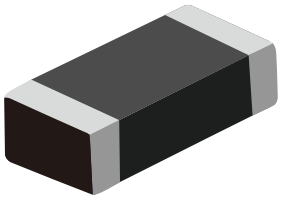
FEATURES

- Small size, large power, strong capacity of suppression of inrush current
- Fast response
- Big material constant(Bvalue), small residual resistance
- Long life and high reliability
- Complete series, wide applications



0603

APPLICATIONS

- Switching power-supply,switch power, ups power
- Monitor, Sps, Fax, Telecom, Adaptor etc.
- All kinds of RT, display
- Bulb and other lighting lamps

APPROVALS

RoHS	Compliance with 2011/65/EU
HF	Compliance with IEC61249-2-21:2003

PRODUCT IDENTIFICATION(PART NUMBER)

SND	—	CMFA	104	F	3950	F	A
①	②	③	④	⑤	⑥	⑦	⑧

①Code		②Type		③External Dimensions (L×W×T)(mm)		④Nominal Zero-Power Resistance	
SND	Logo	-	Delimiter	0402[CMFD]	1.00×0.50×0.50	472	4.7kΩ
				0603[CMFA]	1.60×0.80×0.80	103	10kΩ
				0805[CMFB]	2.00×1.25×0.85	104	100kΩ
				1206[CMFC]	3.20×1.60×0.85		

⑤Tolerance of Resistance		⑥B Constant		⑦Tolerance of B Constant		⑧B constant calculation method	
F	±1%	3380	3380K	F	±1%	A	25°C&85°C
G	±2%	3950	3950K	H	±3%	B	25°C&50°C
H	±3%	4100	4100K				
J	±5%						

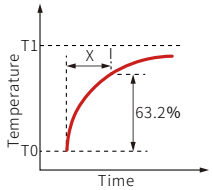
ELECTRICAL CHARACTERISTICS

Part No	Resistance (25°C) (kΩ)	B Constant (25/50°C) (K)	B Constant (25/85°C) (K)	Permissible Operating Current (25°C) (mA)	Dissipation Factor (mW/°C)	Thermal Time Constant (s)	Rated Electric Power(25°C) (mW)	Operating ambient temperature (°C)
SND-CMFA104F3950FA	100±1%	3950±1%	3987	0.10	1.0	<5	100	-40～+125

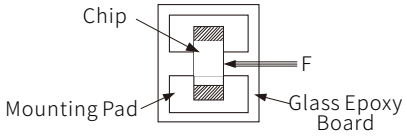
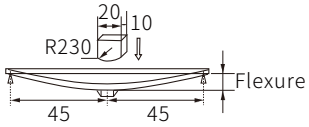
TEST AND MEASUREMENT PROCEDURES

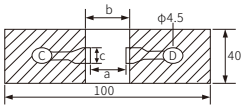
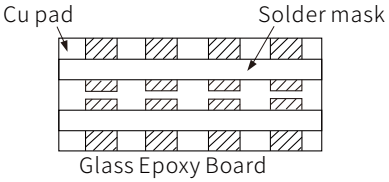
Test Conditions	Inspection Equipment
Unless otherwise specified, the standard atmospheric conditions for measurement/test as: a. Ambient Temperature: 20±15℃ b. Relative Humidity: 65±20% c. Air Pressure: 86kPa to 106kPa	Visual Examination: 20×magnifier Resistance value test: Thermistor resistance tester
If any doubt on the results, measurements/tests should be made within the following limits: a. Ambient Temperature: 25±2℃ b. Relative Humidity: 65±5% c. Air Pressure: 86kPa to 106kPa	

