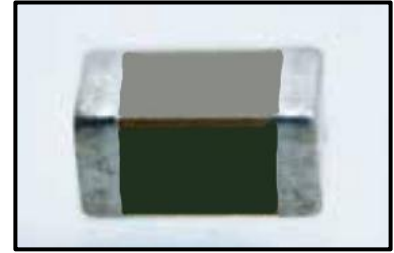


≠ Features

- Large capacitance values in small sizes
- Excellent high frequency characteristics
- All PPI Caps conform to EIA Specifications



≠ Applications

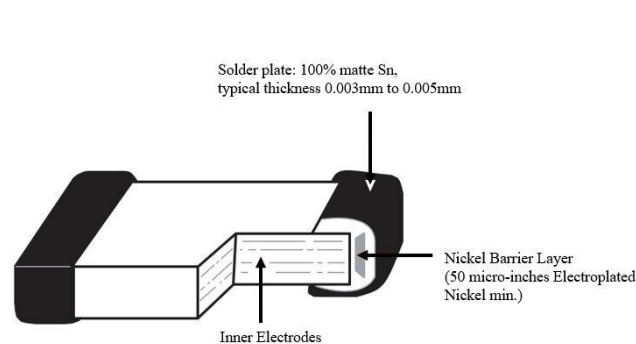
- Can be used on surface mount assembly equipment
- Our fully integrated manufacturing and total quality control systems ensure unprecedented high standards of quality and reliability.

≠ Notes

- Capacitance Value & Tolerance are determined by circuit requirements
- Voltage is determined by circuit requirements
- Capacitor Size select the smallest unit permitted by the circuit constraints that provides the required capacitance and voltage rating
- Nickel Barrier is standard and recommended for units exposed to repeated solder cycles, to minimize leaching of the termination.
- All capacitors conform to EIA specifications.

≠ Construction

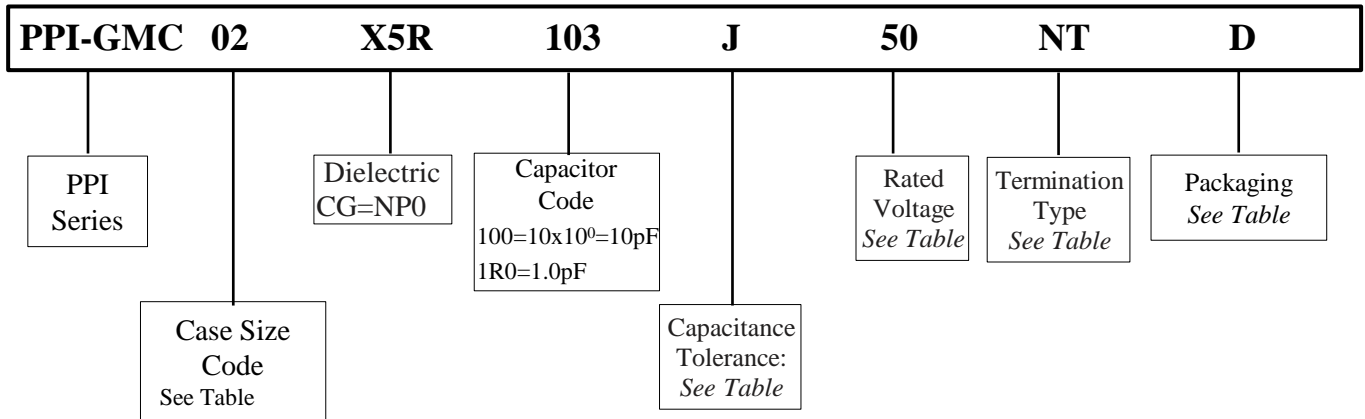
Constructed by screen printing alternative layers of internal metallic electrodes onto ceramic dielectric materials and firing into a concrete monolithic body, then completed by application of metal end terminations which are fired to assure permanent bonding with the individual internal electrodes.



≠ NP0/ COG

Capacitance change with temperature is 0-30ppm/°C which is less than -0.3%/°C from -55°C to +125°C. Typical capacitance change with life is less than -0.1% for NP0s, one-fifth that shown by most other dielectrics. NP0 formulations show no aging characteristics.

