

# UP0431NG

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

- UNR2213 + UNR211F

■ 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 | $^\circ\text{C}$ |

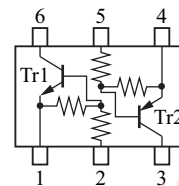
■ Package

- Code  
SSMini6-F2
- Pin Name
 

|                    |                    |
|--------------------|--------------------|
| 1: Emitter (Tr1)   | 4: Emitter (Tr2)   |
| 2: Base (Tr1)      | 5: Base (Tr2)      |
| 3: Collector (Tr2) | 6: Collector (Tr1) |

■ Marking Symbol: HC

■ 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)        | $V_{CBO}$     | $I_C = 10 \mu\text{A}, I_E = 0$                                      | 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) | $I_{EBO}$     | $V_{EB} = 6 \text{ V}, I_C = 0$                                      |      |      | 2    | mA               |
| Forward current transfer ratio               | $h_{FE}$      | $V_{CE} = 10 \text{ V}, I_C = 5 \text{ mA}$                          | 80   |      |      | —                |
| 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% | 4.7  | +30% | $\text{k}\Omega$ |
| Resistance ratio                             | $R_1 / R_2$   |  | 0.08 | 0.10 | 0.12 | —                |
| 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.

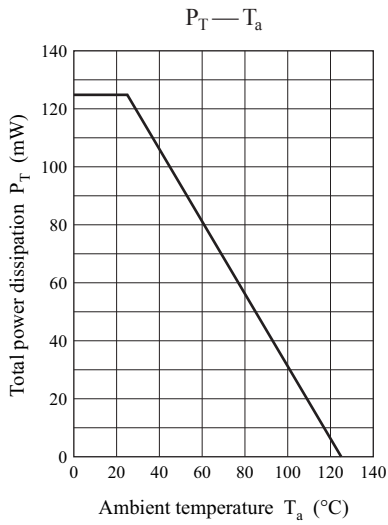
■ Electrical Characteristics (Continued)  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

• Tr2

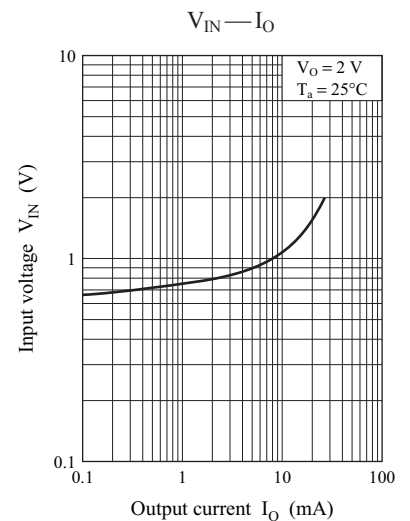
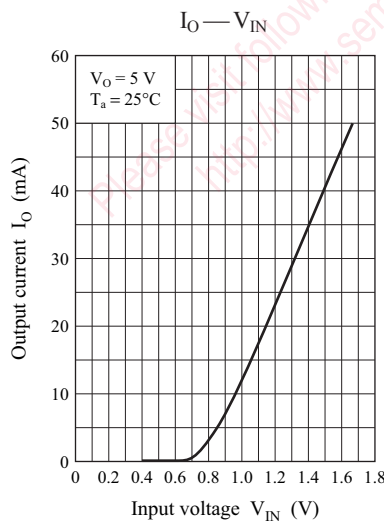
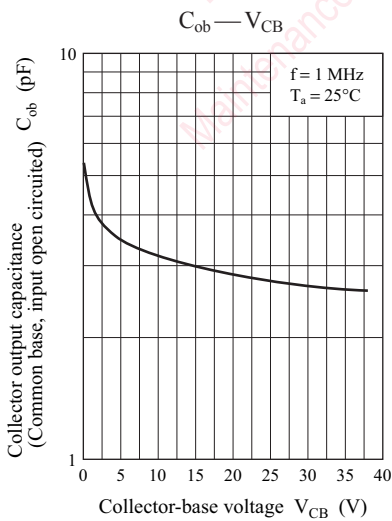
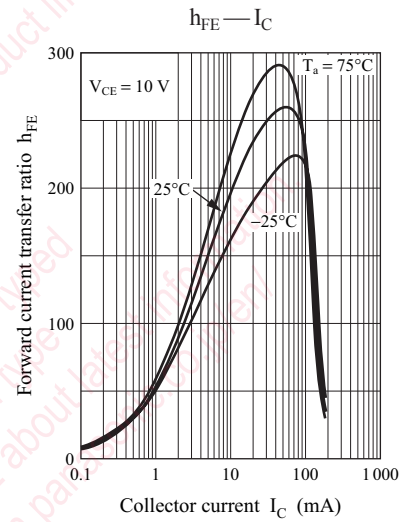
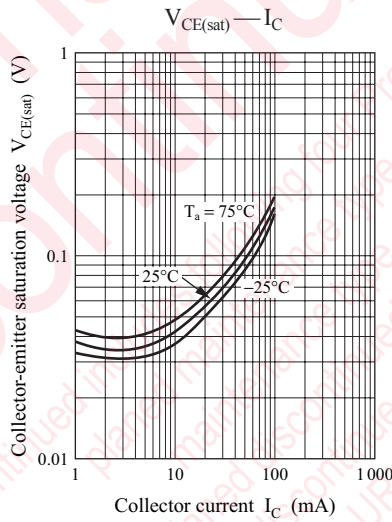
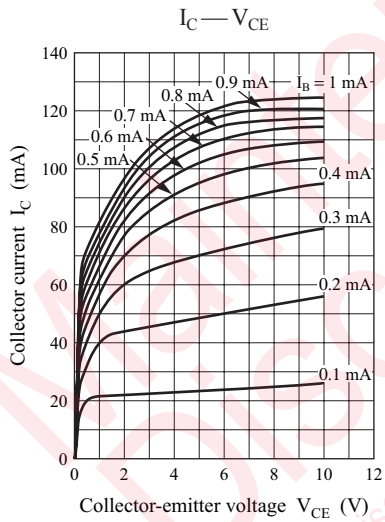
| Parameter                                    | Symbol        | Conditions   | Min  | Typ  | Max   | Unit             |
|--|---------------|--|------|------|-------|------------------|
| Collector-base voltage (Emitter open)        | $V_{CBO}$     | $I_C = -10 \mu\text{A}, I_E = 0$                                       | -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  | $\mu\text{A}$    |
| 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) | $I_{EBO}$     | $V_{EB} = -6 \text{ V}, I_C = 0$                                       |      |      | -2    | mA               |
| Forward current transfer ratio               | $h_{FE}$      | $V_{CE} = -10 \text{ V}, I_C = -5 \text{ mA}$                          | 80   |      |       | —                |
| 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% | 4.7  | +30%  | $\text{k}\Omega$ |
| Resistance ratio                             | $R_1 / R_2$   |  | 0.08 | 0.10 | 0.12  | —                |
| 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.

