# WESURGE Spezifikation für Freigabe / specification for release

Kunde / customer :
Artikelnummer / part number : **820 474 211** Datum / Date : **2006-06-28**

Bezeichnung :
description : **HIGH SURGE VARISTOR DISC** DIAM: **7** MM ROHS Compliant

## A Elektrische Eigenschaften / electrical properties :

TECHNICAL DATA

| Part Number | Breakdown Voltage | Tolerance | Working Voltage | | Clamping Voltage | Current Clamp. Volt. | Peak Current Withstanding C. |
|---|---|---|---|---|---|---|---|
| | (V@mA) (*1) | (%) | AC | DC | V (*2) | (A) | A (*3) |
| **820474211** | **680** | **10** | **420** | **560** | **1120** | **10** | **1750** |

* 1 The varistor voltage was measured at 0.1 mA current for 5 mm diameter and 1 mA current for other
* 2 The Clamping voltage measured at "Current Clamping Voltage" see next column
* 3 The Peak Current was tested at 8/20 us waveform for 1 time

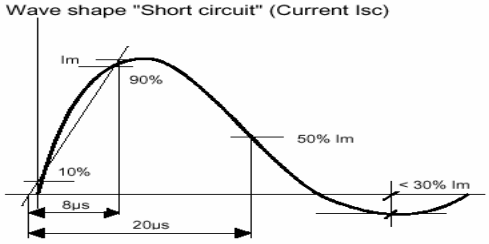
| Part Number | Rated Wattage | Energy | Capacitance | Certification UL | Certification CSA | Certification VDE | Diameter |
|---|---|---|---|---|---|---|---|
| | (W) | J (*4) | pF (*5) | (*6) | (*7) | (*8) | (mm) |
| **820474211** | **0.25** | **56.0** | **78** | **yes** | **yes** | **yes** | **7** |

* 4. The Energy measured at 10/1000 µs waveform for 1 time
* 5. The capacitance value measured at standard frequency @ 1kHz
* 6. Certification UL N° XUHT2.E244196
* 7. Certification CSA N° XUHT8.E244196
* 8. Certification VDE N° 40016998 & 40016986

SURGE LEVEL IEC61000-4-5

| Severity Level | (kV) |
|---|---|
| 1 | 0,5 |
| 2 | 1 |
| 3 | 2 |
| 4 | 4 |
| X | Special |

Wave shape "Short circuit" (Current Isc)




| Wave during | T1 | T2 |
|---|---|---|
| 8/20 µs | 10 µs | 1000 µs |
| 10/700 µs CCITT | 10 µs | 700 µs |
| 10/1000 µs | 10 µs | 1000 µs |

MARKING CODE

ORDER CODE

| 820 | X | X | XXX | X | | S |
|---|---|---|---|---|---|---|
| Varistor Type | Serie | Diameter | Vrms Voltage Code | Tolerance | Other | Special Type |
| Disc Varistor | 5 = Standard<br>4 = High Surge | 5 = 5 mm<br>7 = 7 mm<br>1 = 10 mm<br>4 = 14 mm<br>2 = 20 mm | Example:<br>180 = 18 V<br>271 = 270 V<br>102 = 1 000 V | 5 = 5%<br>1 = 10%<br>6 = 15%<br>2 = 20%<br>7 = 25%<br>3 = 30% | Lead Diameter<br>Lead Pitch<br>Lead Style<br>Packing | See Table<br>See Table<br>Straight lead<br>Ammopack<br>with lead 20 mm |


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Kunde / customer :
Artikelnummer / part number : **820474211**

