

# vPolyTan™ Polymer Surface Mount Chip Capacitors, Molded Case, High Performance Type



## FEATURES

- Ultra low ESR
- Molded case available in 8 case codes
- Terminations:  
cases J, P: 100 % tin  
case A: 100 % tin or Ni / Pd / Au  
cases T, B, Z, V, D: Ni / Pd / Au
- Compatible with “high volume” automatic pick and place equipment
- Moisture sensitivity level 3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## PERFORMANCE / ELECTRICAL CHARACTERISTICS

**Operating Temperature:** -55 °C to +105 °C

**Capacitance Range:** 3.3 µF to 1000 µF

**Capacitance Tolerance:** ± 20 %

**Voltage Rating:** 2.5 V<sub>DC</sub> to 63 V<sub>DC</sub>

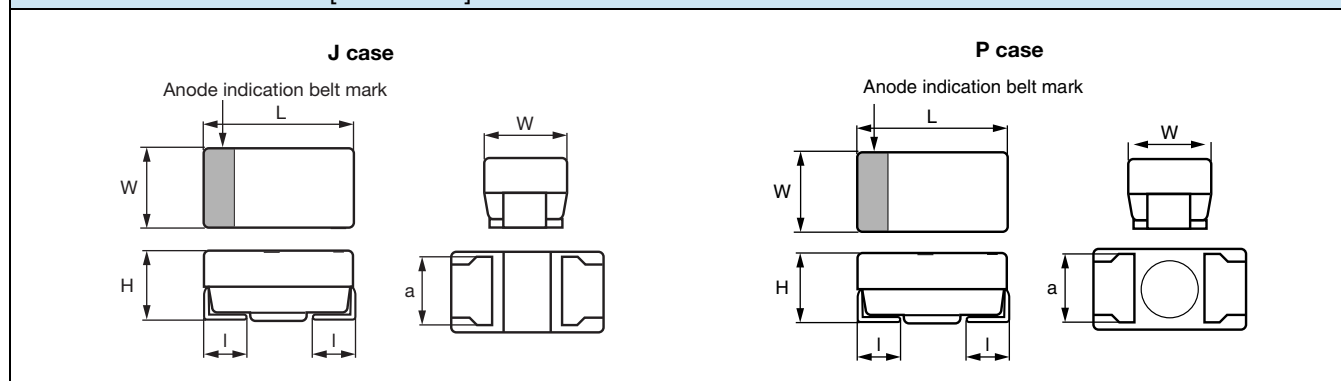
## APPLICATIONS

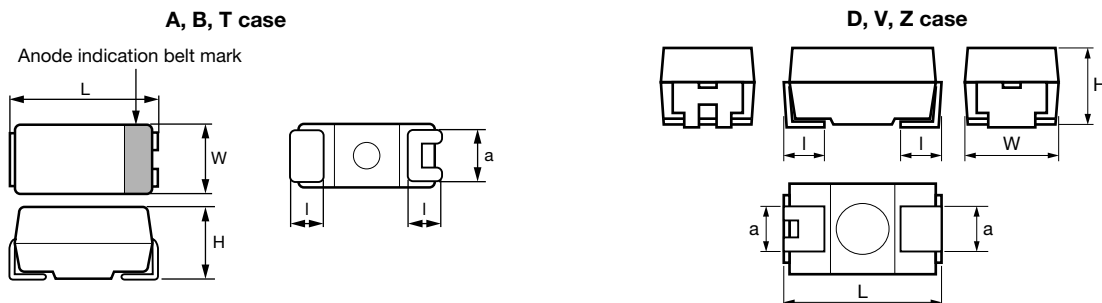
- Decoupling, smoothing, filtering
- Bulk energy storage in wireless cards
- Infrastructure equipment
- Storage and networking
- Computer motherboards
- Smartphones and tablets

## ORDERING INFORMATION

| T55<br>TYPE | B<br>CASE<br>CODE                               | 156<br>CAPACITANCE                                                                                                                               | M<br>CAPACITANCE<br>TOLERANCE | 6R3<br>DC VOLTAGE<br>RATING                                                                                                                               | C<br>TERMINATION /<br>PACKAGING                      | 0500<br>ESR                     |
|-------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------|
|             | See<br>Ratings<br>and<br>Case<br>Codes<br>table | This is expressed in<br>picofarads. The first<br>two digits are the<br>significant figures.<br>The third is the<br>number of zeros<br>to follow. | M = ± 20 %                    | 2R5 = 2.5 V<br>004 = 4 V<br>6R3 = 6.3 V<br>010 = 10 V<br>12R = 12.5 V<br>016 = 16 V<br>020 = 20 V<br>025 = 25 V<br>035 = 35 V<br>050 = 50 V<br>063 = 63 V | C = lead (Pb)-free<br>solderable coating,<br>7" reel | Maximum<br>100 kHz ESR<br>in mΩ |

## DIMENSIONS in inches [millimeters]



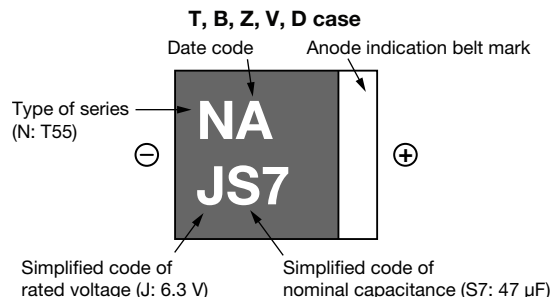
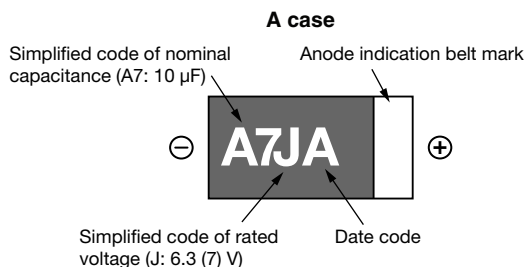
**DIMENSIONS** in inches [millimeters]


| CASE CODE | EIA SIZE | L                            | W                             | H                            | I                             | a                            |
|-----------|----------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
| J         | 1608-09  | 0.063 ± 0.004<br>[1.6 ± 0.1] | 0.031 ± 0.004<br>[0.8 ± 0.1]  | 0.031 ± 0.004<br>[0.8 ± 0.1] | 0.012 ± 0.006<br>[0.3 ± 0.15] | 0.024 ± 0.004<br>[0.6 ± 0.1] |
| P         | 2012-12  | 0.080 ± 0.008<br>[2.0 ± 0.2] | 0.049 ± 0.008<br>[1.25 ± 0.2] | 0.047 max.<br>[1.2 max.]     | 0.020 ± 0.008<br>[0.5 ± 0.2]  | 0.035 ± 0.004<br>[0.9 ± 0.1] |
| A         | 3216-18  | 0.126 ± 0.008<br>[3.2 ± 0.2] | 0.063 ± 0.008<br>[1.6 ± 0.2]  | 0.063 ± 0.008<br>[1.6 ± 0.2] | 0.028 ± 0.012<br>[0.7 ± 0.3]  | 0.047 ± 0.008<br>[1.2 ± 0.2] |
| T         | 3528-12  | 0.138 ± 0.008<br>[3.5 ± 0.2] | 0.110 ± 0.008<br>[2.8 ± 0.2]  | 0.047 max.<br>[1.2 max.]     | 0.030 ± 0.012<br>[0.8 ± 0.3]  | 0.087 ± 0.008<br>[2.2 ± 0.2] |
| B         | 3528-21  | 0.138 ± 0.008<br>[3.5 ± 0.2] | 0.110 ± 0.008<br>[2.8 ± 0.2]  | 0.075 ± 0.008<br>[1.9 ± 0.2] | 0.030 ± 0.012<br>[0.8 ± 0.3]  | 0.087 ± 0.008<br>[2.2 ± 0.2] |
| Z         | 7343-19  | 0.287 ± 0.008<br>[7.3 ± 0.2] | 0.169 ± 0.012<br>[4.3 ± 0.3]  | 0.071 ± 0.004<br>[1.8 ± 0.1] | 0.051 ± 0.012<br>[1.3 ± 0.3]  | 0.094 ± 0.008<br>[2.4 ± 0.2] |
| V         | 7343-20  | 0.287 ± 0.008<br>[7.3 ± 0.2] | 0.169 ± 0.012<br>[4.3 ± 0.3]  | 0.075 ± 0.004<br>[1.9 ± 0.1] | 0.051 ± 0.012<br>[1.3 ± 0.3]  | 0.094 ± 0.008<br>[2.4 ± 0.2] |
| D         | 7343-30  | 0.287 ± 0.008<br>[7.3 ± 0.2] | 0.169 ± 0.012<br>[4.3 ± 0.3]  | 0.110 ± 0.008<br>[2.8 ± 0.2] | 0.051 ± 0.012<br>[1.3 ± 0.3]  | 0.094 ± 0.008<br>[2.4 ± 0.2] |

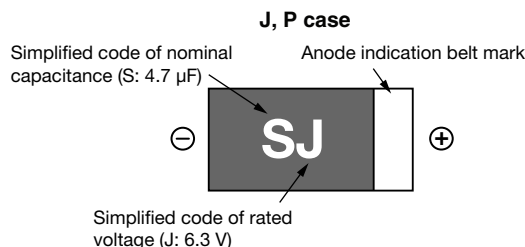
**RATINGS AND CASE CODES**

| μF   | 2.5 V                           | 4.0 V                           | 6.3 V                                   | 7.0 V | 10 V                     | 12.5 V | 16 V                     | 20 V  | 25 V                     | 35 V                     | 50 V | 63 V |
|------|---------------------------------|---------------------------------|-----------------------------------------|-------|--------------------------|--------|--------------------------|-------|--------------------------|--------------------------|------|------|
| 3.3  |                                 |                                 | J / P                                   |       | J / P                    |        |                          |       |                          |                          |      |      |
| 4.7  |                                 |                                 | J / P / A                               |       | P / A                    |        |                          |       |                          |                          |      | D    |
| 6.8  |                                 |                                 | P / A                                   |       | A                        |        | B                        |       | B                        | B                        |      |      |
| 10   |                                 | J / P / A                       | P / A                                   |       | A                        |        | B                        |       | B                        | B                        | D    |      |
| 15   |                                 | P / A                           | A                                       |       | A                        | T      | B                        | B     | B                        | V                        |      |      |
| 22   | A                               | A / B                           | A / T / B                               |       | A / T / B                |        | B                        |       |                          | Z <sup>(1)</sup> / V / D |      |      |
| 33   | A                               | A / B                           | A / T / B                               |       | A / T / B                |        | V                        |       | Z <sup>(1)</sup> / V / D | D                        |      |      |
| 47   | A                               | A / T / B                       | A / T / B                               |       | B                        |        | Z / V / D                | Z / V |                          |                          |      |      |
| 68   | A / B                           | A / T / B                       | T / B                                   |       | V                        |        |                          |       |                          |                          |      |      |
| 100  | A / T / B                       | A / T / B                       | A / T / B /<br>Z <sup>(1)</sup> / V / D | A     | Z <sup>(1)</sup> / V / D |        | Z <sup>(1)</sup> / V / D | D     | D                        |                          |      |      |
| 150  | B                               | B / Z <sup>(1)</sup> / V        | B / Z <sup>(1)</sup> / V                |       | Z <sup>(1)</sup> / V / D |        | D                        |       |                          |                          |      |      |
| 220  | B / V                           | B / Z <sup>(1)</sup> /<br>V / D | B / Z <sup>(1)</sup> /<br>V / D         |       | Z <sup>(1)</sup> / V / D |        |                          |       |                          |                          |      |      |
| 330  | B / Z <sup>(1)</sup> / V        | Z <sup>(1)</sup> / V / D        | Z <sup>(1)</sup> / V / D                |       | D                        |        |                          |       |                          |                          |      |      |
| 470  | B / Z <sup>(1)</sup> /<br>V / D | D                               | Z <sup>(1)</sup> / V / D                |       |                          |        |                          |       |                          |                          |      |      |
| 680  |                                 | D                               |                                         |       |                          |        |                          |       |                          |                          |      |      |
| 1000 | D <sup>(1)</sup>                |                                 |                                         |       |                          |        |                          |       |                          |                          |      |      |

