

# BC635, BC637, BC639, BC639-16

## High Current Transistors

### NPN Silicon

#### Features

- Pb-Free Package is Available\*

#### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | Value          | Unit                       |
|----------------------------------------------------------------------------------------|----------------|----------------|----------------------------|
| Collector-Emitter Voltage<br>BC635<br>BC637<br>BC639                                   | $V_{CEO}$      | 45<br>60<br>80 | Vdc                        |
| Collector-Base Voltage<br>BC635<br>BC637<br>BC639                                      | $V_{CBO}$      | 45<br>60<br>80 | Vdc                        |
| Emitter-Base Voltage                                                                   | $V_{EBO}$      | 5.0            | Vdc                        |
| Collector Current – Continuous                                                         | $I_C$          | 1.0            | Adc                        |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 625<br>5.0     | mW<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 800<br>12      | mW<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | -55 to<br>+150 | $^\circ\text{C}$           |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

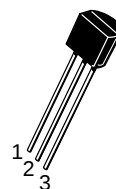
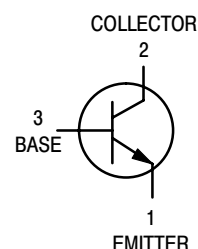
| Characteristic                             | Symbol          | Max  | Unit               |
|--------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance,<br>Junction-to-Ambient | $R_{\theta JA}$ | 200  | $^\circ\text{C/W}$ |
| Thermal Resistance,<br>Junction-to-Case    | $R_{\theta JC}$ | 83.3 | $^\circ\text{C/W}$ |

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

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TO-92  
CASE 29  
STYLE 14

BC63xx = Specific Device Code  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

#### MARKING DIAGRAM



#### ORDERING INFORMATION

| Device       | Package            | Shipping†        |
|--------------|--------------------|------------------|
| BC635RL1     | TO-92              | 2000/Tape & Reel |
| BC635ZL1     | TO-92              | 2000/Ammo Pack   |
| BC637        | TO-92              | 5000 Units/Box   |
| BC639        | TO-92              | 5000 Units/Box   |
| BC639RL1     | TO-92              | 2000/Tape & Reel |
| BC639ZL1     | TO-92              | 2000/Ammo Pack   |
| BC639-16ZL1  | TO-92              | 2000/Ammo Pack   |
| BC639-16ZL1G | TO-92<br>(Pb-Free) | 2000/Ammo Pack   |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic                                                                                                                                       | Symbol               | Min            | Typ         | Max         | Unit         |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|-------------|-------------|--------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                           |                      |                |             |             |              |
| Collector – Emitter Breakdown Voltage <sup>(1)</sup><br>(I <sub>C</sub> = 10 µAdc, I <sub>B</sub> = 0)                                               | V <sub>(BR)CEO</sub> | 45<br>60<br>80 | –<br>–<br>– | –<br>–<br>– | Vdc          |
| Collector – Emitter Zero-Gate Breakdown Voltage <sup>(1)</sup><br>(I <sub>C</sub> = 100 µAdc, I <sub>B</sub> = 0)                                    | V <sub>(BR)CES</sub> | 120            | –           | –           | Vdc          |
| Collector – Base Breakdown Voltage<br>(I <sub>C</sub> = 100 µAdc, I <sub>E</sub> = 0)                                                                | V <sub>(BR)CBO</sub> | 45<br>60<br>80 | –<br>–<br>– | –<br>–<br>– | Vdc          |
| Emitter – Base Breakdown Voltage<br>(I <sub>E</sub> = 10 µAdc, I <sub>C</sub> = 0)                                                                   | V <sub>(BR)EBO</sub> | 5.0            | –           | –           | Vdc          |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 30 Vdc, I <sub>E</sub> = 0)<br>(V <sub>CB</sub> = 30 Vdc, I <sub>E</sub> = 0, T <sub>A</sub> = 125°C) | I <sub>CBO</sub>     | –<br>–         | –<br>–      | 100<br>10   | nAdc<br>µAdc |

