# UP03396

## Silicon NPN epitaxial planar type (Tr1)
## Silicon PNP epitaxial planar type (Tr2)

For digital circuits

### ■ Features

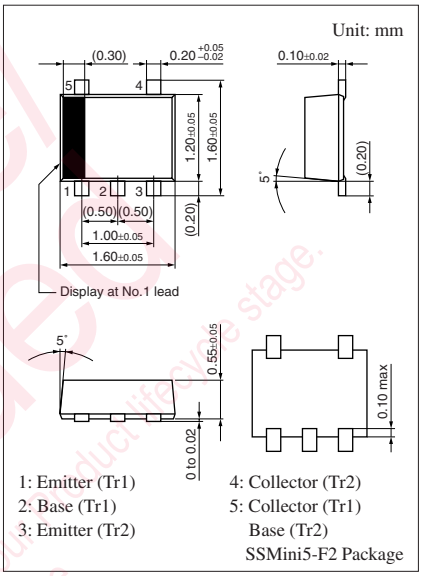
- Two elements incorporated into one package
  (Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

### ■ Basic Part Number

- UNR111T + UNR1211

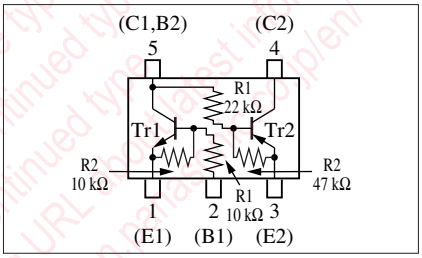
### ■ Absolute Maximum Ratings $T_a = 25°C$

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Tr1 | Collector-base voltage (Emitter open) | $V_{CBO}$ | 50 | V |
| | Collector-emitter voltage (Base open) | $V_{CEO}$ | 50 | V |
| | Collector current | $I_C$ | 100 | mA |
| Tr2 | Collector-base voltage (Emitter open) | $V_{CBO}$ | −50 | V |
| | Collector-emitter voltage (Base open) | $V_{CEO}$ | −50 | V |
| | Collector current | $I_C$ | −100 | mA |
| Overall | Total power dissipation | $P_T$ | 125 | mW |
| | Junction temperature | $T_j$ | 125 | °C |
| | Storage temperature | $T_{stg}$ | −55 to +125 | °C |




Marking Symbol: 6P

Internal Connection




Maintenance/Discontinued
This product includes following maintenance type planned discontinued type
Please visit following URL for latest information.
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## ■ Electrical Characteristics $T_a = 25°C \pm 3°C$

• Tr1

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-base voltage (Emitter open) | $V_{CBO}$ | $I_C = 10\ \mu A$, $I_E = 0$ | 50 | | | V |
| Collector-emitter voltage (Base open) | $V_{CEO}$ | $I_C = 2$ mA, $I_B = 0$ | 50 | | | V |
| Collector-base cutoff current (Emitter open) | $I_{CBO}$ | $V_{CB} = 50$ V, $I_E = 0$ | | | 0.1 | µA |
| Collector-emitter cutoff current (Base open) | $I_{CEO}$ | $V_{CE} = 50$ V, $I_B = 0$ | | | 0.5 | µA |
| Emitter-base cutoff current (Collector open) | $I_{EBO}$ | $V_{EB} = 6$ V, $I_C = 0$ | | | 0.5 | mA |
| Forward current transfer ratio | $h_{FE}$ | $V_{CE} = 10$ V, $I_C = 5$ mA | 35 | | | — |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 10$ mA, $I_B = 0.3$ mA | | | 0.25 | V |
| Output voltage high-level | $V_{OH}$ | $V_{CC} = 5$ V, $V_B = 0.5$ V, $R_L = 1$ kΩ | 4.9 | | | V |
| Output voltage low-level | $V_{OL}$ | $V_{CC} = 5$ V, $V_B = 2.5$ V, $R_L = 1$ kΩ | | | 0.2 | V |
| Input resistance | $R_1$ | | −30% | 10 | +30% | kΩ |
| Resistance ratio | $R_1 / R_2$ | | 0.8 | 1.0 | 1.2 | — |
| Transition frequency | $f_T$ | $V_{CB} = 10$ V, $I_E = -2$ mA, f = 200 MHz | | 150 | | MHz |

Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

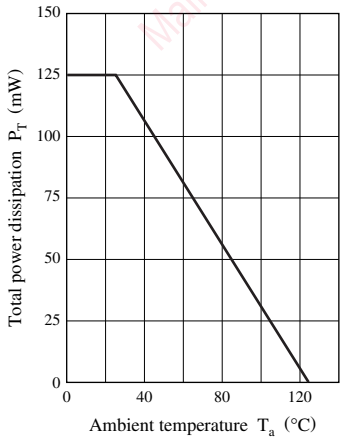
• Tr2

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-base voltage (Emitter open) | $V_{CBO}$ | $I_C = -10\ \mu A$, $I_E = 0$ | −50 | | | V |
| Collector-emitter voltage (Base open) | $V_{CEO}$ | $I_C = -2$ mA, $I_B = 0$ | −50 | | | V |
| Collector-base cutoff current (Emitter open) | $I_{CBO}$ | $V_{CB} = -50$ V, $I_E = 0$ | | | − 0.1 | µA |
| Collector-emitter cutoff current (Base open) | $I_{CEO}$ | $V_{CE} = -50$ V, $I_B = 0$ | | | − 0.5 | µA |
| Emitter-base cutoff current (Collector open) | $I_{EBO}$ | $V_{EB} = -6$ V, $I_C = 0$ | | | − 0.2 | mA |
| Forward current transfer ratio | $h_{FE}$ | $V_{CE} = -10$ V, $I_C = -5$ mA | 80 | | 400 | — |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -10$ mA, $I_B = -0.3$ mA | | | − 0.25 | V |
| Output voltage high-level | $V_{OH}$ | $V_{CC} = -5$ V, $V_B = -0.5$ V, $R_L = 1$ kΩ | −4.9 | | | V |
| Output voltage low-level | $V_{OL}$ | $V_{CC} = -5$ V, $V_B = -2.5$ V, $R_L = 1$ kΩ | | | − 0.2 | V |
| Input resistance | $R_1$ | | −30% | 22 | +30% | kΩ |
| Resistance ratio | $R_1 / R_2$ | | | 0.47 | | — |
| Transition frequency | $f_T$ | $V_{CB} = -10$ V, $I_E = 1$ mA, f = 200 MHz | | 80 | | MHz |

Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Common characteristics chart

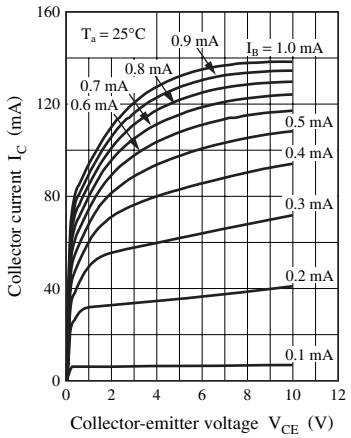
$P_T$ — $T_a$



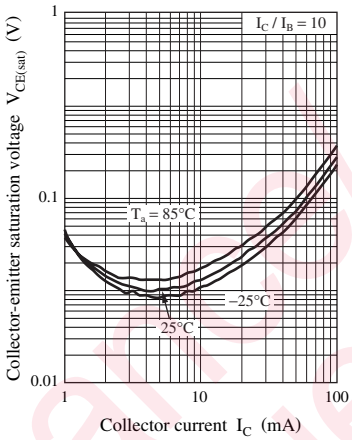

Maintenance/Discontinued
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## Characteristics charts of Tr1

