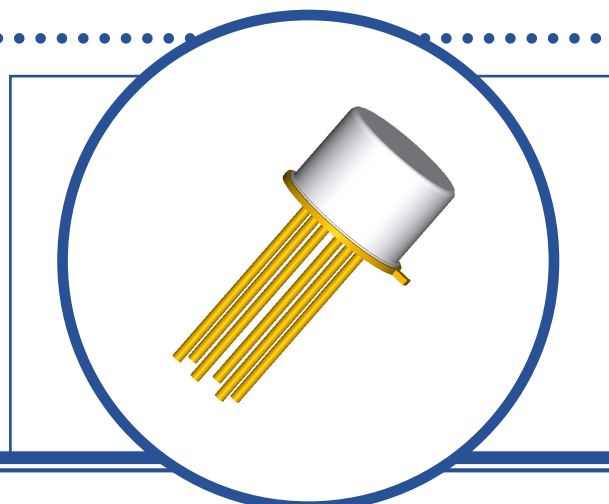


# SILICON DUAL MATCHED NPN TRANSISTORS

## BFY81

- Dual Silicon Matched Planar Transistors
- Hermetic TO-77 (MO-002AF) Metal Package.
- Ideally Suited For Differential And Low Level Dc Amplifiers
- Screening Options Available.



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise stated)

|                  |   |                            |                   |
|------------------|---|----------------------------|-------------------|
| V <sub>CB0</sub> | Collector – Base Voltage  | 45V                        |                   |
| V <sub>CEO</sub> | Collector – Emitter Voltage   | 45V                        |                   |
| V <sub>EBO</sub> | Emitter – Base Voltage  | 6V                         |                   |
| I <sub>C</sub>   | Continuous Collector Current  | 50mA                       |                   |
| P <sub>D</sub>   | Total Power Dissipation at T <sub>A</sub> = 25°C<br>Derate Above 25°C | One Side                   | Both Sides        |
|                  |   | 400mW<br>2.3mW/°C          | 500mW<br>2.9mW/°C |
| P <sub>D</sub>   | Total Power Dissipation at T <sub>C</sub> = 25°C<br>Derate Above 25°C | 800mW<br>4.6mW/°C          | 1.3W<br>7.4mW/°C  |
|                  |   | Junction Temperature Range |                   |
| T <sub>J</sub>   | Junction Temperature Range  | -65 to +200°C              |                   |
| T <sub>stg</sub> | Storage Temperature Range   | -65 to +200°C              |                   |

### THERMAL PROPERTIES

| Symbols          | Parameters                              | One Side Max. | Both Sides Max. | Units |
|------------------|---|---------------|-----------------|-------|
| R <sub>θJA</sub> | Thermal Resistance, Junction To Ambient | 437           | 350             | °C/W  |
| R <sub>θJC</sub> | Thermal Resistance, Junction To Case    | 219           | 135             | °C/W  |

Semelab Limited reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

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

| Symbols             | Parameters                           | Test Conditions                             | Min. | Typ. | Max. | Units         |
|---------------------|--------------------------------------|---|------|------|------|---------------|
| $V_{(BR)CBO}$       | Collector-Base Breakdown Voltage     | $I_C = 10\mu\text{A}$ $I_E = 0$             | 45   |      |      | V             |
| $V_{(BR)CEO}^{(1)}$ | Collector-Emitter Breakdown Voltage  | $I_C = 10\text{mA}$ $I_B = 0$               | 45   |      |      |               |
| $V_{(BR)EBO}$       | Emitter-Base Breakdown Voltage       | $I_E = 10\mu\text{A}$ $I_C = 0$             | 6    |      |      |               |
| $I_{CBO}$           | Collector Cut-Off Current            | $V_{CB} = 40\text{V}$ $I_E = 0$             |      |      | 10   | nA            |
|                     |                                      | $T_A = 150^\circ\text{C}$                   |      |      | 10   | $\mu\text{A}$ |
| $I_{EBO}$           | Emitter-Cut-Off Current              | $V_{EB} = 5\text{V}$ $I_C = 0$              |      |      | 10   | nA            |
| $I_{CEO}$           | Collector-Cut-Off Current            | $V_{CE} = 5\text{V}$ $I_B = 0$              |      |      | 10   | nA            |
| $V_{CE(sat)}^{(1)}$ | Collector-Emitter Saturation Voltage | $I_C = 1.0\text{mA}$ $I_B = 0.1\text{mA}$   |      |      | 0.35 | V             |
| $V_{BE(on)}$        | Base-Emitter On Voltage              | $I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ |      |      | 0.7  |               |
| $h_{FE}^{(1)}$      | Forward-current transfer ratio       | $I_C = 10\mu\text{A}$ $V_{CE} = 5\text{V}$  | 60   |      |      |               |
|                     |                                      | $I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ | 100  |      |      |               |
|                     |                                      | $I_C = 1.0\text{mA}$ $V_{CE} = 5\text{V}$   | 150  |      |      |               |

