

RoHS Compliant Product

## FEATURES

Power dissipation

$P_{CM} : 1 \text{ W}$  ( $T_{amb}=25^{\circ}\text{C}$ )

Collector current

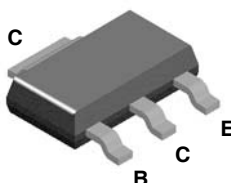
$I_{CM} : 0.6 \text{ A}$

Collector-base voltage

$V_{(BR)CBO} : 75 \text{ V}$

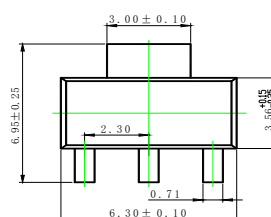
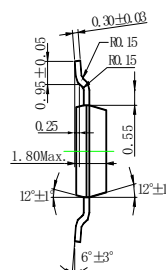
Operating and storage junction temperature range

$T_J, T_{stg} : -55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$



## SOT-223

1. BASE
2. COLLECTOR
3. EMITTER

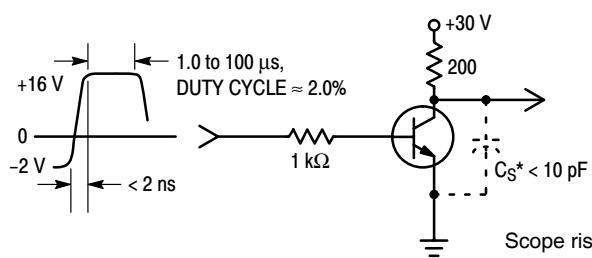


1 2 3 Unit : mm

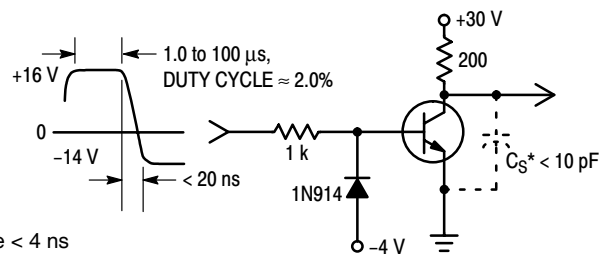
## ELECTRICAL CHARACTERISTICS ( $T_{amb}=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter                            | Symbol        | Test conditions                                                 | MIN | MAX  | UNIT          |
|--------------------------------------|---------------|-----------------------------------------------------------------|-----|------|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_C = 10 \mu\text{A}, I_E = 0$                                 | 75  |      | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_C = 10\text{mA}, I_B = 0$                                    | 40  |      | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E = 10 \mu\text{A}, I_C = 0$                                 | 6   |      | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = 60\text{V}, I_E = 0$                                  |     | 0.01 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = 3\text{V}, I_C = 0$                                   |     | 0.01 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE(1)}$   | $V_{CE} = 10\text{V}, I_C = 0.1\text{mA}$                       | 35  |      |               |
|                                      | $h_{FE(2)}$   | $V_{CE} = 10\text{V}, I_C = 1\text{mA}$                         | 50  |      |               |
|                                      | $h_{FE(3)}$   | $V_{CE} = 10\text{V}, I_C = 10\text{mA}$                        | 75  |      |               |
|                                      | $h_{FE(4)}$   | $V_{CE} = 10\text{V}, I_C = 150\text{mA}$                       | 100 | 300  |               |
|                                      | $h_{FE(5)}$   | $V_{CE} = 1\text{V}, I_C = 150\text{mA}$                        | 50  |      |               |
|                                      | $h_{FE(6)}$   | $V_{CE} = 10\text{V}, I_C = 500\text{mA}$                       | 40  |      |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 500 \text{mA}, I_B = 50\text{mA}$                        |     | 1    | V             |
|                                      | $V_{CE(sat)}$ | $I_C = 150 \text{mA}, I_B = 15\text{mA}$                        |     | 0.3  | V             |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = 500 \text{mA}, I_B = 50\text{mA}$                        |     | 2.0  | V             |
|                                      | $V_{BE(sat)}$ | $I_C = 150 \text{mA}, I_B = 15\text{mA}$                        | 0.6 | 1.2  | V             |
| Transition frequency                 | $f_T$         | $V_{CE} = 20\text{V}, I_C = 20\text{mA}$<br>$f = 100\text{MHz}$ | 300 |      | MHz           |
| Output Capacitance                   | $C_{ob}$      | $V_{CB} = 10\text{V}, I_E = 0$<br>$f = 1\text{MHz}$             |     | 8    | pF            |
| Delay time                           | $t_d$         | $V_{CC} = 30\text{V}, I_C = 150\text{mA}$                       |     | 10   | nS            |
| Rise time                            | $t_r$         | $V_{BE(off)} = 0.5\text{V}, I_{B1} = 15\text{mA}$               |     | 25   | nS            |
| Storage time                         | $t_s$         | $V_{CC} = 30\text{V}, I_C = 150\text{mA}$                       |     | 225  | nS            |
| Fall time                            | $t_f$         | $I_{B1} = I_{B2} = 15\text{mA}$                                 |     | 60   | nS            |

