

Chip Solid MnO₂ Tantalum Capacitors – TC2 Series

Operating Temp.: -55°C~+125°C



FEATURES

- Meets or exceeds EIA-535BAAC standard
- Self-healing capability, high reliability
- Excellent stability of capacitance during operating temperature range
- High volumetric efficiency
- 100% surge current test

APPLICATIONS

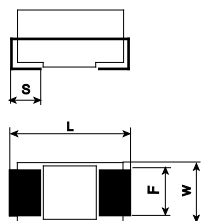
- Communication
- Consumer electronics
- Instruments
- Medical electronics

PRODUCT IDENTIFICATION

| <u>TC</u> | <u>212</u> | <u>B</u> | <u>105</u> | <u>M</u> | <u>035</u> | <u>B</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------------------------|-----------------------|------------|----------|-------------------------------|---|-------|--------|------|---|------------|-----|------------------|--|-----|--------|--------------------------------|------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|-------|-----|-------|--|--|--|---------------|--|---|----------------------------------|---|-----------------------------------|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ① | | | ② | | | ③ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr><th colspan="2">Type</th></tr> <tr><td>TC</td><td>Solid Tantalum Chip Capacitor</td></tr> </table> | | Type | | TC | Solid Tantalum Chip Capacitor | <table border="1"> <tr><th colspan="2">Series</th></tr> <tr><td>211</td><td>Industrial</td></tr> <tr><td>212</td><td>Low ESR</td></tr> </table> | | Series | | 211 | Industrial | 212 | Low ESR | <table border="1"> <tr><th colspan="2">External Dimensions (LxW) (mm)</th></tr> <tr><td>A</td><td>3.2x1.6</td></tr> <tr><td>B</td><td>3.5x2.8</td></tr> <tr><td>C</td><td>6.0x3.2</td></tr> <tr><td>D/E</td><td>7.3x4.3</td></tr> </table> | | | External Dimensions (LxW) (mm) | | A | 3.2x1.6 | B | 3.5x2.8 | C | 6.0x3.2 | D/E | 7.3x4.3 | | | | | | | | | | | | | | | |
| Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TC | Solid Tantalum Chip Capacitor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 211 | Industrial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 212 | Low ESR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| External Dimensions (LxW) (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 3.2x1.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 3.5x2.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 6.0x3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D/E | 7.3x4.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ④ | | ⑥ | | ⑦ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr><th colspan="2">Nominal Capacitance</th></tr> <tr><th>Example</th><th>Nominal Value</th></tr> <tr><td>105</td><td>1.0μF</td></tr> <tr><td>106</td><td>10μF</td></tr> </table> | | Nominal Capacitance | | Example | Nominal Value | 105 | 1.0μF | 106 | 10μF | <table border="1"> <tr><th colspan="2">Rated DC Voltage</th></tr> <tr><td>002</td><td>2.5Vdc</td></tr> <tr><td>004</td><td>4Vdc</td></tr> <tr><td>006</td><td>6.3Vdc</td></tr> <tr><td>010</td><td>10Vdc</td></tr> <tr><td>016</td><td>16Vdc</td></tr> <tr><td>020</td><td>20Vdc</td></tr> <tr><td>025</td><td>25Vdc</td></tr> <tr><td>035</td><td>35Vdc</td></tr> <tr><td>050</td><td>50Vdc</td></tr> </table> | | | Rated DC Voltage | | 002 | 2.5Vdc | 004 | 4Vdc | 006 | 6.3Vdc | 010 | 10Vdc | 016 | 16Vdc | 020 | 20Vdc | 025 | 25Vdc | 035 | 35Vdc | 050 | 50Vdc | <table border="1"> <tr><th colspan="2">Internal Code</th></tr> <tr><td>B</td><td>Black Molded Case, Laser Marking</td></tr> <tr><td>Y</td><td>Yellow Molded Case, Laser Marking</td></tr> </table> | | | Internal Code | | B | Black Molded Case, Laser Marking | Y | Yellow Molded Case, Laser Marking |
| Nominal Capacitance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Example | Nominal Value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105 | 1.0μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 106 | 10μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated DC Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 002 | 2.5Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 004 | 4Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 006 | 6.3Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 010 | 10Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 016 | 16Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 020 | 20Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 025 | 25Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 035 | 35Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 050 | 50Vdc | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Internal Code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Black Molded Case, Laser Marking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y | Yellow Molded Case, Laser Marking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ⑤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr><th colspan="2">Capacitance Tolerance</th></tr> <tr><td>K</td><td>±10%</td></tr> <tr><td>M</td><td>±20%</td></tr> </table> | | Capacitance Tolerance | | K | ±10% | M | ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | ±10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

SHAPE AND DIMENSIONS

Unit: mm [inch]



| Case | EIA | L | W | H | F | S |
|------|---------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A | 3216-18 | 3.20±0.20 [.126±.008] | 1.60±0.20 [.063±.008] | 1.60±0.20 [.063±.008] | 1.20±0.10 [.040±.004] | 0.80±0.30 [.031±.012] |
| B | 3528-21 | 3.50±0.20 [.138±.008] | 2.80±0.20 [.110±.008] | 1.90±0.20 [.075±.008] | 2.20±0.10 [.087±.004] | 0.80±0.30 [.030±.012] |
| C | 6032-28 | 6.00±0.30 [.236±.012] | 3.20±0.30 [.126±.012] | 2.50±0.30 [.098±.012] | 2.20±0.10 [.087±.004] | 1.30±0.30 [.051±.012] |
| D | 7343-31 | 7.30±0.30 [.287±.012] | 4.30±0.30 [.169±.012] | 2.80±0.30 [.110±.012] | 2.40±0.10 [.094±.004] | 1.30±0.30 [.051±.012] |
| E | 7343-43 | 7.30±0.30 [.287±.012] | 4.30±0.30 [.169±.012] | 4.00±0.30 [.161±.012] | 2.40±0.10 [.094±.004] | 1.30±0.30 [.051±.012] |

TECHNICAL SPECIFICATION

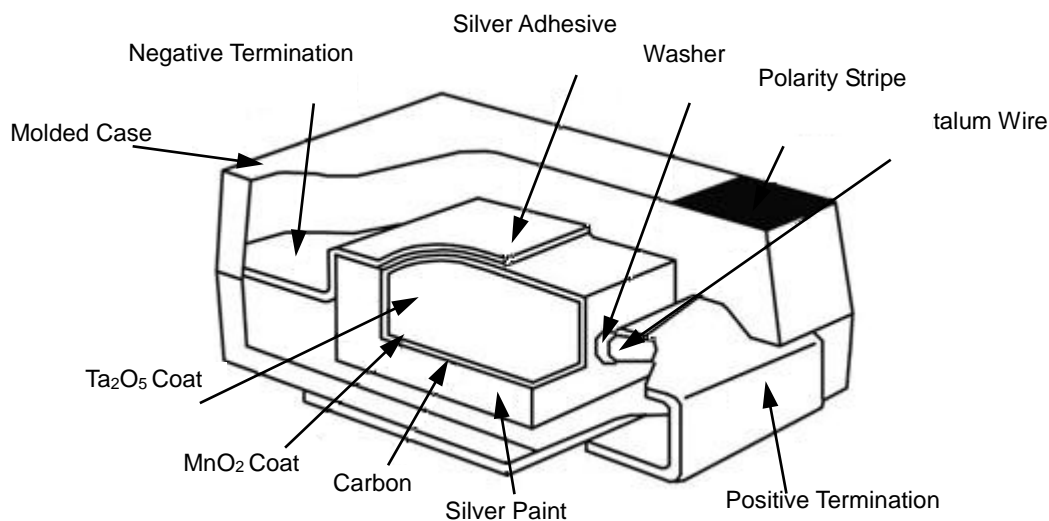
| Item | SPEC | | | | | | | | | Test Condition |
|------------------------------------|--------------|------|------|------|-----|-----|-----|-----|-----|----------------|
| Operating Temp | -55°C~+125°C | | | | | | | | | |
| C _R Range | 0.10μF~680μF | | | | | | | | | 25°C, 120Hz |
| C _R Tolerance | ±10% or ±20% | | | | | | | | | 25°C, 120Hz |
| Rated Voltage (V _R) | 2.5V | 4V | 6.3V | 10V | 16V | 20V | 25V | 35V | 50V | 85°C |
| Category Voltage (V _C) | 1.6V | 2.5V | 4V | 6.3V | 10V | 13V | 16V | 20V | 32V | 125°C |
| Surge Voltage (V _S) | 3.3V | 5.2V | 8V | 13V | 20V | 26V | 32V | 46V | 65V | 85°C |
| Surge Voltage (V _s) | 2.2V | 3.4V | 5V | 8V | 13V | 16V | 20V | 28V | 40V | 125°C |

