



# THE DATASHEET OF BF493S

# BF493S

## High Voltage Transistor

### PNP Silicon

#### Features

- Pb-Free Package is Available\*

#### MAXIMUM RATINGS

| Rating                                                                                   | Symbol         | Value       | Unit                       |
|------------------------------------------------------------------------------------------|----------------|-------------|----------------------------|
| Collector – Emitter Voltage                                                              | $V_{CEO}$      | –350        | Vdc                        |
| Collector – Base Voltage                                                                 | $V_{CBO}$      | –350        | Vdc                        |
| Emitter – Base Voltage                                                                   | $V_{EBO}$      | –6.0        | Vdc                        |
| Collector Current – Continuous                                                           | $I_C$          | –500        | mAdc                       |
| 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 $25^\circ\text{C}$   | $P_D$          | 1.5<br>12   | 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

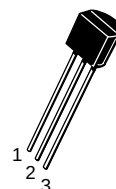
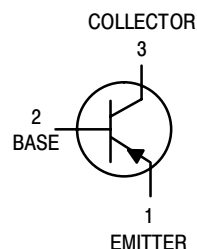
| Characteristic                          | Symbol          | Max  | Unit               |
|-----------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 200  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case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

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.



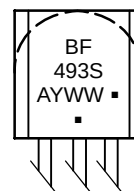
ON Semiconductor®

<http://onsemi.com>



TO-92  
CASE 29-11  
STYLE 1

#### MARKING DIAGRAM



BF493S = 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         |
|---------|--------------------|------------------|
| BF493S  | TO-92              | 5000 Units / Box |
| BF493SG | TO-92<br>(Pb-Free) | 5000 Units / Box |

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

# BF493S

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

| Characteristic                                                                                                                                                              | Symbol        | Min    | Max            | Unit            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|----------------|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                  |               |        |                |                 |
| Collector – Emitter Breakdown Voltage (Note 1)<br>( $I_C = -1.0\text{ mAdc}$ , $I_B = 0$ )                                                                                  | $V_{(BR)CEO}$ | -350   | –              | Vdc             |
| Collector – Base Breakdown Voltage<br>( $I_C = -100\text{ }\mu\text{Adc}$ , $I_E = 0$ )                                                                                     | $V_{(BR)CBO}$ | -350   | –              | Vdc             |
| Emitter – Base Breakdown Voltage<br>( $I_E = -100\text{ }\mu\text{Adc}$ , $I_C = 0$ )                                                                                       | $V_{(BR)EBO}$ | -6.0   | –              | Vdc             |
| Collector Cutoff Current<br>( $V_{CE} = -250\text{ Vdc}$ )                                                                                                                  | $I_{CES}$     | –      | -10            | nAdc            |
| Emitter Cutoff Current<br>( $V_{EB} = -6.0\text{ Vdc}$ , $I_C = 0$ )                                                                                                        | $I_{EBO}$     | –      | 0.1            | $\mu\text{Adc}$ |
| Collector Cutoff Current<br>( $V_{CB} = -250\text{ Vdc}$ , $I_E = 0$ , $T_A = 25^\circ\text{C}$ )<br>( $V_{CB} = -250\text{ Vdc}$ , $I_E = 0$ , $T_A = 100^\circ\text{C}$ ) | $I_{CBO}$     | –<br>– | -0.005<br>-1.0 | $\mu\text{Adc}$ |

## ON CHARACTERISTICS

|                                                                                                                                        |               |          |        |     |
|----------------------------------------------------------------------------------------------------------------------------------------|---------------|----------|--------|-----|
| DC Current Gain<br>( $I_C = -1.0\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -10\text{ mAdc}$ , $V_{CE} = -10\text{ Vdc}$ ) | $h_{FE}$      | 25<br>40 | –<br>– | –   |
| Collector – Emitter Saturation Voltage<br>( $I_C = -20\text{ mAdc}$ , $I_B = -2.0\text{ mAdc}$ )                                       | $V_{CE(sat)}$ | –        | -2.0   | Vdc |
| Base – Emitter On Voltage<br>( $I_C = -20\text{ mA}$ , $I_B = -2.0\text{ mA}$ )                                                        | $V_{BE(sat)}$ | –        | -2.0   | Vdc |

