NTC Thermistor SMD



DESCRIPTION

The LNS series is manganese oxide based NTC thermistor, which shows non-linear resistance-temperature behavior. Multilayered structure has as high reliability as monoblock type, even without protective glass coating, since the active electrode and sensor layer is buried inside the ceramic body.

FEATURES

- Multilayer structure allows diverse resistance value in the same B constant
- Multilayer structure allows lower resistance at high B
- constant.
  Solder plating with Ni barrier gives high reliability for both flow
- and reflow soldering.
  Unified shape and tightly controlled dimension is fit to high mounting speed.

APPLICATIONS

- Temperature compensation for crystal oscillator (TCXO)
- Temperature compensation for Personal computer
- Temperature detection for CPU and memory device
- Temperature detection for battery pack
- Temperature compensation for contrast of LCD

ORDERING INFORMATION

LNS V 16 G 103 J P

Series

B constant
- Z 3250K
- K 3435K
- Y 3670K
- W 3890K
- A 3970K
- V 4150K
- U 4550K
- T 4750K

Chip size (mm)
- 10 1.0 x 0.5 x 0.5 (inches 0402)
- 16 1.6 x 0.8 x 0.8 (inches 0603)
- 20 2.0 x 1.2 x 0.8 (inches 0805)

B constant deviation range
- F ¡ 1%
- G ¡ 2%
- H ¡ 3%

Resistance at 25 ¡
- 101 10 ¡¿10¹ = 100¥
- 102 10 ¡¿10² = 1 K¥
- 103 10 ¡¿10³ = 10 K¥

Resistance deviation range
- F ¡ 1£¥
- H ¡ 3£¥
- J ¡ 5£¥
- K ¡ 10£¥

Package
- P Paper taping
- E Emboss taping
- B Bulk

SPECIFICATIONS

1005(0402) size

Part Number	Resistance @25°C	B constant 25/85	Dissipation Constant	Maximum Power Rating	Operating Temp.
LNSZ10 _ 220_ _	22§	3250K	1mW/°C	100mW	-40~85 °C
LNSZ10 _ 300_ _	30§	3250K			
LNSZ10 _ 400_ _	40§	3250K			
LNSZ10 _ 450_ _	45§	3250K			
LNSZ10 _ 500_ _	50§	3250K			
LNSZ10 _ 600_ _	60§	3250K			
LNSZ10 _ 101_ _	100§	3250K			-40~125°C
LNSK10 _ 502_ _	5§	3435K			
LNSK10 _ 103_ _	10§	3435K			
LNSY10 _ 102_ _	1§	3670K			
LNSY10 _ 222_ _	2.2§	3670K			
LNSY10 _ 472_ _	4.7§	3670K			
LNSY10 _ 502_ _	5§	3670K			
LNSY10 _ 682_ _	6.8§	3670K			
LNSY10 _ 103_ _	10§	3670K			
LNSW10 _ 103_ _	10§	3890K			
LNSW10 _ 223_ _	22§	3890K			
LNSW10 _ 443_ _	44§	3890K			
LNSV10 _ 202_ _	2§	4150K			-40~85°C
LNSV10 _ 222_ _	2.2§	4150K			
LNSV10 _ 272_ _	2.7§	4150K			
LNSV10 _ 332_ _	3.3§	4150K			
LNSV10 _ 103_ _	10§	4150K			
LNSV10 _ 333_ _	33§	4150K			
LNSV10 _ 473_ _	47§	4150K			-40~125°C
LNSV10 _ 503_ _	50§	4150K			
LNSV10 _ 583_ _	58§	4150K			
LNSV10 _ 683_ _	68§	4150K			
LNSV10 _ 853_ _	85§	4150K			
LNSV10 _ 104_ _	100§	4150K			
LNSV10 _ 124_ _	120§	4150K			
LNSV10 _ 154_ _	150§	4150K			
LNSV10 _ 334_ _	330§	4150K			
LNSV10 _ 474_ _	470§	4150K			
LNSU10 _ 333_ _	33§	4550K			
LNSU10 _ 683_ _	68§	4550K			
LNSU10 _ 104_ _	100§	4550K			
LNSU10 _ 224_ _	220§	4550K			
LNSU10 _ 105_ _	1§	4750K			
LNST10 _ 474_ _	470§	4750K			
LNSU10 _ 504_ _	500§	4750K			
LNSU10 _ 205_ _	2 §	4750K			

If you want additional spec., please contact to lattron. Fax : 82-42-935-2034 Email : lattron@lattron.com

Resistance @ 25°C

The zero-power resistance at the standard temperature of 25°C. The zero-power resistance means the value of DC resistance of a thermistor measured at a specified temperature, with electric load being kept so small that there is no noticeable change in the measured resistance by the influence of the applied electric load.

Bconstant 25 / 85

$B = \ln(R_0/R_1) / (1/T_0 - 1/T_1)$ Without special note, B constant is calculated from the resistance values at 25°C and 85°C [B25/85], which is the most common.

Dissipation constant (¥)

Dissipation factor is defined as the ratio at a specified ambient temperature of a change in power dissipation in a thermistor to the resultant body temperature change.

¡ /¥ = P/(T_1 - 25°C) mW/ °C ¡ /P : dissipated power ¡ /T1 : thermistor temp, 85 ¡ 0.1°C

Maximum power rating P

This is the maximum handling power, keeping its temperature not exceeding the allowed maximum temperature for operation.

¡ /P_{max} = ¥(T_{max} - T_a) ¡ /¥:dissipation constant ¡ /T_a:25°C ¡ /T_{max}:125°C

Thermal Time Constant

The time necessary for an unloaded thermistor to vary its temperature by 63.2% of the difference between its initial and final temperatures. Initial temperature is 85 ¡ 0.1°C and final temperature is 47.1 ¡ 0.1°C.

