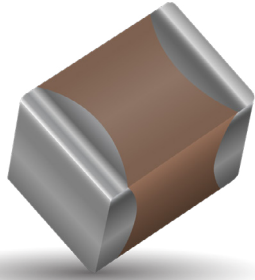


# High Voltage MLC Chips

## For 600V to 5000V Applications



High value, low leakage and small size are difficult parameters to obtain in capacitors for high voltage systems. 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, 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

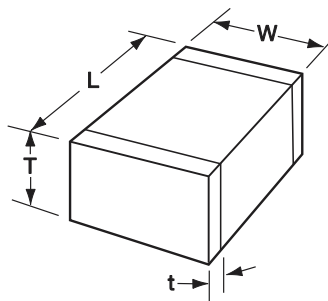
| 1808             | A              | A                              | 271                                   | M                            | A                 | T                                     | 2                | A                   |
|------------------|----------------|--------------------------------|---------------------------------------|-----------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

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.

\*\*\* 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) | 5.72 ± 0.25<br>(0.225 ± 0.010) | 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) | 6.35 ± 0.25<br>(0.250 ± 0.010) | 10.2 ± 0.25<br>(0.400 ± 0.010) |
| (T) Thickness Max.     | 1.35<br>(0.053)                | 1.80<br>(0.071)                | 2.80<br>(0.110)                | 2.20<br>(0.087)                | 2.80<br>(0.110)                | 3.40<br>(0.134)                | 3.40<br>(0.134)                | 2.54<br>(0.100)                | 2.54<br>(0.100)                |
| (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



|                                            |                                                                          |
|--------------------------------------------|--------------------------------------------------------------------------|
| Capacitance Range                          | 10 pF to 0.100 µF (25°C, 1.0 ±0.2 Vrms at 1kHz, for ≤ 1000 pF use 1 MHz) |
| Capacitance Tolerances                     | ±5%, ±10%, ±20%                                                          |
| Dissipation Factor                         | 0.1% max. (+25°C, 1.0 ±0.2 Vrms, 1kHz, for ≤ 1000 pF use 1 MHz)          |
| Operating Temperature Range                | -55°C to +125°C                                                          |
| Temperature Characteristic                 | 0 ±30 ppm/°C (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           |

| Case Size<br>Soldering |            | 0805                            |     |      | 1206                                      |     |      |      | 1210                           |     |     |      |      |      | 1808                           |     |     |      |      |      |      |      | 1812                           |     |     |      |      |      |      |      |      |
|------------------------|------------|---------------------------------|-----|------|-------------------------------------------|-----|------|------|--------------------------------|-----|-----|------|------|------|--------------------------------|-----|-----|------|------|------|------|------|--------------------------------|-----|-----|------|------|------|------|------|------|
| (L) Length             | mm<br>(in) | Reflow/Wave                     |     |      | Reflow/Wave                               |     |      |      | Reflow Only                    |     |     |      |      |      | Reflow Only                    |     |     |      |      |      |      |      | Reflow Only                    |     |     |      |      |      |      |      |      |
|                        |            | 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              | mm<br>(in) | 1.25 ± 0.2 0<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) Thickness          | mm<br>(in) | 1.35<br>(0.053)                 |     |      | 1.80<br>(0.071)                           |     |      |      | 2.80<br>(0.110)                |     |     |      |      |      | 2.20<br>(0.087)                |     |     |      |      |      |      |      | 2.80<br>(0.100)                |     |     |      |      |      |      |      |      |
| (t) Terminal           | mm<br>(in) | 0.50 ± 0.20<br>(0.020 ± 0.008)  |     |      | 0.60 ± 0.20<br>(0.0 4 + 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 | 3000                           | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000                           | 600 | 630 | 1000 | 1500 | 2000 | 2500 | 3000 | 4000 |
| Cap (pF)               | .5 0R5     |                                 | A   | C    |                                           |     |      |      |                                |     |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 1.0 1R0    |                                 | A   | C    |                                           |     |      |      |                                |     |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 1.2 1R2    |                                 | A   | C    |                                           |     |      |      |                                |     |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 1.5 1R5    | A                               | A   | C    | X                                         | X   | X    | X    | X                              |     |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 1.8 1R8    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 2.2 2R2    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 2.7 2R7    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 3.3 3R3    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 3.9 3R9    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 4.7 4R7    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 5.6 5R6    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 6.8 6R8    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 8.2 8R2    | A                               | A   | C    | X                                         | X   | X    | X    | X                              | X   |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |
|                        | 10 100     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 12 120     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 15 150     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 18 180     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 22 220     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 27 270     | A                               | A   | C    | C                                         | C   | C    | C    | C                              | C   | C   | M    | M    | D    | M                              | F   | C   | C    | C    | C    | C    | C    | C                              | C   | C   | C    | C    | C    | C    | C    | E    |
|                        | 33 330     | A                               | A   | C    | C                                         | C   | C    |      |                                |     |     |      |      |      |                                |     |     |      |      |      |      |      |                                |     |     |      |      |      |      |      |      |

