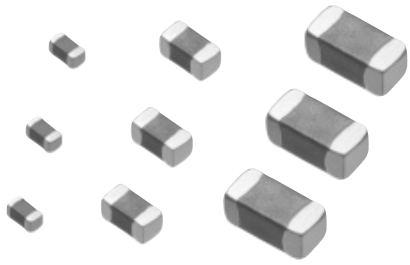
Multilayer NTC Thermistors

Series: **ERTJ**



■ Features

- Surface Mount Device (0201, 0402, 0603)
- Highly reliable multilayer / monolithic structure
- Wide temperature operating range (–40 to 125 °C)
- Environmentally-friendly lead-free
- RoHS compliant

■ Recommended Applications

- Mobile Phone
  - · Temperature compensation for crystal oscillator
  - · Temperature compensation for semiconductor devices
- Personal Computer
  - · Temperature detection for CPU and memory device
  - · Temperature compensation for ink-viscosity (Inkjet Printer)
- Battery Pack
  - · Temperature detection of battery cells
- Liquid Crystal Display
  - · Temperature compensation of display contrast
  - · Temperature compensation of display backlighting (CCFL)

■ Handling Precautions

See Page 155 to 159

■ Packaging Specifications

See Page 149, 168

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	R	T	J	0	E	G	1	0	3	J	A	(Example)

Common Code			
Product Code		Type Code	
ERT	NTC Thermistors	J	Chip Type (SMD) Multilayer Type

Size Code	
Z	"0201"
0	"0402"
1	"0603"

Packaging Style Code	
E	"0201", "0402" Paper Taping (Pitch : 2 mm)
V	"0603" Punched carrier Paper Taping (Pitch : 4 mm)

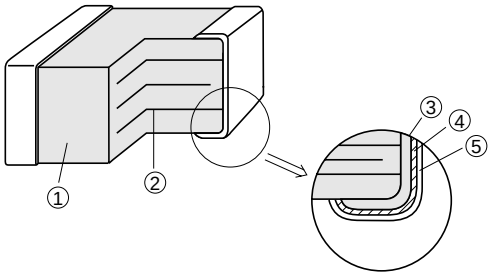
B Value Class Code	
A	2701 to 2800
G	3301 to 3400
M	3801 to 3900
P	4001 to 4100
R	4201 to 4300
S	4301 to 4400
T	4401 to 4500
V	4601 to 4700

Nominal Resistance R_{25} (Ω)
The first two digits are significant figures of resistance and the third one denotes the number of zeros following them.

Resistance Tolerance Code		
F	±1%	Narrow Tolerance Type
G	±2%	
H	±3%	Standard Type
J	±5%	

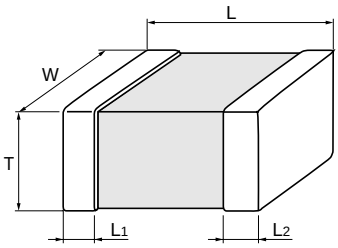
Special Specification

■ Construction



No	Name	
①	Semiconductive Ceramics	
②	Internal electrode	
③	Terminal electrode	Substrate electrode
④		Intermediate electrode
⑤		External electrode

■ Dimensions in mm (not to scale)



Size Code (EIA)	L	W	T	L_1, L_2
Z(0201)	0.60±0.03	0.30±0.03	0.30±0.03	0.15±0.05
0(0402)	1.0±0.1	0.50±0.05	0.50±0.05	0.25±0.15
1(0603)	1.60±0.15	0.8±0.1	0.8±0.1	0.3±0.2

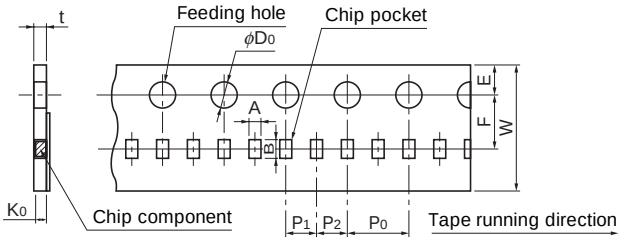
■ Packaging Specifications

● Standard Packing Quantities

Size Code \ Style / Thickness		Paper taping
Z(0201)	0.3 mm	Pitch 2 mm: 15000 pcs./reel
0(0402)	0.5 mm	Pitch 2 mm: 10000 pcs./reel
1(0603)	0.8 mm	Pitch 4 mm: 4000 pcs./reel

