

## SMD 0805, Glass Protected NTC Thermistors



### FEATURES

- TCR ranging from - 6 %/K at - 40 °C to - 2 %/K at 150 °C
- Tolerance on  $R_{25}$  down to 1 %, and on  $B_{25/85}$  down to 1 %
- Suitable for wave or reflow soldering
- NiSn terminations
- Fully glass coated and protected
- Old part number was 2322 615 5....
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### QUICK REFERENCE DATA

PARAMETER	VALUE
Resistance value at 25 °C	2.2 k $\Omega$ to 680 k $\Omega$
Tolerance on $R_{25}$ - value	$\pm 1 \%$ ; $\pm 2 \%$ ; $\pm 3 \%$ ; $\pm 5 \%$
$B_{25/85}$ value	3600K to 4125K
Tolerance on $B_{25/85}$ - value	$\pm 1 \%$ ; $\pm 3 \%$
Maximum dissipation at 25 °C	210 mW
Thermal time constant $\tau$	$\approx 10$ s
Dissipation factor D	3.5 mW/K
Operating temperature range at zero power	- 40 °C to + 150 °C
R/T values	See tables
Climatic category	40/125/56
Weight	$\approx 0.008$ g

### APPLICATIONS

- Temperature sensing, protection and compensation in automotive, industrial, telecom and consumer applications. Examples are:
  - Battery chargers
  - Power suppliers
  - Office equipment
  - LCD compensation
  - In-car entertainment

### DESCRIPTION

Size 0805 chip thermistors with a negative temperature coefficient. The device has no marking.

### PACKAGING

Available in 8 mm punched paper tape on reel package of 4000 units.

### DESIGN-IN SUPPORT

For complete Curve Computation, visit:

[www.vishay.com/thermistors/curve-computation-list/](http://www.vishay.com/thermistors/curve-computation-list/)

### ELECTRICAL DATA AND ORDERING INFORMATION

$R_{25}$ - VALUE [k $\Omega$ ]	$B_{25/85}$ - VALUE [K]	TOLERANCE ON $B_{25/85}$ [%]	12 NC ORDERING CODE 2381 615 5.... <sup>(1)</sup>	SAP MATERIAL NO. NTCS0805E3... <sup>(2)</sup>
2.2	3600	$\pm 1$	*222	222*MT
4.7	3500	$\pm 1$	*472	472*MT
10	3570	$\pm 3$	*103	103*MT
15	3700	$\pm 1$	*153	153*MT
22	3800	$\pm 1$	*223	223*HT
33	3920	$\pm 1$	*333	333*HT
47	3960	$\pm 1$	*473	473*HT
68	4100	$\pm 1$	*683	683*XT
100	4100	$\pm 1$	*104	104*XT
330	3930	$\pm 1$	*334	334*HT
470	4025	$\pm 1$	*474	474*XT
680	4125	$\pm 1$	*684	684*XT

#### Notes

<sup>(1)</sup> Replace \* in 12 NC by 3 for 5 %, 6 for 3 %, 4 for 2 %, 5 for 1 % tolerance on  $R_{25}$

<sup>(2)</sup> Replace \* in SAP part no by J for 5 %, H for 3 %, G for 2 %, F for 1 % tolerance on  $R_{25}$

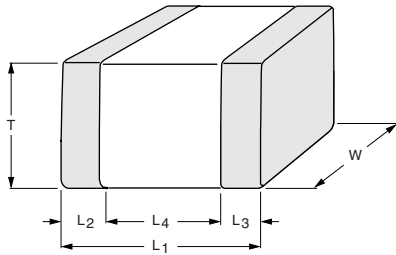
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## DIMENSIONS in millimeters



L <sub>1</sub>	W	T	L <sub>2</sub> and L <sub>3</sub> min.	L <sub>4</sub> min.
2.0 ± 0.2	1.25 ± 0.15	0.8 ± 0.15	0.2	0.55