1608(0603) size

Part Number	Resistance @25°C	B constant 25/85	Dissipation Constant	Maximum Power Rating	Operating Temp.
LNSZ16 _ 220_ _	22§	3250K	3mW/°C	300mW	-40~85°C
LNSZ16 _ 300_ _	30§	3250K			
LNSZ16 _ 400_ _	40§	3250K			
LNSZ16 _ 450_ _	45§	3250K			
LNSZ16 _ 500_ _	50§	3250K			
LNSZ16 _ 600_ _	60§	3250K			
LNSZ16 _ 101_ _	100§	3250K			
LNSK16 _ 502_ _	5§	3435K			-40~125°C
LNSK16 _ 103_ _	10§	3435K			
LNSY16 _ 102_ _	1§	3670K			
LNSY16 _ 222_ _	2.2§	3670K			
LNSY16 _ 472_ _	4.7§	3670K			
LNSY16 _ 502_ _	5§	3670K			
LNSY16 _ 682_ _	6.8§	3670K			
LNSY16 _ 103_ _	10§	3670K			
LNSW16 _ 103_ _	10§	3890K			
LNSW16 _ 223_ _	22§	3890K			
LNSW16 _ 443_ _	44§	3890K			
LNSV16 _ 202_ _	2§	4150K			-40~85°C
LNSV16 _ 222_ _	2.2§	4150K			
LNSV16 _ 272_ _	2.7§	4150K			
LNSV16 _ 332_ _	3.3§	4150K			
LNSV16 _ 103_ _	10§	4150K			
LNSV16 _ 333_ _	33§	4150K			
LNSV16 _ 473_ _	47§	4150K			-40~125°C
LNSV16 _ 503_ _	50§	4150K			
LNSV16 _ 583_ _	58§	4150K			
LNSV16 _ 683_ _	68§	4150K			
LNSV16 _ 853_ _	85§	4150K			
LNSV16 _ 104_ _	100§	4150K			
LNSV16 _ 124_ _	120§	4150K			
LNSV16 _ 154_ _	150§	4150K			
LNSV16 _ 334_ _	330§	4150K			
LNSV16 _ 474_ _	470§	4150K			
LNSU16 _ 683_ _	68§	4550K			
LNSU16 _ 104_ _	100§	4550K			
LNSU16 _ 224_ _	220§	4550K			
LNSU16 _ 105_ _	1§	4750K			
LNST16 _ 474_ _	470 §	4750K			
LNSU16 _ 504_ _	500§	4750K			
LNSU16 _ 205_ _	2 §	4750K			

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Resistance @ 25°C

The zero-power resistance at the standard temperature of 25°C. The zero-power resistance means the value of DC resistance of a thermistor measured at a specified temperature, with electric load being kept so small that there is no noticeable change in the measured resistance by the influence of the applied electric load.

Bconstant 25 / 85

$B = \ln(R_0/R_1) / (1/T_0 - 1/T_1)$ Without special note, B constant is calculated from the resistance values at 25°C and 85°C [B25/85], which is the most common.

Dissipation constant (¥)

Dissipation factor is defined as the ratio at a specified ambient temperature of a change in power dissipation in a thermistor to the resultant body temperature change.

¡ /¥ = P/(T_1 - 25°C) mW/ °C ¡ /P : dissipated power ¡ /T1 : thermistor temp, 85¡ 0.1°C

Maximum power rating P

This is the maximum handling power, keeping its temperature not exceeding the allowed maximum temperature for operation.

¡ /P_{max} = ¥(T_{max} - T_a) ¡ /¥:dissipation constant ¡ /T_a:25°C ¡ /T_{max}:125°C

Thermal Time Constant

The time necessary for an unloaded thermistor to vary its temperature by 63.2% of the difference between its initial and final temperatures. Initial temperature is 85¡ 0.1°C and final temperature is 47.1¡ 0.1°C.

2012(0805) size

Part Number	Resistance @25°C	B constant 25/85	Dissipation Constant	Maximum Power Rating	Operating Temp.
LNSK20 _ 502_ _	5§	3435K	3.5mW/°C	350mW	-40~125°C
LNSK20 _ 103_ _	10§	3435K			
LNSY20 _ 102_ _	1§	3670K			
LNSY20 _ 222_ _	2.2§	3670K			
LNSY20 _ 472_ _	4.7§	3670K			
LNSY20 _ 502_ _	5§	3670K			
LNSY20 _ 682_ _	6.8§	3670K			
LNSY20 _ 103_ _	10§	3670K			
LNSW20 _ 103_ _	10§	3890K			
LNSW20 _ 223_ _	22§	3890K			
LNSW20 _ 443_ _	44§	3890K			-40~85°C
LNSV20 _ 202_ _	2§	4150K			
LNSV20 _ 222_ _	2.2§	4150K			
LNSV20 _ 272_ _	2.7§	4150K			
LNSV20 _ 332_ _	3.3§	4150K			
LNSV20 _ 103_ _	10§	4150K			
LNSV20 _ 333_ _	33§	4150K			-40~125°C
LNSV20 _ 473_ _	47§	4150K			
LNSV20 _ 503_ _	50§	4150K			
LNSV20 _ 583_ _	58§	4150K			
LNSV20 _ 683_ _	68§	4150K			
LNSV20 _ 853_ _	85§	4150K			
LNSV20 _ 104_ _	100§	4150K			
LNSV20 _ 124_ _	120§	4150K			
LNSV20 _ 154_ _	150§	4150K			
LNSV20 _ 334_ _	330§	4150K			
LNSV20 _ 474_ _	470§	4150K			
LNSU20 _ 683_ _	68§	4550K			
LNSU20 _ 104_ _	100§	4550K			
LNSU20 _ 105_ _	1§	4750K			
LNST20 _ 474_ _	470§	4750K			

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Resistance @ 25°C

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Bconstant 25 / 85

$B = \ln(R_0/R_1) / (1/T_0 - 1/T_1)$ Without special note, B constant is calculated from the resistance values at 25°C and 85°C [B25/85], which is the most common.

Dissipation constant (¥)

Dissipation factor is defined as the ratio at a specified ambient temperature of a change in power dissipation in a thermistor to the resultant body temperature change.

¡ /¥ = P/(T_1 - 25°C) mW/ °C ¡ /P : dissipated power ¡ /T1 : thermistor temp, 85¡ 0.1°C

Maximum power rating P

This is the maximum handling power, keeping its temperature not exceeding the allowed maximum temperature for operation.

¡ /P_{max} = ¥(T_{max} - T_a) ¡ /¥:dissipation constant ¡ /T_a:25°C ¡ /T_{max}:125°C

Thermal Time Constant

The time necessary for an unloaded thermistor to vary its temperature by 63.2% of the difference between its initial and final temperatures. Initial temperature is 85¡ 0.1°C and final temperature is 47.1¡ 0.1°C.

