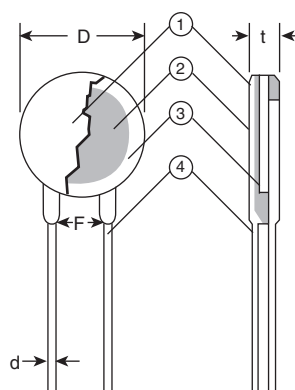




## features

- Flame retardant coating (UL94V0)
- Excellent transient voltage suppression characteristics
- Higher surge current
- Wide varistor voltage
- V-I characteristics are the same in both polarity
- Marking: Green body color with black marking
- UL1449 (3rd Edition) (file no. E328032) NVD05, NVD07: 82~470V, NVD10: 82~1100V, NVD14: 82~910V, NVD20: 200~910V
- VDE (CECC42000, CECC42200, CECC42201, IEC61051: file no. 40015637) NVD05U, NDV07U: 22~470V, NVD10U: 22~1100V, NVD14U: 22~910V
- Products with lead-free terminations meet EU RoHS requirements

## dimensions and construction



Contact KOA Speer  
for detailed dimensions.

| Type | Dimensions inches (mm)       |               |                        |                           |
|------|------------------------------|---------------|------------------------|---------------------------|
|      | øD (max.)*                   | ød            | F                      | t (max.)*                 |
| 05U  | .276 - .295<br>(7.0 - 7.5)   | .024<br>(0.6) | .197±.039<br>(5.0±1.0) | .169±.232<br>(4.3 - 5.9)  |
| 07U  | .276 - .374<br>(9.0 - 9.5)   |               |                        |                           |
| 10U  | .472 - .531<br>(12.0 - 13.5) | .031<br>(0.8) | .295±.039<br>(7.5±1.0) | .169±.567<br>(4.3 - 14.4) |
| 10UB | .472<br>(12.0)               | .024<br>(0.6) | .197±.039<br>(5.0±1.0) | .169±.209<br>(4.3 - 5.3)  |
| 14U  | .630 - .669<br>(16.0 - 17.0) | .031<br>(0.8) | .295±.039<br>(7.5±1.0) | .169±.567<br>(4.3 - 14.4) |
| 20U  | .91 - .94<br>(23.0 - 24.0)   | .039<br>(1.0) | .394±.039<br>(10±1.0)  | .205±.354<br>(5.2 - 9.0)  |

\* D max. and t ma. vary according to the varistor voltage

## ordering information

| New Part # | NV   | D     | 05                         | U                                                                     | C                    | D                             | MHT                                                                                                                                                                                                                | A         | 220                               |
|------------|------|-------|----------------------------|-----------------------------------------------------------------------|----------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------|
| Type       | Disc | Style | Diameter                   | Series                                                                | Termination Material | Inner Connect Solder Material | Taping                                                                                                                                                                                                             | Packaging | Varistor Voltage                  |
|            |      |       | 05<br>07<br>10<br>14<br>20 | S: S series<br>U: U series<br>UB: U series<br>5mm pitch<br>(D10 only) | C: Sn-Cu             | D: SnAgCu<br>Blank: SnPb      | MT:5mm straight<br>taping<br>MHT:5mm inside<br>kink taping<br>10UB:GHT: 7.5mm<br>straight taping<br>GJT: 7.5mm<br>outside kink taping<br>MJT:5mm outside<br>kink taping<br>10UC: MJT: 7.5mm<br>outside kink taping | A: Ammo   | 22V 022<br>220V 220<br>1800V 1800 |

For further information on packaging,  
please refer to Appendix C.