For complete Curve Computation, visit: [www.vishay.com/thermistors/curve-computation-list/](http://www.vishay.com/thermistors/curve-computation-list/)

RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R <sub>25</sub> AT 2.2 AND 4.7 kΩ					
T <sub>OPER</sub> [°C]	PART NUMBER 2381 615 5*222/NTC0805E3222*MT		PART NUMBER 2381 615 5*472/NTC0805E3472*MT		ΔR/R DUE TO B <sub>tol</sub> [± %]
	R <sub>T</sub> [Ω]	TCR [%/K]	R <sub>T</sub> [Ω]	TCR [%/K]	
-40	57 658	- 6.26	101 275	- 5.75	7.58
-35	42 410	- 6.03	76 325	- 5.57	6.83
-30	31 537	- 5.82	58 034	- 5.39	6.13
-25	23 698	- 5.61	44 505	- 5.22	5.45
-20	17 986	- 5.42	34 413	- 5.06	4.80
-15	13 782	- 5.23	26 821	- 4.91	4.18
-10	10 657	- 5.06	21 065	- 7.76	3.58
-5	8312.0	- 4.89	16 667	- 4.61	3.01
0	6537.1	- 4.72	13 280	- 4.47	2.46
5	5182.1	- 4.57	10 654	- 4.34	1.93
10	4139.2	- 4.42	8603.2	- 4.21	1.42
15	3330.1	- 4.28	6991.1	- 4.09	0.93
20	2697.8	- 4.14	5715.6	- 3.97	0.46
25	2200.0	- 4.02	4700.0	- 3.86	0.00
30	1805.5	- 3.89	3886.6	- 3.75	0.22
35	1490.7	- 3.77	3231.2	- 3.64	0.43
40	1237.9	- 3.66	2700.3	- 3.54	0.64
45	1033.7	- 3.55	2267.9	- 3.44	0.84
50	867.85	- 3.45	1913.9	- 3.35	1.03
55	732.31	- 3.35	1622.6	- 3.26	1.22
60	620.96	- 3.25	1381.7	- 3.17	1.40
65	529.02	- 3.16	1181.7	- 3.09	1.58
70	452.73	- 3.07	1014.7	- 3.01	1.75
75	389.13	- 2.99	874.85	- 2.93	1.92
80	335.85	- 2.90	757.13	- 2.85	2.08
85	291.02	- 2.83	657.67	- 2.78	2.23
90	253.15	- 2.75	573.31	- 2.71	2.54
95	221.03	- 2.68	501.48	- 2.64	2.85
100	193.66	- 2.61	440.10	- 2.58	3.14
105	170.27	- 2.54	387.47	- 2.52	3.43
110	150.20	- 2.48	342.18	- 2.46	3.71
115	132.91	- 2.41	303.09	- 2.40	3.98
120	117.98	- 2.35	269.24	- 2.34	4.24
125	105.03	- 2.20	239.83	- 2.29	4.50
130	93.766	- 2.24	214.20	- 2.23	4.76
135	83.943	- 2.19	191.82	- 2.18	5.00
140	75.349	- 2.13	172.20	- 2.13	5.25
145	67.807	- 2.08	154.96	- 2.09	5.48
150	61.172	- 2.04	139.78	- 2.04	5.71



For complete Curve Computation, visit: [www.vishay.com/thermistors/curve-computation-list/](http://www.vishay.com/thermistors/curve-computation-list/)

