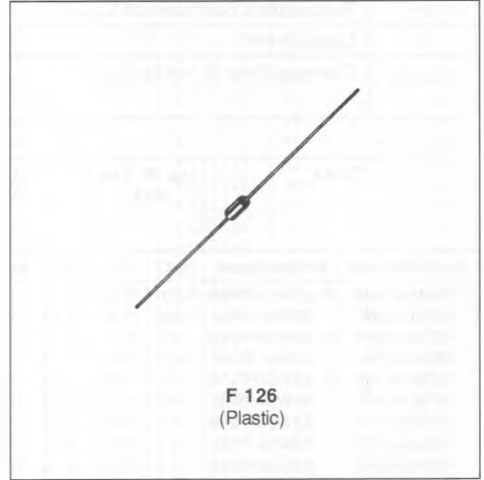




UNI-AND BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSORS

- HIGH SURGE CAPABILITY :
400 W / 1 ms EXPO
- VERY FAST CLAMPING TIME :
1 ps FOR UNIDIRECTIONAL TYPES
5 ns FOR BIDIRECTIONAL TYPES
- LARGE VOLTAGE RANGE :
5.8 V → 376 V
- ORDER CODE :
TYPE NUMBER FOR UNIDIRECTIONAL
TYPES, TYPE NUMBER + SUFFIX B FOR
BIDIRECTIONAL TYPES



DESCRIPTION

Transient voltage suppressor diodes especially useful in protecting integrated circuits, MOS, hybrids and other voltage-sensitive semiconductors and components.

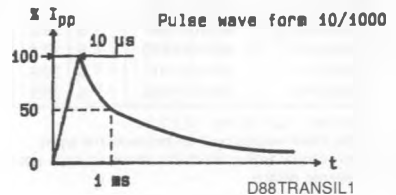
ABSOLUTE MAXIMUM RATINGS (limiting values)

| Symbol | Parameter | | Value | Unit |
|--------------------|--|--------------------------------------|--------------------|----------|
| P_p | Peak Pulse Power for 1 ms Exponential Pulse | T_j Initial = 25 °C See note 1 | 400 | W |
| P | Power Dissipation on Infinite Heatsink | $T_{amb} = 50$ °C | 1.7 | W |
| I_{FSM} | Non Repetitive Surge Peak Forward Current for Unidirectional Types | T_j Initial = 25 °C $t = 10$ ms | 50 | A |
| T_{stg} T_j | Storage and Operating Junction Temperature Range | | - 55 to 150 150 | °C °C |
| T_L | Maximum Lead Temperature for Soldering During 10 s at 4 mm from Case | | 230 | °C |

THERMAL RESISTANCE

| Symbol | Parameter | Value | Unit |
|---------------|--|-------|------|
| $R_{th(j-l)}$ | Junction-leads on Infinite Heatsink for $L_{lead} = 10$ mm | 60 | °C/W |

Note : 1. For surges upper than the maximum values, the diode will present a short-circuit anode-cathode.



ELECTRICAL CHARACTERISTICS (T_j = 25 °C)

| Symbol | Parameter | Value | |
|-----------------------|--|----------------------|-----------|
| V _{RM} | Stand-off Voltage | See tables | |
| V _(BR) | Breakdown Voltage | | |
| V _(CL) | Clamping Voltage | | |
| I _{pp} | Peak Pulse Current | | |
| α _T | Temperature Coefficient of V _(BR) | | |
| C | Capacitance | | |
| t _{clamping} | Clamping Time (0 volt to V _(BR)) | Unidirectional Types | 1 ps max. |
| | | Bidirectional Types | 5 ns max. |

