

# UNR222x Series (UN222x Series)

Silicon NPN epitaxial planar type

For digital circuits

## ■ Features

- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- Mini type package allowing easy automatic insertion through tape packing and magazine packing

## ■ Resistance by Part Number

|           |          | Marking Symbol (R <sub>1</sub> ) |        | (R <sub>2</sub> ) |
|-----------|----------|----------------------------------|--------|-------------------|
| • UNR2221 | (UN2221) | 9A                               | 2.2 kΩ | 2.2 kΩ            |
| • UNR2222 | (UN2222) | 9B                               | 4.7 kΩ | 4.7 kΩ            |
| • UNR2223 | (UN2223) | 9C                               | 10 kΩ  | 10 kΩ             |
| • UNR2224 | (UN2224) | 9D                               | 2.2 kΩ | 10 kΩ             |

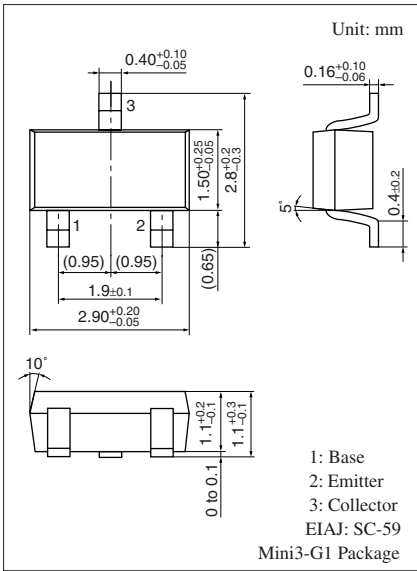
## ■ Absolute Maximum Ratings T<sub>a</sub> = 25°C

| Parameter                             | Symbol           | Rating      | Unit |
|---------------------------------------|------------------|-------------|------|
| Collector-base voltage (Emitter open) | V <sub>CBO</sub> | 50          | V    |
| Collector-emitter voltage (Base open) | V <sub>CEO</sub> | 50          | V    |
| Collector current                     | I <sub>C</sub>   | 500         | mA   |
| Total power dissipation               | P <sub>T</sub>   | 200         | mW   |
| Junction temperature                  | T <sub>j</sub>   | 150         | °C   |
| Storage temperature                   | T <sub>stg</sub> | -55 to +150 | °C   |

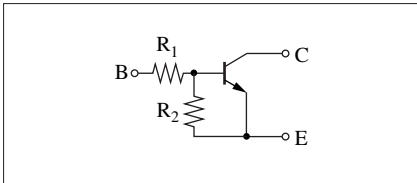
## ■ Electrical Characteristics T<sub>a</sub> = 25°C ± 3°C

| Parameter                                    |              | Symbol               | Conditions                                                            | Min | Typ | Max  | Unit |
|----------------------------------------------|--------------|----------------------|-----------------------------------------------------------------------|-----|-----|------|------|
| Collector-base voltage (Emitter open)        |              | V <sub>CBO</sub>     | I <sub>C</sub> = 10 μA, I <sub>E</sub> = 0                            | 50  |     |      | V    |
| Collector-emitter voltage (Base open)        |              | V <sub>CEO</sub>     | I <sub>C</sub> = 2 mA, I <sub>B</sub> = 0                             | 50  |     |      | V    |
| Collector-base cutoff current (Emitter open) |              | I <sub>CBO</sub>     | V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0                            |     |     | 1    | μA   |
| Collector-emitter cutoff current (Base open) |              | I <sub>CEO</sub>     | V <sub>CE</sub> = 50 V, I <sub>B</sub> = 0                            |     |     | 1    | μA   |
| Emitter-base cutoff current (Collector open) | UNR2221      | I <sub>EBO</sub>     | V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0                             |     |     | 5    | mA   |
|                                              | UNR2222      |                      |                                                                       |     |     | 2    |      |
|                                              | UNR2223/2224 |                      |                                                                       |     |     | 1    |      |
| Forward current transfer ratio               | UNR2221      | h <sub>FE</sub>      | V <sub>CE</sub> = 10 V, I <sub>C</sub> = 100 mA                       | 40  |     |      | —    |
|                                              | UNR2222      |                      |                                                                       | 50  |     |      |      |
|                                              | UNR2223/2224 |                      |                                                                       | 60  |     |      |      |
| Collector-emitter saturation voltage         |              | V <sub>CE(sat)</sub> | I <sub>C</sub> = 10 mA, I <sub>B</sub> = 5 mA                         |     |     | 0.25 | V    |
| Output voltage high-level                    |              | V <sub>OH</sub>      | V <sub>CC</sub> = 5 V, V <sub>B</sub> = 0.5 V, R <sub>L</sub> = 500 Ω | 4.9 |     |      | V    |
| Output voltage low-level                     |              | V <sub>OL</sub>      | V <sub>CC</sub> = 5 V, V <sub>B</sub> = 3.5 V, R <sub>L</sub> = 500 Ω |     |     | 0.2  | V    |

