Sensors

Temperature Sensors
NTC Thermistors

NTCG Series(SMD, Pb Free)
NTCG06/10/16/20 Types

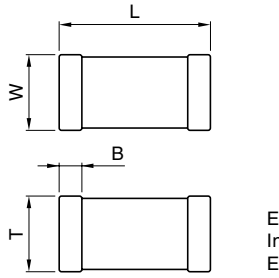
FEATURES

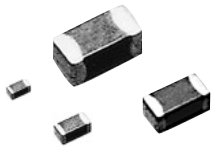
- Small sized 0603 type (L0.6×W0.3×T0.3mm) series are available.
- Lead (Pb) free product.
  By using lead-less terminal electrodes and electroplating (Ni-Sn), this product realized excellent solderablity and soldering heat resistance, comparing with the conventional eutectic mixture solder and lead-free solder (Sn/Ag/Cu, etc.).
- Good solderability.
- Layered internal electrode structure.
- Product series provides a wide range of resistances and B constants.
- Good stability of resistance value after soldering.
- The 0603, 1608 and 1005 types provide 3 different shapes with identical resistance-temperature characteristics.
- Attains less that low floating capacitance (using TCXO) in the high frequency region.

APPLICATIONS

- Equipment related to mobile communication
  TCXOs (temperature compensated type quartz oscillator), RF circuits (power amp circuits, temperature monitoring circuits), LCD panel temperature compensation circuits, battery pack temperature compensation circuits
- Computer related equipment
  CPU periphery temperature monitoring circuits, optical pickup temperature compensated circuit, temperature compensated circuit in HDD
- DVC/DSC devices
  Auto-focus circuits, plunger peripheral circuits, battery pack temperature control circuits
- Equipment related to car audio
  Various types of pickup temperature compensation circuits, temperature compensation for various types of circuits
- Optical communication related equipment
  Laser transmission circuit temperature compensation

SHAPES AND DIMENSIONS



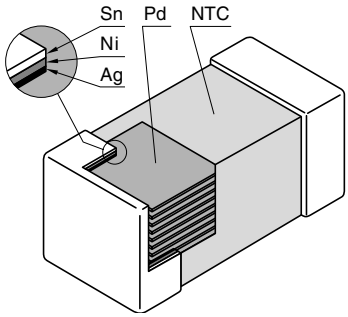


Electrode material
Internal:Pd
External:Ag/Ni/Sn

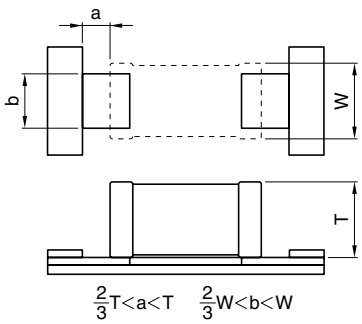
Dimensions in mm

Type	L	W	T	B
0603	0.6±0.03	0.3±0.03	0.3±0.03	0.1 min.
1005	1±0.05	0.5±0.05	0.5±0.05	0.15 min.
1608	1.6±0.1	0.8±0.1	0.8±0.1	0.2 min.
2012	2±0.2	1.25±0.2	0.7±0.2	0.2 min.

