

## Zener Diodes



### FEATURES

- Silicon planar power Zener diodes
- For use in stabilizing and clipping circuits with high power rating
- The Zener voltages are graded according to the international E 24 standard; replace suffix “C” with “B” for  $\pm 2\%$  tolerance
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### LINKS TO ADDITIONAL RESOURCES



### APPLICATIONS

- Voltage stabilization

| PRIMARY CHARACTERISTICS |               |      |
|-------------------------|---------------|------|
| PARAMETER               | VALUE         | UNIT |
| $V_Z$ range nom.        | 3.3 to 75     | V    |
| Test current $I_{ZT}$   | 4 to 80       | mA   |
| $V_Z$ specification     | Pulse current |      |
| Circuit configuration   | Single        |      |

| ORDERING INFORMATION |                  |                                  |                        |
|----------------------|------------------|----------------------------------|------------------------|
| DEVICE NAME          | ORDERING CODE    | TAPED UNITS PER REEL             | MINIMUM ORDER QUANTITY |
| BZX85-series         | BZX85-series-TR  | 5000<br>(52 mm tape on 13" reel) | 25 000/box             |
| BZX85-series         | BZX85-series-TAP | 5000 per ammpack<br>(52 mm tape) | 25 000/box             |

| PACKAGE          |                   |   |                                      |                              |
|------------------|-------------------|---|--------------------------------------|------------------------------|
| PACKAGE NAME     | WEIGHT            | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY<br>LEVEL        | SOLDERING CONDITIONS         |
| DO-41 (DO-204AL) | approx.<br>310 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | Peak temperature max. 260 °C |

| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified) |   |            |             |      |
|---|---|------------|-------------|------|
| PARAMETER   | TEST CONDITION  | SYMBOL     | VALUE       | UNIT |
| Power dissipation   | Valid provided that leads at a distance of 4 mm from case are kept at ambient temperature<br>$t_p = 10\text{ ms}$ | $P_{tot}$  | 1300        | mW   |
| Zener current   | See Table “Electrical characteristics”  |            |             |      |
| Junction to ambient air   | Valid provided that leads at a distance of 4 mm from case are kept at ambient temperature<br>$t_p = 10\text{ ms}$ | $R_{thJA}$ | 110         | K/W  |
| Junction temperature  |   | $T_j$      | 175         | °C   |
| Storage temperature range   |   | $T_{stg}$  | -55 to +175 | °C   |



