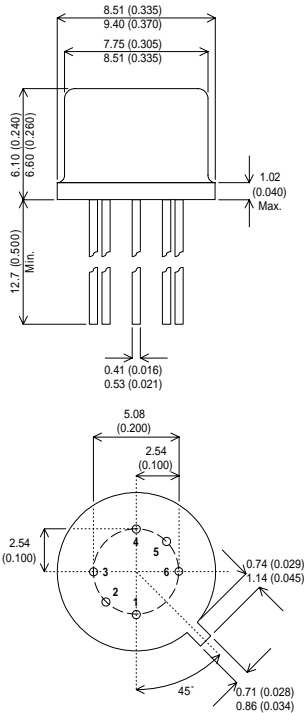


**MECHANICAL DATA**

Dimensions in mm (inches)



**DUAL NPN  
PLANAR TRANSISTORS IN  
TO77 PACKAGE**

**Applications**

- Differential Amplifiers
- High Gain, Low Noise Audio Amplifiers
- Low Level Flip Flops
- Transducer Signal Conditioner Amplifiers

**TO-77 PACKAGE (MO - 002AF)**

Underside View

- |                     |                     |
|---------------------|---------------------|
| PIN 1 – Collector 1 | PIN 4 – Emitter 2   |
| PIN 2 – Base 1      | PIN 5 – Base 2      |
| PIN 3 – Emitter 1   | PIN 6 – Collector 2 |

**ABSOLUTE MAXIMUM RATINGS**

			(T <sub>amb</sub> = 25°C unless otherwise stated)	
			EACH SIDE	TOTAL DEVICE
V <sub>CBO</sub>	Collector – Base Voltage		60V	
V <sub>CEO</sub>	Collector – Emitter Voltage		60V	
V <sub>EBO</sub>	Emitter – Base Voltage		6V	
I <sub>C</sub>	Continuous Collector Current		30mA	
P <sub>D</sub>	Total Device Dissipation	T <sub>AMB</sub> = 25°C	300mW	500mW
		Derate above 25°C	1.72mW / °C	2.86W / °C
P <sub>D</sub>	Total Device Dissipation	T <sub>C</sub> = 25°C	750mW	1.5W
		Derate above 25°C	4.3mW / °C	8.6mW / °C
T <sub>STG</sub>	Storage Temperature Range		–65 to 200°C	
T <sub>L</sub>	Lead temperature (Soldering, 10 sec.)		300°C	

Semelab Plc 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.

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

Parameter	Test Conditions <sup>1</sup>	Min.	Typ.	Max.	Unit	
<b>INDIVIDUAL TRANSISTOR CHARACTERISTICS</b>						
$V_{(BR)CBO}$	Collector – Base Breakdown Voltage	$I_C = 10\mu\text{A}$	$I_E = 0$	60	V	
$V_{(BR)CEO}^*$	Collector – Emitter Breakdown Voltage	$I_C = 10\text{mA}$	$I_B = 0$	60		
$V_{(BR)EBO}$	Emitter – Base Breakdown Voltage	$I_E = 10\mu\text{A}$	$I_C = 0$	6		
$I_{CBO}$	Collector Cut-off Current	$V_{CB} = 45\text{V}$	$I_E = 0$		2	nA
			$T_A = 150^{\circ}\text{C}$			10
$I_{CEO}$	Collector Cut-off Current	$V_{CE} = 5\text{V}$	$I_B = 0$		2	nA
$I_{EBO}$	Emitter Cut-off Current	$V_{EB} = 5\text{V}$	$I_C = 0$		2	
$h_{FE}$	DC Current Gain	$V_{CE} = 5\text{V}$	$I_C = 10\mu\text{A}$	60	240	—
			$T_A = -55^{\circ}\text{C}$	15		
			$I_C = 100\mu\text{A}$	100		
		$V_{CE} = 5\text{V}$	$I_C = 1\text{mA}$	150		
$V_{BE}$	Base – Emitter Voltage	$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$		0.70	V
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_B = 100\mu\text{A}$	$I_C = 1\text{mA}$		0.35	
$h_{ib}$	Small Signal Common – Base Input Impedance	$V_{CB} = 5\text{V}$	$I_C = 1\text{mA}$	25	32	$\Omega$
		$f = 1\text{kHz}$				
$h_{ob}$	Small Signal Common – Base Output Admittance	$V_{CB} = 5\text{V}$	$I_C = 1\text{mA}$		1	$\mu\text{mho}$
		$f = 1\text{kHz}$				
$ h_{fe} $	Small Signal Common – Base Current Gain	$V_{CE} = 5\text{V}$	$I_C = 500\mu\text{A}$	3		—
		$f = 20\text{MHz}$				
$C_{obo}$	Common – Base Open Circuit Output Capacitance	$V_{CB} = 5\text{V}$	$I_E = 0$		6	pF
		$f = 140\text{kHz to } 1\text{MHz}$				

\* Pulse Test:  $t_p = 300\mu\text{s}$ ,  $\delta \leq 1\%$ .

Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
<b>TRANSISTOR MATCHING CHARACTERISTICS</b>						
$h_{FE1}$	Static Forward Current Gain	$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$	0.9	1	—
$h_{FE2}$	Balance Ratio	See Note 2.				
$ V_{BE1} - V_{BE2} $	Base – Emitter Voltage Differential	$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$		3	mV
		$V_{CE} = 5\text{V}$	$I_C = 10\mu\text{A to } 1\text{mA}$		5	
$ \Delta(V_{BE1} - V_{BE2})\Delta T_A $	Base – Emitter Voltage Differential Change With Temperature	$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$		0.8	mV
		$T_{A1} = +25^{\circ}\text{C}$	$T_{A2} = -55^{\circ}\text{C}$			
		$V_{CE} = 5\text{V}$	$I_C = 100\mu\text{A}$		1	
		$T_{A1} = +25^{\circ}\text{C}$	$T_{A2} = +125^{\circ}\text{C}$			

**NOTES**

1) Terminals not under test are open circuited under all test conditions.

2) The lower of the two readings is taken as  $h_{FE1}$ .

Semelab Plc 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.