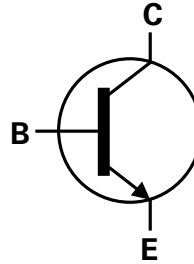


## Features

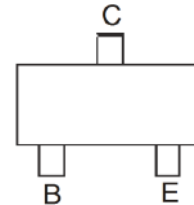
- Ideally Suited for Automatic Insertion
- Complementary PNP Types: BC856–BC858
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under separate datasheet ([BC846AQ-BC848CQ](#))**



Top View



Device Symbol



Top View  
Pin-Out

## Mechanical Data

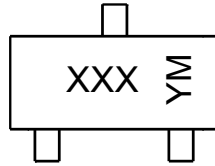
- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 (63)
- Weight: 0.008 grams (Approximate)

## Ordering Information (Note 4)

| Part Number | Package | Marking | Reel Size (inches) | Packing |         |
|-------------|---------|---------|--------------------|---------|---------|
|             |         |         |                    | Qty.    | Carrier |
| BC846A-7-F  | SOT23   | K1Q     | 7                  | 3,000   | Reel    |
| BC846B-7-F  | SOT23   | K1R     | 7                  | 3,000   | Reel    |
| BC846B-13-F | SOT23   | K1R     | 13                 | 10,000  | Reel    |
| BC847A-7-F  | SOT23   | K1Q     | 7                  | 3,000   | Reel    |
| BC847A-13-F | SOT23   | K1Q     | 13                 | 10,000  | Reel    |
| BC847B-7-F  | SOT23   | K1R     | 7                  | 3,000   | Reel    |
| BC847B-13-F | SOT23   | K1R     | 13                 | 10,000  | Reel    |
| BC847C-7-F  | SOT23   | K1M     | 7                  | 3,000   | Reel    |
| BC847C-13-F | SOT23   | K1M     | 13                 | 10,000  | Reel    |
| BC848A-7-F  | SOT23   | K1Q     | 7                  | 3,000   | Reel    |
| BC848B-7-F  | SOT23   | K1R     | 7                  | 3,000   | Reel    |
| BC848B-13-F | SOT23   | K1R     | 13                 | 10,000  | Reel    |
| BC848C-7-F  | SOT23   | K1M     | 7                  | 3,000   | Reel    |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



XXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\overline{Y}$  = Year (ex: L = 2024)  
 M or  $\overline{M}$  = Month (ex: 9 = September)

### Date Code Key

| Year | 2007 | - | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |
|------|------|---|------|------|------|------|------|------|------|------|------|------|
| Code | U    | - | L    | M    | N    | P    | R    | S    | T    | U    | V    | W    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

## Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic               |            | Symbol           | Value | Unit |
|------------------------------|------------|------------------|-------|------|
| Collector-Base Voltage       | BC846A/B   | V <sub>CBO</sub> | 80    | V    |
|                              | BC847A/B/C |                  | 50    |      |
|                              | BC848A/B/C |                  | 30    |      |
| Collector-Emitter Voltage    | BC846A/B   | V <sub>CEO</sub> | 65    | V    |
|                              | BC847A/B/C |                  | 45    |      |
|                              | BC848A/B/C |                  | 30    |      |
| Emitter-Base Voltage         | BC846A/B   | V <sub>EBO</sub> | 6.0   | V    |
|                              | BC847A/B/C |                  | 5.0   |      |
|                              | BC848A/B/C |                  |       |      |
| Continuous Collector Current |            | I <sub>C</sub>   | 100   | mA   |
| Peak Collector Current       |            | I <sub>CM</sub>  | 200   | mA   |
| Peak Emitter Current         |            | I <sub>EM</sub>  | 200   | mA   |

## Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                          |          | Symbol                            | Value       | Unit |
|-----------------------------------------|----------|-----------------------------------|-------------|------|
| Power Dissipation                       | (Note 5) | P <sub>D</sub>                    | 310         | mW   |
|                                         | (Note 6) |                                   | 350         |      |
| Thermal Resistance, Junction to Ambient | (Note 5) | R <sub>θJA</sub>                  | 403         | °C/W |
|                                         | (Note 6) |                                   | 357         |      |
| Thermal Resistance, Junction to Leads   | (Note 7) | R <sub>θJL</sub>                  | 350         | °C/W |
| Operating and Storage Temperature Range |          | T <sub>J</sub> , T <sub>STG</sub> | -65 to +150 | °C   |