<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH R<sub>25</sub> AT 10 kΩ</b>			
T <sub>OPER</sub> [°C]	PART NUMBER 2381 615 5*103/NTC0805E3103*MT		ΔR/R DUE TO B <sub>tol</sub> [± %]
	R <sub>T</sub> [Ω]	TCR [%/K]	
- 40	232 634	- 5.92	11.22
- 35	173 538	- 5.71	10.14
- 30	130 769	- 5.51	9.10
- 25	99 489	- 5.33	8.11
- 20	76 385	- 5.15	7.15
- 15	59 157	- 4.98	6.24
- 10	46 194	- 4.82	5.35
- 5	36 356	- 4.67	4.50
0	28 829	- 4.52	3.68
5	23 025	- 4.38	2.89
10	18 515	- 4.25	2.13
15	14 986	- 4.12	1.40
20	12 205	- 4.00	0.69
25	10 000	- 3.88	0.00
30	8240.3	- 3.77	0.66
35	6827.5	- 3.66	1.31
40	5686.6	- 3.56	1.93
45	4760.3	- 3.46	2.53
50	4004.2	- 3.37	3.11
55	3383.8	- 3.28	3.68
60	2872.3	- 3.19	4.23
65	2448.5	- 3.11	4.76
70	2095.9	- 3.03	5.28
75	1801.2	- 2.95	5.78
80	1553.8	- 2.88	6.27
85	1345.3	- 2.81	6.74
90	1168.9	- 2.74	7.20
95	1019.2	- 2.67	7.65
100	891.48	- 2.61	8.09
105	782.28	- 2.54	8.51
110	688.56	- 2.48	8.93
115	607.85	- 2.43	9.33
120	538.14	- 2.37	9.73
125	477.73	- 2.32	10.11
130	425.24	- 2.26	10.48
135	379.49	- 2.21	10.85
140	339.51	- 2.17	11.20
145	304.47	- 2.12	11.55
150	273.69	- 2.07	11.89

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<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH <math>R_{25}</math> AT 15, 22 AND 33 k<math>\Omega</math></b>							
$T_{OPER}$ [°C]	PART NUMBER 2381 615 5*153/ NTC0805E3153*MT		PART NUMBER 2381 615 5*223/ NTC0805E3223*HT		PART NUMBER 2381 615 5*333/ NTC0805E3333*MT		$\Delta R/R$ DUE TO $B_{tol}$ [± %]
	$R_T$ [ $\Omega$ ]	TCR [%/K]	$R_T$ [ $\Omega$ ]	TCR [%/K]	$R_T$ [ $\Omega$ ]	TCR [%/K]	
- 40	391 251	- 6.14	641 004	- 6.40	1 104 739	- 6.79	7.58
- 35	289 245	- 5.94	468 038	- 6.18	793 249	- 6.53	6.83
- 30	215 960	- 5.75	345 469	- 5.97	576 683	- 6.28	6.13
- 25	162 779	- 5.56	257 644	- 5.77	424 161	- 6.05	5.45
- 20	123 815	- 5.38	194 045	- 5.57	315 430	- 5.84	4.80
- 15	95 001	- 5.21	147 521	- 5.39	237 022	- 5.63	4.18
- 10	73 505	- 5.05	113 159	- 5.22	179 865	- 5.44	3.58
- 5	57 329	- 4.89	87 544	- 5.05	137 767	- 5.26	3.01
0	45 058	- 4.74	68 281	- 4.89	106 459	- 5.08	2.46
5	35 674	- 4.60	53 672	- 4.74	82 958	- 4.92	1.93
10	28 445	- 4.46	42 503	- 4.59	65 162	- 4.76	1.42
15	22 834	- 4.33	33 898	- 4.46	51 572	- 4.61	0.93
20	18 450	- 4.20	27 220	- 4.32	41 112	- 4.47	0.46
25	15 000	- 4.08	22 000	- 4.20	33 000	- 4.34	0.00
30	12 268	- 3.96	17 892	- 4.07	26 663	- 4.21	0.22
35	10 092	- 3.85	14 638	- 3.96	21 678	- 4.08	0.43
40	8347.4	- 3.74	12 045	- 3.84	17 730	- 3.97	0.64
45	6941.1	- 3.64	9965.0	- 3.74	14 585	- 3.86	0.84
50	5801.1	- 3.54	8288.3	- 3.63	12 063	- 3.75	1.03
55	4872.1	- 3.44	6928.4	- 3.54	10 030	- 3.65	1.22
60	4111.1	- 3.35	5819.8	- 3.44	8381.6	- 3.55	1.40
65	3484.7	- 3.26	4911.4	- 3.35	7037.8	- 3.45	1.58
70	2966.6	- 3.18	4163.4	- 3.26	5936.8	- 3.36	1.75
75	2536.2	- 3.09	3544.6	- 3.18	5030.3	- 3.27	1.92
80	2176.9	- 3.02	3030.2	- 3.10	4280.4	- 3.19	2.08
85	1875.8	- 2.94	2600.9	- 3.02	3657.2	- 3.11	2.23
90	1622.5	- 2.87	2241.0	- 2.94	3137.1	- 3.03	2.54
95	1408.4	- 2.79	1938.0	- 2.87	2701.2	- 2.96	2.85
100	1226.8	- 2.73	1682.0	- 2.80	2334.4	- 2.89	3.14
105	1072.3	- 2.66	1464.9	- 2.73	2024.4	- 2.82	3.43
110	940.20	- 2.60	1280.0	- 2.67	1761.6	- 2.75	3.71
115	827.00	- 2.54	1122.0	- 2.60	1538.0	- 2.69	3.98
120	729.62	- 2.48	986.60	- 2.54	1346.9	- 2.63	4.24
125	645.60	- 2.42	870.11	- 2.48	1183.23	- 2.57	4.50
130	572.86	- 2.36	769.60	- 2.43	1042.4	- 2.51	4.76
135	509.71	- 2.31	682.59	- 2.37	921.02	- 2.45	5.00
140	454.71	- 2.26	607.05	- 2.32	815.99	- 2.40	5.25
145	406.69	- 2.21	541.28	- 2.27	724.85	- 2.35	5.48
150	364.64	- 2.16	483.86	- 2.22	645.54	- 2.30	5.71