## applications and ratings

| Type       | Varistor Voltage<br>Vc Ic = 0.1mA (V) | Maximum Allowable Voltage |             | NVD05UC                 |                                 |                  |     | NVD07UC                 |                                 |                  |      |
|------------|---------------------------------------|---------------------------|-------------|-------------------------|---------------------------------|------------------|-----|-------------------------|---------------------------------|------------------|------|
|            |                                       | a.c. r.m.s.<br>(v)        | d.c.<br>(v) | Maximum<br>(2ms) Energy | Max. Peak Current<br>(2 pulses) | Clamping Voltage |     | Maximum<br>(2ms) Energy | Max. Peak Current<br>(2 pulses) | Clamping Voltage |      |
|            |                                       |                           |             | E (J)                   | Ip (A)                          | V1A              | V5A | E (J)                   | Ip (A)                          | V2.5A            | V10A |
| NVD□SCD018 | 16 - 22                               | 11                        | 14          | 0.3                     | 50                              | 40               | —   | —                       | —                               | —                | —    |
| NVD□UCD022 | 20 - 27                               | 14                        | 18          | 0.5                     | 125                             | 48               | —   | 1.1                     | 250                             | 43               | —    |
| NVD□UCD027 | 25 - 32                               | 17                        | 22          | 0.7                     |                                 | 60               | —   | 1.3                     |                                 | 53               | —    |
| NVD□UCD033 | 30 - 39                               | 20                        | 26          | 0.8                     |                                 | 73               | —   | 1.6                     |                                 | 65               | —    |
| NVD□UCD039 | 37 - 47                               | 25                        | 31          | 0.9                     |                                 | 86               | —   | 1.9                     |                                 | 77               | —    |
| NVD□UCD047 | 45 - 54                               | 30                        | 38          | 1.1                     |                                 | 104              | —   | 2.3                     |                                 | 93               | —    |
| NVD□UCD056 | 52 - 62                               | 35                        | 45          | 1.3                     |                                 | 123              | —   | 2.7                     |                                 | 110              | —    |
| NVD□UCD068 | 60 - 76                               | 40                        | 56          | 1.6                     |                                 | 150              | —   | 3.3                     |                                 | 135              | —    |
| NVD□SCD082 | 74 - 90                               | 50                        | 65          | 1.7                     | 200                             | —                | 145 | 3.5                     | 600                             | —                | 135  |
| NVD□UCD100 | 90 - 110                              | 60                        | 85          | 3.0                     | 600                             | —                | 175 | 6.0                     | 1250                            | —                | 165  |
| NVD□UCD120 | 108 - 132                             | 75                        | 100         | 3.5                     |                                 | —                | 210 | 7.0                     |                                 | —                | 200  |
| NVD□UCD150 | 135 - 165                             | 95                        | 125         | 4.5                     |                                 | —                | 260 | 9.0                     |                                 | —                | 250  |
| NVD□UCD200 | 185 - 225                             | 130                       | 170         | 6.0                     |                                 | —                | 355 | 12.5                    |                                 | —                | 340  |
| NVD□UCD220 | 198 - 242                             | 140                       | 180         | 6.5                     |                                 | —                | 380 | 13.5                    |                                 | —                | 360  |
| NVD□UCD240 | 216 - 264                             | 150                       | 200         | 7.5                     |                                 | —                | 415 | 15.0                    |                                 | —                | 395  |
| NVD□UCD270 | 247 - 303                             | 175                       | 225         | 8.0                     |                                 | —                | 475 | 17.0                    |                                 | —                | 455  |
| NVD□UCD330 | 297 - 363                             | 210                       | 270         | 9.5                     |                                 | —                | 570 | 20.0                    |                                 | —                | 545  |
| NVD□UCD360 | 342 - 396                             | 230                       | 300         | 11.0                    |                                 | —                | 620 | 23.0                    |                                 | —                | 595  |
| NVD□UCD390 | 367 - 429                             | 250                       | 320         | 12.0                    |                                 | —                | 675 | 25.0                    |                                 | —                | 650  |
| NVD□UCD430 | 407 - 473                             | 275                       | 350         | 13.5                    |                                 | —                | 745 | 27.5                    |                                 | —                | 710  |
| NVD□UCD470 | 437 - 517                             | 300                       | 385         | 15.0                    |                                 | —                | 810 | 30.0                    |                                 | —                | 775  |