STANDARD C-V VALUE BY CASE CODE

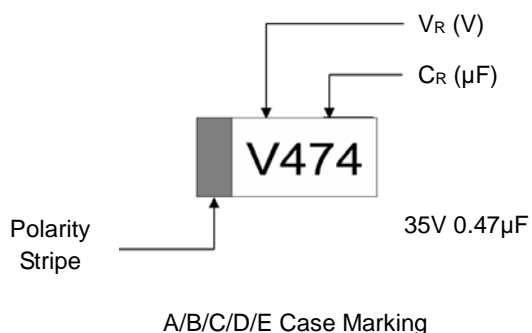
| Rated Voltage (VR) | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 | 35 | 50 | |
|--------------------|--------|-----------|---------|---------|---------|---------|-------|-------|-------|--|
| Voltage Code | e | G | J | A | C | D | E | V | T | |
| CR (μF) | C Code | Case Code | | | | | | | | |
| 0.15 | 154 | | | | | | | | B | |
| 0.22 | 224 | | | | | | | | B/A | |
| 0.33 | 334 | | | | | | A | A | B/A | |
| 0.47 | 474 | | | | | | A | B/A | C/B/A | |
| 0.68 | 684 | | | | | A | A | B/A | C/B/A | |
| 1.0 | 105 | | A | A | A | A | B/A | B/A | C/B | |
| 1.5 | 155 | | A | A | A | B/A | B/A | C/B | C/B | |
| 2.2 | 225 | A | A | A | B/A | B/A | C/B/A | C/B/A | D/C/B | |
| 3.3 | 335 | A | A | A | B/A | B/A | C/B/A | C/B | D/C/B | |
| 4.7 | 475 | A | A | B/A | C/B/A | C/B/A | C/B/A | D/C/B | D | |
| 6.8 | 685 | A | B/A | B/A | C/B/A | D/C/B/A | D/C/B | D/C | D | |
| 10 | 106 | A | B/A | B/A | C/B/A | C/B/A | D/C/B | D/C/B | E/D/C | |
| 15 | 156 | B/A | B/A | B/A | C/B/A | C/B | D/C | D/C/B | E/D | |
| 22 | 226 | A | B/A | B/A | C/B/A | D/C/B/A | D/C/B | D/C | E/D | |
| 33 | 336 | A | C/B/A | C/B/A | D/C/B/A | D/C/B | D/C | E/D | E | |
| 47 | 476 | A | C/B/A | C/B/A | D/C/B/A | D/C/B | E/D/C | E/D | E | |
| 68 | 686 | B/A | D/C/B | D/C/B | D/C/B | D | E/D | E | | |
| 100 | 107 | B/A | D/C/B/A | D/C/B/A | D/C/B | D/C | E/D | E | | |
| 150 | 157 | B | D/C/B | D/C/B | E/D/C | E/D | E | | | |
| 220 | 227 | B | D/C/B | E/D/C | E/D | E/D | | | | |
| 330 | 337 | | E/D/C/B | E/D | E/D | E | | | | |
| 470 | 477 | | E | E/D | E | | | | | |

※: The first case code is standard product and the others are expansion products.

CONSTRUCTION



MARKING



Rated Voltage Code

| | | | | | | | | | |
|---------------------------------|-----|---|-----|----|----|----|----|----|----|
| Rated Voltage(V _R) | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 | 35 | 50 |
| Code | e | G | J | A | C | D | E | V | T |

Capacitance Code

| | | | | | | | | | | | | |
|-----------------------|-----|------|------|------|------|------|-----|-----|-----|-----|-----|-----|
| Capacitance (μF) | 0.1 | 0.15 | 0.22 | 0.33 | 0.47 | 0.68 | 1.0 | 1.5 | 2.2 | 3.3 | 4.7 | 6.8 |
| Code (A/B/C/D/E Case) | 104 | 154 | 224 | 334 | 474 | 684 | 105 | 155 | 225 | 335 | 475 | 685 |
| Capacitance (μF) | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 |
| Code (A/B/C/D/E Case) | 106 | 156 | 226 | 336 | 476 | 686 | 107 | 157 | 227 | 337 | 477 | 687 |

SPECIFICATIONS

TC211 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|------------------------------------|------|---------------|---------------------|-------------------------|--------------------------|
| 2.5V, +85°C (1.6V @ +125°C) | | | | | |
| 10.0 | A | TC211A106◎002 | 0.5 | 6.0 | 5.0 |
| 15.0 | A | TC211A156◎002 | 0.5 | 6.0 | 6.0 |
| 15.0 | B | TC211B156◎002 | 0.5 | 6.0 | 4.0 |
| 22.0 | A | TC211A226◎002 | 0.6 | 6.0 | 4.0 |
| 33.0 | A | TC211A336◎002 | 0.8 | 6.0 | 4.0 |
| 47.0 | A | TC211A476◎002 | 1.2 | 10.0 | 4.0 |
| 68.0 | A | TC211A686◎002 | 1.7 | 10.0 | 3.0 |
| 68.0 | B | TC211B686◎002 | 1.7 | 6.0 | 2.0 |
| 100.0 | A | TC211A107◎002 | 2.5 | 20.0 | 2.5 |
| 100.0 | B | TC211B107◎002 | 2.5 | 8.0 | 1.5 |
| 150.0 | B | TC211B157◎002 | 3.8 | 10.0 | 2.0 |
| 220.0 | B | TC211B227◎002 | 5.5 | 18.0 | 2.0 |
| 4V, +85°C (2.5V @ +125°C) | | | | | |
| 2.2 | A | TC211A225◎004 | 0.5 | 6.0 | 8.0 |
| 3.3 | A | TC211A335◎004 | 0.5 | 6.0 | 8.0 |
| 4.7 | A | TC211A475◎004 | 0.5 | 6.0 | 8.0 |
| 6.8 | A | TC211A685◎004 | 0.5 | 6.0 | 6.0 |
| 10.0 | A | TC211A106◎004 | 0.5 | 6.0 | 6.0 |
| 10.0 | B | TC211B106◎004 | 0.5 | 6.0 | 3.5 |
| 15.0 | A | TC211A156◎004 | 0.6 | 6.0 | 4.0 |
| 15.0 | B | TC211B156◎004 | 0.6 | 6.0 | 3.5 |
| 22.0 | A | TC211A226◎004 | 0.9 | 6.0 | 4.0 |
| 22.0 | B | TC211B226◎004 | 0.9 | 6.0 | 3.5 |
| 33.0 | A | TC211A336◎004 | 1.3 | 6.0 | 4.0 |
| 33.0 | B | TC211B336◎004 | 1.3 | 6.0 | 3.5 |
| 33.0 | C | TC211C336◎004 | 1.3 | 6.0 | 1.8 |
| 47.0 | A | TC211A476◎004 | 1.9 | 6.0 | 3.0 |
| 47.0 | B | TC211B476◎004 | 1.9 | 6.0 | 3.0 |
| 47.0 | C | TC211C476◎004 | 1.9 | 6.0 | 1.8 |
| 68.0 | B | TC211B686◎004 | 2.7 | 6.0 | 3.5 |
| 68.0 | C | TC211C686◎004 | 2.7 | 6.0 | 1.6 |
| 68.0 | D | TC211D686◎004 | 2.7 | 6.0 | 0.8 |
| 100.0 | A | TC211A107◎004 | 4.0 | 18.0 | 5.0 |
| 100.0 | B | TC211B107◎004 | 4.0 | 8.0 | 2.0 |
| 100.0 | C | TC211C107◎004 | 4.0 | 8.0 | 1.3 |
| 100.0 | D | TC211D107◎004 | 4.0 | 8.0 | 0.8 |
| 150.0 | B | TC211B157◎004 | 6.0 | 15.0 | 2.0 |
| 150.0 | C | TC211C157◎004 | 6.0 | 8.0 | 1.2 |
| 150.0 | D | TC211D157◎004 | 6.0 | 8.0 | 0.8 |
| 220.0 | B | TC211B227◎004 | 8.8 | 18.0 | 0.5 |
| 220.0 | C | TC211C227◎004 | 8.8 | 8.0 | 1.0 |
| 220.0 | D | TC211D227◎004 | 8.8 | 8.0 | 0.8 |
| 330.0 | B | TC211B337◎004 | 13.2 | 18.0 | 1.2 |
| 330.0 | C | TC211C337◎004 | 13.2 | 8.0 | 1.2 |
| 330.0 | D | TC211D337◎004 | 13.2 | 8.0 | 0.7 |
| 330.0 | E | TC211E337◎004 | 13.2 | 8.0 | 0.8 |
| 470.0 | E | TC211E477◎004 | 18.8 | 8.0 | 0.8 |
| 680.0 | E | TC211E687◎004 | 27.2 | 8.0 | 0.5 |
| 6.3V, +85°C (4.0V @ +125°C) | | | | | |
| 1.0 | A | TC211A105◎006 | 0.5 | 6.0 | 14.0 |

