

Features

- 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)

Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 556°C/W Junction to Ambient^(Note 2)

| Parameter | Symbol | Rating | Unit |
|------------------------------|------------------|--------|------|
| Collector-Base Voltage | V _{CB0} | 30 | V |
| Collector-Emitter Voltage | V _{CE0} | 30 | V |
| Emitter-Base Voltage | V _{EBO} | 10 | V |
| Continuous Collector Current | I _C | 300 | mA |
| Power Dissipation | P _D | 225 | mW |

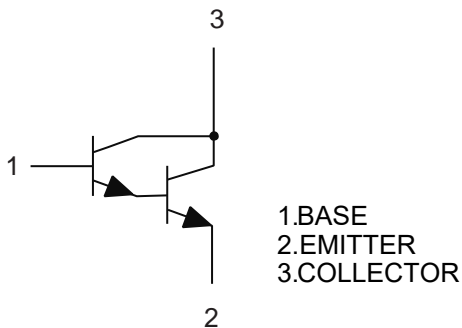
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Mounted on FR-5 PCB 1.0" x0.75" x0.062".

Marking:

MMBTA13: K2D

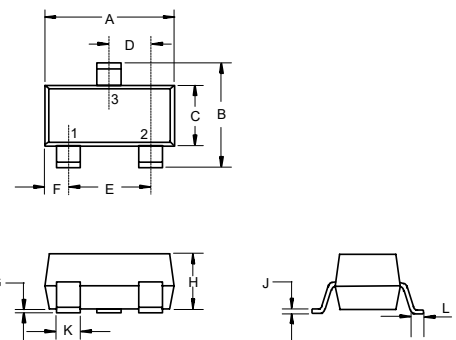
MMBTA14: K3D / 1N

Internal Structure



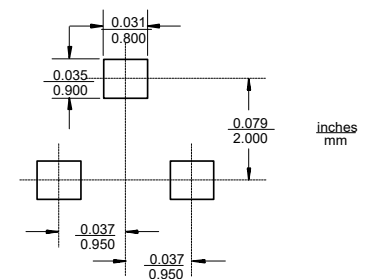
**NPN Darlington
Amplifier Transistor**

SOT-23



| DIM | INCHES | | MM | | NOTE |
|-----|--------|-------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.110 | 0.120 | 2.80 | 3.04 | |
| B | 0.083 | 0.104 | 2.10 | 2.64 | |
| C | 0.047 | 0.055 | 1.20 | 1.40 | |
| D | 0.034 | 0.041 | 0.85 | 1.05 | |
| E | 0.067 | 0.083 | 1.70 | 2.10 | |
| F | 0.018 | 0.024 | 0.45 | 0.60 | |
| G | 0.0004 | 0.006 | 0.01 | 0.15 | |
| H | 0.035 | 0.043 | 0.90 | 1.10 | |
| J | 0.003 | 0.007 | 0.08 | 0.18 | |
| K | 0.012 | 0.020 | 0.30 | 0.51 | |
| L | 0.007 | 0.020 | 0.20 | 0.50 | |

