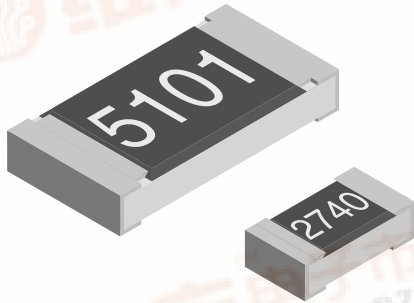


**TNPW**

Vishay Dale

**VISHAY****Thin Film, Rectangular, Resistor Chips****FEATURES**

- Metal film layer on high quality ceramic
- Protective top coat
- Solder contacts on Ni barrier layer  
(2010/2512 size = 100% Sn on Ni barrier)
- Excellent stability at different environmental conditions
- Low TC and tight tolerances

**STANDARD ELECTRICAL SPECIFICATIONS**

| MODEL    | SIZE |        | POWER RATING<br>P <sub>70°C</sub> (W) |         | LIMITING ELEMENT<br>VOLTAGE<br><br>V $\cong$ MAX. | TEMPERATURE<br>COEFFICIENT<br><br>ppm/°C | TOLERANCE<br><br>%     | RESISTANCE<br>RANGE<br><br>$\Omega$ | E-SERIES             |
|----------|------|--------|---------------------------------------|---------|---------------------------------------------------|------------------------------------------|------------------------|-------------------------------------|----------------------|
|          | INCH | METRIC | CECC<br>40401-801                     | EIA 575 |                                                   |                                          |                        |                                     |                      |
| TNPW0402 | 0402 | 1005   | 0.063                                 | 0.062   | 25                                                | 25<br>100<br>100                         | 0.5<br>0.5<br>0.5      | 100R-10K<br>10R-91R<br>11K-100K     | 24-96<br>24<br>24-96 |
| TNPW0603 | 0603 | 1608   | 0.1                                   | 0.062   | 75                                                | 25<br>25                                 | 0.1<br>0.5             | 100R-330K<br>10R-91R                | 24-96                |
| TNPW0805 | 0805 | 2012   | 0.125                                 | 0.1     | 100                                               | 15<br>25, 50<br>25, 50                   | 0.1<br>0.1, 0.5<br>0.5 | 100R-252K<br>49R9-252K<br>10R-49R8  | 24-192<br>24-192     |
| TNPW1206 | 1206 | 3216   | 0.25                                  | 0.125   | 100                                               | 15<br>25, 50<br>50                       | 0.1<br>0.1, 0.5<br>0.5 | 100R-1M<br>49R9-1M<br>22R1-49R8     | 24-192<br>24-192     |
| TNPW1210 | 1210 | 3225   | 0.33*                                 | 0.25    | 100                                               | 25, 50<br>50                             | 0.1, 0.5<br>0.5        | 49R9-1M<br>22R1-49R8                | 24-192               |
| TNPW2010 | 2010 | 5025   |                                       | 0.4     | 150                                               | 50<br>25                                 | 0.5<br>0.1             | 22R1-49R8<br>49R9-362K              | 24-96<br>24-96       |
| TNPW2512 | 2512 | 6332   |                                       | 0.5     | 200                                               | 50<br>25                                 | 0.5<br>0.1             | 22R1-49R8<br>49R9-700K              | 24-96<br>24-96       |

\*Size not specified in CECC

- Power rating depends on the max. Temperature at the solder point, the component placement density and the substrate material

- Extended values available on request.
- Looser tolerance or TC available
- Marking : 3 digits or 4 digits, 0402 no marking