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                    |      |      |              |           |                         |     |                                   |                       |  |        |   |
|--|------------------------------------|------|------|--------------|-----------|-------------------------|-----|-----------------------------------|-----------------------|--|--------|---|
| PART NUMBER  | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |      | TEST CURRENT |           | REVERSE LAEKAGE CURRENT |     | DYNAMIC RESISTANCE <sup>(3)</sup> |                       | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE |        | ADMISSIBLE ZENER CURRENT <sup>(2)</sup> |
|  | $V_Z$ at $I_{ZT1}$                 |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |     | $Z_Z$ at $I_{ZT1}$                | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT1}$               |        | $I_Z$                                   |
|  | V                                  |      |      | mA           |           | $\mu\text{A}$           | V   | $\Omega$                          |                       | %/°C                                     |        | mA                                      |
|  | MIN.                               | NOM. | MAX. |              |           |                         |     | MAX.                              | MAX.                  | MIN.                                     | MAX.   |   |
| BZX85C3V3  | 3.1                                | 3.3  | 3.5  | 80           | 1         | < 40                    | 1   | < 20                              | < 400                 | - 0.08                                   | - 0.05 | 300                                     |
| BZX85C3V6  | 3.4                                | 3.6  | 3.8  | 60           | 1         | < 20                    | 1   | < 20                              | < 500                 | - 0.08                                   | - 0.05 | 290                                     |
| BZX85C3V9  | 3.7                                | 3.9  | 4.1  | 60           | 1         | < 10                    | 1   | < 15                              | < 500                 | - 0.07                                   | - 0.02 | 280                                     |
| BZX85C4V3  | 4                                  | 4.3  | 4.6  | 50           | 1         | < 3                     | 1   | < 13                              | < 500                 | - 0.05                                   | 0.01   | 250                                     |
| BZX85C4V7  | 4.4                                | 4.7  | 5    | 45           | 1         | < 3                     | 1   | < 13                              | < 600                 | - 0.03                                   | 0.04   | 215                                     |
| BZX85C5V1  | 4.8                                | 5.1  | 5.4  | 45           | 1         | < 1                     | 1.5 | < 10                              | < 500                 | - 0.01                                   | 0.04   | 200                                     |
| BZX85C5V6  | 5.2                                | 5.6  | 6    | 45           | 1         | < 1                     | 2   | < 7                               | < 400                 | 0  | 0.045  | 190                                     |
| BZX85C6V2  | 5.8                                | 6.2  | 6.6  | 35           | 1         | < 1                     | 3   | < 4                               | < 300                 | 0.01                                     | 0.055  | 170                                     |
| BZX85C6V8  | 6.4                                | 6.8  | 7.2  | 35           | 1         | < 1                     | 4   | < 3.5                             | < 300                 | 0.015                                    | 0.06   | 155                                     |
| BZX85C7V5  | 7                                  | 7.5  | 7.9  | 35           | 0.5       | < 1                     | 4.5 | < 3                               | < 200                 | 0.02                                     | 0.065  | 140                                     |
| BZX85C8V2  | 7.7                                | 8.2  | 8.7  | 25           | 0.5       | < 1                     | 6.2 | < 5                               | < 200                 | 0.03                                     | 0.07   | 130                                     |
| BZX85C9V1  | 8.5                                | 9.1  | 9.6  | 25           | 0.5       | < 1                     | 6.8 | < 5                               | < 200                 | 0.035                                    | 0.075  | 120                                     |
| BZX85C10   | 9.4                                | 10   | 10.6 | 25           | 0.5       | < 0.5                   | 7.5 | < 7                               | < 200                 | 0.04                                     | 0.08   | 105                                     |
| BZX85C11   | 10.4                               | 11   | 11.6 | 20           | 0.5       | < 0.5                   | 8.2 | < 8                               | < 300                 | 0.045                                    | 0.08   | 97                                      |
