ± 1.0 %

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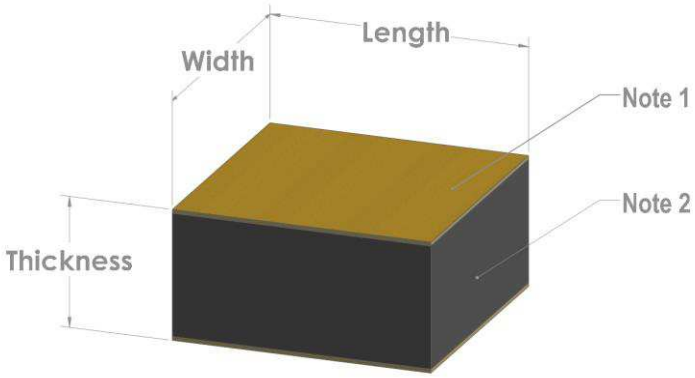
Performance specifications

Parameters	Units	Value
Resistance @ +25°C	Ohms	100,000
Resistance Tolerance @ +25°C	%	±5
Beta Value 25/85	K	4261
Tolerance on Beta Value 25/85	%	±1
Operating Temperature	°C	-40 to +125°C
Thermal Time Constant in Air *	Seconds	< 2
Dissipation Constant *	mW/°C	≥ 0.50
Maximum Power Dissipation *	mW	50

Note: Time Response and DC measurements performed with Alloy 180 Lead wires Ø 0.2mm (0.008”) soldered to chip

Mechanical details



Dimensions

Thickness	Width	Length
0.40mm Min - 0.50mm Max	0.61mm Min - 0.91mm Max	0.61mm Min - 0.91mm Max

Notes

1	Gold Metallization - Top and Bottom electrodes
2	TE Electro Ceramic Material: BT6-D

Reliability performance

Environmental Testing Data, TE Material BT6-D Gold Chip NTC

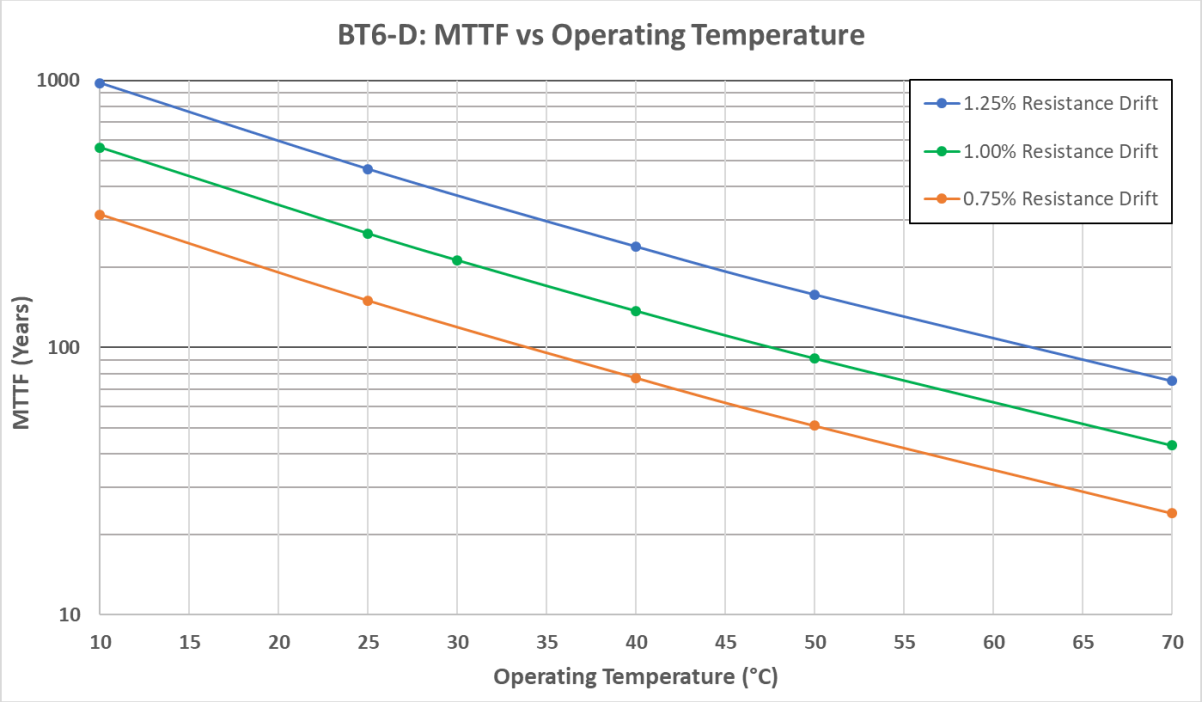
Test	Test Conditions and Duration	Performance
High Temperature Exposure (T1)	**Exposure Temperature = +50°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T1. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
High Temperature Exposure (T2)	**Exposure Temperature = +75°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T2. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
High Temperature Exposure (T3)	**Exposure Temperature = +100°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T3. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
High Temperature Exposure (T4)	**Exposure Temperature = +125°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T4. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
Low Temperature Exposure	**Exposure Temperature = -40°C** Duration = 1,000 Hours Test specimens mounted on CerDIP package and placed in a low temperature chamber. Test specimens allowed to stand under ambient conditions for 2 hours +/- 1 hour prior to zero-power resistance check.	Delta Resistance (%ΔR) @ +25°C after 1,000 hours exposure to test condition. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass

