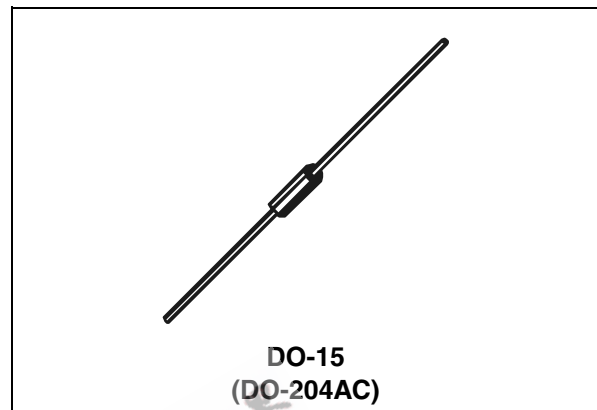


### FEATURES

- Peak pulse power: 600 W (10/1000  $\mu$ s )
- Stand-off voltage range 6.8 to 440V
- Unidirectional and Bidirectional types
- Low clamping factor
- Fast response time
- UL recognized

### DESCRIPTION

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS Technology and low voltage supplied IC's.



**Table 1: Order Codes**

| Part Number | Marking    |
|-------------|------------|
| P6KExxxx    | See page 2 |

**Table 2: Absolute Maximum Ratings** ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol             | Parameter   |  | Value             | Unit               |
|--------------------|---|--|-------------------|--------------------|
| $P_{PP}$           | Peak pulse power dissipation (see note 1)                           | $T_j$ initial = $T_{amb}$                  | 600               | W                  |
| $P$                | Power dissipation on infinite heatsink                              | $T_{amb} = 75^{\circ}\text{C}$             | 5                 | W                  |
| $I_{FSM}$          | Non repetitive surge peak forward current                           | $t_p = 10$ ms<br>$T_j$ initial = $T_{amb}$ | 100               | A                  |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature           |  | -65 to 175<br>175 | $^{\circ}\text{C}$ |
| $T_L$              | Maximum lead temperature for soldering during 10 s at 5mm from case |  | 230               | $^{\circ}\text{C}$ |

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

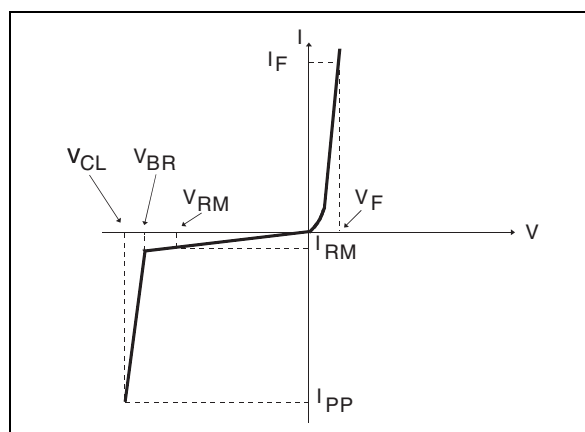
**Table 3: Thermal Resistances**

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

## P6KE

**Table 4: Electrical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol     | Parameter                       |
|------------|---------------------------------|
| $V_{RM}$   | Stand-off voltage               |
| $V_{BR}$   | Breakdown voltage               |
| $V_{CL}$   | Clamping voltage                |
| $I_{RM}$   | Leakage current @ $V_{RM}$      |
| $I_{PP}$   | Peak pulse current              |
| $\alpha T$ | Voltage temperature coefficient |
| $V_F$      | Forward voltage drop            |