● **SWITCHING TIME EQUIVALENT TEST CIRCUITS**

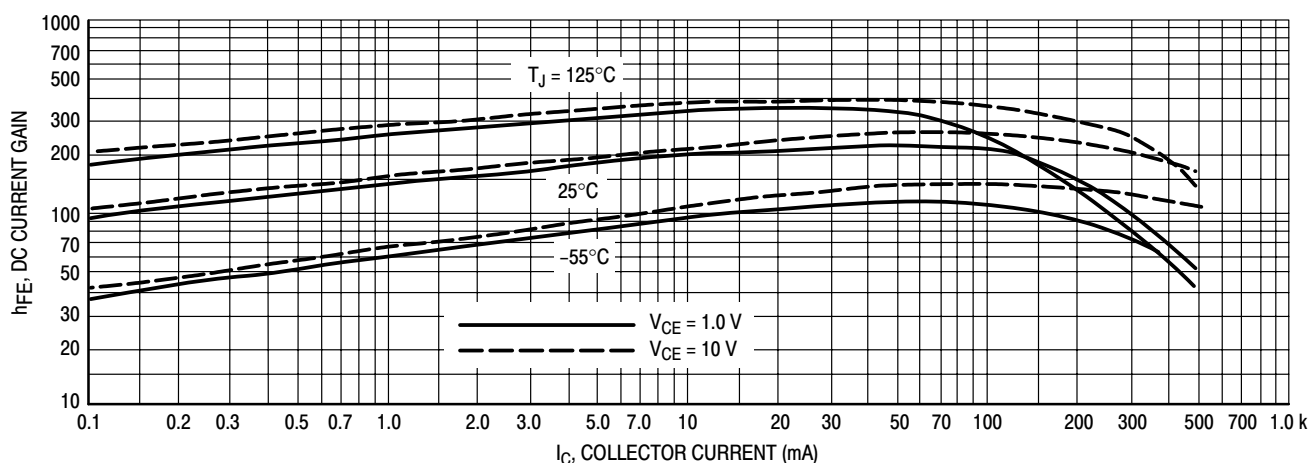


**Figure 1. Turn-On Time**

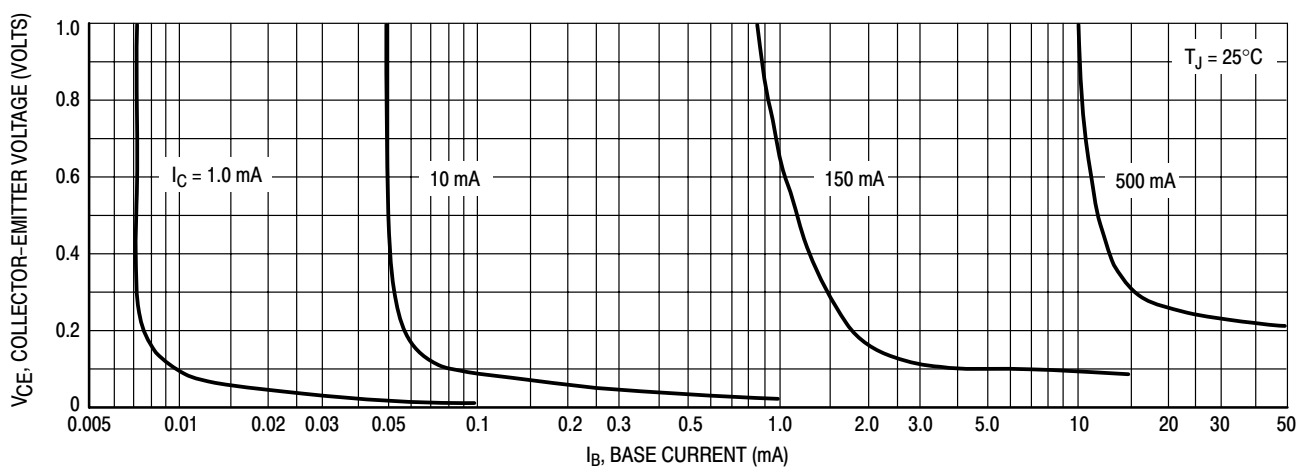


**Figure 2. Turn-Off Time**

Scope rise time < 4 ns  
\*Total shunt capacitance of test jig, connectors, and oscilloscope.