NOTE: Contact factory for non-specified capacitance values

[illegible]

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 $\mu$ F (25°C, 1.0 $\pm$ 0.2 Vrms at 1kHz)                  |
| Capacitance Tolerances                     | $\pm$ 10%; $\pm$ 20%; +80%, -20%                                          |
| Dissipation Factor                         | 2.5% max. (+25°C, 1.0 $\pm$ 0.2 Vrms, 1kHz)                               |
| Operating Temperature Range                | -55°C to +125°C                                                           |
| Temperature Characteristic                 | $\pm$ 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 M $\Omega$ min. or 1000 M $\Omega$ - $\mu$ F min., whichever is less |
| Insulation Resistance (+125°C, at 500 VDC) | 10K M $\Omega$ min. or 100 M $\Omega$ - $\mu$ F 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      | 0805                                   | 1206                                                | 1210                                   | 1808                                   | 1812                                   |
|----------------|----------------------------------------|-----------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| Soldering      | Reflow/Wave                            | Reflow/Wave                                         | Reflow Only                            | Reflow Only                            | Reflow Only                            |
| (L) Length     | 2.10 $\pm$ 0.20<br>(0.085 $\pm$ 0.008) | 3.30 $\pm$ 0.30<br>(0.130 $\pm$ 0.012)              | 3.30 $\pm$ 0.40<br>(0.130 $\pm$ 0.016) | 4.60 $\pm$ 0.50<br>(0.181 $\pm$ 0.020) | 4.60 $\pm$ 0.50<br>(0.177 $\pm$ 0.012) |
| (W) Width      | 1.25 $\pm$ 0.20<br>(0.049 $\pm$ 0.008) | 1.60 $\pm$ 0.30/-0.10<br>(0.063 $\pm$ 0.012/-0.004) | 2.50 $\pm$ 0.30<br>(0.098 $\pm$ 0.012) | 2.00 $\pm$ 0.20<br>(0.079 $\pm$ 0.008) | 3.20 $\pm$ 0.30<br>(0.126 $\pm$ 0.008) |
| (T) Thickness  | 1.35<br>(0.053)                        | 1.80<br>(0.071)                                     | 2.80<br>(0.110)                        | 2.20<br>(0.087)                        | 2.80<br>(0.100)                        |
| (t) Terminal   | 0.50 $\pm$ 0.20<br>(0.020 $\pm$ 0.008) | 0.60 $\pm$ 0.20<br>(0.024 $\pm$ 0.008)              | 0.75 $\pm$ 0.35<br>(0.030 $\pm$ 0.014) | 0.75 $\pm$ 0.35<br>(0.030 $\pm$ 0.014) | 0.75 $\pm$ 0.35<br>(0.030 $\pm$ 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    | 120 121 X X C C C 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    | 180 181 X X C C C 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    |
|                | 270 271 X X C C C 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                 | 390 391 X X C C C 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    | 560 561 X X C C C 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    | 750 751 X X C C C 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    | 1000 102 X X C C C E E E E E E E E E   | 1200 122 X X C C C E E E E E E E E E   |
|                | 1500 152 X X C C C 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                | 2200 222 X X C C C E E E E E E E E E   | 2700 272 C C C C C E E E E E E E E E   | 3300 332 C C C C C E E E E E E E E E   |
|                | 3900 392 C C C C C E E E E E E E E E   | 4700 472 C C C C C E E E E E E E E E                | 5600 562 C C C C C E E E E E E E E E   | 6800 682 C C C C C E E E E E E E E E   | 8200 822 C C C C C E E E E E E E E E   |
| Cap ( $\mu$ F) | 0.010 103 C C C C C E E E E E E E E E  | 0.015 153 C C C C C E E E E E E E E E               | 0.018 183 C C C C C E E E E E E E E E  | 0.022 223 C C C C C E E E E E E E E E  | 0.027 273 C C C C C E E E E E E E E E  |
|                | 0.033 333 C C C C C E E E E E E E E E  | 0.039 393 C C C C C E E E E E E E E E               | 0.047 473 C C C C C E E E E E E E E E  | 0.056 563 C C C C C E E E E E E E E E  | 0.068 683 C C C C C E E E E E E E E E  |
|                | 0.082 823 C C C C C E E E E E E E E E  | 0.100 104 C C C C C E E E E E E E E E               | 0.150 154 C C C C C E E E E E E E E E  | 0.220 224 C C C C C E E E E E E E E E  | 0.270 274 C C C C C E E E E E E E E E  |
|                | 0.330 334 C C C C C E E E E E E E E E  | 0.390 394 C C C C C E E E E E E E E E               | 0.470 474 C C C C C E E E E E E E E E  | 0.560 564 C C C C C E E E E E E E E E  | 0.680 684 C C C C C E E E E E E E E E  |
|                | 0.820 824 C C C C C E E E E E E E E E  | 1.000 105 C C C C C E E E E E E E E E               |                                        |                                        |                                        |
| 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 | 0.813<br>(0.032) | 1.448<br>(0.057) | 1.8034<br>(0.071) | 2.2098<br>(0.087) | 2.794<br>(0.110) | 0.940<br>(0.037) | 3.30<br>(0.130) |