**TECHNICAL SPECIFICATIONS**

| PARAMETER                                           | UNIT            | TNPW0402               |       | TNPW0603            |       | TNPW0805            |     | TNPW1206            |       | TNPW1210            |      | TNPW2010           |     | TNPW2512           |     |
|-----------------------------------------------------|-----------------|------------------------|-------|---------------------|-------|---------------------|-----|---------------------|-------|---------------------|------|--------------------|-----|--------------------|-----|
| Rated Dissipation at 70°C<br>(CECC 40401   EIA 575) | W               | 0.063                  | 0.062 | 0.1                 | 0.062 | 0.125               | 0.1 | 0.25                | 0.125 | 0.33                | 0.25 |                    | 0.4 |                    | 0.5 |
| Limiting Element Voltage <sup>2)</sup>              | V ≅             | 25                     |       | 75                  |       | 100                 |     | 100                 |       | 100                 |      | 150                |     | 200                |     |
| Thermal Resistance <sup>1)</sup>                    | K/W             | ≤ 870 <sup>1)</sup>    |       | ≤ 550 <sup>1)</sup> |       | ≤ 440 <sup>1)</sup> |     | ≤ 220 <sup>1)</sup> |       | ≤ 140 <sup>1)</sup> |      | ≤ 90 <sup>1)</sup> |     | ≤ 70 <sup>1)</sup> |     |
| Insulation Resistance                               | Ω               | > 10 <sup>9</sup>      |       |                     |       |                     |     |                     |       |                     |      |                    |     |                    |     |
| Category Temperature Range                          | °C              | - 55 / + 125 (+ 155)   |       |                     |       |                     |     |                     |       |                     |      |                    |     |                    |     |
| Failure Rate                                        | h <sup>-1</sup> | 0.3 • 10 <sup>-9</sup> |       |                     |       |                     |     |                     |       |                     |      |                    |     |                    |     |
| Weight / 1000pcs                                    | g               | 0.65                   |       | 2                   |       | 5.5                 |     | 10                  |       | 16                  |      | 28                 |     | 39                 |     |

<sup>1)</sup> Measuring conditions in acc. with CECC 40401<sup>2)</sup> Rated voltage:  $\sqrt{P \times R}$ **ORDERING INFORMATION**

| TNPW0805 | 1002                                                                                 | B                                                                 | T9                                                                                                                            | RT1                                 |
|----------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| MODEL    | RESISTANCE VALUE<br>$\Omega$<br>Ex: 1501 = 1.5k<br>10R0 = 10 $\Omega$<br>3303 = 330k | TOLERANCE<br>B = $\pm 0.1\%$<br>C = 0.25%<br>D = 0.5%<br>F = 1.0% | TC<br>T1 = $\pm 100$ ppm/°C<br>T2 = $\pm 50$ ppm/°C<br>T9 = $\pm 25$ ppm/°C<br>T10 = $\pm 15$ ppm/°C<br>T13 = $\pm 10$ ppm/°C | PACKAGING<br>RT1 Papertape 5000 pcs |

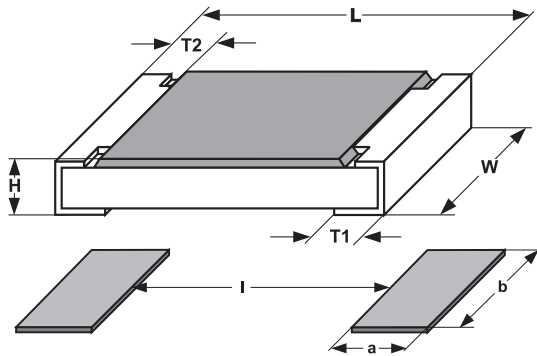


## Thin Film, Rectangular, Resistor Chips

**TNPW**

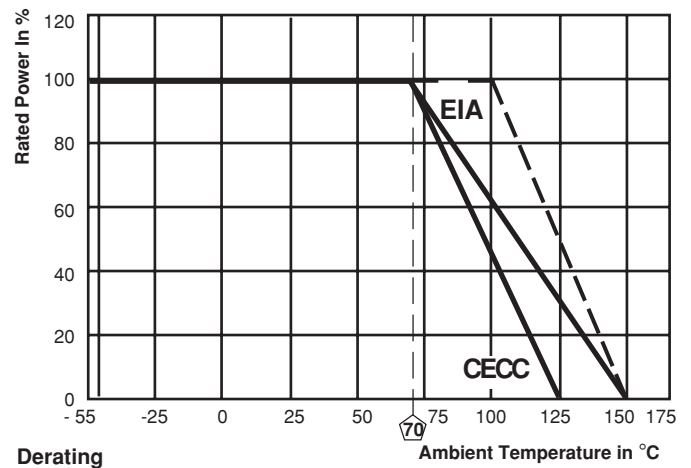
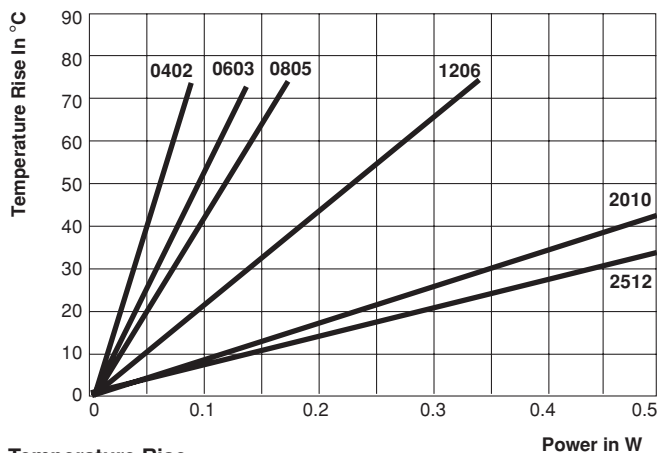
Vishay Dale

