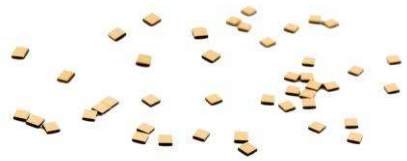
te.com



GOLD CHIP THERMISTOR 10220685-00

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

Specifications

- 100K Ohms Resistance @ +25ºC
- ±2% Resistance Tolerance @ +25ºC
- Rapid Time Response
- Beta $_{25/85}$ = 4075 ± 1.0 %

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

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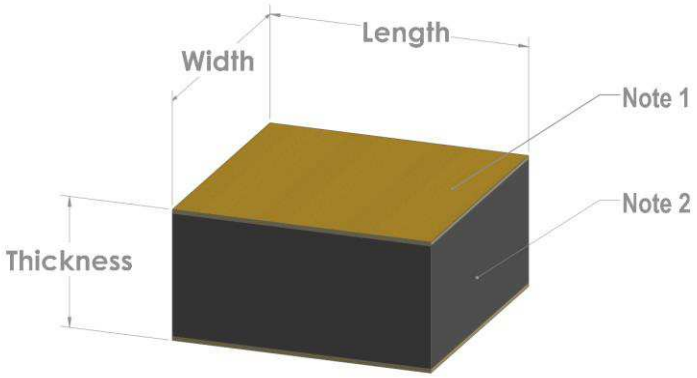
Performance specifications

Parameters	Units	Value
Resistance @ +25°C	Ohms	100,000
Resistance Tolerance @ +25°C	%	±2
Beta Value 25/85	K	4075
Tolerance on Beta Value 25/85	%	±1
Operating Temperature	°C	-40 to +125°C
Thermal Time Constant in Air *	Seconds	< 1.5
Dissipation Constant *	mW/°C	≥ 0.25
Maximum Power Dissipation *	mW	25

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
0.22mm Min - 0.27mm Max	0.27mm Min - 0.30mm Max	0.36mm Min – 0.54mm Max

Notes

1	Gold Metallization - Top and Bottom electrodes, 9.5 +/-2.5µm
2	TE Electro Ceramic Material: BT63-H

Reliability performance

Environmental Testing Data, TE Material BT63-H Gold Chip NTC

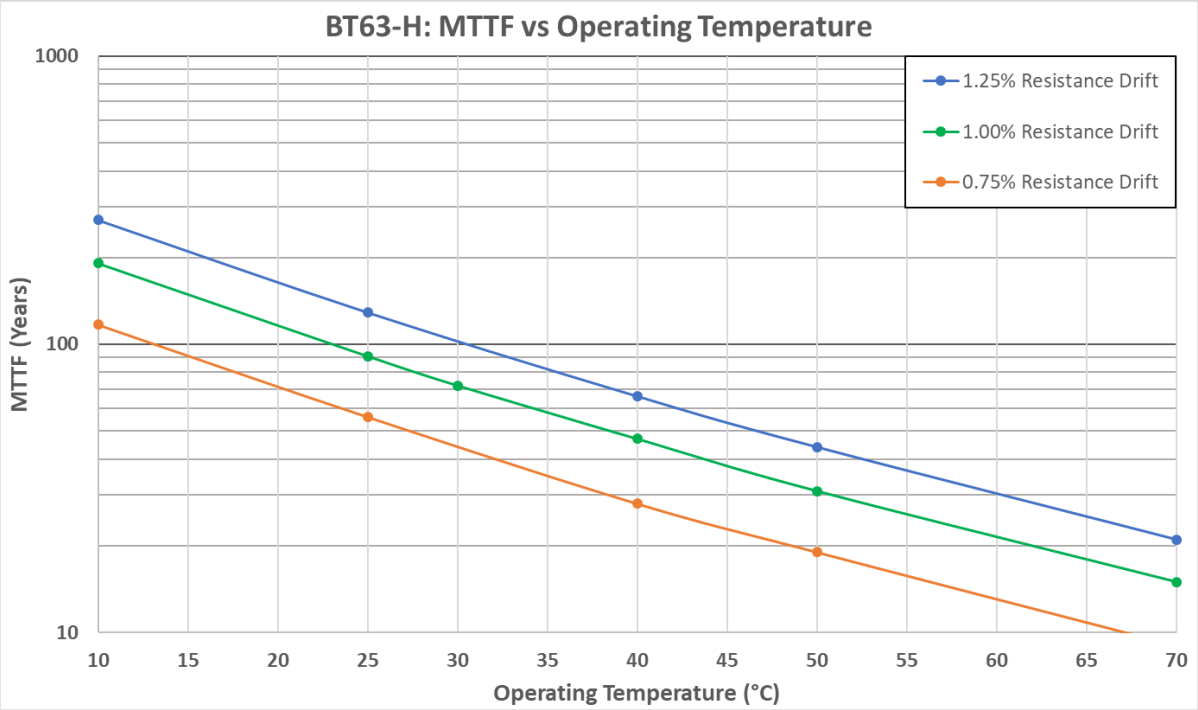
Test	Test Conditions and Duration	Performance
High Temperature Exposure (T1)	**Exposure Temperature = +50°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T1. Delta Resistance (%ΔR) 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 BT63-H Gold Chip NTC

