# 7 Metal Can

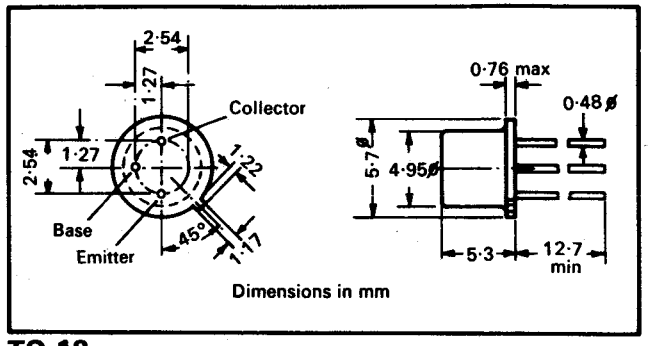
## High Current NPN Amplifiers

| Device Type | Polarity | Case | Maximum ratings BVCBO V | BVCEO V | BVEBO V | ICM mA | hFE1 IC mA | hFE1 min. | hFE1 max. | hFE2 IC mA | hFE2 min. | hFE2 max. | fT MHz | VCE(sat) IC A | VCE(sat) V | Available in TO18 | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFT39 | NPN | TO39 | 90 | 80 | 5 | 1000 | 100 | 50 | 250 | 1000 | 20 | — | 100 | 1.0 | 1.6 | BFT29 | hFE 25 min at 1mA |
| BFT40 | NPN | TO39 | 70 | 60 | 5 | 1000 | 100 | 75 | 250 | 1000 | 25 | — | 100 | 1.0 | 1.0 | BFT30 | hFE 45 min at 1mA |
| BFT41 | NPN | TO39 | 60 | 50 | 5 | 1000 | 100 | 100 | 300 | 1000 | 25 | — | 100 | 1.0 | 1.0 | BFT31 | hFE 45 min at 1mA |
| BFY50 | NPN | TO39 | 80 | 35 | 6 | 1000 | 150 | 30 | — | 1000 | 15 | — | 60 | 1.0 | 1.0 | BFT53 | hFE 20 min at 10mA |
| BFY51 | NPN | TO39 | 60 | 30 | 6 | 1000 | 150 | 40 | — | 1000 | 15 | — | 50 | 1.0 | 1.6 | BFT54 | hFE 30 min at 10mA |
| BFY52 | NPN | TO39 | 40 | 20 | 6 | 1000 | 150 | 60 | — | 1000 | 15 | — | 50 | 1.0 | 1.6 | BFT55 | hFE 30 min at 10mA |
| BC142 | NPN | TO39 | 80 | 60 | 5 | 800 | 200 | 20 | — | — | — | — | 40 | 0.2 | 0.4 | | |
| BC300 | NPN | TO39 | 120 | 80 | 7 | 1000 | 150 | 40 | 240 | 500 | 20 | — | 120 | 0.15 | 0.5 | | hFE 20 min at 100µA<br>Available in 3 hFE Bands at Ic=150 mA |
| BC301 | NPN | TO39 | 90 | 60 | 7 | 1000 | 150 | 40 | 240 | 500 | 20 | — | 120 | 0.15 | 0.5 | | |
| BC302 | NPN | TO39 | 60 | 45 | 7 | 1000 | 150 | 40 | 240 | 500 | 20 | — | 120 | 0.15 | 0.5 | | |
| 2N697 | NPN | TO39 | 60 | 40 | 5 | 1000 | 150 | 40 | 120 | — | — | — | 50 | 0.15 | 1.5 | | |
| 2N1613 | NPN | TO39 | 75 | 50 | 7 | 1000 | 150 | 40 | 120 | 500 | 20 | — | 60 | 0.15 | 1.5 | | hFE 20 min at 100µA |
| 2N1711 | NPN | TO39 | 75 | 50 | 7 | 1000 | 150 | 100 | 300 | 500 | 40 | — | 70 | 0.15 | 1.5 | | hFE 35 min at 100µA |
| 2N1890 | NPN | TO39 | 100 | 60 | 7 | — | 150 | 100 | 300 | — | — | — | 60 | 0.15 | 5.0 | | |
| 2N1893 | NPN | TO39 | 120 | 80 | 7 | 500 | 150 | 40 | 120 | 10 | 35 | — | 50 | 0.15 | 5.0 | | hFE 20 min at 100µA |
| 2N2243A | NPN | TO39 | 120 | 80 | 7 | 1000 | 150 | 40 | 120 | 10 | 30 | — | 50 | 0.15 | 0.25 | | |