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<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH <math>R_{25}</math> AT 47, 68 AND 100 k<math>\Omega</math></b>							
$T_{OPER}$ [°C]	PART NUMBER 2381 615 5*473/ NTC0805E3473*HT		PART NUMBER 2381 615 5*683/ NTC0805E3683*XT		PART NUMBER 2381 615 5*104/ NTC0805E3104*XT		$\Delta R/R$ DUE TO $B_{tol}$ [± %]
	$R_T$ [ $\Omega$ ]	TCR [%/K]	$R_T$ [ $\Omega$ ]	TCR [%/K]	$R_T$ [ $\Omega$ ]	TCR [%/K]	
-40	1 536 095	- 6.60	2 596 437	- 6.92	3 833 689	- 6.96	7.58
-35	1 110 020	- 6.37	1 848 208	- 6.68	2 724 206	- 6.71	6.83
-30	811 212	- 6.15	1 331 164	- 6.45	1 959 612	- 6.47	6.13
-25	599 204	- 5.94	969 559	- 6.23	1 426 014	- 6.25	5.45
-20	447 111	- 5.74	713 753	- 6.02	1 049 150	- 6.03	4.80
-15	336 851	- 5.56	530 805	- 5.82	779 950	- 5.83	4.18
-10	256 116	- 5.38	398 593	- 5.64	585 575	- 5.64	3.58
-5	196 435	- 5.21	302 091	- 5.45	443 786	- 5.45	3.01
0	151 917	- 5.05	230 981	- 5.28	339 343	- 5.28	2.46
5	118 422	- 4.89	178 104	- 5.12	261 695	- 5.11	1.93
10	93 012	- 4.74	138 441	- 4.96	203 455	- 4.96	1.42
15	73 583	- 4.60	108 442	- 4.81	159 402	- 4.81	0.93
20	58 615	- 4.47	85 571	- 4.67	125 811	- 4.66	0.46
25	47 000	- 4.34	68 000	- 4.53	100 000	- 4.52	0.00
30	37 925	- 4.22	54 403	- 4.40	80 021	- 4.39	0.22
35	30 788	- 4.10	43 806	- 4.27	64 447	- 4.27	0.43
40	25 139	- 3.99	35 493	- 4.15	52 224	- 4.15	0.64
45	20 641	- 3.88	28 928	- 4.03	42 570	- 4.03	0.84
50	17 038	- 3.78	23 712	- 3.92	34 897	- 3.92	1.03
55	14 136	- 3.68	19 543	- 3.81	28 763	- 3.81	1.22
60	11 786	- 3.58	16 192	- 3.71	23 830	- 3.71	1.40
65	9872.9	- 3.49	13 483	- 3.61	19 842	- 3.61	1.58
70	8308.1	- 3.40	11 282	- 3.52	16 601	- 3.52	1.75
75	7021.9	- 3.31	9484.2	- 3.43	13 954	- 3.43	1.92
80	5959.7	- 3.23	8008.8	- 3.34	11 781	- 3.34	2.08
85	5078.7	- 3.15	6792.1	- 3.25	9988.4	- 3.26	2.23
90	4344.9	- 3.08	5784.2	- 3.17	8503.6	- 3.18	2.54
95	3731.0	- 3.00	4945.7	- 3.09	7268.2	- 3.10	2.85
100	3215.5	- 2.93	4245.0	- 3.02	6236.0	- 3.03	3.14
105	2781.0	- 2.86	3657.2	- 2.94	5370.1	- 2.95	3.43
110	2413.2	- 2.80	3162.1	- 2.87	4640.8	- 2.88	3.71
115	2101.0	- 2.73	2743.5	- 2.81	4024.3	- 2.82	3.98
120	1834.9	- 2.67	2388.2	- 2.74	3501.2	- 2.75	4.24
125	1607.3	- 2.61	2085.7	- 2.68	3055.8	- 2.69	4.50
130	1412.2	- 2.55	1827.2	- 2.62	2675.3	- 2.63	4.76
135	1244.2	- 2.50	1605.5	- 2.56	2349.2	- 2.57	5.00
140	1099.3	- 2.44	1414.9	- 2.50	2068.7	- 2.51	5.25
145	973.81	- 2.39	1250.4	- 2.44	1826.8	- 2.46	5.48
150	864.87	- 2.34	1108.0	- 2.39	1617.5	- 2.41	5.71