RESISTANCE VS. TEMPERATURE TABLE

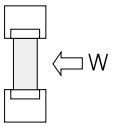
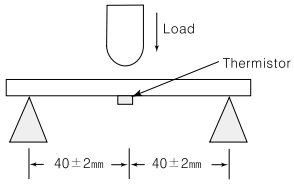
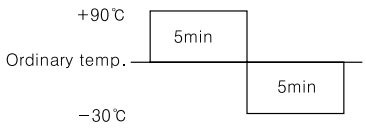
Temp. (°C)	LNSZ _ _ _ 220 _ _		LNSZ _ _ _ 300 _ _		LNSZ _ _ _ 400 _ _		LNSZ _ _ _ 450 _ _		LNSZ _ _ _ 500 _ _		LNSZ _ _ _ 600 _ _		LNSZ _ _ _101 _ _		LNSK_ _ _502_ _		LNSK_ _ _103_ _		LNSY_ _ _102_ _	
	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$
-40	417.2	3147	568.9	3147	758.6	3147	853.4	3147	948.2	3147	1,138	3147	1896	3147	100.4	3208	200.8	3208	23.69	3385
-35	317.0	3157	432.3	3157	576.4	3157	648.5	3157	720.5	3157	864.6	3157	1441	3157	76.44	3227	152.9	3227	17.71	3401
-30	243.2	3167	331.7	3167	442.2	3167	497.5	3167	552.8	3167	663.4	3167	1106	3167	58.61	3244	117.2	3244	13.36	3417
-25	188.3	3177	256.8	3177	342.4	3177	385.2	3177	428.0	3177	513.6	3177	856.0	3177	45.26	3260	90.51	3260	10.17	3433
-20	147.1	3186	200.5	3186	267.4	3186	300.8	3186	334.2	3186	401.1	3186	668.4	3186	35.20	3273	70.40	3273	7.811	3448
-15	115.8	3195	157.9	3195	210.5	3195	236.8	3195	263.1	3195	315.8	3195	526.3	3195	27.57	3285	55.14	3285	6.046	3462
-10	91.87	3204	125.3	3204	167.0	3204	187.9	3204	208.8	3204	250.6	3204	417.6	3204	21.75	3296	43.51	3296	4.716	3477
-5	73.43	3212	100.1	3212	133.5	3212	150.2	3212	166.9	3212	200.3	3212	333.8	3212	17.28	3306	34.57	3306	3.705	3491
0	59.11	3220	80.61	3220	107.5	3220	120.9	3220	134.4	3220	161.2	3220	268.7	3220	13.83	3314	27.66	3314	2.932	3504
5	47.91	3227	65.33	3227	87.11	3227	98.00	3227	108.9	3227	130.7	3227	217.8	3227	11.14	3322	22.28	3322	2.335	3517
10	39.08	3234	53.29	3234	71.06	3234	79.94	3234	88.82	3234	106.6	3234	177.6	3234	9.033	3329	18.07	3329	1.872	3530
15	32.08	3240	43.74	3240	58.32	3240	65.61	3240	72.90	3240	87.49	3240	145.8	3240	7.372	3335	14.74	3335	1.510	3542
20	26.49	3245	36.12	3245	48.16	3245	54.18	3245	60.20	3245	72.24	3245	120.4	3245	6.053	3341	12.11	3341	1.225	3554
25	22.00	3250	30.00	3250	40.00	3250	45.00	3250	50.00	3250	60.00	3250	100.0	3250	5.000	3347	10.00	3347	1.000	3565
30	18.38	3255	25.06	3255	33.41	3255	37.59	3255	41.76	3255	50.11	3255	83.52	3255	4.154	3353	8.307	3353	0.821	3576
35	15.43	3258	21.04	3258	28.06	3258	31.56	3258	35.07	3258	42.09	3258	70.14	3258	3.469	3359	6.938	3359	0.677	3587
40	13.03	3261	17.77	3261	23.69	3261	26.65	3261	29.61	3261	35.53	3261	59.22	3261	2.912	3364	5.824	3364	0.561	3597
45	11.06	3263	15.08	3263	20.10	3263	22.62	3263	25.13	3263	30.16	3263	50.26	3263	2.457	3370	4.913	3370	0.467	3607
50	9.432	3264	12.86	3264	17.15	3264	19.29	3264	21.44	3264	25.72	3264	42.87	3264	2.082	3377	4.164	3377	0.391	3616
55	8.085	3265	11.03	3265	14.70	3265	16.54	3265	18.38	3265	22.05	3265	36.75	3265	1.772	3384	3.543	3384	0.329	3625
60	6.965	3264	9.497	3264	12.66	3264	14.25	3264	15.83	3264	18.99	3264	31.66	3264	1.514	3391	3.028	3391	0.278	3633
65	6.028	3263	8.220	3263	10.96	3263	12.33	3263	13.70	3263	16.44	3263	27.40	3263	1.298	3398	2.597	3398	0.236	3642
70	5.242	3261	7.148	3261	9.53	3261	10.72	3261	11.91	3261	14.30	3261	23.83	3261	1.117	3407	2.235	3407	0.201	3649
75	4.579	3258	6.245	3258	8.32	3258	89.367	3258	10.41	3258	12.49	3258	20.82	3258	0.965	3415	1.930	3415	0.172	3657
80	4.019	3255	5.480	3255	7.30	3255	58.220	3255	9.133	3255	10.96	3255	18.27	3255	0.836	3425	1.671	3425	0.148	3664
85	3.5423	3250	4.830	3250	6.440	3250	7.245	3250	8.050	3250	9.660	3250	16.10	3250	0.726	3435	1.452	3435	0.127	3670
90	3.1363	3245	4.276	3245	5.701	3245	6.414	3245	7.126	3245	8.552	3245	14.25	3245	0.632	3445	1.264	3445	0.110	3676
95	2.7873	3239	3.801	3239	5.068	3239	5.702	3239	6.335	3239	7.602	3239	12.67	3239	0.552	3456	1.104	3456	0.096	3682
100	2.488	3233	3.393	3233	4.524	3233	5.089	3233	5.655	3233	6.786	3233	11.31	3233	0.483	3466	0.966	3466	0.083	3688
105	2.230	3226	3.041	3226	4.054	3226	4.561	3226	5.068	3226	6.08	3226	10.14	3226	0.424	3478	0.848	3478	0.073	3694
110	2.006	3219	2.736	3219	3.647	3219	4.103	3219	4.559	3219	5.471	3219	9.119	3219	0.373	3489	0.746	3489	0.064	3699
115	1.811	3211	2.470	3211	3.294	3211	3.705	3211	4.117	3211	4.940	3211	8.234	3211	0.329	3500	0.657	3500	0.056	3704
120	1.641	3202	2.238	3202	2.984	3202	3.357	3202	3.731	3202	4.477	3202	7.461	3202	0.291	3511	0.581	3511	0.049	3709

