

# UP03396

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

For digital circuits

## ■ Features

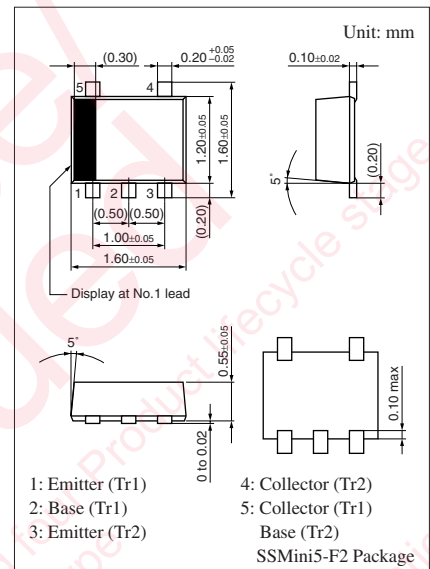
- Two elements incorporated into one package  
(Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

## ■ Basic Part Number

- UNR111T + UNR1211

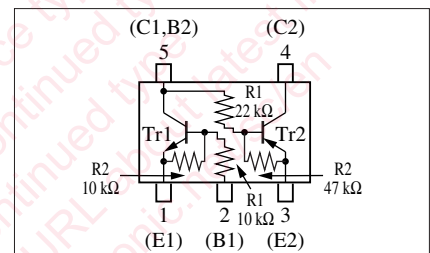
## ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

|         | Parameter                                | Symbol           | Rating      | Unit             |
|---------|--|------------------|-------------|------------------|
| Tr1     | Collector-base voltage<br>(Emitter open) | $V_{\text{CBO}}$ | 50          | V                |
|         | Collector-emitter voltage<br>(Base open) | $V_{\text{CEO}}$ | 50          | V                |
|         | Collector current                        | $I_{\text{C}}$   | 100         | mA               |
| Tr2     | Collector-base voltage<br>(Emitter open) | $V_{\text{CBO}}$ | -50         | V                |
|         | Collector-emitter voltage<br>(Base open) | $V_{\text{CEO}}$ | -50         | V                |
|         | Collector current                        | $I_{\text{C}}$   | -100        | mA               |
| Overall | Total power dissipation                  | $P_{\text{T}}$   | 125         | mW               |
|         | Junction temperature                     | $T_{\text{j}}$   | 125         | $^\circ\text{C}$ |
|         | Storage temperature                      | $T_{\text{stg}}$ | -55 to +125 | $^\circ\text{C}$ |