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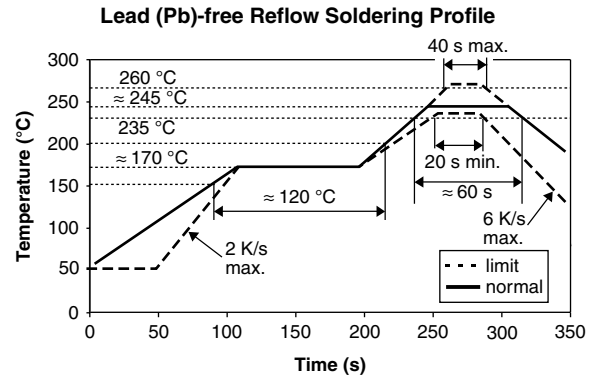
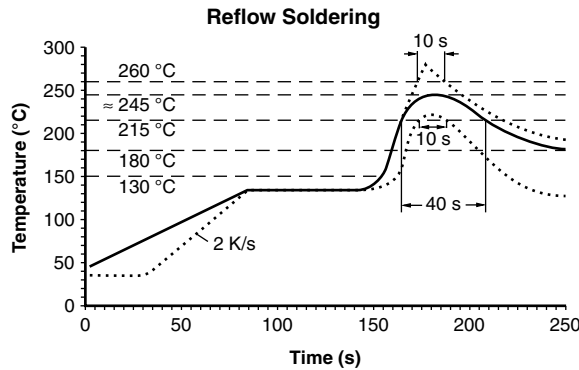
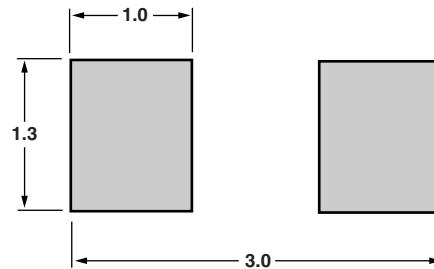
For complete Curve Computation, visit: [www.vishay.com/thermistors/curve-computation-list/](http://www.vishay.com/thermistors/curve-computation-list/)