| Types | | I _{RM} @ V _{RM} max. | | V _(BR) * @ I _R | | | V _(CL) @ I _{pp} max. | | V _(CL) @ I _{pp} max. | | α _T max. | C** typ. V _R =0 f=1MHz | | | |
|----------------|---------------|--|------------|--------------------------------------|------|------|--|-------|--|------|---------------------|-----------------------------------|------|------|------|
| Unidirectional | Bidirectional | (μA) | (V) | min. | nom. | max. | (mA) | (V) | (A) | (V) | (A) | (10 ⁻⁴ /°C) | (pF) | | |
| | | | | | | | 1ms expo | | 8-20μs expo | | | | | | |
| P | BZW04P5V8 | P | BZW04P5V8B | 1000 | 5.8 | 6.45 | 6.8 | 7.48 | 10 | 10.5 | 38 | 13.4 | 174 | 5.7 | 3500 |
| | BZW04-5V8 | | BZW04-5V8B | 1000 | 5.8 | 6.45 | 6.8 | 7.14 | 10 | 10.5 | 38 | 13.4 | 174 | 5.7 | 3500 |
| | BZW04P6V4 | P | BZW04P6V4B | 500 | 6.4 | 7.13 | 7.5 | 8.25 | 10 | 11.3 | 35.4 | 14.5 | 160 | 6.1 | 3100 |
| | BZW04-6V4 | | BZW04-6V4B | 500 | 6.4 | 7.13 | 7.5 | 7.88 | 10 | 11.3 | 35.4 | 14.5 | 160 | 6.1 | 3100 |
| | BZW04P7V0 | P | BZW04P7V0B | 200 | 7.02 | 7.79 | 8.2 | 9.02 | 10 | 12.1 | 33 | 15.5 | 148 | 6.5 | 2700 |
| | BZW04-7V0 | | BZW04-7V0B | 200 | 7.02 | 7.79 | 8.2 | 8.61 | 10 | 12.1 | 33 | 15.5 | 148 | 6.5 | 2700 |
| | BZW04P7V8 | | BZW04P7V8B | 50 | 7.78 | 8.65 | 9.1 | 10.0 | 1 | 13.4 | 30 | 17.1 | 134 | 6.8 | 2300 |
| | BZW04-7V8 | | BZW04-7V8B | 50 | 7.78 | 8.65 | 9.1 | 9.55 | 1 | 13.4 | 30 | 17.1 | 134 | 6.8 | 2300 |
| | BZW04P8V5 | | BZW04P8V5B | 10 | 8.55 | 9.50 | 10 | 11.0 | 1 | 14.5 | 27.6 | 18.6 | 258 | 7.3 | 2000 |
| | BZW04-8V5 | | BZW04-8V5B | 10 | 8.55 | 9.50 | 10 | 10.50 | 1 | 14.5 | 27.6 | 18.6 | 258 | 7.3 | 2000 |
| P | BZW04P9V4 | P | BZW04P9V4B | 5 | 9.4 | 10.5 | 11 | 12.1 | 1 | 15.6 | 25.7 | 20.3 | 236 | 7.5 | 1750 |
| | BZW04-9V4 | | BZW04-9V4B | 5 | 9.4 | 10.5 | 11 | 11.6 | 1 | 15.6 | 25.7 | 20.3 | 236 | 7.5 | 1750 |
| | BZW04P10 | | BZW04P10B | 5 | 10.2 | 11.4 | 12 | 13.2 | 1 | 16.7 | 24 | 21.7 | 221 | 7.8 | 1550 |
| | BZW04-10 | | BZW04-10B | 5 | 10.2 | 11.4 | 12 | 12.6 | 1 | 16.7 | 24 | 21.7 | 221 | 7.8 | 1550 |
| P | BZW04P11 | P | BZW04P11B | 5 | 11.1 | 12.4 | 13 | 14.3 | 1 | 18.2 | 22 | 23.6 | 203 | 8.1 | 1450 |
