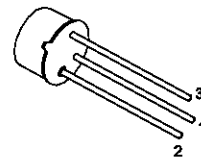


## LOW NOISE AUDIO AMPLIFIERS

### DESCRIPTION

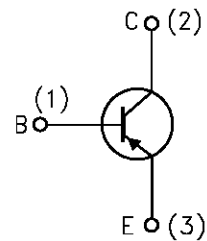
The BCY79 is a silicon planar epitaxial PNP transistors in Jedec TO-18 metal case. They are designed for use in audio driver and low-noise input stages.

The complementary NPN type is the BCY59.



TO-18

### INTERNAL SCHEMATIC DIAGRAM



SC08810

### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                                                                                       | Value      | Unit               |
|-----------|-----------------------------------------------------------------------------------------------------------------|------------|--------------------|
| $V_{CES}$ | Collector-Emitter Voltage ( $V_{BE} = 0$ )                                                                      | -45        | V                  |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )                                                                         | -45        | V                  |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )                                                                              | -5         | V                  |
| $I_C$     | Collector Current                                                                                               | -200       | mA                 |
| $I_{CM}$  | Collector Peak Current                                                                                          | -20        | mA                 |
| $P_{tot}$ | Total Dissipation at $T_{amb} \leq 25\text{ }^{\circ}\text{C}$<br>at $T_{case} \leq 45\text{ }^{\circ}\text{C}$ | 390<br>1   | mW<br>W            |
| $T_{stg}$ | Storage Temperature                                                                                             | -65 to 150 | $^{\circ}\text{C}$ |
| $T_j$     | Max. Operating Junction Temperature                                                                             | 150        | $^{\circ}\text{C}$ |

## THERMAL DATA

|                |                                     |     |     |               |
|----------------|-------------------------------------|-----|-----|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-Case    | Max | 150 | $^{\circ}C/W$ |
| $R_{thj-amb}$  | Thermal Resistance Junction-Ambient | Max | 450 | $^{\circ}C/W$ |

ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

| Symbol          | Parameter                                            | Test Conditions                                                                                                                                                                                                                                                             | Min.              | Typ.                                                                         | Max.                            | Unit                |
|-----------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------|---------------------------------|---------------------|
| $I_{CES}$       | Collector Cut-off Current ( $V_{BE} = 0$ )           | $V_{CE} = -35 V$<br>$V_{CE} = -45 V$<br>$V_{CE} = -35 V$ $T_{amb} = 150^{\circ}C$                                                                                                                                                                                           |                   | -2                                                                           | -20<br>-100<br>-10              | nA<br>nA<br>$\mu A$ |
| $I_{CEX}$       | Collector Cut-off Current ( $V_{BE} = -2V$ )         | $V_{CE} = -45 V$ $T_{amb} = 100^{\circ}C$                                                                                                                                                                                                                                   |                   |                                                                              | -20                             | $\mu A$             |
| $I_{EBO}$       | Emitter Cut-off Current ( $I_C = 0$ )                | $V_{EB} = -4 V$                                                                                                                                                                                                                                                             |                   |                                                                              | -20                             | nA                  |
| $V_{(BR)CES}^*$ | Collector-Emitter Breakdown Voltage ( $V_{BE} = 0$ ) | $I_C = -10 \mu A$                                                                                                                                                                                                                                                           | -45               |                                                                              |                                 | V                   |
| $V_{(BR)CEO}^*$ | Collector-Emitter Breakdown Voltage ( $I_B = 0$ )    | $I_C = -2 mA$                                                                                                                                                                                                                                                               | -45               |                                                                              |                                 | V                   |
| $V_{(BR)EBO}$   | Emitter-Base Breakdown Voltage ( $I_C = 0$ )         | $I_E = -1 \mu A$                                                                                                                                                                                                                                                            | -5                |                                                                              |                                 | V                   |
| $V_{CE(sat)}^*$ | Collector-Emitter Saturation Voltage                 | $I_C = -10 mA$ $I_B = -0.25 mA$<br>$I_C = -100 mA$ $I_B = -2.5 mA$                                                                                                                                                                                                          |                   | -0.12<br>-0.4                                                                | -0.25<br>-0.8                   | V<br>V              |
| $V_{BE(sat)}^*$ | Collector-Base Saturation Voltage                    | $I_C = -10 mA$ $I_B = -0.25 mA$<br>$I_C = -100 mA$ $I_B = -2.5 mA$                                                                                                                                                                                                          | -0.6<br>-0.7      | -0.7<br>-0.85                                                                | -0.85<br>-1.2                   | V<br>V              |
| $V_{BE(on)}^*$  | Base-Emitter On Voltage                              | $I_C = -10 \mu A$ $V_{CE} = -5 V$<br>$I_C = -2 mA$ $V_{CE} = -5 V$<br>$I_C = -10 mA$ $V_{CE} = -1 V$<br>$I_C = -100 mA$ $V_{CE} = -1 V$                                                                                                                                     | -0.6              | -0.55<br>-0.65<br>-0.68<br>-0.75                                             | -0.75                           | V<br>V<br>V<br>V    |
| $h_{FE}^*$      | DC Current Gain                                      | $I_C = -10 \mu A$ $V_{CE} = -5 V$<br>Gr. VII<br>Gr. VIII<br>Gr. IX<br>$I_C = -2 mA$ $V_{CE} = -5 V$<br>Gr. VII<br>Gr. VIII<br>Gr. IX<br>$I_C = -10 mA$ $V_{CE} = -1 V$<br>Gr. VII<br>Gr. VIII<br>Gr. IX<br>$I_C = -100 mA$ $V_{CE} = -1 V$<br>Gr. VII<br>Gr. VIII<br>Gr. IX |                   | 140<br>200<br>270<br>120<br>180<br>250<br>80<br>120<br>160<br>40<br>45<br>60 | 220<br>310<br>460<br>400<br>630 |                     |
| $h_{fe}^*$      | Small Signal Current Gain                            | $I_C = -2 mA$ $V_{CE} = -5 V$ $f = 1KHz$<br>Gr. VII<br>Gr. VIII<br>Gr. IX                                                                                                                                                                                                   | 125<br>175<br>250 | 200<br>260<br>330                                                            | 250<br>350<br>500               |                     |

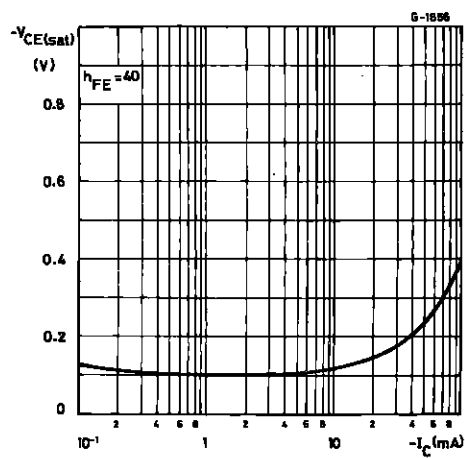
\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle  $\leq 2\%$