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|-----------------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 1.5 | A | TC211A155◎006□ | 0.5 | 6.0 | 8.0 |
| 2.2 | A | TC211A225◎006□ | 0.5 | 6.0 | 8.0 |
| 3.3 | A | TC211A335◎006□ | 0.5 | 6.0 | 8.0 |
| 4.7 | A | TC211A475◎006□ | 0.5 | 6.0 | 6.0 |
| 6.8 | A | TC211A685◎006□ | 0.5 | 6.0 | 6.0 |
| 6.8 | B | TC211B685◎006□ | 0.5 | 6.0 | 3.5 |
| 10.0 | A | TC211A106◎006□ | 0.6 | 6.0 | 4.0 |
| 10.0 | B | TC211B106◎006□ | 0.6 | 6.0 | 3.5 |
| 15.0 | A | TC211A156◎006□ | 0.9 | 6.0 | 4.0 |
| 15.0 | B | TC211B156◎006□ | 0.9 | 6.0 | 3.5 |
| 22.0 | A | TC211A226◎006□ | 1.3 | 6.0 | 4.0 |
| 22.0 | B | TC211B226◎006□ | 1.3 | 6.0 | 3.5 |
| 33.0 | A | TC211A336◎006□ | 2.1 | 8.0 | 4.5 |
| 33.0 | B | TC211B336◎006□ | 2.1 | 6.0 | 3.0 |
| 33.0 | C | TC211C336◎006□ | 2.1 | 6.0 | 1.8 |
| 47.0 | A | TC211A476◎006□ | 3.0 | 8.0 | 3.5 |
| 47.0 | B | TC211B476◎006□ | 3.0 | 6.0 | 3.0 |
| 47.0 | C | TC211C476◎006□ | 3.0 | 6.0 | 1.6 |
| 68.0 | B | TC211B686◎006□ | 4.3 | 10.0 | 1.2 |
| 68.0 | C | TC211C686◎006□ | 4.3 | 6.0 | 1.2 |
| 68.0 | D | TC211D686◎006□ | 4.3 | 6.0 | 0.8 |
| 100.0 | A | TC211A107◎006□ | 6.3 | 20.0 | 4.0 |
| 100.0 | B | TC211B107◎006□ | 6.3 | 10.0 | 3.0 |
| 100.0 | C | TC211C107◎006□ | 6.3 | 8.0 | 1.2 |
| 100.0 | D | TC211D107◎006□ | 6.3 | 8.0 | 0.8 |
| 150.0 | B | TC211B157◎006□ | 9.5 | 15.0 | 1.0 |
| 150.0 | C | TC211C157◎006□ | 9.5 | 8.0 | 1.2 |
| 150.0 | D | TC211D157◎006□ | 9.5 | 8.0 | 0.8 |
| 220.0 | B | TC211B227◎006Y | 39.9 | 18.0 | 1.0 |
| 220.0 | C | TC211C227◎006□ | 13.9 | 8.0 | 1.2 |
| 220.0 | D | TC211D227◎006□ | 13.9 | 8.0 | 0.7 |
| 220.0 | E | TC211E227◎006□ | 13.9 | 8.0 | 0.5 |
| 330.0 | D | TC211D337◎006□ | 20.8 | 8.0 | 0.5 |
| 330.0 | E | TC211E337◎006□ | 20.8 | 8.0 | 0.5 |
| 470.0 | D | TC211D477◎006□ | 29.6 | 12.0 | 0.4 |
| 470.0 | E | TC211E477◎006□ | 29.6 | 10.0 | 0.5 |
| 10V, +85°C (6.3V @ +125°C) | | | | | |
| 1.0 | A | TC211A105◎010□ | 0.5 | 4.0 | 13.0 |
| 1.5 | A | TC211A155◎010□ | 0.5 | 6.0 | 8.0 |
| 2.2 | A | TC211A225◎010□ | 0.5 | 6.0 | 8.0 |
| 3.3 | A | TC211A335◎010□ | 0.5 | 6.0 | 6.0 |
| 4.7 | A | TC211A475◎010□ | 0.5 | 6.0 | 6.0 |
| 4.7 | B | TC211B475◎010□ | 0.5 | 6.0 | 3.5 |
| 6.8 | A | TC211A685◎010□ | 0.7 | 6.0 | 6.0 |
| 6.8 | B | TC211B685◎010□ | 0.7 | 6.0 | 3.5 |
| 10.0 | A | TC211A106◎010□ | 1.0 | 6.0 | 4.0 |
| 10.0 | B | TC211B106◎010□ | 1.0 | 6.0 | 3.5 |
| 10.0 | C | TC211C106◎010□ | 1.0 | 6.0 | 1.8 |
| 15.0 | A | TC211A156◎010□ | 1.5 | 6.0 | 6.0 |
| 15.0 | B | TC211B156◎010□ | 1.5 | 6.0 | 3.5 |
| 15.0 | C | TC211C156◎010□ | 1.5 | 6.0 | 1.8 |