**Note**
<sup>(1)</sup> Rating in development, contact factory for availability

**MARKING**


| VOLTAGE CODE |      | CAPACITANCE CODE |      |
|--------------|------|------------------|------|
| V            | CODE | CAP, µF          | CODE |
| 2.5          | e    | 3.3              | N6   |
| 4            | G    | 4.7              | S6   |
| 6.3 (7)      | J    | 6.8              | W6   |
| 10           | A    | 10               | A7   |
| 12.5         | B    | 15               | E7   |
| 16           | C    | 22               | J7   |
| 20           | D    | 33               | N7   |
| 25           | E    | 47               | S7   |
| 35           | V    | 68               | W7   |
| 50           | H    | 100              | A8   |
| 63           | J    | 150              | E8   |
|              |      | 220              | J8   |
|              |      | 330              | N8   |
|              |      | 470              | S8   |
|              |      | 680              | W8   |



| RATED VOLTAGE | CAPACITANCE | MARKING |
|---------------|-------------|---------|
| 4             | 10          | AG      |
| 4             | 15          | EG      |
| 6.3           | 3.3         | NJ      |
| 6.3           | 4.7         | SJ      |
| 6.3           | 6.8         | WJ      |
| 6.3           | 10          | AJ      |
| 10            | 3.3         | NA      |
| 10            | 4.7         | SA      |

**DATE CODE**

| YEAR | MONTH |   |   |   |   |   |   |   |   |    |    |    |
|------|-------|---|---|---|---|---|---|---|---|----|----|----|
|      | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2013 | A     | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2014 | N     | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2015 | a     | b | c | d | e | f | g | h | j | k  | l  | m  |
| 2016 | n     | p | q | r | s | t | u | v | w | x  | y  | z  |
| 2017 | A     | B | C | D | E | F | G | H | J | K  | L  | M  |
| 2018 | N     | P | Q | R | S | T | U | V | W | X  | Y  | Z  |
| 2019 | a     | b | c | d | e | f | g | h | j | k  | l  | m  |
| 2020 | n     | p | q | r | s | t | u | v | w | x  | y  | z  |

**Note**

- Marking code repeats every four years in alphabetical order (letter of I, i, O, and o are excluded)



| STANDARD RATINGS               |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|--------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)      | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 2.5 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 22                             | A                | T55A226M2R5C0200 | 5.5                                | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 22                             | A                | T55A226M2R5C0180 | 5.5                                | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 33                             | A                | T55A336M2R5C0200 | 8.2                                | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 33                             | A                | T55A336M2R5C0180 | 8.2                                | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 47                             | A                | T55A476M2R5C0200 | 11.7                               | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 47                             | A                | T55A476M2R5C0180 | 11.7                               | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 68                             | A                | T55A686M2R5C0250 | 17.0                               | 10                                   | 250                                                | 0.67                                                       | 1000                                     |
| 68                             | A                | T55A686M2R5C0200 | 17.0                               | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 68                             | B                | T55B686M2R5C0070 | 17.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                            | A                | T55A107M2R5C0200 | 25.0                               | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 100                            | A                | T55A107M2R5C0100 | 25.0                               | 10                                   | 100                                                | 1.07                                                       | 1000                                     |
| 100                            | T                | T55T107M2R5C0070 | 25.0                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 100                            | B                | T55B107M2R5C0070 | 25.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                            | B                | T55B107M2R5C0055 | 25.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 150                            | B                | T55B157M2R5C0070 | 37.5                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 150                            | B                | T55B157M2R5C0055 | 37.5                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0070 | 55.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0055 | 55.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0045 | 55.0                               | 8                                    | 45                                                 | 1.69                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0035 | 55.0                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0030 | 55.0                               | 8                                    | 30                                                 | 2.08                                                       | 1000                                     |
| 220                            | B                | T55B227M2R5C0025 | 55.0                               | 8                                    | 25                                                 | 2.28                                                       | 1000                                     |
| 220                            | V                | T55V227M2R5C0025 | 55.0                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                            | V                | T55V227M2R5C0018 | 55.0                               | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 220                            | V                | T55V227M2R5C0015 | 55.0                               | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 330                            | B                | T55B337M2R5C0070 | 82.5                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 330                            | B                | T55B337M2R5C0045 | 82.5                               | 8                                    | 45                                                 | 1.70                                                       | 1000                                     |
| 330                            | B                | T55B337M2R5C0035 | 82.5                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 330                            | B                | T55B337M2R5C0025 | 82.5                               | 8                                    | 25                                                 | 2.28                                                       | 1000                                     |
| 330                            | Z <sup>(1)</sup> | T55Z337M2R5C0025 | 82.5                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M2R5C0040 | 82.5                               | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 330                            | V                | T55V337M2R5C0025 | 82.5                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M2R5C0018 | 82.5                               | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 330                            | V                | T55V337M2R5C0015 | 82.5                               | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 470                            | B                | T55B477M2R5C0025 | 117.5                              | 8                                    | 25                                                 | 2.28                                                       | 1000                                     |
| 470                            | Z <sup>(1)</sup> | T55Z477M2R5C0025 | 117.5                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 470                            | V                | T55V477M2R5C0012 | 117.5                              | 10                                   | 12                                                 | 3.94                                                       | 1000                                     |
| 470                            | D                | T55D477M2R5C0050 | 117.5                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 470                            | D                | T55D477M2R5C0040 | 117.5                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 470                            | D                | T55D477M2R5C0025 | 117.5                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 470                            | D                | T55D477M2R5C0015 | 117.5                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 470                            | D                | T55D477M2R5C0012 | 117.5                              | 10                                   | 12                                                 | 4.33                                                       | 1000                                     |
| 1000                           | D <sup>(1)</sup> | T55D108M2R5C0006 | 250.0                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |
| 4 V <sub>DC</sub> AT +105 °C   |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 10                             | J                | T55J106M004C0500 | 10.0                               | 10                                   | 500                                                | 0.32                                                       | 1000                                     |
| 10                             | P                | T55P106M004C0500 | 5.0                                | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 10                             | P                | T55P106M004C0300 | 5.0                                | 10                                   | 300                                                | 0.46                                                       | 1000                                     |
| 10                             | P                | T55P106M004C0200 | 5.0                                | 10                                   | 200                                                | 0.56                                                       | 1000                                     |
| 10                             | A                | T55A106M004C0500 | 4.0                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 10                             | A                | T55A106M004C0200 | 4.0                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |

## Notes

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au

<sup>(1)</sup> Rating in development, contact factory for availability



| STANDARD RATINGS             |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)    | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 4 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 15                           | P                | T55P156M004C0500 | 10.0                               | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 15                           | P                | T55P156M004C0200 | 10.0                               | 10                                   | 200                                                | 0.56                                                       | 1000                                     |
| 15                           | A                | T55A156M004C0500 | 6.0                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 15                           | A                | T55A156M004C0300 | 6.0                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 15                           | A                | T55A156M004C0200 | 6.0                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                           | A                | T55A226M004C0500 | 8.8                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 22                           | A                | T55A226M004C0300 | 8.8                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 22                           | A                | T55A226M004C0200 | 8.8                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                           | B                | T55B226M004C0150 | 8.8                                | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 22                           | B                | T55B226M004C0200 | 8.8                                | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 33                           | A                | T55A336M004C0500 | 13.2                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 33                           | A                | T55A336M004C0300 | 13.2                               | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 33                           | A                | T55A336M004C0200 | 13.2                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 33                           | B                | T55B336M004C0200 | 13.2                               | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 47                           | A                | T55A476M004C0500 | 18.8                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 47                           | A                | T55A476M004C0200 | 18.8                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 47                           | A                | T55A476M004C0180 | 18.8                               | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 47                           | T                | T55T476M004C0200 | 18.8                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 47                           | T                | T55T476M004C0080 | 18.8                               | 10                                   | 80                                                 | 1.15                                                       | 1000                                     |
| 47                           | T                | T55T476M004C0070 | 18.8                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 47                           | B                | T55B476M004C0150 | 18.8                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 47                           | B                | T55B476M004C0070 | 18.8                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 68                           | A                | T55A686M004C0500 | 27.2                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 68                           | A                | T55A686M004C0250 | 27.2                               | 10                                   | 250                                                | 0.67                                                       | 1000                                     |
| 68                           | A                | T55A686M004C0200 | 27.2                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 68                           | T                | T55T686M004C0200 | 27.2                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 68                           | T                | T55T686M004C0180 | 27.2                               | 10                                   | 180                                                | 0.76                                                       | 1000                                     |
| 68                           | T                | T55T686M004C0080 | 27.2                               | 10                                   | 80                                                 | 1.15                                                       | 1000                                     |
| 68                           | T                | T55T686M004C0070 | 27.2                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 68                           | B                | T55B686M004C0150 | 27.2                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 68                           | B                | T55B686M004C0070 | 27.2                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                          | A                | T55A107M004C0200 | 40.0                               | 10                                   | 200                                                | 0.75                                                       | 1000                                     |
| 100                          | A                | T55A107M004C0100 | 40.0                               | 10                                   | 100                                                | 1.07                                                       | 1000                                     |
| 100                          | T                | T55T107M004C0150 | 40.0                               | 10                                   | 150                                                | 0.84                                                       | 1000                                     |
| 100                          | T                | T55T107M004C0070 | 40.0                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 100                          | B                | T55B107M004C0070 | 40.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                          | B                | T55B107M004C0055 | 40.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 100                          | B                | T55B107M004C0045 | 40.0                               | 8                                    | 45                                                 | 1.70                                                       | 1000                                     |
| 100                          | B                | T55B107M004C0040 | 40.0                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 100                          | B                | T55B107M004C0035 | 40.0                               | 8                                    | 35                                                 | 1.92                                                       | 1000                                     |
| 150                          | B                | T55B157M004C0070 | 60.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 150                          | B                | T55B157M004C0055 | 60.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 150                          | B                | T55B157M004C0045 | 60.0                               | 8                                    | 45                                                 | 1.69                                                       | 1000                                     |
| 150                          | B                | T55B157M004C0040 | 60.0                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 150                          | B                | T55B157M004C0035 | 60.0                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 150                          | Z <sup>(1)</sup> | T55Z157M004C0025 | 60.0                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                          | V                | T55V157M004C0045 | 60.0                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 150                          | V                | T55V157M004C0025 | 60.0                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                          | V                | T55V157M004C0015 | 60.0                               | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |

## Notes

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au

<sup>(1)</sup> Rating in development, contact factory for availability



| STANDARD RATINGS               |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|--------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)      | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 4 V <sub>DC</sub> AT +105 °C   |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 220                            | B                | T55B227M004C0070 | 88.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 220                            | B                | T55B227M004C0060 | 88.0                               | 8                                    | 60                                                 | 1.47                                                       | 1000                                     |
| 220                            | B                | T55B227M004C0055 | 88.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 220                            | B                | T55B227M004C0045 | 88.0                               | 8                                    | 45                                                 | 1.70                                                       | 1000                                     |
| 220                            | B                | T55B227M004C0035 | 88.0                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 220                            | Z <sup>(1)</sup> | T55Z227M004C0025 | 88.0                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0055 | 88.0                               | 10                                   | 55                                                 | 1.84                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0045 | 88.0                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0040 | 88.0                               | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0035 | 88.0                               | 10                                   | 35                                                 | 2.31                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0025 | 88.0                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0018 | 88.0                               | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 220                            | V                | T55V227M004C0015 | 88.0                               | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 220                            | D                | T55D227M004C0055 | 88.0                               | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 220                            | D                | T55D227M004C0040 | 88.0                               | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 220                            | D                | T55D227M004C0025 | 88.0                               | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 330                            | Z <sup>(1)</sup> | T55Z337M004C0025 | 132.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0050 | 132.0                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0045 | 132.0                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0040 | 132.0                              | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0025 | 132.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0018 | 132.0                              | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 330                            | V                | T55V337M004C0015 | 132.0                              | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 330                            | D                | T55D337M004C0050 | 132.0                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 330                            | D                | T55D337M004C0040 | 132.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 330                            | D                | T55D337M004C0025 | 132.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 330                            | D                | T55D337M004C0015 | 132.0                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0055 | 188.0                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0050 | 188.0                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0040 | 188.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0025 | 188.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0018 | 188.0                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0015 | 188.0                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 470                            | D                | T55D477M004C0012 | 188.0                              | 10                                   | 12                                                 | 4.33                                                       | 1000                                     |
| 680                            | D                | T55D687M004C0025 | 272.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 680                            | D                | T55D687M004C0018 | 272.0                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 680                            | D                | T55D687M004C0015 | 272.0                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 680                            | D <sup>(1)</sup> | T55D687M004C0006 | 272.0                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |
| 6.3 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 3.3                            | J                | T55J335M6R3C0500 | 10.0                               | 10                                   | 500                                                | 0.32                                                       | 1000                                     |
| 3.3                            | P                | T55P335M6R3C0500 | 5.0                                | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 4.7                            | J                | T55J475M6R3C0500 | 10.0                               | 10                                   | 500                                                | 0.32                                                       | 1000                                     |
| 4.7                            | P                | T55P475M6R3C0500 | 5.0                                | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 4.7                            | A                | T55A475M6R3C0500 | 3.0                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 6.8                            | P                | T55P685M6R3C0500 | 5.0                                | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 6.8                            | A                | T55A685M6R3C0500 | 4.2                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 10                             | P                | T55P106M6R3C0500 | 10.0                               | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 10                             | P                | T55P106M6R3C0200 | 10.0                               | 10                                   | 200                                                | 0.56                                                       | 1000                                     |
| 10                             | A                | T55A106M6R3C0500 | 6.3                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 10                             | A                | T55A106M6R3C0300 | 6.3                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 10                             | A                | T55A106M6R3C0200 | 6.3                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |

## Notes

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au
- <sup>(1)</sup> Rating in development, contact factory for availability



| STANDARD RATINGS               |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|--------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)      | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 6.3 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 15                             | A                | T55A156M6R3C0500 | 9.4                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 15                             | A                | T55A156M6R3C0300 | 9.4                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 15                             | A                | T55A156M6R3C0200 | 9.4                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                             | A                | T55A226M6R3C0500 | 13.8                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 22                             | A                | T55A226M6R3C0300 | 13.8                               | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 22                             | A                | T55A226M6R3C0200 | 13.8                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                             | T                | T55T226M6R3C0150 | 13.8                               | 10                                   | 150                                                | 0.84                                                       | 1000                                     |
| 22                             | T                | T55T226M6R3C0070 | 13.8                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 22                             | B                | T55B226M6R3C0150 | 13.8                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 33                             | A                | T55A336M6R3C0500 | 20.7                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 33                             | A                | T55A336M6R3C0200 | 20.7                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 33                             | A                | T55A336M6R3C0180 | 20.7                               | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 33                             | T                | T55T336M6R3C0200 | 20.7                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 33                             | T                | T55T336M6R3C0150 | 20.7                               | 10                                   | 150                                                | 0.84                                                       | 1000                                     |
| 33                             | T                | T55T336M6R3C0070 | 20.7                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 33                             | B                | T55B336M6R3C0200 | 20.7                               | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 33                             | B                | T55B336M6R3C0150 | 20.7                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 33                             | B                | T55B336M6R3C0080 | 20.7                               | 8                                    | 80                                                 | 1.27                                                       | 1000                                     |
| 33                             | B                | T55B336M6R3C0070 | 20.7                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 33                             | B                | T55B336M6R3C0040 | 20.7                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0500 | 29.6                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0200 | 29.6                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0180 | 29.6                               | 10                                   | 180                                                | 0.79                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0150 | 29.6                               | 10                                   | 150                                                | 0.88                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0100 | 29.6                               | 10                                   | 100                                                | 1.07                                                       | 1000                                     |
| 47                             | A                | T55A476M6R3C0070 | 29.6                               | 10                                   | 70                                                 | 1.28                                                       | 1000                                     |
| 47                             | T                | T55T476M6R3C0200 | 29.6                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 47                             | T                | T55T476M6R3C0120 | 29.6                               | 10                                   | 120                                                | 0.93                                                       | 1000                                     |
| 47                             | T                | T55T476M6R3C0080 | 29.6                               | 10                                   | 80                                                 | 1.15                                                       | 1000                                     |
| 47                             | T                | T55T476M6R3C0070 | 29.6                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 47                             | B                | T55B476M6R3C0150 | 29.6                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 47                             | B                | T55B476M6R3C0070 | 29.6                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 47                             | B                | T55B476M6R3C0060 | 29.6                               | 8                                    | 60                                                 | 1.47                                                       | 1000                                     |
| 47                             | B                | T55B476M6R3C0040 | 29.6                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 68                             | T                | T55T686M6R3C0200 | 42.8                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 68                             | T                | T55T686M6R3C0150 | 42.8                               | 10                                   | 150                                                | 0.83                                                       | 1000                                     |
| 68                             | T                | T55T686M6R3C0070 | 42.8                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 68                             | B                | T55B686M6R3C0150 | 42.8                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 68                             | B                | T55B686M6R3C0070 | 42.8                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                            | A                | T55A107M6R3C0200 | 63.0                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 100                            | A                | T55A107M6R3C0150 | 63.0                               | 10                                   | 150                                                | 0.88                                                       | 1000                                     |
| 100                            | A                | T55A107M6R3C0100 | 63.0                               | 10                                   | 100                                                | 1.07                                                       | 1000                                     |
| 100                            | A                | T55A107M6R3C0070 | 63.0                               | 10                                   | 70                                                 | 1.28                                                       | 1000                                     |
| 100                            | A                | T55A107M6R3C0045 | 63.0                               | 10                                   | 45                                                 | 1.59                                                       | 1000                                     |
| 100                            | T                | T55T107M6R3C0200 | 63.0                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 100                            | T                | T55T107M6R3C0070 | 63.0                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0100 | 63.0                               | 8                                    | 100                                                | 1.14                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0070 | 63.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0055 | 63.0                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0045 | 63.0                               | 8                                    | 45                                                 | 1.70                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0040 | 63.0                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 100                            | B                | T55B107M6R3C0035 | 63.0                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 100                            | Z <sup>(1)</sup> | T55Z107M6R3C0045 | 63.0                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 100                            | V                | T55V107M6R3C0045 | 63.0                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 100                            | D                | T55D107M6R3C0015 | 63.0                               | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |

## Notes

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au

<sup>(1)</sup> Rating in development, contact factory for availability



| STANDARD RATINGS               |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|--------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)      | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 6.3 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 150                            | B                | T55B157M6R3C0100 | 94.5                               | 8                                    | 100                                                | 1.14                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0070 | 94.5                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0055 | 94.5                               | 8                                    | 55                                                 | 1.53                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0045 | 94.5                               | 8                                    | 45                                                 | 1.70                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0040 | 94.5                               | 8                                    | 40                                                 | 1.80                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0035 | 94.5                               | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 150                            | B                | T55B157M6R3C0025 | 94.5                               | 8                                    | 25                                                 | 2.28                                                       | 1000                                     |
| 150                            | Z <sup>(1)</sup> | T55Z157M6R3C0025 | 94.5                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0055 | 94.5                               | 10                                   | 55                                                 | 1.84                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0045 | 94.5                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0040 | 94.5                               | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0035 | 94.5                               | 10                                   | 35                                                 | 2.31                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0025 | 94.5                               | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                            | V                | T55V157M6R3C0018 | 94.5                               | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 220                            | B                | T55B227M6R3C0200 | 138.6                              | 8                                    | 200                                                | 0.80                                                       | 1000                                     |
| 220                            | B                | T55B227M6R3C0070 | 138.6                              | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 220                            | B                | T55B227M6R3C0045 | 138.6                              | 8                                    | 45                                                 | 1.69                                                       | 1000                                     |
| 220                            | B                | T55B227M6R3C0035 | 138.6                              | 8                                    | 35                                                 | 1.93                                                       | 1000                                     |
| 220                            | B                | T55B227M6R3C0025 | 138.6                              | 8                                    | 25                                                 | 2.28                                                       | 1000                                     |
| 220                            | Z <sup>(1)</sup> | T55Z227M6R3C0025 | 138.6                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0050 | 138.6                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0045 | 138.6                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0040 | 138.6                              | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0035 | 138.6                              | 10                                   | 35                                                 | 2.31                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0025 | 138.6                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0018 | 138.6                              | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 220                            | V                | T55V227M6R3C0015 | 138.6                              | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 220                            | D                | T55D227M6R3C0055 | 138.6                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 220                            | D                | T55D227M6R3C0050 | 138.6                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 220                            | D                | T55D227M6R3C0040 | 138.6                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 220                            | D                | T55D227M6R3C0035 | 138.6                              | 10                                   | 35                                                 | 2.53                                                       | 1000                                     |
| 220                            | D                | T55D227M6R3C0025 | 138.6                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 330                            | Z <sup>(1)</sup> | T55Z337M6R3C0025 | 207.9                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0050 | 207.9                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0045 | 207.9                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0040 | 207.9                              | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0025 | 207.9                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0018 | 207.9                              | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 330                            | V                | T55V337M6R3C0015 | 207.9                              | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0055 | 207.9                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0050 | 207.9                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0045 | 207.9                              | 10                                   | 45                                                 | 2.23                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0040 | 207.9                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0025 | 207.9                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0018 | 207.9                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0015 | 207.9                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0012 | 207.9                              | 10                                   | 12                                                 | 4.33                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0008 | 207.9                              | 10                                   | 8                                                  | 5.30                                                       | 1000                                     |
| 330                            | D                | T55D337M6R3C0007 | 207.9                              | 10                                   | 7                                                  | 5.66                                                       | 1000                                     |
| 330                            | D <sup>(1)</sup> | T55D337M6R3C0006 | 207.9                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |
| 470                            | Z <sup>(1)</sup> | T55Z477M6R3C0050 | 296.1                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 470                            | V                | T55V477M6R3C0055 | 296.1                              | 10                                   | 55                                                 | 1.84                                                       | 1000                                     |
| 470                            | V                | T55V477M6R3C0050 | 296.1                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 470                            | D                | T55D477M6R3C0030 | 296.1                              | 10                                   | 30                                                 | 2.73                                                       | 1000                                     |
| 470                            | D                | T55D477M6R3C0025 | 296.1                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 470                            | D                | T55D477M6R3C0018 | 296.1                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 470                            | D                | T55D477M6R3C0015 | 296.1                              | 10                                   | 15                                                 | 3.87                                                       | 1000                                     |
| 470                            | D <sup>(1)</sup> | T55D477M6R3C0006 | 296.1                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |

## Notes

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au

<sup>(1)</sup> Rating in development, contact factory for availability





| STANDARD RATINGS              |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|-------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)     | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 7 V <sub>DC</sub> AT +105 °C  |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 100                           | A                | T55A107M007C0070 | 70.0                               | 10                                   | 70                                                 | 1.28                                                       | 1000                                     |
| 10 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 3.3                           | J                | T55J335M010C0500 | 10.0                               | 10                                   | 500                                                | 0.32                                                       | 1000                                     |
| 3.3                           | P                | T55P335M010C0500 | 5.0                                | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 4.7                           | P                | T55P475M010C0500 | 10.0                               | 10                                   | 500                                                | 0.36                                                       | 1000                                     |
| 4.7                           | P                | T55P475M010C0200 | 10.0                               | 10                                   | 200                                                | 0.56                                                       | 1000                                     |
| 4.7                           | A                | T55A475M010C0500 | 4.7                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 4.7                           | A                | T55A475M010C0300 | 4.7                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 4.7                           | A                | T55A475M010C0200 | 4.7                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 6.8                           | A                | T55A685M010C0500 | 6.8                                | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 6.8                           | A                | T55A685M010C0300 | 6.8                                | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 6.8                           | A                | T55A685M010C0200 | 6.8                                | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 10                            | A                | T55A106M010C0500 | 10.0                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 10                            | A                | T55A106M010C0300 | 10.0                               | 10                                   | 300                                                | 0.61                                                       | 1000                                     |
| 10                            | A                | T55A106M010C0200 | 10.0                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 15                            | A                | T55A156M010C0500 | 15.0                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 15                            | A                | T55A156M010C0200 | 15.0                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                            | A                | T55A226M010C0500 | 22.0                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 22                            | A                | T55A226M010C0200 | 22.0                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 22                            | T                | T55T226M010C0200 | 22.0                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 22                            | T                | T55T226M010C0150 | 22.0                               | 10                                   | 150                                                | 0.84                                                       | 1000                                     |
| 22                            | T                | T55T226M010C0070 | 22.0                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 22                            | B                | T55B226M010C0300 | 22.0                               | 8                                    | 300                                                | 0.66                                                       | 1000                                     |
| 22                            | B                | T55B226M010C0200 | 22.0                               | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 22                            | B                | T55B226M010C0150 | 22.0                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 22                            | B                | T55B226M010C0070 | 22.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 33                            | A                | T55A336M010C0500 | 33.0                               | 10                                   | 500                                                | 0.48                                                       | 1000                                     |
| 33                            | A                | T55A336M010C0200 | 33.0                               | 10                                   | 200                                                | 0.76                                                       | 1000                                     |
| 33                            | A                | T55A336M010C0150 | 33.0                               | 10                                   | 150                                                | 0.88                                                       | 1000                                     |
| 33                            | A                | T55A336M010C0070 | 33.0                               | 10                                   | 70                                                 | 1.28                                                       | 1000                                     |
| 33                            | T                | T55T336M010C0200 | 33.0                               | 10                                   | 200                                                | 0.72                                                       | 1000                                     |
| 33                            | T                | T55T336M010C0150 | 33.0                               | 10                                   | 150                                                | 0.84                                                       | 1000                                     |
| 33                            | T                | T55T336M010C0080 | 33.0                               | 10                                   | 80                                                 | 1.14                                                       | 1000                                     |
| 33                            | T                | T55T336M010C0070 | 33.0                               | 10                                   | 70                                                 | 1.22                                                       | 1000                                     |
| 33                            | T                | T55T336M010C0040 | 33.0                               | 8                                    | 40                                                 | 1.62                                                       | 1000                                     |
| 33                            | B                | T55B336M010C0200 | 33.0                               | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 33                            | B                | T55B336M010C0150 | 33.0                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 33                            | B                | T55B336M010C0080 | 33.0                               | 8                                    | 80                                                 | 1.27                                                       | 1000                                     |
| 33                            | B                | T55B336M010C0070 | 33.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 47                            | B                | T55B476M010C0150 | 47.0                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 47                            | B                | T55B476M010C0070 | 47.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 68                            | V                | T55V686M010C0100 | 68.0                               | 10                                   | 100                                                | 1.36                                                       | 1000                                     |
| 68                            | V                | T55V686M010C0060 | 68.0                               | 10                                   | 60                                                 | 1.76                                                       | 1000                                     |
| 100                           | Z <sup>(1)</sup> | T55Z107M010C0045 | 100.0                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 100                           | Z <sup>(1)</sup> | T55Z107M010C0025 | 100.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 100                           | V                | T55V107M010C0045 | 100.0                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 100                           | D                | T55D107M010C0080 | 100.0                              | 10                                   | 80                                                 | 1.67                                                       | 1000                                     |
| 100                           | D                | T55D107M010C0055 | 100.0                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 100                           | D                | T55D107M010C0045 | 100.0                              | 10                                   | 45                                                 | 2.23                                                       | 1000                                     |
| 100                           | D                | T55D107M010C0025 | 100.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 100                           | D                | T55D107M010C0018 | 100.0                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |

**Notes**

- Termination code "C": cases J, P: 100 % tin, case A: 100 % tin or Ni / Pd / Au, cases T, B, Z, V, D: Ni / Pd / Au
- <sup>(1)</sup> Rating in development, contact factory for availability



| STANDARD RATINGS                |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
|---------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| CAPACITANCE<br>( $\mu$ F)       | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
| 10 V <sub>DC</sub> AT +105 °C   |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 150                             | Z <sup>(1)</sup> | T55Z157M010C0025 | 150.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                             | V                | T55V157M010C0055 | 150.0                              | 10                                   | 55                                                 | 1.84                                                       | 1000                                     |
| 150                             | V                | T55V157M010C0045 | 150.0                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 150                             | V                | T55V157M010C0040 | 150.0                              | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 150                             | V                | T55V157M010C0025 | 150.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 150                             | V                | T55V157M010C0015 | 150.0                              | 10                                   | 15                                                 | 3.53                                                       | 1000                                     |
| 150                             | D                | T55D157M010C0040 | 150.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 220                             | Z <sup>(1)</sup> | T55Z227M010C0025 | 220.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                             | V                | T55V227M010C0050 | 220.0                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 220                             | V                | T55V227M010C0045 | 220.0                              | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 220                             | V                | T55V227M010C0040 | 220.0                              | 10                                   | 40                                                 | 2.16                                                       | 1000                                     |
| 220                             | V                | T55V227M010C0025 | 220.0                              | 10                                   | 25                                                 | 2.73                                                       | 1000                                     |
| 220                             | V                | T55V227M010C0018 | 220.0                              | 10                                   | 18                                                 | 3.22                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0055 | 220.0                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0050 | 220.0                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0040 | 220.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0025 | 220.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0018 | 220.0                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0008 | 220.0                              | 10                                   | 8                                                  | 5.30                                                       | 1000                                     |
| 220                             | D                | T55D227M010C0007 | 220.0                              | 10                                   | 7                                                  | 5.66                                                       | 1000                                     |
| 220                             | D <sup>(1)</sup> | T55D227M010C0006 | 220.0                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0040 | 330.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0035 | 330.0                              | 10                                   | 35                                                 | 2.53                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0025 | 330.0                              | 10                                   | 25                                                 | 3.00                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0018 | 330.0                              | 10                                   | 18                                                 | 3.53                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0008 | 330.0                              | 10                                   | 8                                                  | 5.30                                                       | 1000                                     |
| 330                             | D                | T55D337M010C0007 | 330.0                              | 10                                   | 7                                                  | 5.66                                                       | 1000                                     |
| 330                             | D <sup>(1)</sup> | T55D337M010C0006 | 330.0                              | 10                                   | 6                                                  | 6.12                                                       | 1000                                     |
| 12.5 V <sub>DC</sub> AT +105 °C |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 15                              | T                | T55T156M12RC0080 | 18.7                               | 8                                    | 80                                                 | 1.14                                                       | 1000                                     |
| 16 V <sub>DC</sub> AT +105 °C   |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 6.8                             | B                | T55B685M016C0200 | 10.8                               | 8                                    | 200                                                | 0.80                                                       | 1000                                     |
| 10                              | B                | T55B106M016C0200 | 16.0                               | 8                                    | 200                                                | 0.80                                                       | 1000                                     |
| 10                              | B                | T55B106M016C0100 | 16.0                               | 8                                    | 100                                                | 1.14                                                       | 2000                                     |
| 15                              | B                | T55B156M016C0150 | 24.0                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 15                              | B                | T55B156M016C0090 | 24.0                               | 8                                    | 90                                                 | 1.20                                                       | 2000                                     |
| 22                              | B                | T55B226M016C0150 | 35.2                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 22                              | B                | T55B226M016C0070 | 35.2                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 33                              | V                | T55V336M016C0070 | 52.8                               | 10                                   | 70                                                 | 1.63                                                       | 2000                                     |
| 47                              | Z                | T55Z476M016C0045 | 75.2                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 47                              | V                | T55V476M016C0070 | 75.2                               | 10                                   | 70                                                 | 1.63                                                       | 1000                                     |
| 47                              | V                | T55V476M016C0045 | 75.2                               | 10                                   | 45                                                 | 2.03                                                       | 2000                                     |
| 47                              | D                | T55D476M016C0070 | 75.2                               | 10                                   | 70                                                 | 1.79                                                       | 1000                                     |
| 100                             | Z <sup>(1)</sup> | T55Z107M016C0050 | 160.0                              | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 100                             | V                | T55V107M016C0050 | 160.0                              | 10                                   | 50                                                 | 1.93                                                       | 2000                                     |
| 100                             | D                | T55D107M016C0050 | 160.0                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 150                             | D                | T55D157M016C0050 | 240.0                              | 10                                   | 50                                                 | 2.12                                                       | 1000                                     |
| 150                             | D                | T55D157M016C0040 | 240.0                              | 10                                   | 40                                                 | 2.37                                                       | 1000                                     |
| 20 V <sub>DC</sub> AT +105 °C   |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 15                              | B                | T55B156M020C0090 | 30.0                               | 8                                    | 90                                                 | 1.20                                                       | 2000                                     |
| 15                              | B                | T55B156M020C0070 | 30.0                               | 8                                    | 70                                                 | 1.36                                                       | 1000                                     |
| 47                              | Z                | T55Z476M020C0070 | 94.0                               | 10                                   | 70                                                 | 1.63                                                       | 1000                                     |
| 47                              | V                | T55V476M020C0045 | 94.0                               | 10                                   | 45                                                 | 2.03                                                       | 1000                                     |
| 100                             | D                | T55D107M020C0055 | 200.0                              | 10                                   | 55                                                 | 2.02                                                       | 1000                                     |

## Notes

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<sup>(1)</sup> Rating in development, contact factory for availability

**STANDARD RATINGS**

| CAPACITANCE<br>( $\mu$ F)           | CASE CODE        | PART NUMBER      | MAX. DCL<br>AT 25 °C<br>( $\mu$ A) | MAX. DF<br>AT 25 °C<br>120 Hz<br>(%) | MAX. ESR<br>AT + 25 °C<br>100 kHz<br>(m $\Omega$ ) | MAX. RIPPLE<br>AT 45 °C<br>100 kHz I <sub>RMS</sub><br>(A) | HIGH<br>TEMPERATURE<br>LOAD, TIME<br>(h) |
|-------------------------------------|------------------|------------------|------------------------------------|--------------------------------------|----------------------------------------------------|------------------------------------------------------------|------------------------------------------|
| <b>25 V<sub>DC</sub> AT +105 °C</b> |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 6.8                                 | B                | T55B685M025C0100 | 17.0                               | 8                                    | 100                                                | 1.14                                                       | 1000                                     |
| 10                                  | B                | T55B106M025C0150 | 25.0                               | 8                                    | 150                                                | 0.93                                                       | 1000                                     |
| 10                                  | B                | T55B106M025C0100 | 25.0                               | 8                                    | 100                                                | 1.14                                                       | 1000                                     |
| 15                                  | B                | T55B156M025C0100 | 37.5                               | 8                                    | 100                                                | 1.14                                                       | 2000                                     |
| 33                                  | Z <sup>(1)</sup> | T55Z336M025C0050 | 82.5                               | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 33                                  | V                | T55V336M025C0050 | 82.5                               | 10                                   | 50                                                 | 1.93                                                       | 1000                                     |
| 33                                  | D                | T55D336M025C0060 | 82.5                               | 10                                   | 60                                                 | 1.93                                                       | 1000                                     |
| 100                                 | D                | T55D107M025C0060 | 250.0                              | 10                                   | 60                                                 | 1.93                                                       | 1000                                     |
| <b>35 V<sub>DC</sub> AT +105 °C</b> |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 6.8                                 | B                | T55B685M035C0200 | 23.8                               | 8                                    | 200                                                | 0.81                                                       | 1000                                     |
| 10                                  | B                | T55B106M035C0200 | 35.0                               | 8                                    | 200                                                | 0.80                                                       | 1000                                     |
| 15                                  | V                | T55V156M035C0125 | 52.5                               | 10                                   | 125                                                | 1.22                                                       | 1000                                     |
| 22                                  | Z <sup>(1)</sup> | T55Z226M035C0070 | 77.0                               | 10                                   | 70                                                 | 1.63                                                       | 1000                                     |
| 22                                  | V                | T55V226M035C0070 | 77.0                               | 10                                   | 70                                                 | 1.63                                                       | 1000                                     |
| 22                                  | D                | T55D226M035C0120 | 77.0                               | 10                                   | 120                                                | 1.36                                                       | 1000                                     |
| 33                                  | D                | T55D336M035C0100 | 115.5                              | 10                                   | 100                                                | 1.50                                                       | 1000                                     |
| <b>50 V<sub>DC</sub> AT +105 °C</b> |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 10                                  | D                | T55D106M050C0120 | 50.0                               | 10                                   | 120                                                | 1.36                                                       | 1000                                     |
| 10                                  | D                | T55D106M050C0090 | 50.0                               | 10                                   | 90                                                 | 1.58                                                       | 1000                                     |
| <b>63 V<sub>DC</sub> AT +105 °C</b> |                  |                  |                                    |                                      |                                                    |                                                            |                                          |
| 4.7                                 | D                | T55D475M063C0100 | 29.6                               | 10                                   | 100                                                | 1.50                                                       | 1000                                     |

**Notes**

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- <sup>(1)</sup> Rating in development, contact factory for availability

**RECOMMENDED VOLTAGE DERATING GUIDELINES**

| CAPACITOR VOLTAGE RATING | OPERATING VOLTAGE |
|--------------------------|-------------------|
| 2.5                      | 2.3               |
| 4.0                      | 3.6               |
| 6.3                      | 5.7               |
| 7.0                      | 6.3               |
| 10                       | 9.0               |
| 12.5                     | 11.2              |
| 16                       | 12.8              |
| 20                       | 16                |
| 25                       | 20                |
| 35                       | 28                |
| 50                       | 40                |
| 63                       | 50                |

