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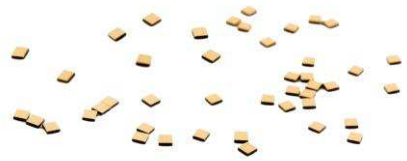

GOLD CHIP THERMISTOR 11016585-00

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

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

- 17.87K Ohms Resistance @ +25ºC
- ± 2% Resistance Tolerance @ +25ºC
- 10K Ohms Resistance @ +40ºC
- ± 2% Resistance Tolerance @ +40ºC
- Rapid Time Response
- Beta $_{25/85}$ = 3694 ± 1.0 %

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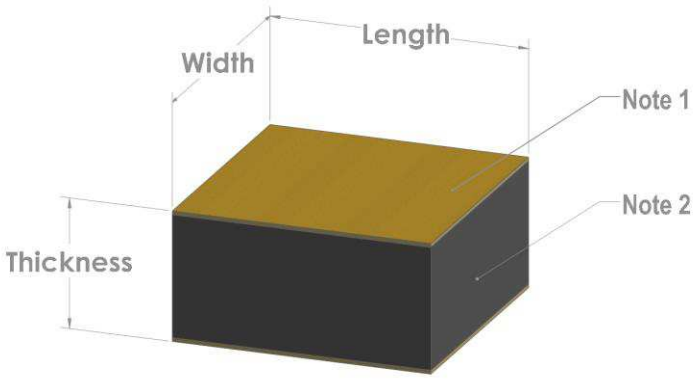
Performance specifications

Parameters	Units	Value
Resistance @ +25°C	Ohms	17,870
Resistance Tolerance @ +25°C	%	±2
Resistance @ +40°C	Ohms	10,000
Resistance Tolerance @ +40°C	%	±2
Beta Value 25/85	K	3694
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
0.30mm Min - 0.46mm Max	0.76mm Min - 1.02mm Max	0.76mm Min – 1.02mm Max

Notes

1	Gold Metallization - Top and Bottom electrodes
2	TE Electro Ceramic Material: BT4-D

Reliability performance

Environmental Testing Data, TE Material BT4-D Gold Chip NTC

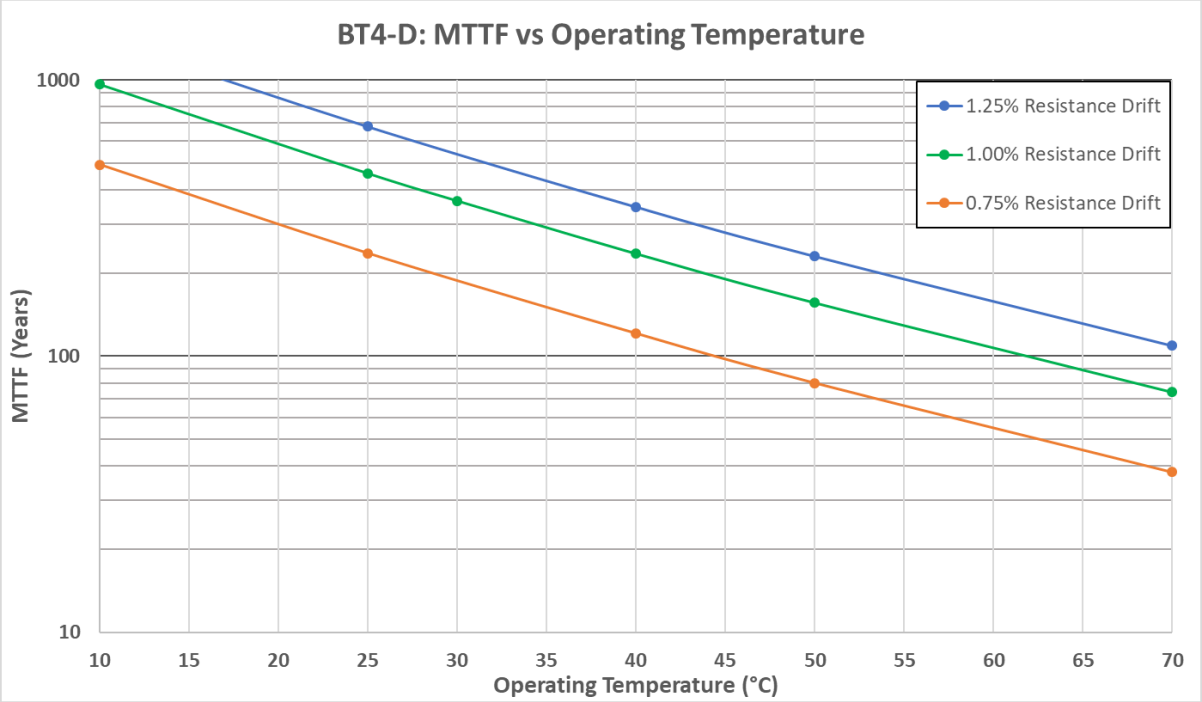
Test	Test Conditions and Duration	Performance
High Temperature Exposure (T1)	**Exposure Temperature = +50°C** Duration = 2,000 Hours Test specimens mounted on CerDIP package and placed in a hotbox oven.	Delta Resistance (%ΔR) @ +25°C after 2,000 hours exposure to Test Condition T1. Delta Resistance (%ΔR) 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 BT4-D Gold Chip NTC