Bezeichnung :
description : **HIGH SURGE VARISTOR DISC** DIAM: **7** MM

## B Mechanische Abmessungen / dimensions :

SIZE

| **Diameter*** | **Ø 5** | **Ø 7** | **Ø 10** | **Ø 14** | **Ø 20** |
|---|---|---|---|---|---|
| D max. | 7,5 | 9,0 | 12,5 | 16,5 | 23,0 |
| d +/-0,05 | 0,6 | 0,6 | 0,6/0,8 | 0,8/1,0 | 0,8/1,0 |
| F +/-1,0 | 5,0 | 5,0 | 5,0/7,5 | 7,5/10,0 | 7,5/10,0 |
| H max. | 11 | 13 | 18 | 22 | 28 |
| H1 max | 3,5 | 3,5 | 5,0 | 5,0 | 5,0 |
| L1 min. | 25 | 25 | 25 | 25 | 25 |
| L min. | 24 | 24 | 24 | 24 | 24 |

(mm) - *Disc diameter before epoxy

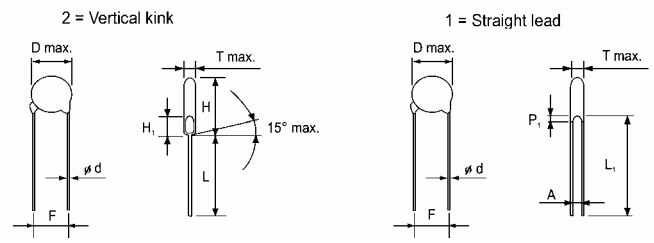


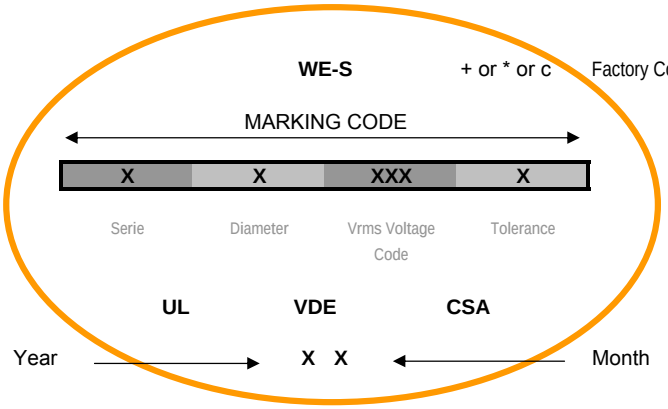

Table of T max., A & $P_1$ . Unit : (mm)