□ Add disk diameter

| Type       | Varistor Voltage<br>Vc Ic = 0.1mA (V) | Maximum Allowable Voltage |             | NVD10UC - NVD10UCB*  |                                    |                  |      | NVD14UC**            |                                    |                  |      | NVD20UC              |                                    |                  |
|------------|---------------------------------------|---------------------------|-------------|----------------------|------------------------------------|------------------|------|----------------------|------------------------------------|------------------|------|----------------------|------------------------------------|------------------|
|            |                                       | a.c. r.m.s.<br>(v)        | d.c.<br>(v) | Max. (2ms)<br>Energy | Max. Peak<br>Current<br>(2 pulses) | Clamping Voltage |      | Max. (2ms)<br>Energy | Max. Peak<br>Current<br>(2 pulses) | Clamping Voltage |      | Max. (2ms)<br>Energy | Max. Peak<br>Current<br>(2 pulses) | Clamping Voltage |
|            |                                       |                           |             | E (J)                | Ip (A)                             | V5A              | V25A | E (J)                | Ip (A)                             | V10A             | V50A | E (J)                | Ip (A)                             | V100A            |
| NVD□SCD018 | 16 - 22                               | 11                        | 14          | —                    | —                                  | —                | —    | —                    | —                                  | —                | —    | —                    | —                                  | —                |
| NVD□UCD022 | 20 - 27                               | 14                        | 18          | 2.6                  | 500                                | 43               | —    | 5.3                  | 1000                               | 43               | —    | —                    | —                                  | —                |
| NVD□UCD027 | 25 - 32                               | 17                        | 22          | 3.2                  |                                    | 53               | —    | 6.5                  |                                    | 53               | —    | —                    | —                                  | —                |
| NVD□UCD033 | 30 - 39                               | 20                        | 26          | 4.0                  |                                    | 65               | —    | 7.9                  |                                    | 65               | —    | —                    | —                                  | —                |
| NVD□UCD039 | 37 - 47                               | 25                        | 31          | 4.4                  |                                    | 77               | —    | 9.4                  |                                    | 77               | —    | —                    | —                                  | —                |
| NVD□UCD047 | 45 - 54                               | 30                        | 38          | 5.7                  |                                    | 93               | —    | 11.0                 |                                    | 93               | —    | —                    | —                                  | —                |
| NVD□UCD056 | 52 - 62                               | 35                        | 45          | 6.7                  |                                    | 110              | —    | 13.0                 |                                    | 110              | —    | —                    | —                                  | —                |
| NVD□UCD068 | 60 - 76                               | 40                        | 56          | 8.2                  |                                    | 135              | —    | 16.0                 |                                    | 135              | —    | —                    | —                                  | —                |
| NVD□SCD082 | 74 - 90                               | 50                        | 65          | 8.0                  | 1250                               | —                | 135  | 14.0                 | 2500                               | —                | 135  | —                    | —                                  | —                |
| NVD□UCD100 | 90 - 110                              | 60                        | 85          | 12.0                 | 2500                               | —                | 165  | 18.0                 |                                    | —                | 165  | —                    | —                                  | —                |
| NVD□UCD120 | 108 - 132                             | 75                        | 100         | 14.5                 |                                    | —                | 200  | 30.0                 | 5000                               | —                | 200  | —                    | —                                  | —                |
| NVD□UCD150 | 135 - 165                             | 95                        | 125         | 18.0                 |                                    | —                | 250  | 37.5                 |                                    | —                | 250  | —                    | —                                  | —                |
| NVD□UCD200 | 185 - 225                             | 130                       | 170         | 25.0                 |                                    | —                | 340  | 50.0                 |                                    | —                | 340  | 100                  | 7000                               | 340              |
| NVD□UCD220 | 198 - 242                             | 140                       | 180         | 27.5                 |                                    | —                | 360  | 55.0                 |                                    | —                | 360  | 110                  |                                    | 360              |
| NVD□UCD240 | 216 - 264                             | 150                       | 200         | 30.0                 |                                    | —                | 395  | 60.0                 |                                    | —                | 395  | 120                  |                                    | 395              |
| NVD□UCD270 | 247 - 303                             | 175                       | 225         | 35.0                 |                                    | —                | 455  | 70.0                 | 4500                               | —                | 455  | 135                  | 6500                               | 455              |
| NVD□UCD330 | 297 - 363                             | 210                       | 270         | 42.0                 |                                    | —                | 545  | 80.0                 |                                    | —                | 545  | —                    |                                    | —                |
| NVD□UCD360 | 342 - 396                             | 230                       | 300         | 45.0                 |                                    | —                | 595  | 90.0                 |                                    | —                | 595  | 180                  |                                    | 595              |
| NVD□UCD390 | 367 - 429                             | 250                       | 320         | 50.0                 |                                    | —                | 650  | 100.0                |                                    | —                | 650  | 195                  | 6500                               | 650              |
| NVD□UCD430 | 407 - 473                             | 275                       | 350         | 55.0                 |                                    | —                | 710  | 110.0                |                                    | —                | 710  | 215                  |                                    | 710              |
| NVD□UCD470 | 437 - 517                             | 300                       | 385         | 60.0                 |                                    | —                | 775  | 125.0                |                                    | —                | 775  | 250                  |                                    | 775              |

