## Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available MMST3904
- Halogen Free. “Green” Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

# PNP Small Signal Transistors

## Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55℃ to +150℃
- Storage Temperature Range: -55℃ to +150℃

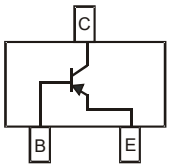
| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -40 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -40 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5 | V |
| Collector Current (2) | $I_C$ | -200 | mA |
| Collector Power Dissipation (2) | $P_C$ | 200 | mW |

Note: 1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

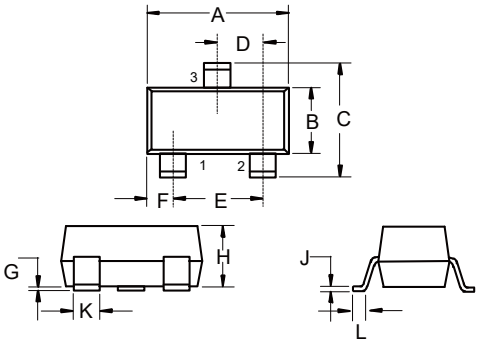
2. Valid provided that terminals are kept at ambient temperature.

**Marking: K5N**

**Internal Structure**

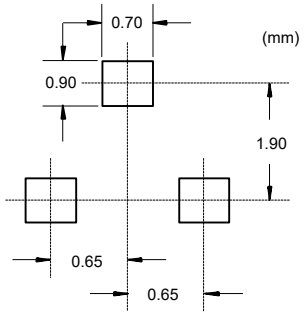



## SOT-323




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | 0.071 | 0.087 | 1.80 | 2.20 | |
| B | 0.045 | 0.053 | 1.15 | 1.35 | |
| C | 0.083 | 0.096 | 2.10 | 2.45 | |
| D | 0.026 | | 0.65 | | TYP. |
| E | 0.047 | 0.055 | 1.20 | 1.40 | |
| F | 0.012 | 0.016 | 0.30 | 0.40 | |
| G | 0.000 | 0.004 | 0.00 | 0.10 | |
| H | 0.035 | 0.044 | 0.90 | 1.10 | |
| J | 0.002 | 0.010 | 0.05 | 0.25 | |
| K | 0.006 | 0.016 | 0.15 | 0.40 | |
| L | 0.010 | 0.018 | 0.26 | 0.46 | |

**Suggested Solder Pad Layout**



## Electrical Characteristics @ 25°C Unless Otherwise Specified

| Parameter | Symbol | Min | Typ | Max | Units | Conditions |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage (3) | $V_{(BR)CBO}$ | -40 | | | V | $I_C$=-10μA, $I_E$=0 |
| Collector-Emitter Breakdown Voltage (3) | $V_{(BR)CEO}$ | -40 | | | V | $I_C$=-1mA, $I_B$=0 |
| Emitter-Base Breakdown Voltage (3) | $V_{(BR)EBO}$ | -5 | | | V | $I_E$=-10μA, $I_C$=0 |
| Collector Cutoff Current (3) | $I_{CEX}$ | | | -50 | nA | $V_{CE}$=-30V, $V_{EB(OFF)}$=-3V |
| Base Cutoff Current (3) | $I_{BL}$ | | | -50 | nA | $V_{CE}$=-30V, $V_{EB(OFF)}$=-3V |
| DC Current Gain (3) | $h_{FE(1)}$ | 60 | | | | $V_{CE}$=-1V, $I_C$=-0.1mA |
| | $h_{FE(2)}$ | 80 | | | | $V_{CE}$=-1V, $I_C$=-1mA |
| | $h_{FE(3)}$ | 100 | | 300 | | $V_{CE}$=-1V, $I_C$=-10mA |
| | $h_{FE(4)}$ | 60 | | | | $V_{CE}$=-1V, $I_C$=-50mA |
| | $h_{FE(5)}$ | 30 | | | | $V_{CE}$=-1V, $I_C$=-500mA |
| Collector-Emitter Saturation Voltage(3) | $V_{CE(sat)}$ | | | -0.2 | V | $I_C$=-10mA, $I_B$=-1mA |
| | | | | -0.3 | V | $I_C$=-50mA, $I_B$=-5mA |
| Base-Emitter Saturation Voltage(3) | $V_{BE(sat)}$ | -0.65 | | -0.85 | V | $I_C$=-10mA, $I_B$=-1mA |
| | | | | -0.95 | V | $I_C$=-50mA, $I_B$=-5mA |
| Output Capacitance | $C_{cbo}$ | | | 4.5 | pF | $V_{CB}$=-5V, $I_E$=0, f=1MHz |
| Input Capacitance | $C_{ibo}$ | | | 10 | pF | $V_{EB}$=-0.5V, $I_C$=0, f=1MHz |
| Input Impedance | $h_{ie}$ | 2 | | 12 | KΩ | $V_{CE}$=-10V, $I_C$=-1mA, f=1KHz |
| Voltage Feedback Ratio | $h_{re}$ | 0.1 | | 10 | $x10^4$ | |
| Small Signal Current Gain | $h_{fe}$ | 100 | | 400 | | |
| Output Admittance | $h_{oe}$ | 3 | | 60 | uS | |
| Transition Frequency | $f_T$ | 300 | | | MHz | $V_{CE}$=-20V, $I_C$=-10mA, f=100MHz |
| Noise Figure | NF | | | 4 | dB | $V_{CE}$=-5V, $I_C$=-0.1mA<br>$R_S$=1KΩ, f=1KHz |
| Delay Time | $t_d$ | | | 35 | ns | $V_{CC}$=-3V, $I_C$=-10mA<br>$V_{BE(OFF)}$=-0.5V, $I_{B1}$=-1mA |
| Rise Time | $t_r$ | | | 35 | ns | |
| Storage Time | $t_s$ | | | 225 | ns | $V_{CC}$=-3V, $I_C$=-10mA<br>$I_{B1}$=$I_{B2}$=-1mA |
| Fall Time | $t_f$ | | | 75 | ns | |