Environmental Testing Data, TE Material BT6-D Gold Chip NTC

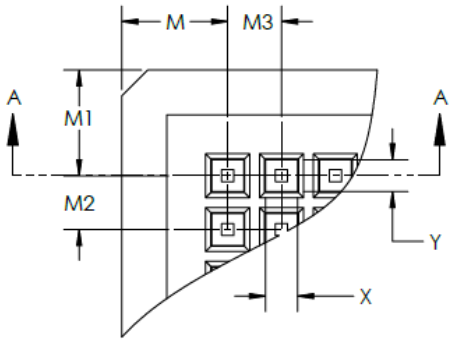
Test	Test Conditions and Duration	Performance
Humidity Storage Test	**Exposure Condition = +85°C at 85% Relative Humidity** Duration = 1,000 Hours Test specimens mounted on CerDIP package and placed in a humidity chamber. Test specimens allowed to stand under ambient conditions for 2 hours +/- 1 hour prior to zero-power resistance check.	Delta Resistance (%ΔR) @ +25°C after 1,000 hours exposure to test condition. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
Thermal Shock Test	**Thermal Shock = -40°C to +85°C** **30 mins @ -40°C ---> 5 sec transfer ---> +85°C** **Total Cycle Time = 1 hour** Number of Thermal Shock Cycles = 1,000 Test specimens mounted on CerDIP package and placed in a Thermal Shock Chamber.	Delta Resistance (%ΔR) @ +25°C after 1,000 Thermal Shock Cycles. Delta Resistance (%ΔR) calculated against 0-Cycle Thermal Shock readings. Max allowable Delta = +/- 1% Result = Pass
High Temperature Power Loading	**Exposure Condition = +100°C** **Supply Voltage +0.11VDC** Duration = 1,000 Hours Test specimens mounted on CerDIP package and placed in a high temperature chamber with DC voltage applied.	Delta Resistance (%ΔR) @ +25°C after 1,000 hours exposure to test condition. Delta Resistance (%ΔR) calculated against 0-hour readings. Max allowable Delta = +/- 1% Result = Pass
Wire Bond Strength	Wire Bond Strength testing conducted as per **MIL-STD-883, Test Method 2011, Section 3.1.3, Test Condition D - Wire pull (double bond).** 25µm Au wire bonded to top electrode of NTC Gold Chip using ball bonding process. Wire Bond Strength testing performed using a Dage Series 4000 Bond tester.	Test specimens exceeded the MIL-STD-883, Method 2011, minimum strength of **3.00g.** Result = Pass
Die Shear Strength	Die Shear Strength testing conducted to assess the integrity of the die-to-bonding pad interface as per **MIL-STD-883, Test Method 2019, Section 3.2.1 Epoxy Attach & Figure 2019-4 (Die Shear Strength Criteria).** Die attach material is silver loaded epoxy (Epo-Tek H35-175MPLV). Die Shear testing performed using a Dage Series 4000 Bond tester.	Test specimens exceeded the MIL-STD-883, Method 2019, minimum strength of **800.00g.** Result = Pass