SPECIFICATIONS

TC211 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. | Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 22.0 | A | TC211A226◎010□ | 2.2 | 8.0 | 4.0 | 47.0 | C | TC211C476◎016□ | 7.5 | 6.0 | 1.2 |
| 22.0 | B | TC211B226◎010□ | 2.2 | 6.0 | 3.0 | 47.0 | D | TC211D476◎016□ | 7.5 | 6.0 | 0.8 |
| 22.0 | C | TC211C226◎010□ | 2.2 | 6.0 | 1.8 | 68.0 | D | TC211D686◎016□ | 10.8 | 6.0 | 0.8 |
| 33.0 | A | TC211A336◎010□ | 3.3 | 15.0 | 6.0 | 100.0 | C | TC211C107◎016□ | 16.0 | 10.0 | 1.0 |
| 33.0 | B | TC211B336◎010□ | 3.3 | 6.0 | 3.5 | 100.0 | D | TC211D107◎016□ | 16.0 | 8.0 | 0.7 |
| 33.0 | C | TC211C336◎010□ | 3.3 | 6.0 | 1.6 | 150.0 | D | TC211D157◎016□ | 24.0 | 12.0 | 0.7 |
| 33.0 | D | TC211D336◎010□ | 3.3 | 6.0 | 0.8 | 150.0 | E | TC211E157◎016□ | 24.0 | 8.0 | 0.5 |
| 47.0 | A | TC211A476◎010□ | 4.7 | 15.0 | 4.0 | 220.0 | D | TC211D227◎016□ | 35.2 | 15.0 | 0.9 |
| 47.0 | B | TC211B476◎010□ | 4.7 | 6.0 | 1.0 | 220.0 | E | TC211E227◎016□ | 35.2 | 10.0 | 0.5 |
| 47.0 | C | TC211C476◎010□ | 4.7 | 6.0 | 1.2 | 330.0 | E | TC211E337◎016□ | 52.8 | 10.0 | 0.5 |
| 47.0 | D | TC211D476◎010□ | 4.7 | 6.0 | 0.8 | 20V, +85°C (13V @ +125°C) | | | | | |
| 68.0 | B | TC211B686◎010□ | 6.8 | 10.0 | 3.0 | 0.68 | A | TC211A684◎020□ | 0.5 | 4.0 | 12.0 |
| 68.0 | C | TC211C686◎010□ | 6.8 | 6.0 | 1.2 | 1.0 | A | TC211A105◎020□ | 0.5 | 4.0 | 10.0 |
| 68.0 | D | TC211D686◎010□ | 6.8 | 6.0 | 0.8 | 1.5 | A | TC211A155◎020□ | 0.5 | 6.0 | 8.0 |
| 100.0 | B | TC211B107◎010□ | 10.0 | 15.0 | 1.5 | 1.5 | B | TC211B155◎020□ | 0.5 | 6.0 | 5.0 |
| 100.0 | C | TC211C107◎010□ | 10.0 | 8.0 | 1.2 | 2.2 | A | TC211A225◎020□ | 0.5 | 6.0 | 7.0 |
| 100.0 | D | TC211D107◎010□ | 10.0 | 8.0 | 0.7 | 2.2 | B | TC211B225◎020□ | 0.5 | 6.0 | 3.5 |
| 150.0 | C | TC211C157◎010□ | 15.0 | 10.0 | 0.9 | 3.3 | A | TC211A335◎020□ | 0.7 | 6.0 | 7.0 |
| 150.0 | D | TC211D157◎010□ | 15.0 | 8.0 | 0.7 | 3.3 | B | TC211B335◎020□ | 0.7 | 6.0 | 3.5 |
| 150.0 | E | TC211E157◎010□ | 15.0 | 8.0 | 0.5 | 4.7 | A | TC211A475◎020□ | 0.9 | 6.0 | 4.0 |
| 220.0 | D | TC211D227◎010□ | 22.0 | 8.0 | 0.5 | 4.7 | B | TC211B475◎020□ | 0.9 | 6.0 | 3.5 |
| 220.0 | E | TC211E227◎010□ | 22.0 | 8.0 | 0.5 | 4.7 | C | TC211C475◎020□ | 0.9 | 6.0 | 2.4 |
| 330.0 | D | TC211D337◎010□ | 33.0 | 10.0 | 0.5 | 6.8 | A | TC211A685◎020□ | 1.4 | 8.0 | 6.0 |
| 330.0 | E | TC211E337◎010□ | 33.0 | 10.0 | 0.5 | 6.8 | B | TC211B685◎020□ | 1.4 | 6.0 | 3.5 |
| 470.0 | E | TC211E477◎010□ | 47.0 | 10.0 | 0.5 | 6.8 | C | TC211C685◎020□ | 1.4 | 6.0 | 2.0 |
| 16V, +85°C (10V @ +125°C) | | | | | | 6.8 | D | TC211D685◎020□ | 1.4 | 6.0 | 1.9 |
| 1.0 | A | TC211A105◎016□ | 0.5 | 4.0 | 10.0 | 10.0 | B | TC211B106◎020□ | 2.0 | 6.0 | 3.0 |
| 1.5 | A | TC211A155◎016□ | 0.5 | 6.0 | 8.0 | 10.0 | C | TC211C106◎020□ | 2.0 | 6.0 | 1.8 |
| 2.2 | A | TC211A225◎016□ | 0.5 | 6.0 | 6.0 | 10.0 | D | TC211D106◎020□ | 2.0 | 6.0 | 1.0 |
| 2.2 | B | TC211B225◎016□ | 0.5 | 6.0 | 4.0 | 15.0 | C | TC211C156◎020□ | 3.0 | 6.0 | 1.7 |
| 3.3 | A | TC211A335◎016□ | 0.52 | 6.0 | 6.0 | 15.0 | D | TC211D156◎020□ | 3.0 | 6.0 | 1.0 |
| 3.3 | B | TC211B335◎016□ | 0.5 | 6.0 | 3.5 | 22.0 | B | TC211B226◎020□ | 4.4 | 8.0 | 4.0 |
| 4.7 | A | TC211A475◎016□ | 0.8 | 6.0 | 6.0 | 22.0 | C | TC211C226◎020□ | 4.4 | 6.0 | 1.2 |
| 4.7 | B | TC211B475◎016□ | 0.8 | 6.0 | 3.5 | 22.0 | D | TC211D226◎020□ | 4.4 | 6.0 | 0.8 |
| 4.7 | C | TC211C475◎016□ | 0.8 | 6.0 | 2.4 | 33.0 | C | TC211C336◎020□ | 6.6 | 6.0 | 1.2 |
| 6.8 | A | TC211A685◎016□ | 1.1 | 6.0 | 7.0 | 33.0 | D | TC211D336◎020□ | 6.6 | 6.0 | 0.8 |
| 6.8 | B | TC211B685◎016□ | 1.1 | 6.0 | 3.5 | 47.0 | C | TC211C476◎020□ | 9.4 | 10.0 | 1.0 |
| 6.8 | C | TC211C685◎016□ | 1.1 | 6.0 | 2.0 | 47.0 | D | TC211D476◎020□ | 9.4 | 6.0 | 0.8 |
| 10.0 | A | TC211A106◎016□ | 1.6 | 8.0 | 7.0 | 47.0 | E | TC211E476◎020□ | 9.4 | 6.0 | 0.8 |
| 10.0 | B | TC211B106◎016□ | 1.6 | 6.0 | 2.8 | 68.0 | D | TC211D686◎020□ | 13.6 | 6.0 | 0.8 |
| 10.0 | C | TC211C106◎016□ | 1.6 | 6.0 | 1.8 | 68.0 | E | TC211E686◎020□ | 13.6 | 6.0 | 0.8 |
| 15.0 | B | TC211B156◎016□ | 2.4 | 6.0 | 3.0 | 100.0 | D | TC211D107◎020□ | 20.0 | 8.0 | 0.6 |
| 15.0 | C | TC211C156◎016□ | 2.4 | 6.0 | 1.8 | 100.0 | E | TC211E107◎020□ | 20.0 | 8.0 | 0.5 |
| 22.0 | A | TC211A226◎016□ | 3.5 | 15.0 | 4.0 | 150.0 | E | TC211E157◎020□ | 30.0 | 8.0 | 0.5 |
| 22.0 | B | TC211B226◎016□ | 3.5 | 8.0 | 2.2 | 25V, +85°C (16V @ +125°C) | | | | | |
| 22.0 | C | TC211C226◎016□ | 3.5 | 6.0 | 1.6 | 0.33 | A | TC211A334◎025□ | 0.5 | 4.0 | 15.0 |
| 22.0 | D | TC211D226◎016□ | 3.5 | 6.0 | 0.8 | 0.47 | A | TC211A474◎025□ | 0.5 | 4.0 | 14.0 |
| 33.0 | B | TC211B336◎016□ | 5.3 | 8.0 | 2.0 | 0.68 | A | TC211A684◎025□ | 0.5 | 4.0 | 10.0 |
| 33.0 | C | TC211C336◎016□ | 5.3 | 6.0 | 1.2 | 1.0 | A | TC211A105◎025□ | 0.5 | 4.0 | 8.0 |
| 33.0 | D | TC211D336◎016□ | 5.3 | 6.0 | 0.8 | 1.0 | B | TC211B105◎025□ | 0.5 | 4.0 | 5.0 |
| 47.0 | B | TC211B476◎016□ | 7.5 | 18.0 | 1.0 | 1.5 | A | TC211A155◎025□ | 0.5 | 6.0 | 10.0 |

SPECIFICATIONS

TC211 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 1.5 | B | TC211B155◎025□ | 0.5 | 6.0 | 5.0 |
| 2.2 | A | TC211A225◎025□ | 0.6 | 6.0 | 6.0 |
| 2.2 | B | TC211B225◎025□ | 0.6 | 6.0 | 4.5 |
| 2.2 | C | TC211C225◎025□ | 0.6 | 6.0 | 3.5 |
| 3.3 | A | TC211A335◎025□ | 0.8 | 6.0 | 7.0 |
| 3.3 | B | TC211B335◎025□ | 0.8 | 6.0 | 3.5 |
| 3.3 | C | TC211C335◎025□ | 0.8 | 6.0 | 2.5 |
| 4.7 | A | TC211A475◎025□ | 1.2 | 8.0 | 6.0 |
| 4.7 | B | TC211B475◎025□ | 1.2 | 6.0 | 2.0 |
| 4.7 | C | TC211C475◎025□ | 1.2 | 6.0 | 2.4 |
| 6.8 | B | TC211B685◎025□ | 1.7 | 6.0 | 3.0 |
| 6.8 | C | TC211C685◎025□ | 1.7 | 6.0 | 1.9 |
| 6.8 | D | TC211D685◎025□ | 1.7 | 6.0 | 1.2 |
| 10.0 | B | TC211B106◎025□ | 2.5 | 6.0 | 3.0 |
| 10.0 | C | TC211C106◎025□ | 2.5 | 6.0 | 1.5 |
| 10.0 | D | TC211D106◎025□ | 2.5 | 6.0 | 1.0 |
| 15.0 | B | TC211B156◎025□ | 3.8 | 8.0 | 4.0 |
| 15.0 | C | TC211C156◎025□ | 3.8 | 6.0 | 1.5 |
| 15.0 | D | TC211D156◎025□ | 3.8 | 6.0 | 1.0 |
| 22.0 | C | TC211C226◎025□ | 5.5 | 6.0 | 1.4 |
| 22.0 | D | TC211D226◎025□ | 5.5 | 6.0 | 0.8 |
| 33.0 | D | TC211D336◎025□ | 8.3 | 6.0 | 0.8 |
| 33.0 | E | TC211E336◎025□ | 8.3 | 6.0 | 0.7 |
| 47.0 | D | TC211D476◎025□ | 11.7 | 6.0 | 0.8 |
| 47.0 | E | TC211E476◎025□ | 11.7 | 6.0 | 0.7 |
| 68.0 | E | TC211E686◎025□ | 17.0 | 6.0 | 0.7 |
| 100.0 | E | TC211E107◎025□ | 25.0 | 10.0 | 1.2 |
| 35V, +85°C (20V @ +125°C) | | | | | |
| 0.33 | A | TC211A334◎035□ | 0.5 | 4.0 | 15.0 |
| 0.47 | A | TC211A474◎035□ | 0.5 | 4.0 | 14.0 |
| 0.47 | B | TC211B474◎035□ | 0.5 | 4.0 | 8.0 |
| 0.68 | A | TC211A684◎035□ | 0.5 | 4.0 | 10.0 |
| 0.68 | B | TC211B684◎035□ | 0.5 | 4.0 | 6.5 |
| 1.0 | A | TC211A105◎035□ | 0.5 | 4.0 | 10.0 |
| 1.0 | B | TC211B105◎035□ | 0.5 | 4.0 | 5.0 |
| 1.5 | B | TC211B155◎035□ | 0.5 | 6.0 | 5.0 |
| 1.5 | C | TC211C155◎035□ | 0.5 | 6.0 | 4.5 |
| 2.2 | A | TC211A225◎035□ | 0.8 | 6.0 | 6.0 |
| 2.2 | B | TC211B225◎035□ | 0.8 | 6.0 | 4.0 |
| 2.2 | C | TC211C225◎035□ | 0.8 | 6.0 | 3.5 |
| 3.3 | B | TC211B335◎035□ | 1.2 | 6.0 | 3.5 |
| 3.3 | C | TC211C335◎035□ | 1.2 | 6.0 | 2.5 |