ELECTRICAL TEST

No.	Items	Test Methods and Remarks
1	Nominal Zero-Power Resistance at 25°C(R25)	Ambient temperature：25±0.05°C Measuring electric power：≤0.1mW
2	Nominal B Constant	Measure the resistance at the ambient temperature of 25±0.05°C, 50±0.05°C or,85±0.05°C. $B(25\text{-}50°C)=\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ $B(25\text{-}85°C)=\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ T: Absolute temperature (K)
3	Thermal Time Constant	The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T0 (°C) to T1 (°C) by the drastic change of the power applied to thermistor from Non-zero Power to Zero-Power state, normally expressed in second(S). 
4	Dissipation Factor	The required power which makes the NTC thermistor body temperature raise 1°C through self-heated, normally expressed in milliwatts per degree Celsius (mW/°C). It can be calculated by the following formula: $\delta=\frac{W}{T-T_0}$
5	Rated Power	The necessary electric power makes thermistor’s temperature rise 100°C by self-heating at ambient temperature 25°C
6	Permissible operating current	The current that keep body temperature of chip NTC on the PC board in still air rising 1°C by self-heating.

RELIABILITY TEST

<table>
<tr><th>Items</th><th>Standard</th><th>Test Methods and Remarks</th><th>Requirements</th></tr>
<tr><td>Terminal Strength</td><td>IEC 60068-2-21</td><td>Solder the chip to the testing jig (glass epoxy board shown in the right) using eutectic solder. Then apply a force in the direction of the arrow.
<table>
<tr><th>Size</th><th>F</th><th>Duration</th></tr>
<tr><td>0201,0402,0603</td><td>5N</td><td rowspan="2">10±1s</td></tr>
<tr><td>0805</td><td>10N</td></tr>
</table></td><td>No removal or split of the termination or other defects shall occur.

</td></tr>
<tr><td>Resistance to Flexure</td><td>IEC 60068-2-21</td><td>Solder the chip to the test jig (glass epoxy board shown in the right) using a eutectic solder. Then apply a force in the direction shown as follow;


<table>
<tr><th>Size</th><th>Flexure</th><th>Pressurizing Speed</th><th>Duration</th></tr>
<tr><td>0201</td><td>1mm</td><td rowspan="2">＜0.5mm/s</td><td rowspan="2">10±1s</td></tr>
<tr><td>0402,0603,0805</td><td>2mm</td></tr>
</table></td><td>① No visible damage
② I ΔR25/R25 I ⩽5%
<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>0201</td><td>0.25</td><td>0.3</td><td>0.3</td></tr>
<tr><td>0402</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
<tr><td>0603</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>0805</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
</table>

</td></tr>
<tr><td>Vibration</td><td>IEC 60068-2-80</td><td>①Solder the chip to the testing jig (glass epoxy board shown in theleft) using eutectic solder
②The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz
③The frequency ranges from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).</td><td>No visible damage

</td></tr>
<tr><td>Dropping</td><td>IEC 60068-2-32</td><td>Drop a chip 10 times on a concrete floor from a height of 1 meter</td><td>No visible damage.</td></tr>
<tr><td>Solderability</td><td>IEC 60068-2-58</td><td>①Solder temperature: 245±5℃
②Duration: 3±0.3s
③Solder: Sn/3.0Ag/0.5Cu.
④Flux:25% Resin and 75% ethanol in weight</td><td>①No visible damage.
②Wetting shall exceed 95% coverage.</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>IEC 60068-2-58</td><td>①Solder temperature: 260±5℃
②Duration: 10±1s
③Solder: Sn/3.0Ag/0.5Cu.
④Flux:25% Resin and 75% ethanol in weight
⑤The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td><td>①No visible damage
② I ΔR25/R25 I ⩽5%
③ I ΔB/B I ⩽2%</td></tr>
<tr><td>Temperature cycling</td><td>IEC 60068-2-14</td><td>5 cycles of following sequence without loading
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>-40±5℃</td><td>30±3min</td></tr>
<tr><td>2</td><td>25±2℃</td><td>5±3min</td></tr>
<tr><td>3</td><td>125±2℃</td><td>30±3min</td></tr>
<tr><td>4</td><td>25±2℃</td><td>5±3min</td></tr>
</table>
The chip shall be stabilized at normal condition for 1~2 hours before measuring</td><td>①No visible damage
② I ΔR25/R25 I ⩽3%
③ I ΔB/B I ⩽2%</td></tr>
<tr><td>Resistance to dry heat</td><td>IEC 60068-2-2</td><td>①125±5℃ in air, for 1000±24 hours without loading.
②The chip shall be stabilized at normal condition for 1~2 hours before measuring</td><td>①No visible damage
② I ΔR25/R25 I ⩽5%
③ I ΔB/B I ⩽2%</td></tr>
</table>