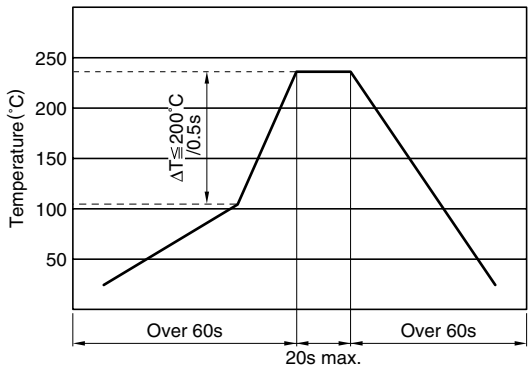
STRUCTURAL DIAGRAM



RECOMMENDED PC BOARD PATTERN



RECOMMENDED REFLOW SOLDERING CONDITIONS



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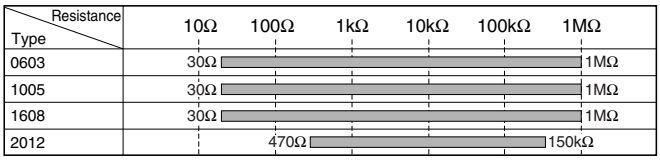
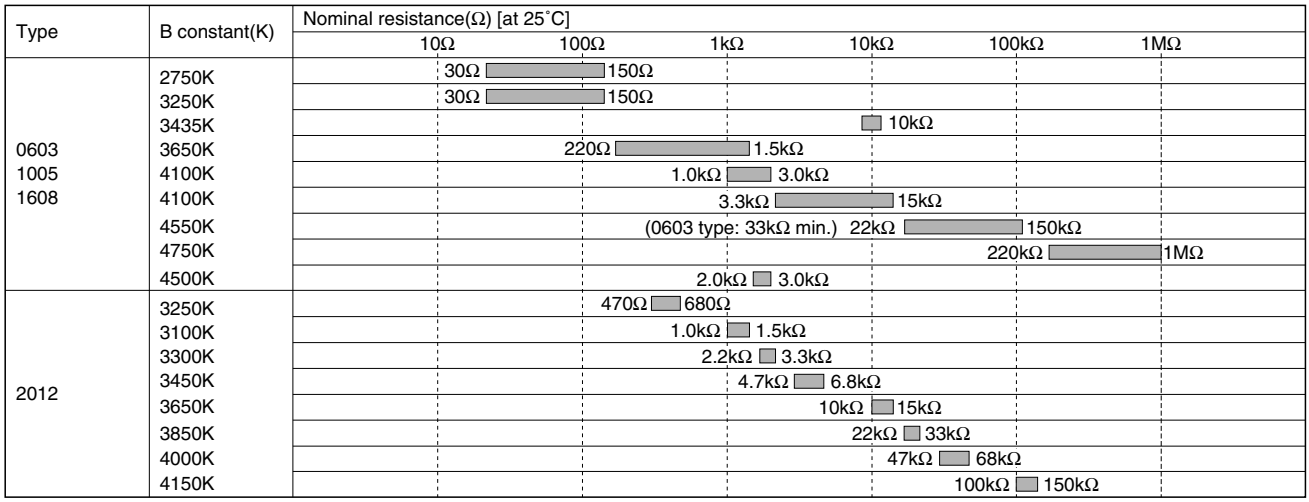
RESISTANCE VALUE RANGE



TYPICAL APPLICATIONS AND TDK PRODUCT NAMES

Field	Applications	Applied circuit	Resistance (R25)	B constant (B25/85)	TDK recommended part number
Mobile communication devices	TCXO(Temperature compensated crystal oscillator)	Low-temperature area compensated circuit	30Ω to 150Ω	3250K(2750K)	NTCG103EH101H
		High-temperature area compensated circuit	1.0kΩ to 4.7kΩ	4100K to 4500K	NTCG104BH222H
	Power amplifier module	Power amplifier temperature compensated circuit	30Ω to 10kΩ	3250K to 4100K	NTCG103NH471J
	LCD	LCD temperature compensated circuit	22kΩ to 1MΩ	4550K to 4750K	NTCG104LH473J
	Temperature monitor	Various-circuit temperature compensated circuit	10kΩ to 470kΩ	4100K to 4750K	NTCG104BH103J
	Battery pack	Battery temperature monitor and charging control circuit	10kΩ to 100kΩ	3435K to 4550K	NTCG103JF103F
Computer devices	CPU	CPU temperature monitor	10kΩ to 1MΩ	3435K to 4550K	NTCG163JF103F
	LCD	LCD temperature compensated circuit	22kΩ to 1MΩ	4550K to 4750K	NTCG164LH473J
	HDD	Pickup temperature compensated circuit	10kΩ, 100kΩ	3435K, 4485K	NTCG163JF103F NTCG164KF104F
	ODD	CD or DVD write current compensated circuit	10kΩ, 100kΩ	3435K, 4485K	NTCG163JF103F NTCG164KF104F
	Battery pack	Battery temperature monitor and charging control circuit	10kΩ to 100kΩ	3435K to 4550K	NTCG163JF103F
DVC, DSC	Auto focus	Driving circuit temperature compensated circuit	1.0kΩ to 15kΩ	3650K to 4100K	NTCG104BH103J
	Iris stop	Hole element temperature compensated circuit	10kΩ	4100K	NTCG164BH103J
	Battery pack	Battery temperature monitor and charging control circuit	10kΩ to 100kΩ	3435K to 4550K	NTCG163JF103F
Car audio unit	Car CD or MD	Laser pickup temperature compensated circuit	22kΩ to 150kΩ	4550K	NTCG164LH473J
Optical transmission system		Laser transmitter or receiver temperature compensated circuit	1.0kΩ to 10kΩ	4100K	NTCG164BH222J
Printer		Ink viscosity controller	10kΩ to 47kΩ	3435K to 4550K	NTCG164LH473H

LIST OF SERIES BY TYPE



∗ B constant is calculated from the resistance at 25˚C and 85˚C

The B constant indicates the magnitude of a change in a zero-load resistance value to a temperature, and is obtained based on arbitrary two temperatures in resistance-to-temperature characteristics.