## ELECTRICAL CHARACTERISTICS (continued)

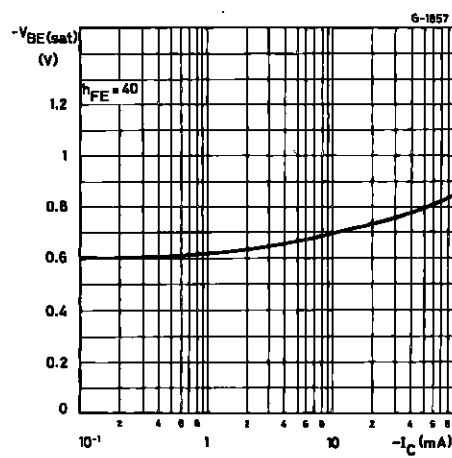
| Symbol    | Parameter                  | Test Conditions                                                                                                                                    | Min. | Typ.              | Max.           | Unit                                                     |
|-----------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|----------------|----------------------------------------------------------|
| $f_T$     | Transition Frequency       | $I_C = -10 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 100 \text{ MHz}$                                                                               |      | 180               |                | MHz                                                      |
| $C_{EBO}$ | Emitter Base Capacitance   | $I_C = 0$ $V_{EB} = -0.5 \text{ V}$ $f = 1 \text{ MHz}$                                                                                            |      | 11                | 15             | pF                                                       |
| $C_{CBO}$ | Collector Base Capacitance | $I_E = 0$ $V_{CB} = -10 \text{ V}$ $f = 1 \text{ MHz}$                                                                                             |      | 4.5               | 7              | pF                                                       |
| NF        | Noise Figure               | $I_C = -0.2 \text{ mA}$ $V_{CE} = -5 \text{ V}$<br>$f = 1 \text{ KHz}$ $R_g = 2 \text{ K}\Omega$                                                   |      | 2                 | 6              | dB                                                       |
| $h_{ie}$  | Input Impedance            | $I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ KHz}$<br>Gr. VII<br>Gr. VIII<br>Gr. IX                                                 |      | 2.7<br>3.6<br>4.5 |                | $\text{K}\Omega$<br>$\text{K}\Omega$<br>$\text{K}\Omega$ |
| $h_{re}$  | Reverse Voltage Ratio      | $I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ KHz}$<br>Gr. VII<br>Gr. VIII<br>Gr. IX                                                 |      | 1.5<br>2<br>2     |                | $10^{-4}$<br>$10^{-4}$<br>$10^{-4}$                      |
| $h_{oe}$  | Output Admittance          | $I_C = -2 \text{ mA}$ $V_{CE} = -5 \text{ V}$ $f = 1 \text{ KHz}$<br>Gr. VII<br>Gr. VIII<br>Gr. IX                                                 |      | 18<br>24<br>30    | 30<br>50<br>60 | $\mu\text{S}$<br>$\mu\text{S}$<br>$\mu\text{S}$          |
| $t_d$     | Delay Time                 | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -10 \text{ mA}$                   |      | 35<br>5           |                | ns<br>ns                                                 |
| $t_r$     | Rise Time                  | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -10 \text{ mA}$                   |      | 50<br>50          |                | ns<br>ns                                                 |
| $t_s$     | Storage Time               | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -I_{B2} = 1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$ |      | 400<br>250        |                | ns<br>ns                                                 |
| $t_f$     | Fall Time                  | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -I_{B2} = 1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$ |      | 80<br>200         |                | ns<br>ns                                                 |
| $t_{on}$  | Turn-on Time               | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -10 \text{ mA}$                   |      | 85<br>55          | 150<br>150     | ns<br>ns                                                 |
| $t_{off}$ | Turn-off Time              | $V_{CC} = -10 \text{ V}$<br>$I_C = -10 \text{ mA}$ $I_{B1} = -I_{B2} = 1 \text{ mA}$<br>$I_C = -100 \text{ mA}$ $I_{B1} = -I_{B2} = 10 \text{ mA}$ |      | 480<br>450        | 800<br>800     | ns<br>ns                                                 |

\* Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1\%$

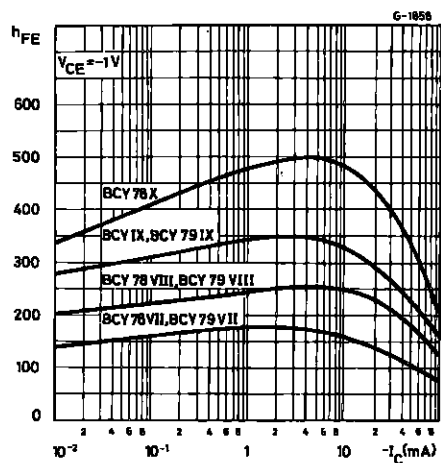
Collector-emitter Saturation Voltage.