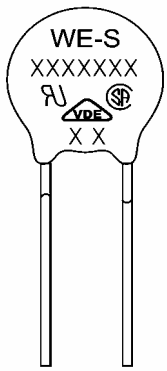
| **Diameter** | **Ø 5** | | | **Ø 7** | | | **Ø 10** | | | **Ø 14** | | | **Ø 20** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Voltage Code | T max | A+/-0,8 | $P_1$ | T max | A+/-0,8 | $P_1$ | T max | A+/-0,8 | $P_1$ | T max | A+/-0,8 | $P_1$ | T max | A+/-0,8 | $P_1$ |
| 180 | 4,5 | 1,4 | 3,0 | 4,5 | 1,4 | 3,0 | 4,9 | 1,4 | 3,0 | 5,0 | 1,5 | 3,0 | 5,2 | 1,5 | 3,0 |
| 220 | 4,5 | 1,5 | 3,0 | 4,5 | 1,5 | 3,0 | 4,9 | 1,5 | 3,0 | 5,0 | 1,6 | 3,0 | 5,3 | 1,6 | 3,0 |
| 270 | 4,7 | 1,5 | 3,0 | 4,7 | 1,5 | 3,0 | 5,1 | 1,5 | 3,0 | 5,2 | 1,7 | 3,0 | 5,4 | 1,7 | 3,0 |
| 330 | 4,7 | 1,6 | 3,0 | 4,7 | 1,6 | 3,0 | 5,1 | 1,6 | 3,0 | 5,2 | 1,8 | 3,0 | 5,4 | 1,8 | 3,0 |
| 390 | 4,7 | 1,8 | 3,0 | 4,7 | 1,8 | 3,0 | 5,1 | 1,8 | 3,0 | 5,2 | 2,0 | 3,0 | 5,4 | 2,0 | 3,0 |
| 470 | 5,0 | 1,8 | 3,0 | 5,0 | 1,8 | 3,0 | 5,5 | 1,8 | 3,0 | 5,6 | 2,0 | 3,0 | 5,6 | 2,0 | 3,0 |
| 560 | 5,0 | 2,0 | 3,0 | 5,0 | 2,0 | 3,0 | 5,5 | 2,0 | 3,0 | 5,6 | 2,2 | 3,0 | 5,6 | 2,2 | 3,0 |
| 680 | 5,5 | 2,3 | 3,0 | 5,5 | 2,3 | 3,0 | 6,0 | 2,3 | 3,0 | 6,1 | 2,5 | 3,0 | 6,1 | 2,5 | 3,0 |
| 820 | 3,8 | 1,4 | 3,0 | 3,8 | 1,4 | 3,0 | 4,3 | 1,4 | 3,0 | 4,4 | 1,6 | 3,0 | 4,9 | 1,8 | 3,0 |
| 101 | 3,9 | 1,4 | 3,0 | 3,9 | 1,4 | 3,0 | 4,4 | 1,4 | 3,0 | 4,5 | 1,6 | 3,0 | 5,1 | 1,8 | 3,0 |
| 121 | 4,1 | 1,5 | 3,0 | 4,1 | 1,5 | 3,0 | 4,5 | 1,5 | 3,0 | 4,6 | 1,7 | 3,0 | 5,3 | 1,9 | 3,0 |
| 151 | 4,5 | 1,8 | 3,0 | 4,5 | 1,8 | 3,0 | 4,9 | 1,8 | 3,0 | 5,1 | 2,0 | 3,0 | 5,6 | 2,2 | 3,0 |
| 181 | 4,1 | 1,6 | 3,0 | 4,1 | 1,6 | 3,0 | 4,5 | 1,6 | 3,0 | 4,7 | 1,8 | 3,0 | 5,2 | 2,0 | 3,0 |
| 201 | 4,2 | 1,6 | 3,0 | 4,2 | 1,6 | 3,0 | 4,6 | 1,6 | 3,0 | 4,8 | 1,8 | 3,0 | 5,3 | 2,0 | 3,0 |
| 221 | 4,3 | 1,7 | 3,0 | 4,3 | 1,7 | 3,0 | 4,7 | 1,7 | 3,0 | 4,9 | 1,9 | 3,0 | 5,4 | 2,1 | 3,0 |