| TYPES          |               | $I_{RM} @ V_{RM}$ |      | $V_{BR} @ I_R$ |     |      |    | $V_{CL} @ I_{PP}$ |      | $V_{CL} @ I_{PP}$ |      | $\alpha T$<br>max<br>note3 | <b>C</b><br>typ<br>note4 |
|----------------|---------------|-------------------|------|----------------|-----|------|----|-------------------|------|-------------------|------|----------------------------|--------------------------|
|                |               | max               |      | min            | nom | max  |    | max               |      | max               |      |                            |                          |
| Unidirectional | Bidirectional | $\mu\text{A}$     | V    | V              | V   | V    | mA | V                 | A    | V                 | A    | $10^{-4}/^{\circ}\text{C}$ | pF                       |
| P6KE6V8A       | P6KE6.8CA     | 1000              | 5.8  | 6.45           | 6.8 | 7.14 | 10 | 10.5              | 57   | 13.4              | 298  | 5.7                        | 4000                     |
| P6KE7V5A       | P6KE7.5CA     | 500               | 6.4  | 7.13           | 7.5 | 7.88 | 10 | 11.3              | 53   | 14.5              | 276  | 6.1                        | 3700                     |
| P6KE10A        | P6KE10CA      | 10                | 8.55 | 9.5            | 10  | 10.5 | 1  | 14.5              | 41   | 18.6              | 215  | 7.5                        | 2800                     |
| P6KE12A        | P6KE12CA      | 5                 | 10.2 | 11.4           | 12  | 12.6 | 1  | 16.7              | 36   | 21.7              | 184  | 7.8                        | 2300                     |
| P6KE15A        | P6KE15CA      | 1                 | 12.8 | 14.3           | 15  | 15.8 | 1  | 21.2              | 28   | 27.2              | 147  | 8.4                        | 1900                     |
| P6KE18A        | P6KE18CA      | 1                 | 15.3 | 17.1           | 18  | 18.9 | 1  | 25.2              | 24   | 32.5              | 123  | 8.8                        | 1600                     |
| P6KE22A        | P6KE22CA      | 1                 | 18.8 | 20.9           | 22  | 23.1 | 1  | 30.6              | 20   | 39.3              | 102  | 9.2                        | 1350                     |
| P6KE24A        | P6KE24CA      | 1                 | 20.5 | 22.8           | 24  | 25.2 | 1  | 33.2              | 18   | 42.8              | 93   | 9.4                        | 1250                     |
| P6KE27A        | P6KE27CA      | 1                 | 23.1 | 25.7           | 27  | 28.4 | 1  | 37.5              | 16   | 48.3              | 83   | 9.6                        | 1150                     |
| P6KE30A        | P6KE30CA      | 1                 | 25.6 | 28.5           | 30  | 31.5 | 1  | 41.5              | 14.5 | 53.5              | 75   | 9.7                        | 1075                     |
| P6KE33A        | P6KE33CA      | 1                 | 28.2 | 31.4           | 33  | 34.7 | 1  | 45.7              | 13.1 | 59                | 68   | 9.8                        | 1000                     |
| P6KE36A        | P6KE36CA      | 1                 | 30.8 | 34.2           | 36  | 37.8 | 1  | 49.9              | 12   | 64.3              | 62   | 9.9                        | 950                      |
| P6KE39A        | P6KE39CA      | 1                 | 33.3 | 37.1           | 39  | 41.0 | 1  | 53.9              | 11.1 | 69.7              | 57   | 10.0                       | 900                      |
| P6KE47A        | P6KE47CA      | 1                 | 40.2 | 44.7           | 47  | 49.4 | 1  | 64.8              | 9.3  | 84                | 48   | 10.1                       | 800                      |
| P6KE56A        | P6KE56CA      | 1                 | 47.8 | 53.2           | 56  | 58.8 | 1  | 77                | 7.8  | 100               | 40   | 10.3                       | 700                      |
| P6KE68A        | P6KE68CA      | 1                 | 58.1 | 64.6           | 68  | 71.4 | 1  | 92                | 6.5  | 121               | 33   | 10.4                       | 625                      |
| P6KE82A        | P6KE82CA      | 1                 | 70.1 | 77.9           | 82  | 86.1 | 1  | 113               | 5.3  | 146               | 27   | 10.5                       | 550                      |
| P6KE100A       | P6KE100CA     | 1                 | 85.5 | 95.0           | 100 | 105  | 1  | 137               | 4.4  | 178               | 22.5 | 10.6                       | 500                      |
| P6KE120A       | P6KE120CA     | 1                 | 102  | 114            | 120 | 126  | 1  | 165               | 3.6  | 212               | 19   | 10.7                       | 450                      |
| P6KE150A       | P6KE150CA     | 1                 | 128  | 143            | 150 | 158  | 1  | 207               | 2.9  | 265               | 15   | 10.8                       | 400                      |
| P6KE180A       | P6KE180CA     | 1                 | 154  | 171            | 180 | 189  | 1  | 246               | 2.4  | 317               | 12.6 | 10.8                       | 360                      |
| P6KE200A       | P6KE200CA     | 1                 | 171  | 190            | 200 | 210  | 1  | 274               | 2.2  | 353               | 11.3 | 10.8                       | 350                      |
| P6KE220A       | P6KE220CA     | 1                 | 188  | 209            | 220 | 231  | 1  | 328               | 1.85 | 388               | 10.3 | 10.8                       | 330                      |
| P6KE250A       | P6KE250CA     | 1                 | 213  | 237            | 250 | 263  | 1  | 344               | 1.75 | 442               | 9    | 11                         | 310                      |
| P6KE300A       | P6KE300CA     | 1                 | 256  | 285            | 300 | 315  | 1  | 414               | 1.45 | 529               | 7.6  | 11                         | 290                      |
| P6KE350A       | P6KE350CA     | 1                 | 299  | 332            | 350 | 368  | 1  | 482               | 1.25 | 618               | 6.5  | 11                         | 270                      |
| P6KE400A       | P6KE400CA     | 1                 | 342  | 380            | 400 | 420  | 1  | 548               | 1.1  | 706               | 5.7  | 11                         | 360                      |
| P6KE440A       | P6KE440CA     | 1                 | 376  | 418            | 440 | 462  | 1  | 603               | 1.0  | 776               | 5.2  | 11                         | 350                      |