| | BZW04-11 | | BZW04-11B | 5 | 11.1 | 12.4 | 13 | 13.7 | 1 | 18.2 | 22 | 23.6 | 203 | 8.1 | 1450 |
| P | BZW04P13 | P | BZW04P13B | 5 | 12.8 | 14.3 | 15 | 16.5 | 1 | 21.2 | 19 | 27.2 | 176 | 8.4 | 1200 |
| | BZW04-13 | | BZW04-13B | 5 | 12.8 | 14.3 | 15 | 15.8 | 1 | 21.2 | 19 | 27.2 | 176 | 8.4 | 1200 |
| P | BZW04P14 | P | BZW04P14B | 5 | 13.6 | 15.2 | 16 | 17.6 | 1 | 22.5 | 17.8 | 28.9 | 166 | 8.6 | 1100 |
| | BZW04-14 | | BZW04-14B | 5 | 13.6 | 15.2 | 16 | 16.8 | 1 | 22.5 | 17.8 | 28.9 | 166 | 8.6 | 1100 |
| P | BZW04P15 | P | BZW04P15B | 5 | 15.3 | 17.1 | 18 | 19.8 | 1 | 25.2 | 16 | 32.5 | 148 | 8.8 | 975 |
| | BZW04-15 | | BZW04-15B | 5 | 15.3 | 17.1 | 18 | 18.9 | 1 | 25.2 | 16 | 32.5 | 148 | 8.8 | 975 |
| | BZW04P17 | | BZW04P17B | 5 | 17.1 | 19 | 20 | 22 | 1 | 27.7 | 14.5 | 36.1 | 133 | 9.0 | 850 |
| | BZW04-17 | | BZW04-17B | 5 | 17.1 | 19 | 20 | 21 | 1 | 27.7 | 14.5 | 36.1 | 133 | 9.0 | 850 |
| | BZW04P19 | | BZW04P19B | 5 | 18.8 | 20.9 | 22 | 24.2 | 1 | 30.6 | 13 | 39.3 | 122 | 9.2 | 800 |
| | BZW04-19 | | BZW04-19B | 5 | 18.8 | 20.9 | 22 | 23.1 | 1 | 30.6 | 13 | 39.3 | 122 | 9.2 | 800 |
| | BZW04P20 | P | BZW04P20B | 5 | 20.5 | 22.8 | 24 | 26.4 | 1 | 33.2 | 12 | 42.8 | 112 | 9.4 | 725 |
| | BZW04-20 | | BZW04-20B | 5 | 20.5 | 22.8 | 24 | 25.2 | 1 | 33.2 | 12 | 42.8 | 112 | 9.4 | 725 |
| P | BZW04P23 | | BZW04P23B | 5 | 23.1 | 25.7 | 27 | 29.7 | 1 | 37.5 | 10.7 | 48.3 | 99 | 9.6 | 625 |
| | BZW04-23 | | BZW04-23B | 5 | 23.1 | 25.7 | 27 | 28.4 | 1 | 37.5 | 10.7 | 48.3 | 99 | 9.6 | 625 |
| P | BZW04P26 | P | BZW04P26B | 5 | 25.6 | 28.5 | 30 | 33 | 1 | 41.5 | 9.6 | 53.5 | 90 | 9.7 | 575 |
| | BZW04-26 | | BZW04-26B | 5 | 25.6 | 28.5 | 30 | 31.5 | 1 | 41.5 | 9.6 | 53.5 | 90 | 9.7 | 575 |
| | BZW04P28 | P | BZW04P28B | 5 | 28.2 | 31.4 | 33 | 36.3 | 1 | 45.7 | 8.8 | 59 | 81.5 | 9.8 | 510 |
| | BZW04-28 | | BZW04-28B | 5 | 28.2 | 31.4 | 33 | 34.7 | 1 | 45.7 | 8.8 | 59 | 81.5 | 9.8 | 510 |
| P | BZW04P31 | P | BZW04P31B | 5 | 30.8 | 34.2 | 36 | 39.6 | 1 | 49.9 | 8 | 64.3 | 74.5 | 9.9 | 480 |
| | BZW04-31 | | BZW04-31B | 5 | 30.8 | 34.2 | 36 | 37.8 | 1 | 49.9 | 8 | 64.3 | 74.5 | 9.9 | 480 |
| P | BZW04P33 | | BZW04P33B | 5 | 33.3 | 37.1 | 39 | 42.9 | 1 | 53.9 | 7.4 | 69.7 | 69 | 10.0 | 450 |