| 241 | 4,4 | 1,7 | 3,0 | 4,4 | 1,9 | 3,0 | 4,8 | 1,9 | 3,0 | 5,0 | 2,1 | 3,0 | 5,5 | 2,3 | 3,0 |
| 271 | 4,6 | 1,9 | 3,0 | 4,6 | 2,0 | 3,0 | 5,0 | 2,0 | 3,0 | 5,2 | 2,1 | 3,0 | 5,7 | 2,5 | 3,0 |
| 301 | 4,8 | 1,9 | 3,0 | 4,8 | 2,1 | 3,0 | 5,2 | 2,2 | 3,0 | 5,4 | 2,3 | 3,0 | 5,9 | 2,7 | 3,0 |
| 331 | 4,9 | 1,9 | 3,0 | 4,9 | 2,1 | 3,0 | 5,3 | 2,2 | 3,0 | 5,5 | 2,3 | 3,0 | 6,0 | 2,7 | 3,0 |
| 361 | 5,1 | 2,4 | 3,0 | 5,1 | 2,5 | 3,0 | 5,5 | 2,5 | 3,0 | 5,7 | 2,7 | 3,0 | 6,2 | 2,9 | 3,0 |
| 391 | 5,3 | 2,6 | 3,5 | 5,3 | 2,6 | 3,5 | 5,7 | 2,8 | 3,5 | 5,9 | 2,8 | 3,5 | 6,4 | 3,0 | 3,5 |
| 431 | 6,1 | 2,7 | 3,5 | 6,1 | 2,9 | 3,5 | 6,5 | 3,1 | 3,5 | 6,7 | 3,1 | 3,5 | 7,2 | 3,3 | 3,5 |
| 471 | 6,4 | 2,8 | 3,5 | 6,4 | 2,9 | 3,5 | 6,8 | 3,2 | 3,5 | 7,0 | 3,3 | 3,5 | 7,5 | 3,5 | 4,0 |
| 511 | 6,6 | 3,1 | 4,0 | 6,6 | 3,1 | 4,0 | 7,0 | 3,7 | 4,0 | 7,2 | 3,7 | 4,0 | 7,7 | 3,9 | 4,0 |
| 561 | 6,9 | 3,4 | 4,0 | 6,9 | 3,4 | 4,0 | 7,3 | 4,0 | 4,0 | 7,5 | 4,0 | 4,0 | 8,0 | 4,2 | 4,0 |
| 621 | 7,2 | 3,7 | 4,0 | 7,2 | 3,7 | 4,0 | 7,6 | 4,6 | 4,0 | 7,8 | 4,4 | 4,0 | 8,3 | 4,7 | 4,0 |
| 681 | 7,5 | 4,0 | 4,0 | 7,5 | 4,0 | 4,0 | 8,0 | 5,0 | 4,0 | 8,2 | 4,7 | 4,0 | 8,7 | 5,0 | 4,0 |
| 751 | 7,9 | 4,3 | 4,0 | 7,9 | 4,3 | 4,0 | 8,4 | 5,0 | 4,0 | 8,6 | 4,9 | 4,0 | 9,1 | 5,1 | 4,0 |
| 781 | | | | 8,1 | 4,5 | 4,0 | 8,6 | 5,2 | 4,0 | 8,8 | 5,2 | 4,0 | 9,3 | 5,4 | 4,0 |
| 821 | | | | 8,3 | 4,7 | 4,0 | 8,8 | 5,2 | 4,0 | 9,0 | 5,2 | 4,0 | 9,5 | 5,4 | 4,0 |
| 911 | | | | | | | 9,4 | 6,0 | 4,0 | 9,6 | 6,0 | 4,0 | 10,1 | 6,3 | 4,0 |
| 102 | | | | | | | 9,9 | 6,0 | 4,0 | 10,1 | 6,2 | 4,0 | 10,7 | 6,4 | 4,0 |
| 112 | | | | | | | 10,5 | 6,3 | 4,0 | 10,7 | 6,7 | 4,0 | 11,2 | 6,9 | 4,0 |
| 182 | | | | | | | 12,6 | 9,8 | 6,0 | 12,8 | 10,2 | 6,0 | 13,5 | 10,4 | 6,0 |