≠ Part Numbering

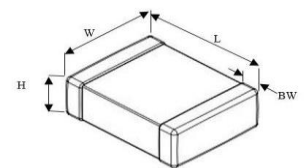


≠ Dielectric

Ultra Stable Class I Dielectric: Linear temperature coefficient, low loss, negligible change of electrical properties with time, voltage and frequency.

≠ Dimensions (mm)

| Dimensions (mm) | | | | | |
|-----------------|-------|-------------|-------------|-------------|-------------|
| Code | Size | L | W | T | BW |
| 01 | 01005 | 0.40 ± 0.02 | 0.20 ± 0.02 | 0.20 ± 0.02 | 0.07 ~ 0.14 |
| 02 | 0201 | 0.60 ± 0.03 | 0.30 ± 0.03 | 0.30 ± 0.03 | 0.15 ± 0.05 |
| 04 | 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.50 ± 0.10 | 0.10 ~ 0.35 |
| 10 | 0603 | 1.60 ± 0.20 | 0.80 ± 0.20 | 1.0 max | 0.10 ~ 0.40 |
| 21 | 0805 | 2.00 ± 0.30 | 1.25 ± 0.20 | 1.40 | 0.25 ~ 0.75 |
| 31 | 1206 | 3.20 ± 0.30 | 2.50 ± 0.20 | 2.20 | 0.25 ~ 0.75 |
| 32 | 1210 | 3.20 ± 0.30 | 1.60 ± 0.20 | 1.80 | 0.25 ~ 0.75 |
| 40 | 1808 | 4.50 ± 0.35 | 3.20 ± 0.30 | 2.20 | 0.25 ~ 0.75 |
| 43 | 1812 | 3.20 ± 0.30 | 1.6 ± 0.20 | 1.80 | 0.25 ~ 0.75 |
| 45 | 1825 | 5.70 ± 0.40 | 5.01 ± 0.40 | 1.80 | 0.25 ~ 0.75 |
| 55 | 2220 | 5.70 ± 0.40 | 6.30 ± 0.40 | 2.20 | 0.25 ~ 0.75 |
| 57 | 2225 | 4.50 ± 0.35 | 6.30 ± 0.40 | 2.20 | 0.25 ~ 0.75 |



≠ Capacitance Code

| Cap Code | Value | Cap Code | Value | Cap Code | Value | Cap Code | Value |
|------------|-------|------------|--------|------------|-------|------------|-------|
| 0R5 | 0.5pF | 100 | 10pF | 104 | 0.1uF | 106 | 10uF |
| 5R0 | 5.0pF | 103 | 0.01uF | 105 | 1.0uF | 107 | 100uF |

≠ Capacitance Tolerances

| Code | B | C | D | F | G | J | K | M | Z |
|------|--------|---------|--------|-----|-----|-----|------|------|------------|
| Tol. | ±0.1pF | ±0.25pF | ±0.5pF | ±1% | ±2% | ±5% | ±10% | ±20% | -20% + 80% |

≠ Rated Voltages

| Code | Voltage | Code | Voltage |
|------------|---------|------------|---------|
| 4R0 | 4.0V | 350 | 35V |
| 6R3 | 6.3V | 500 | 50V |
| 100 | 10V | 630 | 63V |
| 160 | 16V | 101 | 100V |
| 250 | 25V | 201 | 200V |

≠ Terminations

Nickel barrier is standard and recommended for units exposed to repeated solder cycles to minimize leaching of the termination.

| Code | Description |
|-----------|-------------|
| NT | Sn/Ni |
| PT | Pd/Ag |





± Stable Class II Dielectric

Temperature variation of capacitance is within $\pm 15\%$ from -55°C to $+125^{\circ}\text{C}$ for X7R (-55°C to $+85^{\circ}\text{C}$ for X5R). The capacitance change is non-linear.