**Note 2:** Pulse test :  $t_p < 50$  ms.

**Note 3:**  $\Delta V_{BR} = \alpha T \cdot (T_a - 25) \cdot V_{BR}(25^{\circ}\text{C})$ .

**Note 4:**  $V_R = 0$  V,  $F = 1$  MHz. For bidirectional types, capacitance value is divided by 2.

Figure 1: Pulse waveform (10/1000µs)

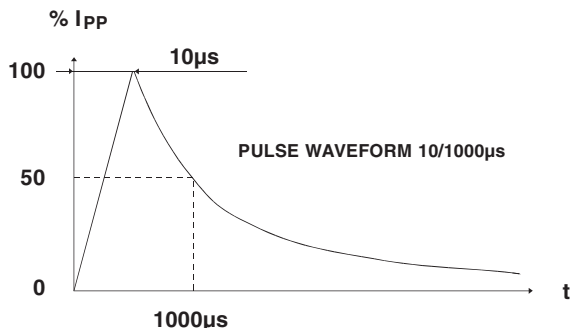


Figure 2: Peak power dissipation versus initial junction temperature (printed circuit board)

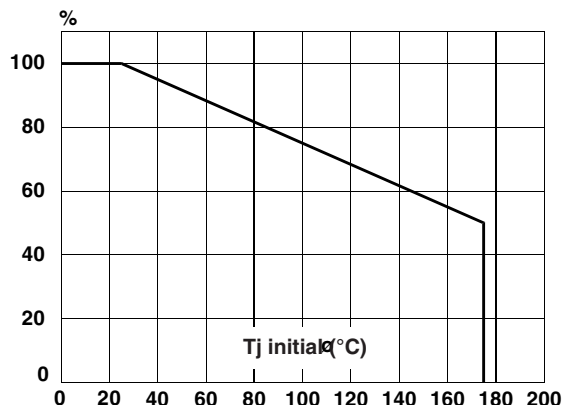


Figure 3: Peak pulse power versus exponential pulse duration

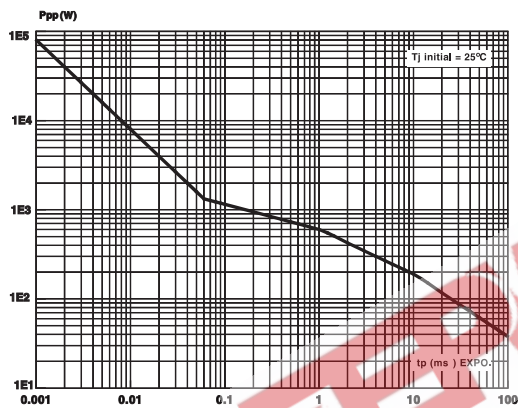
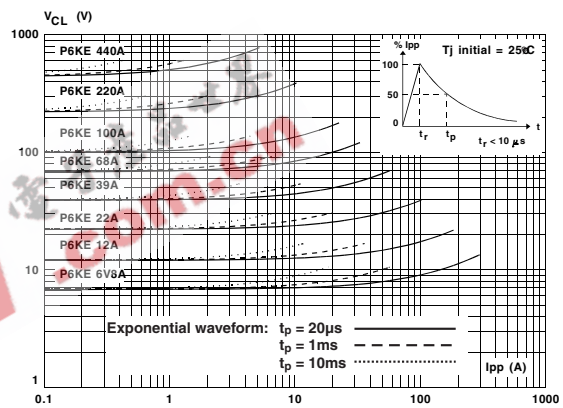


Figure 4: Clamping voltage versus peak pulse current (note 5)



**Note 5:** The curves of the figure 4 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 :  $\Delta V_{BR} = \alpha T * [T_{amb} - 25] * V_{BR}(25^\circ C)$   
 For intermediate voltages, extrapolate the given results.