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## C Lötpad / soldering spec. :

MARKING




GENERAL CHARACTERISTICS

| | |
|---|---|
| Storage temerature : | -40 / +125°C |
| Max. reponse time : | 25 n sec |
| Max. operating temperature : | -40 / +125°C |
| Temp. Coefficient of voltage : | 0 - 0.05% / °C max |
| Max. working surface temperature : | +115°C |
| Insulation resistance (at DC 500V) : | Over 1000 Mohm |

LEAD FREE SOLDERING

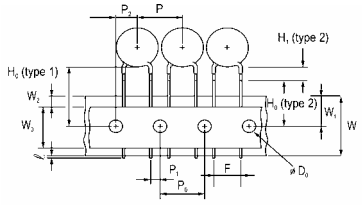
| | |
|---|---|
| Solder | Tin 100% |
| Soldering temperature at | 255°C +/-5 °C |
| Profile soldering | 270°C during 10s |

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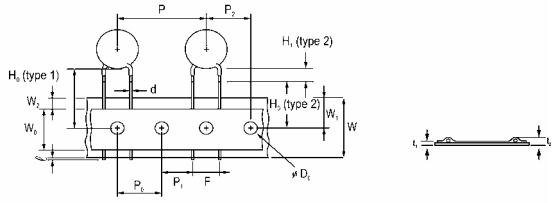
Bezeichnung :
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## D Rollenspezifikation / tape and reel specification :

TAPE 1/2" pitch




1.0" pitch



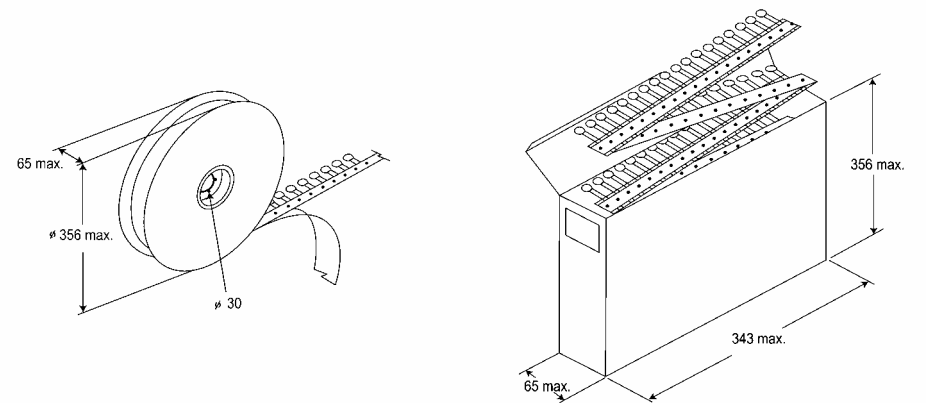

| Item | Ø 5 / 7 | Ø 10 | Ø 10 / 14 / 20 | Ø 14 / 20 |
|---|---|---|---|---|
| Taping pitch | 1/2" | | 1.0" | |
| l | 1,1 mm maxi. | | 1,1 mm maxi. | |
| $H_1$ (type 2) | 3,5 mm maxi. | 5 mm maxi. | 5 mm maxi. | |
| $H_0$ (type 2) | 16 +/-0,5 mm | | 16 +/-0,5 mm | |
| $H_0$ (type 1) | 16 à 21 mm | | 16 à 21 mm | |
| h | +/-2 mm | | +/-2 mm | |
| W | 18 mm +1 / - 0,5 mm | | 18 mm +1 / - 0,5 mm | |
| $W_0$ | 10 mm | | 12 mm | |
| $W_1$ | 9 mm +0,75 / -0,5 mm | | 9 mm +0,75 / -0,5 mm | |
| $W_2$ | 3 mm maxi. | | 3 mm maxi. | |
| F | 5 mm +0,8 / -0,2 mm | | 7,5 mm +0,8 / -0,2 mm | 10 mm +0,8 / -0,2 mm |
| P | 12,7 mm +/-1 mm | | 25,4 mm +/-1 mm | |
| $P_0$ | 12,7 mm +/-0,3 mm | | 12,7 mm +/-0,3 mm | |
| $P_1$ | 3,85 mm +/-0,7 mm | | 8,95 mm +/-0,7 mm | 7,7 mm +/-0,7 mm |
| $P_2$ | 6,35 mm +/-1,3 mm | | 12,7 mm +/-1,3 mm | |
| $D_0$ | 4 mm +/-0,2 mm | | 4 mm +/-0,2 mm | |
| d | 0,6 mm +/-0,05 mm | | 0,8 mm +/-0,05 mm | 1,0 mm +/-0,05 mm |
| T | See T max. table | | See T max. table | |
| $t_1$ | 0,7 mm +/-0,05 mm | | 0,6 mm +/-0,05 mm | |
| $t_2$ | 1,6 mm maxi. | | 1,8 mm maxi. | |

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## D Rollenspezifikation / tape and reel specification :

