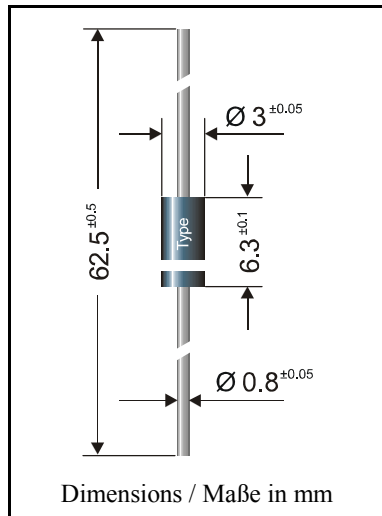


**Unidirectional and bidirectional  
Transient Voltage Suppressor Diodes**
**Unidirektionale und bidirektionale  
Spannungs-Begrenzer-Dioden**


|                                                                                       |                               |
|---------------------------------------------------------------------------------------|-------------------------------|
| Peak pulse power dissipation<br>Impuls-Verlustleistung                                | 400 W                         |
| Nominal breakdown voltage<br>Nominale Abbruch-Spannung                                | 6.8...440 V                   |
| Plastic case – Kunststoffgehäuse                                                      | DO-15 (DO-204AC)              |
| Weight approx. – Gewicht ca.                                                          | 0.4 g                         |
| Plastic material has UL classification 94V-0<br>Gehäusematerial UL94V-0 klassifiziert |                               |
| Standard packaging taped in ammo pack<br>Standard Lieferform gegurtet in Ammo-Pack    | see page 16<br>siehe Seite 16 |

For bidirectional types (suffix “C” or “CA”), electrical characteristics apply in both directions.  
Für bidirektionale Dioden (Suffix “C” oder “CA”) gelten die el. Werte in beiden Richtungen.

**Maximum ratings and Characteristics**
**Kenn- und Grenzwerte**

|                                                                                                                  |                          |                                                                     |                                                                          |
|------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------|
| Peak pulse power dissipation (10/1000 $\mu$ s waveform)<br>Impuls-Verlustleistung (Strom-Impuls 10/1000 $\mu$ s) | $T_A = 25^\circ\text{C}$ | $P_{\text{PPM}}$                                                    | 400 W <sup>1)</sup>                                                      |
| Steady state power dissipation<br>Verlustleistung im Dauerbetrieb                                                | $T_A = 25^\circ\text{C}$ | $P_{\text{M(AV)}}$                                                  | 1 W <sup>2)</sup>                                                        |
| Peak forward surge current, 60 Hz half sine-wave<br>Stoßstrom für eine 60 Hz Sinus-Halbwellen                    | $T_A = 25^\circ\text{C}$ | $I_{\text{FSM}}$                                                    | 40 A <sup>3)</sup>                                                       |
| Max. instantaneous forward voltage<br>Augenblickswert der Durchlaßspannung                                       | $I_F = 25\text{ A}$      | $V_{\text{BR}} \leq 200\text{ V}$<br>$V_{\text{BR}} > 200\text{ V}$ | $V_F < 3.0\text{ V}$ <sup>3)</sup><br>$V_F < 6.5\text{ V}$ <sup>3)</sup> |
| Operating junction temperature – Sperrschichttemperatur<br>Storage temperature – Lagerungstemperatur             |                          | $T_j$<br>$T_s$                                                      | $-50...+175^\circ\text{C}$<br>$-50...+175^\circ\text{C}$                 |
| Thermal resistance junction to ambient air<br>Wärmewiderstand Sperrschicht – umgebende Luft                      |                          | $R_{\text{thA}}$                                                    | $< 45\text{ K/W}$ <sup>2)</sup>                                          |
| Thermal resistance junction to lead<br>Wärmewiderstand Sperrschicht – Anschlußdraht                              |                          | $R_{\text{thL}}$                                                    | $< 15\text{ K/W}$                                                        |

<sup>1)</sup> Non-repetitive current pulse see curve  $I_{\text{PPM}} = f(t_r)$

Höchstzulässiger Spitzenwert eines einmaligen Strom-Impulses, siehe Kurve  $I_{\text{PPM}} = f(t_r)$

<sup>2)</sup> Valid, if leads are kept at ambient temperature at a distance of 10 mm from case

Gültig, wenn die Anschlußdrähte in 10 mm Abstand von Gehäuse auf Umgebungstemperatur gehalten werden

