

# STACKED CAPACITOR High Voltage

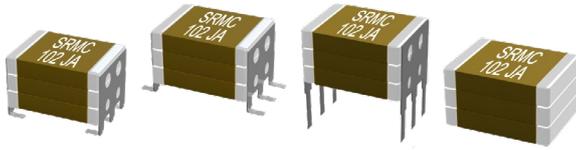
NPO N2T X7R 1KV-10KV



**SRT**  
MICROCÉRAMIQUE  
MLCC CAPACITORS

## APPLICATIONS

- Switch Mode Power Capacitor
- for Input / Output Filtering



RoHS  
compliant

## FEATURES

- High reliability, 100% burn-in
- Low ESR and ESL design
- High frequency switch
- Custom designs with any size, voltage, capacity, leads...
- Marking

## ORDERING INFORMATION

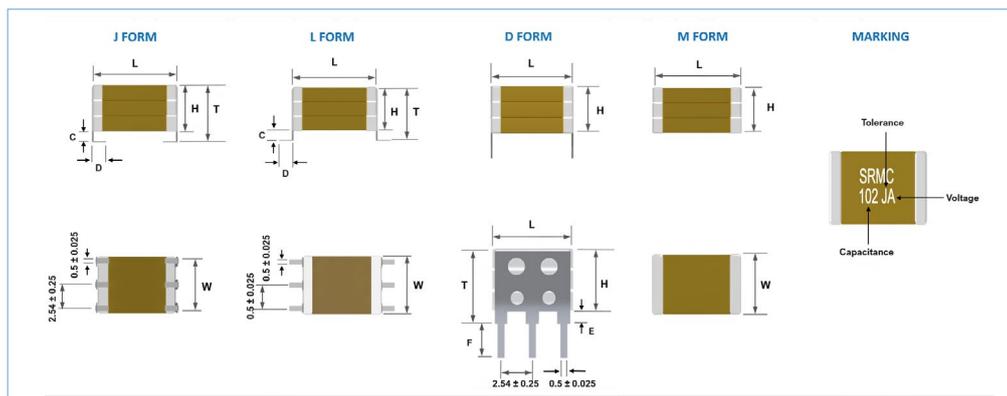
| SRMC   | 2225   | Y   | 102  | J  | G  | -                                 | L                               | 100   | -  | B                    | -   |
|--------|--|---|--|--|--|-----------------------------------|---------------------------------|---|--|----------------------|---|
| SERIES | SIZE   | DIELECTRIC  | CAPACITANCE  | TOLERANCE  | VOLTAGE  | LEAD FRAME                        | FORM                            | HEIGHT (H)  | COATING  | PACKAGING            | SPECIAL   |
| SRMC   | 1812<br>1825<br>2220<br>2225<br>3033<br>3640<br>4040<br>40100<br>5550<br>6560<br>6660<br>8060<br>80150 | A = NPO<br>P = N2T<br>Y = X7R<br>X = BX<br>BY = 2C1 | Expressed in picofarads (pF).<br>The first two digits are significant, the third digit give the number of noughts.<br>Example : 102 = 1 000pF<br><br>For special values R is used as decimal separator<br>Example 12R7 = 12.7pF<br>1340R0 = 1340pF | A = ±0.05pF if < 10pF and<br>0.05% if > 10pF<br>B = ± 0.1pF<br>C = ± 0,25pF<br>D = ± 0,5pF<br>F = ± 1%<br>G = ± 2%<br>J = ± 5%<br>K = ± 10%<br>M = ± 20% | G = 1KV<br>H = 2KV<br>I = 3KV<br>L = 5KV<br>8 = 8KV<br>10 = 10KV | - = Tin Plated<br>N = SnPb Plated | L<br>J<br>D<br>M<br>U = 4 leads | 020<br>030<br>040<br>050<br>060<br>070<br>080<br>090<br>100<br>110<br>120<br>130<br>140<br>160<br>180 | -<br>I = Conformal Coating<br>H = EpoxyCoating | B = Reel<br>V = Bulk | -<br>BM = BME<br>Dxx = Reliability spec<br>Exx = Sorting spec |

For J, L, M form, total height (T) is obtained by adding lead height (C/E) to specified chip height (H) in 1/10mm

For other sizes, voltage, tolerance contact us

## DIMENSIONS (IN MILLIMETERS)

|                 | 1812       | 1825       | 2220       | 2225       | 2825       | 3033       | 3640        | 4040        | 40100       | 5550        | 6080        | 6560 /6660  | 8060        | 80150       |
|-----------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Lenght (L)      | 5.10 ± 0.4 | 5.10 ± 0.4 | 6.20 ± 0.4 | 6.20 ± 0.4 | 7.70 ± 0.4 | 8.20 ± 0.4 | 9.75 ± 0.5  | 10.80 ± 0.8 | 10.80 ± 1.0 | 14.60 ± 1.0 | 15.80 ± 1.0 | 17.40 ± 1.0 | 20.90 ± 1.0 | 20.90 ± 1.0 |
| Width (W)       | 3.20 ± 0.4 | 6.35 ± 0.4 | 5.10 ± 0.4 | 6.35 ± 0.4 | 6.35 ± 0.4 | 8.40 ± 0.4 | 10.20 ± 0.5 | 10.20 ± 0.8 | 25.40 ± 1.0 | 12.70 ± 1.0 | 20.30 ± 1.0 | 15.20 ± 1.0 | 15.20 ± 1.0 | 38.10 ± 1.0 |
| Nb of Leads     | 2          | 3          | 3          | 3          | 3          | 3          | 4           | 4           | 10          | 5           | 8           | 6           | 6           | 15          |
| Min Height (T)  | 2.8        | 3.0        | 3.0        | 3.1        | 3.4        | 3.5        | 3.6         | 4.0         | 4.0         | 4.3         | 4.4         | 4.5         | 4.5         | 4.5         |
| Max Height (T)  | 9.6        | 16.2       | 16.2       | 16.2       | 16.9       | 20.1       | 20.1        | 20.1        | 20.1        | 20.1        | 20.1        | 20.1        | 20.1        | 20.1        |
| Lead Height (C) | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   |
| lead Lenght (D) | 1.4 ± 0.3  | 1.6 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3  | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   | 1.8 ± 0.3   |
| Lead Height (E) | 1.3 ± 0.3  | 1.3 ± 0.3  | 1.3 ± 0.3  | 1.3 ± 0.3  | 1.3 ± 0.3  | 1.3 ± 0.3  | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   | 1.3 ± 0.3   |
| Lead Lenght (F) | 4.0 ± 1.0  | 4.5 ± 1.0  | 5.0 ± 1.0  | 5.0 ± 1.0  | 6.0 ± 1.0  | 6.0 ± 1.0  | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   | 6.0 ± 1.0   |



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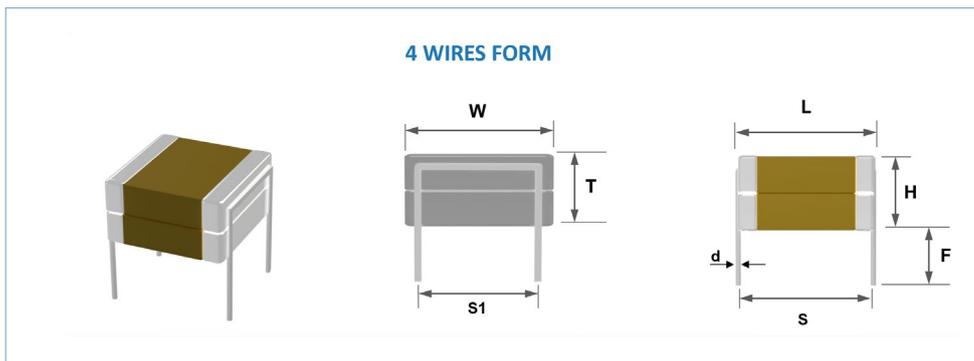
NPO N2T X7R 1KV-10KV



**SRT**  
MICROCÉRAMIQUE  
MLCC CAPACITORS

## DIMENSIONS 4 WIRES (In millimeters)

|                 | 3033       | 3640        | 5550        | 5550        | 5550        | 6080        | 6080        | 6660        | 8060        | 40100       | 80150       |
|-----------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Lenght (L)      | 9.20 ± 0.5 | 11.15 ± 0.5 | 16.00 ± 0.5 | 16.00 ± 0.5 | 16.00 ± 0.5 | 17.20 ± 0.5 | 17.20 ± 0.5 | 18.80 ± 0.5 | 22.30 ± 0.5 | 12.20 ± 0.5 | 22.70 ± 0.5 |
| Width (W)       | 8.40 ± 0.5 | 10.20 ± 0.5 | 12.70 ± 0.5 | 12.70 ± 0.5 | 12.70 ± 0.5 | 20.30 ± 0.5 | 20.30 ± 0.5 | 15.20 ± 0.5 | 15.20 ± 0.5 | 25.40 ± 0.5 | 38.10 ± 0.5 |
| Lead Space (S)  | 8.40       | 10.15       | 15.00       | 15.00       | 15.00       | 16.20       | 16.20       | 17.80       | 21.30       | 11.20       | 21.50       |
| Lead Width (S1) | 5.08       | 7.62        | 7.62        | 10.16       | 15.24       | 10.16       | 15.24       | 10.16       | 10.16       | 27.94       | 30.48       |
| Nb 2.54 sp (x)  | 2          | 3           | 3           | 4           | 6           | 4           | 6           | 4           | 4           | 11          | 12          |
| Lead diam (d)   | 0,8        | 1,0         | 1,0         | 1,0         | 1,0         | 1,0         | 1,0         | 1,0         | 1,0         | 1,0         | 1,2         |
| Min Height (H)  | 3,5        | 3,6         | 4,3         | 4,3         | 4,3         | 4,4         | 4,4         | 4,5         | 4,5         | 4           | 4,5         |
| Max Height (H)  | 20,1       | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        | 20,1        |
| Lead Lenght (F) | 25 ± 1.0   | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    | 25 ± 1.0    |



