

# XP04311 (XP4311)

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

For switching/digital circuits

## ■ Features

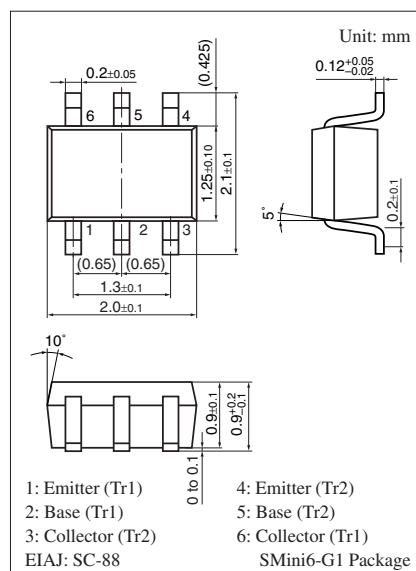
- Two elements incorporated into one package  
(Transistors with built-in resistor)
- Reduction of the mounting area and assembly cost by one half

## ■ Basic Part Number

- UNR2211 (UN2211) + UNR2111 (UN2111)

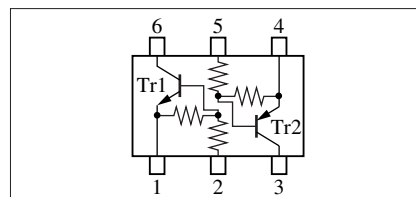
## ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

|         | Parameter                                | Symbol    | Rating      | Unit             |
|---------|------------------------------------------|-----------|-------------|------------------|
| Tr1     | Collector-base voltage<br>(Emitter open) | $V_{CBO}$ | 50          | V                |
|         | Collector-emitter voltage<br>(Base open) | $V_{CEO}$ | 50          | V                |
|         | Collector current                        | $I_C$     | 100         | mA               |
| Tr2     | Collector-base voltage<br>(Emitter open) | $V_{CBO}$ | -50         | V                |
|         | Collector-emitter voltage<br>(Base open) | $V_{CEO}$ | -50         | V                |
|         | Collector current                        | $I_C$     | -100        | mA               |
| Overall | Total power dissipation                  | $P_T$     | 150         | mW               |
|         | Junction temperature                     | $T_j$     | 150         | $^\circ\text{C}$ |
|         | Storage temperature                      | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |



Marking Symbol: 7X

Internal Connection



Note) The part number in the parenthesis shows conventional part number.

# ■ 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  | $\mu\text{A}$    |
| Collector-emitter cutoff current (Base open) | $I_{CEO}$     | $V_{CE} = 50\ \text{V}$ , $I_B = 0$                                        |      |     | 0.5  | $\mu\text{A}$    |
| 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              |

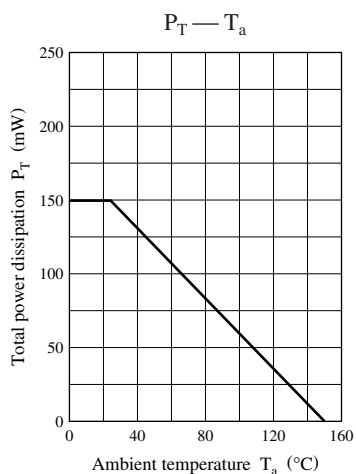
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

## • Tr2

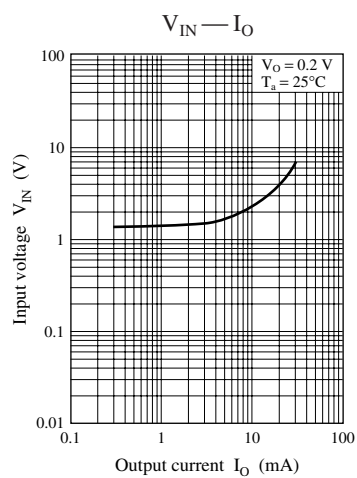
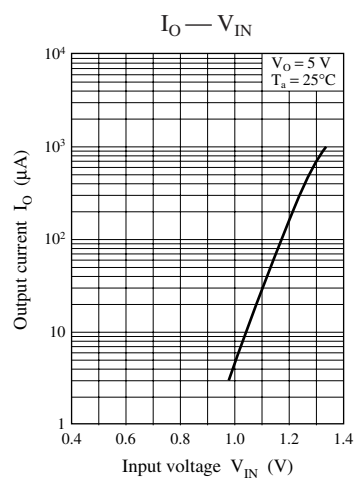
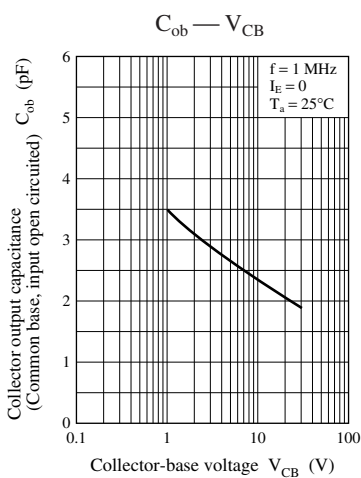
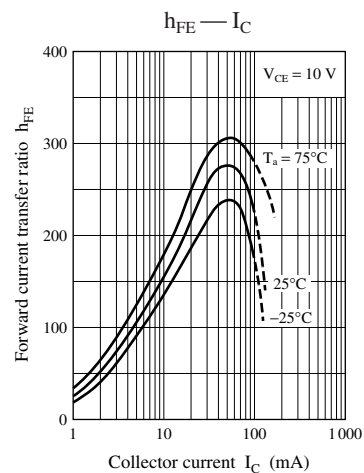
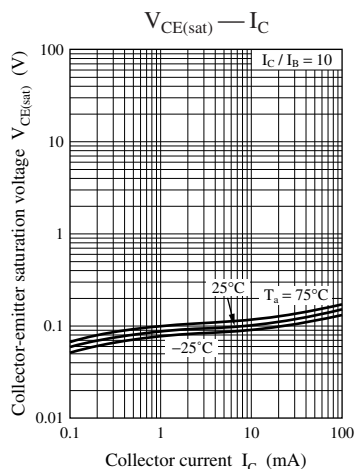
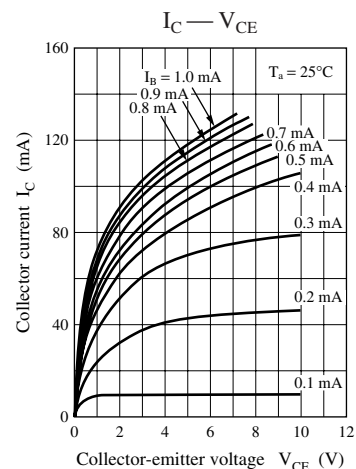
| Parameter                                    | Symbol        | Conditions                                                                   | Min  | Typ | Max   | Unit             |
|----------------------------------------------|---------------|------------------------------------------------------------------------------|------|-----|-------|------------------|
| Collector-base voltage (Emitter open)        | $V_{CBO}$     | $I_C = -10\ \mu\text{A}$ , $I_E = 0$                                         | -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  | $\mu\text{A}$    |
| Collector-emitter cutoff current (Base open) | $I_{CEO}$     | $V_{CE} = -50\ \text{V}$ , $I_B = 0$                                         |      |     | -0.5  | $\mu\text{A}$    |
| 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.