Marking Symbol: 6P

Internal Connection



## ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

### • Tr1

| Parameter                                    | Symbol                        | Conditions  | Min  | Typ | Max  | Unit             |
|--|-------------------------------|---|------|-----|------|------------------|
| Collector-base voltage (Emitter open)        | $V_{\text{CBO}}$              | $I_{\text{C}} = 10 \mu\text{A}, I_{\text{E}} = 0$   | 50   |     |      | V                |
| Collector-emitter voltage (Base open)        | $V_{\text{CEO}}$              | $I_{\text{C}} = 2 \text{ mA}, I_{\text{B}} = 0$   | 50   |     |      | V                |
| Collector-base cutoff current (Emitter open) | $I_{\text{CBO}}$              | $V_{\text{CB}} = 50 \text{ V}, I_{\text{E}} = 0$  |      |     | 0.1  | $\mu\text{A}$    |
| Collector-emitter cutoff current (Base open) | $I_{\text{CEO}}$              | $V_{\text{CE}} = 50 \text{ V}, I_{\text{B}} = 0$  |      |     | 0.5  | $\mu\text{A}$    |
| Emitter-base cutoff current (Collector open) | $I_{\text{EBO}}$              | $V_{\text{EB}} = 6 \text{ V}, I_{\text{C}} = 0$   |      |     | 0.5  | mA               |
| Forward current transfer ratio               | $h_{\text{FE}}$               | $V_{\text{CE}} = 10 \text{ V}, I_{\text{C}} = 5 \text{ mA}$                                   | 35   |     |      | —                |
| Collector-emitter saturation voltage         | $V_{\text{CE(sat)}}$          | $I_{\text{C}} = 10 \text{ mA}, I_{\text{B}} = 0.3 \text{ mA}$                                 |      |     | 0.25 | V                |
| Output voltage high-level                    | $V_{\text{OH}}$               | $V_{\text{CC}} = 5 \text{ V}, V_{\text{B}} = 0.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$ | 4.9  |     |      | V                |
| Output voltage low-level                     | $V_{\text{OL}}$               | $V_{\text{CC}} = 5 \text{ V}, V_{\text{B}} = 2.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$ |      |     | 0.2  | V                |
| Input resistance                             | $R_{\text{I}}$                |   | -30% | 10  | +30% | $\text{k}\Omega$ |
| Resistance ratio                             | $R_{\text{I}} / R_{\text{2}}$ |   | 0.8  | 1.0 | 1.2  | —                |
| Transition frequency                         | $f_{\text{T}}$                | $V_{\text{CB}} = 10 \text{ V}, I_{\text{E}} = -2 \text{ mA}, f = 200 \text{ MHz}$             |      | 150 |      | MHz              |

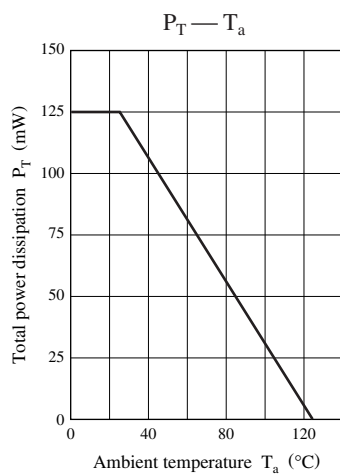
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