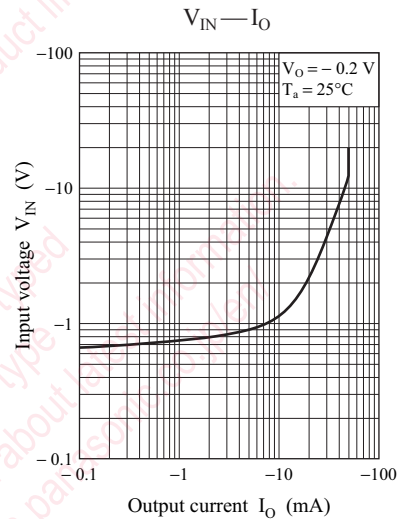
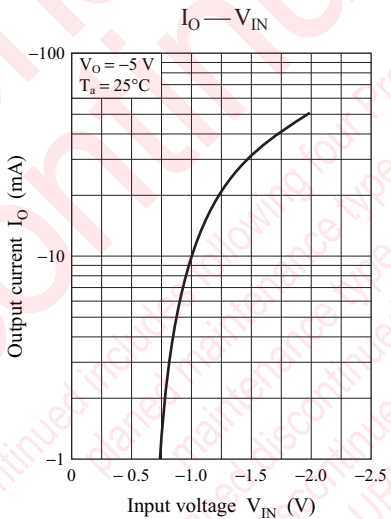
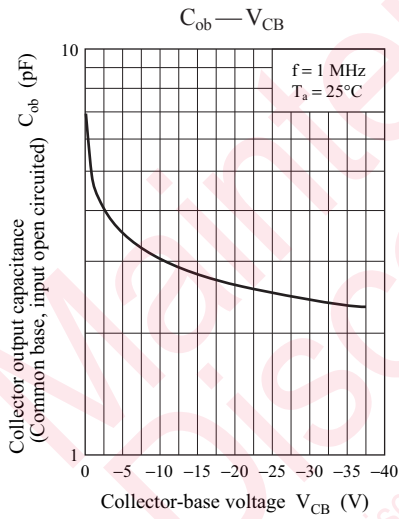
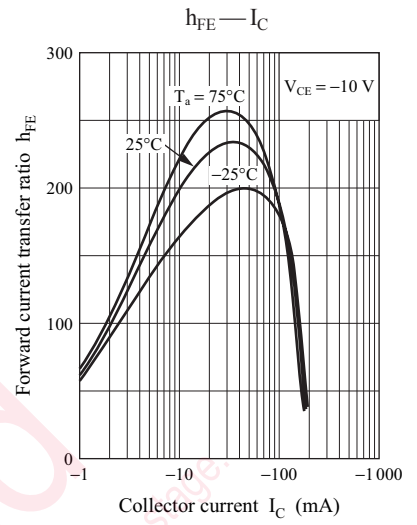
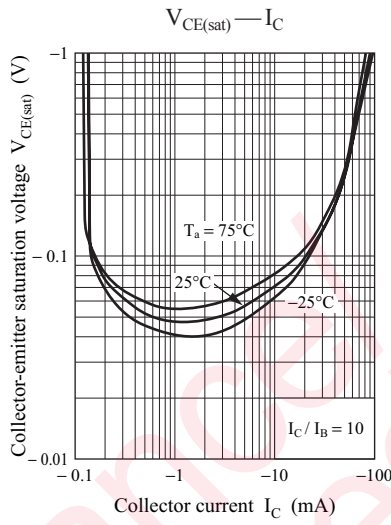
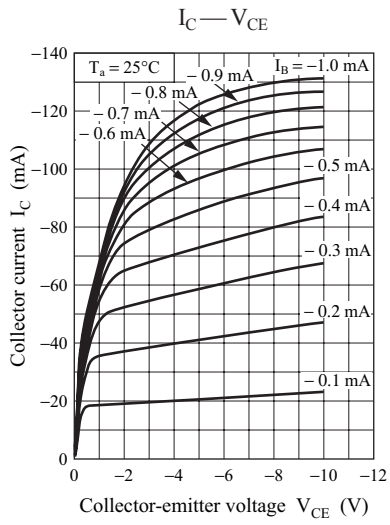
Common characteristics chart