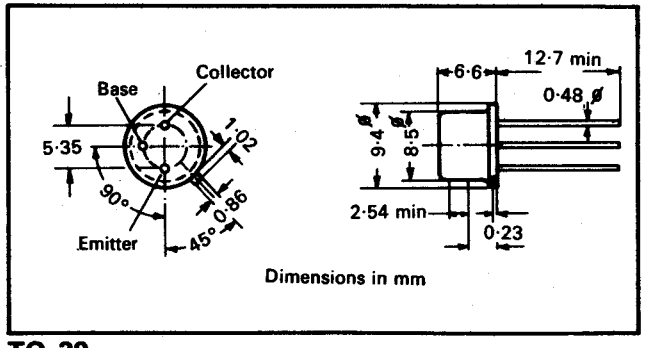
## PNP Amplifiers and Fast Switches

| Device Type | Polarity | Case | Maximum ratings BVCBO V | BVCEO V | BVEBO V | ICM mA | hFE1 IC mA | hFE1 min. | hFE1 max. | hFE2 IC mA | hFE2 min. | hFE2 max. | fT min. MHz | VCE(sat) IC mA | VCE(sat) V | Max. ton ns | Max. ts ns | Max. toff ns | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2N2411 | PNP | TO18 | 25 | 20 | 5 | 300 | 10 | 20 | 60 | 50 | 10 | — | 140 | 10 | 0.20 | 25 | 90 | 100 | hFE 10 min at 50µA |
| 2N2412 | PNP | TO18 | 25 | 20 | 5 | 300 | 10 | 40 | 120 | 50 | 20 | — | 140 | 10 | 0.20 | 25 | 90 | 100 | hFE 20 min at 50µA |
| 2N2894 | PNP | TO18 | 12 | 12 | 4 | 200 | 10 | 30 | — | 30 | 40 | 150 | 400 | 10 | 0.15 | 60 | — | 90 | hFE 25 min at 100mA |
| 2N3012 | PNP | TO18 | 12 | 12 | 4 | 200 | 10 | 25 | — | 30 | 30 | 120 | 400 | 10 | 0.15 | 60 | — | 75 | hFE 30 min at 100mA |
| 2N3576 | PNP | TO18 | 20 | 15 | 5 | 200 | 10 | 40 | 120 | 100 | 10 | — | 400 | 10 | 0.15 | 30 | 30 | 50 | VCE(sat) 0.5V max at 100mA |
| 2N3829 | PNP | TO52 | 35 | 20 | 20 | 500 | 10 | 25 | — | 30 | 30 | 120 | 350 | 10 | 0.18 | 25 | 50 | 65 | hFE 25 min at 100mA |
| 2N4260 | PNP | TO72 | 15 | 15 | 45 | 30 | 10 | 30 | 150 | 30 | 20 | — | 1600 | 10 | 0.35 | 1.2 | — | 1.2 | |