## DYNAMIC CHARACTERISTICS

|                                                                                                                     |          |    |     |     |
|---------------------------------------------------------------------------------------------------------------------|----------|----|-----|-----|
| Current – Gain – Bandwidth Product<br>( $I_C = -10\text{ mAdc}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 20\text{ MHz}$ ) | $f_T$    | 50 | –   | MHz |
| Common – Emitter Feedback Capacitance<br>( $V_{CB} = -100\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )          | $C_{re}$ | –  | 1.6 | pF  |

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

# BF493S

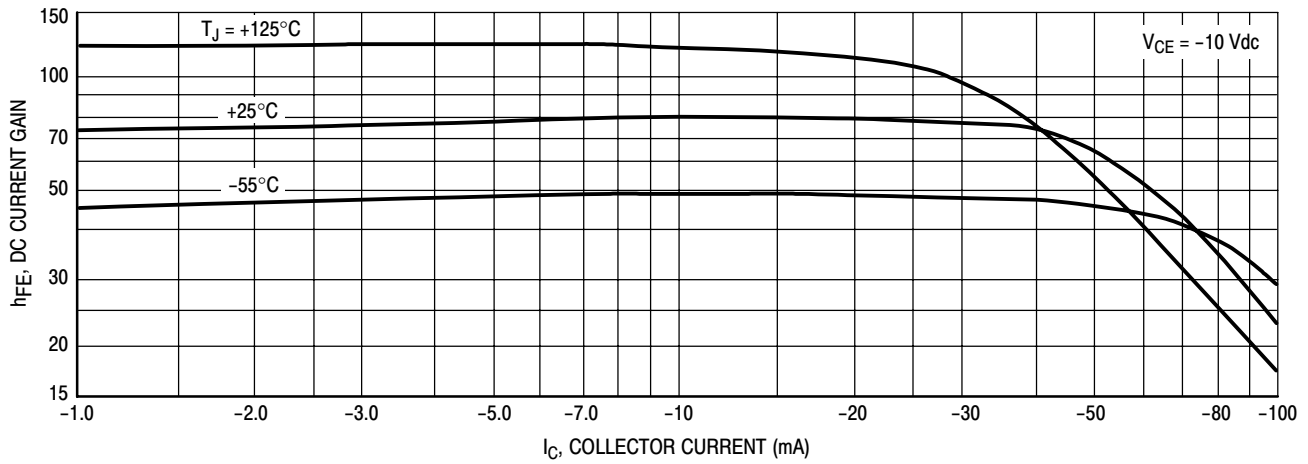


Figure 1. DC Current Gain

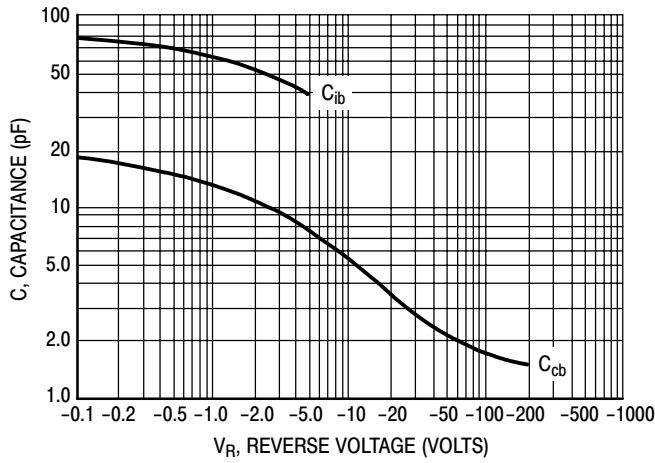


Figure 2. Capacitances

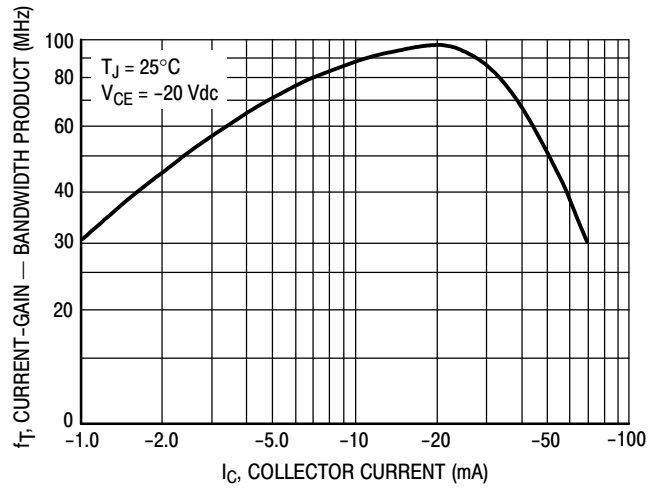


Figure 3. Current-Gain — Bandwidth Product

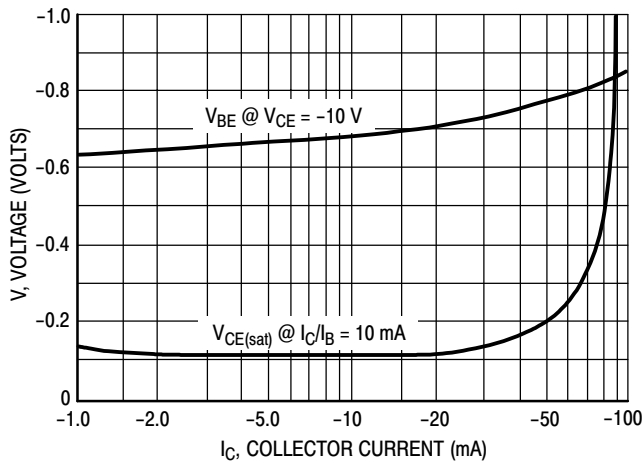


Figure 4. "On" Voltages

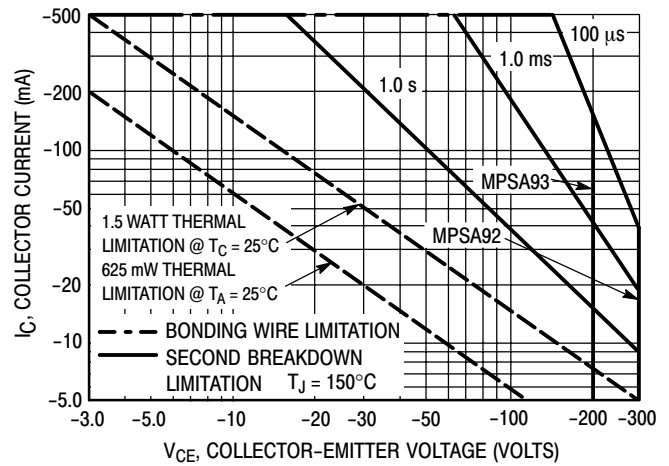
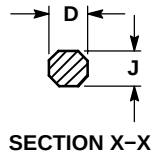
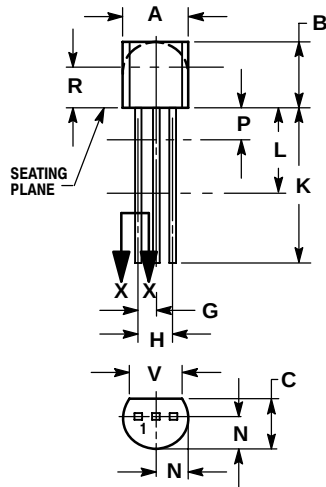


Figure 5. Active Region — Safe Operating Area

# BF493S

## 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 1:

1. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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