

## SOT-323 Plastic-Encapsulate Transistor (PNP)

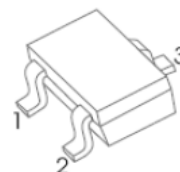
### Feature

- Complementary to MMST3904Q
- Power Dissipation of 200mW
- AEC-Q101 Qualified
- High Stability and High Reliability

### Mechanical Data

- SOT-323 Small Outline Plastic Package
- Epoxy UL: 94V-0
- Mounting Position: Any

### SOT-323



1. BASE
2. EMITTER
3. COLLECTOR

Marking: K5N

### Maximum Ratings & Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise specified)

| Parameter                                   | Symbol          | Value       | Unit               |
|---------------------------------------------|-----------------|-------------|--------------------|
| Collector-Base Voltage                      | $V_{CBO}$       | -40         | V                  |
| Collector-Emitter Voltage                   | $V_{CEO}$       | -40         | V                  |
| Emitter -Base Voltage                       | $V_{EBO}$       | -5          | V                  |
| Collector Current-Continuous                | $I_C$           | -200        | mA                 |
| Collector Power Dissipation                 | $P_C$           | 200         | mW                 |
| Junction Temperature                        | $T_j$           | -55 to +150 | $^\circ\text{C}$   |
| Storage Temperature                         | $T_{stg}$       | -55 to +150 | $^\circ\text{C}$   |
| Thermal resistance from junction to ambient | $R_{\theta JA}$ | 625         | $^\circ\text{C/W}$ |