## QUICK REFERENCE DATA (Max capacitance)

|             | 1812   |        |        | 1825   |        |        | 2220   |        |        | 2225   |        |        | 3033   |        |        | 3640   |        |        | Height H (1/10 mm) |     |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------------|-----|
|             | NPO    | N2T    | X7R    |                    |     |
| <b>min</b>  | 12 pF  | 39 pF  | 1.0 nF | 33 pF  | 100 pF | 2.2 nF | 82 pF  | 220 pF | 470 pF | 100 pF | 220 pF | 560 pF | 180 pF | 560 pF | 1.2 nF | 270 pF | 820 pF | 1.8 nF |                    |     |
| <b>1KV</b>  | 12 nF  | 22 nF  | 68 nF  | 27 nF  | 56 nF  | 150 nF | 27 nF  | 56 nF  | 150 nF | 33 nF  | 68 nF  | 220 nF | 56 nF  | 120 nF | 390 nF | 82 nF  | 180 nF | 560 nF | 560 nF             | 020 |
|             | 18 nF  | 47 nF  | 120 nF | 39 nF  | 100 nF | 330 nF | 39 nF  | 100 nF | 390 nF | 47 nF  | 120 nF | 470 nF | 82 nF  | 220 nF | 820 nF | 120 nF | 330 nF | 1.2 μF | 040                |     |
|             | 33 nF  | 47 nF  | 120 nF | 68 nF  | 100 nF | 330 nF | 82 nF  | 100 nF | 390 nF | 100 nF | 120 nF | 470 nF | 180 nF | 220 nF | 820 nF | 270 nF | 330 nF | 1.2 μF | 060                |     |
|             |        |        |        | 120 nF | 270 nF | 680 nF | 120 nF | 330 nF | 820 nF | 150 nF | 390 nF | 1.0 μF | 270 nF | 680 nF | 1.8 μF | 390 nF | 1.0 μF | 2.7 μF | 100                |     |
| <b>2KV</b>  | 2.2 nF | 3.9 nF | 12 nF  | 4.7 nF | 10 nF  | 33 nF  | 5.6 nF | 10 nF  | 33 nF  | 6.8 nF | 12 nF  | 39 nF  | 12 nF  | 22 nF  | 82 nF  | 18 nF  | 33 nF  | 120 nF | 020                |     |
|             | 4.7 nF | 6.8 nF | 22 nF  | 12 nF  | 15 nF  | 56 nF  | 12 nF  | 15 nF  | 68 nF  | 18 nF  | 22 nF  | 100 nF | 27 nF  | 39 nF  | 180 nF | 47 nF  | 56 nF  | 270 nF | 040                |     |
|             | 4.7 nF | 12 nF  | 22 nF  | 12 nF  | 33 nF  | 56 nF  | 12 nF  | 33 nF  | 68 nF  | 18 nF  | 39 nF  | 100 nF | 27 nF  | 82 nF  | 180 nF | 47 nF  | 120 nF | 270 nF | 060                |     |
|             |        |        |        | 22 nF  | 47 nF  | 120 nF | 27 nF  | 47 nF  | 150 nF | 33 nF  | 56 nF  | 180 nF | 56 nF  | 120 nF | 390 nF | 82 nF  | 180 nF | 560 nF | 100                |     |
| <b>3KV</b>  | 820 pF | 1.5 nF | 5.6 nF | 1.8 nF | 3.3 nF | 12 nF  | 1.8 nF | 3.9 nF | 12 nF  | 2.7 nF | 4.7 nF | 18 nF  | 4.7 nF | 8.2 nF | 33 nF  | 6.8 nF | 12 nF  | 47 nF  | 020                |     |
|             | 1.2 nF | 2.7 nF | 10 nF  | 2.7 nF | 5.6 nF | 27 nF  | 2.7 nF | 6.8 nF | 27 nF  | 3.9 nF | 10 nF  | 33 nF  | 8.2 nF | 18 nF  | 68 nF  | 12 nF  | 27 nF  | 100 nF | 040                |     |
|             | 2.2 nF | 5.6 nF | 10 nF  | 5.6 nF | 12 nF  | 27 nF  | 5.6 nF | 6.8 nF | 27 nF  | 8.2 nF | 10 nF  | 33 nF  | 15 nF  | 18 nF  | 68 nF  | 22 nF  | 27 nF  | 100 nF | 060                |     |
|             |        |        |        | 8.2 nF | 18 nF  | 47 nF  | 8.2 nF | 15 nF  | 56 nF  | 12 nF  | 18 nF  | 68 nF  | 22 nF  | 33 nF  | 120 nF | 33 nF  | 47 nF  | 180 nF | 100                |     |
| <b>5KV</b>  | 220 pF | 470 pF | 1.5 nF | 560 pF | 1.0 nF | 3.3 nF | 560 pF | 1.2 nF | 3.9 nF | 680 pF | 1.5 nF | 4.7 nF | 15 nF  | 2.7 nF | 10 nF  | 2.2 nF | 10 nF  | 3.9 nF | 15 nF              | 020 |
|             | 390 pF | 820 pF | 2.7 nF | 1.2 nF | 2.2 nF | 8.2 nF | 1.5 nF | 2.2 nF | 10 nF  | 1.8 nF | 3.3 nF | 12 nF  | 3.9 nF | 5.6 nF | 22 nF  | 4.7 nF | 8.2 nF | 33 nF  | 040                |     |
|             | 390 pF | 820 pF | 2.7 nF | 1.2 nF | 2.2 nF | 8.2 nF | 1.5 nF | 2.2 nF | 10 nF  | 1.8 nF | 3.3 nF | 12 nF  | 3.9 nF | 5.6 nF | 22 nF  | 4.7 nF | 8.2 nF | 33 nF  | 060                |     |
|             |        |        |        | 2.2 nF | 4.7 nF | 15 nF  | 2.2 nF | 4.7 nF | 18 nF  | 3.9 nF | 6.8 nF | 27 nF  | 6.8 nF | 12 nF  | 47 nF  | 15 nF  | 18 nF  | 68 nF  | 100                |     |
| <b>8KV</b>  | 82 pF  | 120 pF | 390 pF | 180 pF | 270 pF | 1.0 nF | 220 pF | 390 pF | 1.2 nF | 270 pF | 470 pF | 1.5 nF | 560 pF | 1.0 nF | 2.7 nF | 680 pF | 1.5 nF | 3.9 nF | 020                |     |
|             | 150 pF | 270 pF | 1.0 nF | 390 pF | 680 pF | 2.7 nF | 390 pF | 820 pF | 2.7 nF | 560 pF | 1.2 nF | 3.9 nF | 1.0 nF | 2.2 nF | 6.8 nF | 1.5 nF | 3.3 nF | 10 nF  | 040                |     |
|             | 150 pF | 270 pF | 1.0 nF | 390 pF | 680 pF | 2.7 nF | 390 pF | 820 pF | 2.7 nF | 560 pF | 1.2 nF | 3.9 nF | 1.0 nF | 2.2 nF | 6.8 nF | 1.5 nF | 3.3 nF | 10 nF  | 060                |     |
|             |        |        |        | 820 pF | 1.5 nF | 5.6 nF | 820 pF | 1.8 nF | 5.6 nF | 1.0 nF | 2.2 nF | 8.2 nF | 1.8 nF | 2.2 nF | 4.7 nF | 15 nF  | 2.7 nF | 6.8 nF | 22 nF              | 100 |
| <b>10KV</b> | 39 pF  | 39 pF  |        | 100 pF | 100 pF |        | 120 pF | 220 pF | 680 pF | 150 pF | 220 pF | 820 pF | 330 pF | 560 pF | 1.8 nF | 680 pF | 820 pF | 2.7 nF | 020                |     |
|             | 100 pF | 100 pF |        | 220 pF | 270 pF |        | 270 pF | 470 pF | 1.5 nF | 390 pF | 680 pF | 1.8 nF | 680 pF | 1.2 nF | 3.9 nF | 1.0 nF | 1.8 nF | 5.6 nF | 040                |     |
|             | 100 pF | 100 pF |        | 220 pF | 270 pF |        | 270 pF | 470 pF | 1.5 nF | 390 pF | 680 pF | 1.8 nF | 680 pF | 1.2 nF | 3.9 nF | 1.0 nF | 1.8 nF | 5.6 nF | 060                |     |
|             |        |        |        | 470 pF | 560 pF | 820 pF | 560 pF | 1.0 nF | 3.9 nF | 1.2 nF | 5.6 nF | 1.2 nF | 5.6 nF | 1.5 nF | 2.7 nF | 10 nF  | 2.2 nF | 3.9 nF | 15 nF              | 100 |
|             |        |        | 680 pF | 820 pF |        |        |        |        | 1.2 nF | 1.8 nF | 6.8 nF | 2.2 nF | 3.9 nF | 15 nF  | 3.3 nF | 5.6 nF | 22 nF  | 140    |                    |     |
|             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 180                |     |

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### QUICK REFERENCE DATA (Max capacitance)

