

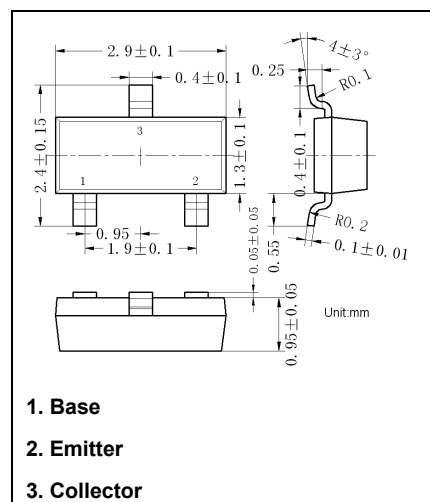
# SOT-23 Plastic-Encapsulate Transistors

## M28S NPN Transistors

### Features

- Excellent  $h_{FE}$  Linearity
- High DC Current Gain

### Marking: 28S



### Maximum Ratings ( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

| Symbol          | Parameter                                   | Value      | Unit                        |
|-----------------|---|------------|-----------------------------|
| $V_{CBO}$       | Collector Base Voltage                      | 40         | V                           |
| $V_{CEO}$       | Collector Emitter Voltage                   | 20         | V                           |
| $V_{EBO}$       | Emitter Base Voltage                        | 6          | V                           |
| $I_C$           | Collector Current                           | 1          | A                           |
| $P_C$           | Collector Power Dissipation                 | 200        | mW                          |
| $T_j$           | Junction Temperature                        | 150        | $^{\circ}\text{C}$          |
| $T_{stg}$       | Storage Temperature                         | -55 ~ +150 | $^{\circ}\text{C}$          |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 625        | $^{\circ}\text{C}/\text{W}$ |