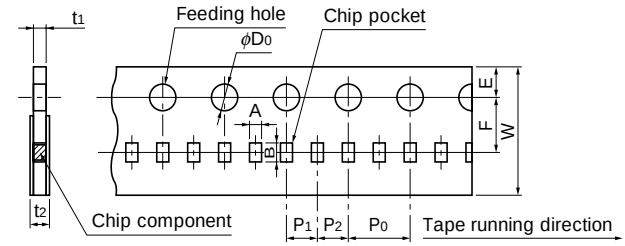
● Paper Taping

Pitch 2 mm (Pressed Carrier taping) : 0201



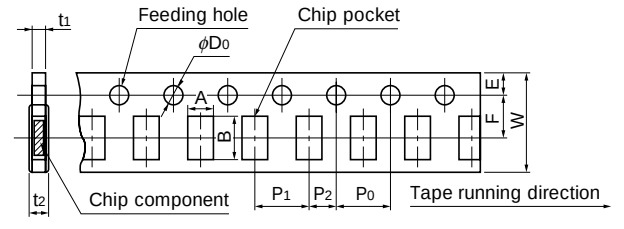
Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t	K_0
Dim. (mm)	0.36 ±0.03	0.66 ±0.03	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.0 ±0.1	$1.5^{+0.1}_{0}$	0.55 max.	0.36 ±0.03

Pitch 2 mm (Punched Carrier taping) : 0402



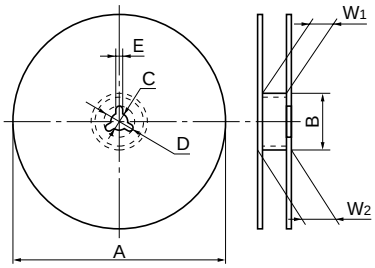
Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t_1	t_2
Dim. (mm)	0.62 ±0.05	1.12 ±0.05	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.0 ±0.1	$1.5^{+0.1}_{0}$	0.7 max.	1.0 max.

Pitch 4 mm (Punched Carrier taping) : 0603



Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD_0	t_1	t_2
Dim. (mm)	1.0 ±0.1	1.8 ±0.1	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	$1.5^{+0.1}_{0}$	1.1 max.	1.4 max.

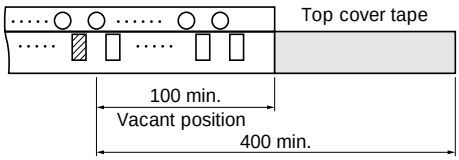
● Reel for Taping



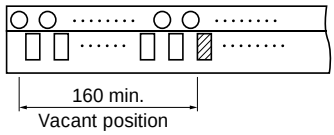
Symbol	φA	φB	C	D	E	W_1	W_2
Dim. (mm)	180^{0}_{-3}	60.0±0.5	13.0±0.5	21.0±0.8	2.0±0.5	9.0±0.3	11.4±1.0

● Leader Part and Taped End

Leader part



Taped end



(Unit : mm)

■ Ratings and Characteristics

Size code (EIA)	Z(0201)	0(0402)	1(0603)
Operating Temperature Range	–40 to 125 °C		
Resistance to Soldering Heat	270 °C–3s, 260 °C–10s		
Dissipation Factor*	approximately 1 mW/°C	approximately 2 mW/°C	approximately 3 mW/°C
Rated Maximum Power Dissipation	33 mW	66 mW	100 mW

✻ Reference value when mounted on a glass epoxy board (1.6 mmT)

● Resistance ratios to R_{25} at each temperature/Reference values
(for obtaining resistance at each temperature by using R_{25} shown in part number)