* Pulse test t_p ≤ 50 ms δ < 2 %

** Divide these values by 2 for bidirectional types.

For bidirectional types, electrical characteristics apply in both directions

P : Preferred device

| Types | | I _{RM} @ V _{RM} max. | | V _(BR) * @ I _R | | | V _(CL) @ I _{PP} max. | | V _(CL) @ I _{PP} max. | | α _T max. | C** typ. V _R =1MHz f=1MHz | |
|----------------|---------------|---|------|--------------------------------------|------|------|---|------|---|------|------------------------|---|------|
| Unidirectional | Bidirectional | (μA) | (V) | min. | nom. | max. | (mA) | (V) | (A) | (V) | (A) | (10 ⁻⁴ /°C) | (pF) |
| BZW04-33 | BZW04-33B | 5 | 33.3 | 37.1 | 39 | 41 | 1 | 53.9 | 7.4 | 69.7 | 69 | 10.0 | 450 |
| BZW04P37 | P BZW04P37B | 5 | 36.8 | 40.9 | 43 | 47.3 | 1 | 59.3 | 6.7 | 76.8 | 62.5 | 10.1 | 400 |
| BZW04-37 | BZW04-37B | 5 | 36.8 | 40.9 | 43 | 45.2 | 1 | 59.3 | 6.7 | 76.8 | 62.5 | 10.1 | 400 |
| BZW04P40 | BZW04P40B | 5 | 40.2 | 44.7 | 47 | 51.7 | 1 | 64.8 | 6.2 | 84 | 57 | 10.1 | 370 |
| BZW04-40 | BZW04-40B | 5 | 40.2 | 44.7 | 47 | 49.4 | 1 | 64.8 | 6.2 | 84 | 57 | 10.1 | 370 |
| BZW04P44 | BZW04P44B | 5 | 43.6 | 48.5 | 51 | 56.1 | 1 | 70.1 | 5.7 | 91 | 52.5 | 10.2 | 350 |
| BZW04-44 | BZW04-44B | 5 | 43.6 | 48.5 | 51 | 53.6 | 1 | 70.1 | 5.7 | 91 | 52.5 | 10.2 | 350 |
| BZW04P48 | BZW04P48B | 5 | 47.8 | 53.2 | 56 | 61.6 | 1 | 77 | 5.2 | 100 | 48 | 10.3 | 320 |
| BZW04-48 | BZW04-48B | 5 | 47.8 | 53.2 | 56 | 58.8 | 1 | 77 | 5.2 | 100 | 48 | 10.3 | 320 |
| BZW04P53 | BZW04P53B | 5 | 53 | 58.9 | 62 | 68.2 | 1 | 85 | 4.7 | 111 | 43 | 10.4 | 290 |
| BZW04-53 | BZW04-53B | 5 | 53 | 58.9 | 62 | 65.1 | 1 | 85 | 4.7 | 111 | 43 | 10.4 | 290 |
| BZW04P58 | BZW04P58B | 5 | 58.1 | 64.6 | 68 | 74.8 | 1 | 92 | 4.3 | 121 | 39.5 | 10.4 | 270 |
| BZW04-58 | BZW04-58B | 5 | 58.1 | 64.6 | 68 | 71.4 | 1 | 92 | 4.3 | 121 | 39.5 | 10.4 | 270 |
| BZW04P64 | BZW04P64B | 5 | 64.1 | 71.3 | 75 | 82.5 | 1 | 103 | 3.9 | 134 | 36 | 10.5 | 250 |
| BZW04-64 | BZW04-64B | 5 | 64.1 | 71.3 | 75 | 78.8 | 1 | 103 | 3.9 | 134 | 36 | 10.5 | 250 |
| BZW04P70 | P BZW04P70B | 5 | 70.1 | 77.9 | 82 | 90.2 | 1 | 113 | 3.5 | 146 | 33 | 10.5 | 230 |
| BZW04-70 | BZW04-70B | 5 | 70.1 | 77.9 | 82 | 86.1 | 1 | 113 | 3.5 | 146 | 33 | 10.5 | 230 |
| BZW04P78 | BZW04P78B | 5 | 77.8 | 86.5 | 91 | 100 | 1 | 125 | 3.2 | 162 | 29.5 | 10.6 | 210 |
| BZW04-78 | BZW04-78B | 5 | 77.8 | 86.5 | 91 | 95.5 | 1 | 125 | 3.2 | 162 | 29.5 | 10.6 | 210 |
| P BZW04P85 | BZW04P85B | 5 | 85.5 | 95 | 100 | 110 | 1 | 137 | 2.9 | 178 | 27 | 10.6 | 200 |
| BZW04-85 | BZW04-85B | 5 | 85.5 | 95 | 100 | 105 | 1 | 137 | 2.9 | 178 | 27 | 10.6 | 200 |
| BZW04P94 | BZW04P94B | 5 | 94 | 105 | 110 | 121 | 1 | 152 | 2.6 | 195 | 24.5 | 10.7 | 185 |
| BZW04-94 | BZW04-94B | 5 | 94 | 105 | 110 | 116 | 1 | 152 | 2.6 | 195 | 24.5 | 10.7 | 185 |