**Figure 3. DC Current Gain**



**Figure 4. Collector Saturation Region**

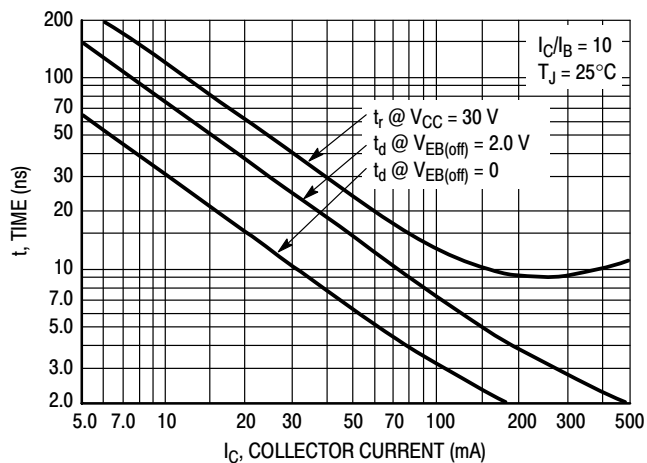


Figure 5. Turn-On Time

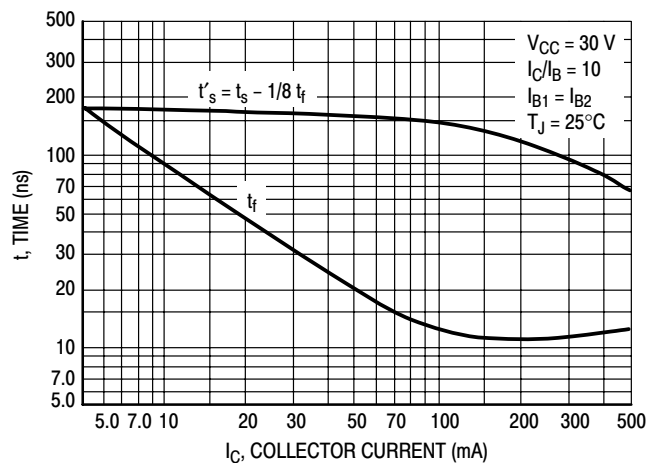


Figure 6. Turn-Off Time

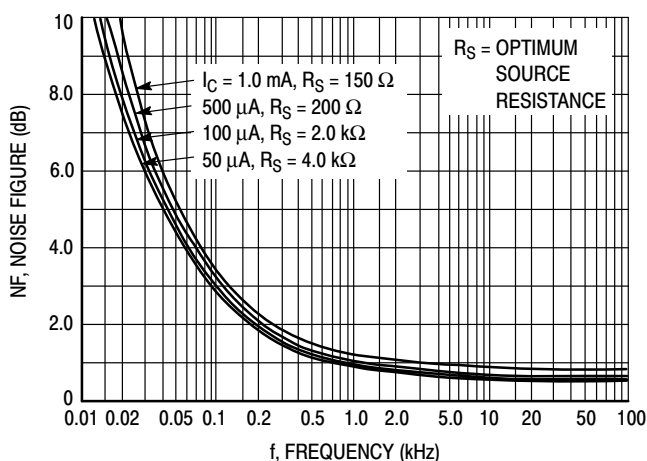


Figure 7. Frequency Effects

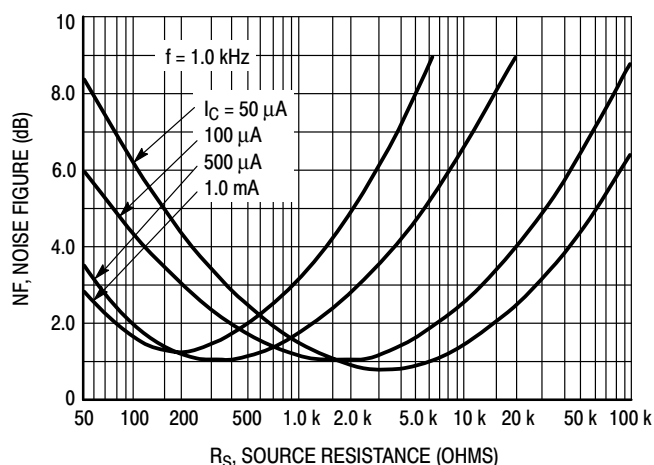