### DIMENSIONS



| SIZE |        | DIMENSIONS millimeters |             |             |            |    |
|------|--------|------------------------|-------------|-------------|------------|----|
| inch | metric | L                      | W           | H           | T1         | T2 |
| 0402 | 1005   | 1.00 ± 0.05            | 0.50 ± 0.05 | 0.35 ± 0.05 | 0.2 ± 0.1  |    |
| 0603 | 1608   | 1.6 ± 0.2              | 0.81 ± 0.2  | 0.4 ± 0.1   | 0.3 ± 0.2  |    |
| 0805 | 2012   | 2.0 ± 0.2              | 1.24 ± 0.2  | 0.4 ± 0.1   | 0.4 ± 0.25 |    |
| 1206 | 3216   | 3.2 ± 0.15             | 1.6 ± 0.15  | 0.61 ± 0.15 | 0.5 ± 0.25 |    |
| 1210 | 3225   | 3.2 ± 0.15             | 2.49 ± 0.15 | 0.61 ± 0.15 | 0.46 ± 0.2 |    |
| 2010 |        | 5.0 ± 0.15             | 2.5 ± 0.15  | 0.61 ± 0.15 | 0.6 ± 0.25 |    |
| 2512 |        | 6.3 ± 0.20             | 3.1 ± 0.15  | 0.61 ± 0.15 | 0.6 ± 0.25 |    |

| SIZE |        | SOLDER PAD DIMENSIONS millimeters |     |     |                |     |     |
|------|--------|-----------------------------------|-----|-----|----------------|-----|-----|
|      |        | REFLOW SOLDERING                  |     |     | WAVE SOLDERING |     |     |
| inch | metric | a                                 | b   | l   | a              | b   | l   |
| 0402 | 1005   | 0.4                               | 0.6 | 0.5 |                |     |     |
| 0603 | 1608   | 0.5                               | 0.9 | 1.0 | 0.9            | 0.9 | 1.0 |
| 0805 | 2012   | 0.7                               | 1.3 | 1.2 | 0.9            | 1.3 | 1.3 |
| 1206 | 3216   | 0.9                               | 1.7 | 2.0 | 1.1            | 1.7 | 2.3 |
| 1210 | 3225   | 0.9                               | 2.5 | 2.0 | 1.1            | 2.5 | 2.3 |
| 2010 |        | 1.0                               | 2.5 | 3.9 | 1.2            | 2.5 | 3.9 |
| 2512 |        | 1.0                               | 3.2 | 5.2 | 1.2            | 3.2 | 5.2 |