## ESD Ratings (Note 8)

| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--------------------------------------------|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

Notes: 5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.  
 6. Same as Note 5, except the device is mounted on 15mm x 15mm 1oz copper.  
 7. Thermal resistance from junction to solder-point (at the end of the leads).  
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information

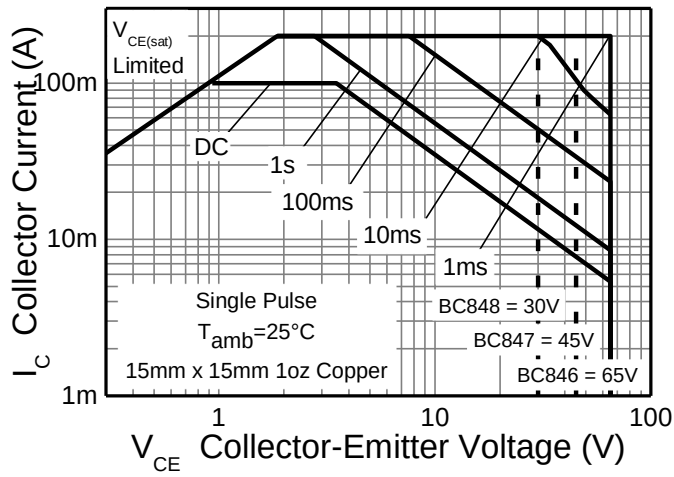


Figure 1. Safe Operating Area

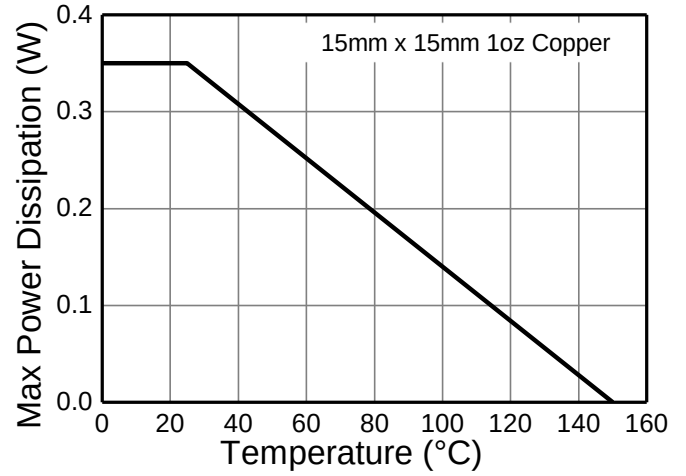


Figure 2. Derating Curve

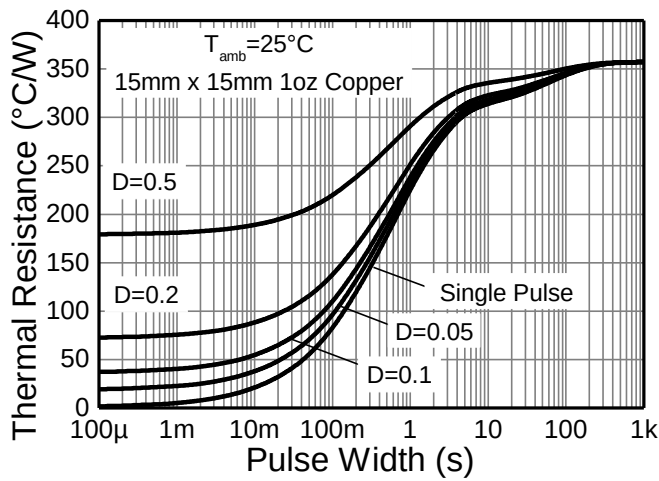


Figure 3. Transient Thermal Impedance

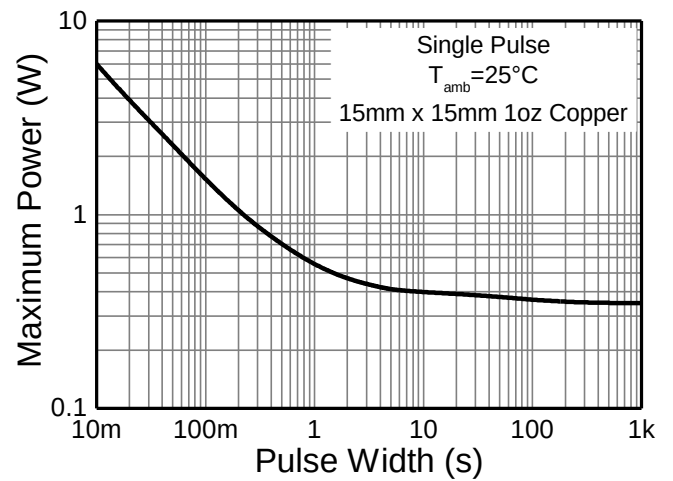


Figure 4. Pulse Power Dissipation

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                |                      | Symbol               | Min | Typ                    | Max | Unit | Test Condition                                                                               |
|-----------------------------------------------|----------------------|----------------------|-----|------------------------|-----|------|----------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage              | BC846A/B             | BV <sub>CBO</sub>    | 80  | —                      | —   | V    | I <sub>C</sub> = 10μA                                                                        |
|                                               | BC847A/B/C           |                      | 50  |                        |     |      |                                                                                              |
|                                               | BC848A/B/C           |                      | 30  |                        |     |      |                                                                                              |
| Collector-Emitter Breakdown Voltage (Note 9)  | BC846A/B             | BV <sub>CEO</sub>    | 65  | —                      | —   | V    | I <sub>C</sub> = 10mA                                                                        |
|                                               | BC847A/B/C           |                      | 45  |                        |     |      |                                                                                              |
|                                               | BC848A/B/C           |                      | 30  |                        |     |      |                                                                                              |
| Emitter-Base Breakdown Voltage                | BC846A/B             | BV <sub>EBO</sub>    | 6   | —                      | —   | V    | I <sub>E</sub> = 1μA                                                                         |
|                                               | BC847A/B/C           |                      | 5   |                        |     |      |                                                                                              |
|                                               | BC848A/B/C           |                      |     |                        |     |      |                                                                                              |
| Collector Cutoff Current                      |                      | I <sub>CBO</sub>     | —   | —                      | 15  | nA   | V <sub>CB</sub> = 30V                                                                        |
|                                               |                      |                      |     |                        | 5   | μA   | V <sub>CB</sub> = 30V, T <sub>J</sub> = +150°C                                               |
| Collector Emitter Cutoff Current              | BC846A/B             | I <sub>CES</sub>     | —   | —                      | 15  | nA   | V <sub>CE</sub> = 80V                                                                        |
|                                               | BC847A/B/C           |                      |     |                        | 15  |      | V <sub>CE</sub> = 50V                                                                        |
|                                               | BC848A/B/C           |                      |     |                        | 15  |      | V <sub>CE</sub> = 30V                                                                        |
| Emitter Base Cutoff Current                   |                      | I <sub>EBO</sub>     | —   | —                      | 100 | nA   | V <sub>EB</sub> = 5V                                                                         |
| Small Signal Current Gain (Note 9)            | BC846A/BC847A/BC848A | h <sub>FE</sub>      | —   | 200                    | —   | —    | I <sub>C</sub> = 2.0mA, V <sub>CE</sub> = 5V<br>f = 1.0kHz                                   |
|                                               | BC846B/BC847B/BC848B |                      |     | 330                    |     |      |                                                                                              |