Note) The part numbers in the parenthesis show conventional part number.



## Internal Connection

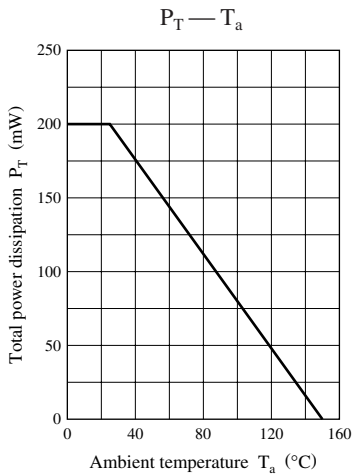


■ Electrical Characteristics (continued)  $T_a = 25^{\circ}\text{C} \pm 3^{\circ}\text{C}$

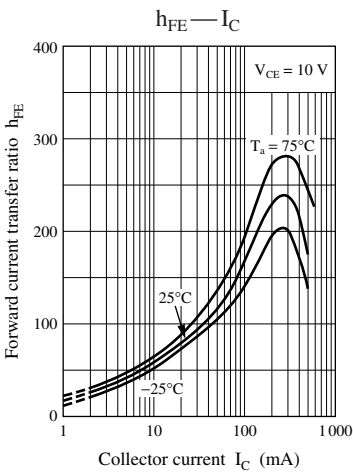
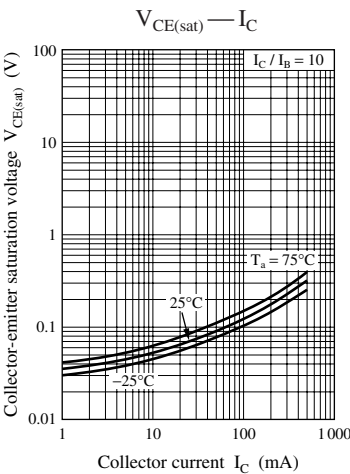
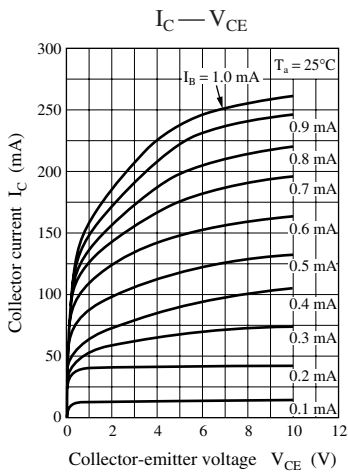
| Parameter            |              | Symbol    | Conditions                                                            | Min  | Typ  | Max  | Unit             |
|----------------------|--------------|-----------|-----------------------------------------------------------------------|------|------|------|------------------|
| Transition frequency |              | $f_T$     | $V_{CB} = 10\text{ V}$ , $I_E = -50\text{ mA}$ , $f = 200\text{ MHz}$ |      | 200  |      | MHz              |
| Input resistance     | UNR2221/2224 | $R_1$     |                                                                       | -30% | 2.2  | +30% | $\text{k}\Omega$ |
|                      | UNR2222      |           |                                                                       |      | 4.7  |      |                  |
|                      | UNR2223      |           |                                                                       |      | 10   |      |                  |
| Resistance ratio     |              | $R_1/R_2$ |                                                                       | 0.8  | 1.0  | 1.2  | —                |
|                      | UNR2224      |           |                                                                       | 0.17 | 0.22 | 0.27 |                  |