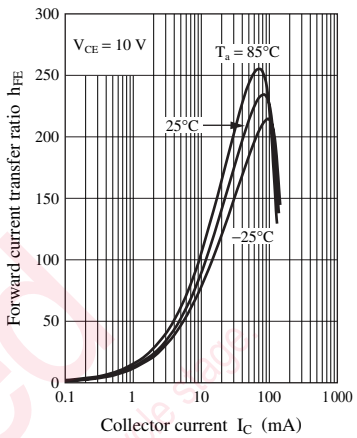
$I_C$ — $V_{CE}$



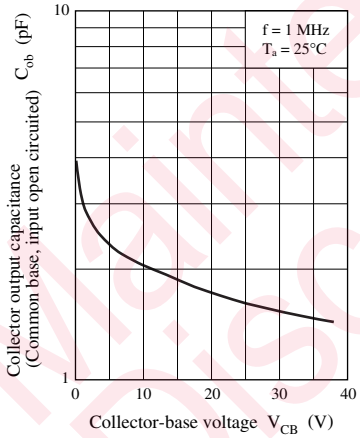

$V_{CE(sat)}$ — $I_C$



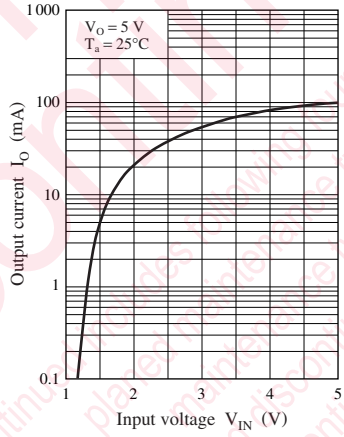

$h_{FE}$ — $I_C$



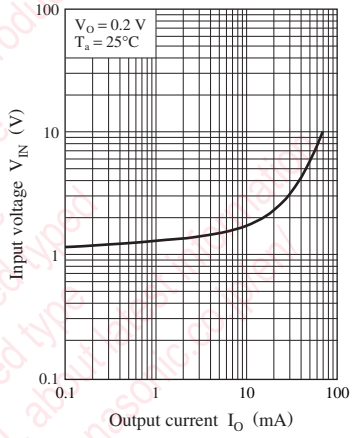

$C_{ob}$ — $V_{CB}$




$I_O$ — $V_{IN}$



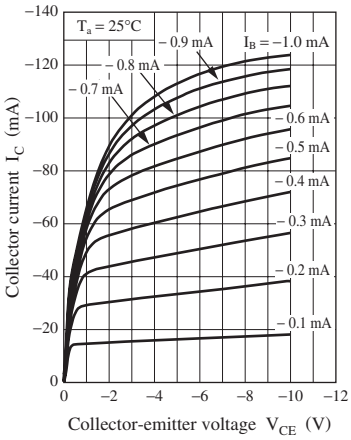

$V_{IN}$ — $I_O$



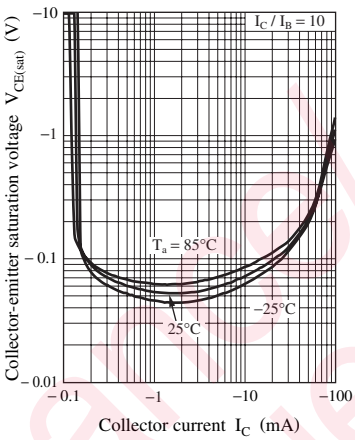

Maintenance/Discontinued
Discontinued
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## Characteristics charts of Tr2

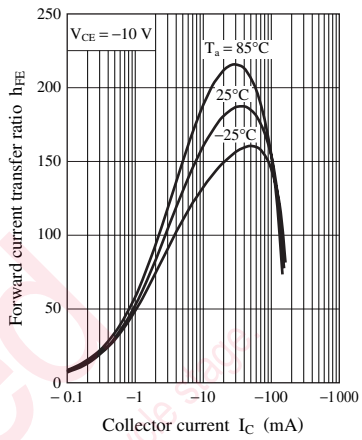
$I_C$ — $V_{CE}$



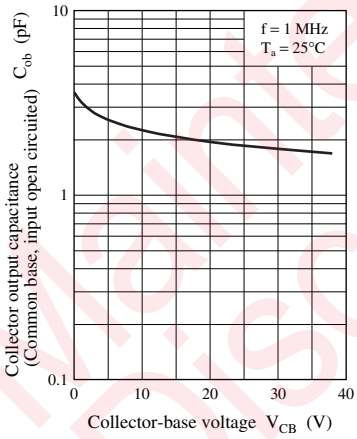

$V_{CE(sat)}$ — $I_C$



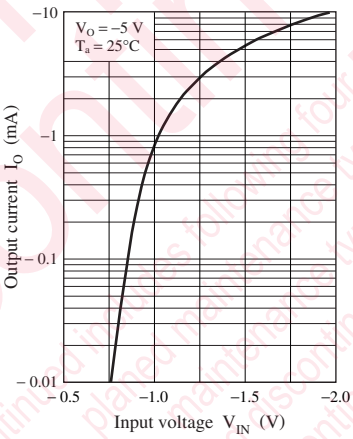

$h_{FE}$ — $I_C$



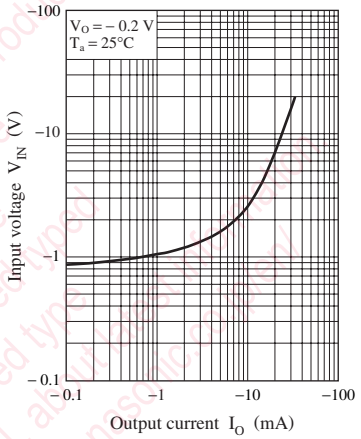

$C_{ob}$ — $V_{CB}$




$I_O$ — $V_{IN}$




$V_{IN}$ — $I_O$




Maintenance/Discontinued
Discontinued
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