Temp. (°C)	LNSY _ _ _222_ _		LNSY_ _ _472 _ _		LNSY _ _ _502_ _		LNSY_ _ _682_ _		LNSY _ _ _103_ _		LNSW_ _ _103_ _		LNSW _ _ _223 _ _		LNSW _ _ _443 _ _		LNSV _ _ _202 _ _		LNSV _ _ _222 _ _	
	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$
-40	52.11	3385	111.3	3385	118.4	3385	161.1	3385	236.9	3385	290.1	3601	638.1	3601	1276	3601	76.67	3900	84.34	3900
-35	38.96	3401	83.23	3401	88.54	3401	120.4	3401	177.1	3401	213.6	3623	469.9	3623	939.8	3623	54.93	3920	60.42	3920
-30	29.40	3417	62.81	3417	66.81	3417	90.87	3417	133.6	3417	158.6	3643	348.9	3643	697.8	3643	39.74	3940	43.72	3940
-25	22.38	3433	47.82	3433	50.87	3433	69.18	3433	101.7	3433	118.7	3661	261.2	3661	522.4	3661	29.03	3958	31.93	3958
-20	17.18	3448	36.71	3448	39.06	3448	53.12	3448	78.11	3448	89.63	3678	197.2	3678	394.4	3678	21.40	3976	23.54	3976
-15	13.30	3462	28.42	3462	30.23	3462	41.11	3462	60.46	3462	68.20	3694	150.0	3694	300.1	3694	15.92	3992	17.51	3992
-10	10.37	3477	22.16	3477	23.58	3477	32.07	3477	47.16	3477	52.30	3709	115.1	3709	230.1	3709	11.95	4006	13.14	4006
-5	8.152	3491	17.42	3491	18.53	3491	25.20	3491	37.05	3491	40.42	3722	88.92	3722	177.8	3722	9.040	4020	9.944	4020
0	6.450	3504	13.78	3504	14.66	3504	19.94	3504	29.32	3504	31.47	3735	69.24	3735	138.5	3735	6.898	4033	7.587	4033
5	5.138	3517	10.98	3517	11.68	3517	15.88	3517	23.35	3517	24.68	3747	54.30	3747	108.6	3747	5.305	4045	5.835	4045
10	4.119	3530	8.800	3530	9.361	3530	12.73	3530	18.72	3530	19.50	3758	42.89	3758	85.79	3758	4.111	4056	4.523	4056
15	3.323	3542	7.098	3542	7.551	3542	10.27	3542	15.10	3542	15.51	3768	34.11	3768	68.22	3768	3.210	4066	3.531	4066
20	2.696	3554	5.760	3554	6.127	3554	8.333	3554	12.25	3554	12.41	3778	27.31	3778	54.62	3778	2.525	4075	2.778	4075
25	2.200	3565	4.700	3565	5.000	3565	6.800	3565	10.00	3565	10.00	3788	22.00	3788	44.00	3788	2.000	4083	2.200	4083
30	1.805	3576	3.856	3576	4.103	3576	5.579	3576	8.205	3576	8.106	3797	17.83	3797	35.66	3797	1.595	4091	1.754	4091
35	1.489	3587	3.181	3587	3.384	3587	4.602	3587	6.768	3587	6.609	3806	14.54	3806	29.08	3806	1.280	4098	1.408	4098
40	1.234	3597	2.637	3597	2.805	3597	3.815	3597	5.611	3597	5.418	3814	11.92	3814	23.84	3814	1.034	4105	1.138	4105
45	1.028	3607	2.197	3607	2.337	3607	3.179	3607	4.675	3607	4.466	3823	9.825	3823	19.65	3823	0.841	4111	0.925	4111
50	0.861	3616	1.839	3616	1.956	3616	2.661	3616	3.913	3616	3.700	3831	8.141	3831	16.28	3831	0.687	4116	0.756	4116
55	0.724	3625	1.547	3625	1.645	3625	2.238	3625	3.291	3625	3.081	3840	6.778	3840	13.56	3840	0.565	4121	0.622	4121
60	0.611	3633	1.306	3633	1.390	3633	1.890	3633	2.779	3633	2.577	3848	5.669	3848	11.34	3848	0.467	4126	0.514	4126
65	0.519	3642	1.108	3642	1.179	3642	1.603	3642	2.358	3642	2.165	3857	4.763	3857	9.527	3857	0.389	4130	0.427	4130
70	0.442	3649	0.944	3649	1.004	3649	1.366	3649	2.009	3649	1.827	3865	4.019	3865	8.038	3865	0.325	4134	0.357	4134
75	0.378	3657	0.808	3657	0.859	3657	1.168	3657	1.718	3657	1.548	3873	3.405	3873	6.811	3873	0.273	4138	0.300	4138
80	0.325	3664	0.693	3664	0.738	3664	1.003	3664	1.475	3664	1.317	3881	2.897	3881	5.793	3881	0.230	4141	0.253	4141
85	0.280	3670	0.598	3670	0.636	3670	0.865	3670	1.272	3670	1.124	3889	2.473	3889	4.947	3889	0.195	4145	0.214	4145
90	0.242	3676	0.517	3676	0.550	3676	0.748	3676	1.100	3676	0.964	3897	2.120	3897	4.240	3897	0.166	4149	0.182	4149
95	0.210	3682	0.449	3682	0.478	3682	0.650	3682	0.955	3682	0.829	3905	1.823	3905	3.647	3905	0.142	4152	0.156	4152
100	0.183	3688	0.391	3688	0.416	3688	0.566	3688	0.832	3688	0.715	3912	1.574	3912	3.148	3912	0.121	4156	0.134	4156
105	0.160	3694	0.342	3694	0.364	3694	0.495	3694	0.727	3694	0.620	3919	1.364	3919	2.727	3919	0.104	4160	0.115	4160
110	0.140	3699	0.300	3699	0.319	3699	0.434	3699	0.638	3699	0.539	3926	1.185	3926	2.371	3926	0.090	4165	0.099	4165
115	0.123	3704	0.264	3704	0.281	3704	0.381	3704	0.561	3704	0.470	3931	1.034	3931	2.069	3931	0.078	4169	0.086	4169
120	0.109	3709	0.233	3709	0.247	3709	0.337	3709	0.495	3709	0.412	3936	0.906	3936	1.812	3936	0.068	4175	0.075	4175