|        | 4040   |        |        | 40100  |        |        | 5550   |        |        | 6660   |        |        | 8060   |        |        | 80150  |        |        | Height H<br>(1/10 mm) |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------------------|
|        | NPO    | N2T    | X7R    |                       |
|        | 330 pF | 820 pF | 1.8 nF | 820 pF | 2.2 nF | 4.7 nF | 560 pF | 1.5 nF | 3.3 nF | 820 pF | 2.2 nF | 4.7 nF | 1.0 nF | 2.7 nF | 5.6 nF | 2.2 nF | 6.8 nF | 15 nF  |                       |
| 1KV    | 100 nF | 180 nF | 680 nF | 220 nF | 470 nF | 1.5 µF | 180 nF | 330 nF | 1.0 µF | 220 nF | 470 nF | 1.5 µF | 270 nF | 560 nF | 1.8 µF | 680 nF | 1.5 µF | 4.7 µF | 020                   |
|        | 150 nF | 390 nF | 1.5 µF | 330 nF | 1.0 µF | 3.3 µF | 220 nF | 680 nF | 2.2 µF | 330 nF | 820 nF | 3.3 µF | 390 nF | 1.0 µF | 3.9 µF | 1.0 µF | 2.7 µF | 10 µF  | 040                   |
|        | 270 nF | 390 nF | 1.5 µF | 680 nF | 1.0 µF | 3.3 µF | 470 nF | 680 nF | 2.2 µF | 680 nF | 820 nF | 3.3 µF | 820 nF | 1.0 µF | 3.9 µF | 2.2 µF | 2.7 µF | 10 µF  | 060                   |
|        | 390 nF | 1.2 µF | 2.7 µF | 1.0 µF | 2.7 µF | 6.8 µF | 680 nF | 1.8 µF | 4.7 µF | 1.0 µF | 2.7 µF | 6.8 µF | 1.2 µF | 3.3 µF | 8.2 µF | 3.3 µF | 8.2 µF | 22 µF  | 100                   |
|        | 680 nF | 1.5 µF | 3.9 µF | 1.8 µF | 3.9 µF | 10 µF  | 1.2 µF | 2.7 µF | 6.8 µF | 1.8 µF | 3.9 µF | 10 µF  | 2.2 µF | 4.7 µF | 12 µF  | 5.6 µF | 10 µF  | 33 µF  | 140                   |
| 820 nF | 1.8 µF | 5.6 µF | 2.2 µF | 4.7 µF | 15 µF  | 1.5 µF | 3.3 µF | 10 µF  | 2.2 µF | 4.7 µF | 12 µF  | 2.7 µF | 5.6 µF | 15 µF  | 5.6 µF | 12 µF  | 39 µF  | 180    |                       |
| 2KV    | 18 nF  | 39 nF  | 120 nF | 47 nF  | 100 nF | 330 nF | 33 nF  | 68 nF  | 220 nF | 47 nF  | 100 nF | 330 nF | 56 nF  | 120 nF | 390 nF | 150 nF | 270 nF | 1.0 µF | 020                   |
|        | 47 nF  | 68 nF  | 270 nF | 120 nF | 150 nF | 680 nF | 82 nF  | 120 nF | 470 nF | 120 nF | 150 nF | 680 nF | 150 nF | 180 nF | 820 nF | 390 nF | 470 nF | 2.2 µF | 040                   |
|        | 47 nF  | 120 nF | 270 nF | 120 nF | 330 nF | 680 nF | 82 nF  | 220 nF | 470 nF | 120 nF | 330 nF | 680 nF | 150 nF | 390 nF | 820 nF | 390 nF | 1.0 µF | 2.2 µF | 060                   |
|        | 100 nF | 180 nF | 560 nF | 220 nF | 470 nF | 1.5 µF | 150 nF | 330 nF | 1.0 µF | 220 nF | 470 nF | 1.5 µF | 270 nF | 560 nF | 1.8 µF | 680 nF | 1.5 µF | 4.7 µF | 100                   |
|        | 150 nF | 270 nF | 820 nF | 390 nF | 680 nF | 2.2 µF | 220 nF | 470 nF | 1.5 µF | 330 nF | 680 nF | 2.2 µF | 390 nF | 820 nF | 2.7 µF | 1.0 µF | 1.8 µF | 6.8 µF | 140                   |
| 180 nF | 390 nF | 1.2 µF | 470 nF | 1.0 µF | 2.7 µF | 330 nF | 680 nF | 2.2 µF | 470 nF | 1.0 µF | 2.7 µF | 560 nF | 1.2 µF | 3.3 µF | 1.5 µF | 2.7 µF | 8.2 µF | 180    |                       |
| 3KV    | 8.2 nF | 15 nF  | 56 nF  | 18 nF  | 33 nF  | 120 nF | 12 nF  | 22 nF  | 82 nF  | 18 nF  | 33 nF  | 120 nF | 22 nF  | 39 nF  | 150 nF | 56 nF  | 100 nF | 390 nF | 020                   |
|        | 12 nF  | 27 nF  | 100 nF | 33 nF  | 68 nF  | 270 nF | 22 nF  | 47 nF  | 180 nF | 27 nF  | 68 nF  | 270 nF | 39 nF  | 82 nF  | 330 nF | 82 nF  | 220 nF | 820 nF | 040                   |
|        | 22 nF  | 27 nF  | 100 nF | 56 nF  | 68 nF  | 270 nF | 39 nF  | 47 nF  | 180 nF | 56 nF  | 68 nF  | 270 nF | 68 nF  | 82 nF  | 330 nF | 180 nF | 220 nF | 820 nF | 060                   |
|        | 39 nF  | 56 nF  | 220 nF | 100 nF | 150 nF | 560 nF | 68 nF  | 100 nF | 390 nF | 82 nF  | 150 nF | 560 nF | 100 nF | 180 nF | 680 nF | 270 nF | 390 nF | 1.5 µF | 100                   |
|        | 47 nF  | 82 nF  | 330 nF | 120 nF | 220 nF | 820 nF | 82 nF  | 150 nF | 560 nF | 120 nF | 220 nF | 820 nF | 150 nF | 270 nF | 820 nF | 1.0 µF | 390 nF | 680 nF | 2.2 µF                |
| 68 nF  | 120 nF | 390 nF | 180 nF | 270 nF | 1.0 µF | 120 nF | 180 nF | 680 nF | 180 nF | 220 nF | 820 nF | 1.0 µF | 220 nF | 330 nF | 1.2 µF | 560 nF | 820 nF | 3.3 µF | 180                   |
| 5KV    | 2.2 nF | 4.7 nF | 18 nF  | 5.6 nF | 12 nF  | 39 nF  | 3.9 nF | 8.2 nF | 27 nF  | 5.6 nF | 12 nF  | 39 nF  | 6.8 nF | 12 nF  | 47 nF  | 18 nF  | 33 nF  | 120 nF | 020                   |
|        | 5.6 nF | 10 nF  | 39 nF  | 15 nF  | 22 nF  | 100 nF | 10 nF  | 18 nF  | 68 nF  | 15 nF  | 22 nF  | 100 nF | 18 nF  | 27 nF  | 120 nF | 39 nF  | 68 nF  | 270 nF | 040                   |
|        | 5.6 nF | 10 nF  | 39 nF  | 15 nF  | 22 nF  | 100 nF | 10 nF  | 18 nF  | 68 nF  | 15 nF  | 22 nF  | 100 nF | 18 nF  | 27 nF  | 120 nF | 39 nF  | 68 nF  | 270 nF | 060                   |
|        | 12 nF  | 18 nF  | 82 nF  | 27 nF  | 47 nF  | 180 nF | 18 nF  | 33 nF  | 120 nF | 27 nF  | 47 nF  | 180 nF | 33 nF  | 56 nF  | 220 nF | 82 nF  | 150 nF | 560 nF | 100                   |
|        | 18 nF  | 27 nF  | 120 nF | 39 nF  | 68 nF  | 270 nF | 27 nF  | 47 nF  | 180 nF | 39 nF  | 68 nF  | 270 nF | 47 nF  | 82 nF  | 330 nF | 120 nF | 220 nF | 820 nF | 140                   |
| 22 nF  | 39 nF  | 150 nF | 56 nF  | 100 nF | 390 nF | 39 nF  | 68 nF  | 270 nF | 56 nF  | 100 nF | 390 nF | 68 nF  | 120 nF | 470 nF | 180 nF | 270 nF | 1.2 µF | 180    |                       |
| 8KV    | 820 pF | 1.5 nF | 4.7 nF | 2.2 nF | 3.9 nF | 12 nF  | 1.5 nF | 2.7 nF | 8.2 nF | 1.8 nF | 3.9 nF | 12 nF  | 2.2 nF | 4.7 nF | 15 nF  | 5.6 nF | 12 nF  | 33 nF  | 020                   |
|        | 1.5 nF | 3.9 nF | 12 nF  | 3.9 nF | 10 nF  | 27 nF  | 2.7 nF | 6.8 nF | 22 nF  | 3.9 nF | 8.2 nF | 27 nF  | 4.7 nF | 10 nF  | 33 nF  | 12 nF  | 27 nF  | 82 nF  | 040                   |
|        | 1.5 nF | 3.9 nF | 12 nF  | 3.9 nF | 10 nF  | 27 nF  | 2.7 nF | 6.8 nF | 22 nF  | 3.9 nF | 8.2 nF | 27 nF  | 4.7 nF | 10 nF  | 33 nF  | 12 nF  | 27 nF  | 82 nF  | 060                   |
|        | 3.3 nF | 6.8 nF | 22 nF  | 8.2 nF | 18 nF  | 56 nF  | 5.6 nF | 12 nF  | 39 nF  | 8.2 nF | 18 nF  | 56 nF  | 10 nF  | 22 nF  | 68 nF  | 22 nF  | 56 nF  | 180 nF | 100                   |
|        | 4.7 nF | 12 nF  | 39 nF  | 12 nF  | 27 nF  | 82 nF  | 8.2 nF | 18 nF  | 56 nF  | 12 nF  | 27 nF  | 82 nF  | 15 nF  | 33 nF  | 100 nF | 39 nF  | 82 nF  | 270 nF | 140                   |
| 8.2 nF | 15 nF  | 47 nF  | 22 nF  | 39 nF  | 120 nF | 15 nF  | 27 nF  | 82 nF  | 18 nF  | 39 nF  | 120 nF | 22 nF  | 47 nF  | 150 nF | 56 nF  | 100 nF | 330 nF | 180    |                       |
| 10KV   | 470 pF | 1.0 nF | 2.7 nF | 1.2 nF | 2.2 nF | 6.8 nF | 820 pF | 1.5 nF | 4.7 nF | 1.2 nF | 2.2 nF | 6.8 nF | 1.5 nF | 2.7 nF | 8.2 nF | 3.9 nF | 6.8 nF | 22 nF  | 020                   |
|        | 1.2 nF | 2.2 nF | 5.6 nF | 2.7 nF | 5.6 nF | 15 nF  | 1.8 nF | 3.9 nF | 10 nF  | 2.7 nF | 5.6 nF | 15 nF  | 3.3 nF | 6.8 nF | 18 nF  | 8.2 nF | 15 nF  | 47 nF  | 040                   |
|        | 1.2 nF | 2.2 nF | 5.6 nF | 2.7 nF | 5.6 nF | 15 nF  | 1.8 nF | 3.9 nF | 10 nF  | 2.7 nF | 5.6 nF | 15 nF  | 3.3 nF | 6.8 nF | 18 nF  | 8.2 nF | 15 nF  | 47 nF  | 060                   |
|        | 2.2 nF | 3.9 nF | 18 nF  | 5.6 nF | 10 nF  | 47 nF  | 3.9 nF | 6.8 nF | 33 nF  | 5.6 nF | 10 nF  | 47 nF  | 6.8 nF | 12 nF  | 56 nF  | 18 nF  | 33 nF  | 120 nF | 100                   |
|        | 3.3 nF | 6.8 nF | 22 nF  | 8.2 nF | 15 nF  | 56 nF  | 5.6 nF | 10 nF  | 39 nF  | 8.2 nF | 15 nF  | 56 nF  | 10 nF  | 18 nF  | 68 nF  | 27 nF  | 47 nF  | 180 nF | 140                   |
| 4.7 nF | 8.2 nF | 27 nF  | 12 nF  | 22 nF  | 68 nF  | 8.2 nF | 15 nF  | 47 nF  | 12 nF  | 22 nF  | 68 nF  | 12 nF  | 27 nF  | 82 nF  | 33 nF  | 68 nF  | 220 nF | 180    |                       |

## STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended :

Indoors under 5 ~ 40°C and 20% ~ 70% RH.