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 4.7 | B | TC211B475◎035□ | 1.6 | 6.0 | 3.0 |
| 4.7 | C | TC211C475◎035□ | 1.6 | 6.0 | 2.5 |
| 4.7 | D | TC211D475◎035□ | 1.6 | 6.0 | 1.5 |
| 6.8 | C | TC211C685◎035□ | 2.4 | 6.0 | 2.0 |
| 6.8 | D | TC211D685◎035□ | 2.4 | 6.0 | 1.5 |
| 10.0 | C | TC211C106◎035□ | 3.5 | 6.0 | 2.0 |
| 10.0 | D | TC211D106◎035□ | 3.5 | 6.0 | 1.0 |
| 10.0 | E | TC211E106◎035□ | 3.5 | 6.0 | 1.0 |
| 15.0 | D | TC211D156◎035□ | 5.3 | 6.0 | 1.0 |
| 15.0 | E | TC211E156◎035□ | 5.3 | 6.0 | 0.9 |
| 22.0 | D | TC211D226◎035□ | 7.7 | 6.0 | 0.8 |
| 22.0 | E | TC211E226◎035□ | 7.7 | 6.0 | 0.7 |
| 33.0 | E | TC211E336◎035□ | 11.0 | 6.0 | 0.6 |
| 47.0 | E | TC211E476◎035□ | 16.5 | 8.0 | 0.6 |
| 50V, +85°C (32V @ +125°C) | | | | | |
| 0.15 | B | TC211B154◎050□ | 0.5 | 4.0 | 16.0 |
| 0.22 | A | TC211A224◎050□ | 0.5 | 4.0 | 18.0 |
| 0.22 | B | TC211B224◎050□ | 0.5 | 4.0 | 14.0 |
| 0.33 | A | TC211A334◎050□ | 0.5 | 4.0 | 15.0 |
| 0.33 | B | TC211B334◎050□ | 0.5 | 4.0 | 10.0 |
| 0.47 | A | TC211A474◎050□ | 0.5 | 4.0 | 12.0 |
| 0.47 | B | TC211B474◎050□ | 0.5 | 4.0 | 9.0 |
| 0.47 | C | TC211C474◎050□ | 0.5 | 4.0 | 8.0 |
| 0.68 | A | TC211A684◎050□ | 0.5 | 4.0 | 10.0 |
| 0.68 | B | TC211B684◎050□ | 0.5 | 4.0 | 8.0 |
| 0.68 | C | TC211C684◎050□ | 0.5 | 4.0 | 7.0 |
| 1.0 | B | TC211B105◎050□ | 0.5 | 6.0 | 6.0 |
| 1.0 | C | TC211C105◎050□ | 0.5 | 4.0 | 5.5 |
| 1.5 | B | TC211B155◎050□ | 0.8 | 6.0 | 4.5 |
| 1.5 | C | TC211C155◎050□ | 0.8 | 6.0 | 3.5 |
| 2.2 | B | TC211B225◎050□ | 1.1 | 6.0 | 2.0 |
| 2.2 | C | TC211C225◎050□ | 1.1 | 6.0 | 3.5 |
| 2.2 | D | TC211D225◎050□ | 1.1 | 6.0 | 2.5 |
| 3.3 | B | TC211B335◎050□ | 1.7 | 6.0 | 5.0 |
| 3.3 | C | TC211C335◎050□ | 1.7 | 6.0 | 3.0 |
| 3.3 | D | TC211D335◎050□ | 1.7 | 6.0 | 2.0 |
| 4.7 | D | TC211D475◎050□ | 2.4 | 6.0 | 1.5 |
| 6.8 | D | TC211D685◎050□ | 3.4 | 6.0 | 1.2 |
| 10.0 | D | TC211D106◎050□ | 5.0 | 6.0 | 1.0 |
| 10.0 | E | TC211E106◎050□ | 5.0 | 6.0 | 0.7 |
| 15.0 | E | TC211E156◎050□ | 7.5 | 6.0 | 0.7 |

SPECIFICATIONS

TC212 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|-----------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 2.5V, +85°C (1.6V @ +125°C) | | | | | |
| 10.0 | A | TC212A106@002□ | 0.5 | 6.0 | 4.0 |
| 15.0 | A | TC212A156@002□ | 0.5 | 6.0 | 4.0 |
| 15.0 | B | TC212B156@002□ | 0.5 | 6.0 | 3.0 |
| 22.0 | A | TC212A226@002□ | 0.6 | 6.0 | 3.0 |
| 33.0 | A | TC212A336@002□ | 0.8 | 6.0 | 3.0 |
| 47.0 | A | TC212A476@002□ | 1.2 | 10.0 | 3.0 |
| 68.0 | A | TC212A686@002□ | 1.7 | 10.0 | 2.5 |
| 68.0 | B | TC212B686@002□ | 1.7 | 6.0 | 1.8 |
| 100.0 | A | TC212A107@002□ | 2.5 | 20.0 | 2.0 |
| 100.0 | B | TC212B107@002□ | 2.5 | 8.0 | 1.0 |
| 150.0 | B | TC212B157@002□ | 3.8 | 10.0 | 1.5 |
| 220.0 | B | TC212B227@002□ | 5.5 | 18.0 | 1.5 |
| 4V, +85°C (2.5V @ +125°C) | | | | | |
| 2.2 | A | TC212A225@004□ | 0.5 | 6.0 | 6.0 |
| 3.3 | A | TC212A335@004□ | 0.5 | 6.0 | 6.0 |
| 4.7 | A | TC212A475@004□ | 0.5 | 6.0 | 5.0 |
| 6.8 | A | TC212A685@004□ | 0.5 | 6.0 | 4.0 |
| 10.0 | A | TC212A106@004□ | 0.5 | 6.0 | 3.0 |
| 10.0 | B | TC212B106@004□ | 0.5 | 6.0 | 1.5 |
| 15.0 | A | TC212A156@004□ | 0.6 | 6.0 | 1.5 |
| 15.0 | B | TC212B156@004□ | 0.6 | 6.0 | 1.2 |
| 22.0 | A | TC212A226@004□ | 0.9 | 6.0 | 1.5 |
| 22.0 | B | TC212B226@004□ | 0.9 | 6.0 | 0.6 |
| 33.0 | A | TC212A336@004□ | 1.3 | 6.0 | 2.5 |
| 33.0 | B | TC212B336@004□ | 1.3 | 6.0 | 0.5 |
| 33.0 | C | TC212C336@004□ | 1.3 | 6.0 | 0.8 |
| 47.0 | A | TC212A476@004□ | 1.9 | 6.0 | 2.0 |
| 47.0 | B | TC212B476@004□ | 1.9 | 6.0 | 0.8 |
| 47.0 | C | TC212C476@004□ | 1.9 | 6.0 | 1.0 |
| 68.0 | B | TC212B686@004□ | 2.7 | 6.0 | 2.5 |
| 68.0 | C | TC212C686@004□ | 2.7 | 6.0 | 0.5 |
| 68.0 | D | TC212D686@004□ | 2.7 | 6.0 | 0.5 |
| 100.0 | A | TC212A107@004□ | 4.0 | 18.0 | 3.0 |
| 100.0 | B | TC212B107@004□ | 4.0 | 8.0 | 1.0 |
| 100.0 | C | TC212C107@004□ | 4.0 | 8.0 | 0.35 |
| 100.0 | D | TC212D107@004□ | 4.0 | 8.0 | 0.2 |
| 150.0 | B | TC212B157@004□ | 6.0 | 15.0 | 1.0 |
| 150.0 | C | TC212C157@004□ | 6.0 | 8.0 | 0.3 |
| 150.0 | D | TC212D157@004□ | 6.0 | 8.0 | 0.2 |
| 220.0 | B | TC212B227@004□ | 8.8 | 18.0 | 0.4 |
| 220.0 | C | TC212C227@004□ | 8.8 | 8.0 | 0.5 |
| 220.0 | D | TC212D227@004□ | 8.8 | 8.0 | 0.3 |
| 330.0 | B | TC212B337@004□ | 13.2 | 18.0 | 0.7 |
| 330.0 | C | TC212C337@004□ | 13.2 | 8.0 | 0.8 |
| 330.0 | D | TC212D337@004□ | 13.2 | 8.0 | 0.2 |
| 330.0 | E | TC212E337@004□ | 13.2 | 8.0 | 0.2 |
| 470.0 | E | TC212E477@004□ | 18.8 | 8.0 | 0.2 |
| 680.0 | E | TC212E687@004□ | 27.2 | 8.0 | 0.2 |
| 6.3V, +85°C (4.0V @ +125°C) | | | | | |

