

# SOT-23 Plastic-Encapsulate Transistors

**MMBTA13,14** TRANSISTOR (NPN)

**FEATURES**

Darlington Amplifier

**Marking :** MMBTA13:K2D; MMBTA14:K3D

**MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise noted)**

| Symbol           | Parameter                              | Value       | Units |
|------------------|--|-------------|-------|
| V <sub>CBO</sub> | Collector-Base Voltage                 | 30          | V     |
| V <sub>CEO</sub> | Collector-Emitter Voltage              | 30          | V     |
| V <sub>EBO</sub> | Emitter-Base Voltage                   | 10          | V     |
| I <sub>C</sub>   | Collector Current -Continuous          | 0.3         | A     |
| P <sub>C</sub>   | Collector Power Dissipation            | 350         | mW    |
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient | 417         | °C/W  |
| T <sub>J</sub>   | Junction Temperature                   | 150         | °C    |
| T <sub>stg</sub> | Storage Temperature                    | -55 to +150 | °C    |



**ELECTRICAL CHARACTERISTICS (T<sub>amb</sub>=25°C unless otherwise specified)**

| Parameter                            | Symbol                  | Test conditions  | MIN     | MAX   | UNIT |
|--------------------------------------|-------------------------|--|---------|-------|------|
| Collector-base breakdown voltage     | V <sub>(BR)CBO</sub>    | I <sub>C</sub> = 100μA, I <sub>E</sub> =0              | 30      |       | V    |
| Collector-emitter breakdown voltage  | V <sub>(BR)CEO</sub>    | I <sub>C</sub> = 100uA, I <sub>B</sub> =0              | 30      |       | V    |
| Collector-emitter breakdown voltage  | V <sub>(BR)EBO</sub>    | I <sub>E</sub> = 100μA, I <sub>C</sub> =0              | 10      |       | V    |
| Collector cut-off current            | I <sub>CBO</sub> *      | V <sub>CB</sub> =30 V , I <sub>E</sub> =0              |         | 0.1   | μA   |
| Emitter cut-off current              | I <sub>EBO</sub> *      | V <sub>EB</sub> = 10V , I <sub>C</sub> =0              |         | 0.1   | μA   |
| DC current gain                      | h <sub>FE(1)</sub> *    | V <sub>CE</sub> =5V, I <sub>C</sub> = 10mA             | MMBTA13 | 5000  |      |
|                                      |                         |  | MMBTA14 | 10000 |      |
|                                      | h <sub>FE(2)</sub> *    | V <sub>CE</sub> =5V, I <sub>C</sub> = 100mA            | MMBTA13 | 10000 |      |
|                                      |                         |  | MMBTA14 | 20000 |      |
| Collector-emitter saturation voltage | V <sub>CE (sat)</sub> * | I <sub>C</sub> =100mA, I <sub>B</sub> =0.1mA           |         | 1.5   | V    |
| Base-emitter saturation voltage      | V <sub>BE (sat)</sub> * | I <sub>C</sub> =100mA, I <sub>B</sub> =0.1mA           |         | 2     | V    |
| Base-emitter voltage                 | V <sub>BE</sub> *       | V <sub>CE</sub> =5V, I <sub>C</sub> = 100mA            |         | 2.0   | V    |
| Transition frequency                 | f <sub>T</sub>          | V <sub>CE</sub> =5V, I <sub>C</sub> = 10mA<br>f=100MHz | 125     |       | MHz  |
| Collector output capacitance         | C <sub>ob</sub>         | V <sub>CB</sub> =10V, I <sub>E</sub> =0, f=1MHz        |         | 12    | pF   |

\* Pulse Test : pulse width≤300μs,duty cycle≤2%.