No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.

Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as possible. Taped products should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 24 months after shipment. Extended shelf life over this period require a solderability check before use.

## HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

## PREHEAT

In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required.

The rate of preheat should not exceed 3°C per second.

## SOLDERING FLUX

Use mildly activated rosin RA and RMA fluxes, but do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.

## SOLDERING TYPE

Lead containing solders, such as Sn60, Sn62 or Sn63 and lead free solders, such as SnAgCu, can all be used with our MLCCs.

In case of non-magnetic termination code C, use lead containing or lead (Pb)-free SAC305 solders.

## SOLDERING HEIGHT

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less.

(Reference from IPC-610E)

## COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

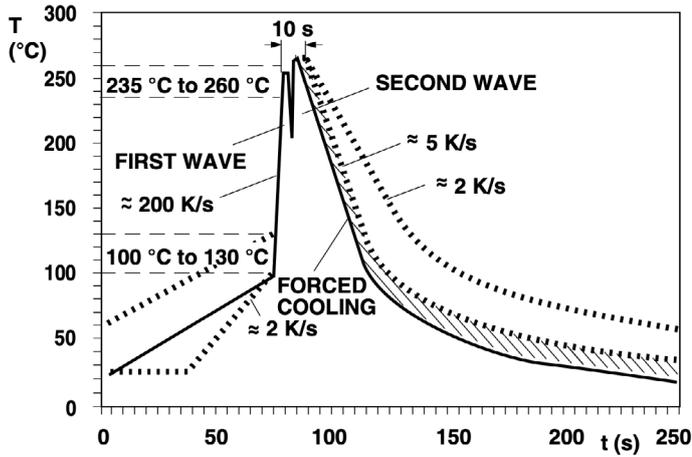
## CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.

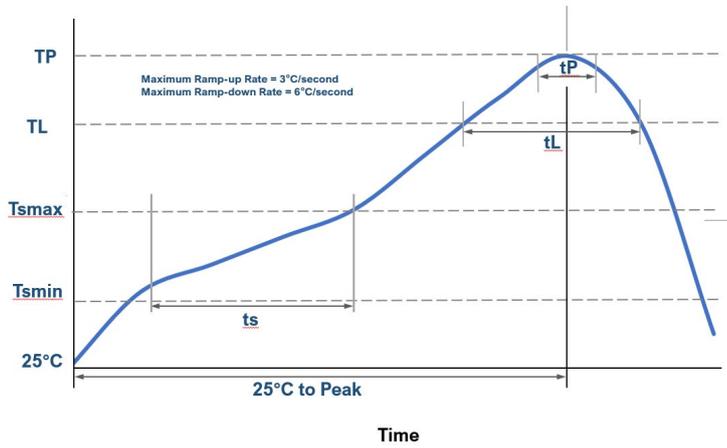
## SOLDERING CONDITIONS

| SIZE             | THICKNESS | WAVE | REFLOW |
|------------------|-----------|------|--------|
| 0201             | All       | 0    | 0      |
| 0402             | All       | 0    | 0      |
| 0505             | All       | 0    | 0      |
| 0603             | All       | 0    | 0      |
| 0805             | < 1.25mm  | 0    | 0      |
| 0805             | ≥ 1.25mm  |      | 0      |
| 1111             | < 1.25mm  | 0    | 0      |
| 1111             | ≥ 1.25mm  |      | 0      |
| 1206             | < 1.25mm  | 0    | 0      |
| 1206             | ≥ 1.25mm  |      | 0      |
| 1210             | < 1.25mm  | 0    | 0      |
| 1210             | ≥ 1.25mm  |      | 0      |
| larger than 1210 | All       |      | 0      |
| High compact     | All       |      | 0      |

## WAVE SOLDERING PROFILE

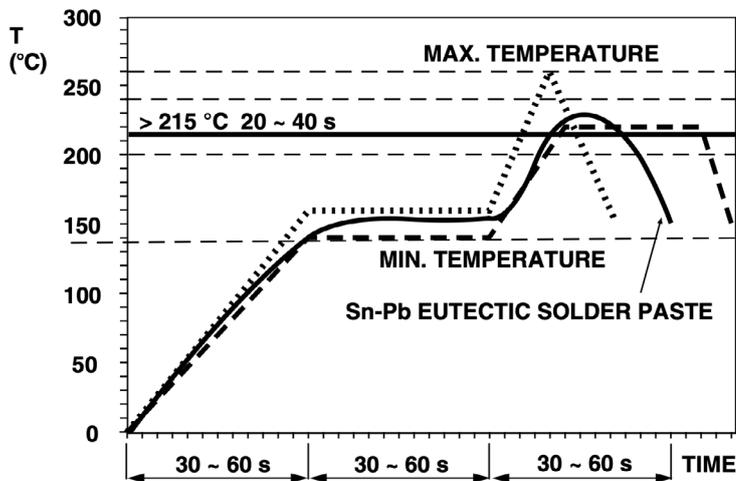


## LEADFREE REFLOW SOLDERING PROFILE

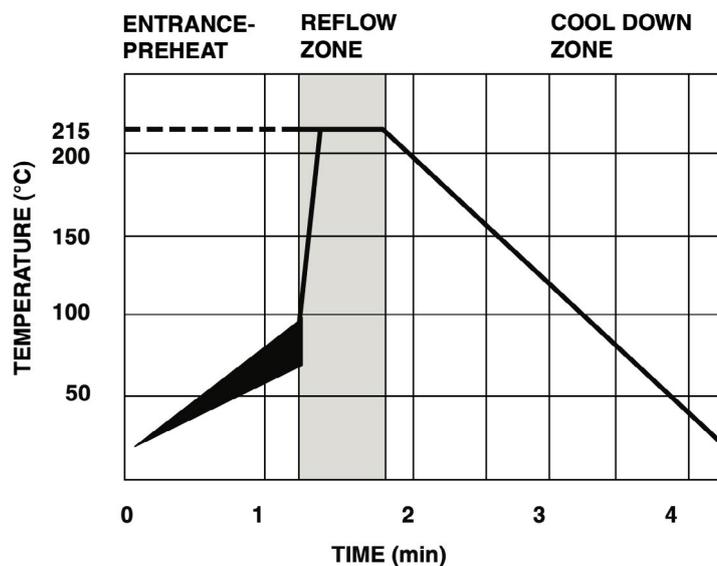


| PROFILE FEATURE            | LEAD FREE (SAC 305) |
|----------------------------|---------------------|
| Tsmin                      | 150°C               |
| Tsmax                      | 190°C               |
| Time from Tsmin to Tsmax   | 60 - 120 seconds    |
| Ramp-up Rate               | 3°C/second max      |
| Liquidous Temperature      | 217°C               |
| Time above Liquidous       | 60 - 120 seconds    |
| Peak Temperature           | 250°C               |
| Time within 5°C of maximum | 10 seconds max      |
| Peak Temperature           | 250°C               |
| Ramp-down Rate             | 6°C/second max      |
| Time 25°C to Peak          | 8min max            |

## SNPB REFLOW SOLDERING PROFILE



## VAPOUR PHASE REFLOW PROFILE



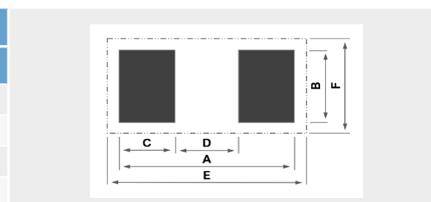
## HAND SOLDERING

Hand soldering is not recommended as the thermal shock may cause a crack, hot air pencil use is advised, however if used the following recommendations should be taken :

- Soldering iron tip diameter  $\leq 3.0$  mm and wattage max. 20W.
- The Capacitors shall be pre-heated to 150°C and that the temperature gradient between the devices and the tip of the soldering iron.
- Tip temperature  $\leq 280$ °C and shouldn't be applied for more than 5 seconds.
- The required amount of solder shall be melted on the soldering tip.
- The tip of iron should not contact the ceramic body directly.
- The Capacitors shall be cooled gradually at room temperature after soldering.
- Forced air cooling is not allowed.

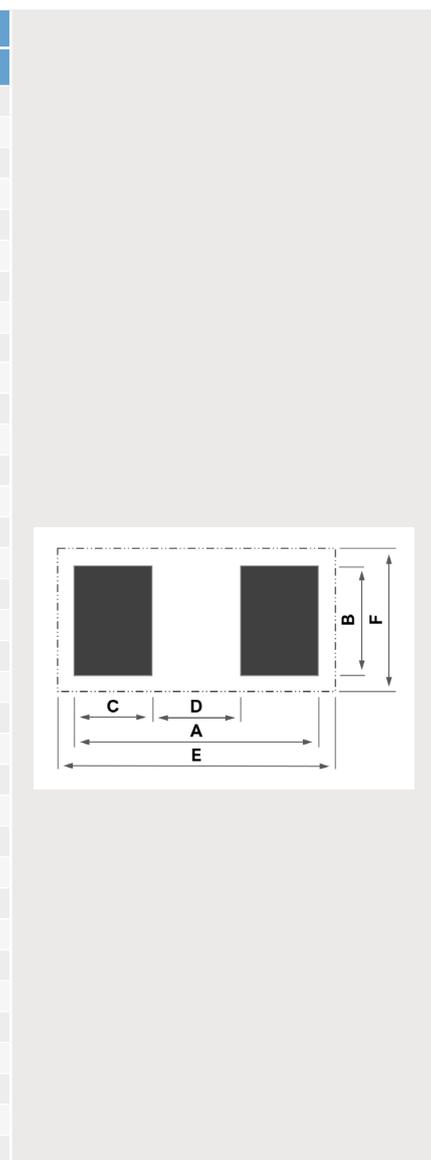
## TYPICAL SMD FOOTPRINT WAVE SOLDERING

| SIZE | FOOTPRINT DIMENSIONS IN MM |      |      |      |      |      |
|------|----------------------------|------|------|------|------|------|
|      | A                          | B    | C    | D    | E    | F    |
| 0603 | 2.40                       | 1.00 | 0.70 | 1.00 | 3.10 | 1.40 |
| 0805 | 3.20                       | 1.30 | 0.90 | 1.40 | 4.10 | 1.85 |
| 1206 | 4.80                       | 1.80 | 1.25 | 2.30 | 5.90 | 2.25 |
| 1210 | 4.80                       | 2.70 | 1.25 | 2.30 | 5.90 | 3.15 |