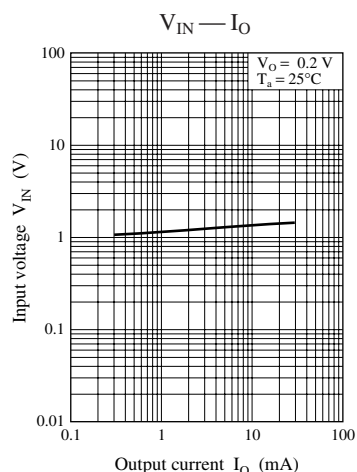
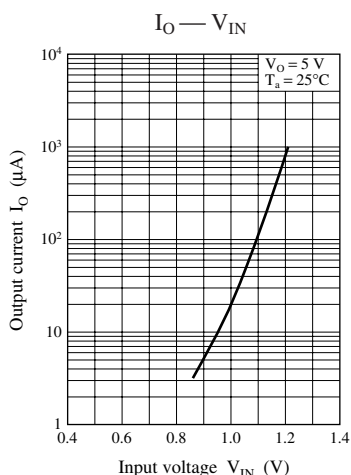
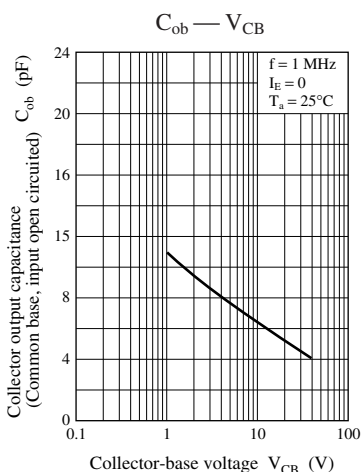
Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

Common characteristics chart

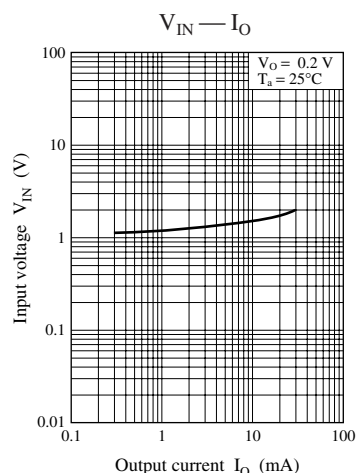
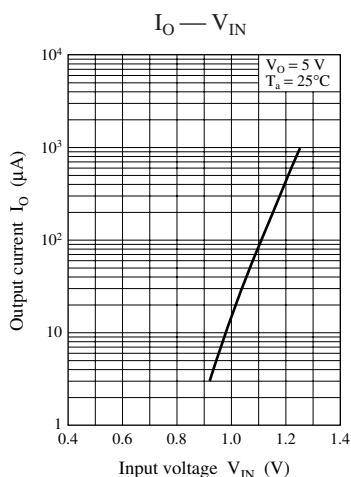
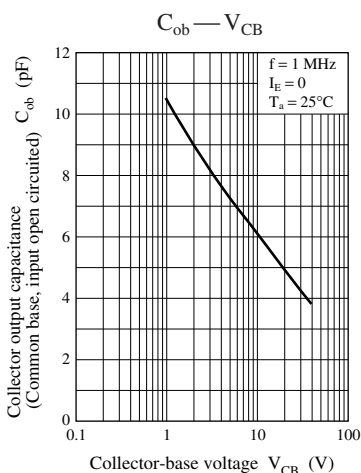
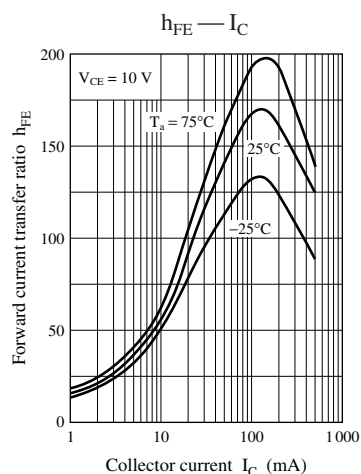
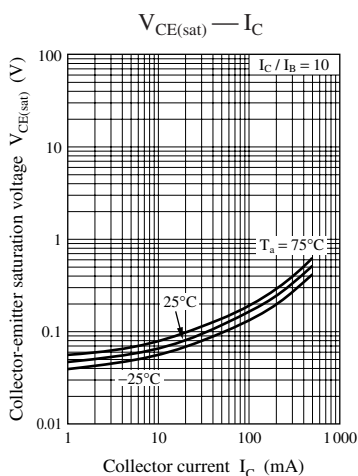
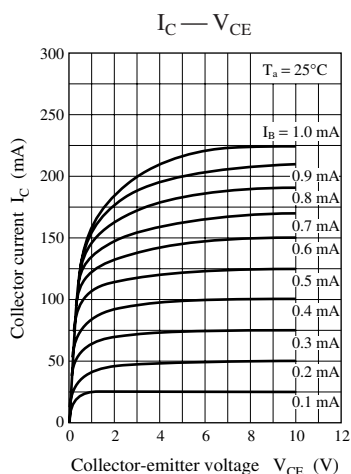