Items	Standard	Test Methods and Remarks	Requirements
Resistance to cold	IEC 60068-2-1	①-40±3℃ in air, for 1000±24 hours without loading. ②The chip shall be stabilized at normal condition for 1~2 hours before measuring.	①No visible damage ②	ΔR25/R25	⩽5% ③	ΔB/B	⩽2%
Resistance to damp heat	IEC 60068-2-78	①40±2℃, 90~95%RH in air, for 1000±24 hours without loading. ②The chip shall be stabilized at normal condition for 1~2 hours before measuring	①No visible damage ②	ΔR25/R25	⩽3% ③	ΔB/B	⩽2%
Resistance to high temperature load	IEC 60539-1 5.25.4	①85±2℃in air with permissive operating current for 1000±48 hours ②The chip shall be stabilized at normal condition for 1~2 hours before measuring	①No visible damage ②	ΔR25/R25	⩽5% ③	ΔB/B	⩽2%

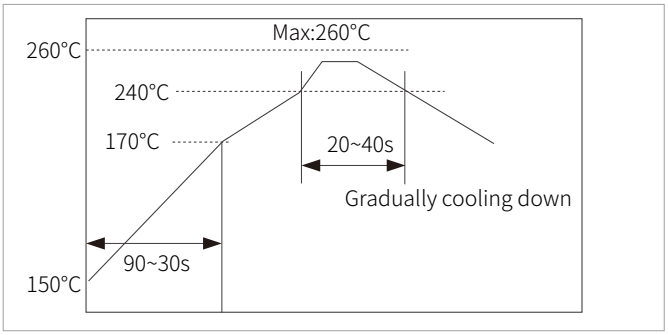
STORAGE

Storage Conditions	
a. Storage Temperature: -10°C~40°C	b. Relative Humidity: ⩽75%RH
c. Keep away from corrosive atmosphere and sunlight	
Period of Storage: 6 Months after delivery	

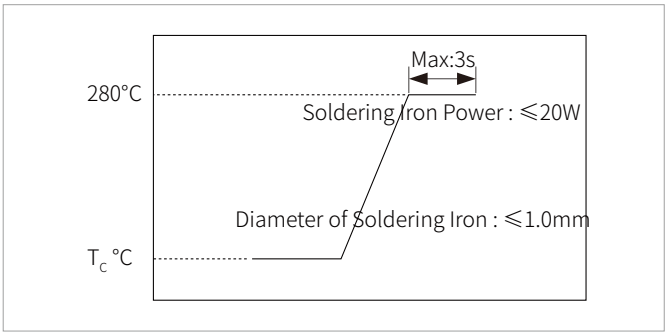
NOTES & WARNINGS

The SND series thermistors shall not be operated and stored under the following environmental condition:	
(1) Corrosive or deoxidized atmospheres (such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)	(2) Volatile or inflammable atmospheres
(3) Dusty condition	(4) Excessively high or low pressure condition
(5) Humid site	(6) Places with brine, oil, chemical liquid or organic solvent
(7) Intense vibration	(8) Places with analogously deleterious conditions
The ceramic body of the SND series thermistors is fragile, no excessive pressure or impact shall be exerted on it.	
The SND series thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.	

RECOMMENDED SOLDERING TECHNOLOGIES



Re-flowing Profile
1~2°C/sec. Ramp
Pre-heating: 150~170°C/90±30 sec.
Time above 240°C: 20~40 sec.
Peak temperature: 260°CMax./10 sec.
Solder paste: Sn/3.0Ag/0.5Cu
Max.2 times for re-flowing



Iron Soldering Profile
Iron soldering power: Max.20W
Pre-heating: 150°C/60sec.
Soldering Tip temperature: 280°CMax.
Soldering time: 3 sec Max.
Solder paste: Sn/3.0Ag/0.5Cu
Max.1 times for iron soldering

