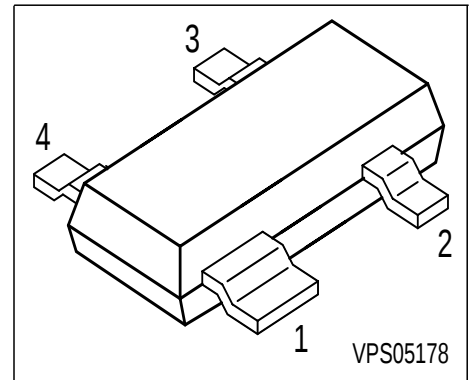
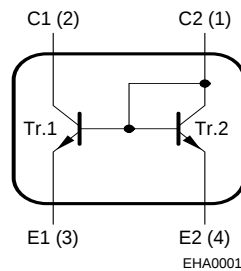


## NPN Silicon Double Transistor

- To be used as a current mirror
- Good thermal coupling and  $V_{BE}$  matching
- High current gain
- Low collector-emitter saturation voltage



| Type   | Marking | Pin Configuration |        |        |        | Package |
|--------|---------|-------------------|--------|--------|--------|---------|
| BCV61A | 1Js     | 1 = C2            | 2 = C1 | 3 = E1 | 4 = E2 | SOT143  |
| BCV61B | 1Ks     | 1 = C2            | 2 = C1 | 3 = E1 | 4 = E2 | SOT143  |
| BCV61C | 1Ls     | 1 = C2            | 2 = C1 | 3 = E1 | 4 = E2 | SOT143  |

## Maximum Ratings

| Parameter                                                | Symbol    | Value       | Unit |
|----------------------------------------------------------|-----------|-------------|------|
| Collector-emitter voltage<br>(transistor T1)             | $V_{CEO}$ | 30          | V    |
| Collector-base voltage (open emitter)<br>(transistor T1) | $V_{CBO}$ | 30          |      |
| Emitter-base voltage                                     | $V_{EBS}$ | 6           |      |
| DC collector current                                     | $I_C$     | 100         | mA   |
| Peak collector current                                   | $I_{CM}$  | 200         |      |
| Base peak current (transistor T1)                        | $I_{BM}$  | 200         |      |
| Total power dissipation, $T_S = 99\text{ °C}$            | $P_{tot}$ | 300         | mW   |
| Junction temperature                                     | $T_j$     | 150         | °C   |
| Storage temperature                                      | $T_{stg}$ | -65 ... 150 |      |

## Thermal Resistance

|                                          |            |      |     |
|------------------------------------------|------------|------|-----|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | ≤170 | K/W |
|------------------------------------------|------------|------|-----|

<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                                                                                                                             | Symbol        | Values   |            |            | Unit          |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------|----------|------------|------------|---------------|
|                                                                                                                                       |               | min.     | typ.       | max.       |               |
| DC Characteristics of T1                                                                                                              |               |          |            |            |               |
| Collector-emitter breakdown voltage<br>$I_C = 10\text{ mA}$ , $I_B = 0$                                                               | $V_{(BR)CEO}$ | 30       | -          | -          | V             |
| Collector-base breakdown voltage<br>$I_C = 10\text{ }\mu\text{A}$ , $I_B = 0$                                                         | $V_{(BR)CBO}$ | 30       | -          | -          |               |
| Emitter-base breakdown voltage<br>$I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$                                                           | $V_{(BR)EBO}$ | 6        | -          | -          |               |
| Collector cutoff current<br>$V_{CB} = 30\text{ V}$ , $I_E = 0$                                                                        | $I_{CBO}$     | -        | -          | 15         | nA            |
| Collector cutoff current<br>$V_{CB} = 30\text{ V}$ , $I_E = 0$ , $T_A = 150\text{ }^\circ\text{C}$                                    | $I_{CBO}$     | -        | -          | 5          | $\mu\text{A}$ |
| DC current gain 1)<br>$I_C = 0.1\text{ mA}$ , $V_{CE} = 5\text{ V}$                                                                   | $h_{FE}$      | 100      | -          | -          | -             |
| DC current gain 1)<br>$I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$                                                                     | $h_{FE}$      |          |            |            |               |
| BCV61A                                                                                                                                |               | 110      | 180        | 220        |               |
| BCV61B                                                                                                                                |               | 200      | 290        | 450        |               |
| BCV61C                                                                                                                                | 420           | 520      | 800        |            |               |
| Collector-emitter saturation voltage1)<br>$I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>$I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$ | $V_{CEsat}$   | -<br>-   | 90<br>200  | 250<br>600 | mV            |
| Base-emitter saturation voltage 1)<br>$I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>$I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$     | $V_{BEsat}$   | -<br>-   | 700<br>900 | -<br>-     |               |
| Base-emitter voltage 1)<br>$I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$<br>$I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$                | $V_{BE(ON)}$  | 580<br>- | 660<br>-   | 700<br>770 |               |