REEL DIMENSION (Unit : mm)




Lead Free "**LF**" Marking

QUANTITY PER PACKING UNIT

| Diameter | Ø 5 | | | Ø 7 | | | Ø 10 | | | | Ø 14 | | | Ø 20 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bulk | Reel | Ammo | Bulk | Reel | Ammo | Bulk | Reel | Ammo | Ammo | Bulk | Reel | Ammo | Bulk | Reel | Ammo |
| Voltage Serie | (Box) | | | (Box) | | | (Box) | | Pitch 7,5 | Pitch 5 | (Box) | | | (Box) | | |
| 180 à 470 | 5000 | 1500 | 1500 | 5000 | 1500 | 1500 | 2500 | 1000 | 500 | 1000 | 1500 | 750 | 500 | 750 | 500 | 500 |
| 560 à 680 | 5000 | 1500 | 1500 | 5000 | 1500 | 1500 | 2500 | 1000 | 500 | 1000 | 1500 | 750 | 500 | 750 | 500 | 500 |
| 820 à 331 | 5000 | 1500 | 1500 | 5000 | 1500 | 1500 | 2500 | 1000 | 500 | 1000 | 1500 | 750 | 500 | 750 | 500 | 500 |
| 361 à 391 | 5000 | 1500 | 1000 | 5000 | 1500 | 1000 | 2500 | 1000 | 500 | 1000 | 1500 | 750 | 500 | 750 | 500 | 500 |
| 431 à 471 | 5000 | 1500 | 1000 | 5000 | 1000 | 1000 | 2500 | 750 | 500 | 750 | 1500 | 750 | 500 | 750 | 500 | 500 |
| 511 à 751 | 4000 | 1000 | 1000 | 4000 | 1000 | 1000 | 1500 | 500 | 500 | 500 | 750 | 500 | 500 | 450 | 500 | 500 |
| 781 à 182 | - | - | - | - | - | - | 1500 | 500 | 500 | 500 | 750 | 500 | 500 | 450 | 500 | 500 |

QUANTITY PER CARTON UNIT

| Packaging | Bulk (Box) | Reel | Reel Ø 14 / 20 | Ammopack | Ammo Ø 14 / 20 |
|---|---|---|---|---|---|
| Box size | 290 x 155 x 110 | 350 x 350 x 108 | 350 x 350 x 74 | 330 x 240 x 45 | 350 x 260 x 65 |
| Carton size | 310 x 328 x 250 | 371 x 371 x 590 | 370 x 370 x 468 | 354 x 515 x 258 | 365 x 535 x 275 |
| One carton with | 4 boxes | 5 boxes (10 reels) | 6 boxes | 10 boxes | 8 boxes |
| Unit:(mm) | | | | | |

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## E Testbedingungen / test conditions :

BASIC TEST AND ENVIRONMENTAL RELIABILITY TEST

**Humidity**
The specimen shall be subjected to 40+/-2°C, 90 to 95% R.H. For 1000 hours without load and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of Vn shall be measured and meet the requirement of:
$\Delta$ Vn/Vn≤ ± 5%.

**Impulse life**
The impulse current listed on catalog is applied 1000 times continuously with the interval of 30 seconds at room temperature. The change of Vn shall be measured
$\Delta$ Vn/Vn≤ ± 10%

**Low temperature**
The specimen shall be subjected to 40 ±2°C without load for 1000 hours and then stored at room temperature and normal humidity for 1 to 2 hours. Thereafter, the change of Vn shall be measured and meet the requirement of $\Delta$ Vn/Vn ≤± 5%.

**High temperature load**
After being continuously applied the maximum allowable Voltage at 85 ±2°C for 1000 hours, the specimen shall be stored at room temperature and humidity for 1 to 2 hours. The change of Vn shall be measured and meet the requirement of Vn/Vn ≤± 10%.