| BZX85C12   | 11.4                               | 12   | 12.7 | 20           | 0.5       | < 0.5                   | 9.1 | < 9                               | < 350                 | 0.045                                    | 0.085  | 88                                      |
| BZX85C13   | 12.4                               | 13   | 14.1 | 20           | 0.5       | < 0.5                   | 10  | < 10                              | < 400                 | 0.05                                     | 0.085  | 79                                      |
| BZX85C15   | 13.8                               | 15   | 15.6 | 15           | 0.5       | < 0.5                   | 11  | < 15                              | < 500                 | 0.055                                    | 0.09   | 71                                      |
| BZX85C16   | 15.3                               | 16   | 17.1 | 15           | 0.5       | < 0.5                   | 12  | < 15                              | < 500                 | 0.055                                    | 0.09   | 66                                      |
| BZX85C18   | 16.8                               | 18   | 19.1 | 15           | 0.5       | < 0.5                   | 13  | < 20                              | < 500                 | 0.06                                     | 0.09   | 62                                      |
| BZX85C20   | 18.8                               | 20   | 21.2 | 10           | 0.5       | < 0.5                   | 15  | < 24                              | < 600                 | 0.06                                     | 0.09   | 56                                      |
| BZX85C22   | 20.8                               | 22   | 23.3 | 10           | 0.5       | < 0.5                   | 16  | < 25                              | < 600                 | 0.06                                     | 0.095  | 52                                      |
| BZX85C24   | 22.8                               | 24   | 25.6 | 10           | 0.5       | < 0.5                   | 18  | < 25                              | < 600                 | 0.06                                     | 0.095  | 47                                      |
| BZX85C27   | 25.1                               | 27   | 28.9 | 8            | 0.25      | < 0.5                   | 20  | < 30                              | < 750                 | 0.06                                     | 0.095  | 41                                      |
| BZX85C30   | 28                                 | 30   | 32   | 8            | 0.25      | < 0.5                   | 22  | < 30                              | < 1000                | 0.06                                     | 0.095  | 36                                      |
| BZX85C33   | 31                                 | 33   | 35   | 8            | 0.25      | < 0.5                   | 24  | < 35                              | < 1000                | 0.06                                     | 0.095  | 33                                      |
| BZX85C36   | 34                                 | 36   | 38   | 8            | 0.25      | < 0.5                   | 27  | < 40                              | < 1000                | 0.06                                     | 0.095  | 30                                      |
| BZX85C39   | 37                                 | 39   | 41   | 6            | 0.25      | < 0.5                   | 30  | < 50                              | < 1000                | 0.06                                     | 0.095  | 28                                      |
| BZX85C43   | 40                                 | 43   | 46   | 6            | 0.25      | < 0.5                   | 33  | < 50                              | < 1000                | 0.06                                     | 0.095  | 26                                      |
| BZX85C47   | 44                                 | 47   | 50   | 4            | 0.25      | < 0.5                   | 36  | < 90                              | < 1500                | 0.06                                     | 0.095  | 23                                      |
| BZX85C51   | 48                                 | 51   | 54   | 4            | 0.25      | < 0.5                   | 39  | < 115                             | < 1500                | 0.06                                     | 0.095  | 21                                      |
| BZX85C56   | 52                                 | 56   | 60   | 4            | 0.25      | < 0.5                   | 43  | < 120                             | < 2000                | 0.06                                     | 0.095  | 19                                      |
| BZX85C62   | 58                                 | 62   | 66   | 4            | 0.25      | < 0.5                   | 47  | < 125                             | < 2000                | 0.06                                     | 0.095  | 16                                      |
| BZX85C68   | 64                                 | 68   | 72   | 4            | 0.25      | < 0.5                   | 51  | < 130                             | < 2000                | 0.055                                    | 0.095  | 15                                      |
| BZX85C75   | 70                                 | 75   | 80   | 4            | 0.25      | < 0.5                   | 56  | < 135                             | < 2000                | 0.055                                    | 0.095  | 14                                      |