1) Pulse test:  $t \leq 300\mu\text{s}$ ,  $D = 2\%$

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

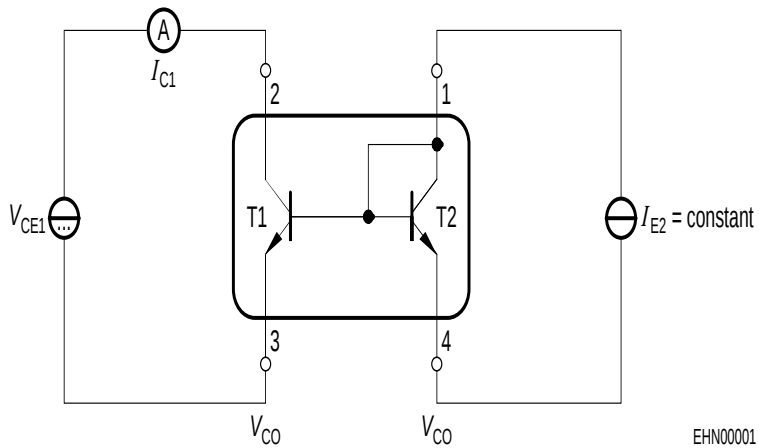
| Parameter                                                                                                                                                               | Symbol            | Values          |             |                 | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|-------------|-----------------|------|
|                                                                                                                                                                         |                   | min.            | typ.        | max.            |      |
| Characteristics                                                                                                                                                         |                   |                 |             |                 |      |
| Base-emitter forward voltage<br>$I_E = 10\ \mu\text{A}$<br>$I_E = 250\ \text{mA}$                                                                                       | $V_{\text{BES}}$  | 0.4<br>-        | -<br>-      | -<br>1.8        | V    |
| Matching of transistor T1 and transistor T2<br>at $I_{E2} = 0.5\text{mA}$ and $V_{\text{CE1}} = 5\text{V}$<br>$T_A = 25\ ^\circ\text{C}$<br>$T_A = 150\ ^\circ\text{C}$ | $I_{C1} / I_{C2}$ | -<br>0.7<br>0.7 | -<br>-<br>- | -<br>1.3<br>1.3 | -    |
| Thermal coupling of transistor T1 and transistor T2 <sup>1)</sup> T1: $V_{\text{CE}} = 5\text{V}$<br>Maximum current of thermal stability of $I_{C1}$                   | $I_{E2}$          | -               | 5           | -               | mA   |

#### AC characteristics for transistor T1

|                                                                                                                                                            |                 |     |     |     |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-----|---------------|
| Transition frequency<br>$I_C = 10 \text{ mA}$ , $V_{\text{CE}} = 5 \text{ V}$ , $f = 100 \text{ MHz}$                                                      | $f_T$           | -   | 250 | -   | MHz           |
| Collector-base capacitance<br>$V_{\text{CB}} = 10 \text{ V}$ , $f = 1 \text{ MHz}$                                                                         | $C_{\text{cb}}$ | -   | 3   | -   | pF            |
| Emitter-base capacitance<br>$V_{\text{EB}} = 0.5 \text{ V}$ , $f = 1 \text{ MHz}$                                                                          | $C_{\text{eb}}$ | -   | 8   | -   |               |
| Noise figure<br>$I_C = 200 \mu\text{A}$ , $V_{\text{CE}} = 5 \text{ V}$ , $R_S = 2 \text{ k}\Omega$ ,<br>$f = 1 \text{ kHz}$ , $\Delta f = 200 \text{ Hz}$ | $F$             | -   | 2   | -   | dB            |
| Short-circuit input impedance<br>$I_C = 1 \text{ mA}$ , $V_{\text{CE}} = 10 \text{ V}$ , $f = 1 \text{ kHz}$                                               | $h_{11e}$       | -   | 4.5 | -   | k $\Omega$    |
| Open-circuit reverse voltage transf.ratio<br>$I_C = 1 \text{ mA}$ , $V_{\text{CE}} = 10 \text{ V}$ , $f = 1 \text{ kHz}$                                   | $h_{12e}$       | -   | 2   | -   | $10^{-4}$     |
| Short-circuit forward current transf.ratio<br>$I_C = 1 \text{ mA}$ , $V_{\text{CE}} = 10 \text{ V}$ , $f = 1 \text{ kHz}$                                  | $h_{21e}$       | 100 | -   | 900 | -             |
| Open-circuit output admittance<br>$I_C = 1 \text{ mA}$ , $V_{\text{CE}} = 10 \text{ V}$ , $f = 1 \text{ kHz}$                                              | $h_{22e}$       | -   | 30  | -   | $\mu\text{S}$ |