### Electrical Characteristics ( $T_a=25^{\circ}\text{C}$ unless otherwise specified)

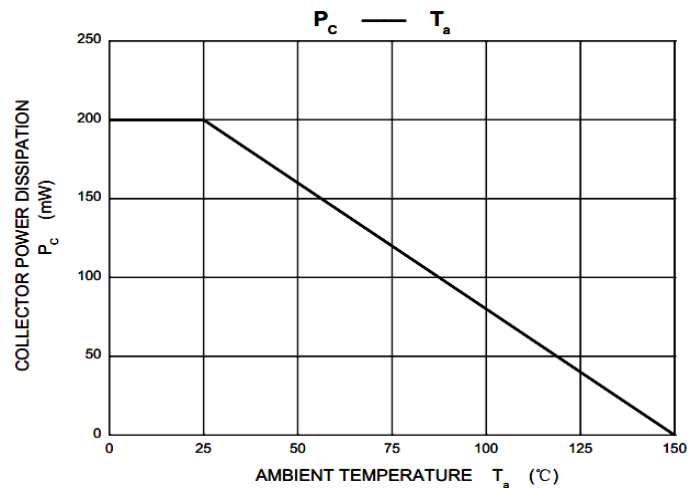
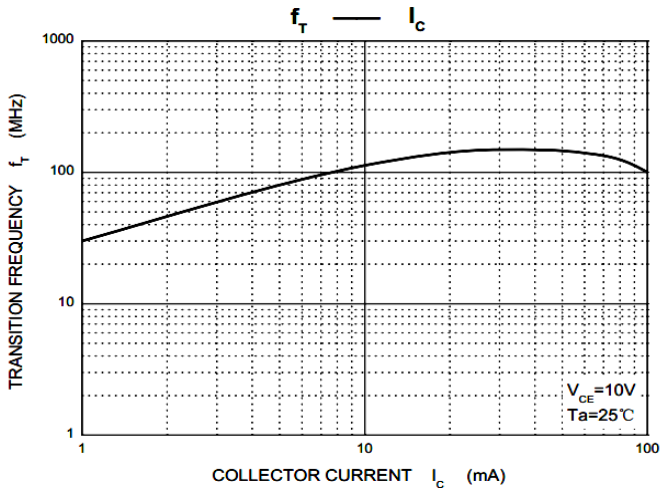
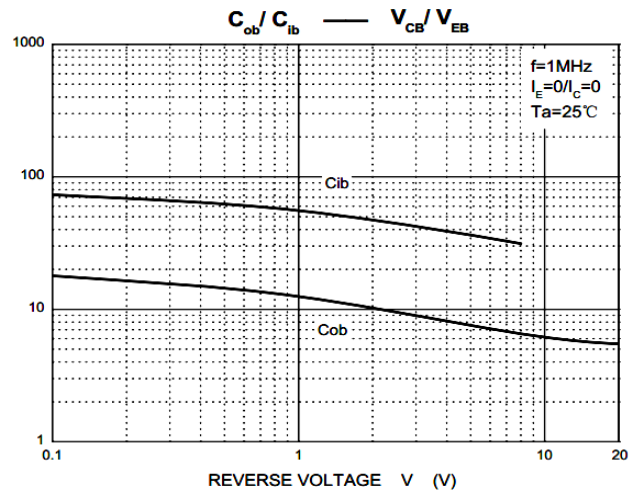
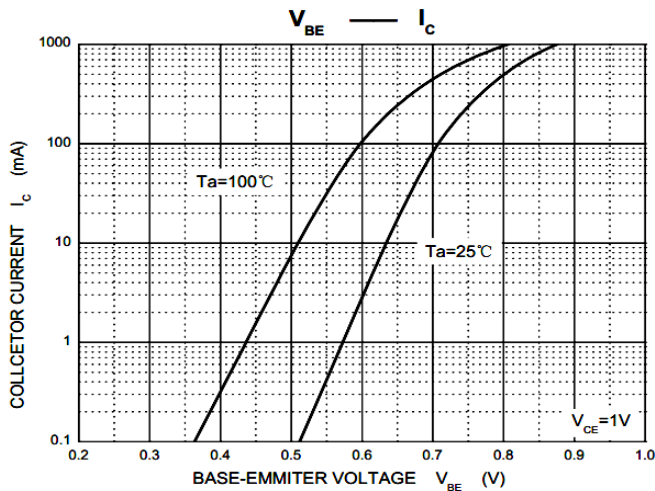
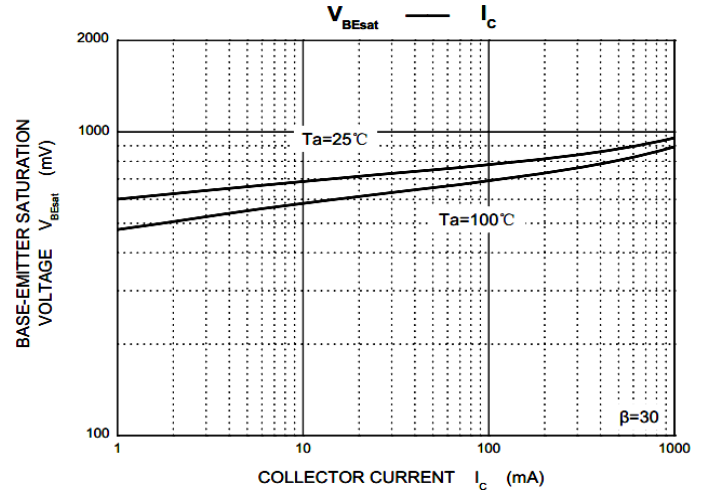
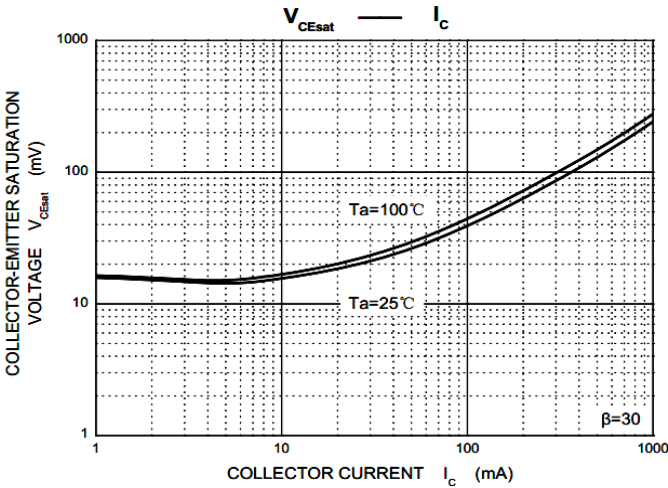
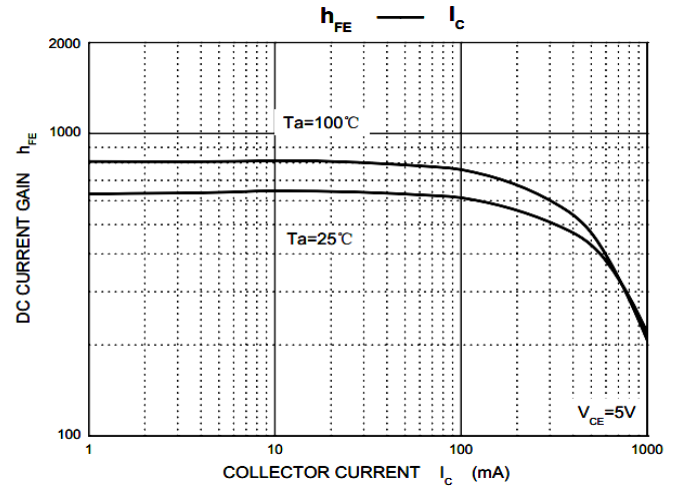
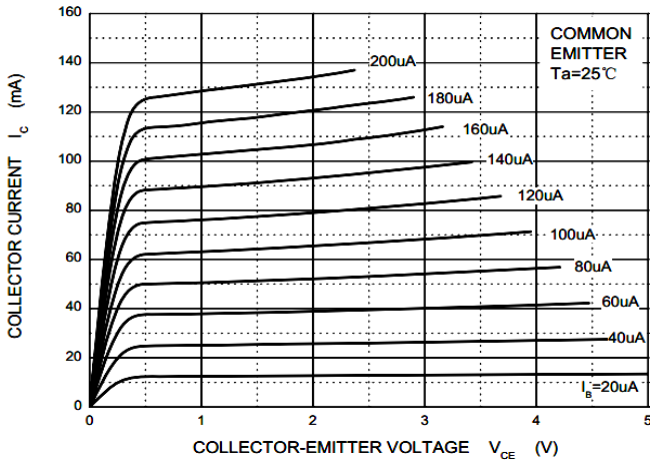
| Symbol        | Parameter                            | Test Conditions   | Min | Typ | Max  | Unit          |
|---------------|--------------------------------------|---|-----|-----|------|---------------|
| $V_{(BR)CBO}$ | Collector-base breakdown voltage     | $I_C = 100\mu\text{A}, I_E = 0$                           | 40  |     |      | V             |
| $V_{(BR)CEO}$ | Collector-emitter breakdown voltage  | $I_C = 1\text{mA}, I_B = 0$                               | 20  |     |      | V             |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage       | $I_E = 100\mu\text{A}, I_C = 0$                           | 6   |     |      | V             |
| $I_{CBO}$     | Collector cut-off current            | $V_{CB} = 35\text{V}, I_E = 0$                            |     |     | 100  | nA            |
| $I_{CEO}$     | Collector cut-off current            | $V_{CE} = 20\text{V}, I_B = 0$                            |     |     | 5    | $\mu\text{A}$ |
| $I_{EBO}$     | Emitter cut-off current              | $V_{EB} = 5\text{V}, I_C = 0$                             |     |     | 100  | nA            |