**Notes**

- (1) Measured with pulses  $t_p = 5\text{ ms}$
- (2) Valid provided that electrodes at a distance of 4 mm from case are kept at ambient temperature,  $t_p = 10\text{ ms}$
- (3) Measured with  $f = 1\text{ kHz}$



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                    |      |      |              |           |                         |     |                                   |                       |  |        |   |
|--|------------------------------------|------|------|--------------|-----------|-------------------------|-----|-----------------------------------|-----------------------|--|--------|---|
| PART NUMBER  | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |      | TEST CURRENT |           | REVERSE LAEKAGE CURRENT |     | DYNAMIC RESISTANCE <sup>(3)</sup> |                       | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE |        | ADMISSIBLE ZENER CURRENT <sup>(2)</sup> |
|  | $V_Z$ at $I_{ZT1}$                 |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |     | $Z_Z$ at $I_{ZT1}$                | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT1}$               |        | $I_Z$                                   |
|  | V                                  |      |      | mA           |           | $\mu\text{A}$           | V   | $\Omega$                          |                       | %/°C                                     |        | mA                                      |
|  | MIN.                               | NOM. | MAX. |              |           |                         |     | MAX.                              | MAX.                  | MIN.                                     | MAX.   |   |
| BZX85B3V3  | 2.24                               | 3.3  | 3.36 | 80           | 1         | < 40                    | 1   | < 20                              | < 400                 | - 0.08                                   | - 0.05 | 300                                     |
| BZX85B3V6  | 3.53                               | 3.6  | 3.67 | 60           | 1         | < 20                    | 1   | < 20                              | < 500                 | - 0.08                                   | - 0.05 | 290                                     |
| BZX85B3V9  | 3.82                               | 3.9  | 3.98 | 60           | 1         | < 10                    | 1   | < 15                              | < 500                 | - 0.07                                   | - 0.02 | 280                                     |
| BZX85B4V3  | 4.21                               | 4.3  | 4.39 | 50           | 1         | < 3                     | 1   | < 13                              | < 500                 | - 0.05                                   | 0.01   | 250                                     |
| BZX85B4V7  | 4.61                               | 4.7  | 4.79 | 45           | 1         | < 3                     | 1   | < 13                              | < 600                 | - 0.03                                   | 0.04   | 215                                     |
| BZX85B5V1  | 5                                  | 5.1  | 5.2  | 45           | 1         | < 1                     | 1.5 | < 10                              | < 500                 | - 0.01                                   | 0.04   | 200                                     |
| BZX85B5V6  | 5.49                               | 5.6  | 5.71 | 45           | 1         | < 1                     | 2   | < 7                               | < 400                 | 0  | 0.045  | 190                                     |
| BZX85B6V2  | 6.08                               | 6.2  | 6.32 | 35           | 1         | < 1                     | 3   | < 4                               | < 300                 | 0.01                                     | 0.055  | 170                                     |
| BZX85B6V8  | 6.66                               | 6.8  | 6.94 | 35           | 1         | < 1                     | 4   | < 3.5                             | < 300                 | 0.015                                    | 0.06   | 155                                     |
| BZX85B7V5  | 7.35                               | 7.5  | 7.65 | 35           | 0.5       | < 1                     | 4.5 | < 3                               | < 200                 | 0.02                                     | 0.065  | 140                                     |
| BZX85B8V2  | 8.04                               | 8.2  | 8.36 | 25           | 0.5       | < 1                     | 6.2 | < 5                               | < 200                 | 0.03                                     | 0.07   | 130                                     |
| BZX85B9V1  | 8.92                               | 9.1  | 9.28 | 25           | 0.5       | < 1                     | 6.8 | < 5                               | < 200                 | 0.035                                    | 0.075  | 120                                     |
| BZX85B10   | 9.8                                | 10   | 10.2 | 25           | 0.5       | < 0.5                   | 7.5 | < 7                               | < 200                 | 0.04                                     | 0.08   | 105                                     |
| BZX85B11   | 10.8                               | 11   | 11.2 | 20           | 0.5       | < 0.5                   | 8.2 | < 8                               | < 300                 | 0.045                                    | 0.08   | 97                                      |