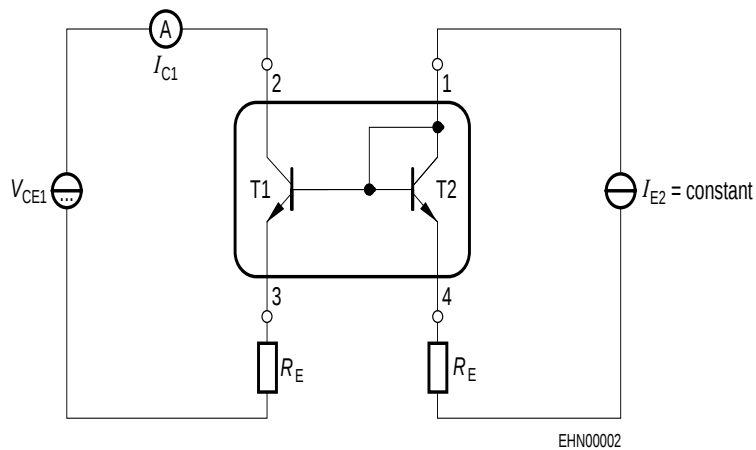
1) Witout emitter resistor. Device mounted on alumina 15mm x 16.5mm x 0.7mm

### Test circuit for current matching



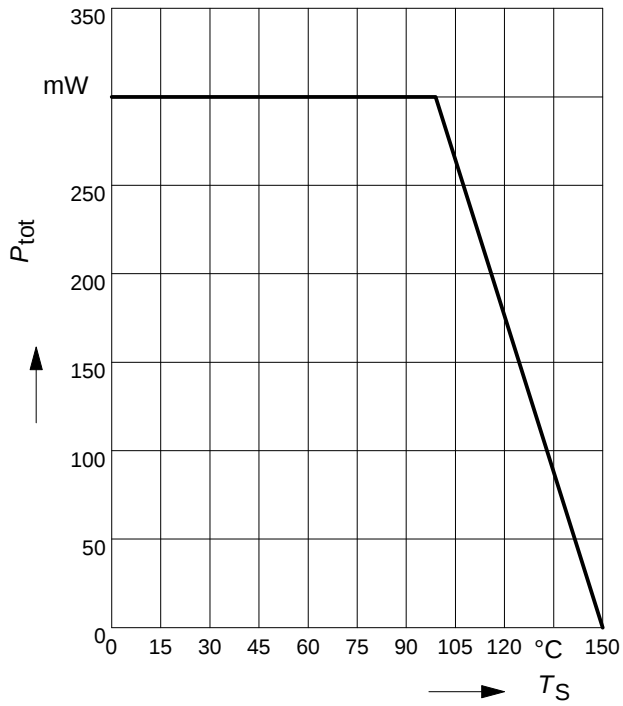
Note: Voltage drop at contacts:  $V_{CO} < 2/3 V_T = 16\text{mV}$

### Characteristic for determination of $V_{CE1}$ at specified $R_E$ range with $I_{E2}$ as parameter under condition of $I_{C1}/I_{E2} = 1.3$



Note: BCV61 with emitter resistors

Total power dissipation  $P_{\text{tot}} = f(T_S)$



Permissible pulse load

$$P_{\text{totmax}} / P_{\text{totDC}} = f(t_p)$$