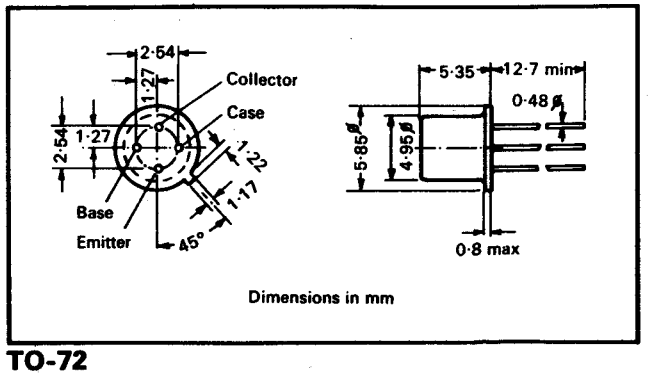
## Case Outlines




TO-18




TO-39




TO-72

Datasheet Archive

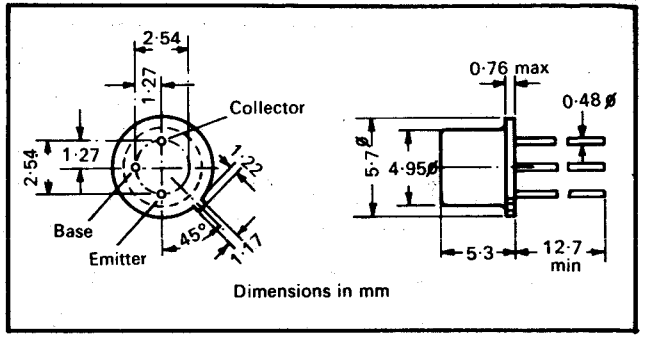
# BS9000 Converted CV

## Small Signal Transistors

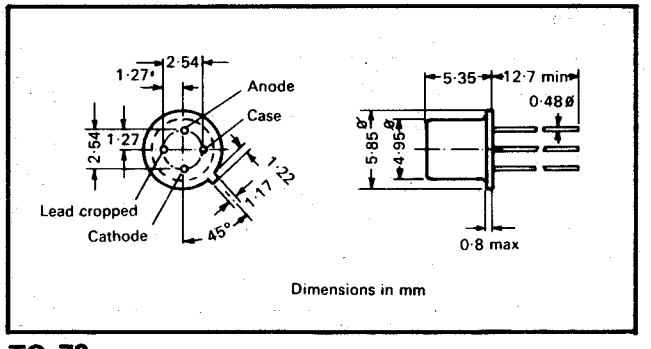
| BS Type Number | Commercial Equivalent | Case Outline | Polarity | Absolute Maximum Rating VCB V | VCE V | VEB V | hFE at Collector Current hFE min. | hFE max. | IC mA | Min. fT MHz | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BS9300 C328 | 2S104 | TO18 | NPN | 60 | 45 | 6 | 80 | 200 | 5 | 80 | |
| BS9300 C371 | 2N2221A* | TO18 | NPN | 60 | 45 | 6 | 35 | 85 | 10 | 150 | ton 140 ns toff 500 ns |
| BS9300 C372 | 2N2222A* | TO18 | NPN | 60 | 45 | 6 | 75 | 170 | 10 | 150 | ton 140 ns toff 500 ns |
| BS9300 C404 | 2N1893 | TO5 | NPN | 120 | 80 | 7 | 40 | 120 | 150 | 60 | High Voltage hFE 35-100 @ IC – 1mA |
| BS9300 C460 | 2N1613 | TO5 | NPN | 75 | 50 | 7 | 40 | 120 | 150 | 60 | High Gain General Purpose Amplifier |
| BS9300 C461 | 2S103 | TO18 | NPN | 60 | 45 | 6 | 40 | 100 | 5 | 60 | SRDE. Low Level Amplifier |
| BS9300 C462 | 2N2411 | TO18 | PNP | 25 | 20 | 5 | 20 | 60 | 10 | 150 | High Frequency Amplifier |
| BS9300 C463 | 2N2412 | TO18 | PNP | 25 | 20 | 5 | 40 | 120 | 10 | 150 | and Fast Switch |
| BS9300 C478 | 2N918 | TO12 | NPN | 30 | 15 | 3 | 30 | — | 3 | 100 | |
| BS9300 C492 | 2N929 | TO18 | NPN | 45 | 45 | 5 | 40 | 120 | 0.01 | 30 | Low Level Low Noise High Gain |
| BS9300 C493 | 2N930 | TO18 | NPN | 45 | 45 | 5 | 100 | 300 | 0.01 | 30 | Amplifiers |
| BS9300 C495 | 2N696 | TO5 | NPN | 60 | 40 | 5 | 20 | 60 | 150 | 50 | Medium Power High Gain General Purpose Amplifier |
| BS9300 C496 | 2N697 | TO5 | NPN | 60 | 40 | 5 | 40 | 120 | 150 | 50 | Complementary to CV7580 & CV7581 |
| BS9300 C580 | 2N1131 | TO5 | PNP | 50 | 35 | 5 | 20 | 45 | 150 | 50 | Complementary to CV7495 & CV7496 |
| BS9300 C581 | 2N1132 | TO5 | PNP | 50 | 35 | 5 | 30 | 90 | 150 | 60 | |