B constant calculation formula

$$B=\frac{\ln R1-\ln R2}{(1/T1)-(1/T2)}$$

B: B Constant (K)
T1: Arbitrary temperature (K)
T2: Arbitrary temperature different from T1 (K)

R1: Zero-load resistance value at temperature T1(Ω)
R2: Zero-load resistance value at temperature T2(Ω)
Each temperature is measured in absolute temperature. 0°C=273.15K

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PRODUCT IDENTIFICATION

NTC	G	○○	3E	H	101	□	T
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) NTC thermistor

(2) Structural classification

G	Multilayer internal electroded chip type NTC thermistor(Pb free type)

(3) Shapes and dimensions code

06	0603
10	1005
16	1608
20	2012

(4) B constant

This code indicates the value of B constant using a combination of one numeric character and one alphabetic character.

Example

Code	B constant(K)
3E	3201 to 3250
3N	3601 to 3650
4L	4501 to 4550
4Q	4701 to 4750

Code	B constant(K)
2	2000
3	3000
4	4000

Code	B constant(K)
A	0 to 50
B	51 to 100
C	101 to 150
E	201 to 250
F	251 to 300
J	401 to 450
K	451 to 500
L	501 to 550
N	601 to 650
Q	701 to 750
S	801 to 850

(5) B constant tolerance

Code	Tolerance(%)
H	±3

(6) Nominal resistance

The resistance is expressed in three digit codes and in units of Ω.
The first and second digits: Effective number
The third digit: Number of 0 which following the effective number.

300	30Ω
101	100Ω
102	1000Ω(1kΩ)
103	10000Ω(10kΩ)

(7) Nominal resistance tolerance

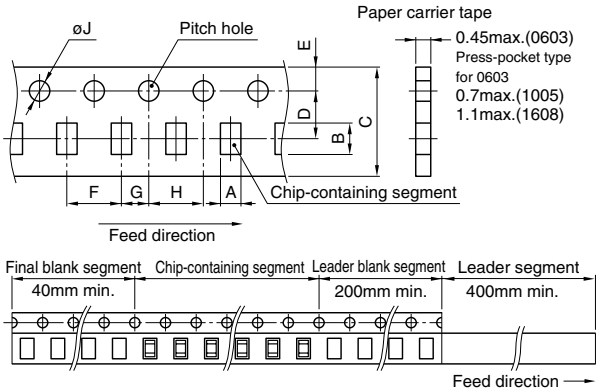
Code	Tolerance(%)
H	±3
J	±5
K	±10

- Resistance tolerance H(±3%) products: Item No. 6 to 11(described on P.4) and 2012 Types(described on P.6) are excluded. For more details, please contact us separately.

(8) Packaging type

T	Tape and reel
B	Bulk

PACKAGING STYLE AND QUANTITIES
TAPING SPECIFICATIONS
0603, 1005, 1608 TYPES



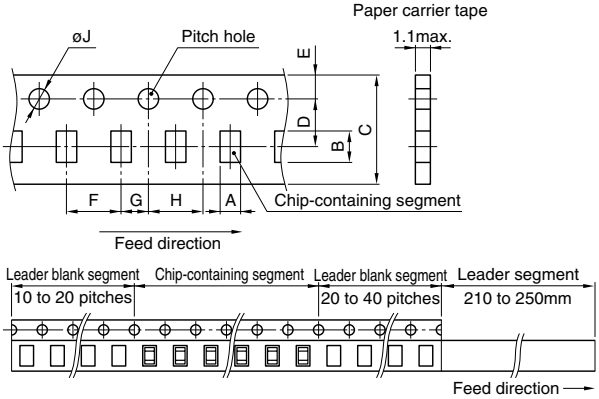
- Cumulative pitch hole shift is within ±0.3mm over a 10-pitch interval.

Dimensions in mm

Type	0603	1005	1608
A	0.38±0.05	0.65+0.05, –0.1	1.1±0.2
B	0.68±0.05	1.15+0.05, –0.1	1.9±0.2
C	8±0.3	8±0.3	8±0.3
D	3.5±0.05	3.5±0.05	3.5±0.05
E	1.75±0.1	1.75±0.1	1.75±0.1
F	2±0.05	2±0.05	4±0.1
G	2±0.05	2±0.05	2±0.05
H	4±0.05	4±0.05	4±0.1
J	1.5+0.1, –0	1.5+0.1, –0	1.5+0.1, –0

- Packaging quantities
  15000 pieces/reel(0603 type), 10000 pieces/reel(1005 type), 4000 pieces/reel(1608 type)

2012 TYPE



- Cumulative pitch hole shift is within ±0.3mm over a 10-pitch interval.

