

Transistors

NPN General Purpose Transistor

UMT3904 / SST3904 / MMST3904

●Features

- 1) $BV_{CEO} > 40V$ ($I_C = 1mA$)
- 2) Complements the UMT3906 / SST3906 / MMST3906.

●Package, marking and packaging specifications

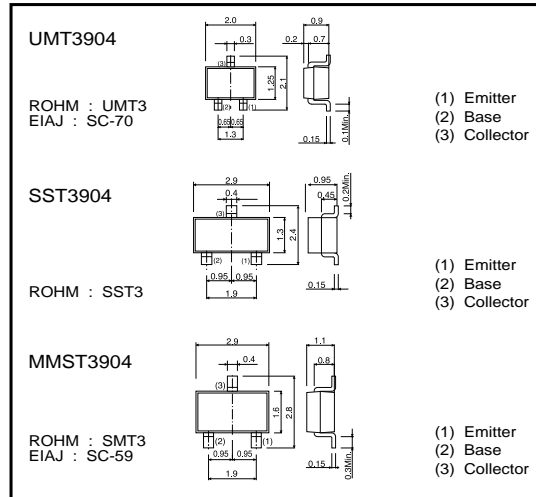
| Part No. | UMT3904 | SST3904 | MMST3904 |
|------------------------------|---------|---------|----------|
| Packaging type | UMT3 | SST3 | SMT3 |
| Marking | R1A | R1A | R1A |
| Code | T106 | T116 | T146 |
| Basic ordering unit (pieces) | 3000 | 3000 | 3000 |

●Absolute maximum ratings ($T_a = 25^{\circ}C$)

| Parameter | Symbol | Limits | 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 | 0.2 | A |
| Collector power dissipation | P_C | 0.2 | W |
| | | 0.35 | W * |
| Junction temperature | T_J | 150 | $^{\circ}C$ |
| Storage temperature | T_{stg} | -55 to +150 | $^{\circ}C$ |

* When mounted on a 7 x 5 x 0.6 mm ceramic board.

●Dimensions (Unit : mm)



●Electrical characteristics ($T_a = 25^{\circ}C$)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------------------------|---------------|------|------|------|------|---|
| Collector-base breakdown voltage | BV_{CBO} | 60 | - | - | V | $I_C = 10\mu A$ |
| Collector-emitter breakdown voltage | BV_{CEO} | 40 | - | - | V | $I_C = 1mA$ |
| Emitter-base breakdown voltage | BV_{EBO} | 6 | - | - | V | $I_E = 10\mu A$ |
| Collector cutoff current | I_{CES} | - | - | 50 | nA | $V_{CB} = 30V$ |
| Emitter cutoff current | I_{EBO} | - | - | 50 | nA | $V_{EB} = 3V$ |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | - | - | 0.2 | V | $I_C/I_B = 10mA/1mA$ |
| | | - | - | 0.3 | V | $I_C/I_B = 50mA/5mA$ |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | 0.65 | - | 0.85 | V | $I_C/I_B = 10mA/1mA$ |
| | | - | - | 0.95 | V | $I_C/I_B = 50mA/5mA$ |
| DC current transfer ratio | h_{FE} | 40 | - | - | - | $V_{CE} = 1V, I_C = 0.1mA$ |
| | | 70 | - | - | - | $V_{CE} = 1V, I_C = 1mA$ |
| | | 100 | - | 300 | - | $V_{CE} = 1V, I_C = 10mA$ |
| | | 60 | - | - | - | $V_{CE} = 1V, I_C = 50mA$ |
| | | 30 | - | - | - | $V_{CE} = 1V, I_C = 100mA$ |
| Transition frequency | f_T | 300 | - | - | MHz | $V_{CE} = 20V, I_E = -10mA, f = 100MHz$ |
| Collector output capacitance | C_{ob} | - | - | 4 | pF | $V_{CB} = 10V, f = 100kHz$ |
| Emitter input capacitance | C_{ib} | - | - | 8 | pF | $V_{EB} = 0.5V, f = 100kHz$ |
| Delay time | t_d | - | - | 35 | ns | $V_{CC} = 3V, V_{BE(OFF)} = 0.5V, I_C = 10mA, I_{B1} = 1mA$ |
| Rise time | t_r | - | - | 35 | ns | $V_{CC} = 3V, V_{BE(OFF)} = 0.5V, I_C = 10mA, I_{B1} = 1mA$ |
| Storage time | t_{stg} | - | - | 200 | ns | $V_{CC} = 3V, I_C = 10mA, I_{B1} = -I_{B2} = 1mA$ |
| Fall time | t_f | - | - | 50 | ns | $V_{CC} = 3V, I_C = 10mA, I_{B1} = -I_{B2} = 1mA$ |