± Electrical Specifications

| | |
|--|---|
| Operating Temperature Range | -55°C to $+85^{\circ}\text{C}$ |
| Temperature Coefficient (TC) | $\pm 15\%$ |
| Temperature Voltage Coefficient (ΔC_{Max} @ V_{DCW}) | Not Applicable |
| Dissipation Factor | 2.5% Max, 1.80% Typical |
| Insulation Resistance (IR) | 25°C , V_{DCW} ; $> 100\text{GQF}$ or 1000QF , whichever is less 125°C V_{DCW} ; $> 10\text{GQF}$ or 100QF , whichever is less |
| Dielectric Withstanding Voltage | $2.5 \times V_{\text{DCW}}$ |
| Aging Rate | $< 2\%$ per decade hour |
| Test Parameters | 1KHz 1.0Vrms $\pm 0.2\text{Vrms}$ 25°C values $>$ or $=$ to 10uF 1.0 Vrms 120Hz |



01005: PPI-GMC01

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|------------|-------|------|------|------------|-------|------|------|------------|
| 150 pF | 151 | K,M | 10V | 1.5 | 152 | K,M | 10V | 15 | 153 | K,M | 10V |
| 180 | 181 | | | 1.8 | 182 | | | 18 | 183 | | |
| 220 | 221 | | | 2.2 | 222 | | | 22 | 223 | | |
| 270 | 271 | | | 2.7 | 272 | | | 27 | 273 | | |
| 330 | 331 | | | 3.3 | 332 | | | 33 | 333 | | |
| 390 | 391 | | | 3.9 | 392 | | | 39 | 393 | | |
| 470 | 471 | | | 4.7 | 472 | | | 47 | 473 | | |
| 560 | 561 | | | 5.6 | 562 | | | 56 | 563 | | |
| 680 | 681 | | | 6.8 | 682 | | | 68 | 683 | | |
| 820 | 821 | | | 8.2 | 822 | | | 82 | 823 | | |
| 1.0 nF | 102 | | | 10 | 103 | | | 100 | 104 | | |
| 1.2 | 122 | | | 12 | 123 | | | | | | |

0201: PPI-GMC02

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|---------------------------|-------|------|------|---------------------------|--------|------|------|---------------------------|
| 100 pF | 101 | K,M | 6.3V or 10V or 16V or 25V | 1.5 | 152 | K,M | 6.3V or 10V or 16V or 25V | 27 | 273 | K,M | 6.3V or 10V or 16V or 25V |
| 120 | 121 | | | 1.8 | 182 | | | 33 | 333 | | |
| 150 | 151 | | | 2.2 | 222 | | | 39 | 393 | | |
| 180 | 181 | | | 3.3 | 332 | | | 47 | 473 | | |
| 220 | 221 | | | 3.9 | 392 | | | 56 | 563 | | |
| 270 | 271 | | | 4.7 | 472 | | | 68 | 683 | | |
| 330 | 331 | | | 5.6 | 562 | | | 82 | 823 | | |
| 390 | 391 | | | 6.8 | 682 | | | 100 | 104 | | |
| 470 | 471 | | | 8.2 | 822 | | | 220 | 224 | | |
| 560 | 561 | | | 10 | 103 | | | 470 | 474 | | |
| 680 | 681 | | | 12 | 123 | | | 1.0 uF | 105 | | 6.3V or 10V |
| 820 | 821 | | | 15 | 153 | | | 2.2 | 225 | | 6.3V or 10V or 16V or 25V |
| 1.0 nF | 102 | | | 18 | 183 | | | 4.7 | 475 | | 6.3V |
| 1.2 | 122 | | | 22 | 223 | | | | | | |



