

ISO/TS16949  
ISO 9001  
ISO14001



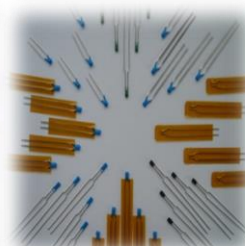
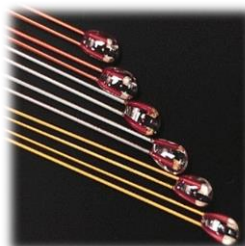
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# 2015

## Electronic Materials Components

### Thermistor (NTC /PTC)

- **GNTC**  
(Chip in Glass Thermistor)
- **SMD NTC Thermistor**
- **SMD PTC Thermistor**
- **Radial type Thermistor**
- **Bare Chip Thermistor**  
(Gold & silver Electrode)



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### SMD NTC Thermistor

( ECTH Series )

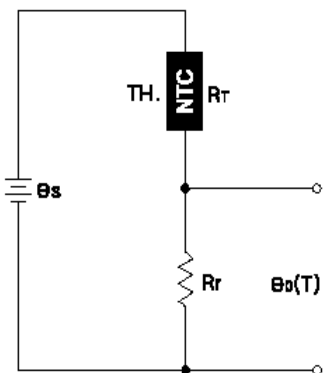


#### 1 What is NTC Thermistor ?

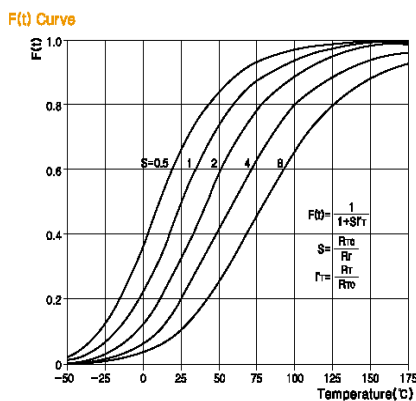
- Initial of Negative Temperature Coefficient of Thermal Resistor.
- Have an electrical characteristic of decreasing resistance with increasing of an ambient temperature, so called Semi-conductive Device of Metal Oxide.
- Protect the electronic equipment from increasing of temperature in an electronic circuit

#### 2 Application of NTC Thermistor

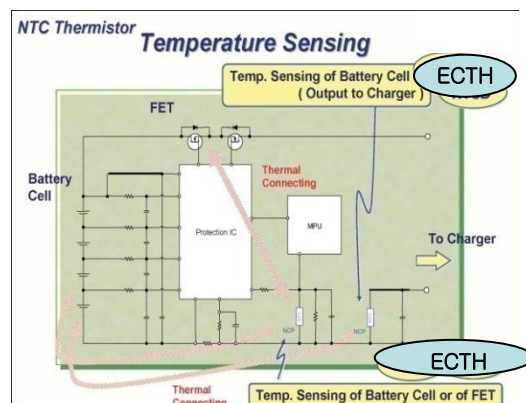
- Temperature Compensated Transistor , IC, TCXO, etc.
- Temperature Compensation of Battery Charger
- Temperature Compensation of LCD
- Car navigation system
- Medical Thermometer
- Computer Peripherals [CPU Battery, Hard/Floppy Disk] etc



Linear TH. Circuit



Linear TH. Output Characteristics.