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●Electrical characteristic curves

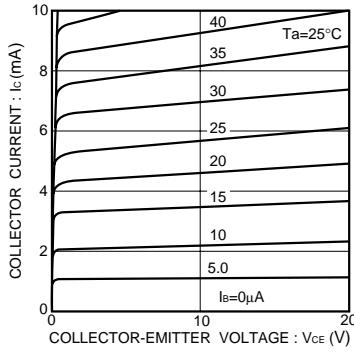


Fig.1 Grounded emitter output characteristics

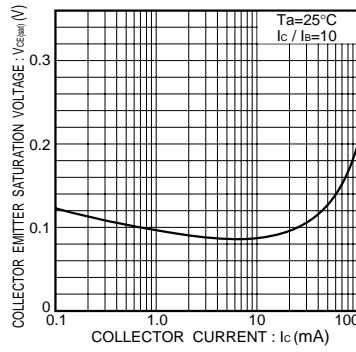


Fig.2 Collector-emitter saturation voltage vs. collector current

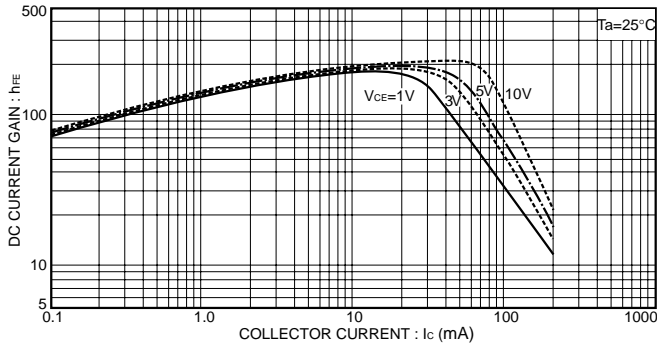


Fig.3 DC current gain vs. collector current (I)

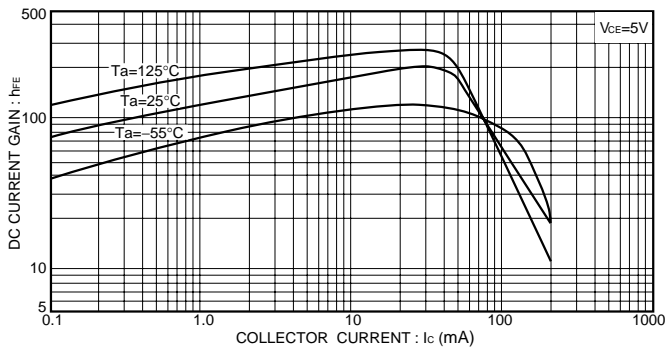


Fig.4 DC current gain vs. collector current (II)

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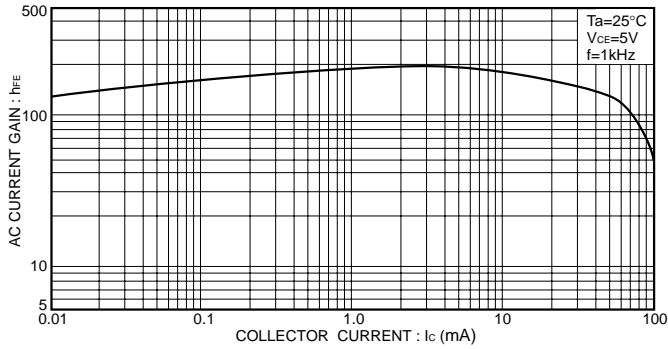