| BZX85B12   | 11.8                               | 12   | 12.2 | 20           | 0.5       | < 0.5                   | 9.1 | < 9                               | < 350                 | 0.045                                    | 0.085  | 88                                      |
| BZX85B13   | 12.7                               | 13   | 13.3 | 20           | 0.5       | < 0.5                   | 10  | < 10                              | < 400                 | 0.05                                     | 0.085  | 79                                      |
| BZX85B15   | 14.7                               | 15   | 15.3 | 15           | 0.5       | < 0.5                   | 11  | < 15                              | < 500                 | 0.055                                    | 0.09   | 71                                      |
| BZX85B16   | 15.7                               | 16   | 16.3 | 15           | 0.5       | < 0.5                   | 12  | < 15                              | < 500                 | 0.055                                    | 0.09   | 66                                      |
| BZX85B18   | 17.6                               | 18   | 18.4 | 15           | 0.5       | < 0.5                   | 13  | < 20                              | < 500                 | 0.06                                     | 0.09   | 62                                      |
| BZX85B20   | 19.6                               | 20   | 20.4 | 10           | 0.5       | < 0.5                   | 15  | < 24                              | < 600                 | 0.06                                     | 0.09   | 56                                      |
| BZX85B22   | 21.6                               | 22   | 22.4 | 10           | 0.5       | < 0.5                   | 16  | < 25                              | < 600                 | 0.06                                     | 0.095  | 52                                      |
| BZX85B24   | 23.5                               | 24   | 24.5 | 10           | 0.5       | < 0.5                   | 18  | < 25                              | < 600                 | 0.06                                     | 0.095  | 47                                      |
| BZX85B27   | 26.5                               | 27   | 27.5 | 8            | 0.25      | < 0.5                   | 20  | < 30                              | < 750                 | 0.06                                     | 0.095  | 41                                      |
| BZX85B30   | 29.4                               | 30   | 30.6 | 8            | 0.25      | < 0.5                   | 22  | < 30                              | < 1000                | 0.06                                     | 0.095  | 36                                      |
| BZX85B33   | 32.3                               | 33   | 33.7 | 8            | 0.25      | < 0.5                   | 24  | < 35                              | < 1000                | 0.06                                     | 0.095  | 33                                      |
| BZX85B36   | 35.3                               | 36   | 36.7 | 8            | 0.25      | < 0.5                   | 27  | < 40                              | < 1000                | 0.06                                     | 0.095  | 30                                      |
| BZX85B39   | 38.2                               | 39   | 39.8 | 6            | 0.25      | < 0.5                   | 30  | < 50                              | < 1000                | 0.06                                     | 0.095  | 28                                      |
| BZX85B43   | 42.1                               | 43   | 43.9 | 6            | 0.25      | < 0.5                   | 33  | < 50                              | < 1000                | 0.06                                     | 0.095  | 26                                      |
| BZX85B47   | 46.1                               | 47   | 47.9 | 4            | 0.25      | < 0.5                   | 36  | < 90                              | < 1500                | 0.06                                     | 0.095  | 23                                      |
| BZX85B51   | 50                                 | 51   | 52   | 4            | 0.25      | < 0.5                   | 39  | < 115                             | < 1500                | 0.06                                     | 0.095  | 21                                      |
| BZX85B56   | 54.9                               | 56   | 57.1 | 4            | 0.25      | < 0.5                   | 43  | < 120                             | < 2000                | 0.06                                     | 0.095  | 19                                      |
| BZX85B62   | 60.8                               | 62   | 63.2 | 4            | 0.25      | < 0.5                   | 47  | < 125                             | < 2000                | 0.06                                     | 0.095  | 16                                      |
| BZX85B68   | 66.6                               | 68   | 69.4 | 4            | 0.25      | < 0.5                   | 51  | < 130                             | < 2000                | 0.055                                    | 0.095  | 15                                      |
| BZX85B75   | 73.5                               | 75   | 76.5 | 4            | 0.25      | < 0.5                   | 56  | < 135                             | < 2000                | 0.055                                    | 0.095  | 14                                      |