**POWER DISSIPATION**

| CASE CODE | MAXIMUM PERMISSIBLE POWER DISSIPATION (W) AT $\leq +45$ °C IN FREE AIR |
|-----------|------------------------------------------------------------------------|
| J         | 0.050                                                                  |
| P         | 0.064                                                                  |
| A         | 0.115                                                                  |
| T         | 0.105                                                                  |
| B         | 0.130                                                                  |
| Z         | 0.187                                                                  |
| V         | 0.187                                                                  |
| D         | 0.225                                                                  |

| STANDARD PACKAGING QUANTITY |                   |
|-----------------------------|-------------------|
| CASE CODE                   | UNITS PER 7" REEL |
| J                           | 4000              |
| P                           | 3000              |
| A                           | 2000              |
| T                           | 3000              |
| B                           | 2000              |
| Z                           | 800               |
| V                           | 800               |
| D                           | 500               |

| PERFORMANCE CHARACTERISTICS |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    |                                                            |                                                   |                                                  |                                              |  |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|----|------|----|----|----|----|----|----|------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------|----------------------------------------------|--|
| ITEM                        | CONDITION                                                                                                                                               |     |     |     |     |    |      |    |    |    |    |    |    | POST TEST PERFORMANCE                                      |                                                   |                                                  |                                              |  |
| Temperature characteristics | Measure the specified characteristics in each stage                                                                                                     |     |     |     |     |    |      |    |    |    |    |    |    |                                                            | Specified initial value                           | -55 °C                                           | +105 °C                                      |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | -                                                 | -30 % to 0 %                                     | 0 % to +50 %                                 |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Dissipation factor shown in Standard Ratings table or less | 8 to 10                                           | 14                                               | -                                            |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Leakage current                                            | Refer to Standard Ratings table                   | -                                                | Not more than 1 CV or 30 μA which is greater |  |
| Surge voltage               | 105 °C, 1000 successive test cycles in series with a 1 kΩ resistor at the rate of 30 s ON, 30 s OFF; test voltage per table below:                      |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | Within ± 20 % of initial value                    |                                                  |                                              |  |
|                             | Rated voltage                                                                                                                                           | 2.5 | 4.0 | 6.3 | 7.0 | 10 | 12.5 | 16 | 20 | 25 | 35 | 50 | 63 | Dissipation factor                                         | Within initial limit                              |                                                  |                                              |  |
|                             | Surge voltage                                                                                                                                           | 3.2 | 5.2 | 8.2 | 9.0 | 13 | 16.2 | 20 | 23 | 29 | 40 | 57 | 72 | Leakage current                                            | Shall not exceed 300 % of initial limit           |                                                  |                                              |  |
| Solder heat resistance      | Reflow board surface peak temperature: less than 260 °C<br>Time: 5 s max.                                                                               |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | Within ± 20 % of initial value                    |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Dissipation factor                                         | Initial specified value or less                   |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Leakage current                                            | Shall not exceed 300 % of initial specified value |                                                  |                                              |  |
| Moisture resistance no load | Leave at 60 °C and 90 % RH for 500 h                                                                                                                    |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | V <sub>R</sub> ≤ 4 V                              | Relative to the value before test +50 % to -20 % |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    |                                                            | V <sub>R</sub> ≥ 6.3 V                            | Relative to the value before test +40 % to -20 % |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Dissipation factor                                         | Initial specified value or less                   |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Leakage current                                            | Shall not exceed 300 % of initial specified value |                                                  |                                              |  |
| High temperature load       | 105 °C. The rated voltage is applied through a protective resistor of 3 Ω for 1000 h or 2000 h <sup>(1)</sup>                                           |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | Within ± 20 % of initial value                    |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Dissipation factor                                         | Initial specified value or less                   |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Leakage current                                            | Shall not exceed 300 % of initial specified value |                                                  |                                              |  |
| Thermal shock               | Leave at -55 °C, normal temperature, 105 °C, and normal temperature for 30 min., 15 min. 30 min., and 15 min.<br>Repeat this operation 5 times running. |     |     |     |     |    |      |    |    |    |    |    |    | Capacitance change                                         | Within ± 20 % of initial value or less            |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Dissipation factor                                         | Initial specified value or less                   |                                                  |                                              |  |
|                             |                                                                                                                                                         |     |     |     |     |    |      |    |    |    |    |    |    | Leakage current                                            | Shall not exceed 300 % of initial specified value |                                                  |                                              |  |
| Failure rate                | 105 °C. The rated voltage is applied through a protective resistor of 1 Ω/V.                                                                            |     |     |     |     |    |      |    |    |    |    |    |    | 1 % / 1000 h                                               |                                                   |                                                  |                                              |  |

**Notes**

- Test conditions per JIS C5101-1

<sup>(1)</sup> Test time, please refer to table "Standard Ratings"



## Guide for Tantalum Solid Electrolyte Chip Capacitors with Polymer Cathode

### INTRODUCTION

Tantalum electrolytic capacitors are the preferred choice in applications where volumetric efficiency, stable electrical parameters, high reliability, and long service life are primary considerations. The stability and resistance to elevated temperatures of the tantalum/tantalum oxide/manganese dioxide system make solid tantalum capacitors an appropriate choice for today's surface mount assembly technology.

Vishay Sprague has been a pioneer and leader in this field, producing a large variety of tantalum capacitor types for consumer, industrial, automotive, military, and aerospace electronic applications.

Tantalum is not found in its pure state. Rather, it is commonly found in a number of oxide minerals, often in combination with Columbium ore. This combination is known as "tantalite" when its contents are more than one-half tantalum. Important sources of tantalite include Australia, Brazil, Canada, China, and several African countries. Synthetic tantalite concentrates produced from tin slags in Thailand, Malaysia, and Brazil are also a significant raw material for tantalum production.

Electronic applications, and particularly capacitors, consume the largest share of world tantalum production. Other important applications for tantalum include cutting tools (tantalum carbide), high temperature super alloys, chemical processing equipment, medical implants, and military ordnance.

Vishay Sprague is a major user of tantalum materials in the form of powder and wire for capacitor elements and rod and sheet for high temperature vacuum processing.

### THE BASICS OF TANTALUM CAPACITORS

Most metals form crystalline oxides which are non-protecting, such as rust on iron or black oxide on copper. A few metals form dense, stable, tightly adhering, electrically insulating oxides. These are the so-called "valve" metals and include titanium, zirconium, niobium, tantalum, hafnium, and aluminum. Only a few of these permit the accurate control of oxide thickness by electrochemical means. Of these, the most valuable for the electronics industry are aluminum and tantalum.

Capacitors are basic to all kinds of electrical equipment, from radios and television sets to missile controls and automobile ignitions. Their function is to store an electrical charge for later use.

Capacitors consist of two conducting surfaces, usually metal plates, whose function is to conduct electricity. They are separated by an insulating material or dielectric. The dielectric used in all tantalum electrolytic capacitors is tantalum pentoxide.

Tantalum pentoxide compound possesses high-dielectric strength and a high-dielectric constant. As capacitors are being manufactured, a film of tantalum pentoxide is applied to their electrodes by means of an electrolytic process. The film is applied in various thicknesses and at various voltages and although transparent to begin with, it takes on different colors as light refracts through it. This coloring occurs on the tantalum electrodes of all types of tantalum capacitors.

Rating for rating, tantalum capacitors tend to have as much as three times better capacitance/volume efficiency than aluminum electrolytic capacitors. An approximation of the capacitance/volume efficiency of other types of capacitors may be inferred from the following table, which shows the dielectric constant ranges of the various materials used in each type. Note that tantalum pentoxide has a dielectric constant of 26, some three times greater than that of aluminum oxide. This, in addition to the fact that extremely thin films can be deposited during the electrolytic process mentioned earlier, makes the tantalum capacitor extremely efficient with respect to the number of microfarads available per unit volume. The capacitance of any capacitor is determined by the surface area of the two conducting plates, the distance between the plates, and the dielectric constant of the insulating material between the plates.

#### COMPARISON OF CAPACITOR DIELECTRIC CONSTANTS

| DIELECTRIC                | $\epsilon$<br>DIELECTRIC CONSTANT |
|---------------------------|-----------------------------------|
| Air or vacuum             | 1.0                               |
| Paper                     | 2.0 to 6.0                        |
| Plastic                   | 2.1 to 6.0                        |
| Mineral oil               | 2.2 to 2.3                        |
| Silicone oil              | 2.7 to 2.8                        |
| Quartz                    | 3.8 to 4.4                        |
| Glass                     | 4.8 to 8.0                        |
| Porcelain                 | 5.1 to 5.9                        |
| Mica                      | 5.4 to 8.7                        |
| Aluminum oxide            | 8.4                               |
| <b>Tantalum pentoxide</b> | <b>26</b>                         |
| Ceramic                   | 12 to 400K                        |

In the tantalum electrolytic capacitor, the distance between the plates is very small since it is only the thickness of the tantalum pentoxide film. As the dielectric constant of the tantalum pentoxide is high, the capacitance of a tantalum capacitor is high if the area of the plates is large:

$$C = \frac{\epsilon A}{t}$$

where

C = capacitance

$\epsilon$  = dielectric constant

A = surface area of the dielectric

t = thickness of the dielectric

Tantalum capacitors contain either liquid or solid electrolytes. In solid electrolyte capacitors, a dry material (manganese dioxide) forms the cathode plate. A tantalum lead is embedded in or welded to the pellet, which is in turn connected to a termination or lead wire. The drawings show the construction details of the surface mount types of tantalum capacitors shown in this catalog.

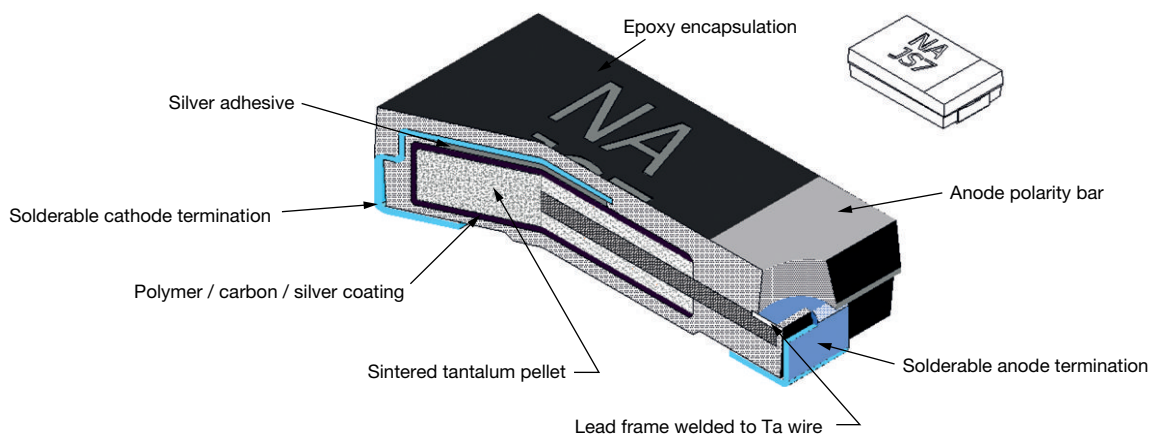
## SOLID ELECTROLYTE POLYMER TANTALUM CAPACITORS

Solid electrolyte polymer capacitors utilize sintered tantalum pellets as anodes. Tantalum pentoxide dielectric layer is formed on the entire surface of anode, which is further impregnated with highly conductive polymer as cathode system.

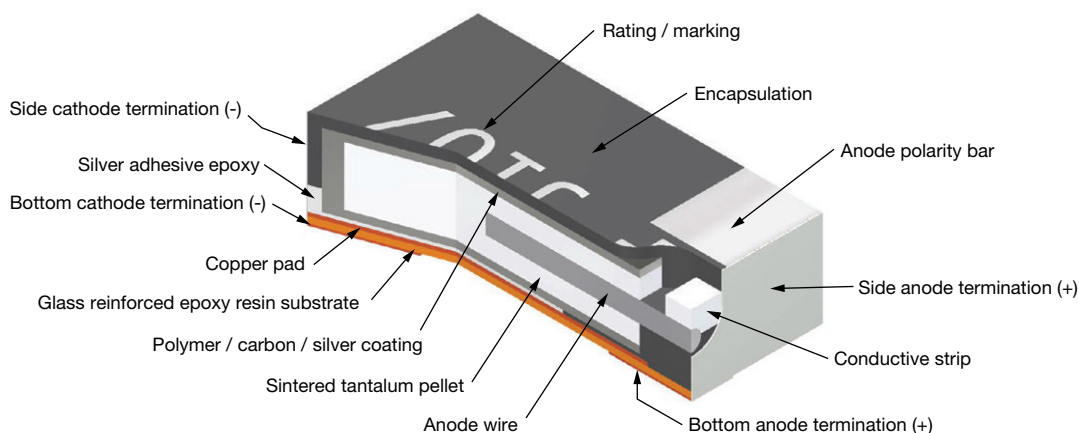
The conductive polymer layer is then coated with graphite, followed by a layer of metallic silver, which provides a conductive surface between the capacitor element and the outer termination (lead frame or other).