**High temperature storage**
The specimen shall be subjected to 125 ±1°C for 1000 hours. In a drying oven without load stored at room temperature and humidity for 1 to 2 hours. The change of Vn shall be measured and meet the requirement of $\Delta$ Vn/Vn ≤± 5%.

**Withstanding Voltage**
The specified voltage shall be applied between both terminals of the specimen connected together for 1 minute, with no remarkable mechanical damage.

Withstanding Voltage (Body Insulation)

| Classification (Nom. varistor voltage) | Test Voltage (AC) |
|---|---|
| $V_{0,1mA}$ - $V_{1mA}$ ≤ 330 V | 1 000 Vrms |
| $V_{0,1mA}$ - $V_{1mA}$ > 330 V | 1 500 Vrms |

**Terminal pull strength**
After gradually applying the load specified below and keeping the unit fixed for 10 ±1 seconds, with no remarkable mechanical damage.

| Terminal diameter | Loading weight in pull strength |
|---|---|
| 0.6mm (0.024") | 10N (1.02Kg) |
| 0.8 mm (0.031") | 10N (1.02Kg) |
| 1.0 mm (0.039") | 20N (2.04Kg) |

**Terminal bending strength**
The unit shall be secured with its terminal kept vertical and the weight specified above shall be applied in the axial direction. The terminal shall gradually be bent 90° in one direction, then 90° in the opposite direction, and again back to the original position. A bend of lead wire shall be repeated 2 times, with no remarkable mechanical damage.
Loading weight in bending strength
5N (0.51Kg)
5N (0.51Kg)
10N (1.02Kg)

**Vibration**
Subjected to simple harmonic motion of 0.75 mm amplitude 1.5 mm maximum total excursion between limits of 10-55 Hz. Frequency scan shall be traversed in one minute. This motion shall then be applied for period of 2 hours in each of three mutually perpendicular directions, with no remarkable mechanical damage.

**Solderability**
After dipping the terminal to a depth of approximately 3mm from the body in a soldering bath of 235 ±5°C for 2 ±0.5 seconds, the terminal shall be visually examined. Approximately 95% of the terminals shall be covered with new solder uniformly.

**Resistance to soldering heat**
The terminal shall be dipped into a soldering bath with temperature of 260 ±5°C to a point of 2~2.5 mm from the body of the unit, be held there for 10 ±1 sec (5N series: 5 ±1 sec) and then be stored at room temperature and humidity for 1 to 2 hours. The change of Vn shall be measured and meet the requirement of $\Delta$ Vn/Vn ≤ ± 5% with no remarkable mechanical damage.

**Damp heat load**
The specimen shall be subjected to 40 ±2°C, 90 to 95% R.H. and the maximum allowable voltage for 100 hours and then stored at room temperature and normally humidity for 1 to 2 hours. The change of Vn shall be measured and meet the requirement of
$\Delta$ Vn/Vn ≤ ± 10%.

**Temperature cycle**
The temperature cycle is repeated fives cycles with (1)-40 ±3°C keeping 30 ±3 minutes then (2) room temperature keeping 15 ±3 minutes then (3)125 ±2°C keeping 30 ±3 minutes then (4) room temperature keeping 15 ±3 minutes and then stored at room temperature and humidity for 1 to 2 hours. The change of Vn shall be measured and meet requirement
$\Delta$ Vn/Vn ≤ ± 5% with no remarkable mechanical damage.

| Freigabe erteilt / general release: | **Kunde / customer** |
|---|---|
| Datum / date | Unterschrift / signature |
| | **Würth Elektronik** |
| Geprüft / checked 2006-06-01 | Kontrolliert / approved JP. Penlou |

| Name | Änderung / modification | Datum / date |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| JP Penlou | New P/N | 2006-06-01 |
| JP Penlou | Customer Layout | 2006-05-11 |
| JP Penlou | Factory codes | 2005-11-16 |
| JP Penlou | Lead Free Marking | 2004-10-19 |

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