| $h_{FE(1)}$   | DC current gain                      | $V_{CE} = 5\text{V}, I_C = 1\text{mA}$                    | 300 |     |      |               |
| $h_{FE(2)}$   |                                      | $V_{CE} = 1\text{V}, I_C = 1\text{mA}$                    | 290 |     |      |               |
| $h_{FE(3)}$   |                                      | $V_{CE} = 1\text{V}, I_C = 100\text{mA}$                  | 300 |     | 1000 |               |
| $h_{FE(4)}$   |                                      | $V_{CE} = 1\text{V}, I_C = 300\text{mA}$                  | 300 |     |      |               |
| $h_{FE(5)}$   |                                      | $V_{CE} = 1\text{V}, I_C = 500\text{mA}$                  | 300 |     |      |               |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_C = 600\text{mA}, I_B = 20\text{mA}$                   |     |     | 0.55 | V             |
| $f_T$         | Transition frequency                 | $V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 1\text{MHz}$ | 100 |     |      | MHz           |
| $C_{ob}$      | Collector output capacitance         | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$           |     | 9   |      | pF            |

### Classification OF $h_{FE(1)}$

| Rank  | B       | C       | D        |
|-------|---------|---------|----------|
| Range | 300-550 | 500-700 | 650-1000 |

# Typical Characteristics

Static Characteristic



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