Suggested Solder Pad Layout



Electrical Characteristics @ $T_A=25^\circ\text{C}$ Unless Otherwise Specified

| Parameter | | Symbol | Min | Typ | Max | Units | Conditions |
|--------------------------------------|---------|---------------|-------|-----|-----|---------------|---|
| Collector Cutoff Current | | I_{CBO} | | | 0.1 | μA | $V_{CB}=30\text{V}, I_E=0$ |
| Emitter Cutoff Current | | I_{EBO} | | | 0.1 | μA | $V_{EB}=10\text{V}, I_C=0$ |
| DC Current Gain | MMBTA13 | $h_{FE(1)}$ | 5000 | | | | $V_{CE}=5\text{V}, I_C=10\text{mA}$ |
| | MMBTA14 | | 10000 | | | | |
| | MMBTA13 | $h_{FE(2)}$ | 10000 | | | | $V_{CE}=1\text{V}, I_C=150\text{mA}$ |
| | MMBTA14 | | 20000 | | | | |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | | | 1.5 | V | $I_C=100\text{mA}, I_B=0.1\text{mA}$ |
| Base-Emitter Voltage | | V_{BE} | | | 2.0 | V | $V_{CE}=5\text{V}, I_C=100\text{mA}$ |
| Transition Frequency | | f_T | 125 | | | MHz | $V_{CE}=5\text{V}, I_C=10\text{mA}, f=100\text{MHz}$ |
| Delay Time | | t_d | | | 10 | ns | $V_{CC}=30\text{V}, V_{BE}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$ |
| Rise Time | | t_r | | | 25 | ns | |
| Storage Time | | t_s | | | 225 | ns | $V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=I_{B2}=15\text{mA}$ |
| Fall Time | | t_f | | | 60 | ns | |
| Output Capacitance | | C_{obo} | | | 8 | pF | $V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$ |
| Input Capacitance | | C_{ibo} | | | 15 | pF | $V_{EB}=0.5\text{V}, I_C=0, f=1\text{MHz}$ |