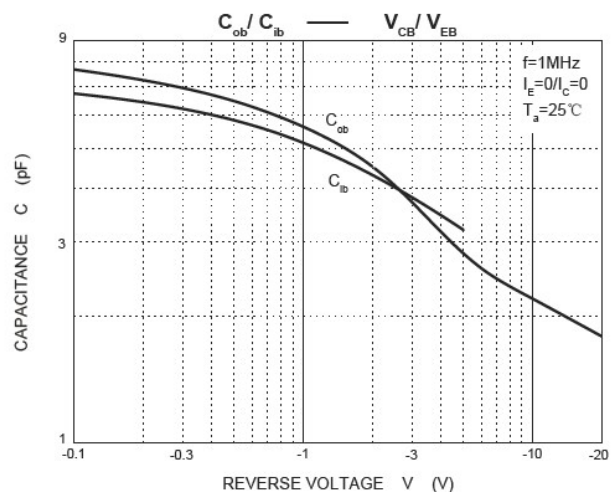
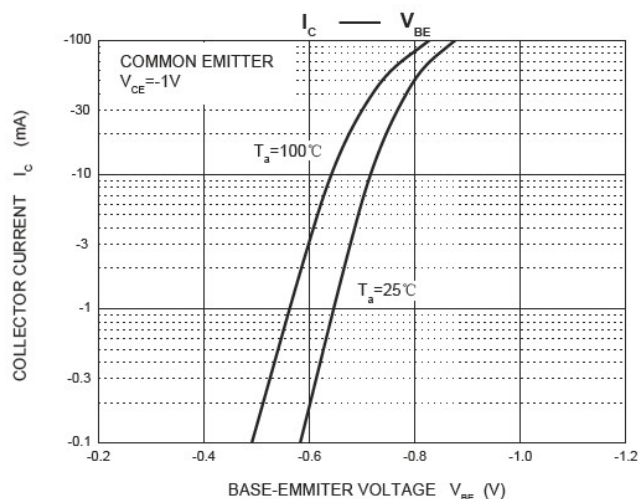
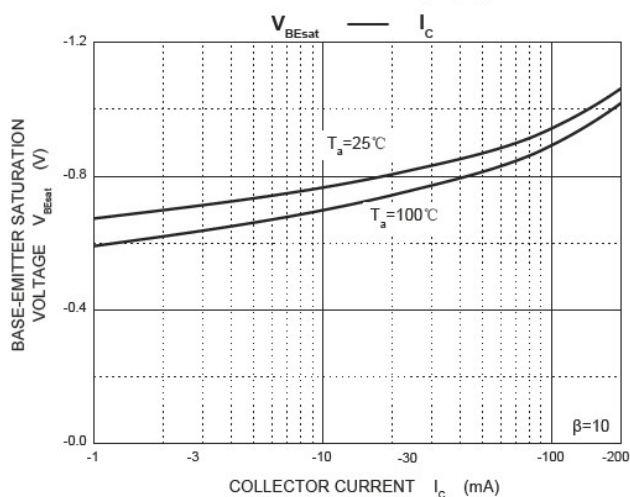
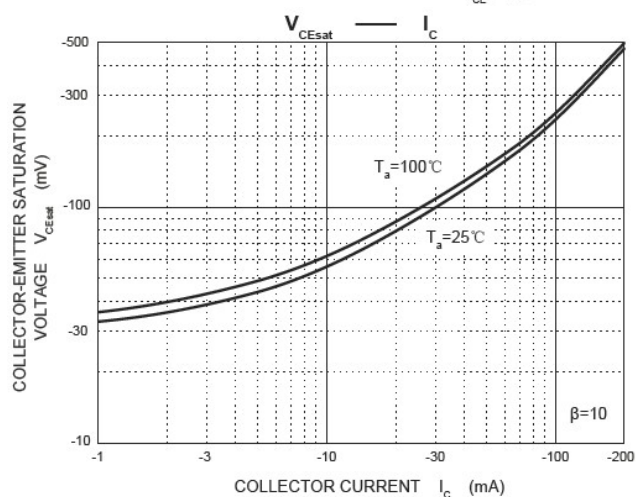
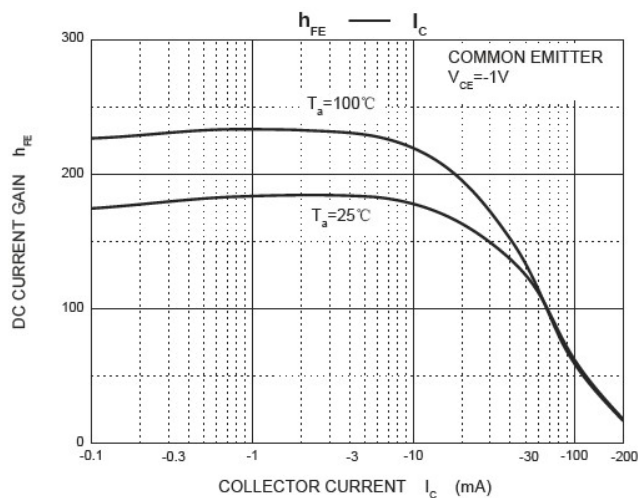
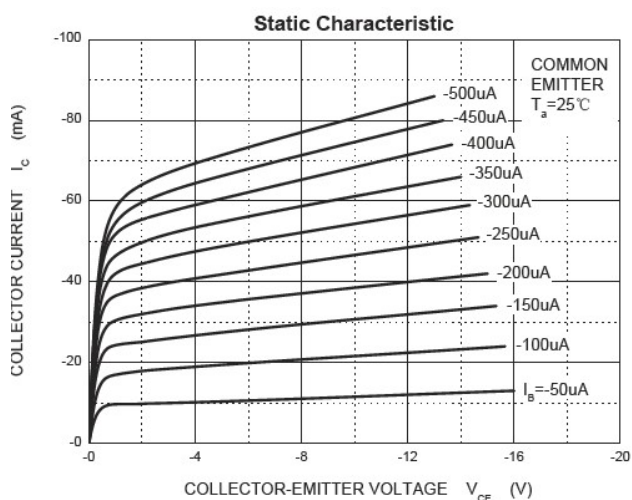
### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise specified)