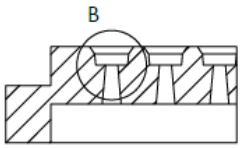
Reliability and Lifetime:

The Gold Chip Thermistor operating lifetime has been calculated using accelerated life test principles. For the tests, the specimens were mounted in CerDIP packages using a silver filled epoxy to form the mechanical, thermal and electrical bond to the substrate. A gold wire bond was used to connect to the top electrode. The thermistors were subjected to unpowered storage at select temperatures between +50°C and +125°C. Periodic calibrations were taken to understand drift in resistance over time. Based on this data, a lifetime prediction model was applied to estimate Mean Time To Failure (MTTF) for operation at typical application temperatures. The criteria for failure was drift in resistance values at a reference temperature of +25°C with the model being applied for different allowable percentage drift values, as indicated below:

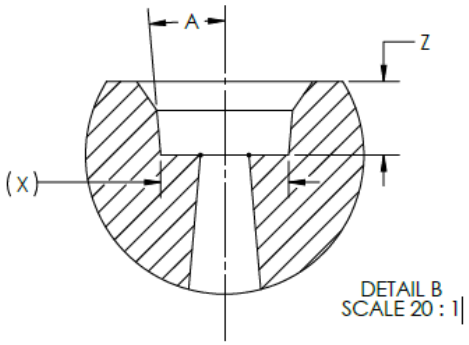


Product packaging – waffle tray H20-040055-62C02





SECTION A-A



Pocket Locations

M = **4.86 ± 0.13mm**

M1 = **4.66 ± 0.13mm**

M2 = **2.43 ± 0.13mm**

M3 = **2.15 ± 0.13mm**

Array = **20x18 (360)**

Pocket Details

X = **1.01mm** pocket size

Y = **1.39mm** pocket size

Z = **0.61mm** pocket depth

A = **5º ±1/2º** pocket draft angle

No cross slots

Overall Tray Size

Size = **50.67 ± 0.25mm**

Height = **3.94 + 0.08mm - 0.13mm**

Flatness = **0.30mm**

Resistance v temperature table

Temp °C	Ohms
-40	4071185.7
-39	3798837.4
-38	3546330.0
-37	3312107.1
-36	3094742.7
-35	2892929.6
-34	2705468.6
-33	2531259.5
-32	2369292.4
-31	2218639.3
-30	2078447.8
-29	1947933.8
-28	1826376.2
-27	1713111.6
-26	1607528.9
-25	1509065.2
-24	1417202.0
-23	1331460.9
-22	1251401.0
-21	1176615.1
-20	1106727.4
-19	1041390.8
-18	980284.6
-17	923112.3
-16	869599.5
-15	819492.7
-14	772556.8
-13	728574.6
-12	687344.4
-11	648679.6
-10	612407.0
-9	578366.1
-8	546407.9
-7	516394.0
-6	488196.1
-5	461694.8
-4	436779.2
-3	413346.2
-2	391300.0
-1	370551.3
0	351017.0
1	332619.9
2	315287.9
3	298953.9
4	283555.3
5	269033.9
6	255335.1
7	242408.3
8	230205.9
9	218683.8
10	207800.6
11	197517.7
12	187798.9
13	178610.5
14	169920.8
15	161700.4
16	153921.5
17	146558.2
18	139586.4
19	132983.1
20	126727.2
21	120798.6
22	115178.6
23	109849.7
24	104795.3
25	**100000.0**
26	95449.2
27	91129.2
28	87027.3
29	83131.4
30	79430.1
31	75912.7
32	72569.3
33	69390.4
34	66367.2
35	63491.2
36	60754.6
37	58149.9
38	55670.3
39	53309.0
40	51059.9
41	48917.1
42	46875.2
43	44928.8
44	43073.0
45	41303.3
46	39615.2
47	38004.5
48	36467.5
49	35000.3
50	33599.4
51	32261.6
52	30983.7
53	29762.8
54	28596.1
55	27480.8
56	26414.6
57	25395.0
58	24419.8
59	23486.8
60	22594.0
61	21739.5
62	20921.6
63	20138.3
64	19388.3
65	18669.8
66	17981.4
67	17321.7
68	16689.4
69	16083.2
70	15502.0
71	14944.6
72	14409.8
73	13896.8
74	13404.5
75	12932.0
76	12478.4
77	12042.8
78	11624.5
79	11222.7
80	10836.7
81	10465.8
82	10109.4
83	9766.7
84	9437.3
85	9120.5
86	8815.9
87	8522.8
88	8240.9
89	7969.5
90	7708.4
91	7457.1
92	7215.1
93	6982.0
94	6757.6
95	6541.4
96	6333.1
97	6132.4
98	5939.0
99	5752.5
100	5572.8
101	5399.5
102	5232.4
103	5071.2
104	4915.7
105	4765.6
106	4620.9
107	4481.1
108	4346.3
109	4216.0
110	4090.3
111	3968.9
112	3851.6
113	3738.3
114	3628.9
115	3523.1
116	3420.9
117	3322.1
118	3226.6
119	3134.3
120	3045.0
121	2958.6
122	2875.1
123	2794.3
124	2716.1
125	2640.4

