

# NPN Medium Power Transistor (Switching)

## UMT4401 / SST4401 / MMST4401 / 2N4401

### ●Features

- 1)  $BV_{CEO} > 40V$  ( $I_C = 1mA$ )
- 2) Complements the UMT4403 / SST4403 / MMST4403 / PN4403.

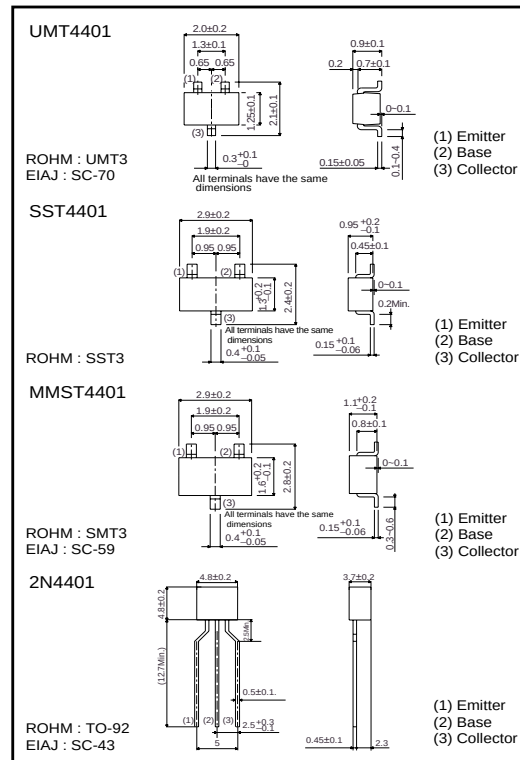
### ●Package, marking, and packaging specifications

| Part No.                     | UMT4401 | SST4401 | MMST4401 | 2N4401 |
|------------------------------|---------|---------|----------|--------|
| Packaging type               | UMT3    | SST3    | SMT3     | TO-92  |
| Marking                      | R2X     | R2X     | R2X      | -      |
| Code                         | T106    | T116    | T146     | T93    |
| Basic ordering unit (pieces) | 3000    | 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           | $I_C$     | 0.6      | A          |
| Collector power dissipation | UMT4401   | 0.2      | W          |
|                             | SST4401   |          |            |
|                             | MMST4401  | 0.625    |            |
| Junction temperature        | $T_J$     | 150      | $^\circ C$ |
| Storage temperature         | $T_{stg}$ | -55~+150 | $^\circ C$ |

### ●External dimensions (Units : mm)



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

| Parameter                            | Symbol        | Min. | Typ. | Max. | Unit    | Conditions                                                   |
|--------------------------------------|---------------|------|------|------|---------|--------------------------------------------------------------|
| Collector-base breakdown voltage     | $BV_{CBO}$    | 60   | -    | -    | V       | $I_C = 100\mu A$                                             |
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | 40   | -    | -    | V       | $I_C = 1mA$                                                  |
| Emitter-base breakdown voltage       | $BV_{EBO}$    | 6    | -    | -    | V       | $I_E = 100\mu A$                                             |
| Collector cutoff current             | $I_{CBO}$     | -    | -    | 0.1  | $\mu A$ | $V_{CE} = 35V$                                               |
| Emitter cutoff current               | $I_{EBO}$     | -    | -    | 0.1  | $\mu A$ | $V_{EB} = 5V$                                                |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | -    | -    | 0.4  | V       | $I_C/I_E = 150mA/15mA$                                       |
|                                      |               | -    | -    | 0.75 | V       | $I_C/I_E = 500mA/50mA$                                       |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ | -    | -    | 0.95 | V       | $I_C/I_E = 150mA/15mA$                                       |
|                                      |               | -    | -    | 1.2  | V       | $I_C/I_E = 500mA/50mA$                                       |
| DC current transfer ratio            | $h_{FE}$      | 20   | -    | -    | -       | $V_{CE} = 1V, I_C = 0.1mA$                                   |
|                                      |               | 40   | -    | -    | -       | $V_{CE} = 1V, I_C = 1mA$                                     |
|                                      |               | 80   | -    | -    | -       | $V_{CE} = 1V, I_C = 10mA$                                    |
|                                      |               | 100  | -    | 300  | -       | $V_{CE} = 1V, I_C = 150mA$                                   |
|                                      |               | 40   | -    | -    | -       | $V_{CE} = 2V, I_C = 500mA$                                   |
| Transition frequency                 | $f_T$         | 250  | -    | -    | MHz     | $V_{CE} = 10V, I_E = 20mA, f = 100MHz$                       |
| Collector output capacitance         | $C_{ob}$      | -    | -    | 6.5  | pF      | $V_{CE} = 10V, f = 100kHz$                                   |
| Emitter input capacitance            | $C_{ib}$      | -    | -    | 30   | pF      | $V_{EB} = 0.5V, f = 100kHz$                                  |
| Delay time                           | $t_d$         | -    | -    | 15   | ns      | $V_{CC} = 30V, V_{EB(OFF)} = 2V, I_C = 150mA, I_{B1} = 15mA$ |
| Rise time                            | $t_r$         | -    | -    | 20   | ns      | $V_{CC} = 30V, V_{EB(OFF)} = 2V, I_C = 150mA, I_{B1} = 15mA$ |
| Storage time                         | $t_{stg}$     | -    | -    | 225  | ns      | $V_{CC} = 30V, I_C = 150mA, I_{B1} = -I_{B2} = 15mA$         |
| Fall time                            | $t_f$         | -    | -    | 30   | ns      | $V_{CC} = 30V, I_C = 150mA, I_{B1} = -I_{B2} = 15mA$         |