| BZW04P102 | BZW04P102B | 5 | 102 | 114 | 120 | 132 | 1 | 165 | 2.4 | 212 | 22.5 | 10.7 | 170 |
| BZW04-102 | BZW04-102B | 5 | 102 | 114 | 120 | 126 | 1 | 165 | 2.4 | 212 | 22.5 | 10.7 | 170 |
| P BZW04P111 | BZW04P111B | 5 | 111 | 124 | 130 | 143 | 1 | 179 | 2.2 | 230 | 20.8 | 10.7 | 165 |
| BZW04-111 | BZW04-111B | 5 | 111 | 124 | 130 | 137 | 1 | 179 | 2.2 | 230 | 20.8 | 10.7 | 165 |
| P BZW04P128 | P BZW04P128B | 5 | 128 | 143 | 150 | 165 | 1 | 207 | 2.0 | 265 | 18.1 | 10.8 | 145 |
| BZW04-128 | BZW04-128B | 5 | 128 | 143 | 150 | 158 | 1 | 207 | 2.0 | 265 | 18.1 | 10.8 | 145 |
| P BZW04P136 | P BZW04P136B | 5 | 136 | 152 | 160 | 176 | 1 | 219 | 1.8 | 282 | 17 | 10.8 | 140 |
| BZW04-136 | BZW04-136B | 5 | 136 | 152 | 160 | 168 | 1 | 219 | 1.8 | 282 | 17 | 10.8 | 140 |
| P BZW04P145 | BZW04P145B | 5 | 145 | 161 | 170 | 187 | 1 | 234 | 1.7 | 301 | 16 | 10.8 | 135 |
| BZW04-145 | BZW04-145B | 5 | 145 | 161 | 170 | 179 | 1 | 234 | 1.7 | 301 | 16 | 10.8 | 135 |
| BZW04P154 | BZW04P154B | 5 | 154 | 171 | 180 | 198 | 1 | 246 | 1.6 | 317 | 15.1 | 10.8 | 125 |
| BZW04-154 | BZW04-154B | 5 | 154 | 171 | 180 | 189 | 1 | 246 | 1.6 | 317 | 15.1 | 10.8 | 125 |
| BZW04P171 | BZW04P171B | 5 | 171 | 190 | 200 | 220 | 1 | 274 | 1.5 | 353 | 13.6 | 10.8 | 120 |
| BZW04-171 | BZW04-171B | 5 | 171 | 190 | 200 | 210 | 1 | 274 | 1.5 | 353 | 13.6 | 10.8 | 120 |
| BZW04P188 | P BZW04P188B | 5 | 188 | 209 | 220 | 242 | 1 | 301 | 1.4 | 388 | 12.4 | 10.8 | 110 |
| BZW04-188 | BZW04-188B | 5 | 188 | 209 | 220 | 231 | 1 | 301 | 1.4 | 388 | 12.4 | 10.8 | 110 |
| P BZW04P213 | BZW04P213B | 5 | 213 | 237 | 250 | 275 | 1 | 344 | 1.5 | 442 | 12 | 11 | 100 |
| BZW04-213 | BZW04-213B | 5 | 213 | 237 | 250 | 263 | 1 | 344 | 1.5 | 442 | 12 | 11 | 100 |
| P BZW04P239 | BZW04P239B | 5 | 239 | 266 | 280 | 308 | 1 | 384 | 1.5 | 494 | 12 | 11 | 95 |
| BZW04-239 | BZW04-239B | 5 | 239 | 266 | 280 | 294 | 1 | 384 | 1.5 | 494 | 12 | 11 | 95 |
| BZW04P256 | BZW04P256B | 5 | 256 | 285 | 300 | 330 | 1 | 414 | 1.2 | 529 | 10 | 11 | 90 |
| BZW04-256 | BZW04-256B | 5 | 256 | 285 | 300 | 315 | 1 | 414 | 1.2 | 529 | 10 | 11 | 90 |
| BZW04P273 | BZW04P273B | 5 | 273 | 304 | 320 | 352 | 1 | 438 | 1.2 | 564 | 10 | 11 | 85 |
| BZW04-273 | BZW04-273B | 5 | 273 | 304 | 320 | 336 | 1 | 438 | 1.2 | 564 | 10 | 11 | 85 |
| P BZW04P299 | BZW04P299B | 5 | 299 | 332 | 350 | 385 | 1 | 482 | 0.9 | 618 | 9 | 11 | 80 |
| BZW04-299 | BZW04-299B | 5 | 299 | 332 | 350 | 368 | 1 | 482 | 0.9 | 618 | 9 | 11 | 80 |
| BZW04P342 | BZW04P342B | 5 | 342 | 380 | 400 | 440 | 1 | 548 | 0.9 | 706 | 8 | 11 | 75 |
| BZW04-342 | BZW04-342B | 5 | 342 | 380 | 400 | 420 | 1 | 548 | 0.9 | 706 | 8 | 11 | 75 |
| BZW04P376 | BZW04P376B | 5 | 376 | 418 | 440 | 484 | 1 | 603 | 0.8 | 776 | 8 | 11 | 70 |
| BZW04-376 | BZW04-376B | 5 | 376 | 418 | 440 | 462 | 1 | 603 | 0.8 | 776 | 8 | 11 | 70 |