Curve Characteristics

Fig. 1 - Static Characteristics

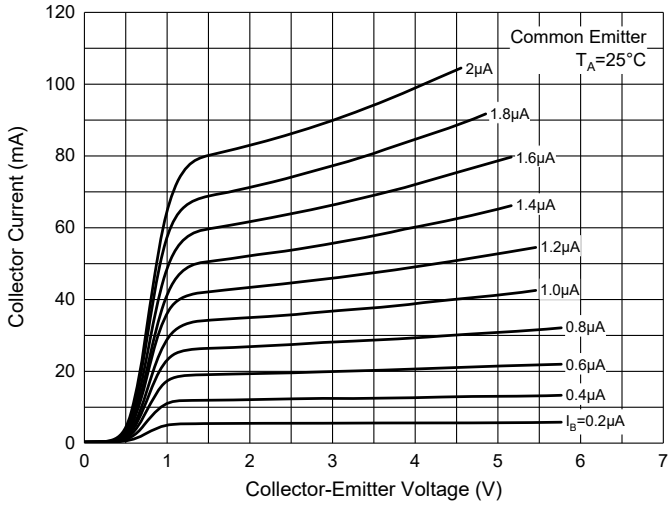


Fig. 2 - DC Current Gain Characteristics

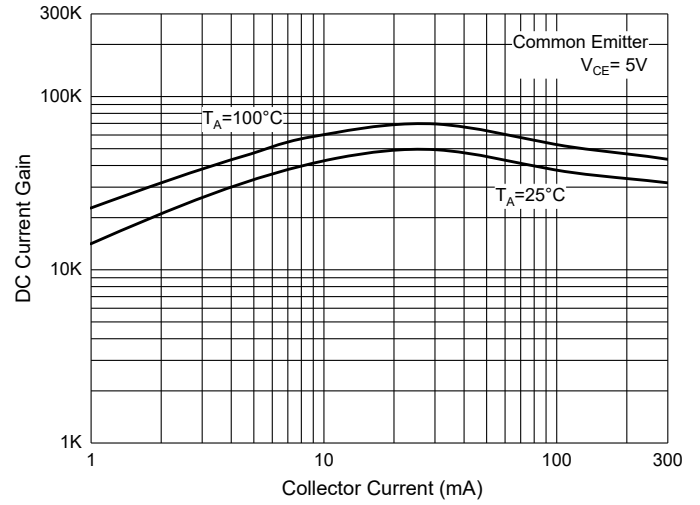


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

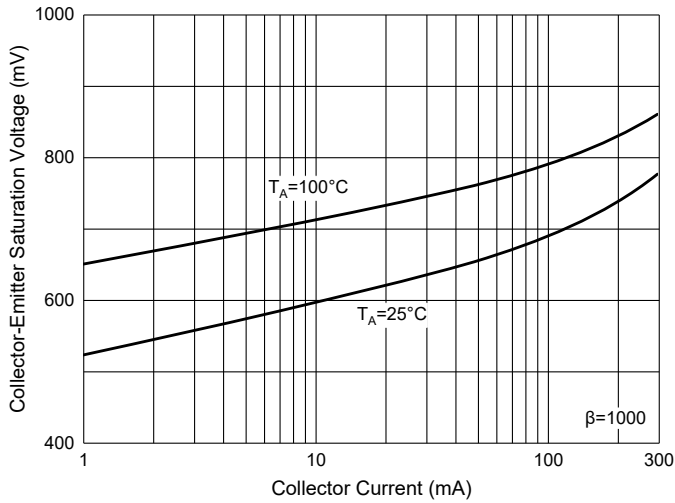


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

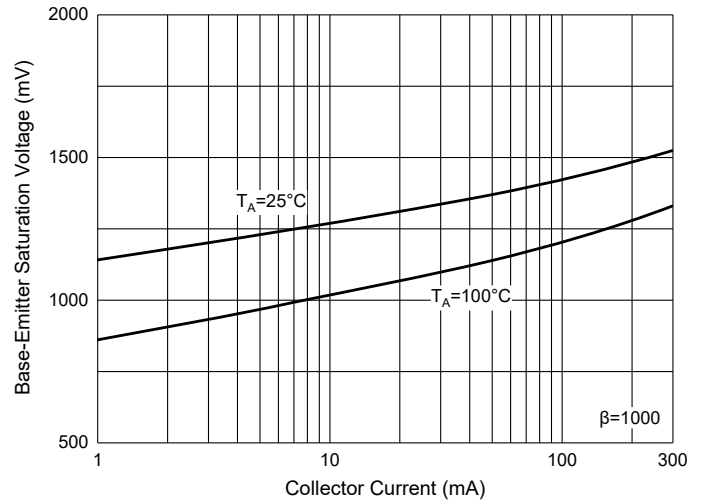


Fig. 5 - Base-Emitter Voltage Characteristics

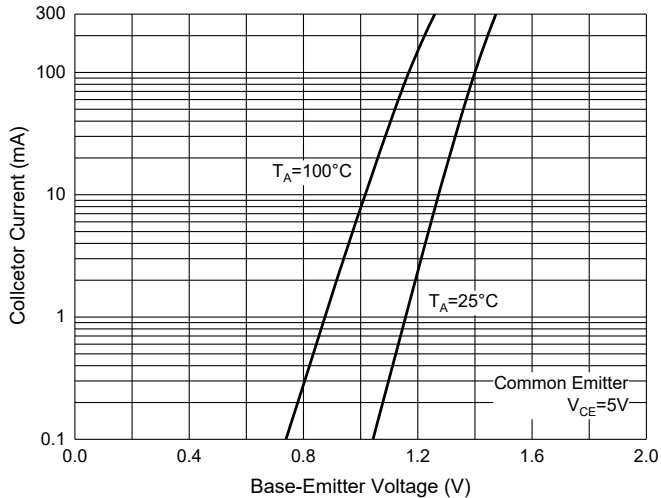
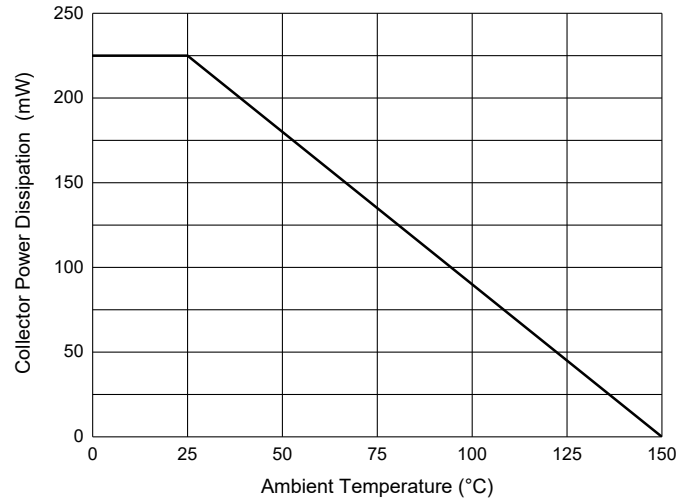


Fig. 6 - Collector Power Derating Curve



Ordering Information

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

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