# Typical Characteristics

# MMBTA13/14

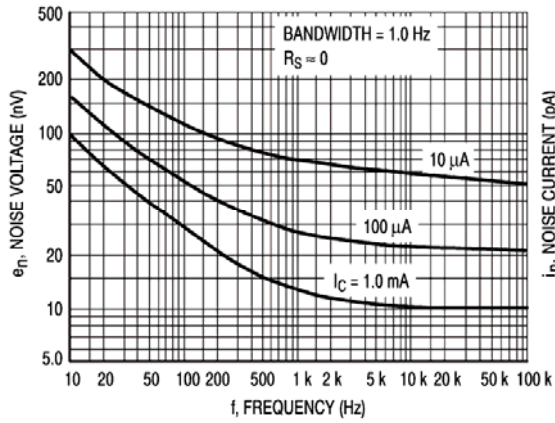


Figure 2. Noise Voltage

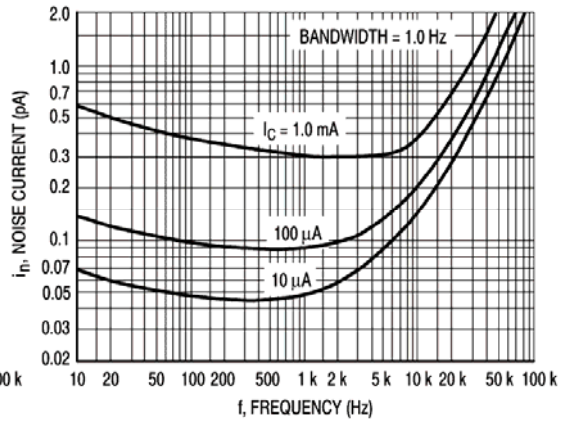


Figure 3. Noise Current

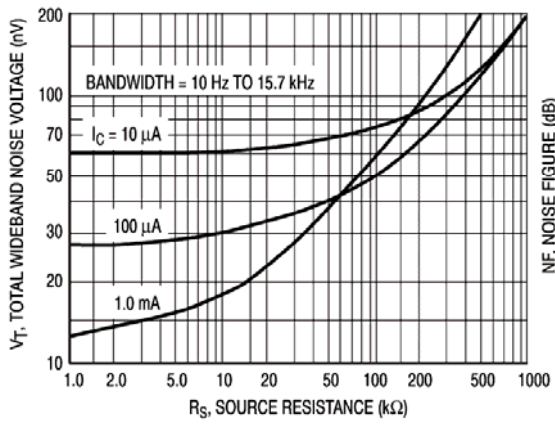


Figure 4. Total Wideband Noise Voltage

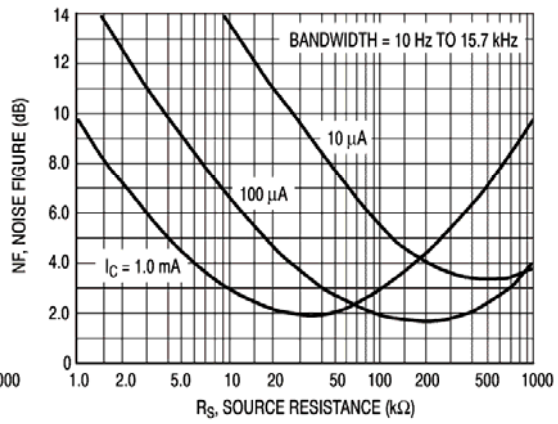


Figure 5. Wideband Noise Figure

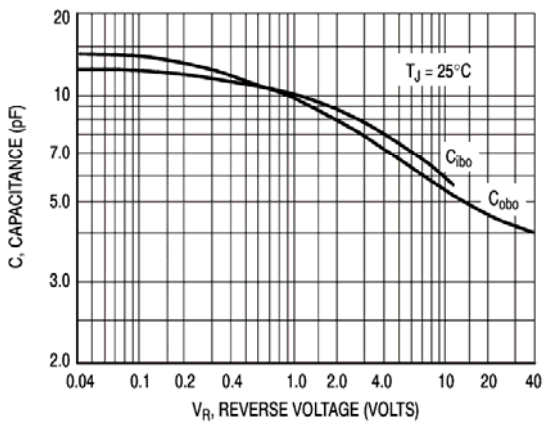


Figure 6. Capacitance

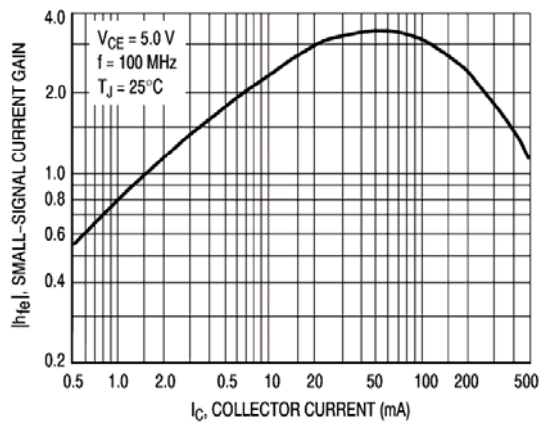


Figure 7. High Frequency Current Gain

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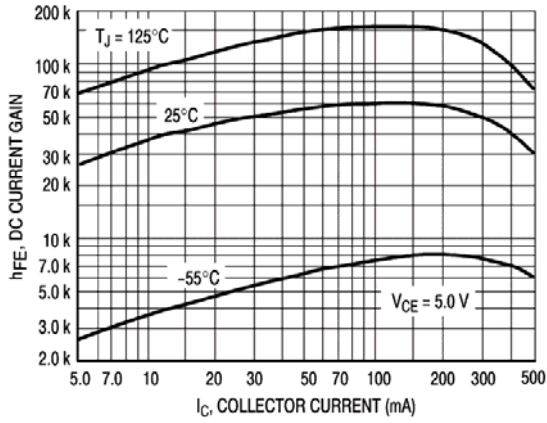