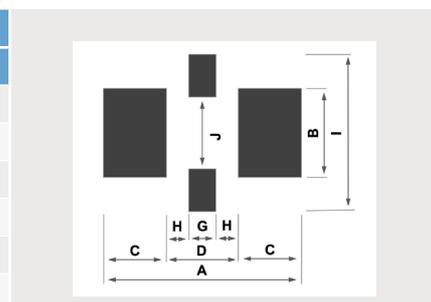
## TYPICAL SMD FOOTPRINT REFLOW SOLDERING

| SIZE              | FOOTPRINT DIMENSIONS IN mm |       |      |       |       |       |
|-------------------|----------------------------|-------|------|-------|-------|-------|
|                   | A                          | B     | C    | D     | E     | F     |
| 0201              | 1.00                       | 0.40  | 0.30 | 0.40  | 1.25  | 0.85  |
| 0204              | 1.00                       | 1.20  | 0.30 | 0.40  | 1.25  | 1.65  |
| 0402              | 1.50                       | 0.60  | 0.40 | 0.70  | 1.75  | 1.05  |
| 0306              | 1.30                       | 1.80  | 0.40 | 0.50  | 1.55  | 2.25  |
| 0404              | 1.50                       | 1.20  | 0.40 | 0.70  | 1.75  | 1.65  |
| 0504              | 1.90                       | 1.20  | 0.40 | 1.10  | 2.15  | 1.65  |
| 0505              | 1.90                       | 1.50  | 0.50 | 0.90  | 2.15  | 1.95  |
| 0508              | 1.90                       | 2.20  | 0.50 | 0.90  | 2.15  | 2.75  |
| 0603              | 2.30                       | 1.00  | 0.60 | 1.10  | 2.55  | 1.55  |
| 0612              | 2.30                       | 3.40  | 0.60 | 1.10  | 2.55  | 3.95  |
| 0805              | 2.90                       | 1.45  | 0.90 | 1.10  | 3.15  | 2.00  |
| 1206              | 4.10                       | 1.80  | 0.90 | 2.30  | 4.35  | 2.45  |
| 1210              | 4.10                       | 2.70  | 1.00 | 2.10  | 4.35  | 3.35  |
| 1808              | 5.50                       | 2.20  | 1.20 | 3.10  | 5.75  | 2.85  |
| 1812              | 5.50                       | 3.40  | 1.20 | 3.10  | 5.75  | 4.05  |
| 1825              | 5.50                       | 6.70  | 1.20 | 3.10  | 5.75  | 7.35  |
| 2211              | 6.80                       | 3.00  | 1.40 | 4.00  | 7.05  | 3.65  |
| 2220              | 6.80                       | 5.40  | 1.40 | 4.00  | 7.05  | 6.05  |
| 2225              | 6.80                       | 6.70  | 1.65 | 3.50  | 7.05  | 7.50  |
| 2525              | 7.70                       | 6.75  | 1.65 | 4.40  | 7.95  | 7.55  |
| 2825              | 8.40                       | 6.70  | 1.65 | 5.10  | 8.65  | 7.50  |
| 3033              | 9.00                       | 8.80  | 1.95 | 5.10  | 9.25  | 9.60  |
| 3640              | 11.60                      | 4.60  | 2.35 | 6.90  | 11.85 | 5.40  |
| 4017              | 11.60                      | 5.45  | 2.35 | 6.90  | 11.85 | 6.25  |
| 4020              | 11.60                      | 10.70 | 2.35 | 6.90  | 11.85 | 11.50 |
| 4040              | 11.60                      | 26.20 | 2.35 | 6.90  | 11.85 | 27.00 |
| 40100             | 15.50                      | 13.20 | 2.35 | 10.80 | 15.75 | 14.00 |
| 5550              | 16.70                      | 20.80 | 2.35 | 12.00 | 16.95 | 21.60 |
| 6080              | 18.30                      | 15.70 | 2.35 | 13.60 | 18.55 | 16.50 |
| 6660              | 21.90                      | 15.70 | 2.35 | 17.20 | 22.15 | 16.50 |
| 8060              | 21.90                      | 38.90 | 2.35 | 17.20 | 22.15 | 39.70 |
| 80150             | 4.15                       | 2.60  | 1.15 | 1.75  | 5.05  | 3.30  |
| HIGH COMPACT 1210 | 5.75                       | 3.40  | 1.35 | 2.70  | 6.70  | 4.20  |
| HIGH COMPACT 1812 | 6.80                       | 5.50  | 1.70 | 2.80  | 7.70  | 6.30  |
| HIGH COMPACT 2220 | 6.80                       | 5.50  | 1.70 | 2.80  | 7.70  | 6.30  |



## TYPICAL FILTER FOOTPRINT REFLOW SOLDERING

| SIZE | FOOTPRINT DIMENSIONS IN mm |      |      |      |      |      |      |      |
|------|----------------------------|------|------|------|------|------|------|------|
|      | A                          | B    | C    | D    | G    | H    | I    | J    |
| 0603 | 2.30                       | 1.00 | 0.55 | 1.20 | 0.60 | 0.30 | 1.40 | 0.60 |
| 0805 | 2.90                       | 1.45 | 0.70 | 1.50 | 0.80 | 0.35 | 1.85 | 1.05 |
| 1206 | 4.10                       | 1.80 | 0.95 | 2.20 | 1.00 | 0.60 | 2.20 | 1.40 |
| 1806 | 5.50                       | 1.80 | 1.15 | 3.20 | 1.50 | 0.85 | 2.20 | 1.40 |
| 1812 | 5.50                       | 3.40 | 1.15 | 3.20 | 1.50 | 0.85 | 3.90 | 3.00 |
| 2220 | 6.80                       | 5.40 | 1.25 | 4.30 | 2.00 | 1.15 | 7.20 | 5.00 |



This document is subject to change without notice.

## ORDERING INFORMATION

| SRMC  | -             | 0603     | Y          | 102   | J                 | A           | -                                      | L       | 040    | -       | -                     | -        | B               | -                      |
|-------|---------------|----------|------------|---|-------------------|-------------|--|---------|--------|---------|-----------------------|----------|-----------------|------------------------|
| SERIE | HT            | SIZE     | DIELECTRIC | CAPACITANCE                                       | TOLERANCE         | VOLTAGE     | TERMINAISON                            | FORM    | HEIGHT | LEADS   | COATING/MARKING       | CUR-RENT | PACKAGING       | SPECIAL                |
| -     | -             | 0201     | Q = High Q | Expressed in picofarads (pF)                      | A = ± 0.05pF/0.5% | V = 2.5V    | X = Nickel Tin                         | -       | -      | -       | -                     | -        | B = Reel        | -                      |
| FK    | H = High Temp | 0204     | A = NP0    |   | B = ± 0.1pF       | Y = 4V      | F = Palladium-Silver                   | J       | 020    | -       | -                     | -        | V = Bulk        | BM = BME               |
| FH    |               | 0402     | P = N2T    | The first two digits are significant,             | C = ± 0.25pF      | R = 6.3V    | P = Polymer Tin (Flex)                 | L       | 030    | 2 to 10 | I = Conformal-Coating | 1        | T = Tray        | Dxx = Reliability spec |
| SREV  |               | 0303     | X = BX     |   | D = ± 0.5pF       | Q = 10V     | C = Copper Tin (Non magnetic)          | D       | 040    | B       | H = Epoxy Coating     | 2        | Package         |                        |
| MCF   |               | 0306     | Y=X7R      | the third digit gives the number of noughts       | E = ± 0.1%        | J = 16V     | (Non magnetic)                         | M       | 050    |         | M = Marked            |          | W = Waffle Pack | Exx = Sorting spec     |
| M2F   |               | 0404     | BY=2C1     | Example : 102 = 1 000pF                           | F = ± 1%          | X = 25V     | CP = Copper Polymer Tin (Non magnetic) | T = 2   | 070    |         | R = Resistor          |          |                 |                        |
| MPF   |               | 0504     | S = X5R    |   | G = ± 2%          | Z = 35V     |  | leads   | 080    |         |                       |          |                 |                        |
| SRMC  |               | 0505     | T = X7S    |   | J = ± 5%          | A = 50V     | W = Nickel Gold Flash                  | U = 4   | 090    |         |                       |          |                 |                        |
| SRTV  |               | 0508     | R = X6S    |   | K = ± 10%         | U = 63V     | G = Nickel Gold Thick                  | leads   | 100    |         |                       |          |                 |                        |
| SR    |               | 0603     | W = X7T    | For special values R is used as decimal separator | M = ± 20%         | B = 100V    | HP = Dipped SnPb Polymer               | JP =    | 110    |         |                       |          |                 |                        |
| SA    |               | 0612     | U = Z5U    | Example 12R7 = 12.7pF                             | Z = -20% +80%     | N = 150V    | H = Dipped SnPb                        | plain J | 120    |         |                       |          |                 |                        |
| SF    |               | 0805     | V = Y5V    | Example 1340R0 = 1340pF                           |                   | C = 200V    | S = Dipped SAC                         | Lead    | 130    |         |                       |          |                 |                        |
|       |               | 1206     |            |   |                   | P = 250V    | SP = Polymer Dipped SAC                |         | 140    |         |                       |          |                 |                        |
|       |               | 1210     |            |   |                   | D = 300V    | I = Electrolytic SnPb                  |         | 160    |         |                       |          |                 |                        |
|       |               | 1808     |            |   |                   | E = 500V    | IP = Polymer Electrolytical SnPb       |         | 180    |         |                       |          |                 |                        |
|       |               | 1812     |            |   |                   | F = 630V    |  |         |        |         |                       |          |                 |                        |
|       |               | 1825     |            |   |                   | G = 1000V   | Q = Solderable Silver                  |         |        |         |                       |          |                 |                        |
|       |               | 2211     |            |   |                   | 1K2 = 1200V | - = Tin Plated Lead Frame              |         |        |         |                       |          |                 |                        |
|       |               | 2220     |            |   |                   | 1K4 = 1400V | N = SnPb Plated Lea Frame              |         |        |         |                       |          |                 |                        |
|       |               | 2225     |            |   |                   | O = 1500V   | M = Microstrip                         |         |        |         |                       |          |                 |                        |
|       |               | 2325     |            |   |                   | 1K7 = 1700V | A = Axial Ribbon                       |         |        |         |                       |          |                 |                        |
|       |               | 2525     |            |   |                   | 1K8 = 1800V | R = Radial Ribbon                      |         |        |         |                       |          |                 |                        |
|       |               | 2825     |            |   |                   | H = 2000V   | U = Axial Wire                         |         |        |         |                       |          |                 |                        |
|       |               | 3033     |            |   |                   | T = 2500V   | V = Radial Wire                        |         |        |         |                       |          |                 |                        |
|       |               | 3640     |            |   |                   | I = 3000V   | CM = Microstrip (Non magnetic)         |         |        |         |                       |          |                 |                        |
|       |               | 4040     |            |   |                   | M = 3600V   | CA = Axial Ribbon (Non magnetic)       |         |        |         |                       |          |                 |                        |
|       |               | 40100    |            |   |                   | K = 4000V   | CR = Radia Ribbon (Non magnetic)       |         |        |         |                       |          |                 |                        |
|       |               | 5550     |            |   |                   | L = 5000V   | CU = Axial Wire (Non magnetic)         |         |        |         |                       |          |                 |                        |
|       |               | 6080     |            |   |                   | 6 = 6000V   | CV = Radial Wire (Non magnetic)        |         |        |         |                       |          |                 |                        |
|       |               | 6560     |            |   |                   | S = 7200V   |  |         |        |         |                       |          |                 |                        |
|       |               | 6660     |            |   |                   | 7K5 = 7500V |  |         |        |         |                       |          |                 |                        |
|       |               | 7274     |            |   |                   | 8 = 8000V   |  |         |        |         |                       |          |                 |                        |
|       |               | 7565     |            |   |                   | 10 = 10000V |  |         |        |         |                       |          |                 |                        |
|       |               | 8060     |            |   |                   | 12 = 12000V |  |         |        |         |                       |          |                 |                        |
|       |               | 80150    |            |   |                   | 15 = 15000V |  |         |        |         |                       |          |                 |                        |
|       |               | 15080    |            |   |                   |             |  |         |        |         |                       |          |                 |                        |
|       |               | 40 to 94 |            |   |                   |             |  |         |        |         |                       |          |                 |                        |