## ON CHARACTERISTICS (Note 1)

|                                                                                                                                     |                      |                                   |                            |                                    |     |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|----------------------------|------------------------------------|-----|
| DC Current Gain<br>(I <sub>C</sub> = 5.0 mAdc, V <sub>CE</sub> = 2.0 Vdc)<br>(I <sub>C</sub> = 150 mAdc, V <sub>CE</sub> = 2.0 Vdc) | h <sub>FE</sub>      | 25<br>40<br>40<br>40<br>100<br>25 | –<br>–<br>–<br>–<br>–<br>– | –<br>250<br>160<br>160<br>250<br>– | –   |
| Collector – Emitter Saturation Voltage<br>(I <sub>C</sub> = 500 mAdc, I <sub>B</sub> = 50 mAdc)                                     | V <sub>CE(sat)</sub> | –                                 | –                          | 0.5                                | Vdc |
| Base – Emitter On Voltage<br>(I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = 2.0 Vdc)                                                 | V <sub>BE(on)</sub>  | –                                 | –                          | 1.0                                | Vdc |

## DYNAMIC CHARACTERISTICS

|                                                                                                          |                 |   |     |   |     |
|----------------------------------------------------------------------------------------------------------|-----------------|---|-----|---|-----|
| Current – Gain – Bandwidth Product<br>(I <sub>C</sub> = 50 mAdc, V <sub>CE</sub> = 2.0 Vdc, f = 100 MHz) | f <sub>T</sub>  | – | 200 | – | MHz |
| Output Capacitance<br>(V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)                        | C <sub>ob</sub> | – | 7.0 | – | pF  |
| Input Capacitance<br>(V <sub>EB</sub> = 0.5 Vdc, I <sub>C</sub> = 0, f = 1.0 MHz)                        | C <sub>ib</sub> | – | 50  | – | pF  |

1. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle 2.0%.

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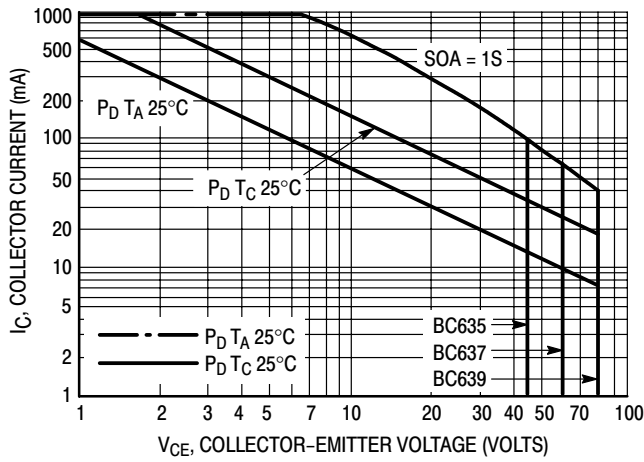


