

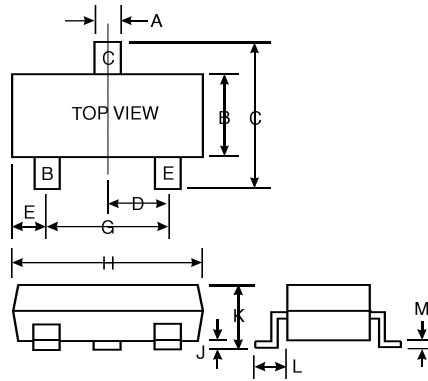


### Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMST3904)
- Ultra-Small Surface Mount Package

### Mechanical Data

- Case: SOT-323, Molded Plastic
- Terminals: Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Marking: K5N
- Weight: 0.006 grams (approx.)



| SOT-323              |              |      |
|----------------------|--------------|------|
| Dim                  | Min          | Max  |
| A                    | 0.30         | 0.40 |
| B                    | 1.15         | 1.35 |
| C                    | 2.00         | 2.20 |
| D                    | 0.65 Nominal |      |
| E                    | 0.30         | 0.40 |
| G                    | 1.20         | 1.40 |
| H                    | 1.80         | 2.20 |
| J                    | 0.0          | 0.10 |
| K                    | 0.90         | 1.00 |
| L                    | 0.25         | 0.40 |
| M                    | 0.10         | 0.25 |
| All Dimensions in mm |              |      |

### Maximum Ratings @ $T_A = 25\text{ C}$ unless otherwise specified

| Characteristic                                   | Symbol         | MMST3906    | Unit |
|--|----------------|-------------|------|
| Collector-Base Voltage                           | $V_{CBO}$      | -40         | V    |
| Collector-Emitter Voltage                        | $V_{CEO}$      | -40         | V    |
| Emitter-Base Voltage                             | $V_{EBO}$      | -5.0        | V    |
| Collector Current - Continuous (Note 1)          | $I_C$          | -200        | mA   |
| Power Dissipation (Note 1)                       | $P_d$          | 200         | mW   |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{JA}$       | 625         | K/W  |
| Operating and Storage and Temperature Range      | $T_j, T_{STG}$ | -55 to +150 | C    |

- Note:
- Valid provided that terminals are kept at ambient temperature.
  - Pulse test: Pulse width 300 s, duty cycle 2%.

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

| Characteristic                       | Symbol        | Min                         | Max            | Unit             | Test Condition  |
|--------------------------------------|---------------|-----------------------------|----------------|------------------|---|
| <b>OFF CHARACTERISTICS (Note 2)</b>  |               |                             |                |                  |   |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | -40                         |                | V                | $I_C = -10\text{ A}, I_E = 0$   |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | -40                         |                | V                | $I_C = -1.0\text{ mA}, I_B = 0$   |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | -5.0                        |                | V                | $I_E = -10\text{ A}, I_C = 0$   |
| Collector Cutoff Current             | $I_{CEX}$     |                             | -50            | nA               | $V_{CE} = -30\text{ V}, V_{EB(OFF)} = -3.0\text{ V}$  |
| Base Cutoff Current                  | $I_{BL}$      |                             | -50            | nA               | $V_{CE} = -30\text{ V}, V_{EB(OFF)} = -3.0\text{ V}$  |
| <b>ON CHARACTERISTICS (Note 2)</b>   |               |                             |                |                  |   |
| DC Current Gain                      | $h_{FE}$      | 60<br>80<br>100<br>60<br>30 | 300            |                  | $I_C = -100\mu\text{A}, V_{CE} = -1.0\text{ V}$<br>$I_C = -1.0\text{ mA}, V_{CE} = -1.0\text{ V}$<br>$I_C = -10\text{ mA}, V_{CE} = -1.0\text{ V}$<br>$I_C = -50\text{ mA}, V_{CE} = -1.0\text{ V}$<br>$I_C = -100\text{ mA}, V_{CE} = -1.0\text{ V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ |                             | -0.20<br>-0.30 | V                | $I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$<br>$I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$  |
| Base- Emitter Saturation Voltage     | $V_{BE(SAT)}$ | -0.65                       | -0.85<br>-0.95 | V                | $I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$<br>$I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |               |                             |                |                  |   |
| Output Capacitance                   | $C_{obo}$     |                             | 4.5            | pF               | $V_{CB} = -5.0\text{ V}, f = 1.0\text{ MHz}, I_E = 0$   |
| Input Capacitance                    | $C_{ibo}$     |                             | 10             | pF               | $V_{EB} = -0.5\text{ V}, f = 1.0\text{ MHz}, I_C = 0$   |
| Input Impedance                      | $h_{ie}$      | 2.0                         | 12             | k                | $V_{CE} = 1.0\text{ V}, I_C = 10\text{ mA}, f = 1.0\text{ kHz}$   |
| Voltage Feedback Ratio               | $h_{re}$      | 0.1                         | 10             | $\times 10^{-4}$ |   |
| Small Signal Current Gain            | $h_{fe}$      | 100                         | 400            |                  |   |
| Output Admittance                    | $h_{oe}$      | 3.0                         | 60             | S                |   |
| Current Gain-Bandwidth Product       | $f_T$         | 300                         |                | MHz              |   |
| Noise Figure                         | NF            |                             | 4.0            | dB               | $V_{CE} = -5.0\text{ V}, I_C = -100\text{ A}, R_S = 1.0\text{ k } f = 1.0\text{ kHz}$   |
| <b>SWITCHING CHARACTERISTICS</b>     |               |                             |                |                  |   |
| Delay Time                           | $t_d$         |                             | 35             | ns               | $V_{CC} = -3.0\text{ V}, I_C = -10\text{ mA}, V_{BE(off)} = 0.5\text{ V}, I_{B1} = -1.0\text{ mA}$  |
| Rise Time                            | $t_r$         |                             | 35             | ns               |   |
| Storage Time                         | $t_s$         |                             | 225            | ns               | $V_{CC} = -3.0\text{ V}, I_C = -10\text{ mA}, I_{B1} = I_{B2} = -1.0\text{ mA}$   |
| Fall Time                            | $t_f$         |                             | 75             | ns               |   |

- Note:
1. Valid provided that terminals are kept at ambient temperature.
  2. Pulse test: Pulse width 300  $\mu\text{s}$ , duty cycle 2%.