Note: 3.Pulse Width ≤ 300μs, Duty Cycle≤2.0%

## Curve Characteristics

Fig. 1 - Static Characteristics

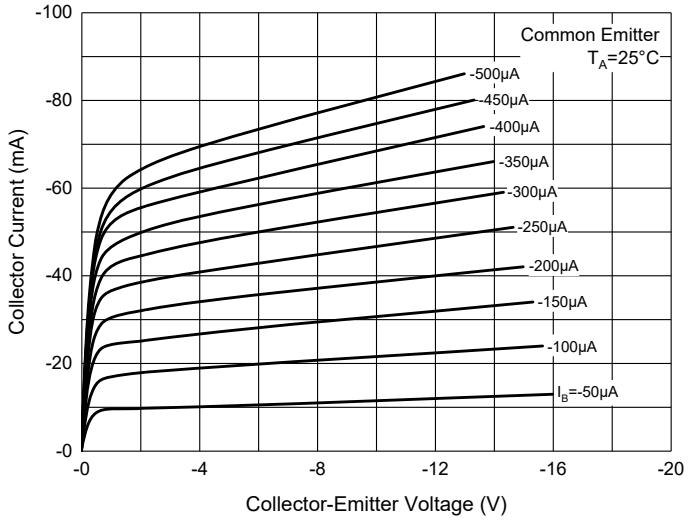



Fig. 2 - DC Current Gain Characteristics

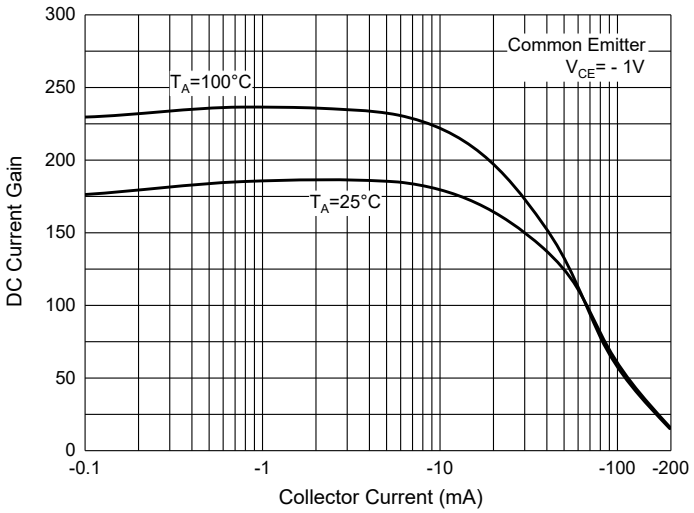



Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

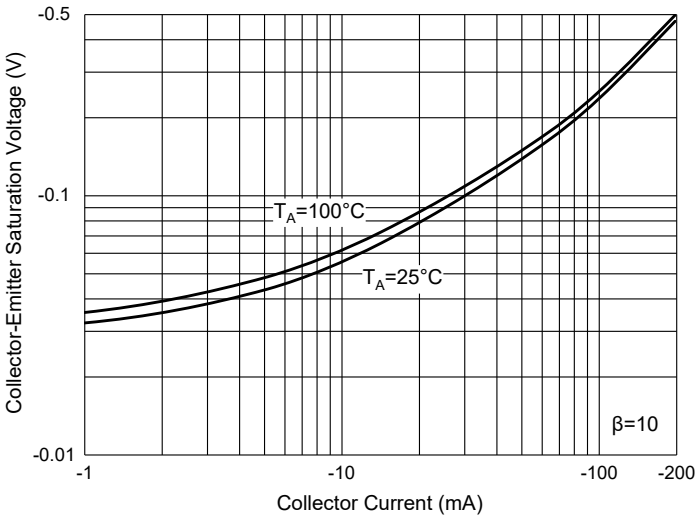