Figure 8. DC Current Gain

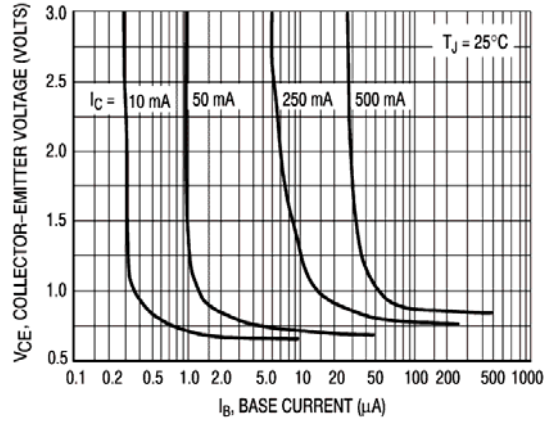


Figure 9. Collector Saturation Region

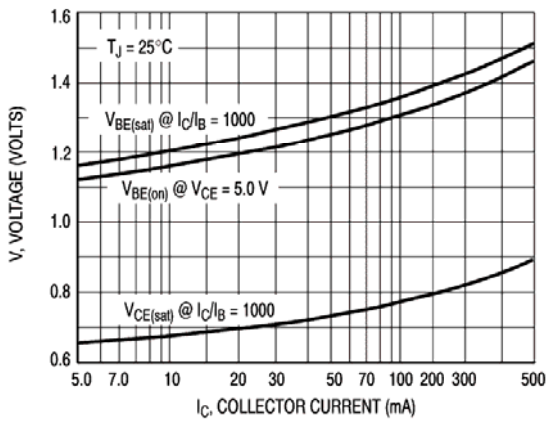


Figure 10. "On" Voltages

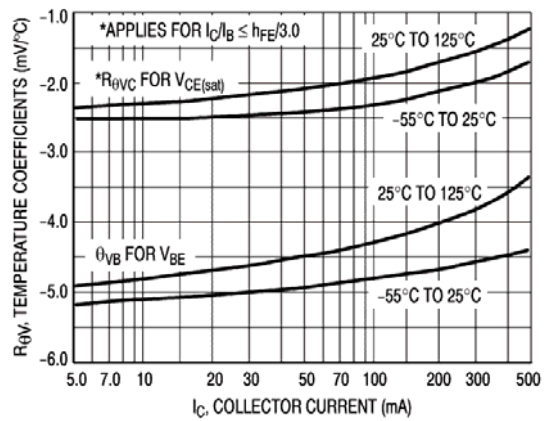


Figure 11. Temperature Coefficients

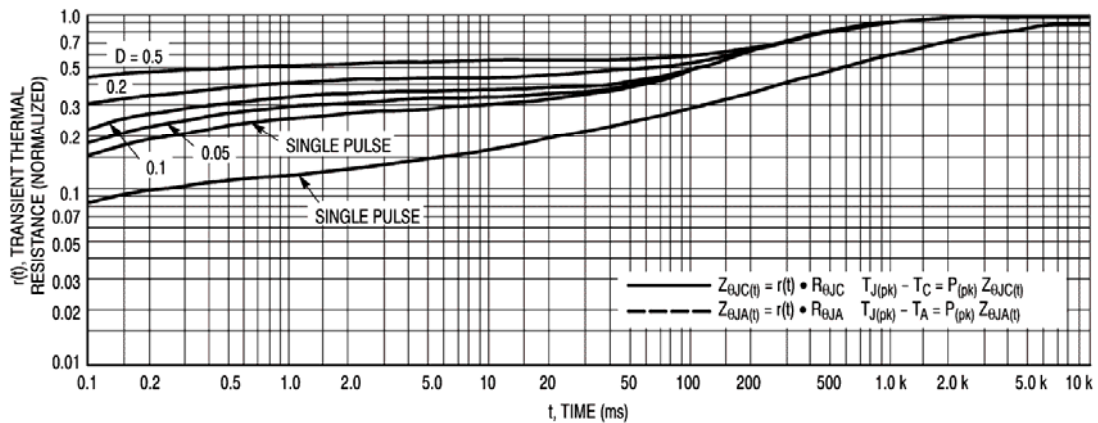


Figure 12. Thermal Response