Figure 5: Capacitance versus reverse applied voltage for unidirectional types (typical values)

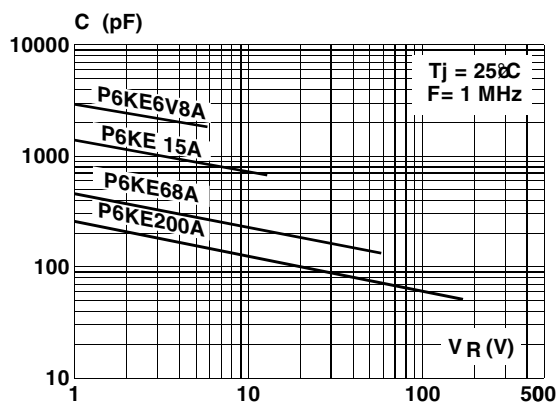
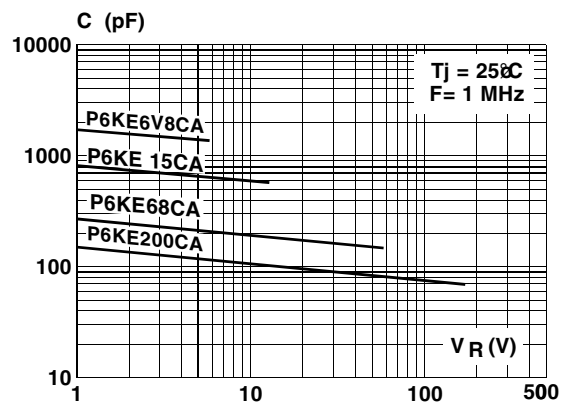
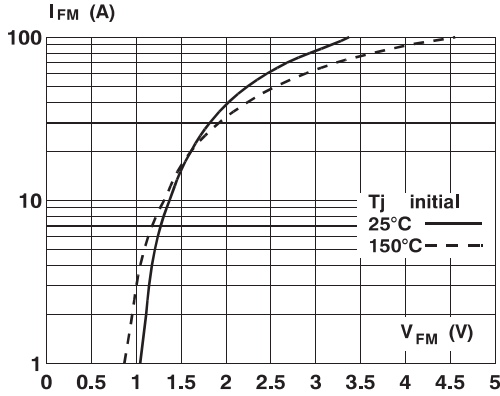


Figure 6: Capacitance versus reverse applied voltage for bidirectional types (typical values)

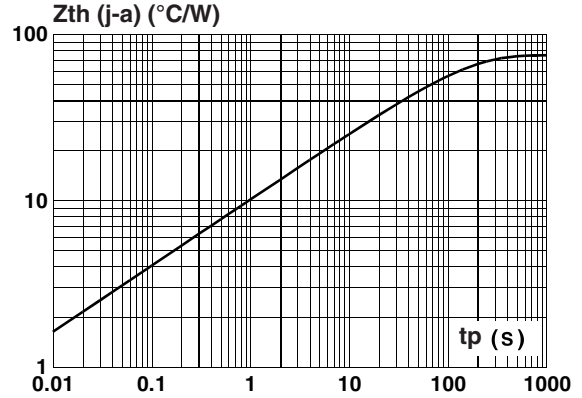


**Figure 7: Peak forward voltage drop versus peak forward current for unidirectional types (typical values)**

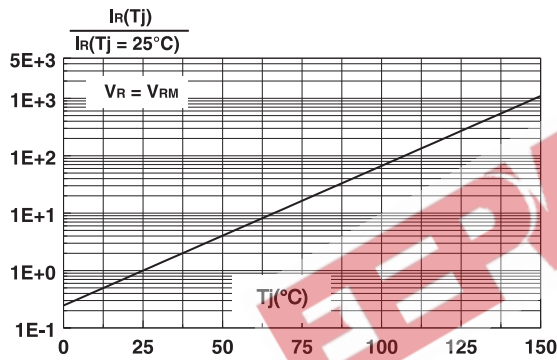
**Note:** multiply by 2 for units with  $V_{BR} \geq 200V$



**Figure 8: Transient thermal impedance junction to ambient versus pulse duration (for FR4 PC Board with  $L_{lead} = 10mm$ )**