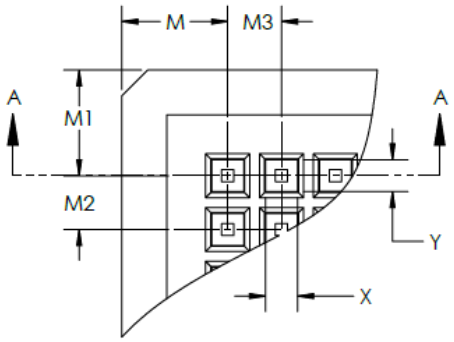
Test	Test Conditions and Duration	Performance
Humidity Storage Test	**Exposure Condition = +85°C at 85% Relative Humidity** Duration = 1,000 Hours Test specimens mounted on CerDIP package and placed in a humidity chamber. Test specimens allowed to stand under ambient conditions for 2 hours +/- 1 hour 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 **1050.00g.** Result = Pass

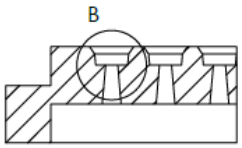
Reliability and Lifetime:

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:

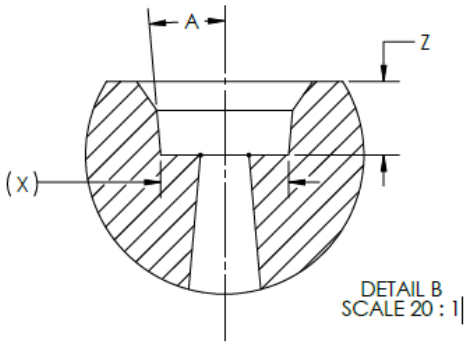


Product packaging – waffle tray H20-052-30 -62C02





SECTION A-A



Pocket Locations

M = **4.36 ± 0.08mm**

M1 = **4.36 ± 0.08mm**

M2 = **2.22 ± 0.05mm**

M3 = **2.22 ± 0.05mm**

Array = **20x20 (400)**

Pocket Details

X = **1.32mm** pocket size

Y = **1.32mm** pocket size

Z = **0.76mm** pocket depth

A = **5º ±1/2º** pocket draft angle

No cross slots

Overall Tray Size

Size = **50.80 ± 0.10mm**

Height = **3.96 + 0.05mm - 0.08mm**

Flatness = **0.10mm**

Resistance v temperature table

Temp °C	Ohms
-40	429168
-39	404584
-38	381552
-37	359965
-36	339725
-35	320739
-34	302925
-33	286203
-32	270500
-31	255748
-30	241886
-29	228854
-28	216599
-27	205070
-26	194220
-25	184005
-24	174386
-23	165323
-22	156783
-21	148732
-20	141139
-19	133977
-18	127218
-17	120838
-16	114813
-15	109122
-14	103744
-13	98662
-12	93856
-11	89311
-10	85011
-9	80942
-8	77090
-7	73442
-6	69987
