# MD5000,A,B

**CASE 654-07, STYLE 1**

**DUAL AMPLIFIER TRANSISTOR**

**PNP SILICON**



## MAXIMUM RATINGS

| Rating | Symbol | Value | | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 15 | | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | 20 | | Vdc |
| Emitter-Base Voltage | $V_{EBO}$ | 5.0 | | Vdc |
| Collector Current Continuous | $I_C$ | 50 | | mAdc |
| | | One Side | Both Sides | |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 300<br>1.7 | 400<br>2.3 | mW<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −65 to +200 | | °C |

**Refer to 2N3307 for graphs.**

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C$ = 3.0 mAdc, $I_B$ = 0) | | $V_{(BR)CEO}$ | 15 | — | — | Vdc |
| Collector-Base Breakdown Voltage ($I_C$ = 10 μAdc, $I_E$ = 0) | | $V_{(BR)CBO}$ | 20 | — | — | Vdc |
| Emitter-Base Breakdown Voltage ($I_E$ = 10 μAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | 5.0 | — | — | Vdc |
| Collector Cutoff Current ($V_{CB}$ = 15 Vdc, $I_E$ = 0)<br>($V_{CB}$ = 15 Vdc, $I_E$ = 0, $T_A$ = 150°C) | | $I_{CBO}$ | —<br>— | —<br>— | 0.010<br>1.0 | μAdc |
| **ON CHARACTERISTICS** | | | | | | |
| DC Current Gain ($I_C$ = 3.0 mAdc, $V_{CE}$ = 1.0 Vdc) | | $h_{FE}$ | 20 | 50 | — | — |
| Collector-Emitter Saturation Voltage ($I_C$ = 10 mAdc, $I_B$ = 1.0 mAdc) | | $V_{CE(sat)}$ | — | — | 0.4 | Vdc |
| Base-Emitter Saturation Voltage ($I_C$ = 10 mAdc, $I_B$ = 1.0 mAdc) | | $V_{BE(sat)}$ | — | — | 1.0 | Vdc |
| **SMALL-SIGNAL CHARACTERISTICS** | | | | | | |
| Current-Gain — Bandwidth Product ($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc, f = 100 MHz) | | $f_T$ | 600 | 900 | — | MHz |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 140 kHz) | | $C_{obo}$ | — | — | 1.7 | pF |
| Input Capacitance ($V_{BE}$ = 0.5 Vdc, $I_C$ = 0, f = 140 kHz) | | $C_{ibo}$ | — | — | 2.0 | pF |
| Noise Figure ($I_C$ = 1.0 mAdc, $V_{CE}$ = 6.0 Vdc, f = 60 MHz, $R_S$ = 400 ohms) | | NF | — | 3.0 | 6.0 | dB |
| **FUNCTIONAL TEST** | | | | | | |
| Amplifier Power Gain ($I_C$ = 6.0 mAdc, $V_{CB}$ = 12 Vdc, $R_G$ = $R_L$ = 50 ohms, f = 200 MHz) | | $G_{pe}$ | 15 | 20 | — | dB |
| **MATCHING CHARACTERISTICS** | | | | | | |
| DC Current Gain Ratio(1)<br>($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc) | MD5000<br>MD5000A<br>MD5000B | $h_{FE1}/h_{FE2}$ | —<br>0.9<br>0.8 | 0.7<br>—<br>— | —<br>1.0<br>1.0 | — |
| Base-Emitter Voltage Differential<br>($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc) | MD5000<br>MD5000A<br>MD5000B | $\lvert V_{BE1}-V_{BE2}\rvert$ | —<br>—<br>— | 5.0<br>—<br>— | —<br>5.0<br>10 | mVdc |
| Base-Emitter Voltage Differential Gradient<br>($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc, $T_A$ = −55 to +125°C) | MD5000<br>MD5000A<br>MD5000B | $\frac{\Delta(V_{BE1}-V_{BE2})}{\Delta T_A}$ | —<br>—<br>— | 10<br>—<br>— | —<br>10<br>20 | μV/°C |

(1) The lowest $h_{FE}$ reading is taken as $h_{FE1}$ for this ratio.