Characteristics charts of Tr1

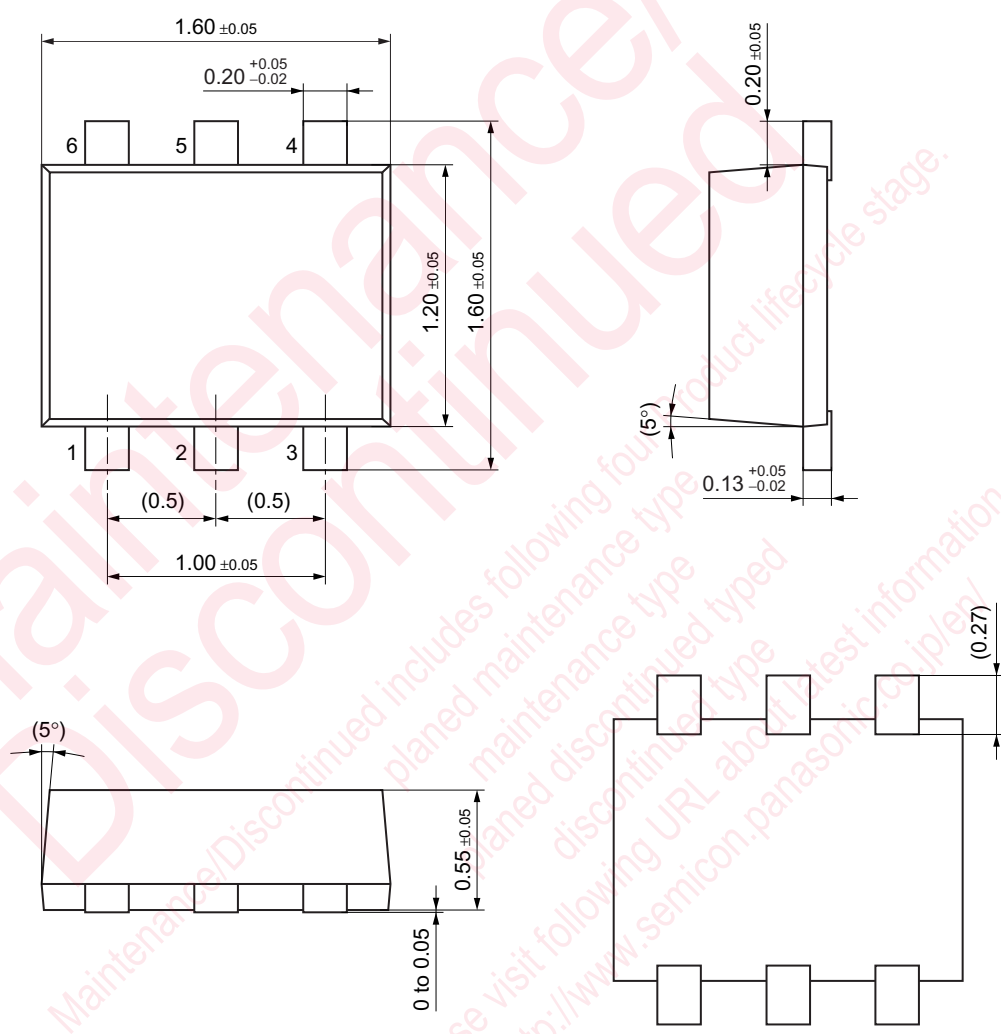


Characteristics charts of Tr2



SSMini6-F2

Unit: mm



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