0402: PPI-GMC04

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | |
|--------|------|------|---|-------|------|------|---|---|------|------|----------------------------------|-----|
| 1.0 nF | 102 | K,M | 6.3V or 10V or 16V or 25V or 35V or 50V | 15 | 153 | K,M | 6.3V or 10V or 16V or 25V or 35V or 50V | 270 | 274 | K,M | 6.3V or 10V or 16V or 25V or 35V | |
| 1.2 | 122 | | | 18 | 183 | | | 390 | 394 | | | |
| 1.5 | 152 | | | 22 | 223 | | | 470 | 474 | | | |
| 1.8 | 182 | | | 27 | 273 | | | 560 | 564 | | | |
| 2.2 | 222 | | | 33 | 333 | | | 680 | 684 | | | |
| 2.7 | 272 | | | 39 | 393 | | | 820 | 824 | | | |
| 3.3 | 332 | | | 47 | 473 | | | 1.0 uF | 105 | | | |
| 3.9 | 392 | | | 56 | 563 | | | 2.2 | 225 | | | |
| 4.7 | 472 | | | 68 | 683 | | | 3.3 | 335 | | | |
| 5.6 | 562 | | | 82 | 823 | | | 3.9 | 395 | | | |
| 6.8 | 682 | | | 100 | 103 | | | 4.7 | 475 | | | |
| 8.2 | 822 | | | 150 | 154 | | | 6.3V or 10V or 16V or 25V or 35V | 10 | | | 106 |
| 10 | 103 | | | 220 | 224 | | | 6.3V or 10V or 16V or 25V or 35V or 50V | 22 | | | 226 |
| 12 | 123 | | | | | | | | | | | |

0603: PPI-GMC10

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|---------------------------|--------|------|------|---------------------------|-------|------|------|---------------------------|
| 100 nF | 104 | K,M | 6.3V or 10V or 25V or 35V | 560 | 564 | K,M | 6.3V or 10V or 25V or 35V | 3.9 | 395 | K,M | 6.3V or 10V or 25V or 35V |
| 120 | 124 | | | 680 | 684 | | | 4.7 | 475 | | |
| 150 | 154 | | | 820 | 824 | | | 10 | 106 | | |
| 220 | 224 | | | 1.0 uF | 105 | | | 22 | 226 | | |
| 270 | 274 | | | 2.2 | 225 | | | 47 | 476 | | |
| 330 | 334 | | | 2.7 | 275 | | | | | | |
| 470 | 474 | | | 3.3 | 335 | | | | | | |
| | | | | | | | | | | | |



0805: PPI-GMC21

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|---|---------|------|------|---|-------|------|------|--|
| 180 nF | 184 | K,M | 4V or 6.3V or 10V or 16V or 25V or 35V or 50V | 820 | 824 | K,M | 4V or 6.3V or 10V or 16V or 25V or 35V or 50V | 15 | 156 | K,M | 4V or 6.3V or 10V or 16V or 25V or 35V |
| 220* | 224 | | | 1.0 uF* | 105 | | | 22 | 226 | | |
| 270 | 274 | | | 2.2* | 225 | | | 33 | 336 | | |
| 390 | 394 | | | 3.3 | 335 | | | 47 | 476 | | |
| 470* | 474 | | | 4.7* | 475 | | | 100 | 107 | | |
| 560 | 564 | | | 6.8 | 685 | | | | | | |
| 680 | 684 | | | 10 | 106 | | | | | | |
| | | | | | | | 4V or 6.3V or 10V or 16V or | | | | |

*Also available in 63V

1206: PPI-GMC31

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|--|--------|------|------|--|-------|------|------|---------------------------------|
| 180 nF | 184 | K,M | 4V or 6.3V or 10V or 16V or 25V or 50V | 820 | 824 | K,M | 4V or 6.3V or 10V or 16V or 25V or 50V | 15 | 156 | K,M | 4V or 6.3V or 10V or 16V or 25V |
| 220 | 224 | | | 1.0 uF | 105 | | | 22 | 226 | | |
| 270 | 274 | | | 2.2 | 225 | | | 33 | 336 | | |
| 390 | 394 | | | 3.3 | 335 | | | 47 | 476 | | |
| 470 | 474 | | | 4.7 | 475 | | | 100 | 107 | | 4V or 6.3V or 10V |
| 560 | 564 | | | 6.8 | 685 | | | 150 | 157 | | |
| 680 | 684 | | | 10 | 106 | | | | | | |

