



**THE DATASHEET OF  
1206AA101JAT1A**



# High Voltage MLC Chips

## For 600V to 5000V Applications



High value, low leakage and small size are difficult parameters to obtain in capacitors for high voltage systems. KYOCERA AVX special high voltage MLC chip capacitors meet these performance characteristics and are designed for applications such as snubbers in high frequency power converters, resonators in SMPS, and high voltage coupling/dc blocking. These high voltage chip designs exhibit low ESRs at high frequencies.

Larger physical sizes than normally encountered chips are used to make high voltage MLC chip products. Special precautions must be taken in applying these chips in surface mount assemblies. The temperature gradient during heating or cooling cycles should not exceed 4°C per second. The preheat temperature must be within 50°C of the peak temperature reached by the ceramic bodies through the soldering process. Chip sizes 1210 and larger should be reflow soldered only. Capacitors may require protective surface coating to prevent external arcing.

For 1825, 2225 and 3640 sizes, KYOCERA AVX offers leaded version in either thru-hole or SMT configurations (for details see section on high voltage leaded MLC chips)

### NEW 630V RANGE

#### HOW TO ORDER

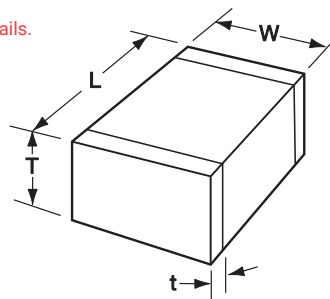
| 1808  | A  | A                              | 271  | M   | A                 | T                                     | 2                             | A                   |
|---|--|--------------------------------|--|---|-------------------|---------------------------------------|-------------------------------|---------------------|
| <b>Style</b>  | <b>Voltage</b>   | <b>Temperature Coefficient</b> | <b>Capacitance Code</b>  | <b>Capacitance Tolerance</b>  | <b>Test Level</b> | <b>Termination*</b>                   | <b>Packaging</b>              | <b>Special Code</b> |
| 0805<br>1206<br>1210<br>1808<br>1812<br>1825<br>2220<br>2225<br>3640<br>*** | C = 600V/630V<br>A = 1000V<br>S = 1500V<br>G = 2000V<br>W = 2500V<br>H = 3000V<br>J = 4000V<br>K = 5000V | A = NPO (C0G)<br>C = X7R       | (2 significant digits + no. of zeros)<br>Examples:<br>10 pF = 100<br>100 pF = 101<br>1,000 pF = 102<br>22,000 pF = 223<br>220,000 pF = 224<br>1 μF = 105 | C0G: J = ±5%<br>K = ±10%<br>M = ±20%<br>X7R: K = ±10%<br>M = ±20%<br>Z = +80%, -20% | A = Standard      | T = Plated Ni and Sn (RoHS Compliant) | 2 = 7" Reel**<br>4 = 13" Reel | A = Standard        |

#### Notes:

- Capacitors with X7R dielectrics are not intended for applications across AC supply mains or AC line filtering with polarity reversal. Contact plant for recommendations. Contact factory for availability of Termination and Tolerance options for Specific Part Numbers.
- \*Terminations with 5% minimum lead (Pb) is available, see pages 100 and 101 for LD style. Leaded terminations are available, see pages 102-106.

\*\*The 3640 Style is not available on 7" Reels.

\*\*\* KYOCERA AVX offers nonstandard chip sizes. Contact factory for details.