Temperature Rise

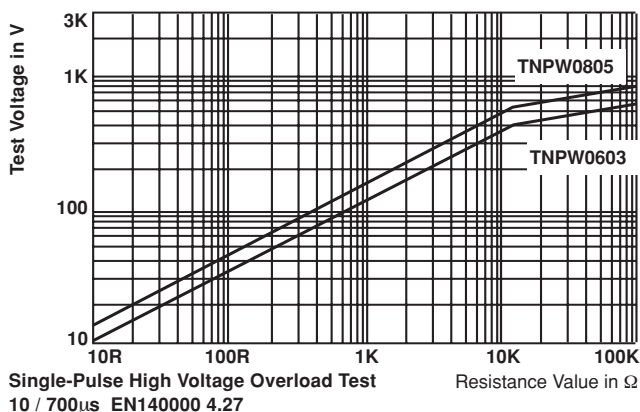
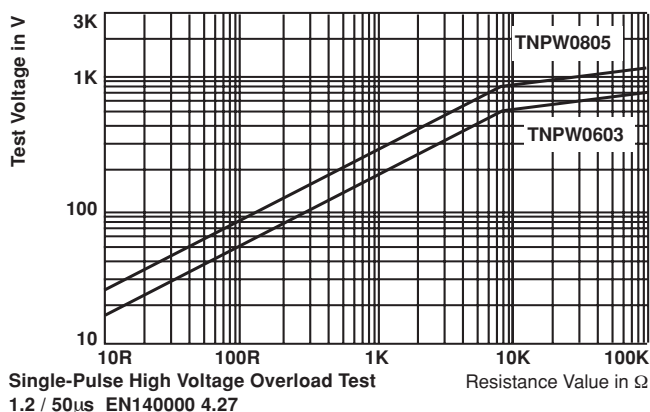
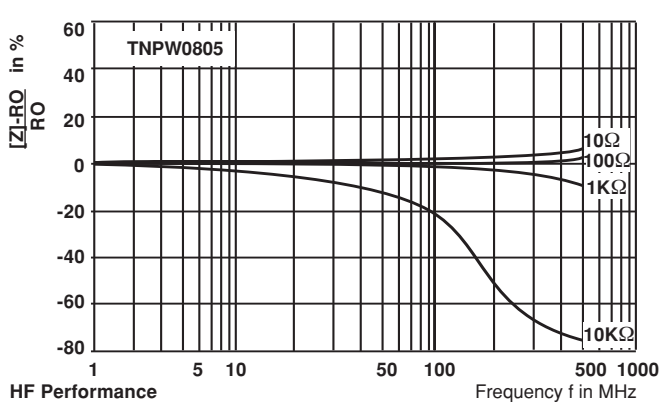
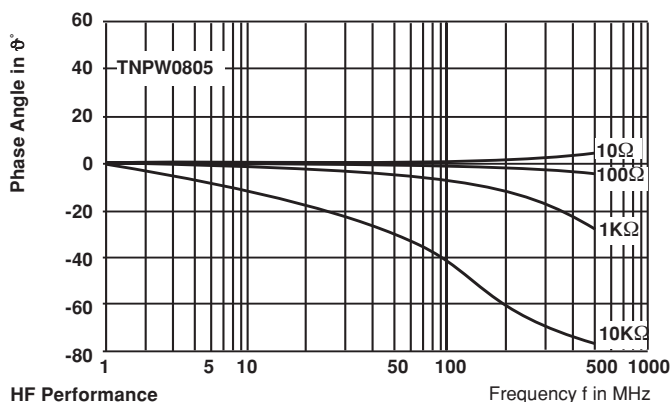
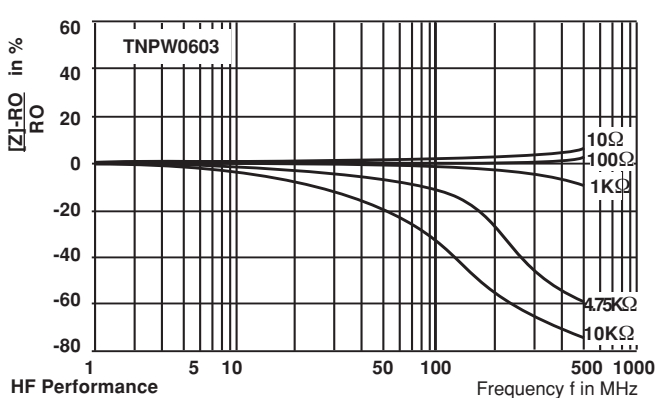
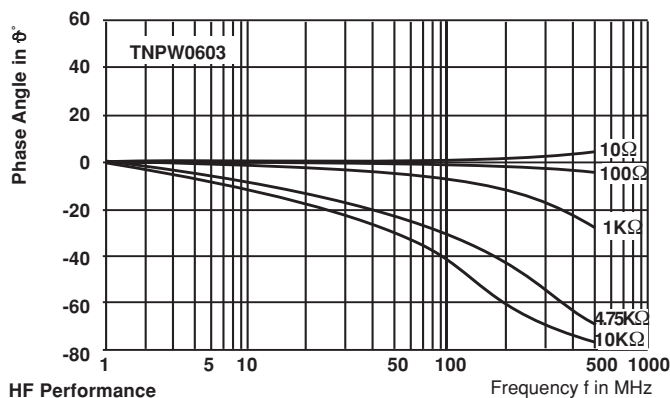
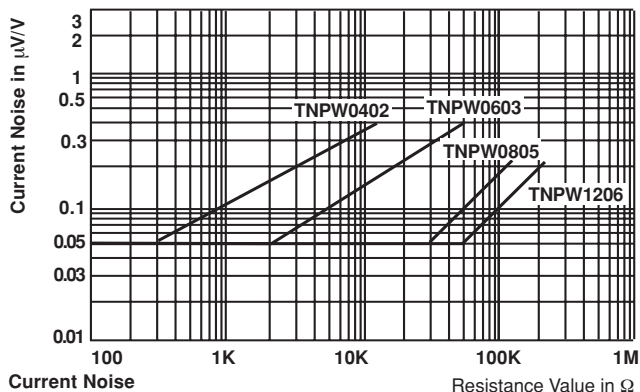
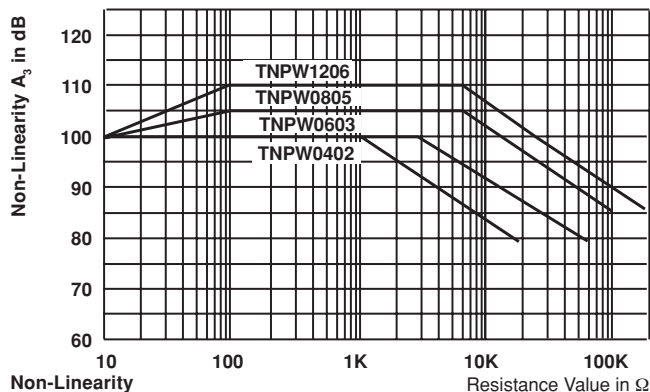
Derating