### • Tr2

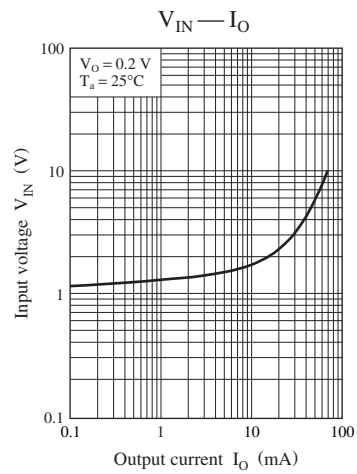
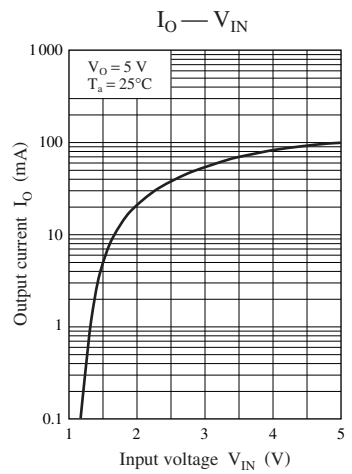
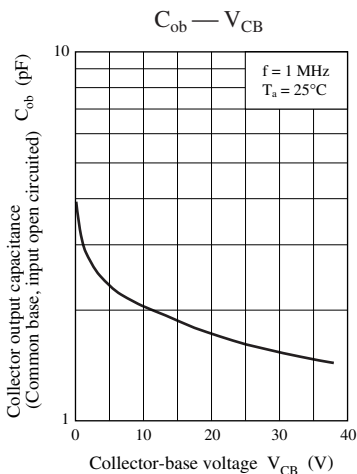
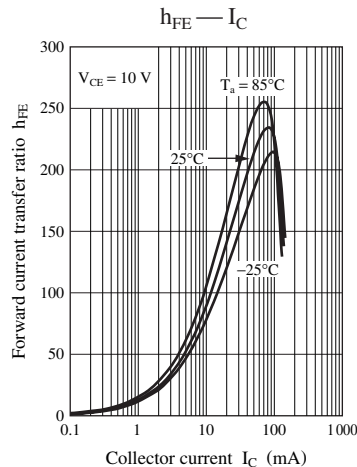
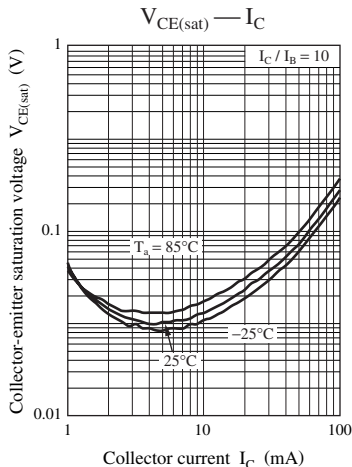
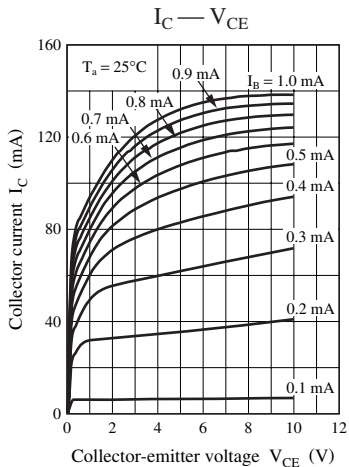
| Parameter                                    | Symbol                        | Conditions  | Min  | Typ  | Max   | Unit             |
|--|-------------------------------|---|------|------|-------|------------------|
| Collector-base voltage (Emitter open)        | $V_{\text{CBO}}$              | $I_{\text{C}} = -10 \mu\text{A}, I_{\text{E}} = 0$  | -50  |      |       | V                |
| Collector-emitter voltage (Base open)        | $V_{\text{CEO}}$              | $I_{\text{C}} = -2 \text{ mA}, I_{\text{B}} = 0$  | -50  |      |       | V                |
| Collector-base cutoff current (Emitter open) | $I_{\text{CBO}}$              | $V_{\text{CB}} = -50 \text{ V}, I_{\text{E}} = 0$   |      |      | -0.1  | $\mu\text{A}$    |
| Collector-emitter cutoff current (Base open) | $I_{\text{CEO}}$              | $V_{\text{CE}} = -50 \text{ V}, I_{\text{B}} = 0$   |      |      | -0.5  | $\mu\text{A}$    |
| Emitter-base cutoff current (Collector open) | $I_{\text{EBO}}$              | $V_{\text{EB}} = -6 \text{ V}, I_{\text{C}} = 0$  |      |      | -0.2  | mA               |
| Forward current transfer ratio               | $h_{\text{FE}}$               | $V_{\text{CE}} = -10 \text{ V}, I_{\text{C}} = -5 \text{ mA}$                                   | 80   |      | 400   | —                |
| Collector-emitter saturation voltage         | $V_{\text{CE(sat)}}$          | $I_{\text{C}} = -10 \text{ mA}, I_{\text{B}} = -0.3 \text{ mA}$                                 |      |      | -0.25 | V                |
| Output voltage high-level                    | $V_{\text{OH}}$               | $V_{\text{CC}} = -5 \text{ V}, V_{\text{B}} = -0.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$ | -4.9 |      |       | V                |
| Output voltage low-level                     | $V_{\text{OL}}$               | $V_{\text{CC}} = -5 \text{ V}, V_{\text{B}} = -2.5 \text{ V}, R_{\text{L}} = 1 \text{ k}\Omega$ |      |      | -0.2  | V                |
| Input resistance                             | $R_{\text{I}}$                |   | -30% | 22   | +30%  | $\text{k}\Omega$ |
| Resistance ratio                             | $R_{\text{I}} / R_{\text{2}}$ |   |      | 0.47 |       | —                |
| Transition frequency                         | $f_{\text{T}}$                | $V_{\text{CB}} = -10 \text{ V}, I_{\text{E}} = 1 \text{ mA}, f = 200 \text{ MHz}$               |      | 80   |       | MHz              |