|                                               | BC847C/BC848C        |                      |     | 600                    |     |      |                                                                                              |
| Input Impedance (Note 9)                      | BC846A/BC847A/BC848A | h <sub>ie</sub>      | —   | 2.7                    | —   | kΩ   |                                                                                              |
|                                               | BC846B/BC847B/BC848B |                      |     | 4.5                    |     |      |                                                                                              |
|                                               | BC847C/BC848C        |                      |     | 8.7                    |     |      |                                                                                              |
| Output Admittance (Note 9)                    | BC846A/BC847A/BC848A | h <sub>oe</sub>      | —   | 18                     | —   | μS   |                                                                                              |
|                                               | BC846B/BC847B/BC848B |                      |     | 30                     |     |      |                                                                                              |
|                                               | BC847C/BC848C        |                      |     | 60                     |     |      |                                                                                              |
| Reverse Voltage Transfer Ratio (Note 9)       | BC846A/BC847A/BC848A | h <sub>re</sub>      | —   | 1.5 × 10 <sup>-4</sup> | —   | —    |                                                                                              |
|                                               | BC846B/BC847B/BC848B |                      |     | 2 × 10 <sup>-4</sup>   |     |      |                                                                                              |
|                                               | BC847C/BC848C        |                      |     | 3 × 10 <sup>-4</sup>   |     |      |                                                                                              |
| DC Current Gain (Note 9)                      | BC846A/BC847A/BC848A | h <sub>FE</sub>      | 110 | 180                    | 220 | —    | I <sub>C</sub> = 2.0mA, V <sub>CE</sub> = 5V                                                 |
|                                               | BC846B/BC847B/BC848B |                      | 200 | 290                    | 450 |      |                                                                                              |
|                                               | BC847C/BC848C        |                      | 420 | 520                    | 800 |      |                                                                                              |
| Collector-Emitter Saturation Voltage (Note 9) |                      | V <sub>CE(sat)</sub> | —   | 90                     | 250 | mV   | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA                                                |
|                                               |                      |                      |     | 200                    | 600 |      | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5.0mA                                               |
| Base-Emitter Turn-On Voltage (Note 9)         |                      | V <sub>BE(on)</sub>  | 580 | 660                    | 700 | mV   | I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V                                                   |
|                                               |                      |                      | —   | —                      | 770 |      | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 5V                                                  |
| Base-Emitter Saturation Voltage (Note 9)      |                      | V <sub>BE(sat)</sub> | —   | 700                    | —   | mV   | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA                                                |
|                                               |                      |                      |     | 900                    |     |      | I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA                                                 |
| Output Capacitance                            |                      | C <sub>obo</sub>     | —   | 3                      | —   | pF   | V <sub>CB</sub> = 10V, f = 1.0MHz                                                            |
| Transition Frequency                          |                      | f <sub>T</sub>       | 100 | 300                    | —   | MHz  | V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA<br>f = 100MHz                                    |
| Noise Figure                                  |                      | NF                   | —   | 2                      | 10  | dB   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 200μA<br>R <sub>S</sub> = 2kΩ, f = 1kHz<br>Δf = 200Hz |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