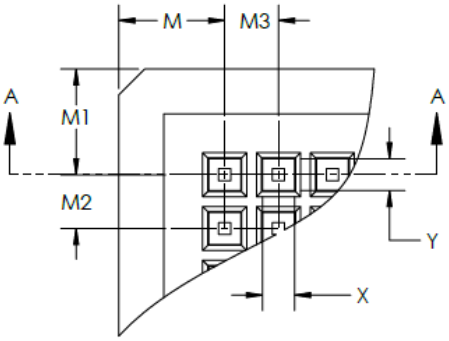
Test	Test Conditions and Duration	Performance
Humidity Storage Test	**Exposure Condition = +85°C at 85% Relative Humidity** Duration = 1,000 Hours Test specimens mounted on CerDIP package and placed in a humidity chamber. Test specimens allowed to stand under ambient conditions for 2 hours +/- 1 hour 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 **167.40g.** Result = Pass

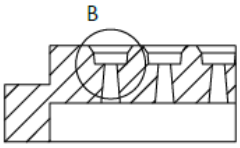
Reliability and Lifetime:

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:

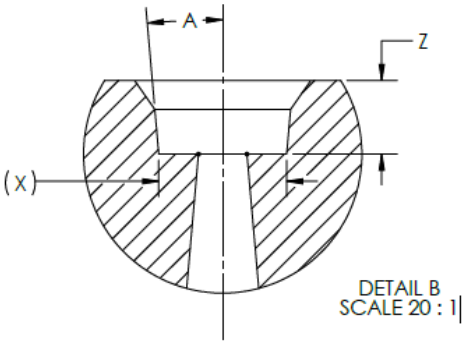


Product packaging – waffle tray H20-021-12-66C02





SECTION A-A



Pocket Locations

M = **8 ± 0.13mm**

M1 = **8 ± 0.13mm**

M2 = **1.83 ± 0.13mm**

M3 = **1.83 ± 0.13mm**

Array = **20x20 (400)**

Pocket Details

X = **0.56mm** pocket size

Y = **0.56mm** pocket size

Z = **0.30mm** pocket depth

A = **14º ±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	3687470
-39	3444584
-38	3219237
-37	3010059
-36	2815793
-35	2635289
-34	2467491
-33	2311429
-32	2166214
-31	2031029
-30	1905122
-29	1787803
-28	1678435
-27	1576435
-26	1481262
-25	1392422
-24	1309455
-23	1231940
-22	1159488
-21	1091740
-20	1028362
-19	969048
-18	913515
-17	861499
-16	812760
-15	767071
-14	724225
-13	684029
-12	646304
-11	610885
-10	577618
-9	546360
-8	516978
-7	489350
-6	463362
-5	438907
-4	415886
-3	394207
-2	373786
-1	354541
0	336399
1	319291
2	303152
3	287922
4	273545
5	259968