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

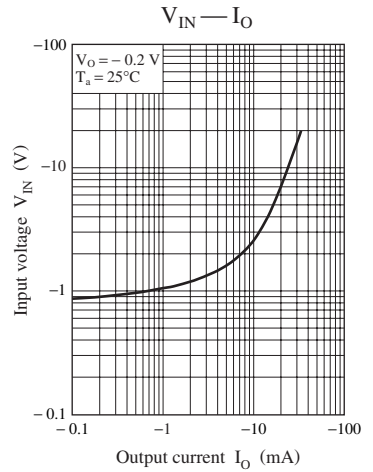
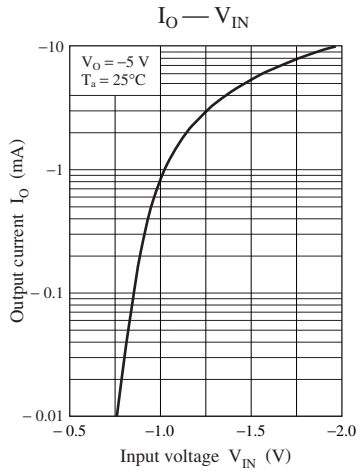
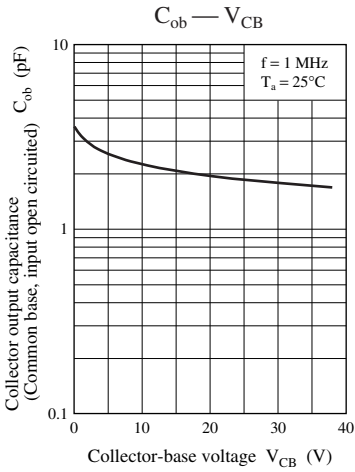
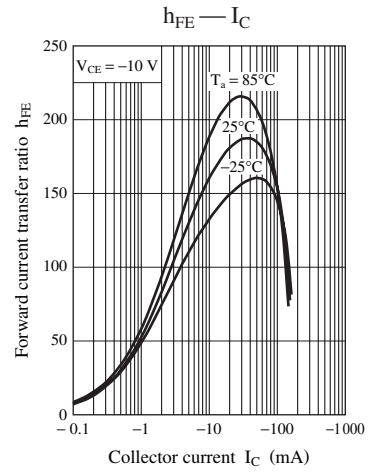
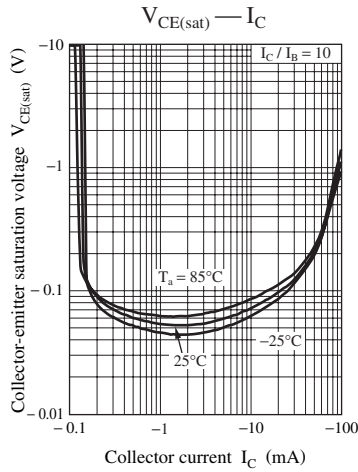
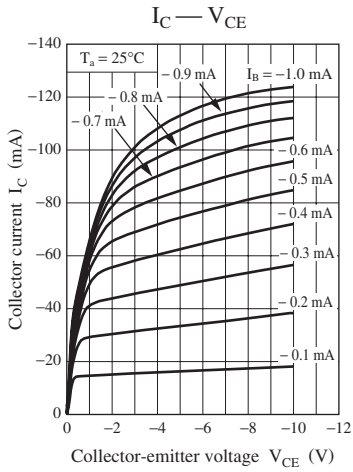
### Common characteristics chart



Characteristics charts of Tr1



Characteristics charts of Tr2



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