Figure 1. Active Region Safe Operating Area

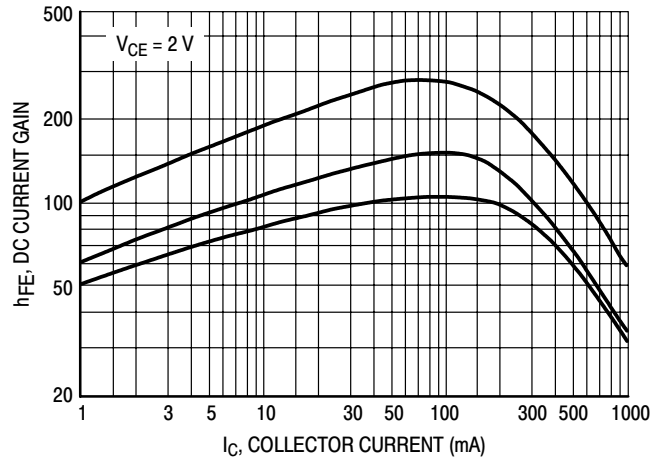


Figure 2. DC Current Gain

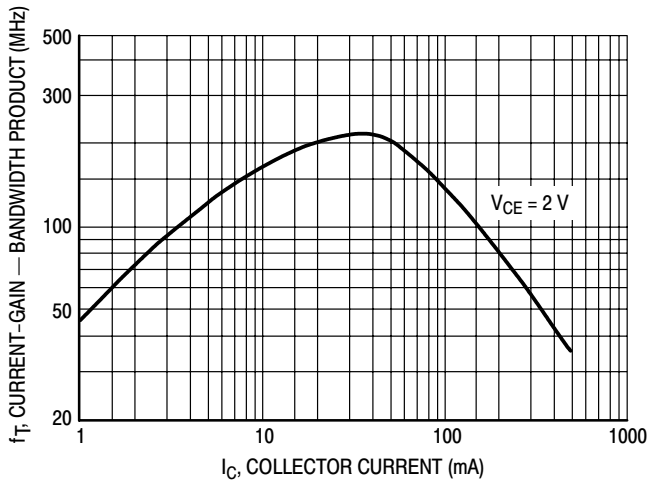


Figure 3. Current-Gain — Bandwidth Product

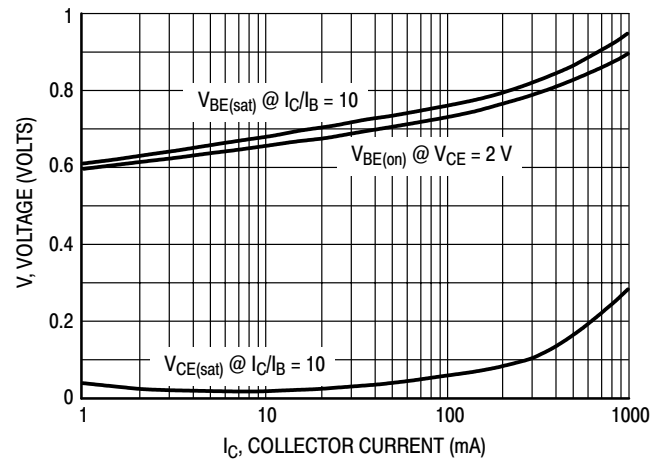


Figure 4. "Saturation" and "On" Voltages

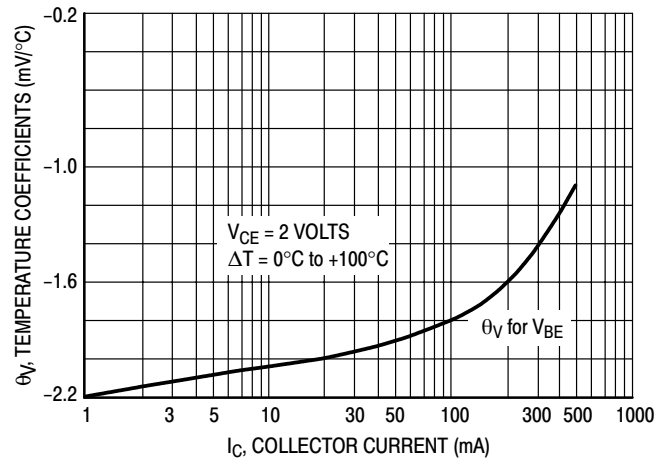
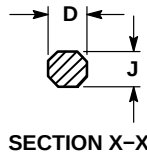
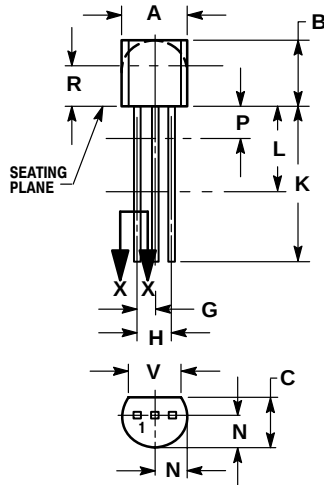


Figure 5. Temperature Coefficients

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## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
ISSUE AL



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.45        | 5.20  |
| B   | 0.170  | 0.210 | 4.32        | 5.33  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.016  | 0.021 | 0.407       | 0.533 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.015  | 0.020 | 0.39        | 0.50  |
| K   | 0.500  | ---   | 12.70       | ---   |
| L   | 0.250  | ---   | 6.35        | ---   |
| N   | 0.080  | 0.105 | 2.04        | 2.66  |
| P   | ---    | 0.100 | ---         | 2.54  |
| R   | 0.115  | ---   | 2.93        | ---   |
| V   | 0.135  | ---   | 3.43        | ---   |

### STYLE 14:

1. EMITTER
2. COLLECTOR
3. BASE

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