#### DIMENSIONS: millimeters (inches)

| SIZE                   | 0805                           | 1206                           | 1210*                          | 1808*                          | 1812*                          | 1825*                          | 2220*                          | 2225*                          | 3640*                          |
|------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| (L) Length             | 2.10 ± 0.20<br>(0.083 ± 0.008) | 3.30 ± 0.30<br>(0.130 ± 0.012) | 3.30 ± 0.40<br>(0.130 ± 0.016) | 4.60 ± 0.50<br>(0.181 ± 0.020) | 4.60 ± 0.50<br>(0.181 ± 0.020) | 4.60 ± 0.50<br>(0.181 ± 0.020) | 5.70 ± 0.50<br>(0.224 ± 0.020) | 5.70 ± 0.50<br>(0.224 ± 0.020) | 9.14 ± 0.25<br>(0.360 ± 0.010) |
| (W) Width              | 1.25 ± 0.20<br>(0.049 ± 0.008) | 1.60 ± 0.20<br>(0.063 ± 0.008) | 2.50 ± 0.30<br>(0.098 ± 0.012) | 2.00 ± 0.20<br>(0.079 ± 0.008) | 3.20 ± 0.30<br>(0.126 ± 0.012) | 6.30 ± 0.40<br>(0.248 ± 0.016) | 5.00 ± 0.40<br>(0.197 ± 0.016) | 6.30 ± 0.40<br>(0.248 ± 0.016) | 10.2 ± 0.25<br>(0.400 ± 0.010) |
| (t) terminal min. max. | 0.50 ± 0.20<br>(0.020 ± 0.008) | 0.60 ± 0.20<br>(0.024 ± 0.008) | 0.75 ± 0.35<br>(0.030 ± 0.014) | 0.75 ± 0.35<br>(0.030 ± 0.014) | 0.75 ± 0.35<br>(0.030 ± 0.014) | 0.75 ± 0.35<br>(0.030 ± 0.014) | 0.85 ± 0.35<br>(0.033 ± 0.014) | 0.85 ± 0.35<br>(0.033 ± 0.014) | 0.76 (0.030)<br>1.52 (0.060)   |

\*Reflow Soldering Only



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### NP0 (C0G) CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