## ELECTRICAL MATCHING CHARACTERISTICS

|   |   |   |     |  |     |                              |
|---|---|---|-----|--|-----|------------------------------|
| $\frac{h_{FE1}^{(2)}}{h_{FE2}}$               | Forward-current transfer ratio (gain ratio)                 | $I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ | 0.8 |  | 1.0 |                              |
| $ V_{BE1} - V_{BE2} $                         | Base-Emitter Voltage Differential                           | $I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ |     |  | 10  | mV                           |
| $ \Delta(V_{BE1} - V_{BE2})\Delta T_A ^{(3)}$ | Base-Emitter Voltage Differential Change Due To Temperature | $I_C = 100\mu\text{A}$ $V_{CE} = 5\text{V}$ |     |  | 25  | $\mu\text{V}/^\circ\text{C}$ |

## DYNAMIC CHARACTERISTICS

|             |   |   |   |  |   |    |
|-------------|---|---|---|--|---|----|
| $ h_{fe} $  | Small signal forward-current transfer ratio | $I_C = 500\mu\text{A}$ $V_{CE} = 5\text{V}$<br>$f = 30\text{MHz}$ | 2 |  |   |    |
| $C_{obo}$   | Output Capacitance                          | $V_{CB} = 5\text{V}$ $I_E = 0$<br>$f = 1.0\text{MHz}$             |   |  | 6 | pF |
| $N_F^{(3)}$ | Noise Figure                                | $I_C = 10\mu\text{A}$ $V_{CE} = 5\text{V}$<br>$f = 1.0\text{KHz}$ |   |  | 4 | dB |

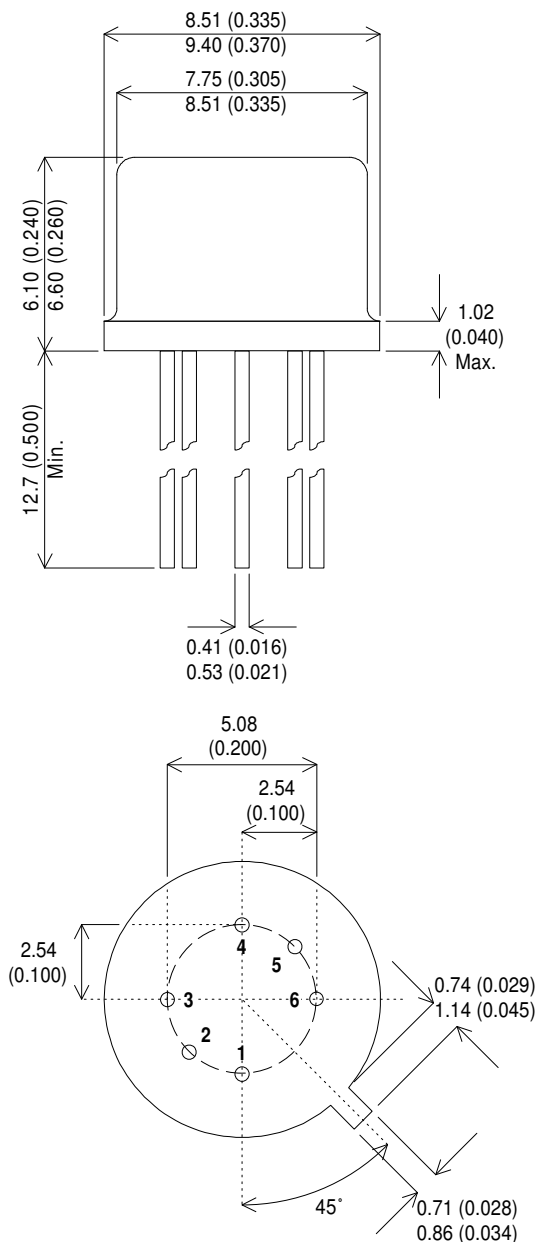
### Notes

- (1) Pulse Width  $\leq 300\mu\text{s}$ ,  $\delta \leq 2\%$
- (2) The lower of the two readings is taken as  $h_{FE1}$
- (3) By design only, not a production test

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## MECHANICAL DATA

Dimensions in mm (inches)



### TO-77 (MO-002AF) Underside View

|                             |                        |                             |
|-----------------------------|------------------------|-----------------------------|
| <b>Pin 1</b><br>Collector 1 | <b>Pin 2</b><br>Base 1 | <b>Pin 3</b><br>Emitter 1   |
| <b>Pin 4</b><br>Emitter 2   | <b>Pin 5</b><br>Base 2 | <b>Pin 6</b><br>Collector 2 |