* Pulse test t_b < 50 ms δ < 2 %.

** Divide these values by 2 for bidirectional types.

For bidirectional types, electrical characteristics apply in both directions.

P : Preferred device.

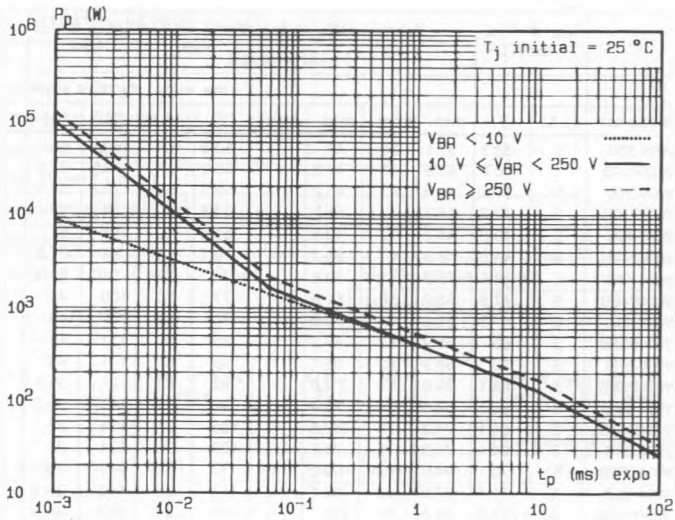


Fig.1 - Peak pulse power versus exponential pulse duration.