Molded chip polymer tantalum capacitor encases the element in plastic resins, such as epoxy materials. After assembly, the capacitors are tested and inspected to assure long life and reliability. It offers excellent reliability and high stability for variety of applications in electronic devices. Usage of conductive polymer cathode system provides very low equivalent series resistance (ESR), which makes the capacitors particularly suitable for high frequency applications.

### TANTALUM CAPACITOR WITH POLYMER CATHODE TYPE T55



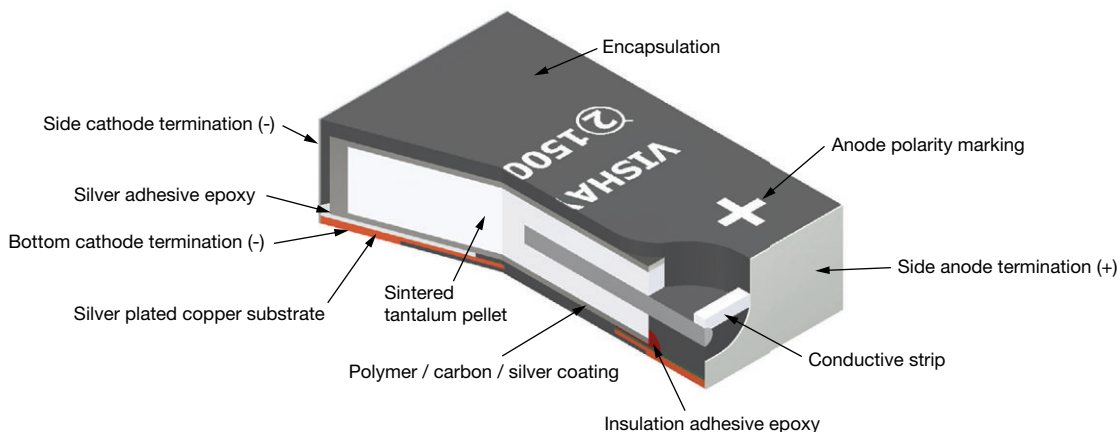
### TANTALUM CAPACITOR WITH POLYMER CATHODE TYPE T58



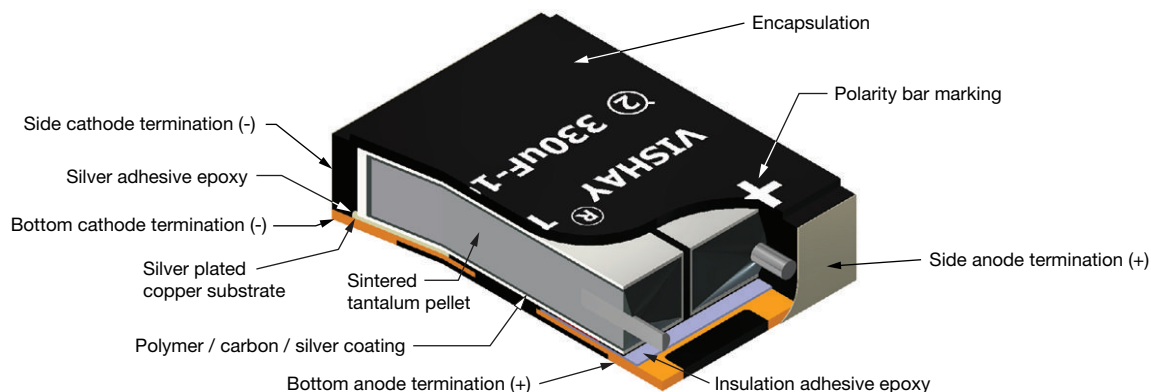


## TANTALUM CAPACITOR WITH POLYMER CATHODE TYPE T52

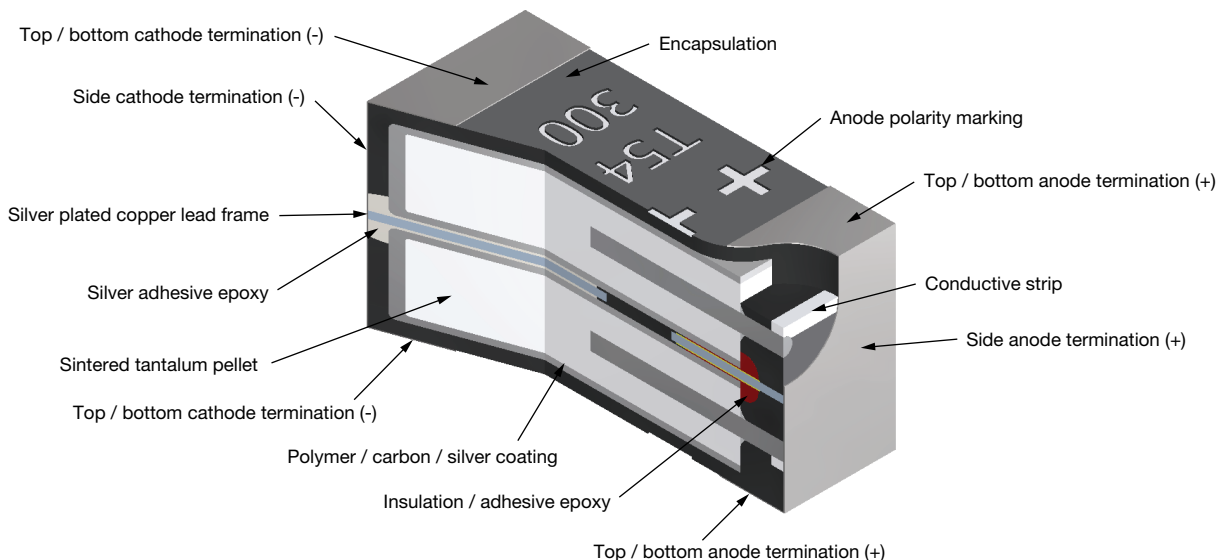
T52 E5 / E1 cases



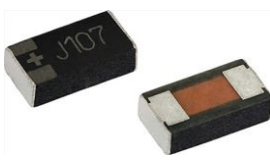
T52 M1 case



## TANTALUM CAPACITOR WITH POLYMER CATHODE TYPE T54 / T59



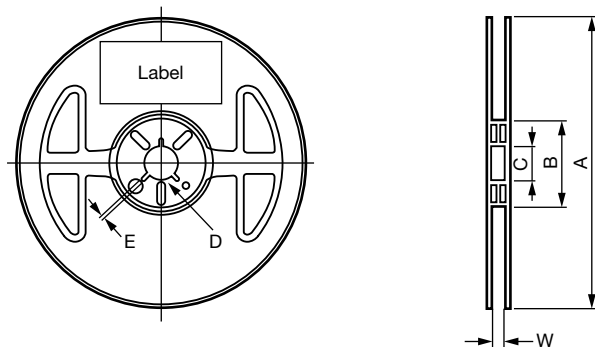
| POLYMER CAPACITORS - MOLDED CASE |                                                                                                 |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| SERIES                           | T55                                                                                             |
| PRODUCT IMAGE                    |               |
| TYPE                             | VPolyTan™, molded case, high performance polymer                                                |
| FEATURES                         | High performance                                                                                |
| TEMPERATURE RANGE                | -55 °C to +105 °C                                                                               |
| CAPACITANCE RANGE                | 3.3 µF to 1000 µF                                                                               |
| VOLTAGE RANGE                    | 2.5 V to 63 V                                                                                   |
| CAPACITANCE TOLERANCE            | ± 20 %                                                                                          |
| LEAKAGE CURRENT                  | 0.1 CV                                                                                          |
| DISSIPATION FACTOR               | 8 % to 10 %                                                                                     |
| ESR                              | 12 mΩ to 500 mΩ                                                                                 |
| CASE SIZES                       | J, P, A, T, B, Z, V, D                                                                          |
| TERMINATION FINISH               | Cases J, P: 100 % tin<br>Case A: 100 % tin or Ni / Pd / Au<br>Cases T, B, Z, V, D: Ni / Pd / Au |

| POLYMER CAPACITORS - LEADFRAMELESS MOLDED CASE |                                                                                         |                                                                                     |                                                                                      |                                                                                                                             |
|------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| SERIES                                         | T52                                                                                     | T58                                                                                 | T59                                                                                  | T54                                                                                                                         |
| PRODUCT IMAGE                                  |      |  |  |                                        |
| TYPE                                           | vPolyTan™ polymer surface mount chip capacitors, low profile, leadframeless molded type | vPolyTan™ polymer surface mount chip capacitors, compact, leadframeless molded type | vPolyTan™ polymer surface mount chip capacitors, low ESR, leadframeless molded type  | vPolyTan™ polymer surface mount chip capacitors, low ESR, leadframeless molded type, hi-rel commercial off-the-shelf (COTS) |
| FEATURES                                       | Low profile                                                                             | Small case size                                                                     | Multianode                                                                           | Hi-rel COTS, multianode                                                                                                     |
| TEMPERATURE RANGE                              | -55 °C to +105 °C                                                                       | -55 °C to +105 °C                                                                   | -55 °C to +105 °C                                                                    | -55 °C to +105 °C                                                                                                           |
| CAPACITANCE RANGE                              | 47 µF to 1500 µF                                                                        | 1 µF to 330 µF                                                                      | 15 µF to 470 µF                                                                      | 15 µF to 470 µF                                                                                                             |
| VOLTAGE RANGE                                  | 6.3 V to 35 V                                                                           | 6.3 V to 35 V                                                                       | 16 V to 75 V                                                                         | 16 V to 75 V                                                                                                                |
| CAPACITANCE TOLERANCE                          | ± 20 %                                                                                  | ± 20 %                                                                              | ± 10 %, ± 20 %                                                                       | ± 20 %                                                                                                                      |
| LEAKAGE CURRENT                                | 0.1 CV                                                                                  |                                                                                     |                                                                                      |                                                                                                                             |
| DISSIPATION FACTOR                             | 10 %                                                                                    | 8 % to 14 %                                                                         | 10 %                                                                                 | 10 %                                                                                                                        |
| ESR                                            | 25 mΩ to 55 mΩ                                                                          | 50 mΩ to 500 mΩ                                                                     | 25 mΩ to 150 mΩ                                                                      | 25 mΩ to 150 mΩ                                                                                                             |
| CASE SIZES                                     | E1, E5, M1                                                                              | MM, M0, W0, W9, A0, AA, B0, BB                                                      | EE                                                                                   | EE                                                                                                                          |
| TERMINATION                                    | 100 % tin                                                                               |                                                                                     | 100 % tin / lead                                                                     |                                                                                                                             |



## MOLDED CAPACITORS, T55 TYPE

### PLASTIC TAPE AND REEL PACKAGING DIMENSIONS in millimeters

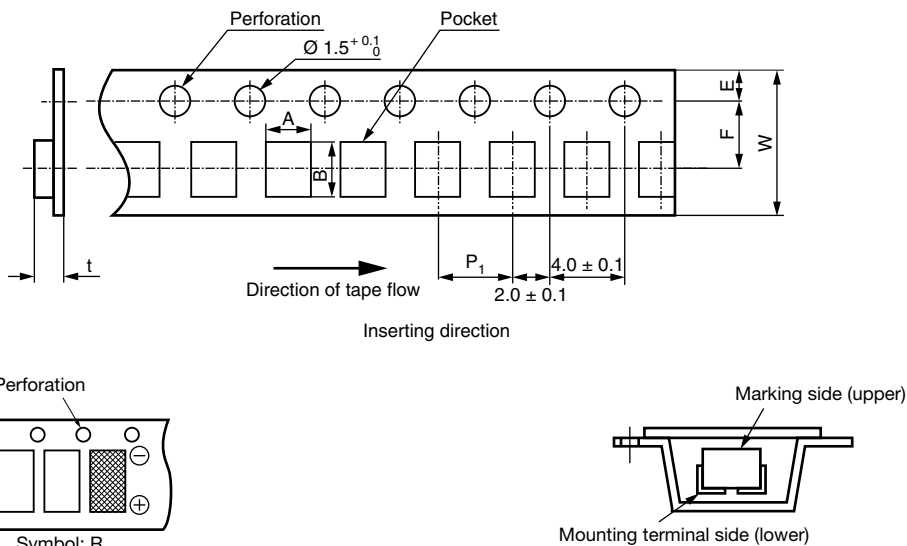


| TAPE WIDTH    | 8   | 12                |
|---------------|-----|-------------------|
| $A + 0 / - 3$ |     | $\varnothing 180$ |
| $B + 1 / 0$   |     | $\varnothing 60$  |
| $C \pm 0.2$   |     | $\varnothing 13$  |
| $D \pm 0.5$   |     | $\varnothing 21$  |
| $E \pm 0.5$   |     | 2.0               |
| $W \pm 0.3$   | 9.0 | 13.0              |