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●Electrical characteristic curves

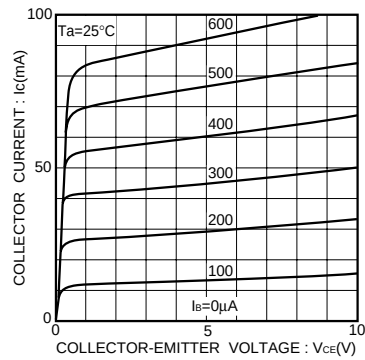


Fig.1 Grounded emitter output characteristics

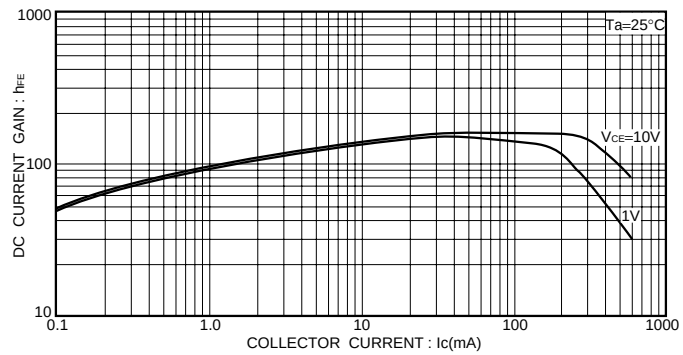


Fig.3 DC current gain vs. collector current(I)

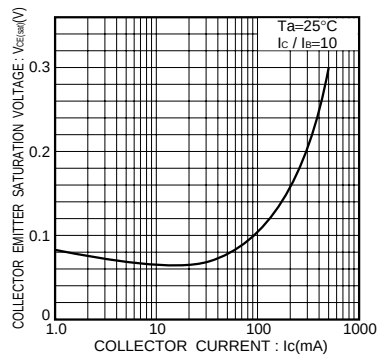


Fig.2 Collector-emitter saturation voltage vs. collector current

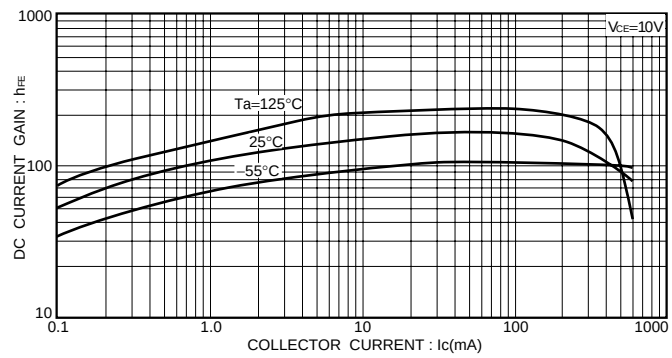


Fig.4 DC current gain vs. collector current(II)