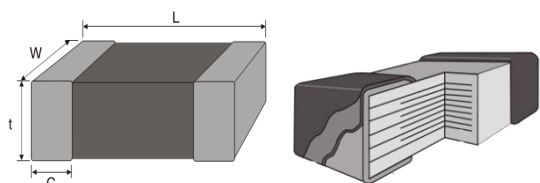
Application example

**3 Order method :** ECTH 1608 08 103 F 3435 F S T  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series	SMD NTC Thermistor ECTH Series
② Size(L×W) (EIA)	0.6×0.3mm(0201), 1.0×0.5mm(0402), 1.6×0.8mm(0603), 2.0×1.1mm(0805)
③ Thickness(T)	0.5, 0.8, 1.2
④ Resistance @25°C	103 = 10,000 Ω [ = 10×10 <sup>3</sup> Ω ]
⑤ R Tolerance	F: ±1% , G: ±2% , H: ±3% , J: ±5% , S: Special code
⑥ B(25/85) constant	3435K, 3970K, 4050K, 4200K, 4400K, 4500K, 4750K
⑦ B Tolerance	F: ±1% , G: ±2% , H: ±3%
⑧ Type	S: Pb free product
⑨ Packing	T : Paper carrier Tape & Plastic Reel , B : Bulk

#### 4 Size & Dimensions

(Unit : mm)



Size type	L	W	t	C
0603	0.60 ± 0.03	0.30 ± 0.03	0.30 ± 0.03	0.15 ± 0.05
1005	1.00 ± 0.10	0.50 ± 0.10	0.50 ± 0.05	0.25 ± 0.10
1608	1.60 ± 0.15	0.80 ± 0.15	0.80 ± 0.10	0.40 ± 0.20
2012	2.00 ± 0.20	1.25 ± 0.20	0.80 ± 0.10	0.40 ± 0.20

## 5 Electrical Data and Ordering Information

### ► SMD NTC Thermistor ECTH Series

NO	Size [mm]	Electrical specifications						Part No.
		R <sub>25C</sub> [Ω]	△R[%]	B <sub>25/85</sub> (K)	△B[%]	δ(mW/°C)	τ(sec)	
1	0603	10,000	3	3435	3	1	3	ECTH060303 103H3435HST
2	0603	10,000	3	4100	3	1	3	ECTH060303 103H4100HST
3	0603	22,000	3	3435	3	1	3	ECTH060303 223H3435HST
4	0603	47,000	3	4050	3	1	3	ECTH060303 473H4050HST
5	0603	100,000	3	4250	3	1	3	ECTH060303 104H4250HST
6	0603	100,000	3	4485	3	1	3	ECTH060303 104H4485HST
7	1005	33	3	3250	3	1	3	ECTH100505 330H3250HST
8	1005	47	3	3250	3	1	3	ECTH100505 470H3250HST
9	1005	68	3	3250	3	1	3	ECTH100505 680H3250HST
10	1005	100	3	3250	3	1	3	ECTH100505 101H3250HST
11	1005	1,000	3	4100	3	1	3	ECTH100505 102H4100HST
12	1005	2,000	3	4100	3	1	3	ECTH100505 202H4100HST
13	1005	2,000	3	4520	3	1	3	ECTH100505 202H4520HST
14	1005	2,200	3	4100	3	1	3	ECTH100505 222H4100HST
15	1005	4,700	3	4100	3	1	3	ECTH100505 472H4100HST
16	1005	10,000	3	3435	3	1	3	ECTH100505 103H3435HST
17	1005	10,000	3	3830	3	1	3	ECTH100505 103H3830HST
18	1005	10,000	3	3950	3	1	3	ECTH100505 103H3950HST
19	1005	10,000	3	4100	3	1	3	ECTH100505 103H4100HST
20	1005	10,000	3	4550	3	1	3	ECTH100505 103H4550HST
21	1005	15,000	3	3920	3	1	3	ECTH100505 153H3920HST
22	1005	22,000	3	3800	3	1	3	ECTH100505 223H3800HST
23	1005	22,000	3	4550	3	1	3	ECTH100505 223H4550HST
24	1005	33,000	3	4050	3	1	3	ECTH100505 333H4050HST
25	1005	47,000	3	3920	3	1	3	ECTH100505 473H3920HST
26	1005	47,000	3	4050	3	1	3	ECTH100505 473H4050HST
27	1005	47,000	3	4550	3	1	3	ECTH100505 473H4550HST
28	1005	68,000	3	4150	3	1	3	ECTH100505 683H4150HST
29	1005	100,000	3	4050	3	1	3	ECTH100505 104H4050HST
30	1005	100,000	3	4600	3	1	3	ECTH100505 104H4600HST
31	1005	150,000	3	4050	3	1	3	ECTH100505 154H4050HST
32	1005	220,000	3	4600	3	1	3	ECTH100505 224H4600HST
33	1005	470,000	3	4050	3	1	3	ECTH100505 474H4050HST
34	1005	470,000	3	4650	3	1	3	ECTH100505 474H4650HST
35	1608	33	3	3200	3	2	5	ECTH160808 330H3200HST
36	1608	47	3	3200	3	2	5	ECTH160808 470H3200HST
37	1608	68	3	3200	3	2	5	ECTH160808 680H3200HST
38	1608	100	3	3250	3	2	5	ECTH160808 101H3250HST
39	1608	220	3	3250	3	2	5	ECTH160808 221H3250HST
40	1608	570	3	3250	3	2	5	ECTH160808 571H3250HST
41	1608	1,000	3	4150	3	2	5	ECTH160808 102H4150HST
42	1608	2,000	3	4150	3	2	5	ECTH160808 202H4150HST
43	1608	3,000	3	4150	3	2	5	ECTH160808 302H4150HST
44	1608	4,700	3	4150	3	2	5	ECTH160808 472H4150HST
45	1608	4,700	3	4500	3	2	5	ECTH160808 472H4500HST
46	1608	5,000	3	3520	3	2	5	ECTH160808 502H3520HST
47	1608	5,000	3	3970	3	2	5	ECTH160808 502H3970HST
48	1608	6,800	3	3830	3	2	5	ECTH160808 682H3830HST
49	1608	10,000	3	3435	3	2	5	ECTH160808 103H3435HST
50	1608	10,000	3	3800	3	2	5	ECTH160808 103H3800HST