1210: PPI-GMC32

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|--------|------|------|--|--------|------|------|--|-----------------------------|------|------|---------------------------------|
| 180 nF | 184 | K,M | 4V or 6.3V or 10V or 16V or 25V or 50V | 1.0 uF | 105 | K,M | 4V or 6.3V or 10V or 16V or 25V or 50V | 33 | 336 | K,M | 4V or 6.3V or 10V or 16V or 25V |
| 220 | 224 | | | 2.2 | 225 | | | 47 | 476 | | |
| 270 | 274 | | | 3.3 | 335 | | | 100 | 107 | | 4V or 6.3V or 10V or 16V |
| 390 | 394 | | | 4.7 | 475 | | | 150 | 157 | | |
| 470 | 474 | | | 6.8 | 685 | | | 220 | 227 | | 4V or 6.3V |
| 560 | 564 | | | 10 | 106 | | | 330 | 337 | | |
| 680 | 684 | | | 15 | 156 | | | | | | |
| 820 | 824 | | | 22 | 226 | | | 4V or 6.3V or 10V or 16V or | | | |

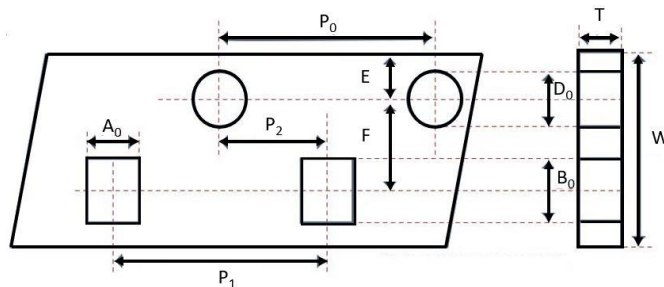
1812: PPI-GMC43

| Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC | Value | Code | Tol. | Rated WVDC |
|-------|------|------|-------------------|-------|------|------|--------------------|-------|------|------|-------------|
| 10 nF | 106 | K,M | 10V or 16V or 25V | 22 | 226 | K,M | 10V or 16V or 25V | 47 | 476 | K,M | 6.3V or 10V |
| 15 | 156 | | | 33 | 336 | | 6.3V or 10V or 16V | 100 | 107 | | |

⚡ Packaging

| Size | Code | | Description | |
|--------------|------------------------|-----|----------------------------|-----|
| | D | G | Q | |
| | <i>Qty per 7" Reel</i> | | <i>Qty per 10/13" Reel</i> | |
| 01005 | 20K | 50K | | |
| 0201 | 10K/ 15K | 50K | | |
| 0402 | 10K | 40K | 50K | |
| 0603 | 4K | 10K | 15K | |
| 0805 | 2K, 3K, 4K | 10K | 15K | 20K |
| 1206 | 2K, 3K, 4K | 10K | 15K | 20K |
| 1210 | 500, 1K, 2K, 3K | 4K | 8K | |
| 1808 | 1K, 2K, 3K | | | |
| 1812 | 500, 1K | 3K | | |
| 1825 | 500, 1K | | | |
| 2220 | 500, 1K | | | |
| 2225 | 500, 750 | | | |

⚡ Tape & Reel Specifications

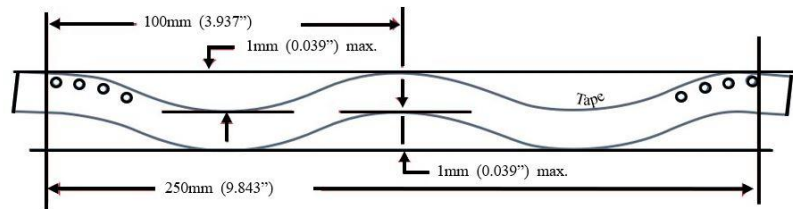
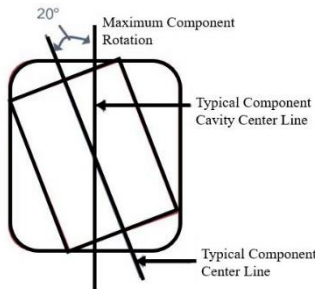
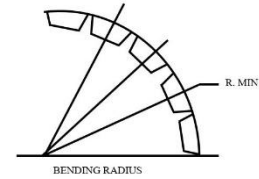
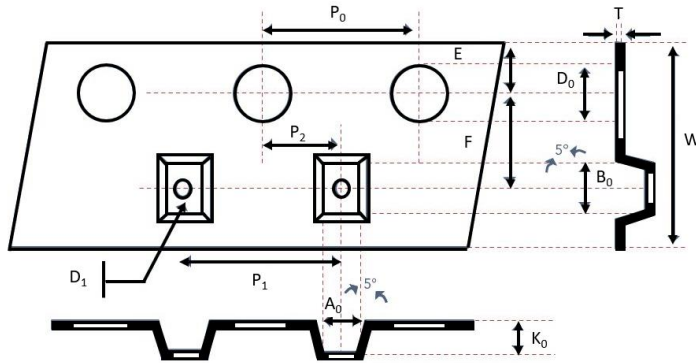