	ERTJ□□A		ERTJ□□G	ERTJ□□M	ERTJ□□P	ERTJ□□R	ERTJ□□S	ERTJ□□T	ERTJ0ET104□	ERTJ□□V
$B_{25/50}$	2750 K	2800 K	(3375 K)	3900 K	4050 K	4250K	(4330K)	4500K	4500K	4700K
$B_{25/85}$	(2700 K)	(2750 K)	3435 K	(3970 K)	(4100 K)	(4300K)	4390K	(4450K)	(4580K)	(4750K)
T(°C)								(✻1)	(✻2)	
-40	13.05	13.28	20.52	32.11	33.10	43.10	45.53	63.30	47.07	59.76
-35	10.21	10.40	15.48	23.29	24.03	30.45	31.99	42.92	33.31	41.10
-30	8.061	8.214	11.79	17.08	17.63	21.76	22.74	29.50	23.80	28.61
-25	6.427	6.547	9.069	12.65	13.06	15.73	16.35	20.53	17.16	20.14
-20	5.168	5.261	7.037	9.465	9.761	11.48	11.89	14.46	12.49	14.33
-15	4.191	4.261	5.507	7.147	7.362	8.466	8.727	10.30	9.159	10.31
-10	3.424	3.476	4.344	5.444	5.599	6.300	6.469	7.407	6.772	7.482
-5	2.819	2.856	3.453	4.181	4.291	4.730	4.839	5.388	5.046	5.481
0	2.336	2.362	2.764	3.237	3.312	3.582	3.650	3.966	3.789	4.050
5	1.948	1.966	2.227	2.524	2.574	2.734	2.776	2.953	2.864	3.015
10	1.635	1.646	1.806	1.981	2.013	2.102	2.126	2.221	2.179	2.262
15	1.380	1.386	1.474	1.567	1.584	1.629	1.641	1.687	1.669	1.710
20	1.171	1.174	1.211	1.247	1.255	1.272	1.276	1.293	1.287	1.303
25	1	1	1	1	1	1	1	1	1	1
30	0.8585	0.8565	0.8309	0.8072	0.8016	0.7921	0.7890	0.7799	0.7823	0.7734
35	0.7407	0.7372	0.6941	0.6556	0.6461	0.6315	0.6266	0.6131	0.6158	0.6023
40	0.6422	0.6376	0.5828	0.5356	0.5235	0.5067	0.5007	0.4856	0.4876	0.4721
45	0.5595	0.5541	0.4916	0.4401	0.4266	0.4090	0.4025	0.3874	0.3884	0.3723
50	0.4899	0.4836	0.4165	0.3635	0.3496	0.3319	0.3254	0.3111	0.3111	0.2954
55	0.4309	0.4238	0.3543	0.3018	0.2881	0.2709	0.2645	0.2513	0.2504	0.2356
60	0.3806	0.3730	0.3027	0.2518	0.2386	0.2222	0.2161	0.2042	0.2026	0.1889
65	0.3376	0.3295	0.2595	0.2111	0.1985	0.1832	0.1774	0.1670	0.1648	0.1523
70	0.3008	0.2922	0.2233	0.1777	0.1659	0.1518	0.1465	0.1377	0.1348	0.1236
75	0.2691	0.2600	0.1929	0.1504	0.1393	0.1264	0.1215	0.1144	0.1108	0.1009
80	0.2417	0.2322	0.1672	0.1278	0.1174	0.1057	0.1013	0.09560	0.09162	0.08284
85	0.2180	0.2081	0.1451	0.1090	0.09937	0.08873	0.08486	0.08033	0.07609	0.06834
90	0.1974	0.1871	0.1261	0.09310	0.08442	0.07468	0.07138	0.06782	0.06345	0.05662
95	0.1793	0.1688	0.1097	0.07980	0.07200	0.06307	0.06028	0.05753	0.05314	0.04712
100	0.1636	0.1528	0.09563	0.06871	0.06166	0.05353	0.05112	0.04903	0.04472	0.03939
105	0.1498	0.1387	0.08357	0.05947	0.05306	0.04568	0.04351	0.04198	0.03784	0.03308
110	0.1377	0.1263	0.07317	0.05170	0.04587	0.03918	0.03718	0.03609	0.03218	0.02791
115	0.1270	0.1153	0.06421	0.04512	0.03979	0.03374	0.03188	0.03117	0.02748	0.02364
120	0.1175	0.1056	0.05650	0.03951	0.03460	0.02916	0.02742	0.02702	0.02352	0.02009
125	0.1091	0.09695	0.04986	0.03470	0.03013	0.02527	0.02367	0.02351	0.02017	0.01712

(✻1) Other than ERTJ0ET104□ in $B_{25/50}$=4500K.
(✻2) ERTJ0ET104□ only.

$$B_{25/50}=\frac{\ell n\ (R_{25}/R_{50})}{1/298.15-1/323.15} \qquad B_{25/85}=\frac{\ell n\ (R_{25}/R_{85})}{1/298.15-1/358.15}$$

R_{25}=Resistance at 25.0±0.1 °C
R_{50}=Resistance at 50.0±0.1 °C
R_{85}=Resistance at 85.0±0.1 °C

■ Part Number List of Narrow Tolerance Type (Resistance Tolerance : ±2 %, ±1 %)

● 0402(EIA)

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		G	V
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	(3375 K) 3435 K±1 %	4700 K±1 % (4750 K)
10 kΩ	±1 %(F) or ±2 %(G)			ERTJ0EG103□A	
100 kΩ					ERTJ0EV104□

□ : Resistance Tolerance Code
Avoid flow soldering.

● 0603(EIA)

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		G	S
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	(3375 K) 3435 K±1 %	(4330 K) 4390 K±1 %
10 kΩ	±1 %(F) or ±2 %(G)			ERTJ1VG103□A	
100 kΩ					ERTJ1VS104□A

□ : Resistance Tolerance Code
Avoid flow soldering.

■ Part Number List of Standard Type (Resistance Tolerance : ±5 %, ±3 %)

● 0201(EIA)

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		G	P	T	V
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	(3375 K) 3435 K±2 %	4050 K±3 % (4100 K)	4500 K±2 % (4450 K)	4700 K±2 % (4750 K)
2 kΩ	±3 %(H) or ±5 %(J)					ERTJZET202□	
3 kΩ						ERTJZET302□	
10 kΩ				ERTJZEG103□A			
47 kΩ					ERTJZEP473□		
100 kΩ							ERTJZEV104□

□ : Resistance Tolerance Code
Avoid flow soldering.

● 0402(EIA)

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		A		G	M
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	2750 K±3 % (2700 K)	2800 K±3 % (2750 K)	(3375 K) 3435 K±1 %	3900 K±2 % (3970 K)
22 Ω	±3 %(H) or ±5 %(J)			ERTJ0EA220□			
33 Ω				ERTJ0EA330□			
40 Ω				ERTJ0EA400□			
47 Ω				ERTJ0EA470□			
68 Ω					ERTJ0EA680□		
100 Ω					ERTJ0EA101□		
150 Ω					ERTJ0EA151□		
10 kΩ						ERTJ0EG103□A	ERTJ0EM103□

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		P	R	T	V
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	4050 K±2 % (4100 K)	4250 K±2 % (4300 K)	4500 K±2 % (4450 K, 4580 K)	4700 K±2 % (4750 K)
1.0 kΩ	±3 %(H) or ±5 %(J)					ERTJ0ET102□	
1.5 kΩ						ERTJ0ET152□	
2.0 kΩ						ERTJ0ET202□	
2.2 kΩ						ERTJ0ET222□	
3.0 kΩ						ERTJ0ET302□	
3.3 kΩ					ERTJ0ER332□	ERTJ0ET332□	
4.7 kΩ					ERTJ0ER472□	ERTJ0ET472□	
6.8 kΩ					ERTJ0ER682□		
10 kΩ					ERTJ0ER103□		
15 kΩ					ERTJ0ER153□		
22 kΩ					ERTJ0ER223□		
33 kΩ					ERTJ0ER333□		
47 kΩ				ERTJ0EP473□			ERTJ0EV473□
68 kΩ							ERTJ0EV683□
100 kΩ						ERTJ0ET104□	ERTJ0EV104□
150 kΩ							ERTJ0EV154□
220 kΩ							ERTJ0EV224□
330 kΩ							ERTJ0EV334□
470 kΩ							ERTJ0EV474□

□ : Resistance Tolerance Code
Avoid flow soldering.

● 0603(EIA)

Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		A		G	P
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	2750 K±3 % (2700 K)	2800 K±3 % (2750 K)	(3375 K) 3435 K±1 %	4050 K±3 % (4100 K)
22 Ω	±3 %(H) or ±5 %(J)			ERTJ1VA220□			
33 Ω				ERTJ1VA330□			
40 Ω					ERTJ1VA400□		
47 Ω					ERTJ1VA470□		
68 Ω					ERTJ1VA680□		
100 Ω					ERTJ1VA101□		
10 kΩ						ERTJ1VG103□A	
47 kΩ							ERTJ1VP473□

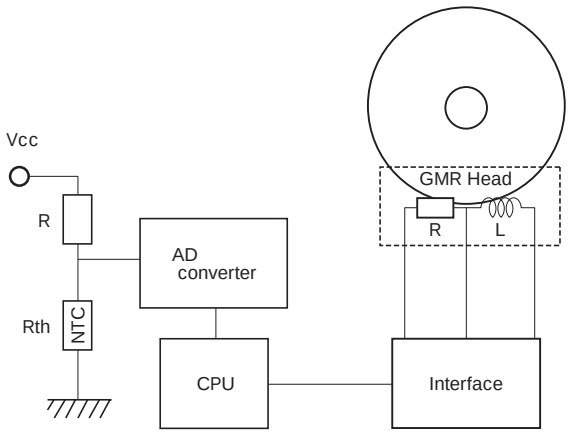
Nominal Resistance at 25 °C	Resistance Tolerance	B value class code		R	S	T	V
		Nominal B value ✻() Reference value	$B_{25/50}$ $B_{25/85}$	4250 K±2 % (4300 K)	(4330 K) 4390 K±1%	4500 K±2 % (4450 K)	4700 K±2 % (4750 K)
1.0 kΩ	±3 %(H) or ±5 %(J)					ERTJ1VT102□	
1.5 kΩ						ERTJ1VT152□	
2.0 kΩ						ERTJ1VT202□	
2.2 kΩ						ERTJ1VT222□	
3.0 kΩ						ERTJ1VT302□	
3.3 kΩ				ERTJ1VR332□		ERTJ1VT332□	
4.7 kΩ				ERTJ1VR472□		ERTJ1VT472□	
6.8 kΩ				ERTJ1VR682□			
10 kΩ				ERTJ1VR103□			
15 kΩ				ERTJ1VR153□			
22 kΩ				ERTJ1VR223□			
33 kΩ				ERTJ1VR333□			
47 kΩ				ERTJ1VR473□			ERTJ1VV473□
68 kΩ				ERTJ1VR683□			ERTJ1VV683□
100 kΩ					ERTJ1VS104□A		ERTJ1VV104□
150 kΩ							ERTJ1VV154□

□ : Resistance Tolerance Code
Avoid flow soldering.

■ Typical Application

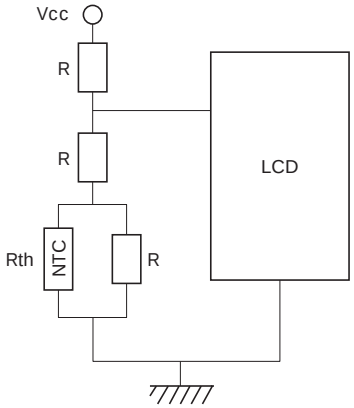
● Temperature Detection

Writing current control of HDD



● Temperature Compensation (Pseudo-linearization)

Contrast level control of LCD



● Temperature Compensation (RF circuit)

Temperature compensation of TCXO