### ► SMD NTC Thermistor ECTH Series

NO	Size [mm]	Electrical specifications						Part No.
		R <sub>25C</sub> [Ω]	△R[%]	B <sub>25/85</sub> (K)	△B[%]	δ(mW/°C)	τ(sec)	
51	1608	10,000	3	3970	3	2	5	ECTH160808 103H3970HST
52	1608	10,000	3	4050	3	2	5	ECTH160808 103H4050HST
53	1608	10,000	3	4550	3	2	5	ECTH160808 103H4550HST
54	1608	12,000	3	3830	3	2	5	ECTH160808 123H3830HST
55	1608	30,000	3	3950	3	2	5	ECTH160808 303H3950HST
56	1608	47,000	3	3950	3	2	5	ECTH160808 473H3950HST
57	1608	47,000	3	4050	3	2	5	ECTH160808 473H4050HST
58	1608	47,000	3	4550	3	2	5	ECTH160808 473H4550HST
59	1608	68,000	3	4150	3	2	5	ECTH160808 683H4150HST
60	1608	100,000	3	3970	3	2	5	ECTH160808 104H3970HST
61	1608	100,000	3	4050	3	2	5	ECTH160808 104H4050HST
62	1608	100,000	3	4150	3	2	5	ECTH160808 104H4150HST
63	1608	100,000	3	4400	3	2	5	ECTH160808 104H4400HST
64	1608	150,000	3	3800	3	2	5	ECTH160808 154H3800HST
65	1608	150,000	3	4600	3	2	5	ECTH160808 154H4600HST
66	1608	220,000	3	4600	3	2	5	ECTH160808 224H4600HST
67	1608	330,000	3	4050	3	2	5	ECTH160808 334H4050FST
68	1608	470,000	3	4050	3	2	5	ECTH160808 474H4050HST
69	1608	520,000	3	4600	3	2	5	ECTH160808 524H4600HST
70	1608	530,000	3	3970	3	2	5	ECTH160808 534H3970HST
71	2012	2,000	3	4100	3	3	7.5	ECTH201208 202H4100HST
72	2012	2,200	3	3520	3	3	7.5	ECTH201208 222H3520HST
73	2012	2,200	3	4100	3	3	7.5	ECTH201208 222H4100HST
74	2012	3,300	3	3750	3	3	7.5	ECTH201208 332H3750HST
75	2012	10,000	3	3435	3	3	7.5	ECTH201208 103H3435HST
76	2012	10,000	3	3970	3	3	7.5	ECTH201208 103H3970HST
77	2012	10,000	3	4050	3	3	7.5	ECTH201208 103H4050HST
78	2012	10,000	3	3750	3	3	7.5	ECTH201208 103H3750HST
79	2012	20,000	3	3950	3	3	7.5	ECTH201208 203H3950HST
80	2012	30,000	3	3950	3	3	7.5	ECTH201208 303H3950HST
81	2012	47,000	3	3950	3	3	7.5	ECTH201208 473H3950HST
82	2012	47,000	3	4050	3	3	7.5	ECTH201208 473H4050HST
83	2012	68,000	3	3800	3	3	7.5	ECTH201208 683H3800HST
84	2012	100,000	3	4050	3	3	7.5	ECTH201208 104H4050HST
85	2012	5,000,000	3	5150	3	3	7.5	ECTH201208 505H5150HST