NOTE: Contact factory for non-specified capacitance values



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at [www.avx.com/disclaimer/](http://www.avx.com/disclaimer/) by reference and should be reviewed in full before placing any order.

High Voltage MLC Chips  
For 600V to 5000V Applications



X7R CAPACITANCE RANGE  
PREFERRED SIZES ARE SHADED

| Case Size     | 1825        |                                |      |      |      |      |      |      | 2220        |     |                                |      |      |      |      |      | 2225        |     |     |                                |      |      |      |      | 3640        |      |     |     |                                |      |      |      |      |      |      |  |
|---------------|-------------|--------------------------------|------|------|------|------|------|------|-------------|-----|--------------------------------|------|------|------|------|------|-------------|-----|-----|--------------------------------|------|------|------|------|-------------|------|-----|-----|--------------------------------|------|------|------|------|------|------|--|
| Soldering     | Reflow Only |                                |      |      |      |      |      |      | Reflow Only |     |                                |      |      |      |      |      | Reflow Only |     |     |                                |      |      |      |      | Reflow Only |      |     |     |                                |      |      |      |      |      |      |  |
| (L) Length    | mm          | 4.60 ± 0.50<br>(0.181 ± 0.020) |      |      |      |      |      |      |             | mm  | 5.70 ± 0.50<br>(0.224 ± 0.020) |      |      |      |      |      |             |     | mm  | 5.70 ± 0.50<br>(0.225 ± 0.010) |      |      |      |      |             |      |     | mm  | 9.14 ± 0.25<br>(0.360 ± 0.010) |      |      |      |      |      |      |  |
| (W) Width     | mm          | 6.30 ± 0.40<br>(0.248 ± 0.016) |      |      |      |      |      |      |             | mm  | 5.00 ± 0.40<br>(0.197 ± 0.016) |      |      |      |      |      |             |     | mm  | 6.30 ± 0.40<br>(0.250 ± 0.010) |      |      |      |      |             |      |     | mm  | 10.2 ± 0.25<br>(0.400 ± 0.010) |      |      |      |      |      |      |  |
| (T) Thickness | mm          | 3.40<br>(0.134)                |      |      |      |      |      |      |             | mm  | 3.40<br>(0.134)                |      |      |      |      |      |             |     | mm  | 3.40<br>(0.100)                |      |      |      |      |             |      |     | mm  | 2.54<br>(0.100)                |      |      |      |      |      |      |  |
| (t) Terminal  | mm          | 0.75 ± 0.35<br>(0.030 ± 0.014) |      |      |      |      |      |      |             | mm  | 0.85 ± 0.35<br>(0.033 ± 0.014) |      |      |      |      |      |             |     | mm  | 0.85 ± 0.35<br>(0.033 ± 0.014) |      |      |      |      |             |      |     | mm  | 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)      | 100         | 101                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 120         | 121                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 150         | 151                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 180         | 181                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 220         | 221                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 270         | 271                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 330         | 331                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 390         | 391                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 470         | 471                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 560         | 561                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 680         | 681                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 750         | 751                            |      |      |      |      |      |      |             |     |                                |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 820         | 821                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | F    | G    |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 1200        | 122                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | F    | G    |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 1500        | 152                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 1800        | 182                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 2200        | 222                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 2700        | 272                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 3300        | 332                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 