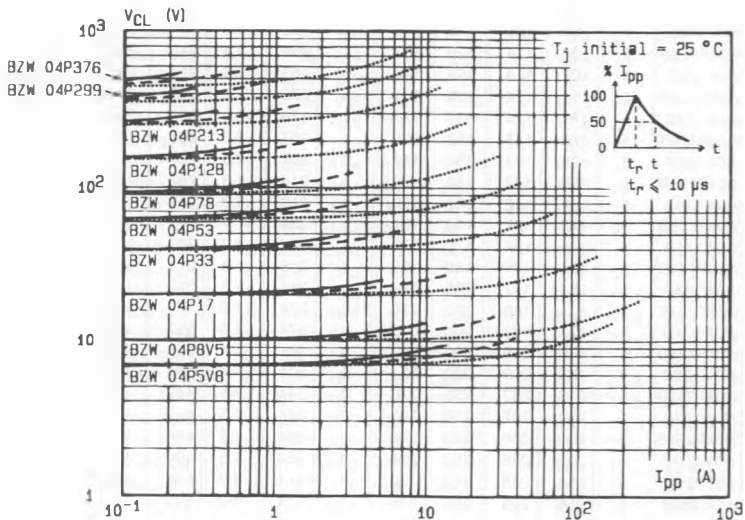


Fig.2 - Clamping voltage versus peak pulse current.
 exponential waveform $t = 20 \mu s$
 $t = 1 ms$ ----
 $t = 10 ms$ —

Note : The curves of the figure 2 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 : $\Delta V(BR) = \alpha_1 (V(BR)) \times [T_j - 25] \times V(BR)$
 For intermediate voltages, extrapolate the given results.

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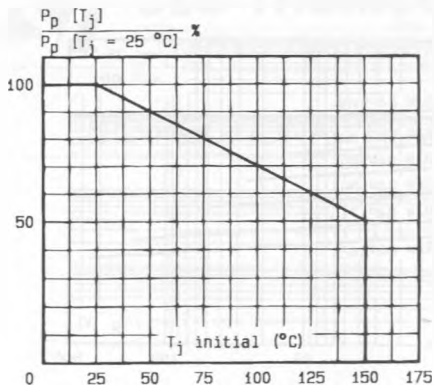


Fig. 3 - Allowable power dissipation versus junction temperature.

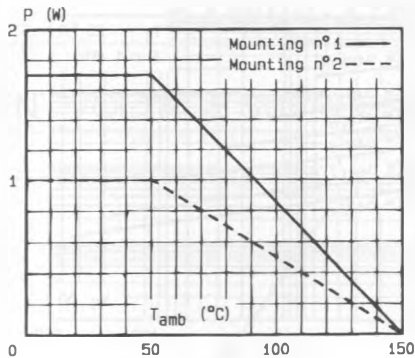


Fig. 4 - Power dissipation versus ambient temperature.

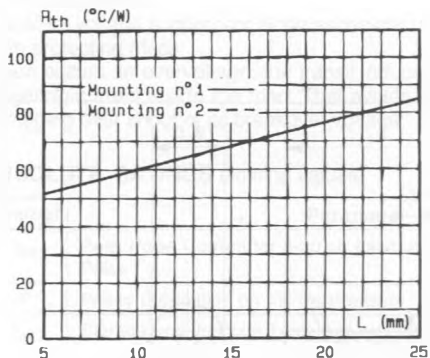


Fig. 5 - Thermal resistance versus lead length.