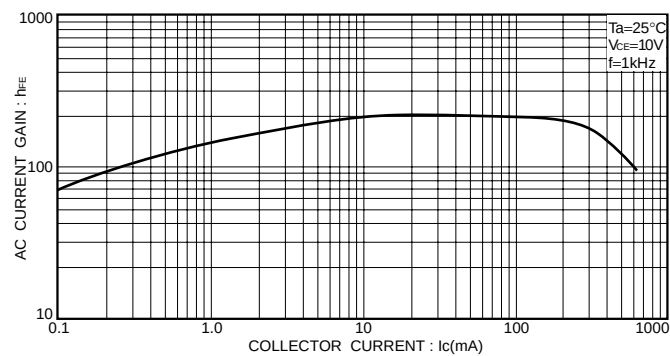


Fig.5 AC current gain vs. collector current

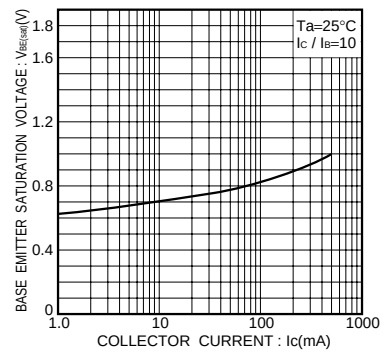


Fig.6 Base-emitter saturation voltage vs. collector current

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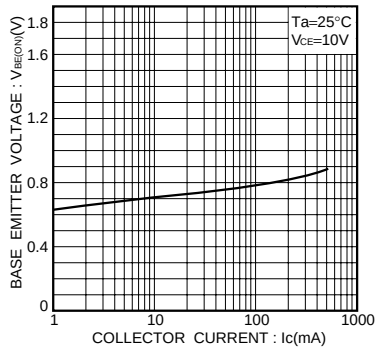


Fig.7 Grounded emitter propagation characteristics

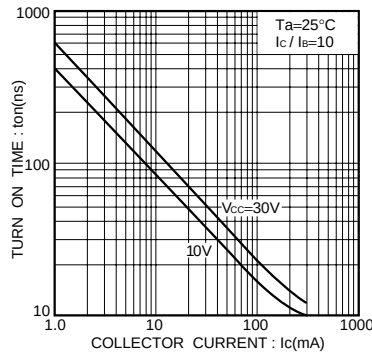


Fig.8 Turn-on time vs. collector current

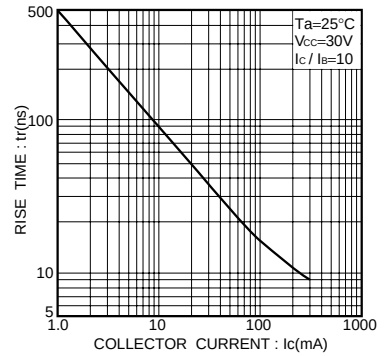


Fig.9 Rise time vs. collector current

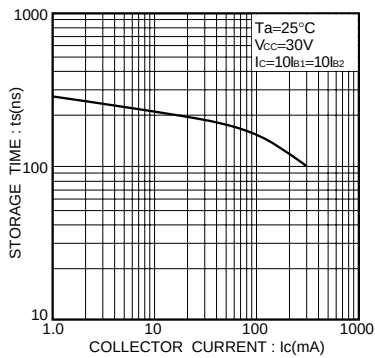


Fig.10 Storage time vs. collector current

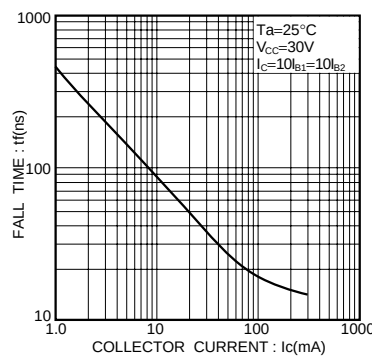


Fig.11 Fall time vs. collector current

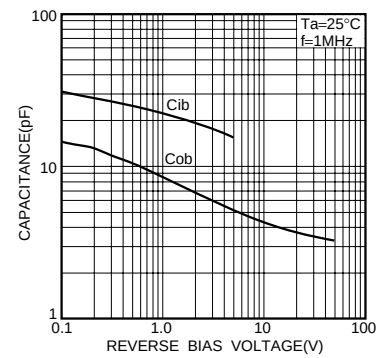


Fig.12 Input / output capacitance vs. voltage

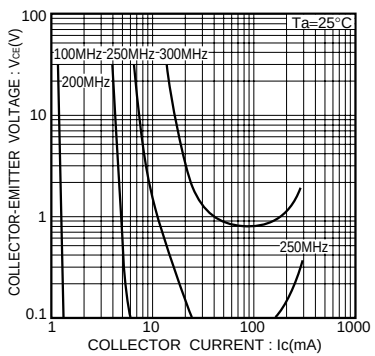


Fig.13 Gain bandwidth product

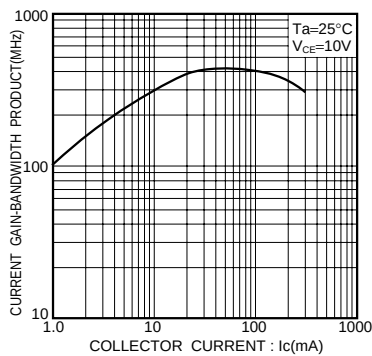


Fig.14 Gain bandwidth product vs. collector current