

Features

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- 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

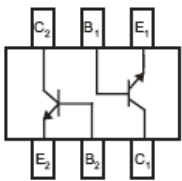
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 625°C/W Junction to Ambient

| Parameter | Symbol | Rating | Unit |
|-------------------------------------|-----------|--------|------|
| Collector-Base Voltage | V_{CBO} | 60 | V |
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Emitter-Base Voltage | V_{EBO} | 6 | V |
| Collector Current | I_C | 200 | mA |
| Collector Power Dissipation (Note2) | P_C | 200 | mW |

Note:

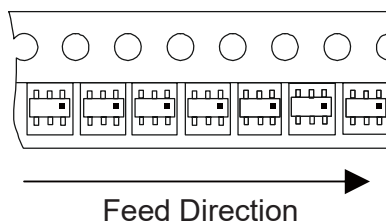
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Valid provided that terminals are kept at ambient temperature.

Internal Structure



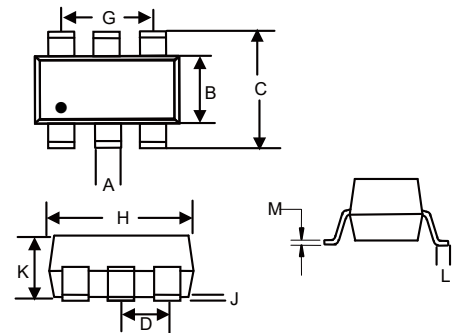
Marking: K6N

Special packing as below



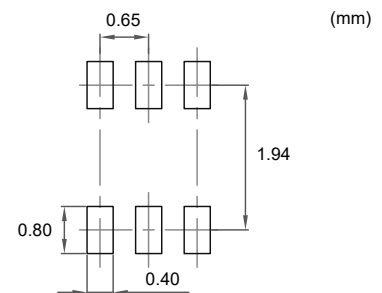
NPN Plastic Encapsulate Transistors

SOT-363



| DIM | DIMENSIONS | | | | NOTE |
|-----|------------|-------|-------|------|------|
| | INCHES | | MM | | |
| | MIN | MAX | MIN | MAX | |
| A | 0.006 | 0.014 | 0.15 | 0.35 | |
| B | 0.045 | 0.053 | 1.15 | 1.35 | |
| C | 0.079 | 0.096 | 2.00 | 2.45 | |
| D | 0.026 | | 0.65 | | TYP. |
| G | 0.047 | 0.055 | 1.20 | 1.40 | |
| H | 0.071 | 0.087 | 1.80 | 2.20 | |
| J | ----- | 0.004 | ----- | 0.10 | |
| K | 0.031 | 0.043 | 0.80 | 1.10 | |
| L | 0.010 | 0.018 | 0.26 | 0.46 | |
| M | 0.003 | 0.006 | 0.08 | 0.15 | |

Suggested Solder Pad Layout



Electrical Characteristics @ 25°C Unless Otherwise Specified

| Parameter | Symbol | Min | Typ | Max | Units | Conditions |
|--------------------------------------|---------------|------|-----|------|-------|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | 60 | | | V | $I_C=10\mu A, I_E=0$ |
| Collector-Emitter Breakdown Voltage* | $V_{(BR)CEO}$ | 40 | | | V | $I_C=1mA, I_B=0$ |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | 6 | | | V | $I_E=10\mu A, I_C=0$ |
| Collector-Base Cutoff Current | I_{CBO} | | | 50 | nA | $V_{CB}=30V, I_E=0$ |
| Collector Cutoff Current | I_{CEX} | | | 50 | nA | $V_{CE}=30V, V_{BE}=3V$ |
| DC Current Gain* | $h_{FE(1)}$ | 40 | | | | $V_{CE}=1V, I_C=0.1mA$ |
| | $h_{FE(2)}$ | 70 | | | | $V_{CE}=1V, I_C=1mA$ |
| | $h_{FE(3)}$ | 100 | | 300 | | $V_{CE}=1V, I_C=10mA$ |
| | $h_{FE(4)}$ | 60 | | | | $V_{CE}=1V, I_C=50mA$ |
| | $h_{FE(5)}$ | 30 | | | | $V_{CE}=1V, I_C=100mA$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | | | 0.2 | V | $I_C=10mA, I_B=1mA$ |
| | | | | 0.3 | V | $I_C=50mA, I_B=5mA$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | 0.65 | | 0.85 | V | $I_C=10mA, I_B=1mA$ |
| | | | | 0.95 | V | $I_C=50mA, I_B=5mA$ |
| Transition Frequency | f_T | 300 | | | MHz | $V_{CE}=20V, I_C=10mA, f=100MHz$ |
| Output Capacitance | C_{cbo} | | | 4.0 | pF | $V_{CB}=5V, I_E=0, f=1MHz,$ |
| Input Capacitance | C_{ibo} | | | 8.0 | pF | $V_{BE}=0.5V, I_C=0, f=1MHz,$ |
| Noise Figure | NF | | | 5 | dB | $V_{CE}=5V, I_C=0.1mA$ $R_S=1K\Omega, f=10Hz$ to 15.7KHz |
| Delay Time | t_d | | | 35 | ns | $V_{CC}=3V, I_C=10mA$ |
| Rise Time | t_r | | | 35 | ns | $V_{BE}=0.5V, I_{B1}=1mA$ |
| Storage Time | t_s | | | 200 | ns | $V_{CC}=3V, I_C=10mA$ |
| Fall Time | t_f | | | 50 | ns | $I_{B1}=I_{B2}=1mA$ |

*Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2.0\%$

Curve Characteristics

Fig. 1 - Static Characteristics

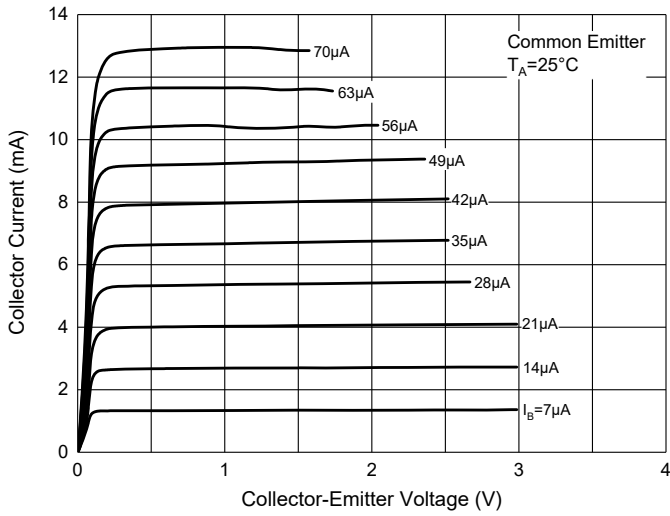


Fig. 2 - DC Current Gain Characteristics

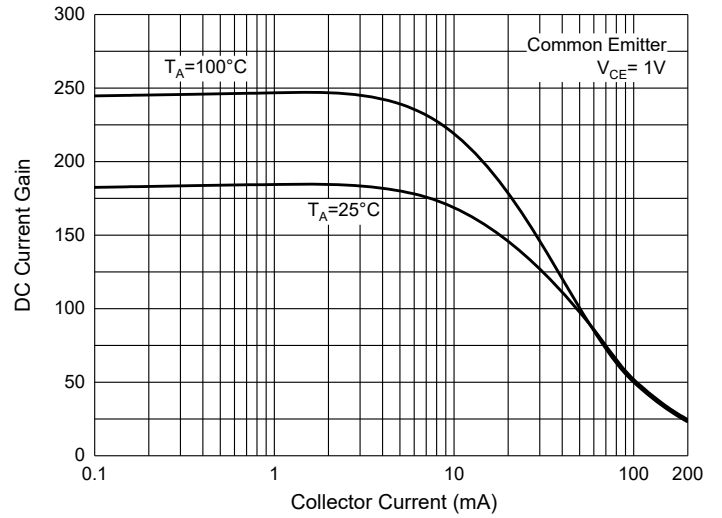


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

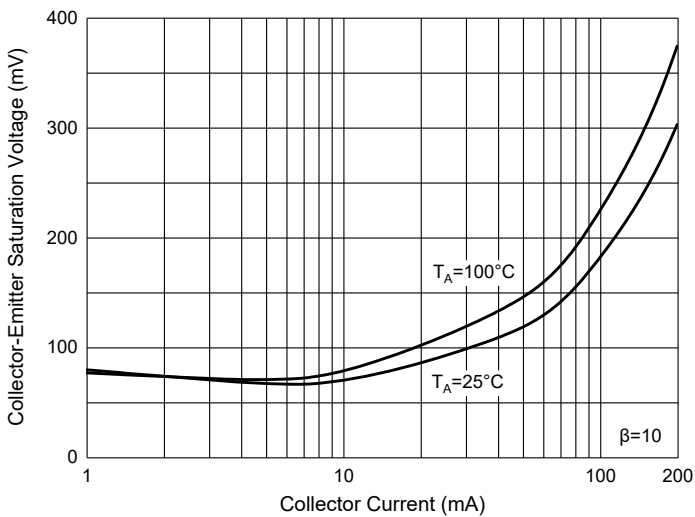


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