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|----------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 1.0 | A | TC212A105@006□ | 0.5 | 6.0 | 10.0 |
| 1.5 | A | TC212A155@006□ | 0.5 | 6.0 | 6.0 |
| 2.2 | A | TC212A225@006□ | 0.5 | 6.0 | 6.0 |
| 3.3 | A | TC212A335@006□ | 0.5 | 6.0 | 6.0 |
| 4.7 | A | TC212A475@006□ | 0.5 | 6.0 | 4.0 |
| 6.8 | A | TC212A685@006□ | 0.5 | 6.0 | 3.5 |
| 6.8 | B | TC212B685@006□ | 0.5 | 6.0 | 3.0 |
| 10.0 | A | TC212A106@006□ | 0.6 | 6.0 | 2.0 |
| 10.0 | B | TC212B106@006□ | 0.6 | 6.0 | 1.0 |
| 15.0 | A | TC212A156@006□ | 0.9 | 6.0 | 2.0 |
| 15.0 | B | TC212B156@006□ | 0.9 | 6.0 | 0.7 |
| 22.0 | A | TC212A226@006□ | 1.4 | 6.0 | 2.5 |
| 22.0 | B | TC212B226@006□ | 1.4 | 6.0 | 0.8 |
| 33.0 | A | TC212A336@006□ | 2.1 | 8.0 | 1.5 |
| 33.0 | B | TC212B336@006□ | 2.1 | 6.0 | 0.8 |
| 33.0 | C | TC212C336@006□ | 2.1 | 6.0 | 0.3 |
| 47.0 | A | TC212A476@006□ | 2.9 | 8.0 | 2.5 |
| 47.0 | B | TC212B476@006□ | 2.9 | 6.0 | 0.5 |
| 47.0 | C | TC212C476@006□ | 2.9 | 6.0 | 0.3 |
| 68.0 | B | TC212B686@006□ | 4.3 | 10.0 | 0.65 |
| 68.0 | C | TC212C686@006□ | 4.3 | 6.0 | 0.3 |
| 68.0 | D | TC212D686@006□ | 4.3 | 6.0 | 0.2 |
| 100.0 | A | TC212A107@006□ | 6.3 | 20.0 | 2.0 |
| 100.0 | B | TC212B107@006□ | 6.3 | 10.0 | 1.5 |
| 100.0 | C | TC212C107@006□ | 6.3 | 8.0 | 0.3 |
| 100.0 | D | TC212D107@006□ | 6.3 | 8.0 | 0.2 |
| 150.0 | B | TC212B157@006□ | 9.5 | 15.0 | 0.6 |
| 150.0 | C | TC212C157@006□ | 9.5 | 8.0 | 0.3 |
| 150.0 | D | TC212D157@006□ | 9.5 | 8.0 | 0.2 |
| 220.0 | B | TC212B227@006□ | 39.9 | 18.0 | 0.7 |
| 220.0 | C | TC212C227@006□ | 13.9 | 8.0 | 0.3 |
| 220.0 | D | TC212D227@006□ | 13.9 | 8.0 | 0.15 |
| 220.0 | E | TC212E227@006□ | 13.9 | 8.0 | 0.15 |
| 330.0 | D | TC212D337@006□ | 20.8 | 8.0 | 0.15 |
| 330.0 | E | TC212E337@006□ | 20.8 | 8.0 | 0.15 |
| 470.0 | D | TC212D477@006□ | 29.6 | 12.0 | 0.15 |
| 470.0 | E | TC212E477@006□ | 29.6 | 10.0 | 0.12 |
| 10V, +85°C (6.3V @ +125°C) | | | | | |
| 1.0 | A | TC212A105@010□ | 0.5 | 4.0 | 8.0 |
| 1.5 | A | TC212A155@010□ | 0.5 | 6.0 | 6.0 |
| 2.2 | A | TC212A225@010□ | 0.5 | 6.0 | 6.0 |
| 3.3 | A | TC212A335@010□ | 0.5 | 6.0 | 4.0 |
| 4.7 | A | TC212A475@010□ | 0.5 | 6.0 | 3.0 |
| 4.7 | B | TC212B475@010□ | 0.5 | 6.0 | 1.5 |
| 6.8 | A | TC212A685@010□ | 0.7 | 6.0 | 3.0 |
| 6.8 | B | TC212B685@010□ | 0.7 | 6.0 | 1.2 |
| 10.0 | A | TC212A106@010□ | 1.0 | 6.0 | 1.8 |
| 10.0 | B | TC212B106@010□ | 1.0 | 6.0 | 0.8 |
| 10.0 | C | TC212C106@010□ | 1.0 | 6.0 | 0.6 |
| 15.0 | A | TC212A156@010□ | 1.5 | 6.0 | 4.0 |