Note: Take care not to apply the tip of the soldering iron to the terminal electrodes

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL	Temp. TOL.(°C)
-40	3,299.275	3,452.748	3,613.000	4.64%	0.67
-39	3,086.507	3,227.909	3,375.451	4.57%	0.66
-38	2,888.916	3,019.247	3,155.143	4.50%	0.66
-37	2,705.320	2,825.494	2,950.711	4.43%	0.65
-36	2,534.636	2,645.486	2,760.908	4.36%	0.65
-35	2,375.874	2,478.161	2,584.594	4.29%	0.64
-34	2,228.123	2,322.542	2,420.720	4.23%	0.64
-33	2,090.549	2,177.736	2,268.333	4.16%	0.63
-32	1,962.386	2,042.922	2,126.550	4.09%	0.63
-31	1,842.930	1,917.347	1,994.569	4.03%	0.62
-30	1,731.535	1,800.319	1,871.649	3.96%	0.61
-29	1,627.605	1,691.203	1,757.110	3.90%	0.61
-28	1,530.593	1,589.414	1,650.330	3.83%	0.60
-27	1,439.996	1,494.413	1,550.732	3.77%	0.60
-26	1,355.349	1,405.707	1,457.791	3.71%	0.59
-25	1,276.225	1,322.839	1,371.019	3.64%	0.59
-24	1,202.069	1,245.222	1,289.795	3.58%	0.58
-23	1,132.704	1,172.662	1,213.908	3.52%	0.58
-22	1,067.789	1,104.798	1,142.976	3.46%	0.57
-21	1,007.012	1,041.298	1,076.644	3.39%	0.56
-20	950.083	981.854	1,014.586	3.33%	0.56
-19	896.736	926.182	956.500	3.27%	0.55
-18	846.723	874.020	902.107	3.21%	0.55
-17	799.816	825.125	851.151	3.15%	0.54
-16	755.802	779.274	803.393	3.10%	0.53
-15	714.487	736.257	758.614	3.04%	0.53
-14	675.688	695.883	716.610	2.98%	0.52
-13	639.237	657.974	677.193	2.92%	0.51
-12	604.978	622.365	640.187	2.86%	0.51
-11	572.767	588.902	605.432	2.81%	0.50
-10	542.468	557.444	572.776	2.75%	0.49
-9	513.958	527.858	542.081	2.69%	0.49
-8	487.119	500.023	513.217	2.64%	0.48
-7	461.844	473.824	486.065	2.58%	0.47
-6	438.034	449.155	460.513	2.53%	0.47
-5	415.595	425.920	436.458	2.47%	0.46
-4	394.410	403.995	413.772	2.42%	0.45

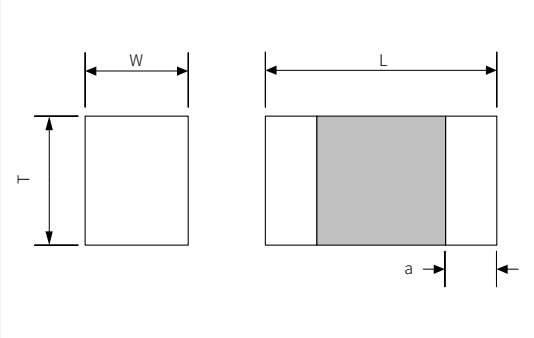
Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL	Temp. TOL.(°C)
-3	374.434	383.332	392.403	2.37%	0.45
-2	355.589	363.850	372.266	2.31%	0.44
-1	337.807	345.475	353.283	2.26%	0.43
0	321.020	328.139	335.382	2.21%	0.43
1	305.185	311.793	318.513	2.16%	0.42
2	290.224	296.357	302.590	2.10%	0.41
3	276.083	281.775	287.557	2.05%	0.40
4	262.713	267.995	273.357	2.00%	0.40
5	250.067	254.969	259.940	1.95%	0.39
6	238.082	242.628	247.236	1.90%	0.38
7	226.741	230.956	235.227	1.85%	0.37
8	216.007	219.915	223.872	1.80%	0.37
9	205.845	209.467	213.132	1.75%	0.36
10	196.220	199.576	202.969	1.70%	0.35
11	187.106	190.215	193.357	1.65%	0.34
12	178.469	181.348	184.255	1.60%	0.33
13	170.278	172.943	175.632	1.55%	0.33
14	162.511	164.976	167.462	1.51%	0.32
15	155.141	157.420	159.718	1.46%	0.31
16	148.144	150.250	152.372	1.41%	0.30
17	141.502	143.448	145.406	1.37%	0.29
18	135.195	136.991	138.797	1.32%	0.29
19	129.205	130.862	132.526	1.27%	0.28
20	123.514	125.041	126.574	1.23%	0.27
21	118.106	119.511	120.922	1.18%	0.26
22	112.964	114.257	115.554	1.13%	0.25
23	108.075	109.264	110.454	1.09%	0.24
24	103.425	104.515	105.607	1.04%	0.24
25	99.000	100.000	101.000	1.00%	0.23
26	94.705	95.704	96.704	1.04%	0.24
27	90.621	91.617	92.614	1.09%	0.25
28	86.735	87.726	88.719	1.13%	0.26
29	83.036	84.021	85.009	1.18%	0.27
30	79.516	80.493	81.475	1.22%	0.29
31	76.164	77.133	78.107	1.26%	0.30
32	72.972	73.932	74.897	1.31%	0.31
33	69.931	70.881	71.837	1.35%	0.32