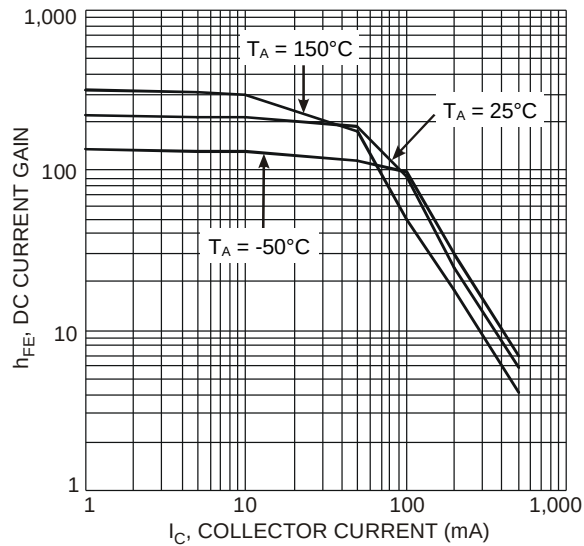


Figure 5. Typical DC Current Gain vs. Collector Current

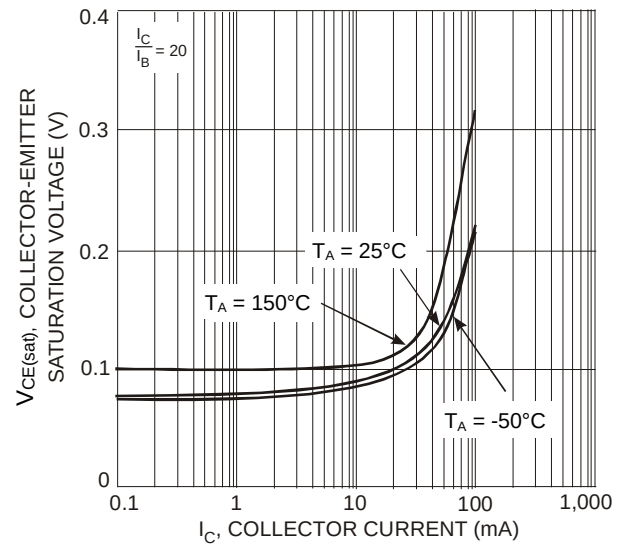


Figure 6. Typical Collector-Emitter Saturation Voltage vs. Collector Current

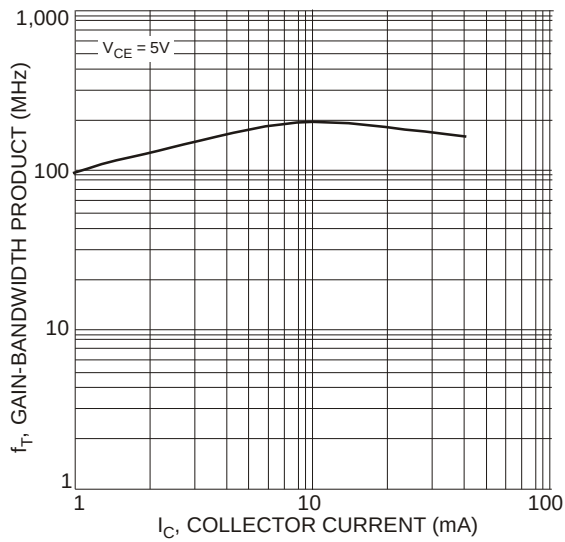
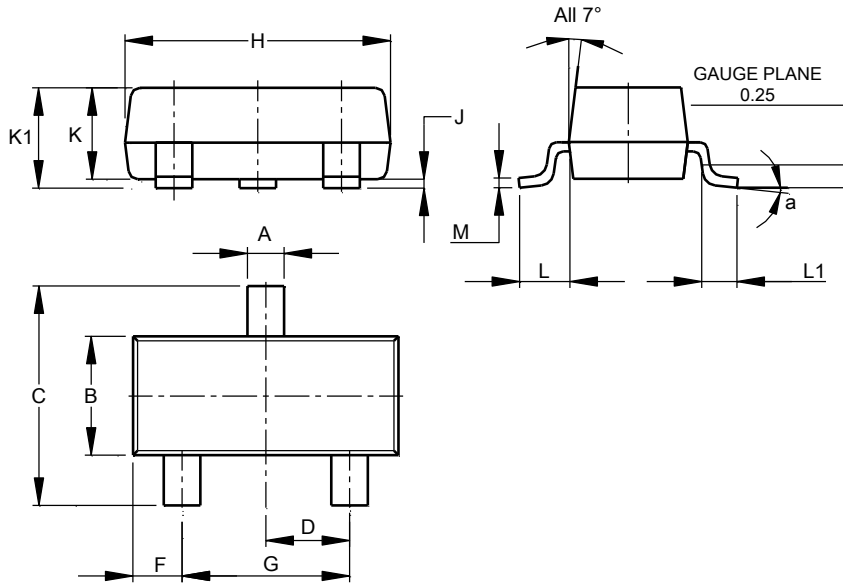


Figure 7. Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

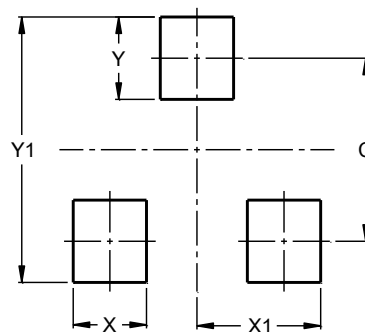


| SOT23                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.37  | 0.51  | 0.40  |
| B                    | 1.20  | 1.40  | 1.30  |
| C                    | 2.30  | 2.50  | 2.40  |
| D                    | 0.89  | 1.03  | 0.915 |
| F                    | 0.45  | 0.60  | 0.535 |
| G                    | 1.78  | 2.05  | 1.83  |
| H                    | 2.80  | 3.00  | 2.90  |
| J                    | 0.013 | 0.10  | 0.05  |
| K                    | 0.890 | 1.00  | 0.975 |
| K1                   | 0.903 | 1.10  | 1.025 |
| L                    | 0.45  | 0.61  | 0.55  |
| L1                   | 0.25  | 0.55  | 0.40  |
| M                    | 0.085 | 0.150 | 0.110 |
| a                    | 0°    | 8°    | --    |
| All Dimensions in mm |       |       |       |

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.0           |
| X          | 0.8           |
| X1         | 1.35          |
| Y          | 0.9           |
| Y1         | 2.9           |

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