$\propto \mathcal{N}_{\varepsilon \omega} \mathcal{I}_{\varepsilon \tau 1 \varepsilon y} S_{\varepsilon m i-C o n d u c t o r} \mathfrak{P}_{\text {roducts, }}, I_{n c}$.

## GENERAL PURPOSE APPLICATIONS

## DESCRIPTION

The BCY70, BCY71 and BCY72 are silicon planar epitaxial PNP transistors in Jedec TO-18 metal case.


## INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value |  |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | BCY70 | BCY71 | BCY72 |  |
| $V_{\text {cbo }}$ | Collector-base Voltage ( $\mathrm{I}_{\mathrm{E}}=0$ ) | - 50 | -45 | -25 | $V$ |
| $V_{\text {CEO }}$ | Collector-emitter Voltage ( $\mathrm{I}_{\mathrm{B}}=0$ ) | -40 | -45 | -25 | $V$ |
| $\mathrm{V}_{\text {Ebo }}$ | Emitter-base Voltage ( $\mathrm{I}_{\mathrm{C}}=0$ ) | -5 |  |  | V |
| $\mathrm{I}_{\mathrm{CM}}$ | Collector Peak Current | -200 |  |  | mA |
| $\mathrm{P}_{\text {tot }}$ | Total Power Dissipation at $\mathrm{T}_{\text {amb }} \leq 25^{\circ} \mathrm{C}$ | 350 |  |  | mW |
| $\mathrm{T}_{\mathbf{s t g} \text { g }}, \mathrm{T}_{\mathrm{f}}$ | Storage and Junction Temperature | -65 to 200 |  |  | ${ }^{\circ} \mathrm{C}$ |

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I HEHMAL DAIA

| $\mathrm{R}_{\text {th }}$ j-case |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| $\mathrm{R}_{\text {th j-amb }}$ | Thermal Resistance Junction-case | Thermal Resistance Junction-ambient | Max | 150 |
| ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |  |  |  |  |

ELECTRICAL CHARACTERISTICS ( $T_{a m b}=25^{\circ} \mathrm{C}$ unless otherwise specifled)