#### Note

- A reel diameter of 330 mm is also applicable

### PLASTIC TAPE SIZE DIMENSIONS in millimeters



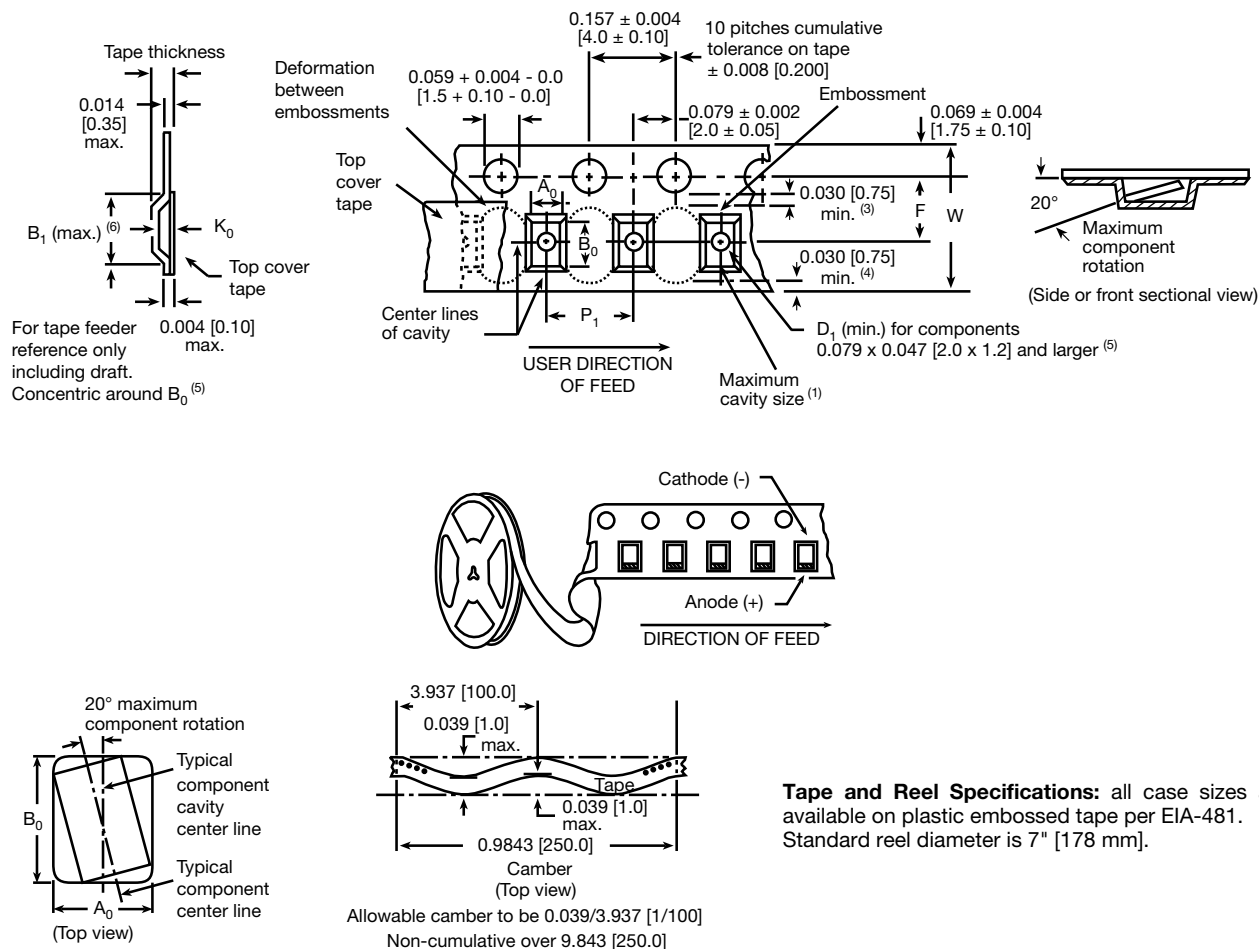
| CASE CODE | $A \pm 0.2$ | $B \pm 0.2$ | $W \pm 0.3$ | $F \pm 0.1$ | $E \pm 0.1$ | $P_1 \pm 0.1$ | $t_{max}$ |
|-----------|-------------|-------------|-------------|-------------|-------------|---------------|-----------|
| J         | 1.0         | 1.8         | 8.0         | 3.5         | 1.75        | 4.0           | 1.3       |
| P         | 1.4         | 2.2         | 8.0         | 3.5         | 1.75        | 4.0           | 1.6       |
| A         | 1.9         | 3.5         | 8.0         | 3.5         | 1.75        | 4.0           | 2.5       |
| T         | 3.1         | 3.8         | 8.0         | 3.5         | 1.75        | 4.0           | 1.7       |
| B         | 3.1         | 3.8         | 8.0         | 3.5         | 1.75        | 4.0           | 2.5       |
| Z         | 4.8         | 7.7         | 12.0        | 5.5         | 1.75        | 8.0           | 2.6       |
| V         | 4.8         | 7.7         | 12.0        | 5.5         | 1.75        | 8.0           | 2.6       |
| D         | 4.8         | 7.7         | 12.0        | 5.5         | 1.75        | 8.0           | 3.4       |

#### Note

- A reel diameter of 330 mm is also applicable

## LEADFRAMELESS MOLDED CAPACITORS, ALL TYPES

### PLASTIC TAPE AND REEL PACKAGING in inches [millimeters]



#### Notes

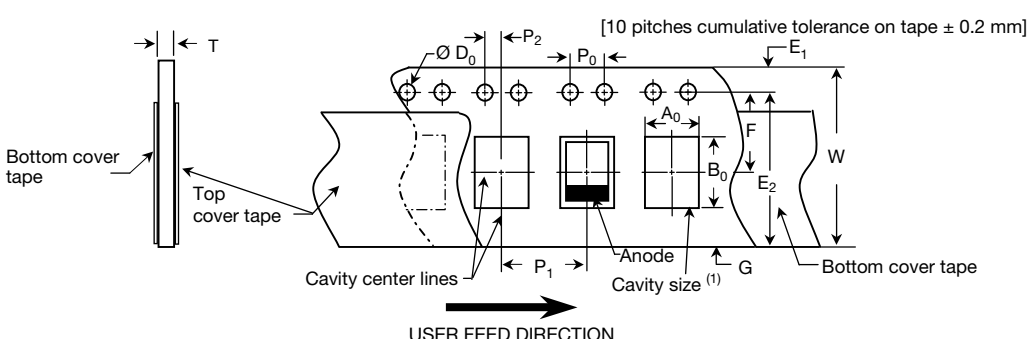
- Metric dimensions will govern. Dimensions in inches are rounded and for reference only.
- (1)  $A_0$ ,  $B_0$ ,  $K_0$ , are determined by the maximum dimensions to the ends of the terminals extending from the component body and / or the body dimensions of the component. The clearance between the ends of the terminals or body of the component to the sides and depth of the cavity ( $A_0$ ,  $B_0$ ,  $K_0$ ) must be within 0.002" (0.05 mm) minimum and 0.020" (0.50 mm) maximum. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20°.
- (2) Tape with components shall pass around radius "R" without damage. The minimum trailer length may require additional length to provide "R" minimum for 12 mm embossed tape for reels with hub diameters approaching N minimum.
- (3) This dimension is the flat area from the edge of the sprocket hole to either outward deformation of the carrier tape between the embossed cavities or to the edge of the cavity whichever is less.
- (4) This dimension is the flat area from the edge of the carrier tape opposite the sprocket holes to either the outward deformation of the carrier tape between the embossed cavity or to the edge of the cavity whichever is less.
- (5) The embossed hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location shall be applied independent of each other.
- (6)  $B_1$  dimension is a reference dimension tape feeder clearance only.

| CARRIER TAPE DIMENSIONS in inches [millimeters] |           |                                      |                       |                               |                       |                             |                                                  |
|-------------------------------------------------|-----------|--------------------------------------|-----------------------|-------------------------------|-----------------------|-----------------------------|--------------------------------------------------|
| CASE CODE                                       | TAPE SIZE | B <sub>1</sub> (MAX.) <sup>(1)</sup> | D <sub>1</sub> (MIN.) | F                             | K <sub>0</sub> (MAX.) | P <sub>1</sub>              | W                                                |
| E1                                              | TBD       |                                      |                       |                               |                       |                             |                                                  |
| E5                                              | TBD       |                                      |                       |                               |                       |                             |                                                  |
| MM <sup>(2)</sup>                               | 8 mm      | 0.075 [1.91]                         | 0.02 [0.5]            | 0.138 [3.5]                   | 0.043 [1.10]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| M1                                              | 12 mm     | 0.32 [8.2]                           | 0.059 [1.5]           | 0.217 ± 0.002<br>[5.5 ± 0.05] | 0.094 [2.39]          | 0.315 ± 0.04<br>[8.0 ± 1.0] | 0.472 + 0.012 / - 0.004<br>[12.0 + 0.3 / - 0.10] |
| W9                                              | 8 mm      | 0.126 [3.20]                         | 0.030 [0.75]          | 0.138 [3.5]                   | 0.045 [1.15]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| W0                                              | 8 mm      | 0.126 [3.20]                         | 0.030 [0.75]          | 0.138 [3.5]                   | 0.045 [1.15]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| A0                                              | 8 mm      | -                                    | 0.02 [0.5]            | 0.138 [3.5]                   | 0.049 [1.25]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| AA                                              | 8 mm      | 0.154 [3.90]                         | 0.039 [1.0]           | 0.138 [3.5]                   | 0.079 [2.00]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| B0                                              | 12 mm     | 0.181 [4.61]                         | 0.059 [1.5]           | 0.217 [5.5]                   | 0.049 [1.25]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| BB                                              | 8 mm      | 0.157 [4.0]                          | 0.039 [1.0]           | 0.138 [3.5]                   | 0.087 [2.22]          | 0.157 [4.0]                 | 0.315 [8.0]                                      |
| EE                                              | 12 mm     | 0.32 [8.2]                           | 0.059 [1.5]           | 0.217 ± 0.002<br>[5.5 ± 0.05] | 0.175 [4.44]          | 0.315 ± 0.04<br>[8.0 ± 1.0] | 0.472 + 0.012 / - 0.004<br>[12.0 + 0.3 / - 0.10] |

## Notes

<sup>(1)</sup> For reference only.