| Case Size    | 1825                           |     |      |      |      |      |      |      |      |     |      |      |      |      |      |      | 2220                           |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      | 2225                           |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  | 3640                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------|--------------------------------|-----|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|--------------------------------|-----|-----|------|------|------|------|------|------|------|-----|-----|------|------|------|------|--------------------------------|------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|              | Reflow Only                    |     |      |      |      |      |      |      |      |     |      |      |      |      |      |      | Reflow Only                    |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      | Reflow Only                    |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  | Reflow Only                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| (L) Length   | 4.60 ± 0.50<br>(0.181 ± 0.020) |     |      |      |      |      |      |      |      |     |      |      |      |      |      |      | 5.70 ± 0.50<br>(0.224 ± 0.020) |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      | 5.70 ± 0.50<br>(0.224 ± 0.020) |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  | 9.14 ± 0.25<br>(0.360 ± 0.010) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| (W) Width    | 6.30 ± 0.40<br>(0.248 ± 0.016) |     |      |      |      |      |      |      |      |     |      |      |      |      |      |      | 5.00 ± 0.40<br>(0.197 ± 0.016) |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      | 6.30 ± 0.40<br>(0.248 ± 0.016) |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  | 10.2 ± 0.25<br>(0.400 ± 0.010) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| (t) Terminal | 0.75 ± 0.35<br>(0.030 ± 0.014) |     |      |      |      |      |      |      |      |     |      |      |      |      |      |      | 0.85 ± 0.35<br>(0.033 ± 0.014) |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      | 0.85 ± 0.35<br>(0.033 ± 0.014) |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.76 (0.030)<br>1.52 (0.060)   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Voltage (V)  | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 600  | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 5000                           | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 5000 | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000                           | 4000 | 5000 |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cap (pF)     | 1.5                            | 1R5 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 1.8                            | 1R8 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 2.2                            | 2R2 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 2.7                            | 2R7 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 3.3                            | 3R3 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 3.9                            | 3R9 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 4.7                            | 4R7 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 5.6                            | 5R6 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 6.8                            | 6R8 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 8.2                            | 8R2 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 10                             | 100 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 12                             | 120 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 15                             | 150 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 18                             | 180 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 22                             | 220 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 27                             | 270 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 33                             | 330 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 39                             | 390 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | F    |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 47                             | 470 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 56                             | 560 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 68                             | 680 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 82                             | 820 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | F   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 100                            | 101 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 120                            | 121 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 150                            | 151 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 180                            | 181 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 220                            | 221 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 270                            | 271 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 330                            | 331 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 390                            | 391 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 470                            | 471 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 560                            | 561 | E    | E    | G    | E    | F    | E    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 680                            | 681 | E    | E    | G    | E    | F    | F    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 750                            | 751 | E    | E    | G    | E    | F    | F    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 820                            | 821 | E    | E    | G    | E    | F    | F    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 1000                           | 102 | E    | E    | G    | E    | F    | F    | F    | F   | F    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 1200                           | 122 | E    | E    | G    | E    | F    | G    | G    | G   | G    | E    | E    | E    | E    | E    | E                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 1500                           | 152 | E    | E    | G    | F    | G    | G    | G    | G   | G    | E    | E    | E    | F    | F    | G                              | G   | E   | E    | E    | E    | F    | F    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 1800                           | 182 | E    | E    | G    | F    | G    | G    | G    | G   | G    | E    | E    | E    | F    | F    | G                              | G   | E   | E    | E    | E    | E    | G    | G    | E    | E   | E   | G    | G    |      |      |                                |      | G    |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 2200                           | 222 | E    | E    | G    | G    | G    | G    | G    | G   | G    | E    | E    | E    | G    | G    | G                              | E   | E   | E    | E    | E    | E    | E    | E    | E    | E   | E   | G    | G    |      |      |                                |      | G    |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 2700                           | 272 | E    | E    | G    | G    | G    | G    | G    | G   | G    | E    | E    | E    | G    | G    | G                              | E   | E   | E    | F    | F    | F    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 3300                           | 332 | E    | E    | G    | G    | G    | G    | G    | G   | G    | E    | E    | E    | G    | G    | G                              | E   | E   | E    | F    | F    | F    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 3900                           | 392 | E    | E    | G    | G    | G    | G    | G    | G   | G    | E    | E    | E    | G    | G    | G                              | E   | E   | E    | G    | G    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 4700                           | 472 | E    | E    | G    | G    | G    | G    | G    | G   | G    | E    | E    | E    | G    | G    | G                              | F   | F   | F    | G    | G    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 5600                           | 562 | F    | F    | G    | G    | G    | G    | G    | G   | G    | F    | F    | F    | G    | G    | G                              | F   | F   | F    | G    | G    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 6800                           | 682 | F    | F    | G    | G    | G    | G    | G    | G   | G    | F    | F    | F    | G    | G    | G                              | F   | F   | F    | G    | G    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 8200                           | 822 | F    | F    | G    | G    | G    | G    | G    | G   | G    | F    | F    | F    | G    | G    | G                              | F   | F   | F    | G    | G    | E    | E    | E    | E    | E   | G   | G    |      |      |      |                                | G    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cap (µF)     | 0.010                          | 103 | F    | F    | G    |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.012                          | 123 | F    | F    | G    |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.015                          | 153 | F    | F    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.018                          | 183 | F    | F    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.022                          | 223 | F    | F    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.027                          | 273 | F    | F    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.033                          | 333 | F    | F    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.039                          | 393 | G    | G    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.047                          | 473 | G    | G    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.056                          | 563 | G    | G    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.068                          | 683 | G    | G    |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | 0.100                          | 104 |      |      |      |      |      |      |      |     |      |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Voltage (V)  | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 600  | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 5000                           | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 5000 | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000                           | 4000 | 5000 |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Case Size    | 1825                           |     |      |      |      |      |      |      | 2220 |     |      |      |      |      |      |      | 2225                           |     |     |      |      |      |      |      | 3640 |      |     |     |      |      |      |      |                                |      |      |  |  |  |  |  |  |  |  |  |  |  |  |  |                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| Letter         | A               | C               | E               | F               | G               | X               | 7               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Max. Thickness | 0.81<br>(0.032) | 1.45<br>(0.057) | 1.80<br>(0.071) | 2.20<br>(0.087) | 2.80<br>(0.110) | 0.94<br>(0.037) | 3.30<br>(0.130) |