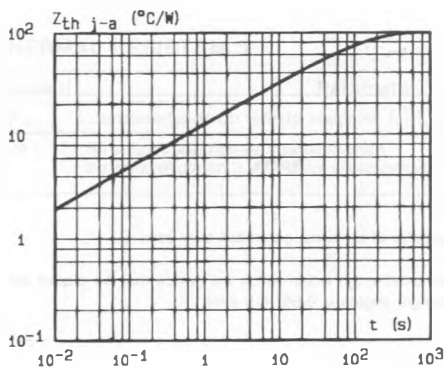


Fig. 6 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

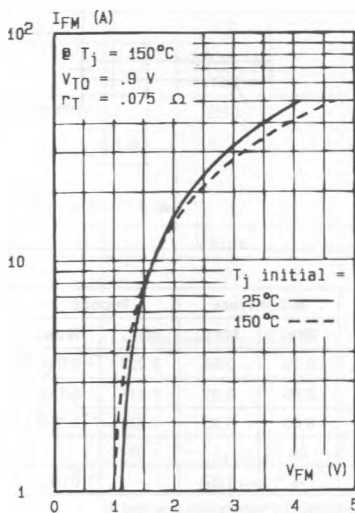
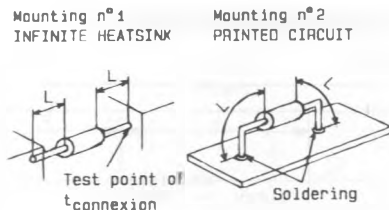


Fig. 7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

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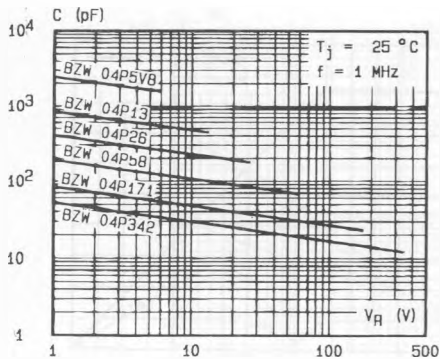


Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

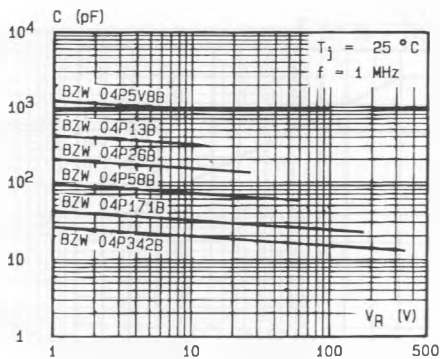
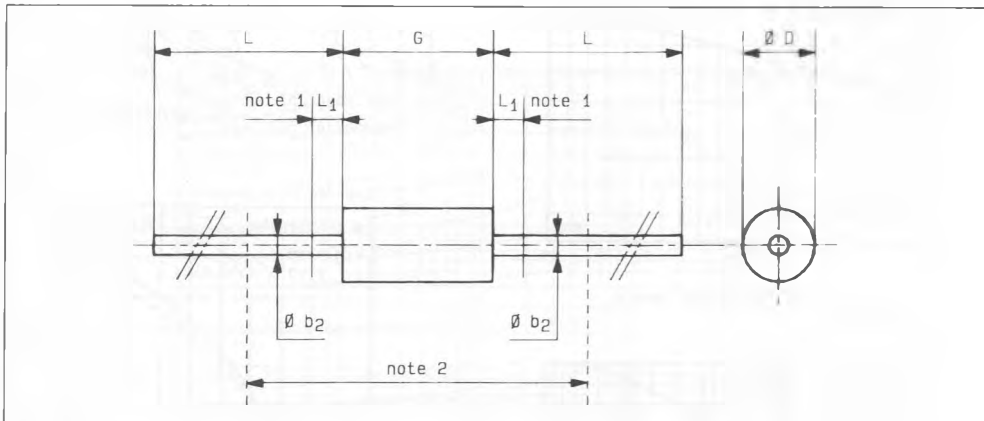


Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

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PACKAGE MECHANICAL DATA

F 126 Plastic



| Ref. | Millimeters | | Inches | | Notes |
|------------------|-------------|------|--------|-------|---|
| | Min. | Max. | Min. | Max. | |
| Ø b ₂ | 0.76 | 0.86 | 0.029 | 0.034 | 1 - The lead diameter Ø b ₂ is not controlled over zone L ₁ . 2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.59" (15 mm). |
| Ø D | 2.95 | 3.05 | 0.116 | 0.120 | |
| G | 6.05 | 6.35 | 0.238 | 0.250 | |
| L | 26 | - | 1.024 | - | |
| L ₁ | - | 1.27 | - | 0.050 | |

Cooling method : by convection (method A)

Marking : type number ; white band indicates cathode for unidirectional types

Weight : 0.4 g