<sup>(2)</sup> Standard packaging of MM case is with paper tape. Plastic tape is available per request.

| PAPER TAPE AND REEL PACKAGING DIMENSIONS in inches [millimeters]                     |           |                                |                                |                             |                              |                              |                               |                               |                                |                              |                                |
|--------------------------------------------------------------------------------------|-----------|--------------------------------|--------------------------------|-----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|------------------------------|--------------------------------|
|  |           |                                |                                |                             |                              |                              |                               |                               |                                |                              |                                |
| CASE SIZE                                                                            | TAPE SIZE | A <sub>0</sub>                 | B <sub>0</sub>                 | D <sub>0</sub>              | P <sub>0</sub>               | P <sub>1</sub>               | P <sub>2</sub>                | E                             | F                              | W                            | T                              |
| MM                                                                                   | 8 mm      | 0.041 ± 0.002<br>[1.05 ± 0.05] | 0.071 ± 0.002<br>[1.8 ± 0.05]  | 0.06 ± 0.004<br>[1.5 ± 0.1] | 0.157 ± 0.004<br>[4.0 ± 0.1] | 0.157 ± 0.004<br>[4.0 ± 0.1] | 0.079 ± 0.002<br>[2.0 ± 0.05] | 0.069 ± 0.004<br>[1.75 ± 0.1] | 0.0138 ± 0.002<br>[3.5 ± 0.05] | 0.315 ± 0.008<br>[8.0 ± 0.2] | 0.037 ± 0.002<br>[0.95 ± 0.05] |
| M0                                                                                   | 8 mm      | 0.049 ± 0.002<br>[1.25 ± 0.05] | 0.081 ± 0.002<br>[2.05 ± 0.05] | 0.06 ± 0.004<br>[1.5 ± 0.1] | 0.157 ± 0.004<br>[4.0 ± 0.1] | 0.157 ± 0.004<br>[4.0 ± 0.1] | 0.079 ± 0.002<br>[2.0 ± 0.05] | 0.069 ± 0.004<br>[1.75 ± 0.1] | 0.0138 ± 0.002<br>[3.5 ± 0.05] | 0.315 ± 0.008<br>[8.0 ± 0.2] | 0.041 ± 0.002<br>[1.05 ± 0.05] |

## Note

<sup>(1)</sup> A<sub>0</sub>, B<sub>0</sub> are determined by the maximum dimensions to the ends of the terminals extending from the component body and / or the body dimensions of the component. The clearance between the ends of the terminals or body of the component to the sides and depth of the cavity (A<sub>0</sub>, B<sub>0</sub>) must be within 0.002" (0.05 mm) minimum and 0.020" (0.50 mm) maximum. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20°.

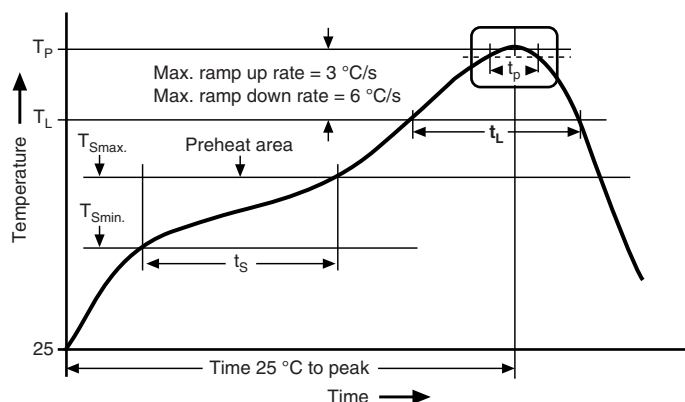
**PACKING AND STORAGE**

Polymer capacitors meet moisture sensitivity level rating (MSL) of 3 or 4 as specified in IPC/JEDEC® J-STD-020 and are dry packaged in moisture barrier bags (MBB) per J-STD-033. Standard Ratings table defines MSL level for each particular family. Level 3 specifies a floor life (out of bag) of 168 hours and level 4 specifies a floor life of 72 hours at 30 °C maximum and 60 % relative humidity (RH). Unused capacitors should be re-sealed in the MBB with fresh desiccant. A moisture strip (humidity indicator card) is included in the bag to assure dryness. To remove excess moisture, capacitors can be dried at 40 °C (standard “dry box” conditions).

For detailed recommendations please refer to J-STD-033.

**RECOMMENDED REFLOW PROFILES**

Vishay recommends no more than 3 cycles of reflow in accordance with J-STD-020.



| PROFILE FEATURE                                         | SnPb EUTECTIC ASSEMBLY                     | LEAD (Pb)-FREE ASSEMBLY |
|---------------------------------------------------------|--------------------------------------------|-------------------------|
| <b>PREHEAT AND SOAK</b>                                 |                                            |                         |
| Temperature min. ( $T_{Smin.}$ )                        | 100 °C                                     | 150 °C                  |
| Temperature max. ( $T_{Smax.}$ )                        | 150 °C                                     | 200 °C                  |
| Time ( $t_s$ ) from ( $T_{Smin.}$ to $T_{Smax.}$ )      | 60 s to 120 s                              | 60 s to 120 s           |
| <b>RAMP UP</b>                                          |                                            |                         |
| Ramp-up rate ( $T_L$ to $T_P$ )                         | 3 °C/s maximum                             |                         |
| Liquidus temperature ( $T_L$ )                          | 183 °C                                     | 217 °C                  |
| Time ( $t_L$ ) maintained above $T_L$                   | 60 s to 150 s                              |                         |
| Peak package body temperature ( $T_P$ ) max.            | Depends on type and case - see table below |                         |
| Time ( $t_p$ ) within 5 °C of the peak max. temperature | 20 s                                       | 5 s                     |
| <b>RAMP DOWN</b>                                        |                                            |                         |
| Ramp-down rate ( $T_P$ to $T_L$ )                       | 6 °C/s maximum                             |                         |
| Time from 25 °C to peak temperature                     | 6 min maximum                              | 8 min maximum           |

**PEAK PACKAGE BODY TEMPERATURE ( $T_P$ ) MAXIMUM**

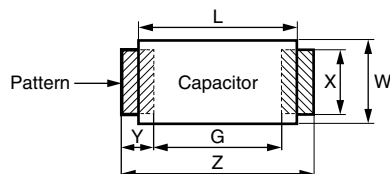
| TYPE | CASE CODE                      | PEAK PACKAGE BODY TEMPERATURE ( $T_P$ ) MAX. |                         |
|------|--------------------------------|----------------------------------------------|-------------------------|
|      |                                | SnPb EUTECTIC ASSEMBLY                       | LEAD (Pb)-FREE ASSEMBLY |
| T55  | J, P, A, T, B, Z, V, D         | n/a                                          | 260 °C                  |
| T52  | E1, E5, M1                     |                                              | 260 °C                  |
| T58  | MM, M0, W9, W0, A0, AA, B0, BB |                                              | 260 °C                  |
| T59  | EE                             | 220 °C                                       | 250 °C                  |
| T54  | EE                             | 220 °C                                       | 250 °C                  |

**Notes**

- T52, T55, and T58 capacitors are process sensitive. PSL classification to JEDEC J-STD-075: R4G
- T54 and T59 capacitors are process sensitive. PSL classification to JEDEC J-STD-075: R6G

## MOLDED CAPACITORS, T55 TYPE

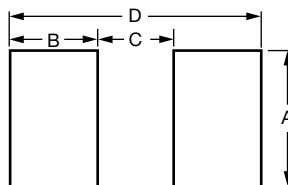
### PAD DIMENSIONS in millimeters



| CASE /<br>DIMENSIONS | CAPACITOR SIZE |      | PAD DIMENSIONS |          |          |          |
|----------------------|----------------|------|----------------|----------|----------|----------|
|                      | L              | W    | G (max.)       | Z (min.) | X (min.) | Y (Ref.) |
| J                    | 1.6            | 0.8  | 0.7            | 2.5      | 1.0      | 0.9      |
| P                    | 2.0            | 1.25 | 0.5            | 2.6      | 1.2      | 1.05     |
| A                    | 3.2            | 1.6  | 1.1            | 3.8      | 1.5      | 1.35     |
| T / B                | 3.5            | 2.8  | 1.4            | 4.1      | 2.7      | 1.35     |
| Z / V / D            | 7.3            | 4.3  | 4.1            | 8.2      | 2.9      | 2.05     |

## LEADFRAMELESS MOLDED CAPACITORS, ALL TYPES

### PAD DIMENSIONS in inches [millimeters]



| FAMILY    | CASE CODE  | A (NOM.)     | B (MIN.)     | C (NOM.)     | D (MIN.)     |
|-----------|------------|--------------|--------------|--------------|--------------|
| T52       | E1 / E5    | 0.094 [2.40] | 0.073 [1.85] | 0.187 [4.75] | 0.333 [8.45] |
|           | M1         | 0.161 [4.10] | 0.073 [1.85] | 0.187 [4.75] | 0.333 [8.45] |
| T58       | MM, M0     | 0.024 [0.61] | 0.027 [0.70] | 0.025 [0.64] | 0.080 [2.03] |
|           | W0, W9     | 0.035 [0.89] | 0.029 [0.74] | 0.041 [1.05] | 0.099 [2.52] |
|           | AA, A0, A2 | 0.047 [1.19] | 0.042 [1.06] | 0.065 [1.65] | 0.148 [3.76] |
|           | BB, B0     | 0.094 [2.39] | 0.044 [1.11] | 0.072 [1.82] | 0.159 [4.03] |
| T59 / T54 | EE         | 0.209 [5.30] | 0.098 [2.50] | 0.169 [4.30] | 0.366 [9.30] |

## GUIDE TO APPLICATION

- AC Ripple Current:** the maximum allowable ripple current shall be determined from the formula:

$$I_{RMS} = \sqrt{\frac{P}{R_{ESR}}}$$

where,

P = power dissipation in W at +45 °C as given in the tables in the product datasheets.

R<sub>ESR</sub> = the capacitor equivalent series resistance at the specified frequency.

- AC Ripple Voltage:** the maximum allowable ripple voltage shall be determined from the formula:

$$V_{RMS} = Z \sqrt{\frac{P}{R_{ESR}}}$$

or, from the formula:

$$V_{RMS} = I_{RMS} \times Z$$

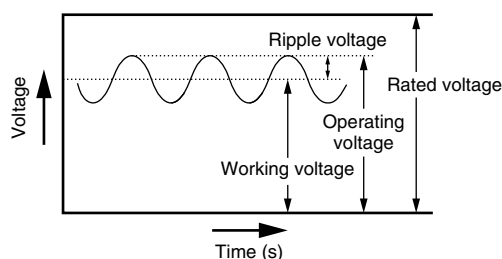
where,

P = power dissipation in W at +45 °C as given in the tables in the product datasheets.

R<sub>ESR</sub> = The capacitor equivalent series resistance at the specified frequency.

Z = The capacitor impedance at the specified frequency.

- The tantalum capacitors must be used in such a condition that the sum of the working voltage and ripple voltage peak values does not exceed the rated voltage as shown in figure below.



- Temperature Derating:** power dissipation is affected by the heat sinking capability of the mounting surface. If these capacitors are to be operated at temperatures above +45 °C, the permissible ripple current (or voltage) shall be calculated using the derating coefficient as shown in the table below:

| MAXIMUM RIPPLE CURRENT TEMPERATURE DERATING FACTOR |     |
|----------------------------------------------------|-----|
| ≤ 45 °C                                            | 1.0 |
| 55 °C                                              | 0.8 |
| 85 °C                                              | 0.6 |
| 105 °C                                             | 0.4 |

- Reverse Voltage:** the capacitors are not intended for use with reverse voltage applied. However, they are capable of withstanding momentary reverse voltage peaks, which must not exceed the following values:  
At 25 °C: 10 % of the rated voltage or 1 V, whichever is smaller.

At 85 °C: 5 % of the rated voltage or 0.5 V, whichever is smaller.

At 105 °C: 3 % of the rated voltage or 0.3 V, whichever is smaller.

- Mounting Precautions:**

- Limit Pressure on Capacitor Installation with Moulder:** pressure must not exceed 4.9 N with a tool end diameter of 1.5 mm when applied to the capacitors using an absorber, centering tweezers, or similar (maximum permitted pressurization time: 5 s). An excessively low absorber setting position would result in not only the application of undue force to the capacitors but capacitor and other component scattering, circuit board wiring breakage, and / or cracking as well, particularly when the capacitors are mounted together with other chips having a height of 1 mm or less.

- Flux Selection**

- Select a flux that contains a minimum of chlorine and amine.

- After flux use, the chlorine and amine in the flux remain must be removed.

- Cleaning After Mounting:** the following solvents are usable when cleaning the capacitors after mounting. Never use a highly active solvent.

- Halogen organic solvent (HCFC225, etc.)
- Alcoholic solvent (IPA, ethanol, etc.)
- Petroleum solvent, alkali saponifying agent, water, etc.

Circuit board cleaning must be conducted at a temperature of not higher than 50 °C and for an immersion time of not longer than 30 minutes. When an ultrasonic cleaning method is used, cleaning must be conducted at a frequency of 48 kHz or lower, at an vibrator output of 0.02 W/cm<sup>3</sup>, at a temperature of not higher than 40 °C, and for a time of 5 minutes or shorter.

### Notes

- Care must be exercised in cleaning process so that the mounted capacitor will not come into contact with any cleaned object or the like or will not get rubbed by a stiff brush or similar. If such precautions are not taken particularly when the ultrasonic cleaning method is employed, terminal breakage may occur.
- When performing ultrasonic cleaning under conditions other than stated above, conduct adequate advance checkout.



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