

# ON Semiconductor

## Is Now



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# BDC01D

## One Watt Amplifier Transistor

### NPN Silicon

#### Features

- Pb-Free Package is Available\*

#### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | Value       | Unit                      |
|----------------------------------------------------------------------------------------|----------------|-------------|---------------------------|
| Collector - Emitter Voltage                                                            | $V_{CEO}$      | 100         | Vdc                       |
| Collector - Base Voltage                                                               | $V_{CBO}$      | 100         | Vdc                       |
| Emitter - Base Voltage                                                                 | $V_{EBO}$      | 5.0         | Vdc                       |
| Collector Current - Continuous                                                         | $I_C$          | 0.5         | Adc                       |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.0<br>8.0  | W<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 2.5<br>20   | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | -55 to +150 | $^\circ\text{C}$          |

#### THERMAL CHARACTERISTICS

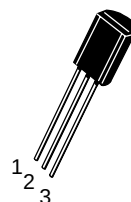
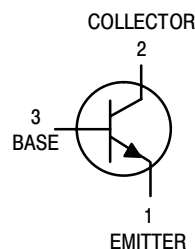
| Characteristic                          | Symbol          | Max | Unit               |
|-----------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 125 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 50  | $^\circ\text{C/W}$ |

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.



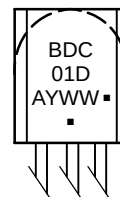
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TO-92 (TO-226)  
CASE 29-10  
STYLE 1

#### MARKING DIAGRAM



BDC01D = Device Code

A = Assembly Location

Y = Year

WW = Work Week

▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device     | Package            | Shipping           |
|------------|--------------------|--------------------|
| BDC01DRL1  | TO-92              | 2000 / Tape & Reel |
| BDC01DRL1G | TO-92<br>(Pb-Free) | 5000 / Tape & Reel |

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

# BDC01D

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                                                                                                                | Symbol        | Min      | Max      | Unit            |
|-------------------------------------------------------------------------------------------------------------------------------|---------------|----------|----------|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                    |               |          |          |                 |
| Collector – Emitter Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 0$ )                                                           | $V_{(BR)CEO}$ | 100      | –        | Vdc             |
| Collector Cutoff Current<br>( $V_{CB} = 100\text{ V}$ , $I_E = 0$ )                                                           | $I_{CBO}$     | –        | 0.1      | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $I_C = 0$ , $V_{EB} = 5.0\text{ V}$ )                                                             | $I_{EBO}$     | –        | 100      | nAdc            |
| <b>ON CHARACTERISTICS</b>                                                                                                     |               |          |          |                 |
| DC Current Gain<br>( $I_C = 100\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ ) | $h_{FE}$      | 40<br>25 | 400<br>– | –               |
| Collector – Emitter Saturation Voltage (Note 1)<br>( $I_C = 1000\text{ mA}$ , $I_B = 100\text{ mA}$ )                         | $V_{CE(sat)}$ | –        | 0.7      | Vdc             |
| Collector – Emitter On Voltage (Note 1)<br>( $I_C = 1000\text{ mA}$ , $V_{CE} = 1.0\text{ V}$ )                               | $V_{BE(on)}$  | –        | 1.2      | Vdc             |
| <b>DYNAMIC CHARACTERISTICS</b>                                                                                                |               |          |          |                 |
| Current Gain Bandwidth Product<br>( $I_C = 200\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $f = 20\text{ MHz}$ )                   | $f_T$         | 50       | –        | MHz             |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )                                           | $C_{ob}$      | –        | 30       | pF              |

1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ ; Duty Cycle 2.0%.