Fig.5 AC current gain vs. collector current

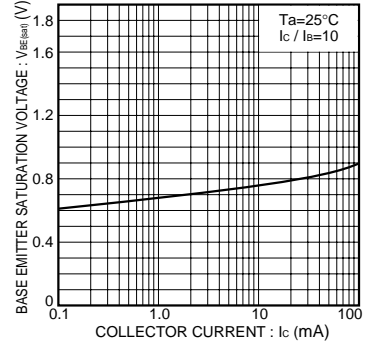


Fig.6 Base-emitter saturation voltage vs. collector current

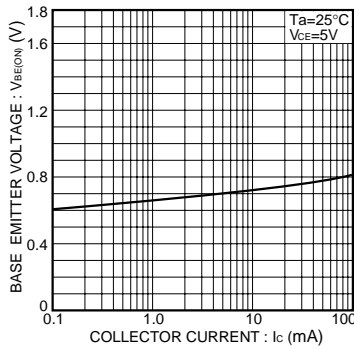


Fig.7 Grounded emitter propagation characteristics

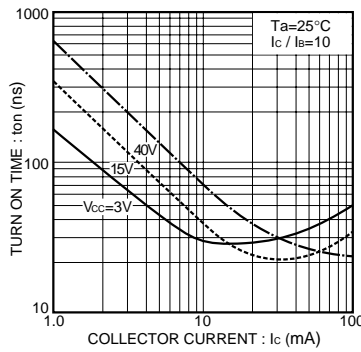


Fig.8 Turn-on time vs. collector current

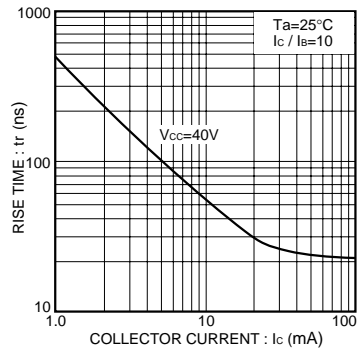


Fig.9 Rise time vs. collector current

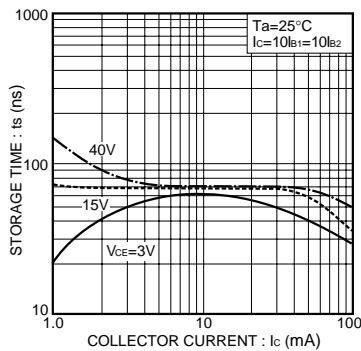


Fig.10 Storage time vs. collector current

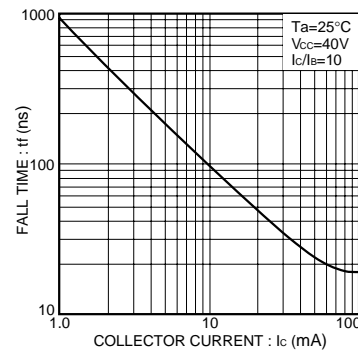


Fig.11 Fall time vs. collector current

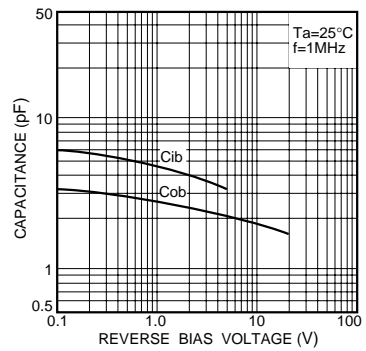


Fig.12 Input/output capacitance vs. voltage

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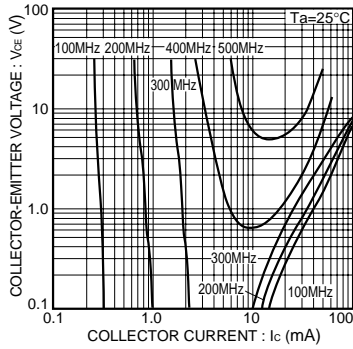