<b>RESISTANCE VALUES AT INTERMEDIATE TEMPERATURES WITH <math>R_{25}</math> AT 330, 470 AND 680 k<math>\Omega</math></b>							
$T_{OPER}$ [°C]	PART NUMBER 2381 615 5*334/ NTC0805E3334*HT		PART NUMBER 2381 615 5*474/ NTC0805E3474*XT		PART NUMBER 2381 615 5*684/ NTC0805E3684*XT		$\Delta R/R$ DUE TO $B_{tol}$ [± %]
	$R_T$ [k $\Omega$ ]	TCR [%/K]	$R_T$ [k $\Omega$ ]	TCR [%/K]	$R_T$ [k $\Omega$ ]	TCR [%/K]	
-40	10 488	- 6.53	16 325	- 6.70	23 477	- 6.58	7.58
-35	7608.4	- 6.31	11 742	- 6.48	16 980	- 6.38	6.83
-30	5579.1	- 6.10	8539.8	- 6.26	12 404	- 6.18	6.13
-25	4133.1	- 5.90	6276.8	- 6.05	9147.1	- 6.00	5.45
-20	3092.0	- 5.71	4660.3	- 5.86	6807.4	- 5.82	4.80
-15	2334.8	- 5.53	3493.6	- 5.67	5110.7	- 5.65	4.18
-10	1778.8	- 5.35	2643.2	- 5.49	3869.3	- 5.48	3.58
-5	1366.9	- 5.19	2017.4	- 5.32	2953.2	- 5.33	3.01
0	1058.9	- 5.03	1552.8	- 5.15	2271.5	- 5.17	2.46
5	826.75	- 4.87	1204.7	- 5.00	1760.2	- 5.03	1.93
10	650.33	- 4.73	941.99	- 4.85	1373.89	- 4.89	1.42
15	515.22	- 4.59	741.96	- 4.70	1079.7	- 4.75	0.93
20	410.99	- 4.45	588.54	- 4.56	854.12	- 4.62	0.46
25	330.00	- 4.33	470.00	- 4.43	680.00	- 4.50	0.00
30	266.64	- 4.20	377.77	- 4.31	544.69	- 4.38	0.22
35	216.75	- 4.08	305.53	- 4.18	438.89	- 4.26	0.43
40	177.22	- 3.97	248.58	- 4.07	355.64	- 4.15	0.64
45	145.70	- 3.86	203.40	- 3.96	289.76	- 4.04	0.84
50	120.43	- 3.76	167.35	- 3.85	237.33	- 3.94	1.03
55	100.06	- 3.66	138.42	- 3.75	195.38	- 3.84	1.22
60	83.541	- 3.56	115.06	- 3.65	161.62	- 3.75	1.40
65	70.081	- 3.47	96.120	- 3.55	134.33	- 3.65	1.58
70	59.059	- 3.38	80.672	- 3.46	112.16	- 3.56	1.75
75	49.989	- 3.29	68.012	- 3.37	94.052	- 3.48	1.92
80	42.491	- 3.21	57.588	- 3.29	79.204	- 3.39	2.08
85	36.265	- 3.13	48.966	- 3.20	66.973	- 3.31	2.23
90	31.074	- 3.05	41.803	- 3.12	56.855	- 3.24	2.54
95	26.726	- 2.98	35.826	- 3.05	48.449	- 3.16	2.85
100	23.070	- 2.91	30.819	- 2.97	41.439	- 3.09	3.14
105	19.985	- 2.84	26.608	- 2.90	35.569	- 3.02	3.43
110	17.371	- 2.77	23.053	- 2.83	30.636	- 2.95	3.71
115	15.149	- 2.71	20.039	- 2.77	26.474	- 2.89	3.98
120	13.253	- 2.64	17.477	- 2.70	22.952	- 2.82	4.24
125	11.630	- 2.58	15.290	- 2.64	19.961	- 2.76	4.50
130	10.236	- 2.52	13.417	- 2.58	17.412	- 2.70	4.76
135	9.0345	- 2.47	11.808	- 2.53	15.233	- 2.65	5.00
140	7.9963	- 2.41	10.422	- 2.47	13.364	- 2.59	5.25
145	7.0964	- 2.36	9.2239	- 2.42	11.757	- 2.54	5.48
150	6.3142	- 2.31	8.1851	- 2.36	10.371	- 2.48	5.71