Fig. 4 - Base-Emitter Saturation Voltage Characteristics

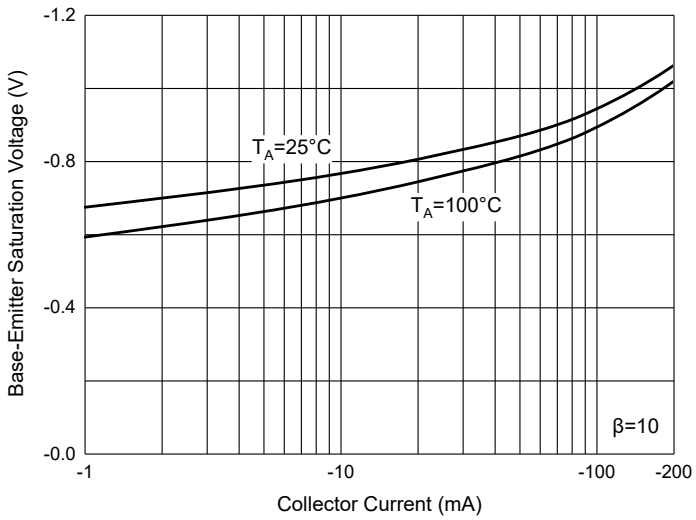



Fig. 5 - Base-Emitter Voltage Characteristics

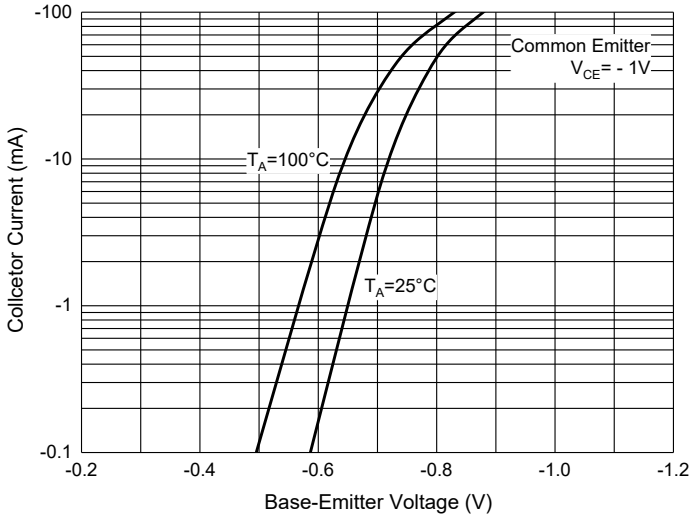
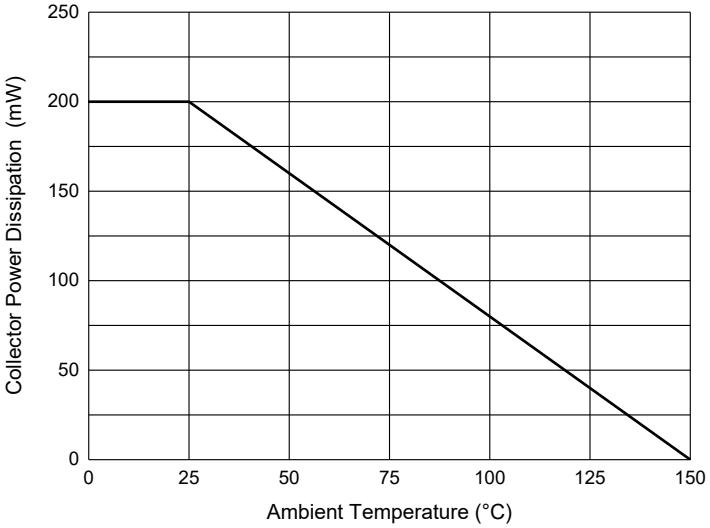



Fig. 6 - Collector Power Derating Curve



## Ordering Information

| Device | Packing |
|---|---|
| Part Number-TP | Tape&Reel: 3Kpcs/Reel |