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL	Temp. TOL.(°C)
34	67.034	67.973	68.918	1.39%	0.33
35	64.272	65.199	66.133	1.43%	0.35
36	61.638	62.554	63.476	1.47%	0.36
37	59.127	60.030	60.941	1.52%	0.37
38	56.732	57.621	58.519	1.56%	0.38
39	54.446	55.322	56.207	1.60%	0.40
40	52.264	53.127	53.999	1.64%	0.41
41	50.181	51.030	51.889	1.68%	0.42
42	48.193	49.028	49.873	1.72%	0.43
43	46.294	47.115	47.945	1.76%	0.45
44	44.479	45.285	46.102	1.80%	0.46
45	42.745	43.537	44.340	1.84%	0.47
46	41.089	41.867	42.656	1.88%	0.49
47	39.507	40.270	41.045	1.92%	0.50
48	37.993	38.743	39.503	1.96%	0.51
49	36.546	37.281	38.027	2.00%	0.53
50	35.161	35.882	36.614	2.04%	0.54
51	33.836	34.543	35.261	2.08%	0.55
52	32.567	33.260	33.965	2.12%	0.57
53	31.353	32.032	32.723	2.16%	0.58
54	30.190	30.856	31.533	2.19%	0.59
55	29.076	29.729	30.392	2.23%	0.61
56	28.010	28.649	29.299	2.27%	0.62
57	26.988	27.613	28.251	2.31%	0.64
58	26.008	26.620	27.245	2.35%	0.65
59	25.069	25.669	26.280	2.38%	0.66
60	24.168	24.755	25.355	2.42%	0.68
61	23.306	23.881	24.468	2.46%	0.69
62	22.479	23.042	23.616	2.49%	0.71
63	21.686	22.237	22.799	2.53%	0.72
64	20.925	21.464	22.014	2.57%	0.74
65	20.194	20.721	21.261	2.60%	0.75
66	19.491	20.007	20.535	2.64%	0.76
67	18.816	19.321	19.838	2.67%	0.78
68	18.167	18.661	19.167	2.71%	0.79
69	17.544	18.028	18.523	2.75%	0.81
70	16.946	17.419	17.903	2.78%	0.82