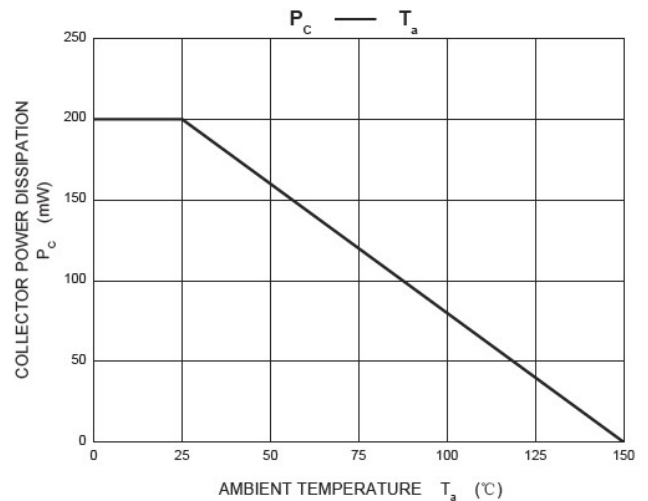
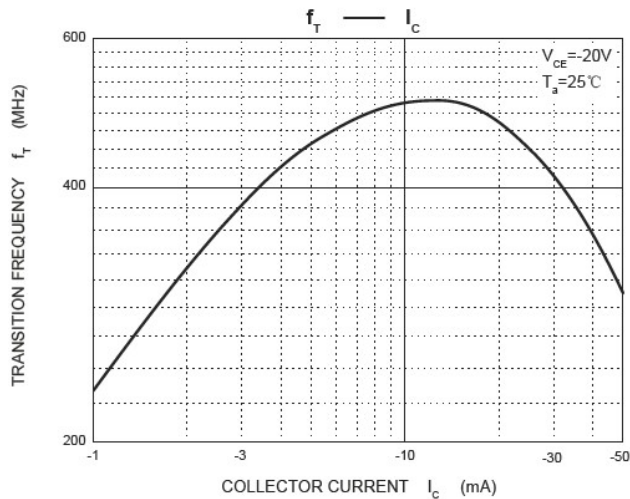
| Parameter                            | Symbol          | Test Conditions                                                                                 | Min   | Typ | Max   | Unit |
|--------------------------------------|-----------------|-------------------------------------------------------------------------------------------------|-------|-----|-------|------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}^*$ | $I_C=-10\mu\text{A}$ , $I_E=0$                                                                  | -40   |     |       | V    |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}^*$ | $I_C=-1\text{mA}$ , $I_B=0$                                                                     | -40   |     |       | V    |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}^*$ | $I_E=-10\mu\text{A}$ , $I_C=0$                                                                  | -5    |     |       | V    |
| Base cut-off current                 | $I_{BL}^*$      | $V_{CE}=-30\text{V}$ , $V_{EB(Off)}=-3\text{V}$                                                 |       |     | -50   | nA   |
| Collector cut-off current            | $I_{CEX}^*$     | $V_{CE}=-30\text{V}$ , $V_{EB(Off)}=-3\text{V}$                                                 |       |     | -50   | nA   |
| DC current gain                      | $h_{FE}^*$      | $V_{CE}=-1\text{V}$ , $I_C=-100\mu\text{A}$                                                     | 60    |     |       |      |
|                                      |                 | $V_{CE}=-1\text{V}$ , $I_C=-1\text{mA}$                                                         | 80    |     |       |      |
|                                      |                 | $V_{CE}=-1\text{V}$ , $I_C=-10\text{mA}$                                                        | 100   |     | 300   |      |
| Collector-emitter saturation voltage | $V_{CE(sat)}^*$ | $I_C=-10\text{mA}$ , $I_B=-1\text{mA}$                                                          |       |     | -0.2  | V    |
|                                      |                 | $I_C=-50\text{mA}$ , $I_B=-5\text{mA}$                                                          |       |     | -0.3  | V    |
| Base-emitter saturation voltage      | $V_{BE(sat)}^*$ | $I_C=-10\text{mA}$ , $I_B=-1\text{mA}$                                                          | -0.65 |     | -0.85 | V    |
|                                      |                 | $I_C=-50\text{mA}$ , $I_B=-5\text{mA}$                                                          |       |     | -0.95 | V    |
| Transition frequency                 | $f_T$           | $V_{CE}=-20\text{V}$ , $I_C=-10\text{mA}$ , $f=100\text{MHz}$                                   | 250   |     |       | MHz  |
| Collector output capacitance         | $C_{ob}$        | $V_{CB}=-5\text{V}$ , $I_E=0$ , $f=1\text{MHz}$                                                 |       |     | 4.5   | pF   |
| Collector output capacitance         | $C_{ib}$        | $V_{EB}=-0.5\text{V}$ , $I_E=0$ , $f=1\text{MHz}$                                               |       |     | 10    | pF   |
| Delay time                           | $t_d$           | $V_{CC}=-3\text{V}$ , $V_{BE(off)}=-0.5\text{V}$ ,<br>$I_C=-10\text{mA}$ , $I_{B1}=-1\text{mA}$ |       |     | 35    | ns   |
| Rise time                            | $t_r$           |                                                                                                 |       |     | 35    | ns   |
| Storage time                         | $t_s$           | $V_{CC}=3\text{V}$ , $I_C=-10\text{mA}$ , $I_{B1}=I_{B2}=-1\text{mA}$                           |       |     | 225   | ns   |
| Fall time                            | $t_f$           |                                                                                                 |       |     | 75    | ns   |