## RELIABILITY/SCREENING LEVEL

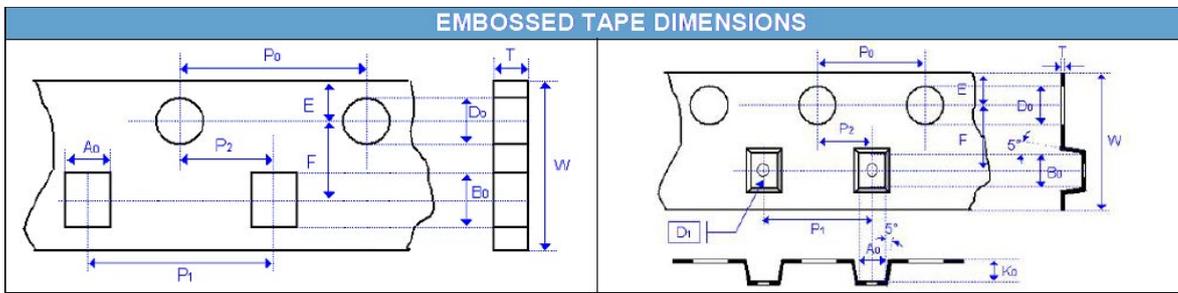
| OPTIONAL CODE | TESTING DETAIL   |
|---------------|--|
| D20           | Generic AECQ-200   |
| D55681        | DPA & 100% Burn-In Per Group A of MIL-PRF-55681  |
| D123          | Group A & B Per MIL-PRF-123  |
| D3009         | DPA & 100% Burn-In according to ECSS-3009 for space application  |
| COTS1         | Class 1 COTS+ according to ECSS-Q-ST-60-13C-Rev1   |
| COTS2         | Class 2 COTS+ according to ECSS-Q-ST-60-13C-Rev1   |
| COTS3         | Class 3 COTS+ according to ECSS-Q-ST-60-13C-Rev1   |
| D03           | High Temperature application<br>Burn-In 100% 125° 168H 2Un, 6.5% AQL   |
| D05           | Burn-In 100% 125° 168H 2Un, less than 5% default allowed<br>VRT CEI 68-2-14 10 cycles 0V -55°C/+125°C, less than 5% default allowed<br>20 pieces life test 125°C, 1.5Un, 1 default allowed |

## SORTING

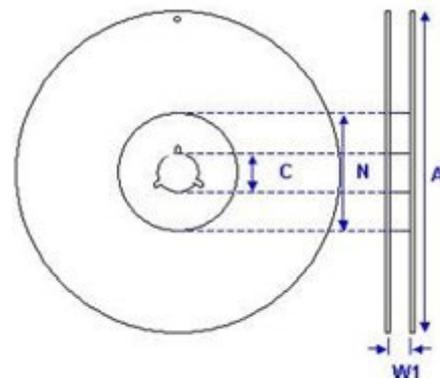
| OPTIONAL CODE | SORTING DETAIL   |
|---------------|--|
| E01           | 2 cells sorting 0 to +2,5 & +2,5 to +5 (% or pF accoding to value)                         |
| E02           | 4 cells sorting -5 to -2,5 ; -2,5 to 0 ; 0 to +2,5 & +2,5 to 5 (% or pF accoding to value) |
| E21           | 2% cells   |

## PACKAGE DIMENSION AND QUANTITY

| SIZE              | THICKNESS  | PAPER TAPE |         | PLASTIC TAPE |           |
|-------------------|------------|------------|---------|--------------|-----------|
|                   |            | 7 REEL     | 13 REEL | 7' REEL      | 13 REEL   |
| 0201              | 0.3 ± 0.05 | 10 K       | 50 K    |              |           |
| 0402              | 0.5 ± 0.05 | 10 K       | 50 K    |              |           |
| 0504              | 0.6 ± 0.05 |            |         | 4K           | 15K       |
|                   | 0.9 ± 0.05 |            |         | 4K           | 15K       |
| 0603              | 0.7 ± 0.07 | 4K         |         | 4K           | 15K       |
|                   | 0.9 ± 0.07 | 4K         | 15K     | 4K           | 15K       |
|                   | 0.9 ± 0.07 |            |         | 4K           | 15K       |
|                   | 1.1 ± 0.07 |            |         | 4K           | 15K       |
| 0805              | 0.8 ± 0.07 | 4K         | 15K     | 4K           | 15K       |
|                   | 0.9 ± 0.07 |            |         | 4K           | 10K       |
|                   | 1.1 ± 0.07 |            |         | 3K           | 10K       |
|                   | 1.3 ± 0.07 |            |         | 3K           | 10K       |
| 1206              | 1.1 ± 0.1  |            |         | 3K           | 10K       |
|                   | 1.4 ± 0.1  |            |         | 3K           | 8K        |
|                   | 1.8 ± 0.1  |            |         | 2K           | 8K        |
| 1210              | 1.4 ± 0.1  |            |         | 3K           | 8K        |
|                   | 1.8 ± 0.1  |            |         | 1K           | 6K        |
| 1808              | 1.4 ± 0.1  |            |         | 3K           | 8K        |
| 1812              | 1.6 ± 0.1  |            |         | 2K           | 8K        |
|                   | 2.1 ± 0.1  |            |         | 1K           | 6K        |
|                   | 2.8 ± 0.1  |            |         | 1K           | 6K        |
| 2220              | 1.8 ± 0.1  |            |         | 1K           | 6K        |
|                   | 3.0 ± 0.1  |            |         | 0.5K         | 2K        |
| 2225              | 3.0 ± 0.1  |            |         | 0.5K         | 2K        |
| 3033              | 3.0 ± 0.1  |            |         | 0.5K         | 2K        |
| 3640              | 3.0 ± 0.1  |            |         | 0.5K         | 2K        |
| 5440              | 3.9 ± 0.1  |            |         |              | 0.5K - 1K |
| HIGH COMPACT 1210 |            |            |         | 1K           | 6K        |
| HIGH COMPACT 1812 |            |            |         | 1K           | 6K        |
| HIGH COMPACT 2220 |            |            |         | 0.5K         | 2K        |



| REEL SIZE | 7                 | 7                 | 13                |
|-----------|-------------------|-------------------|-------------------|
| C         | 13.0<br>+0.5/-0.2 | 13.0<br>+0.5/-0.2 | 13.0<br>+0.7/-0.3 |
| W1        | 8.4<br>+1.5/-0    | 12.4<br>+2.0/-0   | 8.4<br>+2.0/-0    |
| A         | 178.0<br>±0.10    | 178.0<br>±0.10    | 330.0<br>±1.0     |
| N         | 60.0<br>±1.0      | 80.0<br>±1.0      | 100<br>±1.0       |



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## PRODUCTION CONTROL

Comparison of the Screening/Testing of the standard and High Reliability SRT-Microcéramique components