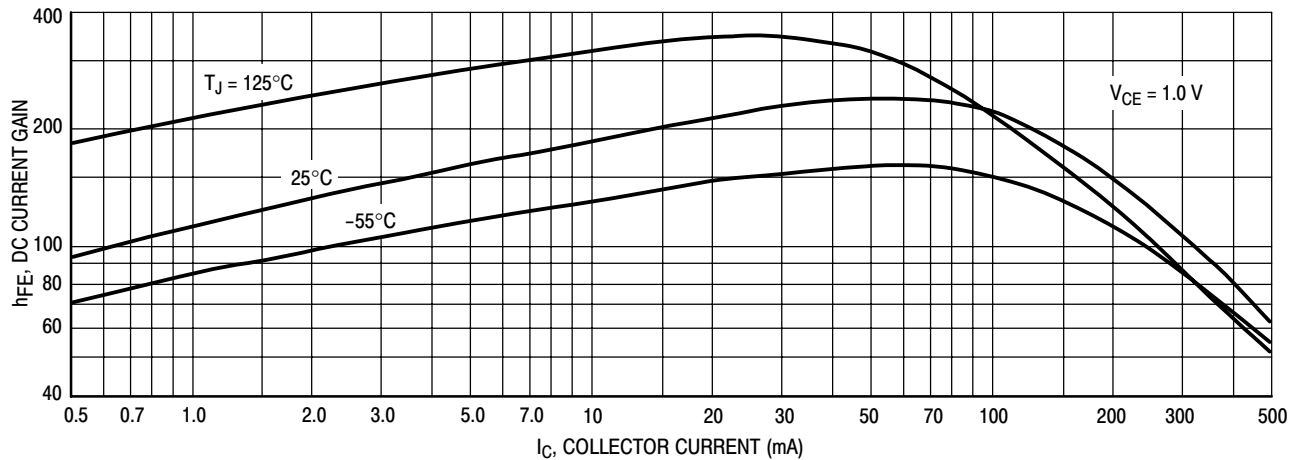


Figure 1. DC Current Gain

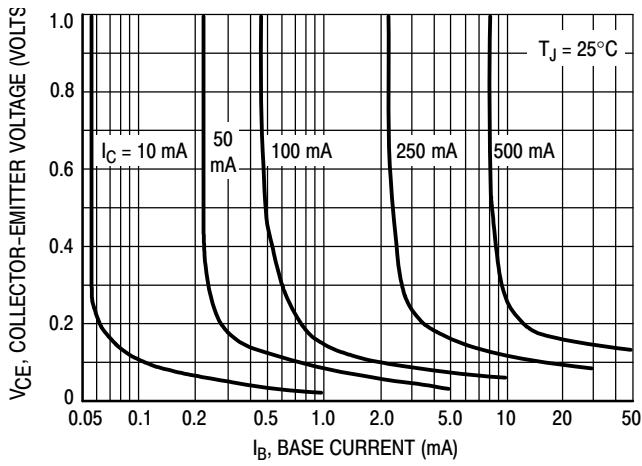


Figure 2. Collector Saturation Region

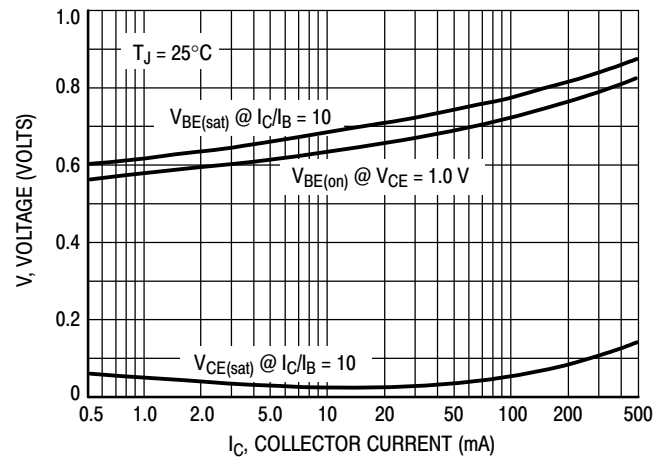


Figure 3. "On" Voltages

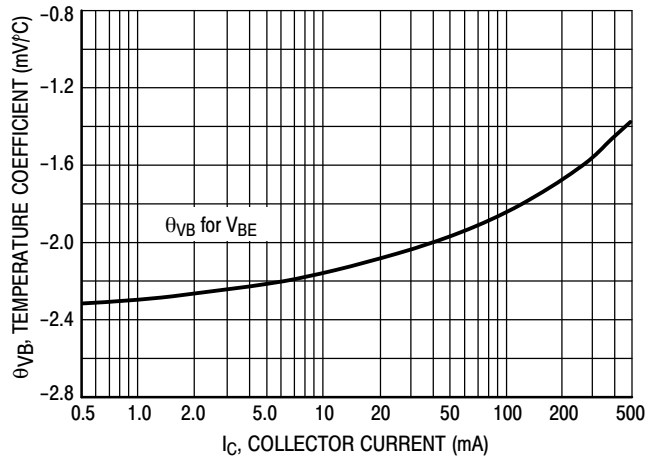


Figure 4. Base-Emitter Temperature Coefficient

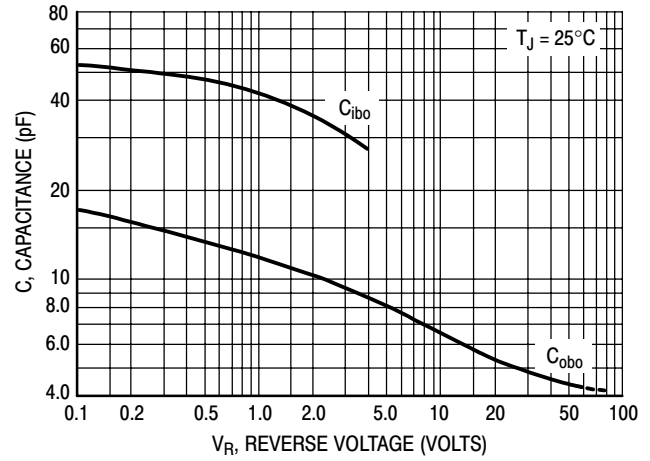


Figure 5. Capacitance

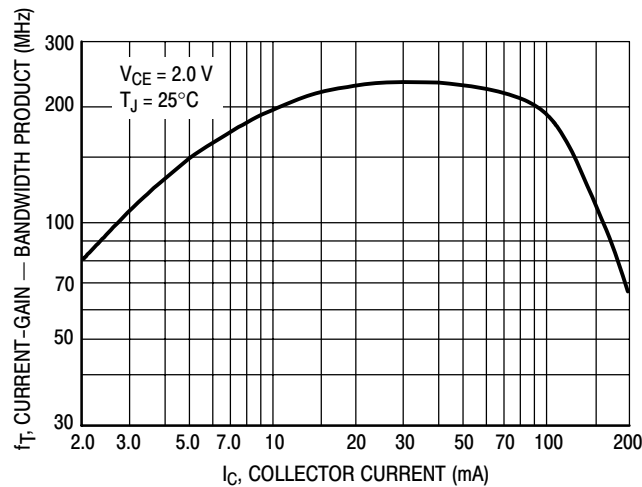


Figure 6. Current-Gain — Bandwidth Product

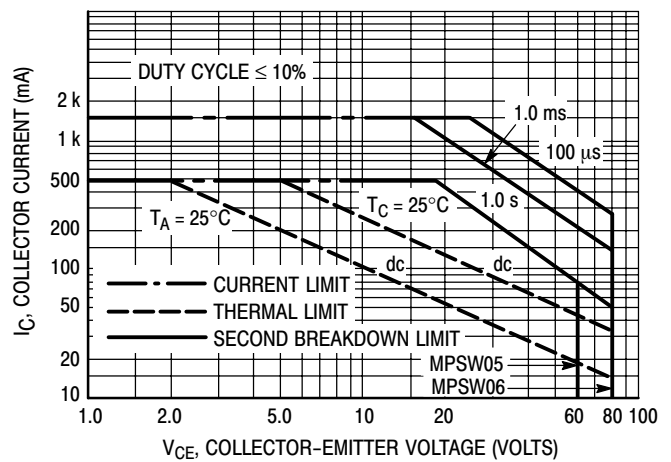
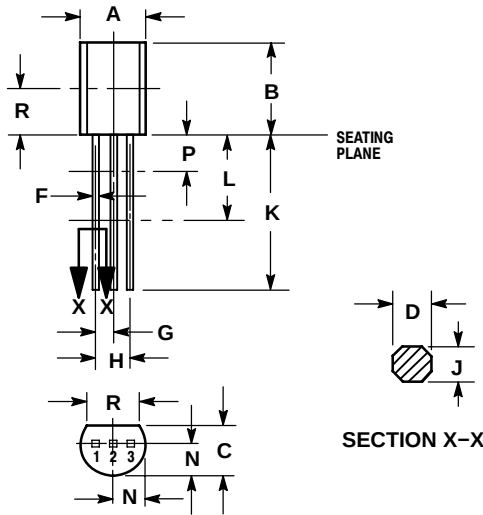


Figure 7. Active Region — Safe Operating Area

# BDC01D

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-10  
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. DIMENSION F APPLIES BETWEEN P AND L. DIMENSIONS D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.44        | 5.21  |
| B   | 0.290  | 0.310 | 7.37        | 7.87  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.018  | 0.021 | 0.457       | 0.533 |
| F   | 0.016  | 0.019 | 0.407       | 0.482 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.018  | 0.024 | 0.46        | 0.61  |
| 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   | 0.135  | ---   | 3.43        | ---   |

### STYLE 14:

- PIN 1. EMITTER
2. COLLECTOR
3. BASE

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