-5	66713
-4	63610
-3	60668
-2	57878
-1	55231
0	52720
1	50336
2	48073
3	45924
4	43883
5	41943
6	40099
7	38346
8	36679
9	35093
10	33584
11	32148
12	30781
13	29480
14	28240
15	27059
16	25933
17	24860
18	23837
19	22862
20	21931
21	21043
22	20196
23	19387
24	18615
25	**17870**
26	17173
27	16500
28	15856
29	15241
30	14653
31	14091
32	13553
33	13038
34	12546
35	12074
36	11623
37	11191
38	10777
39	10380
40	10000
41	9636
42	9287
43	8952
44	8631
45	8323
46	8028
47	7744
48	7472
49	7211
50	6961
51	6720
52	6488
53	6266
54	6053
55	5847
56	5650
57	5461
58	5278
59	5103
60	4934
61	4772
62	4616
63	4465
64	4320
65	4181
66	4047
67	3918
68	3793
69	3673
70	3558
71	3446
72	3339
73	3235
74	3135
75	3039
76	2946
77	2857
78	2770
79	2687
80	2606
81	2528
82	2453
83	2381
84	2311
85	2243
86	2178
87	2115
88	2054
89	1995
90	1938
91	1882
92	1829
93	1778
94	1728
95	1679
96	1633
97	1588
98	1544
99	1501
100	1460
101	1421
102	1382
103	1345
104	1309
105	1274
106	1240
107	1208
108	1176
109	1145
110	1115
111	1086
112	1058
113	1031
114	1005
115	979
116	954
117	930
118	907
119	884
120	862
121	841
122	820
123	800
124	780
125	761

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.

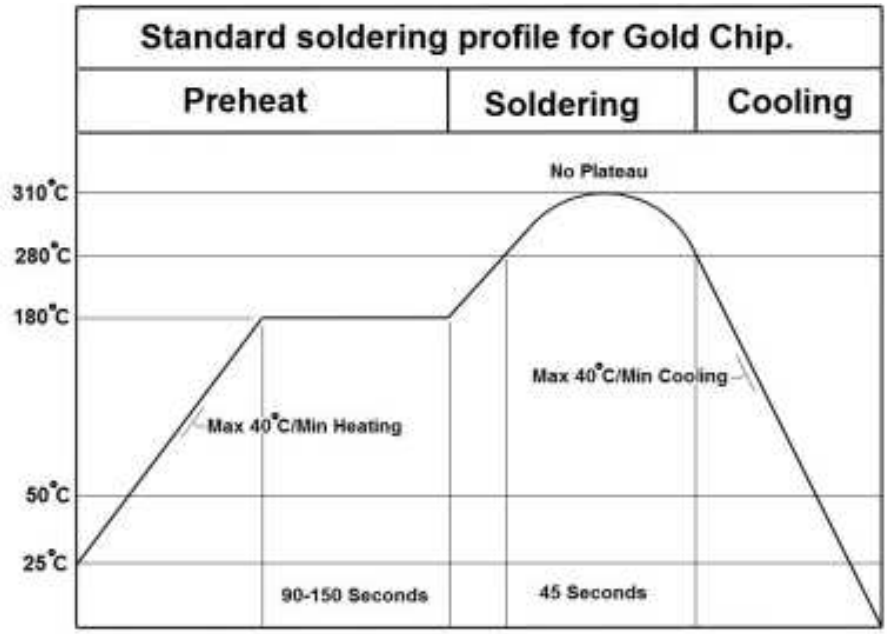
• Max ramp rate of 40°C per minute to a preheat temperature of +180°C to +200°C

• 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
11016585-00	Gold Chip Thermistor	17.87K	400*

*For orders less than MOQ, contact Sales

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