Figure 8. Source Resistance Effects

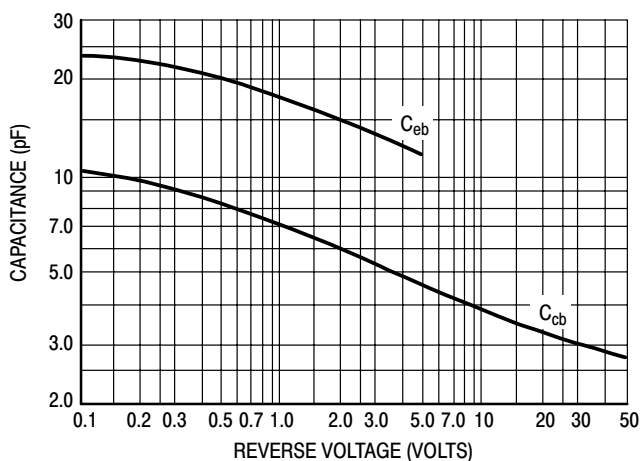


Figure 9. Capacitances

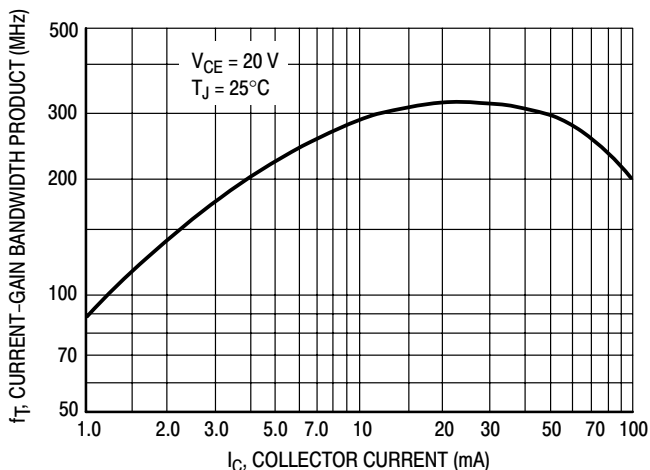


Figure 10. Current-Gain Bandwidth Product

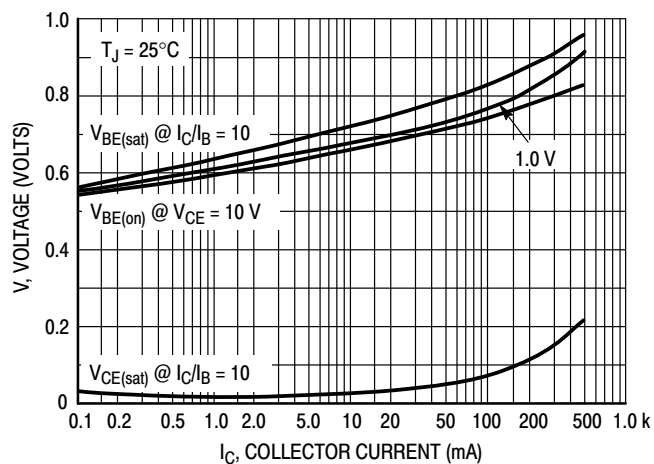


Figure 11. "On" Voltages

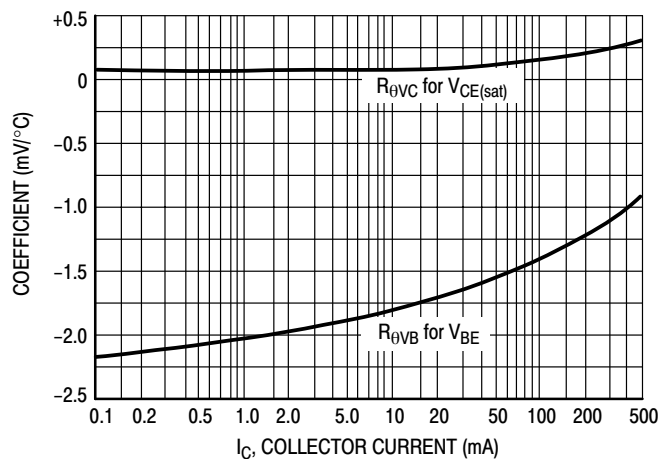


Figure 12. Temperature Coefficients