<sup>3)</sup> Unidirectional diodes only – Nur für unidirektionale Dioden

## Maximum ratings

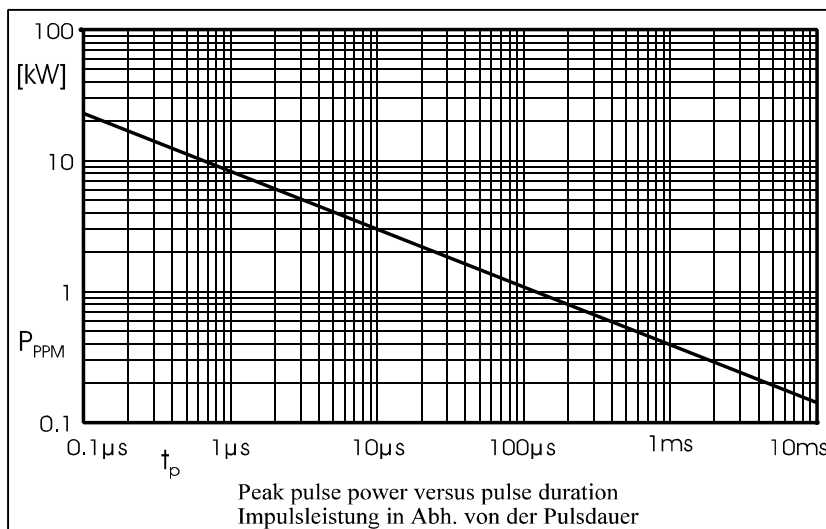
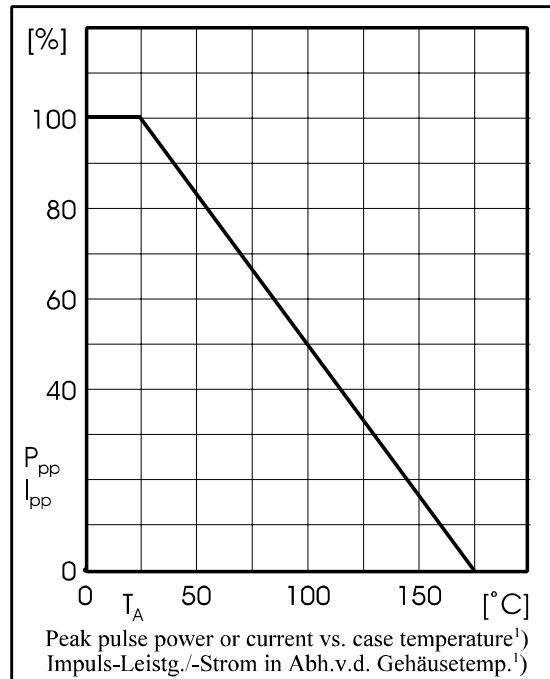
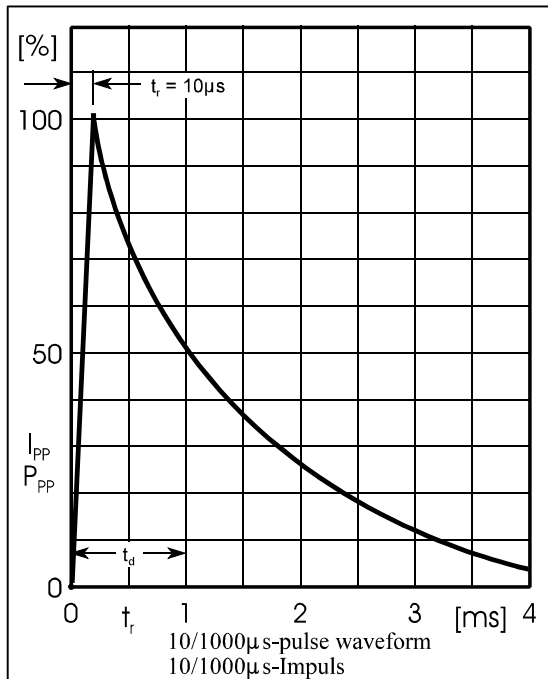
## Grenzwerte

| Type<br>Typ | Breakdown voltage at I <sub>T</sub> = 1 mA<br>Abbruch-Spanng. bei I <sub>T</sub> = 1 mA<br>) at / bei I <sub>T</sub> = 10 mA |                | Stand-off<br>voltage<br>Sperrspg. | Max. rev. current<br>Max. Sperrstrom<br>at / bei V <sub>WM</sub> | Max. clamping voltage<br>Max. Begrenzerspanng.<br>at / bei I <sub>PPM</sub> (10/1000μs) |                     |
|-------------|------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------|
|             | V <sub>BR</sub> [V]                                                                                                          |                |                                   |                                                                  | V <sub>WM</sub> [V]                                                                     | I <sub>D</sub> [μA] |
| P4 KE6.8    | 6.8 ± 10%                                                                                                                    | 6.12...7.48 *) | 5.5                               | 1000                                                             | 10.8                                                                                    | 38.0                |
| P4 KE6.8A   | 6.8 ± 5%                                                                                                                     | 6.45...7.14 *) | 5.8                               | 1000                                                             | 10.5                                                                                    | 40.0                |
| P4 KE7.5    | 7.5 ± 10%                                                                                                                    | 6.75...8.25 *) | 6.0                               | 500                                                              | 11.7                                                                                    | 35.0                |
| P4 KE7.5A   | 7.5 ± 5%                                                                                                                     | 7.13...7.88 *) | 6.4                               | 500                                                              | 11.3                                                                                    | 37.0                |
| P4 KE8.2    | 8.2 ± 10%                                                                                                                    | 7.38...9.02 *) | 6.6                               | 200                                                              | 12.5                                                                                    | 33.0                |
| P4 KE8.2A   | 8.2 ± 5%                                                                                                                     | 7.79...8.61 *) | 7.0                               | 200                                                              | 12.1                                                                                    | 34.0                |
| P4 KE9.1    | 9.1 ± 10%                                                                                                                    | 8.19...10.0    | 7.3                               | 50                                                               | 13.8                                                                                    | 30.0                |
| P4 KE9.1A   | 9.1 ± 5%                                                                                                                     | 8.65...9.55    | 7.7                               | 50                                                               | 13.4                                                                                    | 31.0                |
| P4 KE10     | 10 ± 10%                                                                                                                     | 9.0...11.0     | 8.1                               | 10                                                               | 15.0                                                                                    | 28.0                |
| P4 KE10A    | 10 ± 5%                                                                                                                      | 9.5...10.5     | 8.5                               | 10                                                               | 14.5                                                                                    | 29.0                |
| P4 KE11     | 11 ± 10%                                                                                                                     | 9.9...12.1     | 8.9                               | 5                                                                | 16.2                                                                                    | 26.0                |
| P4 KE11A    | 11 ± 5%                                                                                                                      | 10.5...11.6    | 9.4                               | 5                                                                | 15.6                                                                                    | 27.0                |
| P4 KE12     | 12 ± 10%                                                                                                                     | 10.8...13.2    | 9.7                               | 5                                                                | 17.3                                                                                    | 24.0                |
| P4 KE12A    | 12 ± 5%                                                                                                                      | 11.4...12.6    | 10.2                              | 5                                                                | 16.7                                                                                    | 25.0                |
| P4 KE13     | 13 ± 10%                                                                                                                     | 11.7...14.3    | 10.5                              | 5                                                                | 19.0                                                                                    | 22.0                |
| P4 KE13A    | 13 ± 5%                                                                                                                      | 12.4...13.7    | 11.1                              | 5                                                                | 18.2                                                                                    | 23.0                |
| P4 KE15     | 15 ± 10%                                                                                                                     | 13.5...16.5    | 12.1                              | 5                                                                | 22.0                                                                                    | 19.0                |
| P4 KE15A    | 15 ± 5%                                                                                                                      | 14.3...15.8    | 12.8                              | 5                                                                | 21.2                                                                                    | 21.0                |
| P4 KE16     | 16 ± 10%                                                                                                                     | 14.4...17.6    | 12.9                              | 5                                                                | 23.5                                                                                    | 17.8                |
| P4 KE16A    | 16 ± 5%                                                                                                                      | 15.2...16.8    | 13.6                              | 5                                                                | 22.5                                                                                    | 18.6                |
| P4 KE18     | 18 ± 10%                                                                                                                     | 16.2...19.8    | 14.5                              | 5                                                                | 26.5                                                                                    | 16.0                |
| P4 KE18A    | 18 ± 5%                                                                                                                      | 17.1...18.9    | 15.3                              | 5                                                                | 25.5                                                                                    | 16.5                |
| P4 KE20     | 20 ± 10%                                                                                                                     | 18.0...22.0    | 16.2                              | 5                                                                | 29.1                                                                                    | 14.0                |
| P4 KE20A    | 20 ± 5%                                                                                                                      | 19.0...21.0    | 17.1                              | 5                                                                | 27.7                                                                                    | 15.0                |
| P4 KE22     | 22 ± 10%                                                                                                                     | 19.8...24.2    | 17.8                              | 5                                                                | 31.9                                                                                    | 13.0                |
| P4 KE22A    | 22 ± 5%                                                                                                                      | 20.9...23.1    | 18.8                              | 5                                                                | 30.6                                                                                    | 13.7                |
| P4 KE24     | 24 ± 10%                                                                                                                     | 21.6...26.4    | 19.4                              | 5                                                                | 34.7                                                                                    | 12.0                |
| P4 KE24A    | 24 ± 5%                                                                                                                      | 22.8...25.2    | 20.5                              | 5                                                                | 33.2                                                                                    | 12.6                |
| P4 KE27     | 27 ± 10%                                                                                                                     | 24.3...29.7    | 21.8                              | 5                                                                | 39.1                                                                                    | 10.7                |
| P4 KE27A    | 27 ± 5%                                                                                                                      | 25.7...28.4    | 23.1                              | 5                                                                | 37.5                                                                                    | 11.0                |
| P4 KE30     | 30 ± 10%                                                                                                                     | 27.0...33.0    | 24.3                              | 5                                                                | 43.5                                                                                    | 9.6                 |
| P4 KE30A    | 30 ± 5%                                                                                                                      | 28.5...31.5    | 25.6                              | 5                                                                | 41.4                                                                                    | 10.0                |
| P4 KE33     | 33 ± 10%                                                                                                                     | 29.7...36.3    | 26.8                              | 5                                                                | 47.7                                                                                    | 8.8                 |
| P4 KE33A    | 33 ± 5%                                                                                                                      | 31.4...34.7    | 28.2                              | 5                                                                | 45.7                                                                                    | 9.0                 |
| P4 KE36     | 36 ± 10%                                                                                                                     | 32.4...39.6    | 29.1                              | 5                                                                | 52.0                                                                                    | 8.0                 |
| P4 KE36A    | 36 ± 5%                                                                                                                      | 34.2...37.8    | 30.8                              | 5                                                                | 49.9                                                                                    | 8.4                 |
| P4 KE39     | 39 ± 10%                                                                                                                     | 35.1...42.9    | 31.6                              | 5                                                                | 56.4                                                                                    | 7.4                 |
| P4 KE39A    | 39 ± 5%                                                                                                                      | 37.1...41.0    | 33.3                              | 5                                                                | 53.9                                                                                    | 7.7                 |
| P4 KE43     | 43 ± 10%                                                                                                                     | 38.7...47.3    | 34.8                              | 5                                                                | 61.9                                                                                    | 6.7                 |
| P4 KE43A    | 43 ± 5%                                                                                                                      | 40.9...45.2    | 36.8                              | 5                                                                | 59.3                                                                                    | 7.0                 |
| P4 KE47     | 47 ± 10%                                                                                                                     | 42.3...51.7    | 38.1                              | 5                                                                | 67.8                                                                                    | 6.2                 |
| P4 KE47A    | 47 ± 5%                                                                                                                      | 44.7...49.4    | 40.2                              | 5                                                                | 64.8                                                                                    | 6.4                 |
| P4 KE51     | 51 ± 10%                                                                                                                     | 45.9...56.1    | 41.3                              | 5                                                                | 73.5                                                                                    | 5.7                 |

## Maximum ratings

## Grenzwerte

| Type<br>Typ | Breakdown voltage at I <sub>T</sub> = 1 mA<br>Abbruch-Spanng. bei I <sub>T</sub> = 1 mA<br>) at / bei I <sub>T</sub> = 10 mA |             | Stand-off<br>voltage<br>Sperrspg.<br>V <sub>WM</sub> [V] | Max. rev. current<br>Max. Sperrstrom<br>at / bei V <sub>WM</sub><br>I <sub>D</sub> [μA] | Max. clamping voltage<br>Max. Begrenzerspanng.<br>at / bei I <sub>PPM</sub> (10/1000μs)<br>V <sub>C</sub> [V]      I <sub>PPM</sub> [A] |      |
|-------------|------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------|
|             | V <sub>BR</sub> [V]                                                                                                          |             |                                                          |                                                                                         |                                                                                                                                         |      |
| P4 KE51A    | 51 ± 5%                                                                                                                      | 48.5...53.6 | 43.6                                                     | 5                                                                                       | 70.1                                                                                                                                    | 6.0  |
| P4 KE56     | 56 ± 10%                                                                                                                     | 50.4...61.6 | 45.4                                                     | 5                                                                                       | 80.5                                                                                                                                    | 5.2  |
| P4 KE56A    | 56 ± 5%                                                                                                                      | 53.2...58.8 | 47.8                                                     | 5                                                                                       | 77.0                                                                                                                                    | 5.4  |
| P4 KE62     | 62 ± 10%                                                                                                                     | 55.8...68.8 | 50.2                                                     | 5                                                                                       | 89.0                                                                                                                                    | 4.7  |
| P4 KE62A    | 62 ± 5%                                                                                                                      | 58.9...65.1 | 53.0                                                     | 5                                                                                       | 85.0                                                                                                                                    | 5.0  |
| P4 KE68     | 68 ± 10%                                                                                                                     | 61.2...74.8 | 55.1                                                     | 5                                                                                       | 98.0                                                                                                                                    | 4.2  |
| P4 KE68A    | 68 ± 5%                                                                                                                      | 64.6...71.4 | 58.1                                                     | 5                                                                                       | 92.0                                                                                                                                    | 4.5  |
| P4 KE75     | 75 ± 10%                                                                                                                     | 67.5...82.5 | 60.7                                                     | 5                                                                                       | 108                                                                                                                                     | 3.8  |
| P4 KE75A    | 75 ± 5%                                                                                                                      | 71.3...78.8 | 64.1                                                     | 5                                                                                       | 103                                                                                                                                     | 4.0  |
| P4 KE82     | 82 ± 10%                                                                                                                     | 73.8...90.2 | 66.4                                                     | 5                                                                                       | 118                                                                                                                                     | 3.5  |
| P4 KE82A    | 82 ± 5%                                                                                                                      | 77.9...86.1 | 70.1                                                     | 5                                                                                       | 113                                                                                                                                     | 3.7  |
| P4 KE91     | 91 ± 10%                                                                                                                     | 81.9...100  | 73.7                                                     | 5                                                                                       | 131                                                                                                                                     | 3.2  |
| P4 KE91A    | 91 ± 5%                                                                                                                      | 86.5...95.5 | 77.8                                                     | 5                                                                                       | 125                                                                                                                                     | 3.3  |
| P4 KE100    | 100 ± 10%                                                                                                                    | 90.0...110  | 81.0                                                     | 5                                                                                       | 144                                                                                                                                     | 2.9  |
| P4 KE100A   | 100 ± 5%                                                                                                                     | 95.0...105  | 85.5                                                     | 5                                                                                       | 137                                                                                                                                     | 3.0  |
| P4 KE110    | 110 ± 10%                                                                                                                    | 99.0...121  | 89.2                                                     | 5                                                                                       | 158                                                                                                                                     | 2.6  |
| P4 KE110A   | 110 ± 5%                                                                                                                     | 105...116   | 94.0                                                     | 5                                                                                       | 152                                                                                                                                     | 2.7  |
| P4 KE120    | 120 ± 10%                                                                                                                    | 108...132   | 97.2                                                     | 5                                                                                       | 173                                                                                                                                     | 2.4  |
| P4 KE120A   | 120 ± 5%                                                                                                                     | 114...126   | 102                                                      | 5                                                                                       | 165                                                                                                                                     | 2.5  |
| P4 KE130    | 130 ± 10%                                                                                                                    | 117...143   | 105                                                      | 5                                                                                       | 187                                                                                                                                     | 2.2  |
| P4 KE130A   | 130 ± 5%                                                                                                                     | 124...137   | 111                                                      | 5                                                                                       | 179                                                                                                                                     | 2.3  |
| P4 KE150    | 150 ± 10%                                                                                                                    | 135...165   | 121                                                      | 5                                                                                       | 215                                                                                                                                     | 1.9  |
| P4 KE150A   | 150 ± 5%                                                                                                                     | 143...158   | 128                                                      | 5                                                                                       | 207                                                                                                                                     | 2.0  |
| P4 KE160    | 160 ± 10%                                                                                                                    | 144...176   | 130                                                      | 5                                                                                       | 230                                                                                                                                     | 1.8  |
| P4 KE160A   | 160 ± 5%                                                                                                                     | 152...168   | 136                                                      | 5                                                                                       | 219                                                                                                                                     | 1.9  |
| P4 KE170    | 170 ± 10%                                                                                                                    | 153...187   | 138                                                      | 5                                                                                       | 244                                                                                                                                     | 1.7  |
| P4 KE170A   | 170 ± 5%                                                                                                                     | 162...179   | 145                                                      | 5                                                                                       | 234                                                                                                                                     | 1.8  |
| P4 KE180    | 180 ± 10%                                                                                                                    | 162...198   | 146                                                      | 5                                                                                       | 258                                                                                                                                     | 1.6  |
| P4 KE180A   | 180 ± 5%                                                                                                                     | 171...189   | 154                                                      | 5                                                                                       | 246                                                                                                                                     | 1.7  |
| P4 KE200    | 200 ± 10%                                                                                                                    | 180...220   | 162                                                      | 5                                                                                       | 287                                                                                                                                     | 1.4  |
| P4 KE200A   | 200 ± 5%                                                                                                                     | 190...210   | 171                                                      | 5                                                                                       | 274                                                                                                                                     | 1.5  |
| P4 KE220    | 220 ± 10%                                                                                                                    | 198...242   | 175                                                      | 5                                                                                       | 344                                                                                                                                     | 1.2  |
| P4 KE220A   | 220 ± 5%                                                                                                                     | 209...231   | 185                                                      | 5                                                                                       | 328                                                                                                                                     | 1.3  |
| P4 KE250    | 250 ± 10%                                                                                                                    | 225...275   | 202                                                      | 5                                                                                       | 360                                                                                                                                     | 1.1  |
| P4 KE250A   | 250 ± 5%                                                                                                                     | 237...263   | 214                                                      | 5                                                                                       | 344                                                                                                                                     | 1.2  |
| P4 KE300    | 300 ± 10%                                                                                                                    | 270...330   | 243                                                      | 5                                                                                       | 430                                                                                                                                     | 0.97 |
| P4 KE300A   | 300 ± 5%                                                                                                                     | 285...315   | 256                                                      | 5                                                                                       | 414                                                                                                                                     | 1.0  |
| P4 KE350    | 350 ± 10%                                                                                                                    | 315...385   | 284                                                      | 5                                                                                       | 504                                                                                                                                     | 0.83 |
| P4 KE350A   | 350 ± 5%                                                                                                                     | 332...368   | 300                                                      | 5                                                                                       | 482                                                                                                                                     | 0.87 |
| P4 KE400    | 400 ± 10%                                                                                                                    | 360...440   | 324                                                      | 5                                                                                       | 574                                                                                                                                     | 0.73 |
| P4 KE400A   | 400 ± 5%                                                                                                                     | 380...420   | 342                                                      | 5                                                                                       | 548                                                                                                                                     | 0.76 |
| P4 KE440    | 440 ± 10%                                                                                                                    | 396...484   | 356                                                      | 5                                                                                       | 631                                                                                                                                     | 0.66 |
| P4 KE440A   | 440 ± 5%                                                                                                                     | 418...462   | 376                                                      | 5                                                                                       | 602                                                                                                                                     | 0.69 |



The order of type numbers is graded to the international E 24 standard. The standard tolerance of the breakdown voltage for each type is  $\pm 10\%$ . Suffix "A" denotes a tolerance of  $\pm 5\%$ .

e.g.: P4KE160C = bidirectional diode,  $V_{BR} = 160 V (\pm 10\%)$ ,  $V_{WM} \geq 130 V$  at  $I_D = 5 \mu A$   
P4KE10A = unidirectional diode,  $V_{BR} = 10V (\pm 5\%)$ ,  $V_{WM} \geq 8.1 V$  at  $I_D = 10 \mu A$

Die Abstufung der Typen innerhalb der Reihe entspricht dem internationalen E 24-Standard. Die Toleranz der Arbeitsspannung jedes einzelnen Typs beträgt in der Standardausführung  $\pm 10\%$ . Suffix "A" kennzeichnet eine Toleranz von  $\pm 5\%$ .

z.B.: P4KE160C = bidirektionale Diode,  $V_{BR} = 160 V (\pm 10\%)$ ,  $V_{WM} \geq 130 V$  bei  $I_D = 5 \mu A$   
P4KE10A = unidirektionale Diode,  $V_{BR} = 10V (\pm 5\%)$ ,  $V_{WM} \geq 8.1 V$  bei  $I_D = 10 \mu A$

<sup>1)</sup> Valid, if leads are kept at ambient temperature at a distance of 10 mm from case

Gültig, wenn die Anschlußdrähte in 10 mm Abstand von Gehäuse auf Umgebungstemperatur gehalten werden