Dimensions in mm

Type	2012
A	1.5±0.2
B	2.3±0.2
C	8±0.3
D	3.5±0.05
E	1.75±0.1
F	4±0.1
G	2±0.05
H	4±0.1
J	1.5+0.1, –0

- Packaging quantities
  2000 pieces/reel

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NTCG06/10/16/20 Types

0603, 1005, 1608 TYPES
ELECTRICAL CHARACTERISTICS

No.	Part No.	Normal resistance value [25°C]	B constant [+25 to +85°C]	B constant [+25 to +50°C]	Operating temperature range
1	NTCG○○*3EH300□	30Ω	3250K±3%	3244K	–40 to +125°C
2	NTCG○○3EH400□	40Ω	3250K±3%	3244K	
3	NTCG○○3EH101□	100Ω	3250K±3%	3244K	
4	NTCG○○3EH131□	125Ω	3250K±3%	3244K	
5	NTCG○○3EH151□	150Ω	3250K±3%	3244K	
6	NTCG○○3NH221□	220Ω	3650K±3%	3642K	–40 to +125°C
7	NTCG○○3NH331□	330Ω	3650K±3%	3642K	
8	NTCG○○3NH471□	470Ω	3650K±3%	3642K	
9	NTCG○○3NH681□	680Ω	3650K±3%	3642K	
10	NTCG○○3NH102□	1.0kΩ	3650K±3%	3642K	
11	NTCG○○3NH152□	1.5kΩ	3650K±3%	3642K	
12	NTCG○○4BH102□	1.0kΩ	4100K±3%	4096K	–40 to +85°C
13	NTCG○○4BH152□	1.5kΩ	4100K±3%	4096K	
14	NTCG○○4BH182□	1.8kΩ	4100K±3%	4096K	
15	NTCG○○4BH202□	2.0kΩ	4100K±3%	4096K	
16	NTCG○○4BH222□	2.2kΩ	4100K±3%	4096K	
17	NTCG○○4BH302□	3.0kΩ	4100K±3%	4096K	
18	NTCG○○4KH202□	2.0kΩ	4500K±3%	4498K	–40 to +125°C
19	NTCG○○4KH222□	2.2kΩ	4500K±3%	4498K	
20	NTCG○○4KH302□	3.0kΩ	4500K±3%	4498K	
21	NTCG○○4BH332□	3.3kΩ	4100K±3%	4067K	–40 to +125°C
22	NTCG○○4BH472□	4.7kΩ	4100K±3%	4067K	
23	NTCG○○4BH682□	6.8kΩ	4100K±3%	4067K	
24	NTCG○○4BH103□	10kΩ	4100K±3%	4067K	
25	NTCG○○4BH153□	15kΩ	4100K±3%	4067K	
26	NTCG○○4LH223□	22kΩ	4550K±3%	4485K	–40 to +125°C
27	NTCG○○4LH333□	33kΩ	4550K±3%	4485K	
28	NTCG○○4LH473□	47kΩ	4550K±3%	4485K	
29	NTCG○○4LH683□	68kΩ	4550K±3%	4485K	
30	NTCG○○4LH104□	100kΩ	4550K±3%	4485K	
31	NTCG○○4LH154□	150kΩ	4550K±3%	4485K	
32	NTCG○○4QH224□	220kΩ	4750K±3%	4661K	–40 to +125°C
33	NTCG○○4QH334□	330kΩ	4750K±3%	4661K	
34	NTCG○○4QH474□	470kΩ	4750K±3%	4661K	
35	NTCG○○4QH684□	680kΩ	4750K±3%	4661K	
36	NTCG○○4QH105□	1.0MΩ	4750K±3%	4661K	
37	NTCG○○2QH300□	30Ω	2750K±3%	2744K	–40 to +85°C
38	NTCG○○2QH400□	40Ω	2750K±3%	2744K	
39	NTCG○○2QH101□	100Ω	2750K±3%	2744K	
40	NTCG○○2QH131□	125Ω	2750K±3%	2744K	
41	NTCG○○2QH151□	150Ω	2750K±3%	2744K	
42	NTCG○○3JH103□	10kΩ	3435K±3%	3382K	–40 to +125°C

* ○○ : Shapes and dimensions code(06:0603 type, 10:1005 type, 16:1608 type)

- 0603 type: No.1 to 5, 12 to 20, 37 to 41: Capacitance 6pF max.(25°C, 10 to 40MHz, 0.1Vrms)
- 1005, 1608 types: No.1 to 5, 12 to 20, 37 to 41: Capacitance 3pF max.(25°C, 10 to 40MHz, 0.1Vrms)
- No.26: Except 0603 type