\* Another specifications are available on request.

### SMD PTC Thermistors

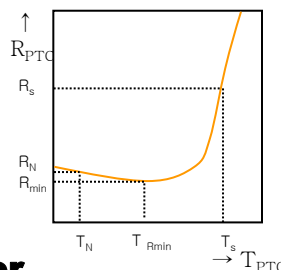
( ECPH Series )



#### 1 What is PTC Thermistor ?

PTC Thermistor is Positive Temperature Coefficient of Thermally Sensitive Resistor. It's resistance value rises sharply with increasing temperature has been exceed. This feature makes it use many applications of electronic devices as resettable fuse against current overload.

- $R_{PTC} = f(T_{PTC})$
- $R_N$  Rated PTC resistance (resistance value at  $T_N$ )
- $R_{min}$  Minimum resistance (resistance value at  $T_{Rmin}$ )
- $T_{Rmin}$  Temperature at  $R_{min}$  ( $\alpha$  becomes positive)
- $R_s$  Sensing resistance  
 $R_s = 10 \cdot R_{min}$  (resistance value at  $T_s$ )
- $T_s$  Sensing Temperature (Resistance rises sharply)



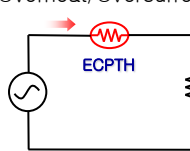
#### 2 Feature of PTC Thermistor

- Suitable for miniaturizing circuits due to small size SMD type
- Fast response for overheating sensing with an accuracy of  $\pm 5^\circ C$
- Contact noise & trouble free due to surface mounted

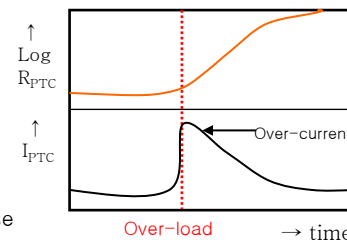
#### 3 Applications of PTC Thermistor

- Overheat protection for power transistor and power-ICs
- Inverter circuit for LCD backlight
- AC adapter of Net-book and Note Book PC
- DC/DC converter in LCD driving circuit
- Light driving circuit in LED application

Overheat/Overcurrent



Function of resettable fuse



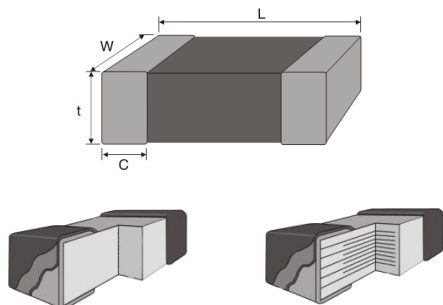
#### 4 Order method (standard) :