| BS9300 C588 | 2S104 | TO18 | NPN | 60 | 45 | 6 | 80 | 200 | 5 | 100 | NPN General Purpose Amplifiers |
| BS9300 C596 | 2S103 | TO18 | NPN | 60 | 45 | 6 | 40 | 100 | 5 | 80 | |
| BS9300 C630 | 2N2696 | TO18 | PNP | 25 | 25 | 4 | 30 | 130 | 50 | 100 | PNP High Frequency Amplifiers |
| BS9300 C631 | 2N2927 | TO5 | PNP | 25 | 25 | 4 | 30 | 130 | 50 | 100 | and Saturated Switches |
| BS9300 C633 | 2N1893 | TO5 | NPN | 120 | 100 | 6 | 65 | 200 | 200 | 60 | High Voltage General Purpose Amplifier |
| BS9300 C637 | 2N2905* | TO5 | PNP | 32 | 32 | 5 | 80 | 160 | 1.0 | 40 | General Purpose PNP Amplifiers |
| BS9300 C638 | 2N2905A* | TO5 | PNP | 60 | 60 | 5 | 60 | 120 | 1.0 | 40 | |
| BS9300 C644 | BC107A* | TO18 | NPN | 65 | 65 | 5 | 50 | 200 | 10 | 50 | |
| BS9300 C669 | 2N2904 | TO5 | PNP | 60 | 40 | 5 | 40 | 120 | 150 | 200 | High Speed Medium Power Switching and |
| BS9300 C670 | 2N2905 | TO5 | PNP | 60 | 40 | 5 | 100 | 300 | 150 | 200 | General Purpose Amplifiers |
| BS9300 C671 | 2N2904A | TO5 | PNP | 60 | 60 | 5 | 40 | 120 | 150 | 200 | |
| BS9300 C672 | 2N2905A | TO5 | PNP | 60 | 60 | 5 | 100 | 300 | 150 | 200 | |
| BS9300 C673 | 2N2906 | TO18 | PNP | 60 | 40 | 5 | 40 | 120 | 150 | 200 | |
| BS9300 C674 | 2N2907 | TO18 | PNP | 60 | 40 | 5 | 100 | 300 | 150 | 200 | High Speed Switching and General Purpose |
| BS9300 C675 | 2N2906A | TO18 | PNP | 60 | 60 | 5 | 40 | 120 | 150 | 200 | Medium Power Amplifiers |
| BS9300 C676 | 2N2907A | TO18 | PNP | 60 | 60 | 5 | 100 | 300 | 150 | 200 | |
| BS9300 C722 | BFY50 | TO5 | NPN | 80 | 35 | 6 | 30 | 100 | 150 | 50 | |
| BS9300 C723 | BFY51 | TO5 | NPN | 60 | 30 | 6 | 40 | 120 | 150 | 50 | General purpose Amplifier |
| BS9300 C724 | BFY52 | TO5 | NPN | 40 | 20 | 6 | 60 | 200 | 150 | 50 | |
| BS9300 C725 | BFY50 | TO5 | NPN | 80 | 35 | 6 | 30 | — | 150 | 50 | General Purpose Amplifier and |
| BS9300 C726 | BFY51 | TO5 | NPN | 60 | 30 | 6 | 35 | — | 150 | 50 | Saturated Switches |
| BS9300 C727 | BFY52 | TO5 | NPN | 40 | 20 | 6 | 50 | — | 150 | 50 | 1 Amp hFE Minimum 10 |