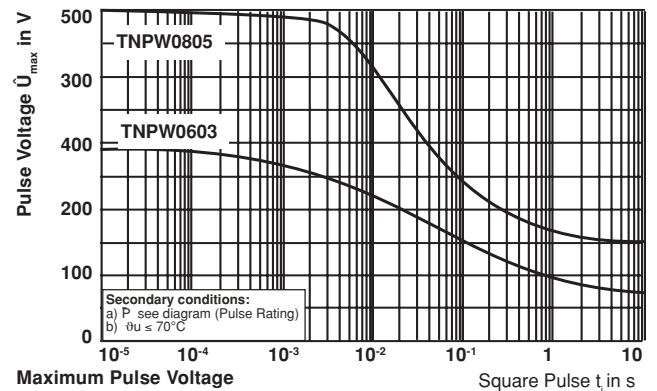
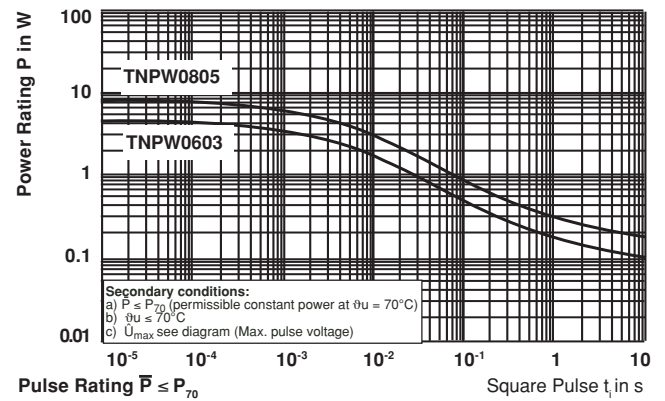
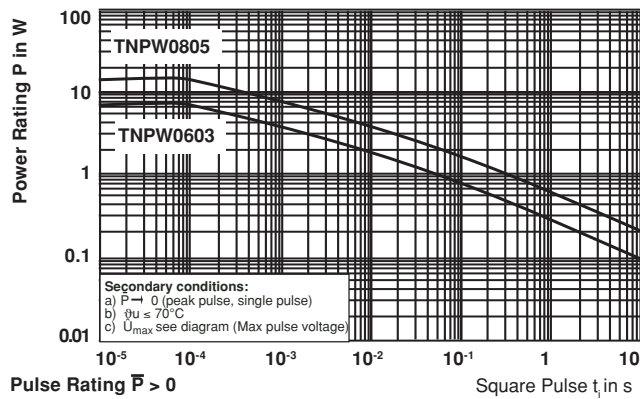
| PACKAGING |                                |               |               |                     |         |
|-----------|--------------------------------|---------------|---------------|---------------------|---------|
| MODEL     | REEL                           |               |               |                     |         |
|           | TAPE WIDTH                     | DIAMETER      | PIECES / REEL | PACKAGING CODE      |         |
|           |                                |               |               | PAPER <sup>2)</sup> | BLISTER |
| TNPW0402  | 8mm Papertape                  | 180mm / 7"    | 10000         | RT7                 |         |
| TNPW0603  | 8mm Paper                      | 180mm / 7"    | 5000          | RT1                 |         |
|           |                                | 292mm / 11.5" | 10000         | RT5                 |         |
| TNPW0805  | 8mm                            | 180mm / 7"    | 1000          | R52                 | R75     |
| TNPW1206  | Paper/Blisertape <sup>1)</sup> | 180mm / 7"    | 5000          | RT1                 | RG1     |
|           |                                | 292mm / 11.5" | 10000         | RT5                 | RT4     |
| TNPW1210  | 8mm Paper                      | 180mm / 7"    | 5000          | RT1                 |         |
|           |                                | 292mm / 11.5" | 10000         | RT5                 |         |
| TNPW2010  | 12mm Blisertape                | 180mm/7"      | 4000          |                     | R02     |
| TNPW2512  | 12mm Blisertape                | 180mm/7"      | 2000          |                     | R67     |
|           |                                |               | 4000          |                     | R82     |