| Symbol | Parameter | Test Condiltions | MIn. | Typ. | Max. | Unlt |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Iges | Collector Cutoff Current ( $\mathrm{V}_{\mathrm{BE}}=0$ ) | For BCY70 <br> $V_{C E}=-20 \mathrm{~V}$ <br> $V_{C E}=-50 \mathrm{~V}$ <br> For BCY71 <br> $V_{C B}=-20 \mathrm{~V}$ <br> $V_{C B}=-45 \mathrm{~V}$ <br> For BCY72 <br> $V_{C B}=-20 \mathrm{~V}$ <br> $V_{C B}=-25 \mathrm{~V}$ |  |  | $\left\lvert\, \begin{aligned} & -10 \\ & -500 \\ & -100 \\ & -10 \\ & -100 \\ & -10 \end{aligned}\right.$ | nA nA <br> nA $\mu \mathrm{A}$ nA $\mu \mathrm{A}$ |
| Iebo | Emitter cutoff Current $\left(I_{C}=0\right)$ | $V_{\text {Eb }}=-5 \mathrm{~V}$ |  |  | - 10 | $\mu \mathrm{A}$ |
| $V_{\text {ce(sat) }}{ }^{*}$ | Collector-emitter Saturation Voitage | $\begin{array}{ll} I_{\mathrm{C}}=-10 \mathrm{~mA} & I_{\mathrm{B}}=-1 \mathrm{~mA} \\ \mathrm{I}_{\mathrm{C}}=-50 \mathrm{~mA} & \mathrm{I}_{\mathrm{B}}=-5 \mathrm{~mA} \\ \hline \end{array}$ |  |  | $\begin{array}{\|c} -0.25 \\ -0.5 \\ \hline \end{array}$ | $\begin{aligned} & V \\ & v \end{aligned}$ |
| $\mathrm{V}_{\mathrm{BE} \text { (sat) }}{ }^{*}$ | Base-Emitter Saturation Voltage | $\mathrm{I}_{\mathrm{C}}=-10 \mathrm{~mA} \quad \mathrm{I}_{\mathrm{B}}=-1 \mathrm{~mA}$ For BCY70 and BCY71 Only $\mathrm{I}_{\mathrm{C}}=-50 \mathrm{~mA} \quad \mathrm{I}_{\mathrm{B}}=-5 \mathrm{~mA}$ | -0.6 |  | $\left\lvert\, \begin{aligned} & -0.9 \\ & -1.2 \end{aligned}\right.$ | $\stackrel{V}{v}$ |
| $\mathrm{h}_{\text {FE }}{ }^{*}$ | DC Current Gain | For BCY70 <br> $\mathrm{I}_{\mathrm{c}}=-0.1 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $I_{C}=-1 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $\mathrm{If}_{\mathrm{c}}=-10 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $\mathrm{I}_{\mathrm{C}}=-50 \mathrm{~mA} \quad \mathrm{~V}_{\mathrm{CE}}=-1 \mathrm{~V}$ <br> For BCY71 <br> $\mathrm{I}_{\mathrm{C}}=-0.01 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $\mathrm{I}_{\mathrm{c}}=-0.1 \mathrm{~mA}$ <br> $V_{c E}=-1 V$ <br> $\mathrm{I}_{\mathrm{C}}^{\mathrm{a}} \mathrm{a}-1 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $\mathrm{I}_{\mathrm{c}}=-10 \mathrm{~mA}$ <br> $V_{C E}=-1 V$ <br> $\mathrm{I}_{\mathrm{c}}=-50 \mathrm{~mA}$ <br> $V_{G E}=-i V$ <br> For BCY72 <br> $\mathrm{I}_{\mathrm{c}}=-1 \mathrm{~mA}$ <br> $V_{O E}=-1 \mathrm{~V}$ <br> $\mathrm{I}_{\mathrm{C}}=-10 \mathrm{~mA} \quad \mathrm{~V}_{\mathrm{CE}}=-1 \mathrm{~V}$ | 40 <br> 45 <br> 50 <br> 15 <br> 80 <br> 90 <br> 100 <br> 15 <br> 40 <br> 50 | 60 | 600 |  |
| $\mathrm{hfo}_{\text {f }}$ | Small Signal Current Galn (for BCY71 only) | $\begin{aligned} & \mathrm{I}_{\mathrm{c}}=-1 \mathrm{~mA} \\ & \mathrm{f}=1 \mathrm{kHz} \end{aligned} \quad \mathrm{VCE}=-10 \mathrm{~V}$ | 100 |  | 400 |  |
| $\mathrm{f}_{\mathrm{T}}$ | Transition Frequency | $I_{\mathrm{C}}=-0.1 \mathrm{~mA}$ $V_{C E}=-20 \mathrm{~V}$ <br> $\mathrm{f}=10.7 \mathrm{MHz}$ For BCY 71 <br> $\mathrm{I}_{\mathrm{C}}=-10 \mathrm{~mA}$ $\mathrm{~V}_{\mathrm{CE}}=-20 \mathrm{~V}$ <br> $\mathrm{f}=100 \mathrm{MHz}$ For BCY70 <br> For BCY70 <br> For BCY70 and BCY72 | 15 <br> 250 <br> 200 |  |  | MHz <br> MHz <br> MHz |
| Cebo | Emitter-base Capacitance | $\begin{array}{ll} \begin{array}{l} l_{G}=0 \\ f=1 \mathrm{MHz} \end{array} & V_{E B}=-1 \mathrm{~V} \end{array}$ |  |  | 8 | pF |
| Ccbo | Collector-base Capacitance | $\begin{array}{ll} l_{E}=0 & V_{C B}=-10 \mathrm{~V} \\ f=1 \mathrm{MHz} & \end{array}$ |  |  | 6 | pF |