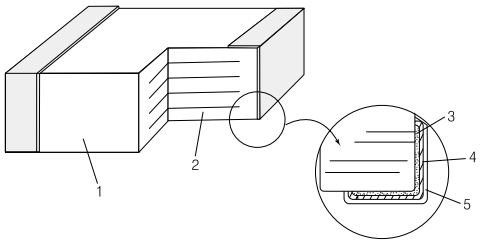
Temp.	LNSV _ _ _ 272 _ _		LNSV _ _ _ 332 _ _		LNSV _ _ _ 103 _ _		LNSV _ _ _ 333 _ _		LNSV _ _ _ 473 _ _		LNSV _ _ _ 503 _ _		LNSV _ _ _ 583 _ _		LNSV _ _ _ 683 _ _		LNSV _ _ _ 583 _ _		LNSV _ _ _ 104 _ _	
(°C)	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$
-40	103.5	3900	126.5	3900	383.3	3900	1,265	3900	1625	3789	1729	3789	2005	3789	2351	3789	2939	3789	3458	3789
-35	74.15	3920	90.63	3920	274.6	3920	906.3	3920	1172	3806	1247	3806	1446	3806	1695	3806	2119	3806	2493	3806
-30	53.65	3940	65.57	3940	198.7	3940	655.7	3940	854.6	3823	909.2	3823	1055	3823	1236	3823	1546	3823	1818	3823
-25	39.19	3958	47.90	3958	145.1	3958	479.0	3958	629.8	3840	670.0	3840	777.2	3840	911.2	3840	1139	3840	1340	3840
-20	28.89	3976	35.31	3976	107.0	3976	353.1	3976	468.7	3857	498.6	3857	578.4	3857	678.1	3857	847.7	3857	997.3	3857
-15	21.49	3992	26.27	3992	79.60	3992	262.7	3992	352.1	3875	374.5	3875	434.5	3875	509.4	3875	636.7	3875	749.1	3875
-10	16.13	4006	19.71	4006	59.73	4006	197.1	4006	266.7	3892	283.8	3892	329.2	3892	385.9	3892	482.4	3892	567.5	3892
-5	12.20	4020	14.92	4020	45.20	4020	149.2	4020	203.7	3909	216.8	3909	251.4	3909	294.8	3909	368.5	3909	433.5	3909
0	9.312	4033	11.38	4033	34.49	4033	113.8	4033	156.8	3926	166.9	3926	193.5	3926	226.9	3926	283.7	3926	333.7	3926
5	7.161	4045	8.753	4045	26.52	4045	87.53	4045	121.6	3942	129.4	3942	150.1	3942	176.0	3942	220.0	3942	258.8	3942
10	5.550	4056	6.784	4056	20.56	4056	67.84	4056	94.97	3959	101.0	3959	117.2	3959	137.4	3959	171.8	3959	202.1	3959
15	4.334	4066	5.297	4066	16.05	4066	52.97	4066	74.65	3975	79.41	3975	92.12	3975	108.0	3975	135.0	3975	158.8	3975
20	3.409	4075	4.166	4075	12.63	4075	41.66	4075	59.05	3991	62.82	3991	72.87	3991	85.44	3991	106.8	3991	125.6	3991
25	2.700	4083	3.300	4083	10.00	4083	33.00	4083	47.00	4006	50.00	4006	58.00	4006	68.00	4006	85.00	4006	100.0	4006
30	2.153	4091	2.632	4091	7.975	4091	26.32	4091	37.63	4021	40.03	4021	46.43	4021	54.44	4021	68.05	4021	80.06	4021
35	1.728	4098	2.112	4098	6.401	4098	21.12	4098	30.30	4035	32.23	4035	37.39	4035	43.83	4035	54.79	4035	64.46	4035
40	1.396	4105	1.707	4105	5.171	4105	17.07	4105	24.53	4048	26.09	4048	30.27	4048	35.48	4048	44.36	4048	52.18	4048
45	1.135	4111	1.387	4111	4.203	4111	13.87	4111	19.96	4062	21.24	4062	24.63	4062	28.88	4062	36.10	4062	42.47	4062
50	0.928	4116	1.134	4116	3.437	4116	11.34	4116	16.33	4074	17.37	4074	20.15	4074	23.63	4074	29.53	4074	34.74	4074
55	0.763	4121	0.933	4121	2.826	4121	9.327	4121	13.43	4086	14.28	4086	16.57	4086	19.43	4086	24.28	4086	28.57	4086
60	0.631	4126	0.771	4126	2.337	4126	7.712	4126	11.09	4097	11.80	4097	13.69	4097	16.05	4097	20.06	4097	23.60	4097
65	0.525	4130	0.641	4130	1.943	4130	6.411	4130	9.211	4108	9.799	4108	11.37	4108	13.33	4108	16.66	4108	19.60	4108
70	0.438	4134	0.536	4134	1.623	4134	5.356	4134	7.682	4118	8.173	4118	9.480	4118	11.11	4118	13.89	4118	16.35	4118
75	0.368	4138	0.450	4138	1.363	4138	4.497	4138	6.437	4127	6.847	4127	7.943	4127	9.313	4127	11.64	4127	13.69	4127
80	0.310	4141	0.379	4141	1.149	4141	3.793	4141	5.416	4136	5.762	4136	6.684	4136	7.837	4136	9.796	4136	11.52	4136
85	0.263	4145	0.321	4145	0.974	4145	3.214	4145	4.577	4145	4.869	4145	5.648	4145	6.622	4145	8.278	4145	9.739	4145
90	0.224	4149	0.273	4149	0.829	4149	2.734	4149	3.884	4153	4.132	4153	4.793	4153	5.619	4153	7.024	4153	8.263	4153
95	0.191	4152	0.234	4152	0.708	4152	2.336	4152	3.308	4161	3.519	4161	4.082	4161	4.786	4161	5.983	4161	7.038	4161
100	0.164	4156	0.200	4156	0.607	4156	2.003	4156	2.828	4169	3.009	4169	3.490	4169	4.092	4169	5.114	4169	6.017	4169
105	0.141	4160	0.172	4160	0.522	4160	1.724	4160	2.426	4177	2.581	4177	2.994	4177	3.510	4177	4.387	4177	5.162	4177
110	0.122	4165	0.149	4165	0.451	4165	1.488	4165	2.088	4185	2.221	4185	2.576	4185	3.020	4185	3.776	4185	4.442	4185
115	0.105	4169	0.129	4169	0.391	4169	1.289	4169	1.802	4194	1.917	4194	2.223	4194	2.607	4194	3.258	4194	3.833	4194
120	0.092	4175	0.112	4175	0.339	4175	1.120	4175	1.559	4203	1.658	4203	1.924	4203	2.255	4203	2.819	4203	3.317	4203