Cardboard carrier tape for EIA case sizes: 01005, 0201, 0402, 0603, 0805, 1206

Unit: mm

| Size | A ₀ | B ₀ | T | K ₀ | W | P ₀ | 10XP ₀ | P ₁ | P ₂ | D ₀ | D ₁ | E | F |
|--------------|----------------|----------------|-------------|----------------|-------------|----------------|-------------------|----------------|----------------|----------------|----------------|-------------|-------------|
| 01005 | 0.25 ± 0.04 | 0.45 ± 0.04 | 0.36 ± 0.05 | * | 8.00 ± 0.30 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | * | 1.75 ± 0.10 | 3.50 ± 0.05 |
| 0201 | 0.39 ± 0.07 | 0.69 ± 0.07 | <0.50 | * | 8.00 ± 0.10 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.55 ± 0.05 | * | 1.75 ± 0.05 | 3.50 ± 0.05 |
| 0402 | 0.70 ± 0.20 | 1.20 ± 0.20 | <0.80 | * | 8.00 ± 0.10 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.55 ± 0.05 | * | 1.75 ± 0.05 | 3.50 ± 0.05 |
| 0603 | 1.10 ± 0.20 | 1.90 ± 0.20 | <1.20 | * | 8.00 ± 0.10 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.55 ± 0.05 | * | 1.75 ± 0.05 | 3.50 ± 0.05 |
| 0805 | 1.65 ± 0.20 | 2.40 ± 0.20 | <1.30 | * | 8.00 ± 0.10 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.55 ± 0.05 | * | 1.75 ± 0.05 | 3.50 ± 0.05 |
| 1206 | 2.00 ± 0.20 | 3.60 ± 0.20 | <1.30 | * | 8.00 ± 0.10 | 4.00 ± 0.10 | 40.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.55 ± 0.05 | * | 1.75 ± 0.05 | 3.50 ± 0.05 |

≠ Tape & Reel Specifications



Embossed plastic carrier tape for case sizes: 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225

Unit: mm

| Size | A ₀ | B ₀ | T | K ₀ | W | P ₀ | 10XP ₀ | P ₁ | P ₂ | D ₀ | D ₁ | E | F |
|------|----------------|----------------|-------------|----------------|--------------|----------------|-------------------|----------------|----------------|----------------|----------------|-------------|-------------|
| 0805 | <1.80 | <2.70 | 0.23 ± 0.10 | <2.50 | 8.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.00 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 |
| 1206 | <2.30 | <4.00 | 0.23 ± 0.10 | <2.50 | 8.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.00 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 |
| 1210 | <3.20 | <3.95 | 0.23 ± 0.10 | <3.00 | 8.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.00 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 |
| 1808 | <2.50 | <5.30 | 0.25 ± 0.10 | <2.50 | 12.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.00 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |
| 1812 | <3.90 | <5.30 | 0.25 ± 0.10 | <3.50 | 12.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |
| 1825 | <6.80 | <5.30 | 0.30 ± 0.10 | <3.10 | 12.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |
| 2220 | <5.80 | <6.50 | 0.30 ± 0.10 | <3.10 | 12.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |
| 2225 | <6.80 | <6.50 | 0.30 ± 0.10 | <3.10 | 12.00 ± 0.20 | 4.00 ± 0.10 | 40.00 ± 0.20 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |