

# 1 Characteristics

**Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

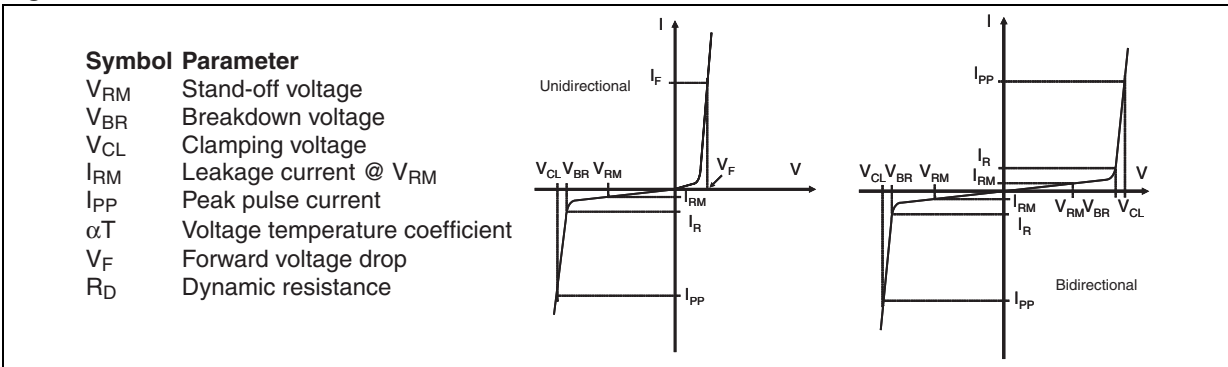
| Symbol    | Parameter                                                             | Value                                                           | Unit               |
|-----------|-----------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|
| $P_{PP}$  | Peak pulse power dissipation <sup>(1)</sup>                           | $T_{j\text{ initial}} = T_{amb}$<br>600                         | W                  |
| $P$       | Power dissipation on infinite heatsink                                | $T_{amb} = 75\text{ }^{\circ}\text{C}$<br>5                     | W                  |
| $I_{FSM}$ | Non repetitive surge peak forward current for unidirectional types    | $t_p = 10\text{ ms}$<br>$T_{j\text{ initial}} = T_{amb}$<br>100 | A                  |
| $T_{stg}$ | Storage temperature range                                             | -65 to + 175                                                    | $^{\circ}\text{C}$ |
| $T_j$     | Maximum operating junction temperature                                | 175                                                             | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s at 5 mm from case. | 260                                                             | $^{\circ}\text{C}$ |

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

**Table 2. Thermal resistances**

| Symbol        | Parameter                                                         | Value | Unit                 |
|---------------|-------------------------------------------------------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads                                                 | 20    | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit. $L_{lead} = 10\text{ mm}$ | 75    |                      |

**Figure 1. Electrical characteristics - definitions**



**Figure 2. Pulse definition for electrical characteristics**

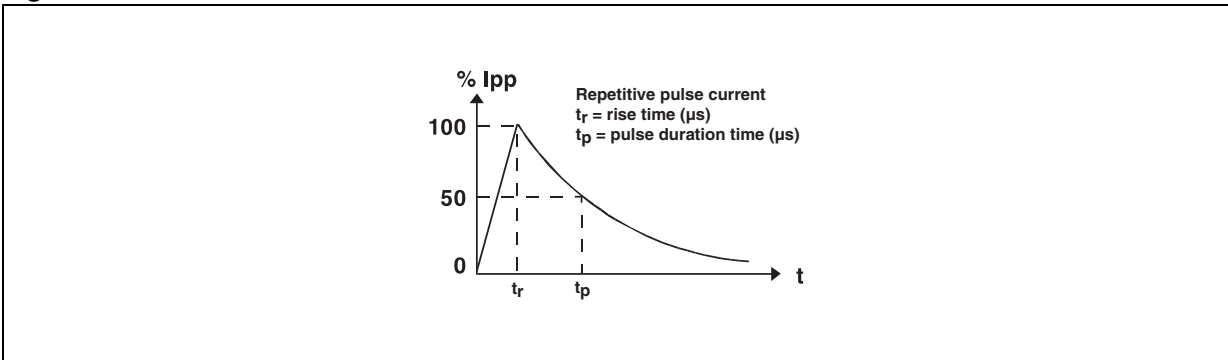
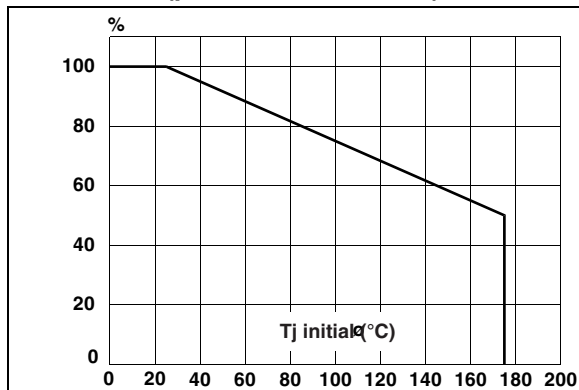


Table 3. Electrical characteristics - values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

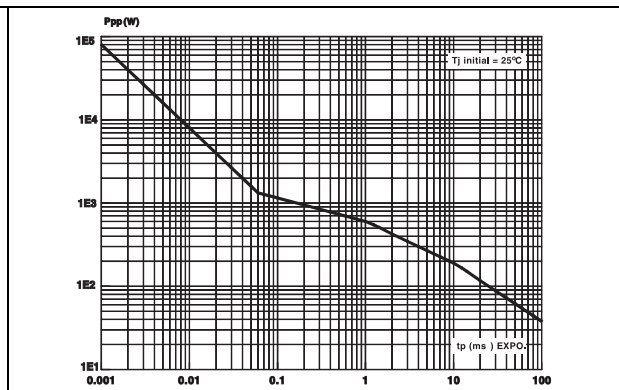
| Order code     |               | $I_{RM} @ V_{RM}^{(1)}$ |      | $V_{BR} @ I_R^{(2)}$ |     |      |    | $V_{CL} @ I_{PP}$<br>10/1000 $\mu\text{s}$ |      | $V_{CL} @ I_{PP}$<br>8/20 $\mu\text{s}$ |      | $\alpha T^{(3)}$           | $C^{(4)}$ |
|----------------|---------------|-------------------------|------|----------------------|-----|------|----|--------------------------------------------|------|-----------------------------------------|------|----------------------------|-----------|
|                |               | max                     |      | min                  | nom | max  |    | max                                        |      | max                                     |      | max                        | typ       |
| Unidirectional | Bidirectional | $\mu\text{A}$           | V    | V                    | V   | V    | mA | V                                          | A    | V                                       | A    | $10^{-4}/^{\circ}\text{C}$ | pF        |
| P6KE6V8A       | P6KE6V8CA     | 10                      | 5.8  | 6.45                 | 6.8 | 7.14 | 10 | 10.5                                       | 57   | 13.4                                    | 298  | 5.7                        | 4000      |
| P6KE7V5A       | P6KE7V5CA     | 10                      | 6.4  | 7.13                 | 7.5 | 7.88 | 10 | 11.3                                       | 53   | 14.5                                    | 276  | 6.1                        | 3700      |
| P6KE10A        | P6KE10CA      | 1                       | 8.55 | 9.5                  | 10  | 10.5 | 1  | 14.5                                       | 41   | 18.6                                    | 215  | 7.5                        | 2800      |
| P6KE12A        | P6KE12CA      | 0.5                     | 10   | 11.4                 | 12  | 12.6 | 1  | 16.7                                       | 36   | 21.7                                    | 184  | 7.8                        | 2300      |
| P6KE15A        | P6KE15CA      | 0.5                     | 13   | 14.3                 | 15  | 15.8 | 1  | 21.2                                       | 28   | 27.2                                    | 147  | 8.4                        | 1900      |
| P6KE18A        | P6KE18CA      | 0.5                     | 15   | 17.1                 | 18  | 18.9 | 1  | 25.2                                       | 24   | 32.5                                    | 123  | 8.8                        | 1600      |
| P6KE22A        | P6KE22CA      | 0.5                     | 19   | 20.9                 | 22  | 23.1 | 1  | 30.6                                       | 20   | 39.3                                    | 102  | 9.2                        | 1350      |
| P6KE24A        | P6KE24CA      | 0.5                     | 20   | 22.8                 | 24  | 25.2 | 1  | 33.2                                       | 18   | 42.8                                    | 93   | 9.4                        | 1250      |
| P6KE27A        | P6KE27CA      | 0.5                     | 23   | 25.7                 | 27  | 28.4 | 1  | 37.5                                       | 16   | 48.3                                    | 83   | 9.6                        | 1150      |
| P6KE30A        | P6KE30CA      | 0.5                     | 26   | 28.5                 | 30  | 31.5 | 1  | 41.5                                       | 14.5 | 53.5                                    | 75   | 9.7                        | 1075      |
| P6KE33A        | P6KE33CA      | 0.5                     | 28   | 31.4                 | 33  | 34.7 | 1  | 45.7                                       | 13.1 | 59                                      | 68   | 9.8                        | 1000      |
| P6KE36A        | P6KE36CA      | 0.5                     | 31   | 34.2                 | 36  | 37.8 | 1  | 49.9                                       | 12   | 64.3                                    | 62   | 9.9                        | 950       |
| P6KE39A        | P6KE39CA      | 0.5                     | 33   | 37.1                 | 39  | 41.0 | 1  | 53.9                                       | 11.1 | 69.7                                    | 57   | 10.0                       | 900       |
| P6KE47A        | P6KE47CA      | 0.5                     | 40   | 44.7                 | 47  | 49.4 | 1  | 64.8                                       | 9.3  | 84                                      | 48   | 10.1                       | 800       |
| P6KE56A        | P6KE56CA      | 0.5                     | 48   | 53.2                 | 56  | 58.8 | 1  | 77                                         | 7.8  | 100                                     | 40   | 10.3                       | 700       |
| P6KE68A        | P6KE68CA      | 0.5                     | 58   | 64.6                 | 68  | 71.4 | 1  | 92                                         | 6.5  | 121                                     | 33   | 10.4                       | 625       |
| P6KE82A        | P6KE82CA      | 0.5                     | 70   | 77.9                 | 82  | 86.1 | 1  | 113                                        | 5.3  | 146                                     | 27   | 10.5                       | 550       |
| P6KE100A       | P6KE100CA     | 0.5                     | 85   | 95.0                 | 100 | 105  | 1  | 137                                        | 4.4  | 178                                     | 22.5 | 10.6                       | 500       |
| P6KE120A       | P6KE120CA     | 0.5                     | 102  | 114                  | 120 | 126  | 1  | 165                                        | 3.6  | 212                                     | 19   | 10.7                       | 450       |
| P6KE150A       | P6KE150CA     | 0.5                     | 128  | 143                  | 150 | 158  | 1  | 207                                        | 2.9  | 265                                     | 15   | 10.8                       | 400       |
| P6KE180A       | P6KE180CA     | 0.5                     | 154  | 171                  | 180 | 189  | 1  | 246                                        | 2.4  | 317                                     | 12.6 | 10.8                       | 360       |
| P6KE200A       | P6KE200CA     | 0.5                     | 171  | 190                  | 200 | 210  | 1  | 274                                        | 2.2  | 353                                     | 11.3 | 10.8                       | 350       |
| P6KE220A       | P6KE220CA     | 0.5                     | 188  | 209                  | 220 | 231  | 1  | 328                                        | 1.85 | 388                                     | 10.3 | 10.8                       | 330       |
| P6KE250A       | P6KE250CA     | 0.5                     | 213  | 237                  | 250 | 263  | 1  | 344                                        | 1.75 | 442                                     | 9    | 11                         | 310       |
| P6KE300A       | P6KE300CA     | 0.5                     | 256  | 285                  | 300 | 315  | 1  | 414                                        | 1.45 | 529                                     | 7.6  | 11                         | 290       |
| P6KE350A       | P6KE350CA     | 0.5                     | 299  | 332                  | 350 | 368  | 1  | 482                                        | 1.25 | 618                                     | 6.5  | 11                         | 270       |
| P6KE400A       | P6KE400CA     | 0.5                     | 342  | 380                  | 400 | 420  | 1  | 548                                        | 1.1  | 706                                     | 5.7  | 11                         | 360       |
| P6KE440A       | P6KE440CA     | 0.5                     | 376  | 418                  | 440 | 462  | 1  | 603                                        | 1.0  | 776                                     | 5.2  | 11                         | 350       |

1. For bidirectional types having  $V_{RM} \leq 10\text{V}$ ,  $I_{RM}$  is multiplied by 2
2. Pulse test:  $t_p < 50\text{ ms}$ .
3.  $\Delta V_{BR} = \alpha T * (T_{amb} - 25) * V_{BR}(25^{\circ}\text{C})$ .
4.  $V_R = 0\text{ V}$ ,  $F = 1\text{ MHz}$ . For bidirectional types, capacitance value is divided by 2.

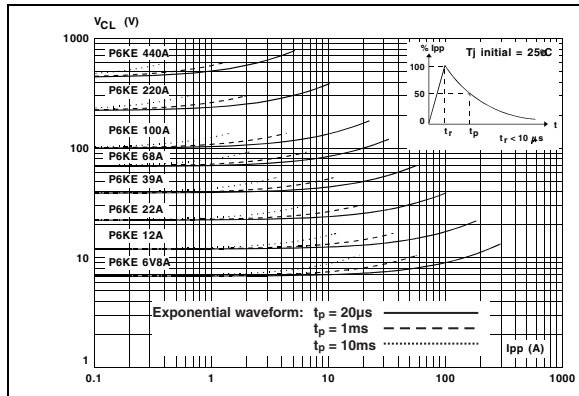
**Figure 3. Peak power dissipation vs. initial junction temperature (printed circuit board)**



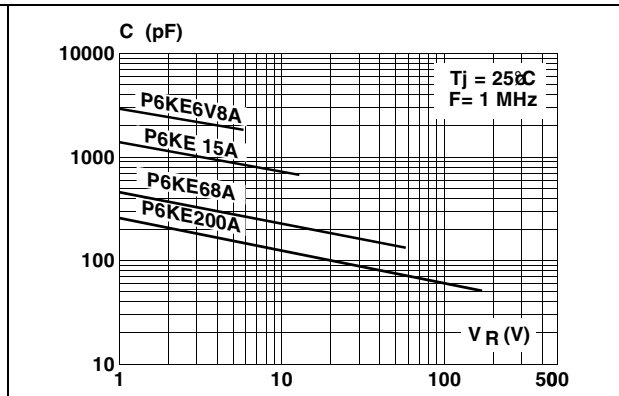
**Figure 4. Peak pulse power vs. exponential pulse duration.**



**Figure 5. Clamping voltage vs. peak pulse current<sup>(1)</sup>**

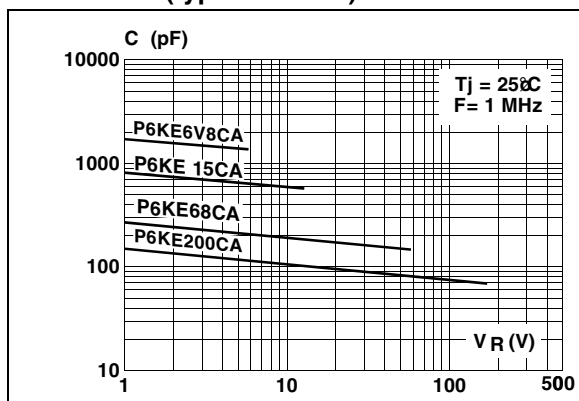


**Figure 6. Capacitance vs. reverse applied voltage for unidirectional types (typical values).**

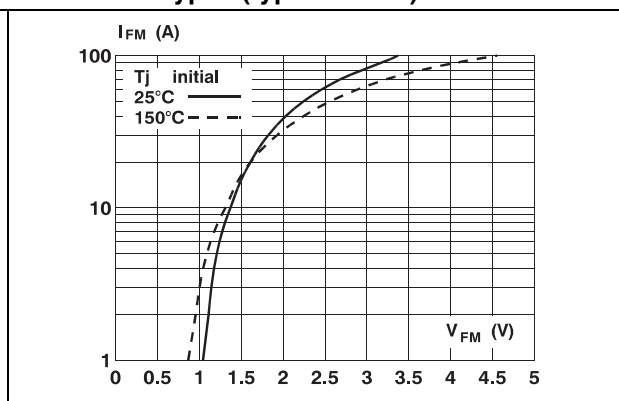


1. The curves in Figure 5 are specified for a junction temperature of 25°C before surge. The given results may be extrapolated for other junction temperatures by using the following formula :  $\Delta V_{BR} = \alpha T \times [T_{amb} - 25] \times V_{BR}(25^\circ C)$   
For intermediate voltages, extrapolate the given results.

**Figure 7. Capacitance vs. reverse applied voltage for bidirectional types (typical values).**



**Figure 8. Peak forward voltage drop vs. peak forward current for unidirectional types (typical value).<sup>(1)</sup>**



1. Multiply by 2 for units with  $V_{BR} > 220$  V.

Figure 9. Transient thermal impedance junction to ambient vs. pulse duration

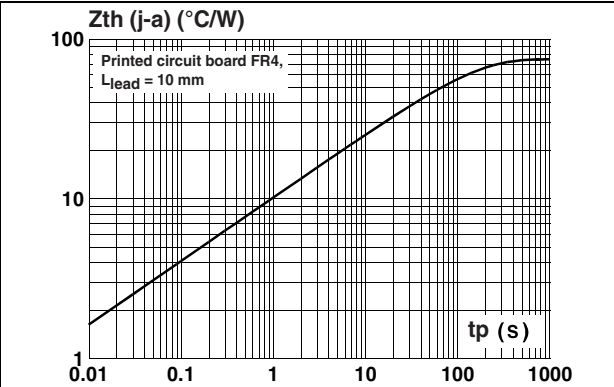
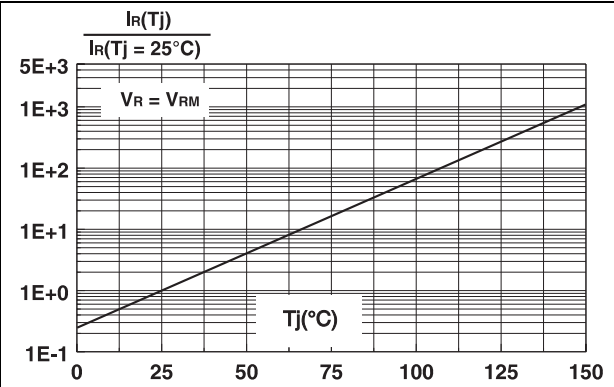
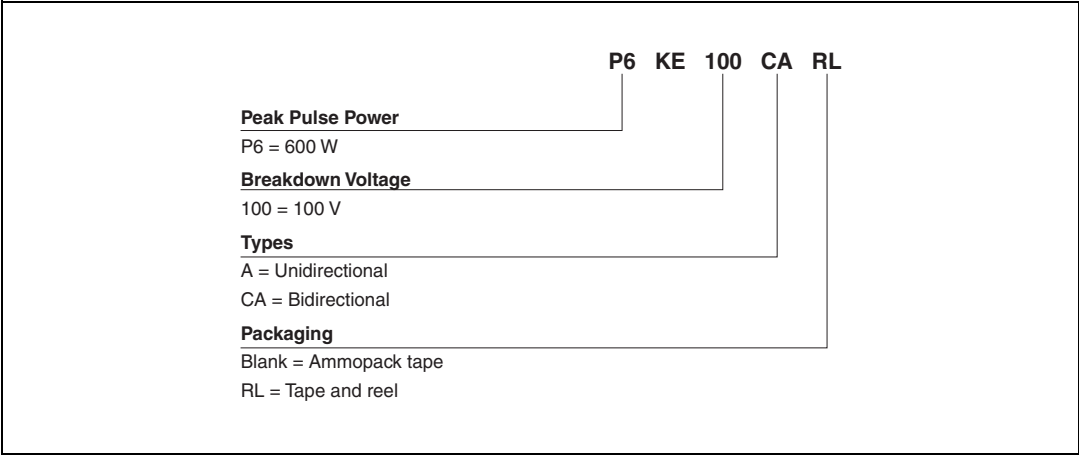


Figure 10. Relative variation of leakage current vs. junction temperature



## 2 Ordering information scheme

Figure 11. Ordering information scheme



## 3 Package information

- Epoxy meets UL94, V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

Table 4. DO-15 dimensions

| Ref. | Dimensions  |      |        |       |
|------|-------------|------|--------|-------|
|      | Millimeters |      | Inches |       |
|      | Min.        | Max. | Min.   | Max.  |
| A    | 6.05        | 6.75 | 0.238  | 0.266 |
| B    | 2.95        | 3.53 | 0.116  | 0.139 |
| C    | 26          | 31   | 1.024  | 1.220 |
| D    | 0.71        | 0.88 | 0.028  | 0.035 |