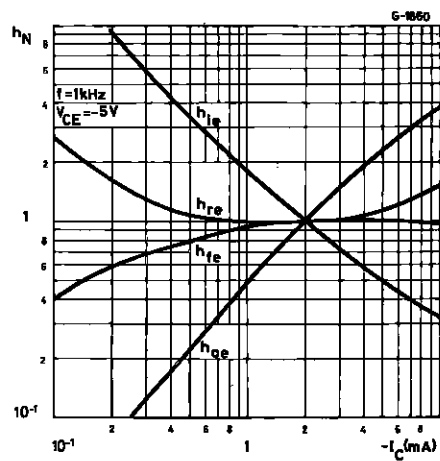
Base-emitter Saturation Voltage.



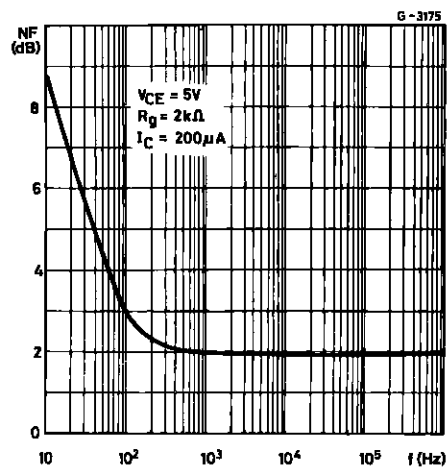
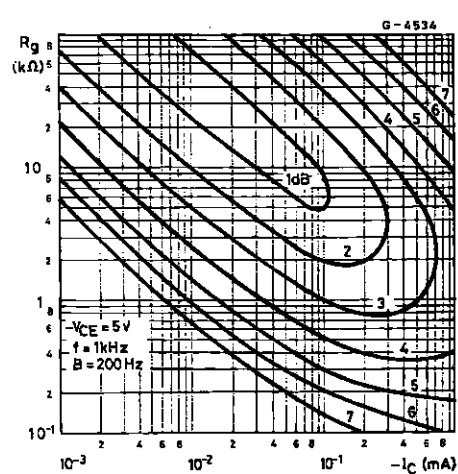
DC Current Gain.



Normalized h Parameters.

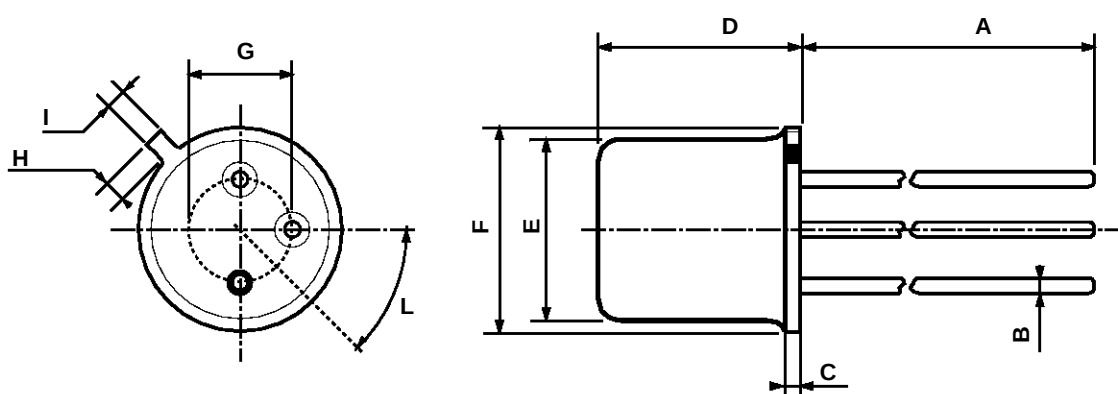


Noise Figure vs. Frequency.

Noise Figure ( $f = 1 kHz$ ).

## TO-18 MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      | 12.7 |      |       | 0.500 |       |
| B    |      |      | 0.49 |       |       | 0.019 |
| D    |      |      | 5.3  |       |       | 0.208 |
| E    |      |      | 4.9  |       |       | 0.193 |
| F    |      |      | 5.8  |       |       | 0.228 |
| G    | 2.54 |      |      | 0.100 |       |       |
| H    |      |      | 1.2  |       |       | 0.047 |
| I    |      |      | 1.16 |       |       | 0.045 |
| L    | 45°  |      |      | 45°   |       |       |



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