SPECIFICATIONS

TC212 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. | Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 15.0 | B | TC212B156◎010□ | 1.5 | 6.0 | 0.7 | 33.0 | D | TC212D336◎016□ | 5.3 | 6.0 | 0.5 |
| 15.0 | C | TC212C156◎010□ | 1.5 | 6.0 | 0.5 | 47.0 | B | TC212B476◎016□ | 7.5 | 18.0 | 0.7 |
| 22.0 | A | TC212A226◎010□ | 2.2 | 8.0 | 2.5 | 47.0 | C | TC212C476◎016□ | 7.5 | 6.0 | 0.8 |
| 22.0 | B | TC212B226◎010□ | 2.2 | 6.0 | 1.0 | 47.0 | D | TC212D476◎016□ | 7.5 | 6.0 | 0.5 |
| 22.0 | C | TC212C226◎010□ | 2.2 | 6.0 | 0.4 | 68.0 | D | TC212D686◎016□ | 10.8 | 6.0 | 0.5 |
| 33.0 | A | TC212A336◎010□ | 3.3 | 15.0 | 4.0 | 100.0 | C | TC212C107◎016□ | 16.0 | 10.0 | 0.7 |
| 33.0 | B | TC212B336◎010□ | 3.3 | 6.0 | 1.0 | 100.0 | D | TC212D107◎016□ | 16.0 | 8.0 | 0.5 |
| 33.0 | C | TC212C336◎010□ | 3.3 | 6.0 | 0.4 | 150.0 | D | TC212D157◎016□ | 24.0 | 12.0 | 0.4 |
| 33.0 | D | TC212D336◎010□ | 3.3 | 6.0 | 0.25 | 150.0 | E | TC212E157◎016□ | 24.0 | 8.0 | 0.15 |
| 47.0 | A | TC212A476◎010□ | 4.7 | 15.0 | 1.5 | 220.0 | D | TC212D227◎016□ | 35.2 | 15.0 | 0.6 |
| 47.0 | B | TC212B476◎010□ | 4.7 | 6.0 | 0.65 | 220.0 | E | TC212E227◎016□ | 35.2 | 10.0 | 0.2 |
| 47.0 | C | TC212C476◎010□ | 4.7 | 6.0 | 0.3 | 330.0 | E | TC212E337◎016□ | 52.8 | 10.0 | 0.2 |
| 47.0 | D | TC212D476◎010□ | 4.7 | 6.0 | 0.22 | 20V, +85°C (13V @ +125°C) | | | | | |
| 68.0 | B | TC212B686◎010□ | 6.8 | 10.0 | 1.5 | 0.68 | A | TC212A684◎020□ | 0.5 | 4.0 | 10.0 |
| 68.0 | C | TC212C686◎010□ | 6.8 | 6.0 | 0.3 | 1.0 | A | TC212A105◎020□ | 0.5 | 4.0 | 8.0 |
| 68.0 | D | TC212D686◎010□ | 6.8 | 6.0 | 0.2 | 1.5 | A | TC212A155◎020□ | 0.5 | 6.0 | 4.5 |
| 100.0 | B | TC212B107◎010□ | 10.0 | 15.0 | 1.0 | 1.5 | B | TC212B155◎020□ | 0.5 | 6.0 | 1.5 |
| 100.0 | C | TC212C107◎010□ | 10.0 | 8.0 | 0.3 | 2.2 | A | TC212A225◎020□ | 0.5 | 6.0 | 4.0 |
| 100.0 | D | TC212D107◎010□ | 10.0 | 8.0 | 0.15 | 2.2 | B | TC212B225◎020□ | 0.5 | 6.0 | 3.0 |
| 150.0 | C | TC212C157◎010□ | 15.0 | 10.0 | 0.7 | 3.3 | A | TC212A335◎020□ | 0.7 | 6.0 | 6.0 |
| 150.0 | D | TC212D157◎010□ | 15.0 | 8.0 | 0.15 | 3.3 | B | TC212B335◎020□ | 0.7 | 6.0 | 2.5 |
| 150.0 | E | TC212E157◎010□ | 15.0 | 8.0 | 0.15 | 4.7 | A | TC212A475◎020□ | 0.9 | 6.0 | 3.5 |
| 220.0 | D | TC212D227◎010□ | 22.0 | 8.0 | 0.15 | 4.7 | B | TC212B475◎020□ | 0.9 | 6.0 | 2.5 |
| 220.0 | E | TC212E227◎010□ | 22.0 | 8.0 | 0.15 | 4.7 | C | TC212C475◎020□ | 0.9 | 6.0 | 1.2 |
| 330.0 | D | TC212D337◎010□ | 33.0 | 10.0 | 0.15 | 6.8 | A | TC212A685◎020□ | 1.4 | 8.0 | 3.0 |
| 330.0 | E | TC212E337◎010□ | 33.0 | 10.0 | 0.2 | 6.8 | B | TC212B685◎020□ | 1.4 | 6.0 | 2.5 |
| 470.0 | E | TC212E477◎010□ | 47.0 | 10.0 | 0.2 | 6.8 | C | TC212C685◎020□ | 1.4 | 6.0 | 1.2 |
| 16V, +85°C (10V @ +125°C) | | | | | | 6.8 | D | TC212D685◎020□ | 1.4 | 6.0 | 0.8 |
| 1.0 | A | TC212A105◎016□ | 0.5 | 4.0 | 8.0 | 10.0 | B | TC212B106◎020□ | 2.0 | 6.0 | 2.0 |
| 1.5 | A | TC212A155◎016□ | 0.5 | 6.0 | 6.0 | 10.0 | C | TC212C106◎020□ | 2.0 | 6.0 | 1.2 |
| 2.2 | A | TC212A225◎016□ | 0.5 | 6.0 | 4.0 | 10.0 | D | TC212D106◎020□ | 2.0 | 6.0 | 0.8 |
| 2.2 | B | TC212B225◎016□ | 0.5 | 6.0 | 3.0 | 15.0 | C | TC212C156◎020□ | 3.0 | 6.0 | 1.2 |
| 3.3 | A | TC212A335◎016□ | 0.5 | 6.0 | 5.0 | 15.0 | D | TC212D156◎020□ | 3.0 | 6.0 | 0.8 |
| 3.3 | B | TC212B335◎016□ | 0.5 | 6.0 | 2.5 | 22.0 | B | TC212B226◎020□ | 4.4 | 8.0 | 3.0 |
| 4.7 | A | TC212A475◎016□ | 0.8 | 6.0 | 5.0 | 22.0 | C | TC212C226◎020□ | 4.4 | 6.0 | 0.4 |
| 4.7 | B | TC212B475◎016□ | 0.8 | 6.0 | 2.5 | 22.0 | D | TC212D226◎020□ | 4.4 | 6.0 | 0.5 |
| 4.7 | C | TC212C475◎016□ | 0.8 | 6.0 | 1.5 | 33.0 | C | TC212C336◎020□ | 6.6 | 6.0 | 0.6 |
| 6.8 | A | TC212A685◎016□ | 1.1 | 6.0 | 5.0 | 33.0 | D | TC212D336◎020□ | 6.6 | 6.0 | 0.4 |
| 6.8 | B | TC212B685◎016□ | 1.1 | 6.0 | 2.5 | 47.0 | C | TC212C476◎020□ | 9.4 | 10.0 | 0.8 |
| 6.8 | C | TC212C685◎016□ | 1.1 | 6.0 | 1.0 | 47.0 | D | TC212D476◎020□ | 9.4 | 6.0 | 0.6 |
| 10.0 | A | TC212A106◎016□ | 1.6 | 8.0 | 3.0 | 47.0 | E | TC212E476◎020□ | 9.4 | 6.0 | 0.3 |
| 10.0 | B | TC212B106◎016□ | 1.6 | 6.0 | 0.8 | 68.0 | D | TC212D686◎020□ | 13.6 | 6.0 | 0.4 |
| 10.0 | C | TC212C106◎016□ | 1.6 | 6.0 | 1.5 | 68.0 | E | TC212E686◎020□ | 13.6 | 6.0 | 0.3 |
| 15.0 | B | TC212B156◎016□ | 2.4 | 6.0 | 2.0 | 100.0 | D | TC212D107◎020□ | 20.0 | 8.0 | 0.2 |
| 15.0 | C | TC212C156◎016□ | 2.4 | 6.0 | 1.2 | 100.0 | E | TC212E107◎020□ | 20.0 | 8.0 | 0.2 |
| 22.0 | A | TC212A226◎016□ | 3.5 | 15.0 | 2.0 | 150.0 | E | TC212E157◎020□ | 30.0 | 8.0 | 0.2 |
| 22.0 | B | TC212B226◎016□ | 3.5 | 8.0 | 1.5 | 25V, +85°C (16V @ +125°C) | | | | | |
| 22.0 | C | TC212C226◎016□ | 3.5 | 6.0 | 1.2 | 0.33 | A | TC212A334◎025□ | 0.5 | 4.0 | 12.0 |
| 22.0 | D | TC212D226◎016□ | 3.5 | 6.0 | 0.6 | 0.47 | A | TC212A474◎025□ | 0.5 | 4.0 | 10.0 |
| 33.0 | B | TC212B336◎016□ | 5.3 | 8.0 | 1.0 | 0.68 | A | TC212A684◎025□ | 0.5 | 4.0 | 6.0 |
| 33.0 | C | TC212C336◎016□ | 5.3 | 6.0 | 1.0 | 1.0 | A | TC212A105◎025□ | 0.5 | 4.0 | 6.0 |

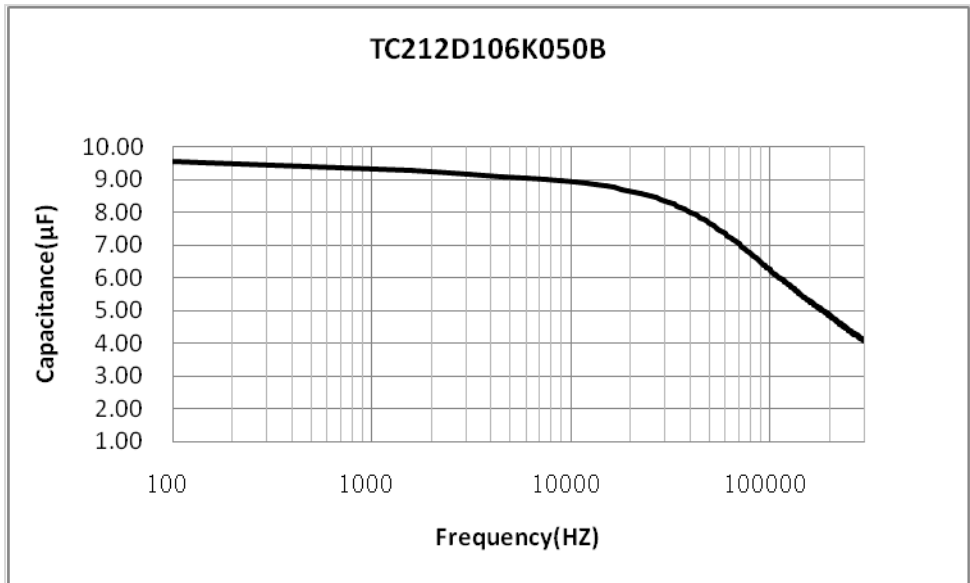
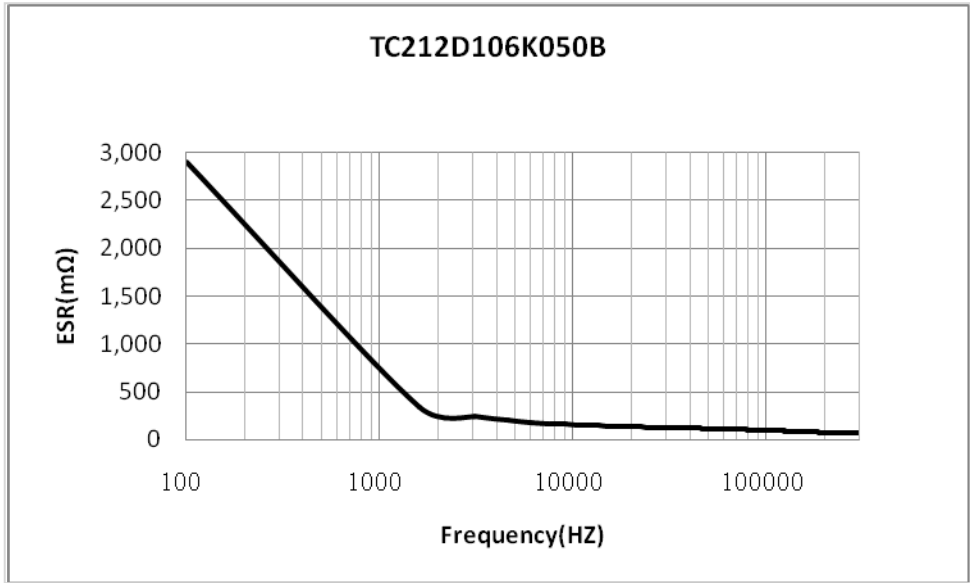
SPECIFICATIONS