Fig.13 Gain bandwidth product

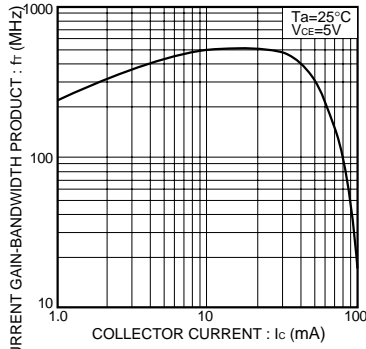


Fig.14 Gain bandwidth product vs. collector current

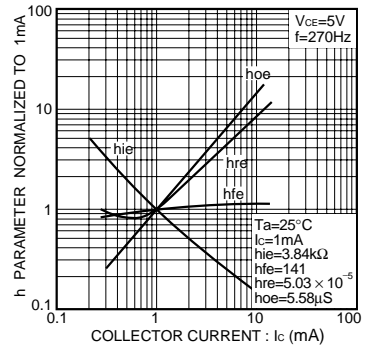


Fig.15 h parameter vs. collector current

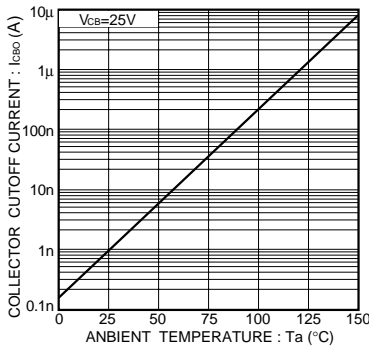


Fig.16 Noise characteristics (I)

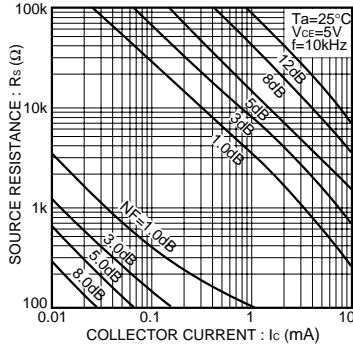


Fig.17 Noise characteristics (II)

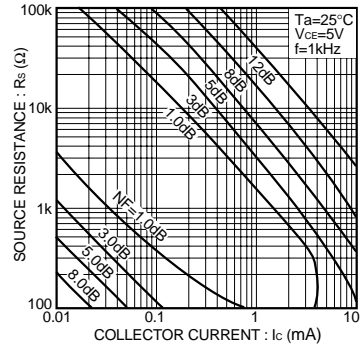


Fig.18 Noise characteristics (III)

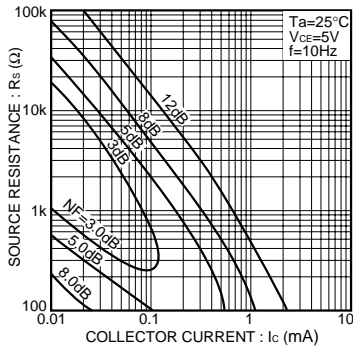


Fig.19 Noise characteristics (IV)

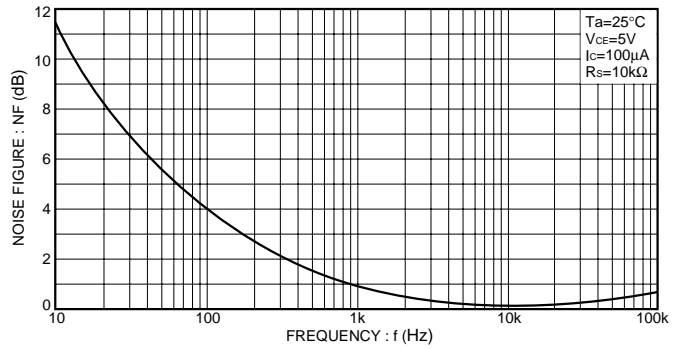


Fig.20 Noise vs. collector current

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