\*Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycles  $\leq 2.0\%$ .

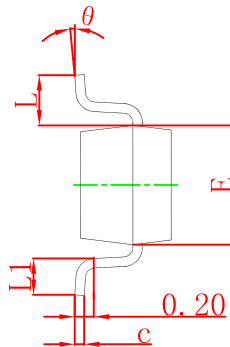
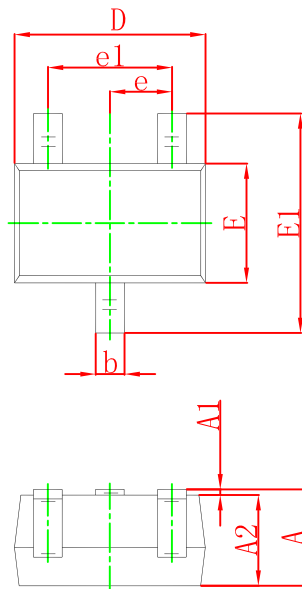


Typical Characteristics



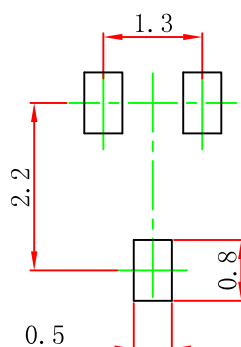


### SOT-323 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.100 | 0.035                | 0.043 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.000 | 0.035                | 0.039 |
| b      | 0.200                     | 0.400 | 0.008                | 0.016 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.000                     | 2.200 | 0.079                | 0.087 |
| E      | 1.150                     | 1.350 | 0.045                | 0.053 |
| E1     | 2.150                     | 2.450 | 0.085                | 0.096 |
| e      | 0.650 TYP                 |       | 0.026 TYP            |       |
| e1     | 1.200                     | 1.400 | 0.047                | 0.055 |
| L      | 0.525 REF                 |       | 0.021 REF            |       |
| L1     | 0.260                     | 0.460 | 0.010                | 0.018 |
| theta  | 0°                        | 8°    | 0°                   | 8°    |

### SOT-323 Suggested Pad Layout



#### Notes:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.