|                     | TEST/STRESS                 | STANDARD SMD                       | STACKS SRMC RADIALS                         | HIGH TEMPERATURE             | IAW ESA-ESCC3009   | COTS1   | COTS2   | COTS3   | IAW MIL-PRF-55681 GROUP A             | IAW MIL-PRF-123 GROUP A                          |
|---------------------|-----------------------------|------------------------------------|---|------------------------------|--|---|---|---|---------------------------------------|--|
|                     | CODE                        |                                    |   | D03                          | D3009  | COTS1   | COTS2   | COTS3   | D55681                                | D123   |
|                     | SCOPE                       | PME MLCC X7R, BX, NPO, N2T, High Q | Encapsulated, Dipped radial and Stacks SRMC | Type 1, Type 2 Chips         | SRT PME BME, Radials, Stacks, X7R, BX, N2T, NPO, High Q                    | Class 1 BME Chips   | Class 2 BME Chips   | Class 3 BME Chips   | SRT PME BME X7R, NPO, BX, N2T, High Q | SRT PME BME X7R, BX, NPO, N2T, High Q            |
| PROCESS / SCREENING | Burn-In                     |                                    | 100% Chips 24H +Stack 48H Tmax 2Un PDA 6.5% | 100% 168H Tmax 2Un PDA 6.5%  | 100% 96H Tmax 2Un PDA 5%   | 100% 96H Tmax 2Un PDA 5%  | 100% 96H Tmax 2Un PDA 5% for non AEC-Q200                                   | 100% 96H Tmax 2Un PDA 5% for non AEC-Q200                                   | 100% 100H Min Tmax 2Un PDA 8%         | 100% 168H Min 0.1%/1pc last 48H 125°C 2Un PDA 5% |
|                     | Capa, DF, IR, VP (25°C)     | 100%                               | 100%  | 100%                         | 100%   | 100%  | 100%  | 100%  | 100%                                  | 100%   |
|                     | IR (125°C)                  |                                    |   |                              |  |   |   |   | Sample                                | Sample   |
|                     | Voltage Breakdown           | 10 pcs/lot                         | 10 pcs/lot                                  | 10 pcs/lot                   | 10 pcs/lot   | 10 pcs/lot  | 10 pcs/lot  | 10 pcs/lot  | 10 pcs/lot                            | 10 pcs/lot                                       |
|                     | Dimension                   | 5 pcs/lot                          | 5 pcs/lot                                   | 5 pcs/lot                    | 5 pcs/lot  | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot                             | 5 pcs/lot  |
|                     | DPA                         | per lot                            | per lot                                     | per lot                      | per lot  | per lot   | per lot   | per lot   | per lot                               | per lot  |
|                     | Visual                      | 100%                               | 100%  | 100%                         | 100%   | 100%  | 100%  | 100%  | 100%                                  | 100%   |
|                     | Solderability               | 5 pcs/lot                          | 5 pcs/lot                                   | 5 pcs/lot                    | 5 pcs/lot  | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot                             | 5 pcs/lot  |
|                     | Leaching                    | 5 pcs/lot                          | 5 pcs/lot                                   | 5 pcs/lot                    | 5 pcs/lot  | 6 pcs/lot   | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot                             | 5 pcs/lot  |
|                     | Termination thickness       | 5 pcs/lot                          | 5 pcs/lot                                   | 5 pcs/lot                    | 5 pcs/lot  | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot   | 5 pcs/lot                             | 5 pcs/lot  |
| TC                  | per ceramic lot             | per ceramic lot                    | per ceramic lot                             | per ceramic lot              | per ceramic lot and in LAT   | in LAT  | in LAT  | in LAT  | per ceramic lot                       | per ceramic lot                                  |
| LAT                 | On request                  | On request                         | On request                                  | On request                   | Flying Part  | Flying part   | Flying part   | Flying part   | On request                            | On request                                       |
| LAT SUBGROUP 1      | Mounting                    |                                    |   |                              | 20 serialized pcs on PCB   |   |   |   |                                       |  |
|                     | Thermal Shock               |                                    |   |                              | 10 Cycles 30mn/1mn   |   |   |   |                                       |  |
|                     | Humidity                    |                                    |   |                              | For Un<500V 1000h 85/85  |   |   |   |                                       |  |
| Criteria            |                             |                                    |   | No visual/electrical default |  |   |   |   |                                       |  |
| LAT SUBGROUP 2A     | Mounting                    |                                    |   |                              | 20 serialized pcs on PCB   | 20 serialized pcs on PCB  | 20 serialized pcs on PCB  | 20 serialized pcs on PCB for non AEC-Q200                                   |                                       |  |
|                     | Operational Life            |                                    |   |                              | 1000h ±24 125°C 2Un Un=500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V | 1000h ±24 max T° 2Un Un=500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V | 1000h ±24 max T° 2Un Un=500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V | 1000h ±24 Max T° 2Un Un=500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V |                                       |  |
|                     | Criteria                    |                                    |   |                              | No visual/electrical default   | No visual/electrical default  | No visual/electrical default  | No visual/electrical default  |                                       |  |
| LAT SUBGROUP 2B     | Mounting                    |                                    |   |                              | 6 serialized pcs on PCB  | 6 serialized pcs on PCB non AEC-Q200  |   |   |                                       |  |
|                     | TC                          |                                    |   |                              | IR at 125°C Cp at -55°C/20°C+125°C   | IR at 125°C Cp at -55°C/20°C+125°C  |   |   |                                       |  |
|                     | Shear Test                  |                                    |   |                              | 5N 10s   | 5N 10s  |   |   |                                       |  |
|                     | Criteria                    |                                    |   |                              | No visual/electrical default   | No visual/electrical default  |   |   |                                       |  |
| LAT SUBGROUP 3      | Mounting                    |                                    |   |                              | 6 pcs serialized   | 6 pcs serialized  |   |   |                                       |  |
|                     | Solderability               |                                    |   |                              | Solder bath 235°C 5s included in screening                                 | Solder bath 235°C 5s included in screening                                  |   |   |                                       |  |
|                     | Permanence of Marking       |                                    |   |                              | ESCC24800 when applicable  | ESCC24800 when applicable   |   |   |                                       |  |
|                     | Criteria                    |                                    |   |                              | No visual/electrical default   | No visual/electrical default  |   |   |                                       |  |
|                     | Thermal Cycle (optional)    |                                    |   |                              |  |   |   |   |                                       |  |
|                     | Ultrasonic, Xray (optional) |                                    |   |                              |  |   |   |   |                                       |  |

- All components components can be proposed with SbPb termination (electrolytical I or Dipped H) with 5% min Pb for whisker mitigation
- Standard NiSn Termination is qualified according to JDEC JESD201A regarding whisker mitigation
- Other termination available Silver Palladium F, Solderable Silver Q, Thick Gold G, Flash Gold W, Non Magnetic Copper C, Polymer option P
- ECSS COTS framework is used to propose space ready components Class 1 to 3 based on SRT or customer chosen BME chips either AEC-Q200 (preferred) or non AEC-Q200. Size can start from 0201 and resistors can also be proposed and termination be changed.
- Specific High Reliability programs can be established to fit customer requirement for medical, defense, space, high stress applications.

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## RELIABILITY PRINCIPLES OVERVIEW GENERAL PRODUCTION

In order to guarantee highly reliable products to their customers, SRT-Microcéramique follows a strict quality policy which is explained below :

- According to AECQ philosophy, each component belongs to a family, which most restrictive members (four corners) have been fully qualified.
- PME components are produced in our Vendôme facility, with very stable process and equipments, in order to ensure Reliability and reproductibility.
- Reliability is based on batch tests, new product or equipment-specific qualifications and periodic requalifications.
- In addition to those regular tests, our quality departement launches regular accelerated tests to further deepens our reliability datas.
- Tests and qualifications of our standard products are based on AECQ methodology and are qualified according to the following limits.
- In accordance to AECQ methodology, specifics tests and limits can be adapted to fit our clients' needs.
- A whole range of stricter reliability tests can be offered for high Reliability products (burn-in, shocks, pulses...) for medical, space and defense applications.
- Based on our reliability database, FIT datas can be provided if necessary.

## PRODUCTION CONTROL

Test conducted on each lot according to AECQ-200 framework

| FREQUENCY     | TEST/STRESS             | REFERENCE           | AEC-Q       | DETAIL                       |
|---------------|-------------------------|---------------------|-------------|------------------------------|
| 100%          | Capa, DF, IR            | CECC-32100-4.6      |             | according to datasheet       |
| 100%          | Visual                  | CECC-32100-4.5      | AEC-Q200-9  | no visual defects            |
| 50/lot        | DPA                     | SRT QC1302          | AEC-Q200-5  | internal component integrity |
| 5/lot         | Dimension               | CECC-32100-4.5      | AEC-Q200-5  | according to datasheet       |
| 5/lot         | Solderability           | CECC-32100-4.11     | AEC-Q200-18 | 0 fail                       |
| 5/lot         | Leaching                | SRT QC1105          |             | 0 fail                       |
| 5/lot         | Termination Thickness   | SRT QC1108          |             | 0 fail                       |
| 10/lot        | Voltage Breakdown       | CECC-32100-4.6.4    |             | 0 fail                       |
| 1/ceramic lot | Temperature coefficient | CECC 32100-Prgph4,7 |             | according to datasheet       |

## QUALIFICATIONS

Each component family has been qualified according to CECC and AECQ tests methodology, which are renewed on a periodic basis.

| FREQUENCY | TEST/STRESS                 | REFERENCE                          | AEC-Q       | DETAIL   |
|-----------|-----------------------------|------------------------------------|-------------|--|
| Qualif    | Electrical Characterization | CECC-32100-4.6 4.7                 | AEC-Q200-19 | measure before test according to datasheet and after test according to post environmental limits |
| Qualif    | Temperature Cycling         | JESD22 Method-JA method 104        | AEC-Q200-4  | 1,000 cycles -55°C to +125°C Measurement at 24 ± 2 hours after test conclusion                   |
| Qualif    | Biased Humidity             | MIL-STD-202 Method 103             | AEC-Q200-7  | 1,000 hours 85°C/85%RH. Rated voltage. Measurement at 24 ± 2 hours after test conclusion         |
| Qualif    | Operational Life            | MIL-STD-202 Method 108 condition D | AEC-Q200-8  | 1,000 hours at 125°C with applied Voltage : 2xRV RV≤500V, 1.2xRV 500V<RV≤1250V, RV RV>1250V      |
| Qualif    | Terminal Strength           | CECC-32100-4.8                     | AEC-Q200-6  | 1.8kg 60 seconds   |
| Qualif    | Vibration                   | MIL-STD-202 Method 204             | AEC-Q200-14 | 5g 20min 12cycles 3 orientations 10-2000Hz   |
| Qualif    | Board Flex                  | CEC 32100-4.9                      | AEC-Q200-21 | 3mm Type 1, 2mm Type 2, Measurement at 24 ± 2 hours after test conclusion                        |

## POST ENVIRONMENTAL STRESS LIMIT

| DIELECTRIC | DISSIPATION FACTOR (MAXIMUM) | CAPACITANCE SHIFT | INSULATION RESISTANCE |
|------------|------------------------------|-------------------|-----------------------|
| NPO        | ≤ 4 10 <sup>-3</sup>         | ±2%               | 10% initial limit     |
| N2T        | ≤ 6 10 <sup>-3</sup>         | ±4%               | 10% initial limit     |
| X7R        | ≤ 0.035                      | ±15%              | 10% initial limit     |

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## SPACE LEVEL COMPONENT SCREENED AND QUALIFIED ACCORDING TO ESCC-3009

SRT-Microcéramique can propose a wide range of BME and PME component from its catalog qualified and tested according to ESCC-3009 Revision 5 specifications for space applications. Both for development en evaluation and flight ready with full lot validation and ESCC standard documentation. Specific qualification programmes can be included to meet final customer requirement.