**Table 5. Marking**

| Unidirectional<br>order code | Marking <sup>(1)</sup>  | Bidirectional<br>order code | Marking <sup>(1)</sup>   |
|------------------------------|-------------------------|-----------------------------|--------------------------|
| P6KE6V8A                     | P6KE6V8A                | P6KE6V8CA                   | P6KE6V8CA                |
| P6KE7V5A                     | P6KE7V5A                | P6KE7V5CA                   | P6KE7V5CA                |
| P6KE10A                      | P6KE10A                 | P6KE10CA                    | P6KE10CA                 |
| P6KE12A                      | P6KE12A                 | P6KE12CA                    | P6KE12CA                 |
| P6KE15A                      | P6KE15A                 | P6KE15CA                    | P6KE15CA                 |
| P6KE18A                      | P6KE18A                 | P6KE18CA                    | P6KE18CA                 |
| P6KE22A                      | P6KE22A                 | P6KE22CA                    | P6KE22CA                 |
| P6KE24A                      | P6KE24A                 | P6KE24CA                    | P6KE24CA                 |
| P6KE27A                      | P6KE27A                 | P6KE27CA                    | P6KE27CA                 |
| P6KE30A                      | P6KE30A                 | P6KE30CA                    | P6KE30CA                 |
| P6KE33A                      | P6KE33A                 | P6KE33CA                    | P6KE33CA                 |
| P6KE36A                      | P6KE36A                 | P6KE36CA                    | P6KE36CA                 |
| P6KE39A                      | P6KE39A                 | P6KE39CA                    | P6KE39CA                 |
| P6KE47A                      | P6KE47A                 | P6KE47CA                    | P6KE47CA                 |
| P6KE56A                      | P6KE56A                 | P6KE56CA                    | P6KE56CA                 |
| P6KE68A                      | P6KE68A                 | P6KE68CA                    | P6KE68CA                 |
| P6KE82A                      | P6KE82A                 | P6KE82CA                    | P6KE82CA                 |
| P6KE100A                     | P6KE100A                | P6KE100CA                   | P6KE100CA                |
| P6KE120A                     | P6KE120A                | P6KE120CA                   | P6KE120CA                |
| P6KE150A                     | P6KE150A                | P6KE150CA                   | P6KE150CA <sup>(2)</sup> |
| P6KE180A                     | P6KE180A                | P6KE180CA                   | P6KE180CA                |
| P6KE200A                     | P6KE200A                | P6KE200CA                   | P6KE200CA                |
| P6KE220A                     | P6KE220A                | P6KE220CA                   | P6KE220CA                |
| P6KE250A                     | P6KE250A                | P6KE250CA                   | P6KE250CA                |
| P6KE300A                     | P6KE300A                | P6KE300CA                   | P6KE300CA                |
| P6KE350A                     | P6KE350A                | P6KE350CA                   | P6KE350CA                |
| P6KE400A                     | P6KE400A <sup>(2)</sup> | P6KE400CA                   | P6KE400CA                |
| P6KE440A                     | P6KE440A <sup>(2)</sup> | P6KE440CA                   | P6KE440CA                |

1. Includes a space character after P6KE for ECOPACK2 compliant devices

2. Includes a space character after P6KE for ECOPACK1 compliant devices in tape and reel packaging.

## 4 Ordering information

**Table 6. Ordering information**

| Order code | Marking <sup>(1)</sup>      | Package | Weight | Base qty | Delivery mode |
|------------|-----------------------------|---------|--------|----------|---------------|
| P6KExxxx   | See <a href="#">Table 5</a> | DO-15   | 0.4 g  | 1000     | Ammopack      |
| P6KExxxxRL |                             |         |        | 6000     | Tape and reel |

1. Logo, date code, type code, cathode band (for unidirectional types only).

## 5 Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                                                                  |
|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feb-2003    | 4A       | Last update                                                                                                                                                                                                              |
| Oct-2004    | 5        | 1/ Note 5, figure 7 on page 4, updated from $V_{BR} > 220V$ to $V_{BR} \geq 200V$ .<br>2/ Types table on page 2: $I_{PP}$ (@ 10/1000 $\mu$ s) changed for P6KE220xx to P6KE440xx                                         |
| 14-Sep-2011 | 6        | Updated $I_{RM}$ @ $V_{RM}$ values, $V_{BRmax}$ @ $I_R$ for P6KE33 and order codes in <a href="#">Table 3</a> . Updated footnotes to <a href="#">Table 5</a> .<br>Updated $T_L$ temperature in <a href="#">Table 1</a> . |
| 26-Apr-2012 | 7        | Corrected typographical area <a href="#">Table 3</a> .                                                                                                                                                                   |

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