**Figure 9: Relative variation of leakage current versus junction temperature**



**Figure 10: Ordering Information Scheme**

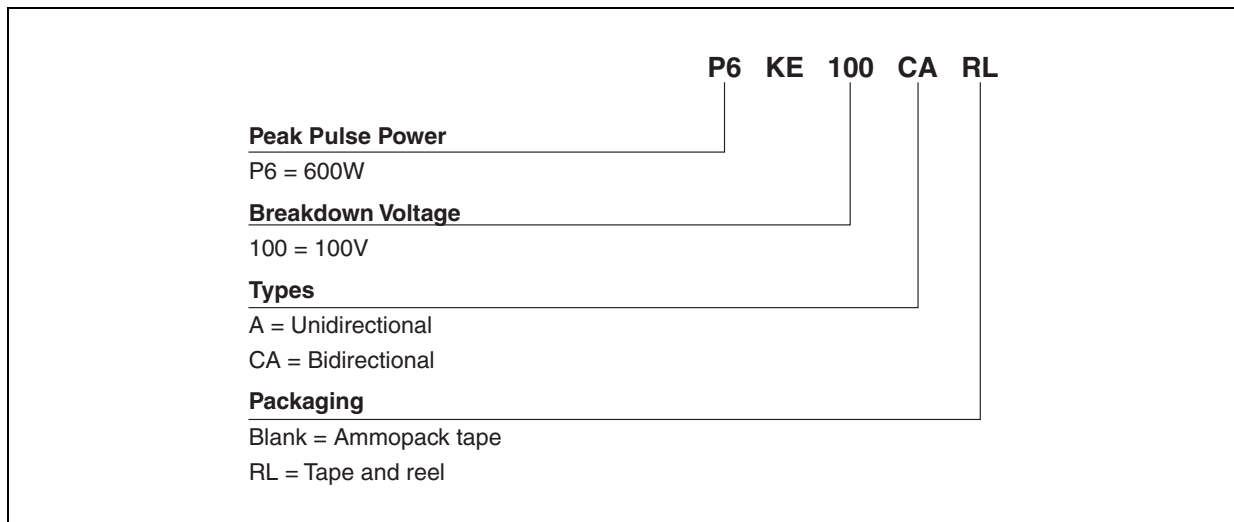


Figure 11: DO-15 (DO-204AC) Package Mechanical Data

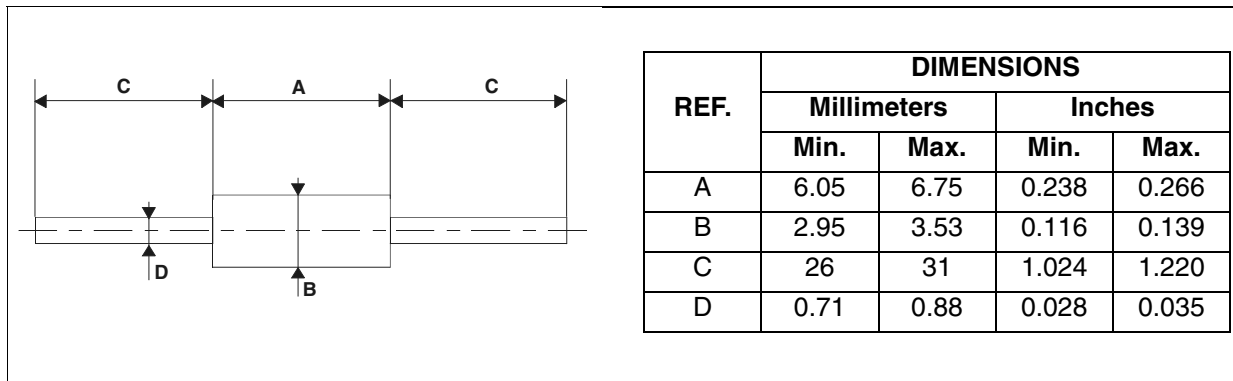


Table 5: Ordering Information

| Part Number | Marking    | Package | Weight | Base qty | Delivery mode |
|-------------|------------|---------|--------|----------|---------------|
| P6KExxxx    | See page 2 | DO-15   | 0.4 g  | 1000     | Ammopack      |
| P6KExxxxRL  |            |         |        | 6000     | Tape & reel   |

Marking: Logo, data code, type code, cathode band (for unidirectional types only)

Table 6: Revision History

| Date     | Revision | Description of Changes   |
|----------|----------|--|
| Feb-2003 | 4B       | 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 |



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