Temp.	LNSV _ _ _ 124 _ _		LNSV _ _ _ 154 _ _		LNSV _ _ _ 334 _ _		LNSV _ _ _ 474 _ _		LNSU _ _ _ 683 _ _		LNSU _ _ _ 104 _ _		LNSU _ _ _ 224 _ _		LNSU _ _ _ 504 _ _		LNSU _ _ _ 105 _ _		LNSU _ _ _ 205 _ _		LNST _ _ _ 474 _ _	
(°C)	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$	R_{25}(§)	$B_{25/T}$
-40	4149	3789	5186	3789	11410	3789	16251	3789	3408	4186	5012	4186	11025	4186	25058	4186	50.12	4186	100.2	4186	25423	4268
-35	2992	3806	3740	3806	8228	3806	11719	3806	2386	4210	3508	4210	7718	4210	17541	4210	35.08	4210	70.17	4210	17789	4300
-30	2182	3823	2727	3823	6000	3823	8546	3823	1688	4233	2482	4233	5460	4233	12408	4233	24.82	4233	49.63	4233	12560	4331
-25	1608	3840	2010	3840	4422	3840	6298	3840	1206	4255	1773	4255	3901	4255	8866	4255	17.73	4255	35.47	4255	8946	4360
-20	1197	3857	1496	3857	3291	3857	4687	3857	870.1	4275	1280	4275	2815	4275	6398	4275	12.80	4275	25.59	4275	6428	4387
-15	1197	3857	1496	3857	2472	3875	3521	3875	633.8	4295	932.0	4295	2050	4295	4660	4295	9.320	4295	18.64	4295	4658	4413
-10	681.0	3892	851.3	3892	1873	3892	2667	3892	465.9	4314	685.1	4314	1507	4314	3425	4314	6.851	4314	13.70	4314	3403	4438
-5	520.2	3909	650.3	3909	1431	3909	2037	3909	345.5	4332	508.0	4332	1118	4332	2540	4332	5.080	4332	10.16	4332	2507	4462
0	400.4	3926	500.6	3926	1101	3926	1568	3926	258.4	4349	380.0	4349	835.9	4349	1900	4349	3.800	4349	7.599	4349	1862	4484
5	310.5	3942	388.2	3942	853.9	3942	1216	3942	194.8	4365	286.5	4365	630.3	4365	1433	4365	2.865	4365	5.730	4365	1393	4505
10	242.5	3959	303.1	3959	666.8	3959	949.7	3959	148.1	4380	217.8	4380	479.1	4380	1089	4380	2.178	4380	4.355	4380	1050	4525
15	190.6	3975	238.2	3975	524.1	3975	746.5	3975	113.4	4395	166.8	4395	366.9	4395	833.9	4395	1.668	4395	3.336	4395	797.7	4545
20	150.8	3991	188.5	3991	414.6	3991	590.5	3991	87.51	4409	128.7	4409	283.1	4409	643.4	4409	1.287	4409	2.574	4409	610.2	4563
25	120.0	4006	150.0	4006	330.0	4006	470.0	4006	68.00	4422	100.0	4422	220.0	4422	500.0	4422	1.000	4422	2.000	4422	470.0	4581
30	96.07	4021	120.1	4021	264.2	4021	376.3	4021	53.20	4435	78.24	4435	172.1	4435	391.2	4435	0.782	4435	1.565	4435	364.5	4598
35	77.35	4035	96.69	4035	212.7	4035	303.0	4035	41.91	4448	61.63	4448	135.6	4448	308.1	4448	0.616	4448	1.233	4448	284.4	4614
40	62.62	4048	78.27	4048	172.2	4048	245.3	4048	33.22	4460	48.85	4460	107.5	4460	244.2	4460	0.488	4460	0.977	4460	223.4	4629
45	50.96	4062	63.71	4062	140.2	4062	199.6	4062	26.49	4471	38.96	4471	85.71	4471	194.8	4471	0.390	4471	0.779	4471	176.5	4644
50	41.69	4074	52.12	4074	114.7	4074	163.3	4074	21.25	4482	31.25	4482	68.76	4482	156.3	4482	0.313	4482	0.625	4482	140.3	4659
55	34.28	4086	42.85	4086	94.28	4086	134.3	4086	17.15	4493	25.22	4493	55.48	4493	126.1	4493	0.252	4493	0.504	4493	112.2	4673
60	28.33	4097	35.41	4097	77.90	4097	110.9	4097	13.91	4503	20.46	4503	45.01	4503	102.3	4503	0.205	4503	0.409	4503	90.13	4687
65	23.52	4108	29.40	4108	64.67	4108	92.11	4108	11.35	4513	16.69	4513	36.71	4513	83.43	4513	0.167	4513	0.334	4513	72.82	4700
70	19.61	4118	24.52	4118	53.94	4118	76.82	4118	9.302	4523	13.68	4523	30.09	4523	68.40	4523	0.137	4523	0.274	4523	59.13	4713
75	16.43	4127	20.54	4127	45.19	4127	64.37	4127	7.663	4532	11.27	4532	24.79	4532	56.34	4532	0.113	4532	0.225	4532	48.25	4726
80	13.83	4136	17.29	4136	38.03	4136	54.16	4136	6.343	4541	9.327	4541	20.52	4541	46.64	4541	0.093	4541	0.187	4541	39.56	4738
85	11.69	4145	14.61	4145	32.14	4145	45.77	4145	5.274	4550	7.755	4550	17.06	4550	38.78	4550	0.078	4550	0.155	4550	32.58	4750
90	9.916	4153	12.39	4153	27.27	4153	38.84	4153	4.404	4559	6.477	4559	14.25	4559	32.38	4559	0.065	4559	0.130	4559	26.95	4762
95	8.446	4161	10.56	4161	23.23	4161	33.08	4161	3.693	4568	5.432	4568	11.95	4568	27.16	4568	0.054	4568	0.109	4568	22.38	4774
100	7.220	4169	9.026	4169	19.86	4169	28.28	4169	3.110	4576	4.574	4576	10.06	4576	22.87	4576	0.046	4576	0.091	4576	18.67	4785
105	6.194	4177	7.742	4177	17.03	4177	24.26	4177	2.629	4584	3.867	4584	8.506	4584	19.33	4584	0.039	4584	0.077	4584	15.63	4796
110	5.330	4185	6.663	4185	14.66	4185	20.88	4185	2.231	4592	3.281	4592	7.218	4592	16.41	4592	0.033	4592	0.066	4592	13.14	4807
115	4.600	4194	5.750	4194	12.65	4194	18.02	4194	1.900	4600	2.794	4600	6.147	4600	13.97	4600	0.028	4600	0.056	4600	11.09	4818
120	3.980	4203	4.975	4203	10.95	4203	15.59	4203	1.624	4608	2.388	4608	5.254	4608	11.94	4608	0.024	4608	0.048	4608	9.390	4828