**Notes**

- (1) Measured with pulses  $t_p = 5\text{ ms}$
- (2) Valid provided that electrodes at a distance of 4 mm from case are kept at ambient temperature,  $t_p = 10\text{ ms}$
- (3) Measured with  $f = 1\text{ kHz}$

**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

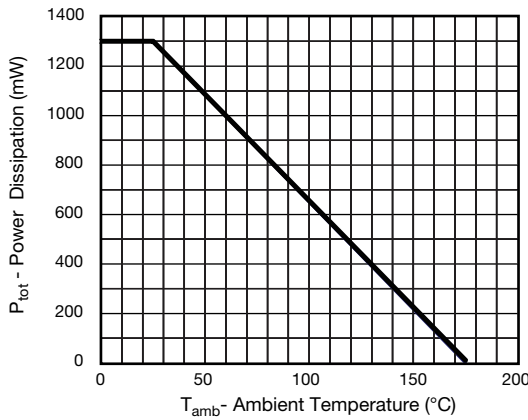


Fig. 1 - Admissible Power Dissipation vs. Ambient Temperature  
 $P_{tot} = f(T_{amb})$

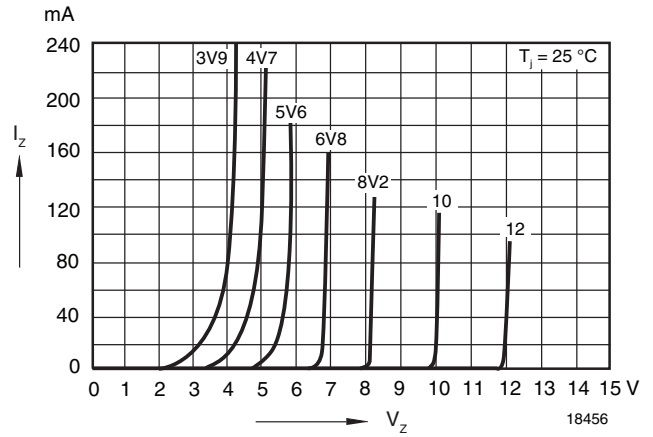


Fig. 3 - Typical Breakdown Characteristics

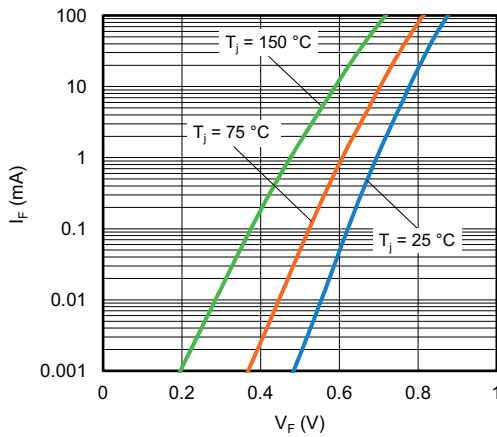


Fig. 2 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$

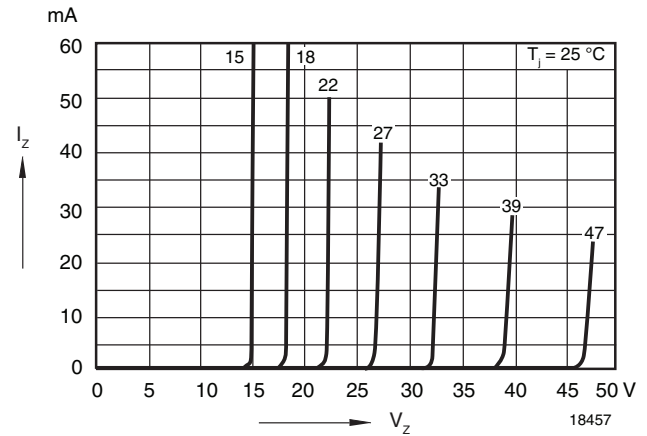
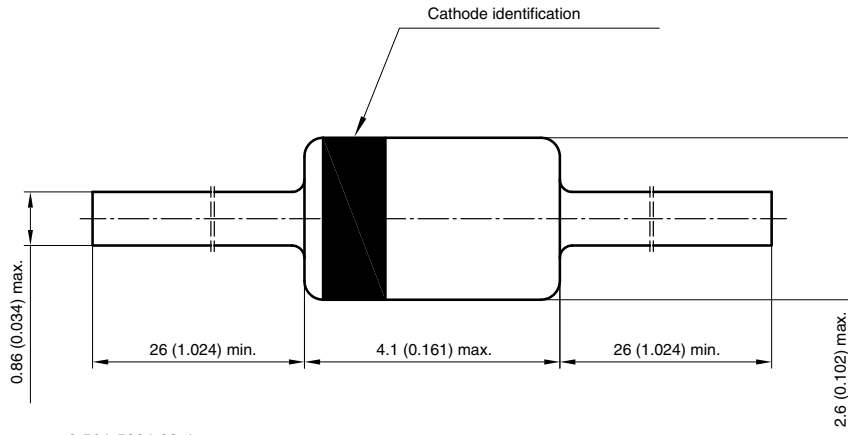


Fig. 4 - Typical Breakdown Characteristics

**PACKAGE DIMENSIONS** in millimeters (inches): **DO-41 (DO-204AL)**



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94 9368



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