ECPH    G    1608    221    N    75    T  
 ①            ②            ③            ④            ⑤            ⑥            ⑦

① Series	SMD PTC Thermistor ECPH Series
② Type	G : Over current Protection , F : Over heat Sensing
③ Size(mm)	1005:1.0×0.5, 1608:1.6×0.8 , 2012:2.0×1.2 , 3225:3.2×1.6
④ Resistance	221 = 220 Ω [ = 22×10 <sup>1</sup> Ω ]
⑤ R Tolerance	K : ±10% , M : ±20% , H : ±25% , N : ±30% , P : ±50%
⑥ Temperature (Curie & Sensing)	G type : Curie temperature [T <sub>c</sub> : R@25°C × 2] F type : Sensing temperature [T <sub>s</sub> : R@25°C × 10]
⑦ Packing	T : Paper carrier Tape & Plastic Reel , B : Bulk

#### 5 Size & Dimension

(Unit : mm)



Size type	L	W	t	C
1005	1.00 ± 0.10	0.50 ± 0.10	0.50 ± 0.05	0.25 ± 0.10
1608	1.60 ± 0.15	0.80 ± 0.15	0.80 ± 0.10	0.40 ± 0.20
2012	2.00 ± 0.20	1.25 ± 0.20	0.80 ± 0.10	0.40 ± 0.20
3216	3.20 ± 0.20	1.60 ± 0.20	1.15 ± 0.30	0.50 ± 0.25
3225	3.20 ± 0.20	2.50 ± 0.20	1.15 ± 0.30	0.50 ± 0.25
4532	4.50 ± 0.20	3.20 ± 0.20	1.15 ± 0.30	0.60 ± 0.35

## 6 Electrical Data and Ordering Information

### ► SMD PTC Thermistor, ECPTH Series

NO	Size [mm]	Electrical specifications				Part No.
		R <sub>25C</sub> [Ω]	ΔR[%]	T <sub>c</sub> (°C)	T <sub>s</sub> (°C)	
1*	1005	10kΩ	50	-	at. 4.7MΩ[at130±5 °C]	ECPTHF 1005 103P 130T
2	1608	220	30	75±5	-	ECPTHG 1608 221N 75T
3	1608	470	30	75±5	-	ECPTHG 1608 471N 75T
4	1608	470	50	-	75±5	ECPTHF 1608 471P 75T
5	1608	470	50	-	85±5	ECPTHF 1608 471P 85T
6	1608	470	50	-	95±5	ECPTHF 1608 471P 95T
7	1608	470	50	-	105±5	ECPTHF 1608 471P 105T
8	1608	470	50	-	115±5	ECPTHF 1608 471P 115T
9	1608	470	50	-	125±5	ECPTHF 1608 471P 125T
10	1608	470	50	-	135±5	ECPTHF 1608 471P 135T
11*	1608	10kΩ	50	-	at. 4.7MΩ[at130±5 °C]	ECPTHF 1608 103P 130T
12	2012	220	30	75±5	-	ECPTHG 2012 221N 75T
13	2012	470	30	75±5	-	ECPTHG 2012 471N 75T
14	2012	470	50	-	75±5	ECPTHF 2012 471P 75T
15	2012	470	50	-	85±5	ECPTHF 2012 471P 85T
16	2012	470	50	-	95±5	ECPTHF 2012 471P 95T
17	2012	470	50	-	105±5	ECPTHF 2012 471P 105T
18	2012	470	50	-	115±5	ECPTHF 2012 471P 115T
19	2012	470	50	-	125±5	ECPTHF 2012 471P 125T
20	2012	470	50	-	135±5	ECPTHF 2012 471P 135T
21*	2012	10kΩ	50	-	at. 4.7MΩ[at130±5 °C]	ECPTHF 2012 103P 130T
22	3225	55	30	120±5	-	ECPTHG 3225 550N 120T

\* Another specifications are available on request.