Mounting recommendations using Au Sn eutectic solders

Recommended eutectic gold-tin alloy is 80%Au/20%Sn with a melt point of +280°C (556°F). High thermal conductivity of 80%Au/20%Sn solders increases the responsiveness of the NTC gold thermistor.

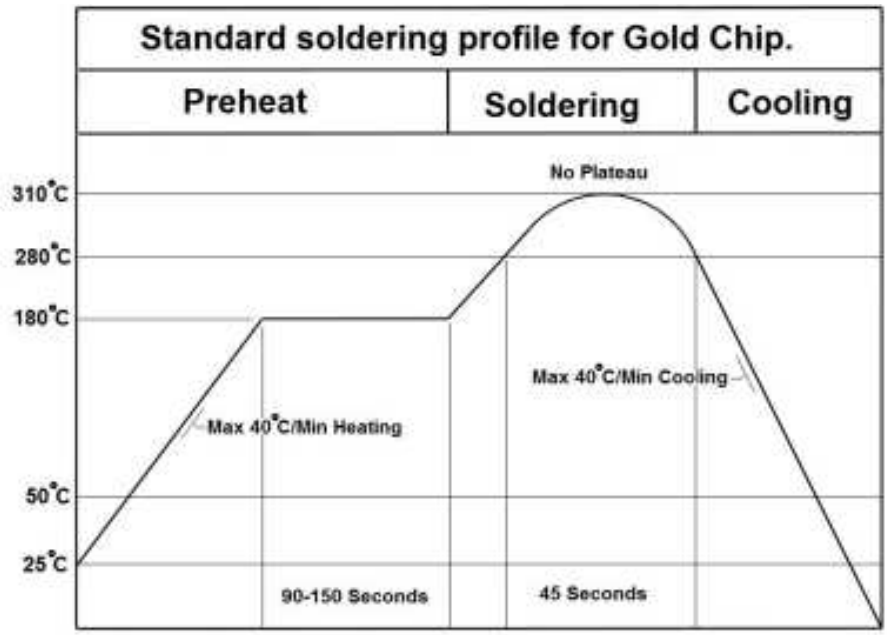
• Max ramp rate of 40°C per minute to a preheat temperature of +180°C to +200°C

• Preheat dwell period of 90 – 150 seconds @ +180°C to +200°C

• Maximum time above the eutectic temperature of +280°C for 45 seconds with a bell-shaped profile — no plateau at peak temperature of +300°C to +305°C

• Maximum time above peak temperature of +300°C for 8 seconds. • Max cooling rate of 40°C per minute or less to prevent thermal stress on the component. • Times indicated are based on the NTC surface temperature.

Excessive soldering temperatures and durations can cause leaching of the termination resulting in changes to the electrical characteristics of the NTC caused by reduction in adherence strength. The recommended profile is provided as a guideline only and it is recommended the customer validates the suitability for the intended purpose.



Ordering information

Part Number	Description	Resistance @ +25ºC	MOQ
GA100K6CG3	Gold Chip Thermistor	100,000	360*

*For orders less than MOQ, contact Sales

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