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UP04311

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

For switching

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

- UNR2211 + UNR2111

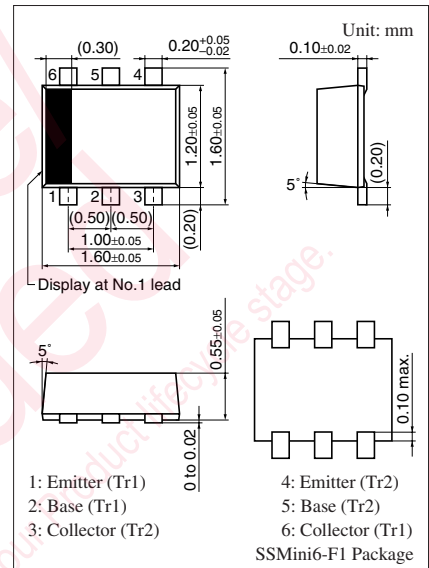
■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

| 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 | $^\circ\text{C}$ |
| | Storage temperature | T_{stg} | -55 to +125 | $^\circ\text{C}$ |

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

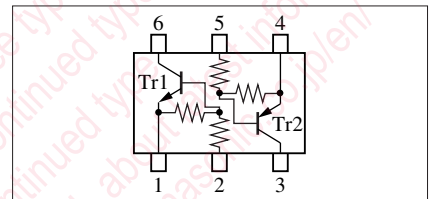
- Tr1

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



Marking Symbol: 7X

Internal Connection



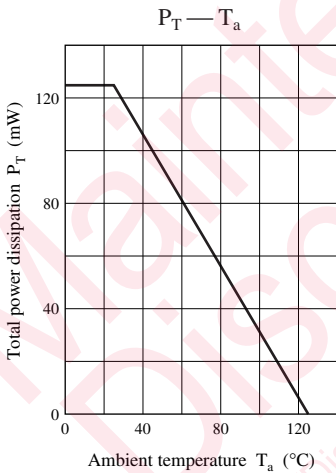
■ Electrical Characteristics (continued) $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

• Tr2

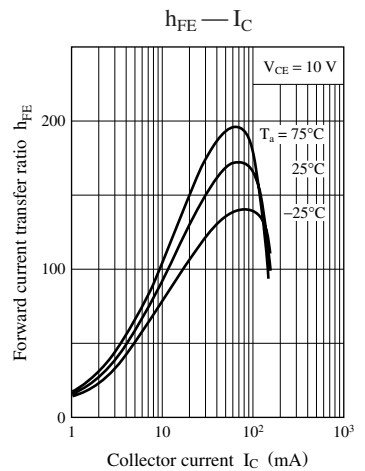
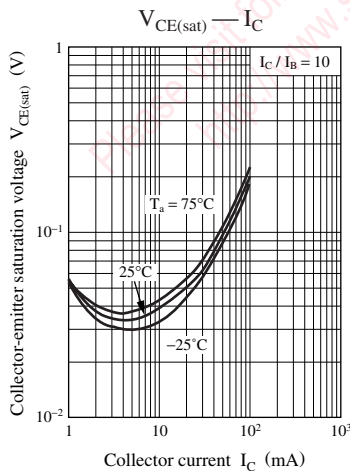
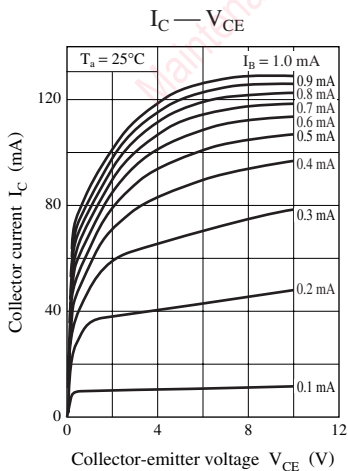
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--|---------------|--|------|-----|-------|------------------|
| Collector-base voltage (Emitter open) | V_{CBO} | $I_C = -10 \mu\text{A}, I_E = 0$ | -50 | | | V |
| Collector-emitter voltage (Base open) | V_{CEO} | $I_C = -2 \text{ mA}, I_B = 0$ | -50 | | | V |
| Collector-base cutoff current (Emitter open) | I_{CBO} | $V_{CB} = -50 \text{ V}, I_E = 0$ | | | -0.1 | μA |
| Collector-emitter cutoff current (Base open) | I_{CEO} | $V_{CE} = -50 \text{ V}, I_B = 0$ | | | -0.5 | μA |
| Emitter-base cutoff current (Collector open) | I_{EBO} | $V_{EB} = -6 \text{ V}, I_C = 0$ | | | -0.5 | mA |
| Forward current transfer ratio | h_{FE} | $V_{CE} = -10 \text{ V}, I_C = -5 \text{ mA}$ | 35 | | | - |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -10 \text{ mA}, I_B = -0.3 \text{ mA}$ | | | -0.25 | V |
| Output voltage high-level | V_{OH} | $V_{CC} = -5 \text{ V}, V_B = -0.5 \text{ V}, R_L = 1 \text{ k}\Omega$ | -4.9 | | | V |
| Output voltage low-level | V_{OL} | $V_{CC} = -5 \text{ V}, V_B = -2.5 \text{ V}, R_L = 1 \text{ k}\Omega$ | | | -0.2 | V |
| Input resistance | R_1 | | -30% | 10 | +30% | $\text{k}\Omega$ |
| Resistance ratio | R_1/R_2 | | 0.8 | 1.0 | 1.2 | - |
| Transition frequency | f_T | $V_{CB} = -10 \text{ V}, I_E = 1 \text{ mA}, f = 200 \text{ MHz}$ | | 80 | | MHz |