| BS9300 C735 | 2N1711 | TO5 | NPN | 75 | 50 | 7 | 100 | 300 | 150 | 70 | High Gain Medium Power Amplifier |
| BS9300 C736 | 2N2484 | TO18 | NPN | 60 | 60 | 6 | 100 | 500 | 0.01 | 60 | Very High Gain Low Noise Low Level Amplifier |
| BS9300 C748 | 2N2221* | TO18 | NPN | 25 | 25 | 4 | 38 | 162 | 10 | 120 | |
| BS9300 C749 | 2N2906* | TO18 | PNP | 25 | 25 | 4 | 38 | 162 | 10 | 120 | |
| BS9300 C750 | 2N2221A* | TO18 | NPN | 45 | 35 | 4 | 38 | 162 | 10 | 120 | |
| BS9300 C751 | 2N2906A* | TO18 | PNP | 45 | 35 | 4 | 38 | 162 | 10 | 120 | High Frequency, Low Power Switching and |
| BS9300 C752 | 2N2222A* | TO18 | NPN | 45 | 35 | 4 | 75 | 250 | 10 | 120 | Amplifier Applications. Fully Complementary |
| BS9300 C753 | 2N2907A* | TO18 | PNP | 45 | 35 | 4 | 75 | 250 | 10 | 120 | |
| BS9300 C754 | 2N2222* | TO18 | NPN | 25 | 25 | 4 | 75 | 250 | 10 | 120 | |
| BS9300 C755 | 2N2907* | TO18 | PNP | 25 | 25 | 4 | 75 | 250 | 10 | 120 | |
| BS9300 C756 | 2N2218 | TO5 | NPN | 60 | 30 | 5 | 40 | 120 | 150 | 250 | |
| BS9300 C764 | 2N2219 | TO5 | NPN | 60 | 30 | 5 | 100 | 300 | 150 | 250 | High Frequency, Medium Power NPN Amplifier |
| BS9300 C765 | 2N2218A | TO5 | NPN | 75 | 40 | 6 | 40 | 120 | 150 | 250 | High Current Switches |
| BS9300 C766 | 2N2219A | TO5 | NPN | 75 | 40 | 6 | 100 | 300 | 150 | 250 | |
| BS9300 C767 | 2N2221 | TO18 | NPN | 60 | 30 | 5 | 40 | 120 | 150 | 250 | |
| BS9300 C768 | 2N2222 | TO18 | NPN | 60 | 30 | 5 | 100 | 300 | 150 | 250 | TO18 Version of CV7763-66 |
| BS9300 C769 | 2N2221A | TO18 | NPN | 75 | 40 | 6 | 40 | 120 | 150 | 250 | |
| BS9300 C770 | 2N2222A | TO18 | NPN | 75 | 40 | 6 | 100 | 300 | 150 | 250 | |
| BS9300 C774 | 2N2194 | TO5 | NPN | 60 | 40 | 5 | 20 | 60 | 150 | 50 | General Purpose Amplifier |
| BS9300 C775 | 2N2243A | TO5 | NPN | 120 | 80 | 7 | 40 | 120 | 150 | 50 | High Voltage Amplifier |

*Near Equivalent

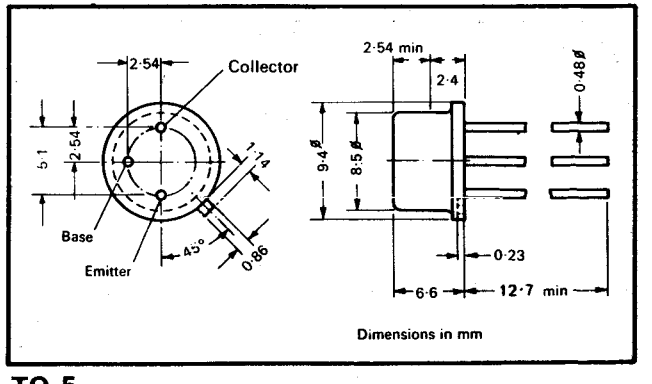
## Case Outlines




TO-18




TO-72




TO-5