SRT manufactured PME with standard production control or requalified source BME components directly or after termination change or mounting enter the following screening process :

### SCREENING D3009

| FREQUENCY | TEST/STRESS                        | REFERENCE                                     | DETAIL  |
|-----------|------------------------------------|---|---|
| 100%      | Voltage conditioning               | IEC Publication No. 60384-1 clause 4.23       | 100% 96H Tmax 2Un PDA 5%  |
| 100%      | Capa, DF, IR, VP (25°C)            | ESCC3009 Chart F3                             | According to datasheet  |
| 5/Lot     | High and Low Temperatures Electri- | ESCC3009 Chart F3                             | According to datasheet, 0 fail or 100%                                  |
| 5/lot     | Dimension                          | ESCC Basic Specification No. 20500            | According to datasheet (done in manufacturing, requalification process) |
| 5/lot     | DPA                                | ESCC Basic Specification No. 23400            | Internal component integrity  |
| 100%      | Visual                             | ESCC Basic Specification Nos. 20400 and 20500 | No defect   |
| 5/lot     | Solderability                      | IEC Publication No. 60068-2-58                | 0 fail  |

### LOT VALIDATION D3009

| GROUP       | NB PCS | TEST/STRESS           | REFERENCE                                       | DETAIL  |
|-------------|--------|-----------------------|---|---|
| SUBGROUP 1  | 20     | Mounting              | ESCC3009 8.6                                    | 20 serialized pcs on PCB  |
|             |        | Thermal Shock         | ESCC3009 8.7, IEC No. 60068-2-14                | 10 Cycles 30mn/1mn  |
|             |        | Humidity              | ESCC3009 8.2                                    | For Un<500V 1000h 85/85 Un≥500V not applicable  |
|             |        | Criteria              | ESCC3009  | No visual/electrical default  |
| SUBGROUP 2A | 40     | Mounting              | ESCC3009 8.6                                    | 40 serialized pcs on PCB  |
|             |        | Operational Life      | ESCC3009 Chart F4, IEC No. 60384-1 clause 4.23. | 1000h ±24 125°C (optional 2000h) 2U U<500V   1.5U 500≤U<1000   1.2U 1000≤U≤2000   1U U>2000 |
|             |        | Criteria              | ESCC3009  | No visual/electrical default  |
| SUBGROUP 2B | 6      | Mounting              | ESCC3009 8.6                                    | 6 serialized pcs on PCB   |
|             |        | TC                    | ESCC3009 8.10                                   | IR at 125°C, CP at -55°C/25°C/125°C   |
|             |        | Shear Test            | ESCC3009 8.7, IEC No. 60384-1                   | 5N 10s  |
|             |        | Criteria              | ESCC3009  | No visual/electrical default  |
| SUBGROUP 3  | 6      | Solderability         | ESCC3009 8.11, IEC No. 60068-2-58               | Solder bath 235°C 5s included in screening  |
|             |        | Permanence of Marking | ESCC3009 8.12                                   | ESCC24800 when applicable   |
|             |        | Criteria              | ESCC3009  | No visual/electrical default  |

LAT3=LVT3 = Subgroup 3/LAT2=LVT2 = Subgroup 2A + Subgroup 2B + Subgroup 3/LAT1=LVT1 = Subgroup 1 + Subgroup 2A + Subgroup 2B + Subgroup 3

## SPACE LEVEL COMPONENT SCREENED ACCORDING TO COTS+ ECSS-Q-ST-60-13C-REV1

SRT-Microcéramique can apply the COTS+ qualification framework to any suitable component AEQ-200 or not, with or without termination change, to make them fly ready, offering a wide range of possibilities at competitive cost, either in Class 1 (COTS1), Class 2 (COTS2) or Class 3 (COTS3).

### EVALUATION/SCREENING/LAT COTS1/COTS2/COTS3

Class 1 (COTS1), Class 2 (COTS2), Class 3 (COTS3)

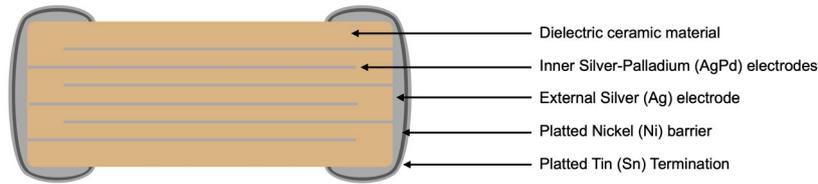
| AECQ-200 | CLASS 1 | CLASS 2 | CLASS 3 | CATEGORY   | TEST TYPE                    | SAMPLE | PROCEDURE          |
|----------|---------|---------|---------|------------|------------------------------|--------|--------------------|
| Yes      | X       | X       | X       | Evaluation | Construction Analysis        | 5      | ESCC21001          |
| Yes      | X       | X       | X       | Evaluation | Temperature characterization | 5      | ESCC3009 8.10      |
| Yes      | X       |         |         | Evaluation | Life Test 2000h              | 40     | ESCC3009 8.6 + 8.9 |
| Yes      | X       |         |         | Screening  | Complete screening           | 100%   | ESCC3009 chart F3  |
| Yes      | X       | X       | X       | LAT        | DPA                          | 3      | ESCC21001          |
| Yes      | X       | X       |         | LAT        | Life Test 1000h              | 20     | ESCC3009 8.6 + 8.9 |
| No       | X       | X       | X       | Evaluation | Construction Analysis        | 5      | ESCC21001          |
| No       | X       | X       | X       | Evaluation | Temperature characterization | 5      | ESCC 3009 8.10     |
| No       | X       | X       |         | Evaluation | Complete evaluation          | 72     | ESCC 3009 chart F4 |
| No       |         |         | X       | Evaluation | Life Test 1000h              | 40     | ESCC3009 8.6 + 8.9 |
| No       | X       | X       | X       | Screening  | Complete screening           | 100%   | ESCC3009 chart F3  |
| No       | X       | X       | X       | LAT        | DPA                          | 3      | ESCC21001          |
| No       | X       |         |         | LAT        | Complete LAT                 | 52     | ESCC 3009 chart F4 |
| No       |         | X       | X       | LAT        | Life Test 1000h              | 20     | ESCC3009 8.6 + 8.9 |

### TINNING

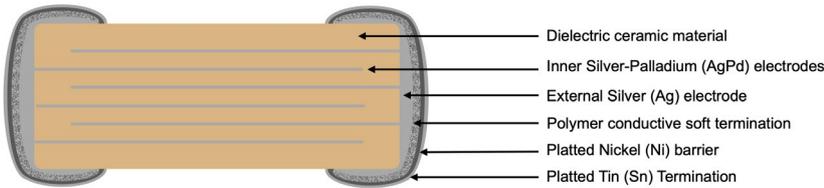
All component for space application can be proposed with dipped SnPb termination (Sn62 Pb36 Ag2) or SAC 305 (Sn96.5 Ag3 Cu0.5) for maximum reliability and whiskers avoidance.

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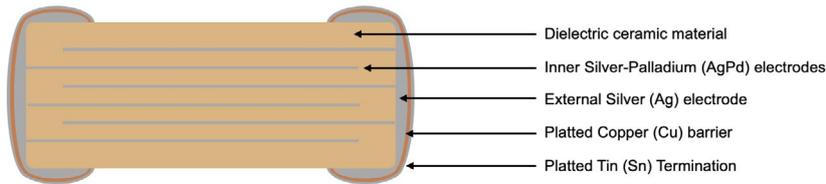
**PME (Precious Metal Electrodes)**



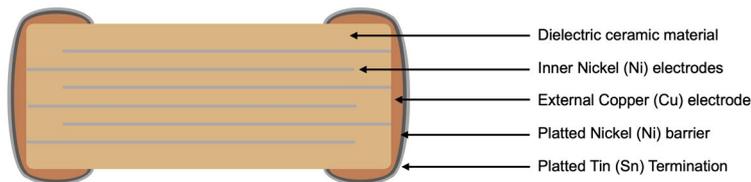
**PME (Precious Metal Electrodes) Polymer Soft Termination**



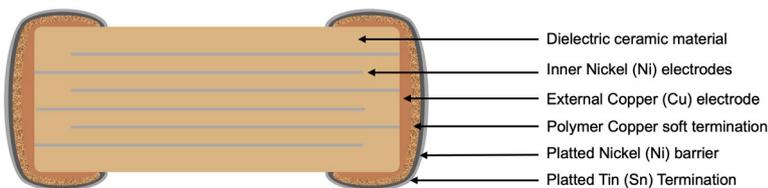
**PME (Precious Metal Electrodes) Non Magnetic**



**BME (Basis Metal Electrodes) code BM**



**BME (Basis Metal Electrodes) code BM Polymer Soft Termination**



## REACH Compliance

- SRT-Microcéramique delivers non-chemical articles only.
- These contain no substances which are intended to be released under normal or reasonably foreseeable conditions of use according to Reach article 7(1).

SRT-Microcéramique confirms hereby that our products contain none of the substances which are listed in the present candidate list of the European Chemicals Agency (ECHA), above a concentration of 0.1% by weight of the whole component.

Candidate list of substances (European Chemicals Agency ECHA) :  
<http://echa.europa.eu/fr/candidate-list-table>

## ROHS COMPLIANCE

SRT-Microcéramique herewith confirms that RoHS-compliant SRT-microcéramique products are conforming to the following EU directives:  
**EU directive 2015/863/EU EU directive 2011/65/EU EU directive 2003/11/EC**

Following restricted materials are not used and do not exceed the legal limits: Lead (Pb, see exemptions),

- Mercury (Hg)
- Cadmium (Cd)
- Chromium (Cr VI)
- Polybrominated biphenyls (PBB) Polybrominated diphenyl ethers (PBDE) Bis(2-Ethylhexyl) phthalate (DEHP) Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP) Diisobutyl phthalate (DIBP)

Exemptions: The following exemptions according to the RoHS annexe are applicable:

Identity 7(a) :

- Lead in high melting temperature type solders (i.e lead-based alloys containing 85% by weight or more lead).

Identity 7(c)-I :

- Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

The components are suitable for a lead-free process according to EN 60068-2-58 and in accordance with the IPC/JEDEC standard J-Std-020D. The lead free process has been tested using solder alloy Sn96.5Ag3Cu0.5

## Export controls and dual-use regulations

Some SRT-Microcéramique components fall under 'dual-use' items under international export controls definition - those that can be used for civil or military purposes which meet certain specified technical standards.

The defining criteria for a dual use component is one with a voltage rating of >750Vdc and a capacitance value of >250nF when measured at 750Vdc and a series inductance <10nH. Components defined as dual-use under the above criteria may require a licence for export across international borders. Please contact us for further information on specific part numbers.

## ISO9001:2015

In their design, research and development as well as the manufacturing of MLCC capacitors, customer service and distribution SRT-Microcéramique uses and maintains a Management System audited and certified in accordance to : **ISO9001:2015**

You may contact us for any inquiry regarding the regulations and compliance listed above.