1005, 1608 NARROW TOLERANCE TYPES

No.	Part No.	Normal resistance value [25°C]	B constant [+25 to +85°C]	Operating temperature range
30	NTCG164KF104F	100kΩ±1%	4485K±1%	–40 to +125°C
30	NTCG104KF104F	100kΩ±1%	4485K±1%	
42	NTCG163JF103F	10kΩ±1%	3435K±1%	–40 to +125°C
42	NTCG103JF103F	10kΩ±1%	3435K±1%	

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NTCG06/10/16/20 Types

0603, 1005 AND 1608 TYPES

RESISTANCE vs. TEMPERATURE CHARACTERISTICS TABLE (CONUERSION TABLE)

Temp. (°C)	No.1 to 5		No.6 to 11		No.12 to 17		No.18 to 20		No.21 to 25		No.26 to 31		No.32 to 36		No.37 to 41		No.42	
	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)
–40	19.59	3182	26.37	3499	41.78	3991	58.88	4358	38.44	3903	50.89	4203			12.090	2665	18.850	3140
–35	14.79	3188	19.48	3514	29.45	4003	40.29	4374	27.34	3915	35.49	4224			9.560	2672	14.429	3159
–30	11.28	3193	14.53	3528	21.01	4014	27.92	4389	19.68	3928	25.03	4245			7.625	2678	11.133	3176
–25	8.685	3199	10.94	3540	15.17	4024	19.59	4402	14.33	3939	17.85	4264			6.131	2683	8.656	3194
–20	6.753	3204	8.313	3552	11.07	4033	13.90	4415	10.54	3951	12.86	4284	13.55	4371	4.969	2689	6.779	3210
–15	5.298	3208	6.371	3563	8.168	4041	9.976	4426	7.837	3962	9.353	4302	9.833	4398	4.056	2694	5.346	3226
–10	4.192	3213	4.923	3573	6.087	4049	7.236	4436	5.883	3972	6.869	4320	7.197	4424	3.334	2700	4.245	3241
–5	3.343	3217	3.836	3583	4.581	4056	5.303	4446	4.456	3982	5.090	4337	5.309	4449	2.759	2705	3.393	3256
0	2.687	3220	3.011	3591	3.480	4062	3.925	4454	3.406	3992	3.805	4353	3.947	4473	2.297	2709	2.728	3270
5	2.176	3224	2.382	3599	2.667	4068	2.933	4462	2.625	4001	2.868	4369	2.957	4496	1.924	2714	2.207	3283
10	1.774	3227	1.898	3606	2.062	4073	2.212	4469	2.039	4010	2.179	4384	2.232	4518	1.621	2718	1.796	3296
15	1.456	3230	1.523	3613	1.607	4077	1.683	4475	1.596	4018	1.669	4399	1.696	4539	1.373	2723	1.470	3308
20	1.203	3233	1.230	3618	1.263	4081	1.292	4480	1.259	4026	1.287	4412	1.298	4559	1.169	2726	1.209	3320
25	1.000	3235	1.000	3623	1.000	4084	1.000	4485	1.000	4034	1.000	4426	1.000	4577	1.000	2730	1.000	3332
30	0.8360	3237	0.8181	3628	0.7976	4088	0.7801	4488	0.7997	4041	0.7823	4439	0.7755	4596	0.860	2733	0.831	3343
35	0.7029	3239	0.6734	3632	0.6407	4090	0.6133	4492	0.6437	4048	0.6160	4451	0.6052	4614	0.742	2737	0.694	3353
40	0.5941	3241	0.5576	3636	0.5182	4092	0.4857	4494	0.5213	4055	0.4882	4463	0.4753	4630	0.644	2739	0.583	3363
45	0.5047	3243	0.4643	3639	0.4218	4094	0.3875	4497	0.4248	4061	0.3893	4474	0.3754	4646	0.561	2742	0.491	3373
50	0.4309	3244	0.3887	3642	0.3455	4096	0.3112	4498	0.3481	4067	0.3123	4485	0.2983	4661	0.491	2744	0.416	3382
55	0.3697	3246	0.3272	3644	0.2847	4097	0.2516	4500	0.2869	4072	0.2520	4496	0.2384	4676	0.431	2746	0.354	3390
60	0.3185	3247	0.2768	3646	0.2360	4098	0.2048	4501	0.2377	4078	0.2044	4506	0.1916	4690	0.380	2747	0.302	3399
65	0.2757	3248	0.2353	3647	0.1967	4099	0.1677	4501	0.1979	4083	0.1667	4515	0.1548	4703	0.336	2749	0.259	3407
70	0.2396	3248	0.2010	3648	0.1648	4099	0.1381	4501	0.1657	4087	0.1367	4524	0.1257	4716	0.298	2749	0.223	3414
75	0.2091	3249	0.1724	3649	0.1388	4100	0.11439	4501	0.1393	4092	0.1126	4533	0.1026	4728	0.266	2750	0.192	3422
80	0.1832	3250	0.1486	3650	0.1175	4100	0.09528	4501	0.1177	4096	0.09325	4542	0.08412	4739	0.238	2750	0.167	3428
85*	0.1610	3250	0.1286	3650	0.0999	4100	0.07978	4500	0.09989	4100	0.07757	4550	0.06933	4750	0.213	2750	0.145	3435
90	0.1421	3250	0.1118	3650	0.0853	4100	0.06714	4499	0.08513	4104	0.06482	4558	0.05740	4760	0.192	2749	0.127	3441
95	0.1258	3251	0.09751	3650	0.0732	4100	0.05679	4498	0.07286	4107	0.05440	4565	0.04773	4770	0.173	2748	0.111	3447
100	0.1118	3251	0.08539	3650	0.0630	4100	0.04826	4497	0.06260	4110	0.04584	4573	0.03987	4780	0.157	2747	0.098	3453
105	0.09960	3251	0.07505	3650	0.05451	4100	0.04119	4495	0.05400	4114	0.03879	4580	0.03344	4789	0.143	2745	0.086	3458
110	0.08903	3251	0.06619	3649	0.04731	4100	0.03532	4493	0.04675	4116	0.03295	4586	0.02817	4797	0.130	2743	0.076	3463
115	0.07981	3251	0.05857	3649	0.04121	4101	0.03041	4491	0.04063	4119	0.02810	4593	0.02382	4806	0.119	2740	0.067	3468
120	0.07175	3251	0.05198	3648	0.03602	4101	0.02629	4489	0.03543	4122	0.02405	4599	0.02022	4813	0.109	2737	0.060	3473
125	0.06468	3251	0.04628	3648	0.03159	4101	0.02282	4487	0.03099	4124	0.02066	4606	0.01723	4821	0.100	2734	0.053	3478