<sup>1)</sup> only in combination with 180mm/7" and 330mm/13" plastic reel

<sup>2)</sup> plastic reel

• further information about packaging: see appropriate catalog or web page





| PERFORMANCE                                                      |                                                                                            |              |              |           |           |  |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------|--------------|-----------|-----------|--|
| TEST                                                             | CONDITIONS OF TEST                                                                         | TEST RESULTS |              |           |           |  |
|                                                                  |                                                                                            | 0402         | 0603 TO 2512 |           |           |  |
|                                                                  |                                                                                            | TOLERANCES % |              |           |           |  |
|                                                                  |                                                                                            | 0.5          | 0.1 / 0.25   |           | 0.5, 1.0% |  |
| < 100R                                                           | ≥ 100R                                                                                     |              |              |           |           |  |
| Endurance Test at 70°C<br>IEC 60115-1 4.25.1                     | 1000 hours at 70°C, 1.5 hours “ON”, 0.5 hours “OFF”                                        | ≤ ± 3%       | ≤ ± 0.1%     | ≤ ± 0.05% | ≤ ± 0.25% |  |
| Endurance at UCT<br>IEC 60115-1 4.25.3                           | 1000 hours at 125 °C without load                                                          | ≤ ± 3%       | ≤ ± 0.1%     | ≤ ± 0.05% | ≤ ± 0.5%  |  |
| Overload Test<br>IEC 60115-1 4.13                                | Short time overload for 2 seconds<br>2.5 x rated voltage or ≤ 2 x limiting element voltage | ≤ ± 2%       | ≤ ± 0.05%    | ≤ ± 0.02% | ≤ ± 0.1%  |  |
| Thermal Shock<br>IEC 60115-1 4.19, IEC 60068-2-14                | Rapid change between upper and lower<br>category temperature                               | ≤ ± 1%       | ≤ ± 0.05%    | ≤ ± 0.02% | ≤ ± 0.1%  |  |
| Damp Heat Steady State<br>IEC 60115-1 4.24, IEC 60068-2-3        | 56 days at 40°C and 93% relative humidity                                                  | ≤ ± 3%       | ≤ ± 0.1%     | ≤ ± 0.05% | ≤ ± 0.5%  |  |
| Resistance to Soldering Heat<br>IEC 60115-1 4.18, IEC 60068-2-20 | 10 seconds at 260°C solder bath temperature                                                | ≤ ± 2%       | ≤ ± 0.05%    | ≤ ± 0.02% | ≤ ± 0.1%  |  |

**APPLICABLE SPECIFICATIONS**

- CECC40000 / 40400 / 40401-801
- EN140400 / IEC 60115 – 1
- EIA 575