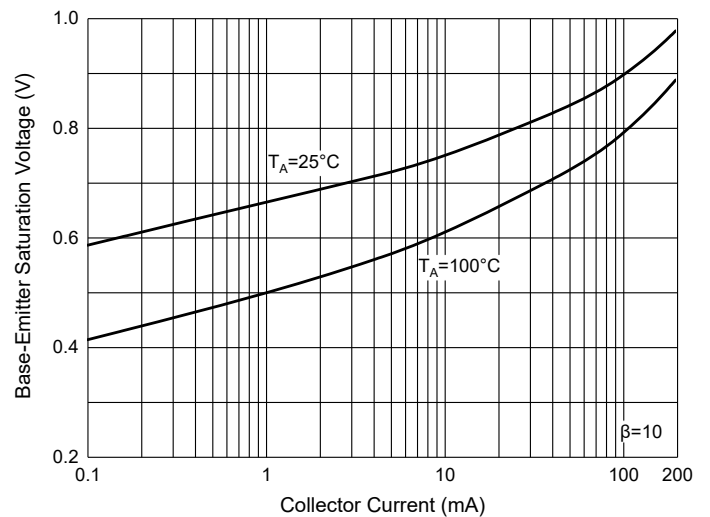


Fig. 5 - Base-Emitter Voltage Characteristics

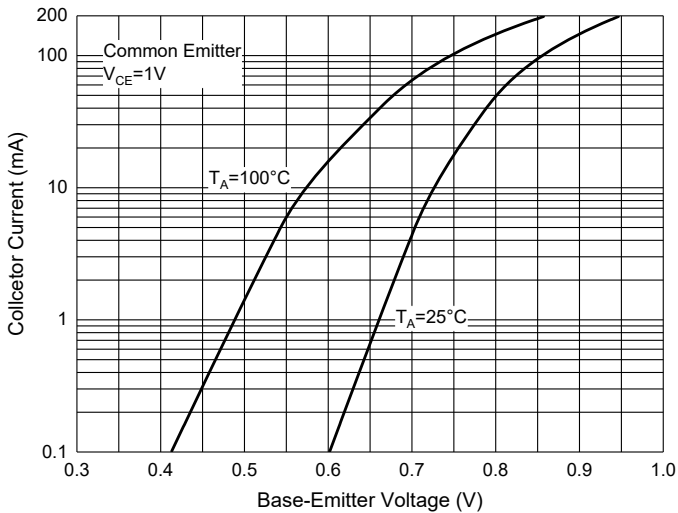
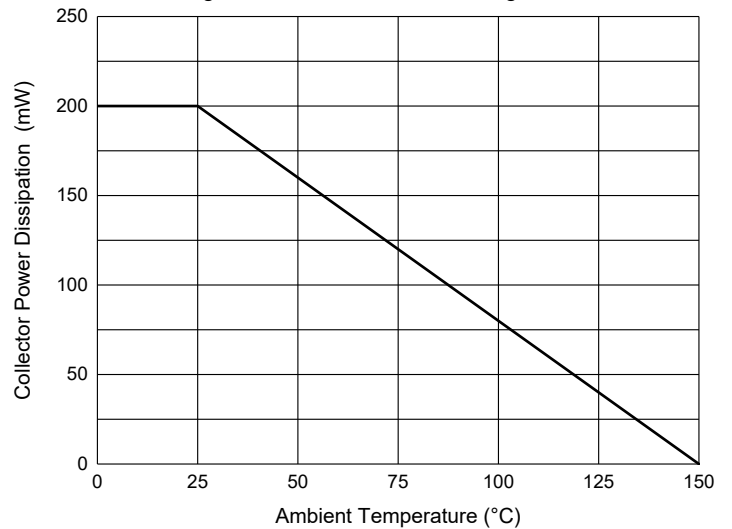


Fig. 6 - Collector Power Derating Curve



Ordering Information

| Device | Packing |
|---------------|-----------------------|
| MMDT3904-TPQ2 | Tape&Reel: 3Kpcs/Reel |

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