Ex.1) R25=1.000×30=30Ω
R85=K85(0.1610)×R25(30Ω)=4.83Ω
(listed *)

Ex.2) R25=1.000×3.3=3.3kΩ
R85=K85(0.09989)×R25(3.3kΩ)=0.330kΩ
(listed *)

Sensors

Temperature Sensors
NTC Thermistors

NTCG Series(SMD, Pb Free)
NTCG06/10/16/20 Types

2012 TYPE

ELECTRICAL CHARACTERISTICS

No.	Part No.	Normal resistance value [25°C]	B constant [+25 to +85°C]	B constant [+25 to +50°C]	Operating temperature range
1	NTCG203EH471□	470Ω	3250K±3%	3232K	–40 to +125°C
2	NTCG203EH681□	680Ω	3250K±3%	3232K	
3	NTCG203BH102□	1.0kΩ	3100K±3%	3060K	–40 to +125°C
4	NTCG203BH152□	1.5kΩ	3100K±3%	3060K	
5	NTCG203FH222□	2.2kΩ	3300K±3%	3248K	–40 to +125°C
6	NTCG203FH332□	3.3kΩ	3300K±3%	3248K	
7	NTCG203JH472□	4.7kΩ	3450K±3%	3392K	–40 to +125°C
8	NTCG203JH682□	6.8kΩ	3450K±3%	3392K	
9	NTCG203NH103□	10kΩ	3650K±3%	3590K	–40 to +125°C
10	NTCG203NH153□	15kΩ	3650K±3%	3590K	
11	NTCG203SH223□	22kΩ	3850K±3%	3782K	–40 to +125°C
12	NTCG203SH333□	33kΩ	3850K±3%	3782K	
13	NTCG204AH473□	47kΩ	4000K±3%	3931K	–40 to +125°C
14	NTCG204AH683□	68kΩ	4000K±3%	3931K	
15	NTCG204CH104□	100kΩ	4150K±3%	4085K	–40 to +125°C
16	NTCG204CH154□	150kΩ	4150K±3%	4085K	

RESISTANCE vs. TEMPERATURE CHARACTERISTICS TABLE (CONUERSION TABLE)