6	247144
7	235025
8	223570
9	212739
10	202494
11	192801
12	183626
13	174940
14	166714
15	158921
16	151536
17	144536
18	137898
19	131602
20	125629
21	119959
22	114578
23	109467
24	104612
25	**100000**
26	95616
27	91449
28	87486
29	83716
30	80129
31	76716
32	73466
33	70372
34	67424
35	64616
36	61940
37	59390
38	56958
39	54638
40	52425
41	50314
42	48299
43	46376
44	44539
45	42784
46	41108
47	39507
48	37976
49	36512
50	35113
51	33774
52	32494
53	31268
54	30096
55	28973
56	27898
57	26868
58	25882
59	24937
60	24031
61	23163
62	22330
63	21532
64	20766
65	20031
66	19327
67	18650
68	18000
69	17377
70	16778
71	16203
72	15650
73	15119
74	14609
75	14118
76	13646
77	13193
78	12756
79	12337
80	11933
81	11544
82	11170
83	10810
84	10463
85	10129
86	9807
87	9497
88	9199
89	8911
90	8633
91	8366
92	8108
93	7859
94	7619
95	7388
96	7165
97	6949
98	6741
99	6540
100	6346
101	6159
102	5978
103	5804
104	5635
105	5472
106	5314
107	5162
108	5015
109	4872
110	4735
111	4602
112	4473
113	4348
114	4228
115	4111
116	3998
117	3889
118	3783
119	3681
120	3582
121	3485
122	3392
123	3302
124	3215
125	3130

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.

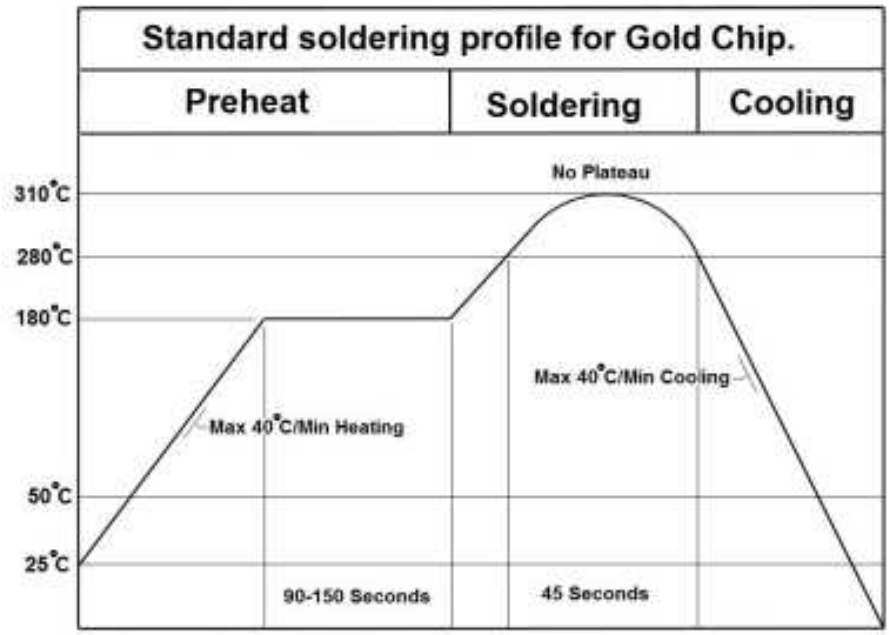
• Max ramp rate of 40°C per minute to a preheat temperature of +180°C to +200°C

• 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
10220685-00	Gold Chip Thermistor	100,000	400*

*For orders less than MOQ, contact Sales

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