3900        | 392                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 4700        | 472                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 5600        | 562                            | F    | F    | F    | F    | F    | F    | F           | F   | F                              | F    | F    | F    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 6800        | 682                            | F    | F    | F    | G    | G    | G    | G           | F   | F                              | F    | F    | F    | G    | G    |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 8200        | 822                            | F    | F    | F    | G    | G    | G    | G           | F   | F                              | F    | G    | G    | G    | G    |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
| Cap (uF)      | 0.010       | 103                            | F    | F    | F    | G    | G    | G    | G           | F   | F                              | F    | G    | G    | G    | G    |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.015       | 153                            | F    | F    | F    | G    | G    | G    | G           | F   | F                              | F    | G    | G    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.018       | 183                            | F    | F    | F    | G    | G    |      |             | F   | F                              | F    | G    | G    | G    |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.022       | 223                            | F    | F    | F    | G    | G    |      |             | F   | F                              | F    | G    | G    |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.027       | 273                            | F    | F    | F    | G    |      |      |             | F   | F                              | F    | G    | G    |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.033       | 333                            | F    | F    | F    | G    |      |      |             | F   | F                              | F    | G    |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.039       | 393                            | F    | F    | F    | G    |      |      |             | F   | F                              | F    | G    |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.047       | 473                            | F    | F    | F    | P    |      |      |             | F   | F                              | F    | G    |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.056       | 563                            | F    | F    | F    | G    |      |      |             | F   | F                              | F    | G    |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.068       | 683                            | F    | F    | G    |      |      |      |             | F   | F                              | G    |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.082       | 823                            | F    | F    | G    |      |      |      |             | F   | F                              | G    |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.100       | 104                            | F    | F    | G    |      |      |      |             | F   | F                              | G    |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.150       | 154                            | F    | F    |      |      |      |      |             | F   | F                              | G    |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.220       | 224                            | F    | F    |      |      |      |      |             | F   | F                              | G    |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.270       | 274                            | F    | F    |      |      |      |      |             | F   | F                              |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.330       | 334                            | F    | F    |      |      |      |      |             | F   | F                              |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.390       | 394                            | F    | F    |      |      |      |      |             | F   | F                              |      |      |      |      |      |             |     |     |                                |      |      |      |      |             |      |     |     |                                |      |      |      |      |      |      |  |
|               | 0.470       | 474                            | F    | F    |      |      |      |      |             | F   | F                              |      |      |      |      |      |             |     |     |                                |      |      |      | </   |             |      |     |     |                                |      |      |      |      |      |      |  |