Temp.	No.1 or 2		No.3 or 4		No.5 or 6		No.7 or 8		No.9 or 10		No.11 or 12		No.13 or 14		No.15 or 16	
(°C)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)	K	B (25/T)
–40	17.74	3076	15.18	2909	17.65	3070	19.80	3193	23.36	3370	27.76	3554	31.77	3699	35.34	3813
–35	13.62	3091	11.78	2919	13.52	3082	15.00	3205	17.42	3382	20.43	3570	23.02	3712	25.28	3822
–30	10.54	3105	9.217	2928	10.45	3094	11.47	3216	13.13	3394	15.18	3585	16.88	3725	18.33	3834
–25	8.226	3118	7.273	2936	8.150	3104	8.853	3227	9.994	3406	11.39	3599	12.50	3738	13.47	3848
–20	6.466	3131	5.786	2944	6.405	3115	6.894	3238	7.679	3419	8.618	3613	9.357	3751	10.01	3864
–15	5.119	3142	4.639	2953	5.073	3125	5.413	3249	5.952	3432	6.582	3626	7.070	3763	7.520	3882
–10	4.081	3152	3.746	2961	4.048	3134	4.283	3261	4.650	3445	5.073	3640	5.391	3777	5.697	3900
–5	3.277	3163	3.047	2969	3.254	3144	3.415	3273	3.661	3458	3.937	3652	4.147	3790	4.352	3919
0	2.647	3171	2.494	2977	2.633	3154	2.740	3284	2.903	3472	3.080	3665	3.215	3804	3.349	3937
5	2.153	3180	2.054	2985	2.145	3163	2.215	3297	2.317	3484	2.427	3677	2.511	3817	2.596	3956
10	1.762	3188	1.702	2993	1.757	3173	1.800	3307	1.862	3499	1.926	3690	1.975	3830	2.026	3974
15	1.450	3195	1.418	3000	1.449	3184	1.471	3319	1.505	3512	1.539	3702	1.564	3843	1.591	3989
20	1.201	3203	1.188	3011	1.200	3194	1.210	3329	1.223	3519	1.237	3715	1.247	3856	1.258	4012
25	1.000	3207	1.000	3017	1.000	3202	1.000	3339	1.000	3532	1.000	3727	1.000	3868	1.000	4024
30	0.837	3211	0.846	3023	0.837	3211	0.831	3350	0.822	3546	0.813	3738	0.807	3881	0.800	4036
35	0.704	3218	0.719	3031	0.704	3223	0.694	3361	0.679	3557	0.665	3748	0.654	3895	0.644	4049
40	0.596	3224	0.613	3046	0.595	3232	0.582	3372	0.564	3568	0.546	3762	0.534	3907	0.521	4062
45	0.506	3227	0.526	3047	0.505	3240	0.490	3383	0.470	3579	0.451	3772	0.438	3919	0.424	4074
50	0.432	3232	0.452	3060	0.430	3248	0.415	3392	0.394	3590	0.375	3782	0.361	3931	0.347	4085
55	0.371	3235	0.391	3062	0.369	3255	0.352	3402	0.332	3599	0.313	3793	0.299	3940	0.285	4096
60	0.320	3237	0.339	3070	0.316	3266	0.301	3411	0.280	3609	0.262	3803	0.249	3951	0.235	4106
65	0.276	3241	0.295	3077	0.273	3271	0.257	3420	0.238	3618	0.220	3813	0.208	3963	0.195	4115
70	0.240	3243	0.258	3080	0.236	3279	0.221	3427	0.203	3626	0.186	3823	0.174	3973	0.163	4126
75	0.209	3246	0.226	3087	0.205	3285	0.191	3436	0.174	3635	0.158	3832	0.147	3982	0.137	4134
80	0.183	3248	0.199	3091	0.179	3292	0.166	3443	0.149	3642	0.134	3841	0.124	3991	0.115	4142
85*	0.161	3250	0.175	3102	0.156	3302	0.144	3451	0.129	3650	0.115	3850	0.106	4000	0.0971	4150
90	0.142	3252	0.155	3105	0.137	3308	0.126	3457	0.111	3657	0.0986	3858	0.0901	4008	0.0824	4158
95	0.126	3253	0.138	3106	0.121	3313	0.110	3461	0.0967	3663	0.0850	3866	0.0772	4016	0.0702	4165
100	0.111	3255	0.123	3109	0.107	3318	0.0966	3467	0.0842	3671	0.0734	3874	0.0664	4023	0.0601	4172
105	0.0992	3256	0.110	3111	0.0945	3324	0.0851	3472	0.0737	3675	0.0637	3881	0.0573	4030	0.0515	4179
110	0.0886	3257	0.0980	3122	0.0841	3327	0.0751	3479	0.0646	3682	0.0554	3888	0.0496	4036	0.0444	4186
115	0.0793	3258	0.0880	3125	0.0750	3331	0.0666	3484	0.0569	3686	0.0484	3895	0.0431	4042	0.0384	4193
120	0.0713	3259	0.0790	3132	0.0668	3339	0.0594	3485	0.0502	3691	0.0424	3901	0.0376	4047	0.0333	4199
125	0.0642	3260	0.0720	3123	0.0600	3340	0.0530	3487	0.0445	3695	0.0372	3906	0.0329	4053	0.0289	4206