**SOLDERING CONDITIONS**

This SMD thermistor is only suitable for wave or reflow soldering, in accordance with "CECC 00802". The maximum temperature of 260 °C during 40 seconds should not be exceeded.

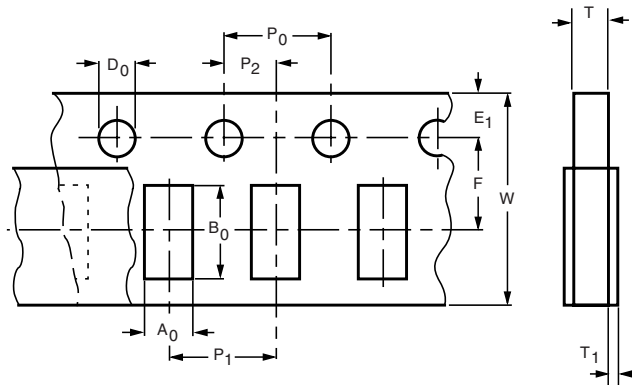
Typical examples of a soldering processes that will provide reliable joints without damage, are shown below.


**Dimensions of the solder lands**

**TESTS AND REQUIREMENTS**

SOLDERABILITY AND RESISTANCE TO SOLDERING HEAT				
IEC 60068-2-58	TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
6	TC	Solderability	2 s at 235 °C	Min. 95 % of surface wetted
		Resistance to soldering heat	10 s at 260 °C	$\Delta R/R < 5\%$

**PACKAGING**
**TAPE SPECIFICATIONS**

All tape specifications are in accordance with "IEC 60286-3". Basic dimensions are given below. Carrier tape material is paper.

**PAPER TAPE**


PAPER TAPE DIMENSIONS in millimeters		
PARAMETER	DIMENSION	TOLERANCE
A <sub>0</sub> <sup>(1)</sup>	1.7	± 0.2
B <sub>0</sub> <sup>(1)</sup>	2.35	± 0.1
W	8.0	± 0.2
E <sub>1</sub>	1.75	± 0.1
F	3.5	± 0.05
D <sub>0</sub>	1.55	± 0.05
P <sub>0</sub> <sup>(2)</sup>	4.0	± 0.1
P <sub>1</sub>	4.0	± 0.1
P <sub>2</sub>	2.0	± 0.05
T tape thickness	1.1	max.
T <sub>1</sub> cover tape	< 0.1	-

**Notes**

<sup>(1)</sup> Measured 0.3 mm above base pocket

<sup>(2)</sup> P<sub>0</sub> pitch cumulative error over any 10 pitches ± 1.0 mm



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