NOTE: Contact factory for non-specified capacitance values

# High Voltage MLC Chips

## For 600V to 5000V Applications

### X7R Dielectric

#### Performance Characteristics

|  |  |
|--|--|
| Capacitance Range                          | 10 pF to 0.82 μF (25°C, 1.0 ±0.2 Vrms at 1kHz)                   |
| Capacitance Tolerances                     | ±10%; ±20%; +80%, -20%   |
| Dissipation Factor                         | 2.5% max. (+25°C, 1.0 ±0.2 Vrms, 1kHz)                           |
| Operating Temperature Range                | -55°C to +125°C  |
| Temperature Characteristic                 | ±15% (0 VDC)   |
| Voltage Ratings                            | 600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C) |
| Insulation Resistance (+25°C, at 500 VDC)  | 100K MΩ min. or 1000 MΩ - μF min., whichever is less             |
| Insulation Resistance (+125°C, at 500 VDC) | 10K MΩ min. or 100 MΩ - μF min., whichever is less               |
| Dielectric Strength                        | Minimum 120% rated voltage for 5 seconds at 50 mA max. current   |

### X7R CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

| Case Size<br>Soldering | 0805                           |     |      | 1206  |     |      |      |      | 1210                           |     |      |      |      | 1808                           |     |      |      |      |      |      |      | 1812                           |     |      |      |      |      |      |      |
|------------------------|--------------------------------|-----|------|---|-----|------|------|------|--------------------------------|-----|------|------|------|--------------------------------|-----|------|------|------|------|------|------|--------------------------------|-----|------|------|------|------|------|------|
|                        | Reflow/Wave                    |     |      | Reflow/Wave                                 |     |      |      |      | Reflow Only                    |     |      |      |      | Reflow Only                    |     |      |      |      |      |      |      | Reflow Only                    |     |      |      |      |      |      |      |
| (L) Length             | 2.10 ± 0.20<br>(0.085 ± 0.008) |     |      | 3.30 ± 0.30<br>(0.130 ± 0.012)              |     |      |      |      | 3.30 ± 0.40<br>(0.130 ± 0.016) |     |      |      |      | 4.60 ± 0.50<br>(0.181 ± 0.020) |     |      |      |      |      |      |      | 4.60 ± 0.50<br>(0.177 ± 0.012) |     |      |      |      |      |      |      |
| (W) Width              | 1.25 ± 0.20<br>(0.049 ± 0.008) |     |      | 1.60 ± 0.30/-0.10<br>(0.063 ± 0.012/-0.004) |     |      |      |      | 2.50 ± 0.30<br>(0.098 ± 0.012) |     |      |      |      | 2.00 ± 0.20<br>(0.079 ± 0.008) |     |      |      |      |      |      |      | 3.20 ± 0.30<br>(0.126 ± 0.008) |     |      |      |      |      |      |      |
| (t) Terminal           | 0.50 ± 0.20<br>(0.020 ± 0.008) |     |      | 0.60 ± 0.20<br>(0.024 ± 0.008)              |     |      |      |      | 0.75 ± 0.35<br>(0.030 ± 0.014) |     |      |      |      | 0.75 ± 0.35<br>(0.030 ± 0.014) |     |      |      |      |      |      |      | 0.75 ± 0.35<br>(0.030 ± 0.014) |     |      |      |      |      |      |      |
| Voltage (V)            | 600                            | 630 | 1000 | 600   | 630 | 1000 | 1500 | 2000 | 600                            | 630 | 1000 | 1500 | 2000 | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 |
| Cap (pF) 100           | 101                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 120                    | 121                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 150                    | 151                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 180                    | 181                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 220                    | 221                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 270                    | 271                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 330                    | 331                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 390                    | 391                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 470                    | 471                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 560                    | 561                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 680                    | 681                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 750                    | 751                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 820                    | 821                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 1000                   | 102                            | X   | X    | X   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 1200                   | 122                            | X   | X    | X   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 1500                   | 152                            | X   | X    | X   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 1800                   | 182                            | X   | X    | C   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 2200                   | 222                            | X   | X    | X   | C   | C    | E    | E    | E                              | E   | E    | E    | E    | E                              | E   | E    | E    | E    | E    | E    | E    | E                              | E   | E    | E    | E    | E    |      |      |
| 2700                   | 272                            | C   | C    |   | C   | C    | E    | E    |                                | E   | E    | E    | F    | E                              | E   | E    | E    | F    | F    |      | F    | F                              | F   | F    | F    | G    | G    |      |      |
| 3300                   | 332                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    | F    | E                              | E   | E    | E    | F    | F    |      | F    | F                              | F   | F    | F    | G    | G    |      |      |
| 3900                   | 392                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    | F    |                                | E   | E    | E    | F    |      |      | F    | F                              | F   | F    | F    | G    | G    |      |      |
| 4700                   | 472                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    | F    |                                | E   | E    | E    | F    |      |      | F    | F                              | F   | F    | F    | G    | G    |      |      |