Ex.1) R25=470Ω
R85=K85(0.161)×R25(470Ω)=75.67Ω
(listed *)

Ex.2) R25=3.3kΩ
R85=K85(0.156)×R25(3.3kΩ)=0.5148kΩ
(listed *)

Sensors

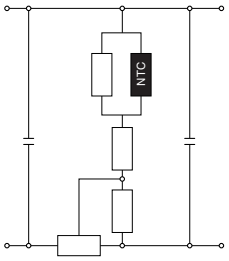
Temperature Sensors
NTC Thermistors

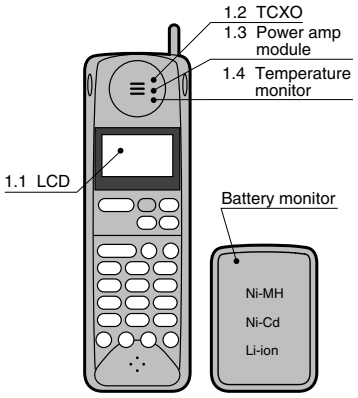
NTCG Series(SMD, Pb Free)
NTCG06/10/16/20 Types

CIRCUIT EXAMPLES

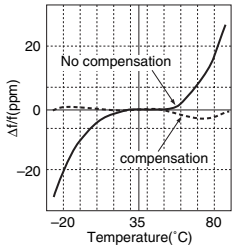
1. CELLULAR PHONE

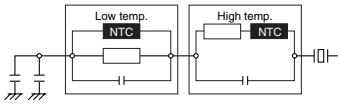
1.1 LCD, Adjustment of contrast



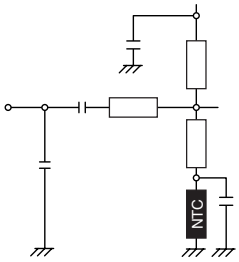


1.2 TCXO, Frequency compensation of crystal

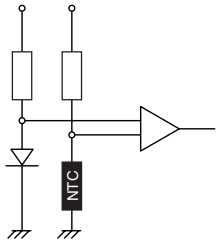




1.3 Power amp. module, Control of voltage

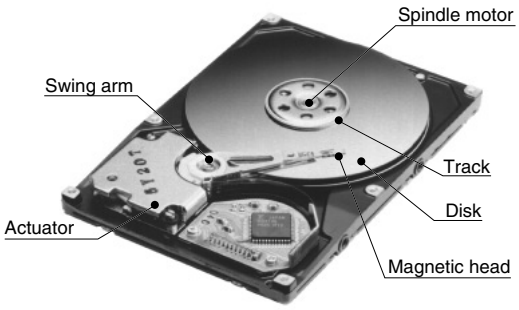


1.4 Temperature monitor

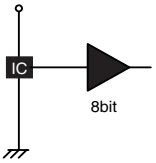


2. HARD DISK DRIVE

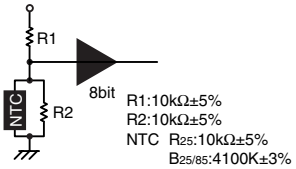
Chip NTC thermistor
NTCG1005, 1608 types
Resistance tolerance: ±3 to ±5%/B constant tolerance: ±2 to ±3%



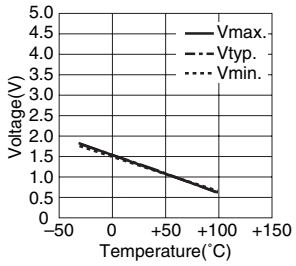
Temperature sensor IC
(Cost:¥20 to 25)

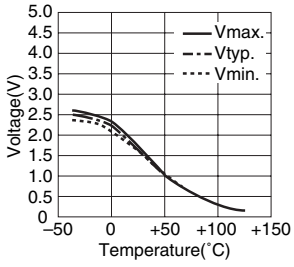


NTC thermistor
(Cost: 50% down)

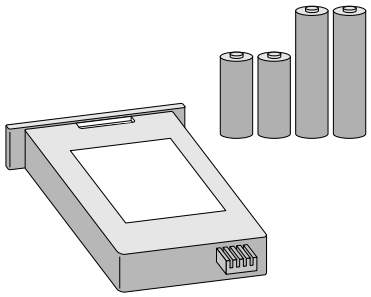


Voltage vs. temperature characteristics





3. BATTERY PACK



Control circuit for quick charge battery