RELIABILITY TEST METHOD

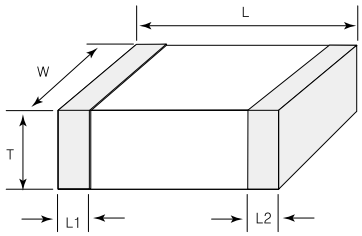
Item	Test Method	Criteria for judging
Resistance to Soldering Heat Test	Soldering temperature : 260¡ 5°C Duration of immersion : 10¡ 1sec. Preheating : 150¡ , 1min.	Visual : No mechanical damage Zero-power resistance at 25°C Change as against pretest values within ¡ 3% Change of B-value : within ¡ 2%
Solderability Test	Soldering temperature : 230¡ 5°C Duration of immersion : 5¡ 1sec. Preheating : 150°C, 1min.	At least 75% of the electrode must be covered with new solder.
Adhesion	Force W is applied to DUT. 	2012 : over 2.0 kg f 1608 : over 1.0 kg f 1005 : over 0.7 kg f
Resistance to flexure of substrate	The middle part of substrate shall, successively, be pressurized by means of the pressurizing rod at a rate of about 1§fi/sec. Maintenance time : 5 sec. Bending distance : 1§fi 	Visual : No mechanical damage
Dry Heat Test	Test temperature : 125¡ 2°C, 85¡ 2°C (R-T curve Z) Test duration : 1000+48hrs. After completion of the test, leaving the sample under the standard conditions for 24¡ 2hrs.	Zero-power resistance at 25°C: Change as against pretest values within ¡ 3% Change of B-value : within ¡ 2%
Cold Test	Test temperature : -30¡ 2°C Test duration : 1000+48hrs. After completion of the test, leaving the sample under the standard conditions for 24¡ 2hrs.	Zero-power resistance at 25°C: Change as against pretest values within ¡ 3% Change of B-value : within ¡ 2%
Damp Heat Test (Steady State)	Test temperature : 60¡ 2°C Test relative humidity : 90¡ ›95RH% Test duration : 1000+24hrs. After completion of the test, leaving the sample under the standard conditions for 24¡ 2hrs.	Zero-power resistance at 25°C: Change as against pretest values within ¡ 3% Change of B-value : within ¡ 2%
Thermal shock Test	 This cycle is repeated 1000 times. After completion of the test, allow the sample to stand under the standard conditions for at 24¡ 2hrs.	Zero-power resistance at 25¡ : Change as against pretest values within ¡ 3% Change of B-value : within ¡ 2%

CHIP STRUCTURE



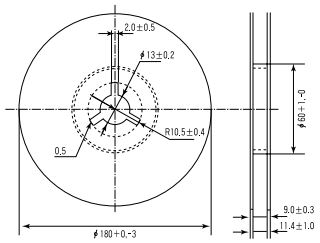
Number	Name
1	Ceramics
2	Inner Electrode
3	External Electrode(Ag)
4	Electroplating Layer(Ni)
5	Electroplating Layer(Sn or SnPb)

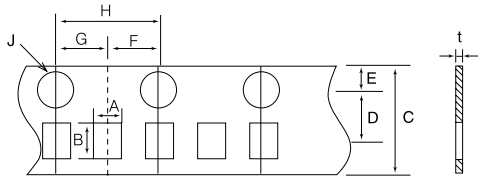
CHIP DIMENSION



	L	W	T	L1, L2
1005	1.0¡ 0.1	0.5¡ 0.1	0.5¡ 0.1	0.2¡ 0.1
1608	1.6¡ 0.1	0.8¡ 0.1	0.8¡ 0.1	0.3¡ 0.1
2012	2.0¡ 0.1	1.2¡ 0.1	0.8¡ 0.1	0.4¡ 0.1
3216	3.2¡ 0.2	1.6¡ 0.2	1.0¡ 0.1	0.4¡ 0.1

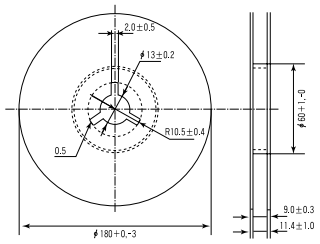
Tape and Reel Packaging for Paper Package