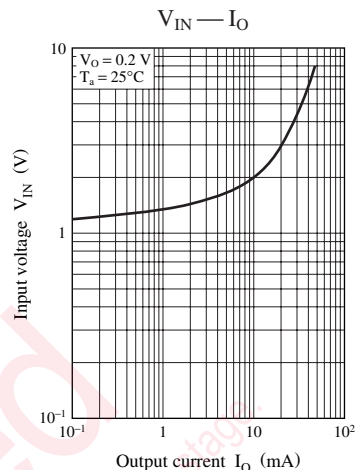
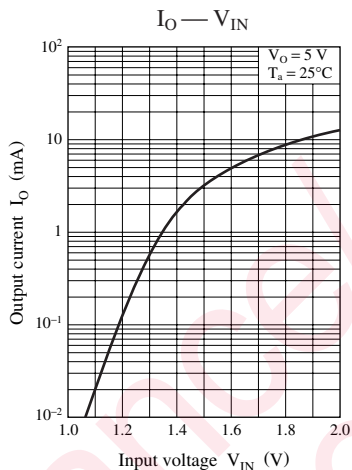
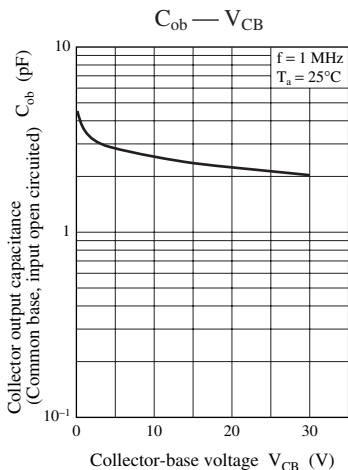
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Common characteristics chart

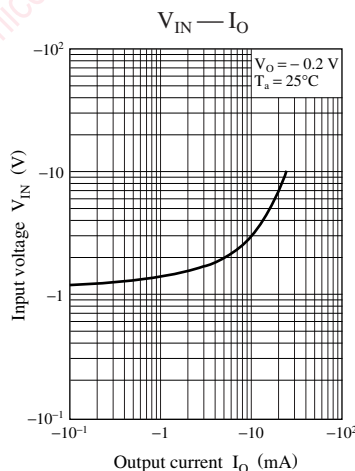
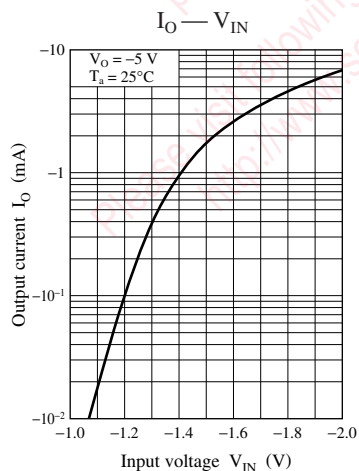
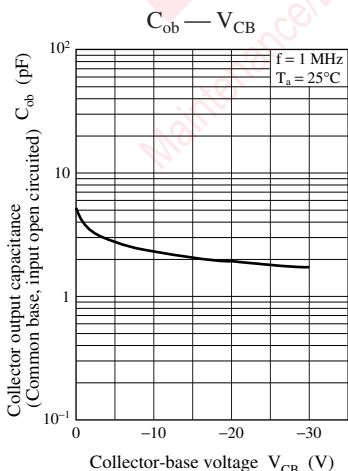
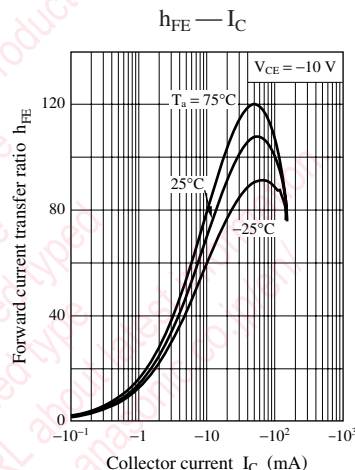
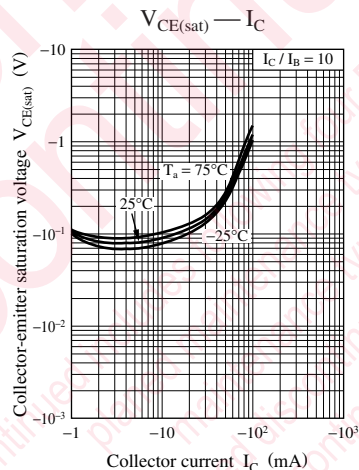
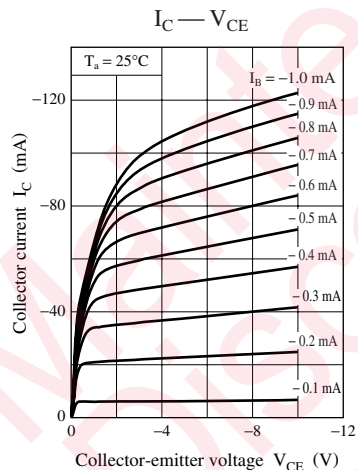


Characteristics charts of Tr1





Characteristics charts of Tr2



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