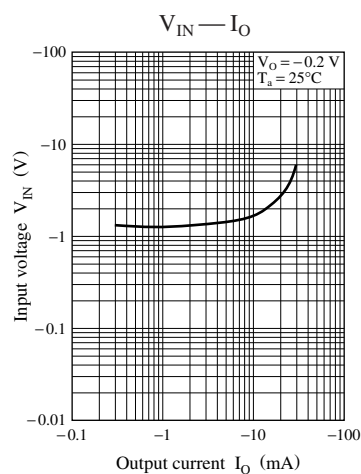
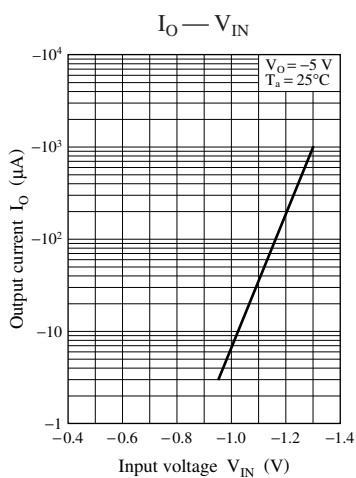
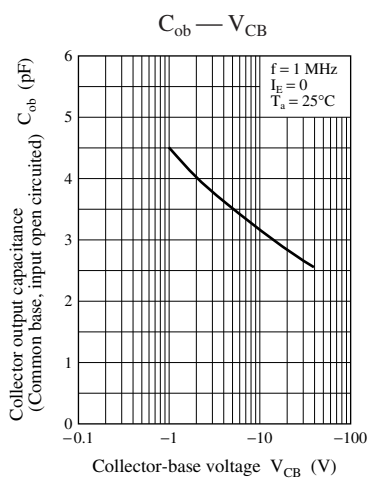
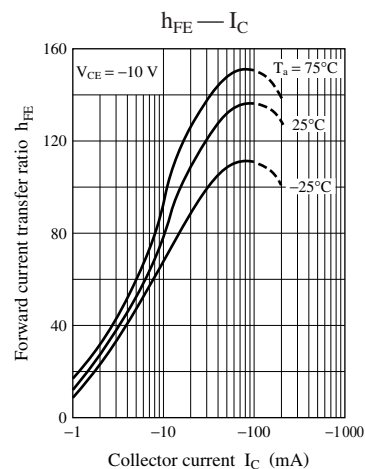
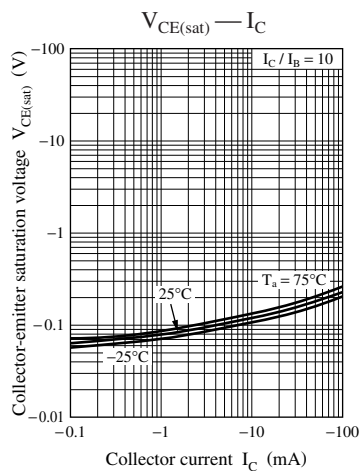
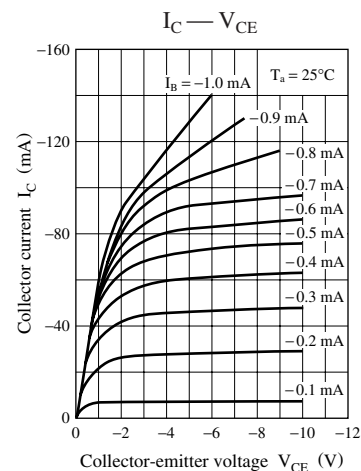
## Common characteristics chart



## Characteristics charts of Tr1



## Characteristics charts of Tr2



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