| 5600                   | 562                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    | F    |                                | E   | E    | E    | F    |      |      | F    | F                              | F   | F    | F    | G    | G    |      |      |
| 6800                   | 682                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    |      |                                | E   | E    | E    | F    |      |      | F    | F                              | F   | G    | G    |      |      |      |      |
| 8200                   | 822                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    |      |                                | E   | E    | E    |      |      |      | F    | F                              | F   | G    | G    |      |      |      |      |
| Cap (μF) 0.010         | 103                            | C   | C    |   | C   | C    | E    |      |                                | E   | E    | E    |      |                                | E   | E    | E    |      |      |      | F    | F                              | F   | G    |      |      |      |      |      |
| 0.015                  | 153                            | C   | C    |   | E   | E    | E    |      |                                | E   | E    | E    |      |                                | F   | F    | F    |      |      |      | F    | F                              | F   | G    |      |      |      |      |      |
| 0.018                  | 183                            | C   | C    |   | E   | E    |      |      |                                | E   | E    | E    |      |                                | F   | F    | F    |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.022                  | 223                            | C   | C    |   | E   | E    |      |      |                                | E   | E    | F    |      |                                | F   | F    | F    |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.027                  | 273                            |     |      |   | E   | E    |      |      |                                | E   | E    |      |      |                                | F   | F    |      |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.033                  | 333                            |     |      |   | E   | E    |      |      |                                | E   | E    |      |      |                                | F   | F    |      |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.039                  | 393                            |     |      |   |     |      |      |      |                                | E   | E    |      |      |                                | F   | F    |      |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.047                  | 473                            |     |      |   |     |      |      |      |                                | E   | E    |      |      |                                | F   | F    |      |      |      |      | F    | F                              | G   |      |      |      |      |      |      |
| 0.056                  | 563                            |     |      |   |     |      |      |      |                                | F   | F    |      |      |                                | F   | F    |      |      |      |      | F    | F                              |     |      |      |      |      |      |      |
| 0.068                  | 683                            |     |      |   |     |      |      |      |                                | F   | F    |      |      |                                | F   | F    |      |      |      |      | F    | F                              |     |      |      |      |      |      |      |
| 0.082                  | 823                            |     |      |   |     |      |      |      |                                | F   | F    |      |      |                                | F   | F    |      |      |      |      | F    | F                              |     |      |      |      |      |      |      |
| 0.100                  | 104                            |     |      |   |     |      |      |      |                                | F   | F    |      |      |                                |     |      |      |      |      |      | F    | F                              |     |      |      |      |      |      |      |
| 0.150                  | 154                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      | G    | G                              |     |      |      |      |      |      |      |
| 0.220                  | 224                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      | G    | G                              |     |      |      |      |      |      |      |
| 0.270                  | 274                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.330                  | 334                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.390                  | 394                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.470                  | 474                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.560                  | 564                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.680                  | 684                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 0.820                  | 824                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| 1.000                  | 105                            |     |      |   |     |      |      |      |                                |     |      |      |      |                                |     |      |      |      |      |      |      |                                |     |      |      |      |      |      |      |
| Voltage (V)            | 600                            | 630 | 1000 | 600   | 630 | 1000 | 1500 | 2000 | 600                            | 630 | 1000 | 1500 | 2000 | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 | 600                            | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 |
| Case Size              | 0805                           |     |      | 1206  |     |      |      |      | 1210                           |     |      |      |      | 1808                           |     |      |      |      |      |      |      | 1812                           |     |      |      |      |      |      |      |

| Letter         | A               | C               | E               | F               | G               | X               | 7               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Max. Thickness | 0.81<br>(0.032) | 1.45<br>(0.057) | 1.80<br>(0.071) | 2.20<br>(0.087) | 2.80<br>(0.110) | 0.94<br>(0.037) | 3.30<br>(0.130) |

NOTE: Contact factory for non-specified capacitance values



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