TC212 TYPE

| Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. | Capacitance (μF) | Case | Part Number | DCL (μA) +25°C Max. | DF (%) +25°C 120Hz Max. | ESR(Ω) +25°C 100kHz Max. |
|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|---------------------------|------|----------------|---------------------|-------------------------|--------------------------|
| 1.0 | B | TC212B105◎025□ | 0.5 | 4.0 | 4.0 | 3.3 | C | TC212C335◎035□ | 1.2 | 6.0 | 2.0 |
| 1.5 | A | TC212A155◎025□ | 0.5 | 6.0 | 5.0 | 4.7 | B | TC212B475◎035□ | 1.6 | 6.0 | 2.0 |
| 1.5 | B | TC212B155◎025□ | 0.5 | 6.0 | 3.5 | 4.7 | C | TC212C475◎035□ | 1.6 | 6.0 | 2.0 |
| 2.2 | A | TC212A225◎025□ | 0.6 | 6.0 | 4.0 | 4.7 | D | TC212D475◎035□ | 1.6 | 6.0 | 1.0 |
| 2.2 | B | TC212B225◎025□ | 0.6 | 6.0 | 3.0 | 6.8 | C | TC212C685◎035□ | 2.4 | 6.0 | 1.2 |
| 2.2 | C | TC212C225◎025□ | 0.6 | 6.0 | 2.0 | 6.8 | D | TC212D685◎035□ | 2.4 | 6.0 | 0.8 |
| 3.3 | A | TC212A335◎025□ | 0.8 | 6.0 | 3.0 | 10.0 | C | TC212C106◎035□ | 3.5 | 6.0 | 1.5 |
| 3.3 | B | TC212B335◎025□ | 0.8 | 6.0 | 2.5 | 10.0 | D | TC212D106◎035□ | 3.5 | 6.0 | 0.6 |
| 3.3 | C | TC212C335◎025□ | 0.8 | 6.0 | 2.0 | 10.0 | E | TC212E106◎035□ | 3.5 | 6.0 | 0.6 |
| 4.7 | A | TC212A475◎025□ | 1.2 | 8.0 | 3.0 | 15.0 | D | TC212D156◎035□ | 5.25 | 6.0 | 0.8 |
| 4.7 | B | TC212B475◎025□ | 1.2 | 6.0 | 1.0 | 15.0 | E | TC212E156◎035□ | 5.3 | 6.0 | 0.6 |
| 4.7 | C | TC212C475◎025□ | 1.2 | 6.0 | 0.6 | 22.0 | D | TC212D226◎035□ | 7.7 | 6.0 | 0.6 |
| 6.8 | B | TC212B685◎025□ | 1.7 | 6.0 | 1.2 | 22.0 | E | TC212E226◎035□ | 7.7 | 6.0 | 0.3 |
| 6.8 | C | TC212C685◎025□ | 1.7 | 6.0 | 0.8 | 33.0 | E | TC212E336◎035□ | 11.0 | 6.0 | 0.5 |
| 6.8 | D | TC212D685◎025□ | 1.7 | 6.0 | 0.5 | 47.0 | E | TC212E476◎035□ | 16.5 | 8.0 | 0.5 |
| 10.0 | B | TC212B106◎025□ | 2.5 | 6.0 | 2.0 | 50V, +85°C (32V @ +125°C) | | | | | |
| 10.0 | C | TC212C106◎025□ | 2.5 | 6.0 | 1.4 | 0.15 | B | TC212B154◎050□ | 0.5 | 4.0 | 12.0 |
| 10.0 | D | TC212D106◎025□ | 2.5 | 6.0 | 0.8 | 0.22 | A | TC212A224◎050□ | 0.5 | 4.0 | 15.0 |
| 15.0 | B | TC212B156◎025□ | 3.8 | 8.0 | 3.0 | 0.22 | B | TC212B224◎050□ | 0.5 | 4.0 | 12.0 |
| 15.0 | C | TC212C156◎025□ | 3.8 | 6.0 | 1.2 | 0.33 | A | TC212A334◎050□ | 0.5 | 4.0 | 12.0 |
| 15.0 | D | TC212D156◎025□ | 3.8 | 6.0 | 0.8 | 0.33 | B | TC212B334◎050□ | 0.5 | 4.0 | 8.0 |
| 22.0 | C | TC212C226◎025□ | 5.5 | 6.0 | 1.0 | 0.47 | A | TC212A474◎050□ | 0.5 | 4.0 | 8.0 |
| 22.0 | D | TC212D226◎025□ | 5.5 | 6.0 | 0.6 | 0.47 | B | TC212B474◎050□ | 0.5 | 4.0 | 6.0 |
| 33.0 | D | TC212D336◎025□ | 8.3 | 6.0 | 0.6 | 0.47 | C | TC212C474◎050□ | 0.5 | 4.0 | 5.0 |
| 33.0 | E | TC212E336◎025□ | 8.3 | 6.0 | 0.5 | 0.68 | A | TC212A684◎050□ | 0.5 | 4.0 | 8.0 |
| 47.0 | D | TC212D476◎025□ | 11.7 | 6.0 | 0.4 | 0.68 | B | TC212B684◎050□ | 0.5 | 4.0 | 5.0 |
| 47.0 | E | TC212E476◎025□ | 11.7 | 6.0 | 0.4 | 0.68 | C | TC212C684◎050□ | 0.5 | 4.0 | 4.0 |
| 68.0 | E | TC212E686◎025□ | 17.0 | 6.0 | 0.3 | 1.0 | B | TC212B105◎050□ | 0.5 | 6.0 | 4.0 |
| 100.0 | E | TC212E107◎025□ | 25.0 | 10.0 | 0.7 | 1.0 | C | TC212C105◎050□ | 0.5 | 4.0 | 3.5 |
| 35V, +85°C (20V @ +125°C) | | | | | | 1.5 | B | TC212B155◎050□ | 0.8 | 6.0 | 3.5 |
| 0.33 | A | TC212A334◎035□ | 0.5 | 4.0 | 12.0 | 1.5 | C | TC212C155◎050□ | 0.8 | 6.0 | 2.5 |
| 0.47 | A | TC212A474◎035□ | 0.5 | 4.0 | 10.0 | 2.2 | B | TC212B225◎050□ | 1.1 | 6.0 | 1.5 |
| 0.47 | B | TC212B474◎035□ | 0.5 | 4.0 | 6.0 | 2.2 | C | TC212C225◎050□ | 1.1 | 6.0 | 3.0 |
| 0.68 | A | TC212A684◎035□ | 0.5 | 4.0 | 6.0 | 2.2 | D | TC212D225◎050□ | 1.1 | 6.0 | 2.0 |
| 0.68 | B | TC212B684◎035□ | 0.5 | 4.0 | 6.0 | 3.3 | B | TC212B335◎050□ | 1.7 | 6.0 | 3.0 |
| 1.0 | A | TC212A105◎035□ | 0.5 | 4.0 | 8.0 | 3.3 | C | TC212C335◎050□ | 1.7 | 6.0 | 2.0 |
| 1.0 | B | TC212B105◎035□ | 0.5 | 4.0 | 2.0 | 3.3 | D | TC212D335◎050□ | 1.7 | 6.0 | 1.0 |
| 1.5 | B | TC212B155◎035□ | 0.5 | 6.0 | 4.0 | 4.7 | D | TC212D475◎050□ | 2.4 | 6.0 | 0.8 |
| 1.5 | C | TC212C155◎035□ | 0.5 | 6.0 | 3.0 | 6.8 | D | TC212D685◎050□ | 3.4 | 6.0 | 0.7 |
| 2.2 | A | TC212A225◎035□ | 0.8 | 6.0 | 3.0 | 10.0 | D | TC212D106◎050□ | 5.0 | 6.0 | 0.7 |
| 2.2 | B | TC212B225◎035□ | 0.8 | 6.0 | 3.0 | 10.0 | E | TC212E106◎050□ | 5.0 | 6.0 | 0.4 |
| 2.2 | C | TC212C225◎035□ | 0.8 | 6.0 | 2.5 | 15.0 | E | TC212E156◎050□ | 7.5 | 6.0 | 0.4 |
| 3.3 | B | TC212B335◎035□ | 1.2 | 6.0 | 3.0 | | | | | | |

※◎:Capacitance tolerance code (K=±10%, M=±20%); □: Internal code (B=Black molded case, Laser marking; Y=Yellow molded case, Laser marking).

TYPICAL FREQUENCY CHARACTERISTICS



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[293D475X0035B2DE3](#) [F951C106MSAAQ2](#) [293D155X9020A2DE3](#) [CWR29FC106KDBC](#) [CWR09NC224KB](#) [CWR09NC684KM](#)
[CWR29HH155KCBB](#) [CWR29HC106KCDC](#) [CWR29FC336KDGC](#) [CWR09NC225KDB](#) [CWR29FC475KDDC](#)