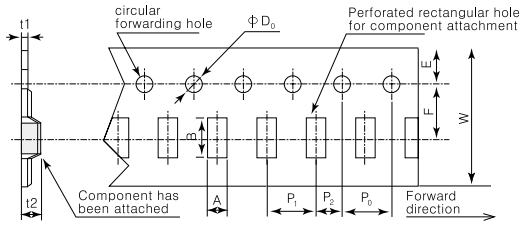




Size	A	B	C	D	E	F	G	H	J	t	note
1608	1.0¡ 0.1	1.9¡ 0.1	8.0¡ 0.1	3.5¡ 0.05	1.75¡ 0.1	4.0¡ 0.1	2.0¡ 0.05	4.0¡ 0.1	1.5+0.1-0.0	0.23¡ 0.02	paper
1005	0.62¡ 0.04	1.12¡ 0.04	8.0¡ 0.1	3.5¡ 0.05	1.75¡ 0.1	4.0¡ 0.1	2.0¡ 0.05	4.0¡ 0.1	1.5+0.1-0.0	0.6¡ 0.05	paper

Tape and Reel Packaging for Emboss Package

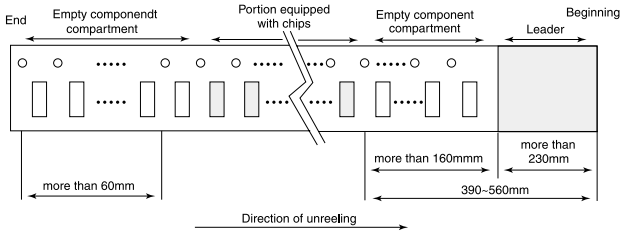




Size	A	B	W	F	E	P1	P2	P0	D0	t1	t2	note
3216	1.73¡ 0.1	3.56¡ 0.1	8.0+0.3-0.1	3.5¡ 0.05	1.75¡ 0.1	4.0¡ 0.1	2.0¡ 0.05	4.0¡ 0.1	1.5+0.1-0.0	0.23¡ 0.02	1.14¡ 0.1	emboss
2012	1.45¡ 0.1	2.25¡ 0.1	8.0+0.3-0.1	3.5¡ 0.05	1.75¡ 0.1	4.0¡ 0.1	2.0¡ 0.05	4.0¡ 0.1	1.5+0.1-0.0	0.23¡ 0.02	1.0¡ 0.1	emboss

Structure of Taping

Taping must have leader and empty component compartment as shown in the following figure.

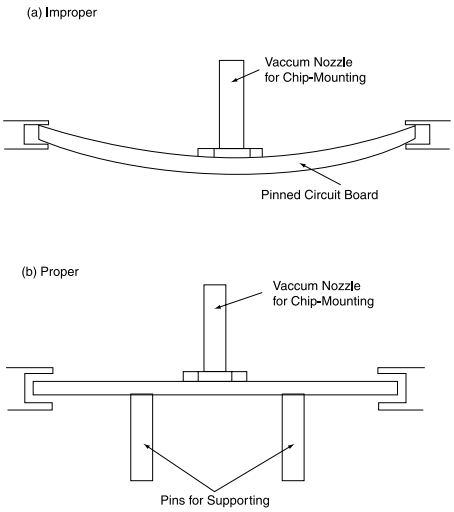


Package Quantity

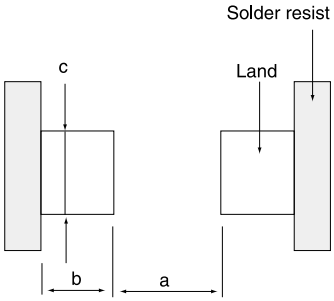
12,000(pcs/Reel) - 1005 size
4,000(pcs/Reel) - 1608, 2012, 3216 size

SMT Process Characteristics

Component Mounting



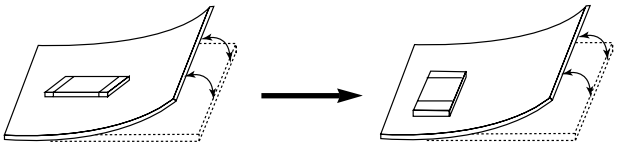
Recommended Land Pattern



Chip size	a	b	c
1005(0402)	0.4	0.4 ~0.5	0.5
1608(0603)	0.6 ~0.8	0.6 ~0.7	0.6 ~0.8
2012(0805)	1.0 ~1.1	0.6 ~0.7	1.0 ~1.2
3216(1206)	2.1 ~2.3	1.0 ~1.1	1.3 ~1.4

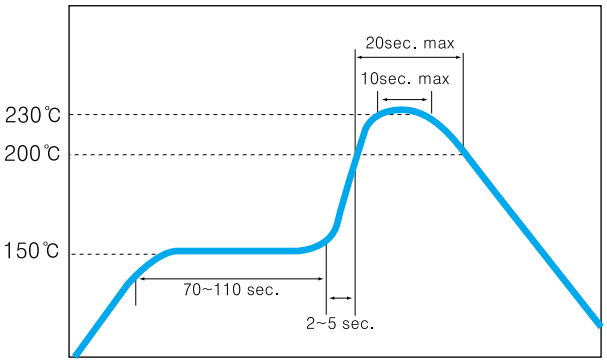
Component Layout

Locate the product horizontal to the direction at which bending is applied.

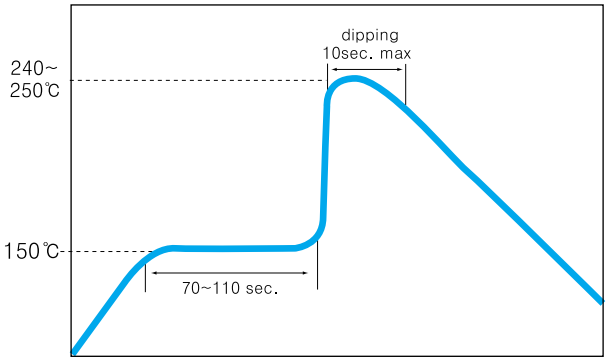


Soldering

Hand soldering : 280°C max., 5sec max.
Reflow profile



Flow profile



Solder and Flux

Solder : Eutetic solder recommended
Flux : Rosin based flux recommended
Halogen content 0.2 w% or less recommended