[^0]ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NF | Noise Figure | $\begin{aligned} & \hline \mathrm{I}_{\mathrm{C}}=-0.1 \mathrm{~mA} \quad V_{\mathrm{CE}}=-5 \mathrm{~V} \\ & \mathrm{R}_{\mathrm{g}}=2 \mathrm{kS} \\ & \mathrm{f}=10 \text { to } 10000 \mathrm{~Hz} \\ & \text { For } \mathrm{BCY70} \text { and } \mathrm{BCY72} \\ & \\ & \end{aligned}$ |  |  | $\begin{aligned} & 6 \\ & 2 \\ & \hline \end{aligned}$ | $\begin{gathered} \mathrm{dB} \\ \mathrm{~dB} \end{gathered}$ |
| $h_{\text {le }}$ | Input Impedance (for BCY71 only) | $\begin{array}{ll} \mathrm{I}_{\mathrm{C}}=-1 \mathrm{~mA} \\ \mathrm{f}=1 \mathrm{kHz} & \mathrm{~V}_{\mathrm{CE}}=-10 \mathrm{~V} \end{array}$ | 2 |  | 12 | $\mathrm{k} \Omega$ |
| $h_{\text {re }}$ | Reverse Voltage Ratio (for BCY71 only) | $\begin{array}{ll} I_{C}=-1 \mathrm{~mA} & V_{C E}=-10 \mathrm{~V} \\ f=1 \mathrm{kHz} & \end{array}$ |  |  | $20 \times 10^{-4}$ |  |
| $\mathrm{h}_{0}$ | Output Admittance (for BCY71 only) | $\begin{array}{ll} \begin{array}{l} \mathrm{IC}=-1 \mathrm{~mA} \\ \mathrm{f}=1 \mathrm{kHz} \end{array} & V_{C E}=-10 \mathrm{~V} \end{array}$ | 10 |  | 60 | $\mu \mathrm{S}$ |
| $t_{d}$ | Delay Time (for BCY70 and BCY72 only) | $\begin{array}{ll} \mathrm{I}_{\mathrm{C}}=-10 \mathrm{~mA} & V_{\mathrm{EE}}=3 \mathrm{~V} \\ \mathrm{I}_{\mathrm{B} 1}=-1 \mathrm{~mA} & \end{array}$ |  | 23 | 35 | ns |
| $t_{r}$ | Rise Time (for BCY70 and BCY72 only) | $\begin{array}{ll} \mathrm{I}_{\mathrm{c}}=-10 \mathrm{~mA} & V_{\mathrm{EE}}=3 \mathrm{~V} \\ \mathrm{I}_{\mathrm{B} 1}=-1 \mathrm{~mA} & \end{array}$ |  | 25 | 35 | ns |
| ts | Storage Time (for BCY70 and BCY72 only) | $\begin{aligned} & \mathrm{I}_{\mathrm{c}}=-10 \mathrm{~mA} \quad \mathrm{~V}_{\mathrm{EE}}=3 \mathrm{~V} \\ & \mathrm{I}_{\mathrm{B} 1}=-\mathrm{I}_{\mathrm{B} 2}=-1 \mathrm{~mA} \end{aligned}$ |  | 270 | 350 | ns |
| $\mathrm{t}_{1}$ | Fall Time (for BCY70 and BCY72 only) | $\begin{aligned} & I_{\mathrm{C}}=-10 \mathrm{~mA} \quad V_{E E}=3 \mathrm{~V} \\ & \mathrm{I}_{\mathrm{B} 1}=-\mathrm{I}_{\mathrm{B} 2}=-1 \mathrm{~mA} \end{aligned}$ |  | 50 | 80 | ns |
| ton | Turn-on Time (for BCY70 and BCY72 only) | $\begin{array}{ll} \mathrm{I}_{\mathrm{C}}=-10 \mathrm{~mA} & V_{\mathrm{EE}}=3 \mathrm{~V} \\ \mathrm{I}_{\mathrm{A}_{1}}=-1 \mathrm{~mA} & \end{array}$ |  | 48 | 65 | ns |
| taft | Turn-off Time (for BCY70 and BCY72 only) | $\begin{array}{ll} I_{\mathrm{C}}=-10 \mathrm{~mA} & \mathrm{~V}_{\mathrm{EE}}=3 \mathrm{~V} \\ \mathrm{I}_{\mathrm{B} 1}=-I_{\mathrm{B} 2}=-1 & \mathrm{~mA} \end{array}$ |  | 320 | 420 | ns |

* Pulsed : pulse duration $=300 \mu$ s, duty cycle $=1 \%$.


## TEST CIRCUIT

Test Circuit for Switching Times.



[^0]:    * Pulsed : pulse duration $\approx 300 \mu \mathrm{~s}$, duty cycle $=1 \%$.