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL	Temp. TOL.(°C)
71	16.374	16.836	17.310	2.82%	0.84
72	15.824	16.276	16.740	2.85%	0.85
73	15.295	15.738	16.192	2.88%	0.87
74	14.786	15.220	15.664	2.92%	0.88
75	14.298	14.721	15.156	2.95%	0.90
76	13.826	14.240	14.666	2.99%	0.92
77	13.372	13.777	14.194	3.02%	0.93
78	12.935	13.332	13.739	3.06%	0.95
79	12.515	12.903	13.301	3.09%	0.96
80	12.110	12.490	12.880	3.12%	0.98
81	11.722	12.093	12.475	3.16%	0.99
82	11.348	11.711	12.084	3.19%	1.01
83	10.988	11.343	11.708	3.22%	1.03
84	10.641	10.988	11.346	3.26%	1.04
85	10.306	10.646	10.996	3.29%	1.06
86	9.984	10.316	10.659	3.32%	1.07
87	9.673	9.999	10.334	3.35%	1.09
88	9.374	9.692	10.020	3.38%	1.11
89	9.085	9.396	9.717	3.42%	1.12
90	8.806	9.111	9.425	3.45%	1.14
91	8.538	8.836	9.143	3.48%	1.16
92	8.279	8.570	8.871	3.51%	1.17
93	8.029	8.314	8.609	3.54%	1.19
94	7.787	8.066	8.355	3.57%	1.21
95	7.555	7.828	8.110	3.61%	1.22
96	7.330	7.598	7.874	3.64%	1.24
97	7.114	7.376	7.646	3.67%	1.26
98	6.906	7.162	7.427	3.70%	1.27
99	6.704	6.955	7.214	3.73%	1.29
100	6.509	6.755	7.008	3.76%	1.31
101	6.321	6.561	6.810	3.79%	1.33
102	6.139	6.374	6.618	3.82%	1.34
103	5.963	6.194	6.432	3.85%	1.36
104	5.793	6.019	6.252	3.88%	1.38
105	5.629	5.850	6.079	3.91%	1.40
106	5.470	5.686	5.910	3.94%	1.41
107	5.317	5.528	5.747	3.97%	1.43

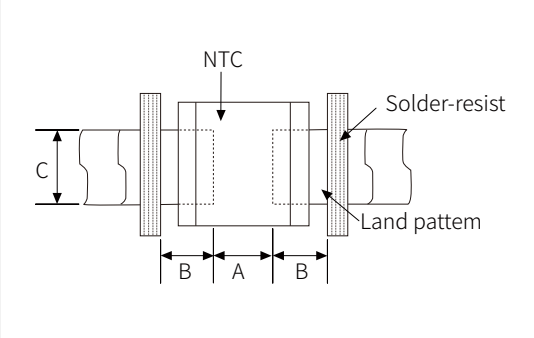
Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL	Temp. TOL.(°C)
108	5.168	5.375	5.590	4.00%	1.45
109	5.025	5.227	5.438	4.03%	1.47
110	4.886	5.084	5.290	4.05%	1.49
111	4.751	4.945	5.147	4.08%	1.50
112	4.620	4.811	5.009	4.11%	1.52
113	4.494	4.681	4.875	4.14%	1.54
114	4.372	4.555	4.745	4.17%	1.56
115	4.254	4.433	4.619	4.20%	1.58
116	4.141	4.316	4.498	4.22%	1.60
117	4.030	4.202	4.381	4.25%	1.62
118	3.923	4.092	4.267	4.28%	1.63
119	3.820	3.985	4.157	4.31%	1.65
120	3.720	3.881	4.050	4.34%	1.67
121	3.622	3.781	3.946	4.36%	1.69
122	3.528	3.684	3.845	4.39%	1.71
123	3.437	3.589	3.748	4.42%	1.73
124	3.349	3.498	3.653	4.44%	1.75
125	3.263	3.409	3.562	4.47%	1.77

DIMENSION SPECIFICATION



Size	L(mm)	W(mm)	T(mm)	a(mm)
0603	0.063±0.006	0.031±0.006	0.031±0.006	0.012±0.008
[1608]	[1.6±0.15]	[0.8±0.15]	[0.8±0.15]	[0.3±0.2]

DIMENSION SPECIFICATION



A(mm)	B(mm)	C(mm)
[0.6-0.8]	[0.6-0.7]	[0.6-0.8]

TAPING

Type	0201	0402	0603	0805
Tape thickness(mm)	0.5±0.15	0.5±0.15	0.8±0.15	0.85±0.2
Tape material	Paper Tape			
Quantity per Reel	15K	10K	4K	4K

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