□ Add disk diameter

\* Manufacturing range of NVD10UCB is varistor voltages 22 - 270

\*\* NVD14C100 is applied

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

11/21/08

## applications and ratings (continued)

| Type        | Varistor Voltage<br>Vc Ic = 0.1mA (V) | Maximum Allowable Voltage |             | NVD10UC - NVD10UCB*           |                                              |                                 | NVD14UC**                     |                                              |                                  | NVD20UC                       |                                              |                              |
|-------------|---------------------------------------|---------------------------|-------------|-------------------------------|----------------------------------------------|---------------------------------|-------------------------------|----------------------------------------------|----------------------------------|-------------------------------|----------------------------------------------|------------------------------|
|             |                                       | a.c. r.m.s.<br>(V)        | d.c.<br>(V) | Max. (2ms)<br>Energy<br>E (J) | Max. Peak<br>Current<br>(2 pulses)<br>Ip (A) | Clamping<br>Voltage<br>V5A V25A | Max. (2ms)<br>Energy<br>E (J) | Max. Peak<br>Current<br>(2 pulses)<br>Ip (A) | Clamping<br>Voltage<br>V10A V50A | Max. (2ms)<br>Energy<br>E (J) | Max. Peak<br>Current<br>(2 pulses)<br>Ip (A) | Clamping<br>Voltage<br>V100A |
|             |                                       |                           |             |                               |                                              |                                 |                               |                                              |                                  |                               |                                              |                              |
| NVD□UCD510  | 474 - 561                             | 320                       | 410         | 67.0                          | 2500                                         | — 845                           | 136.0                         | 4500                                         | — 845                            | —                             | 6500                                         | —                            |
| NVD□UCD620  | 577 - 682                             | 380                       | 505         | 67.0                          |                                              | — 1025                          | 136.0                         |                                              | — 1025                           | 273                           |                                              | 1025                         |
| NVD□UCD680  | 637 - 748                             | 420                       | 560         | 67.0                          |                                              | — 1120                          | 136.0                         |                                              | — 1120                           | 273                           |                                              | 1120                         |
| NVD□UCD750  | 697 - 825                             | 460                       | 615         | 70.0                          |                                              | — 1240                          | 150.0                         |                                              | — 1240                           | 300                           |                                              | 1240                         |
| NVD□UCD780  | 737 - 858                             | 485                       | 640         | 70.0                          |                                              | — 1290                          | 150.0                         |                                              | — 1290                           | 300                           |                                              | 1290                         |
| NVD□UCD820  | 767 - 902                             | 510                       | 670         | 80.0                          |                                              | — 1355                          | 165.0                         |                                              | — 1355                           | 325                           |                                              | 1355                         |
| NVD□UCD910  | 857 - 1000                            | 550                       | 745         | 90.0                          |                                              | — 1500                          | 180.0                         |                                              | — 1500                           | 360                           |                                              | 1500                         |
| NVD□UCD1100 | 1070 - 1210                           | 680                       | 895         | 110.0                         |                                              | — 1815                          | —                             |                                              | — —                              | —                             |                                              | —                            |
| NVD□UCD1800 | 1700 - 1980                           | 1000                      | 1465        | 183.0                         |                                              | — 2970                          | 360.0                         |                                              | — 2970                           | —                             |                                              | —                            |

□ Add disk diameter

\* Manufacturing range of NVD10UCB is varistor voltages 22 - 270

\*\* NVD14C100 is applied

## environmental applications

### Performance Characteristics

| Parameter                                       | Requirement Δ V±%            | Test Method                                                                                                                      |       |                     |
|-------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------|---------------------|
| Varistor Voltage                                | Within specified tolerance   | Voltage between terminals when the specified current is flowed                                                                   | Ic    | Type                |
|                                                 |                              |                                                                                                                                  | 0.1mA | NVD05UCD            |
|                                                 |                              |                                                                                                                                  | 1mA   | NVD07UCD - NVD20UCD |
| Solderability                                   | 95% coverage minimum         | 230°C ± 5°C, 5 seconds ± 0.5 second / 250°C ± 5°C, 5 seconds ± 0.5 second (Pb free)                                              |       |                     |
| Resistance to Solder Heat                       | No abnormality in appearance | 260°C ± 5°C, 10 seconds ± 1 second                                                                                               |       |                     |
| Rapid Change of Temperature                     | No abnormality in appearance | -40°C (30 minutes)/ +125°C (30 minutes), 5 cycles, except NVD20UCD<br>-40°C (30 minutes)/ +85°C (30 minutes), 5 cycles: NVD20UCD |       |                     |
| Maximum Peak Current                            | ±10%                         | Rated impulse current of (T=8/20μs), positive/negative applied once each                                                         |       |                     |
| Maximum Energy                                  | ±10%                         | A single standard impulse of 2ms, once                                                                                           |       |                     |
| High Temperature Life with d.c. Bias            | ±10%                         | 85°C ± 5°C, Vc=(Vd.c.) 1000h<br>Load: maximum allowable circuit voltage (d.c.)                                                   |       |                     |
| High Temperature Life with a.c. Bias            | ±10%                         | 85°C ± 5°C, Vc=(Va.c.r.m.s.) 1000h<br>Load: maximum allowable circuit voltage (d.c.)                                             |       |                     |
| High Temperature & High Humidity Life with Bias | ±5%                          | 80°C ± 5°C, 95% RH, 1000h                                                                                                        |       |                     |
| High Temperature Storage Life                   | ±5%                          | 125°C ± 5°C, 1000h                                                                                                               |       |                     |
| Low Temperature Storage Life                    | ±5%                          | -40°C ± 5°C, 1000h                                                                                                               |       |                     |

For Typical Characteristics Graphs see Environmental Applications. Additional environmental applications can also be found at [www.koaspeer.com](http://www.koaspeer.com)

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11/23/14