Characteristics charts of UNR2221

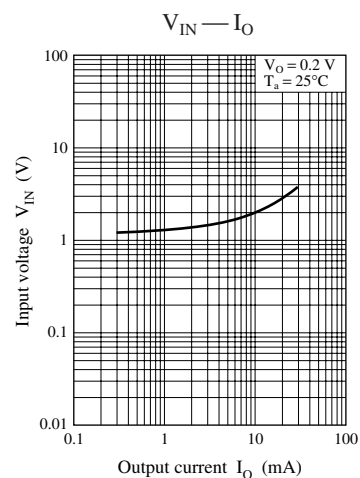
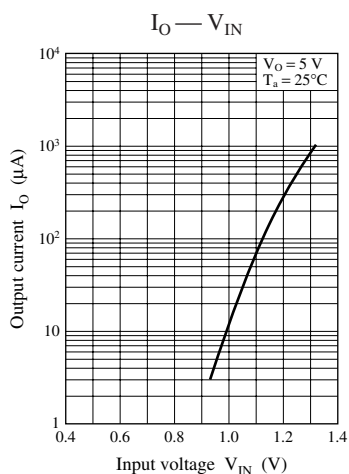
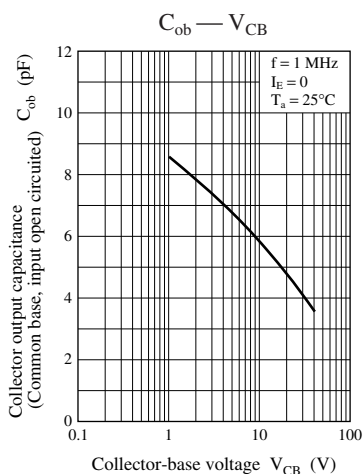
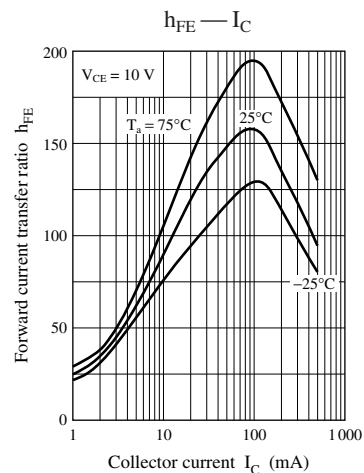
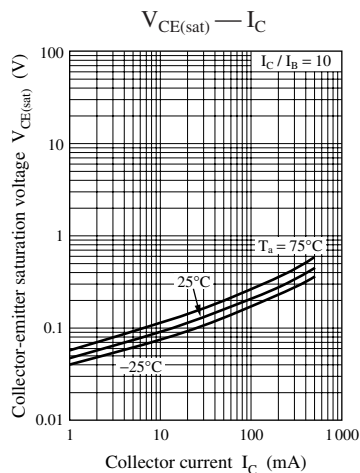
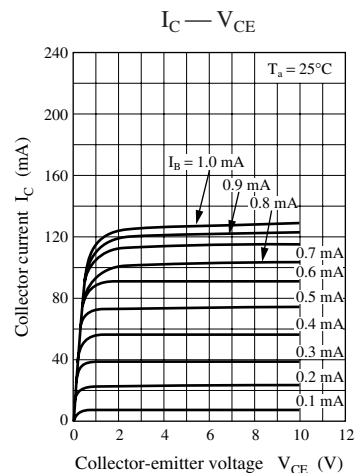




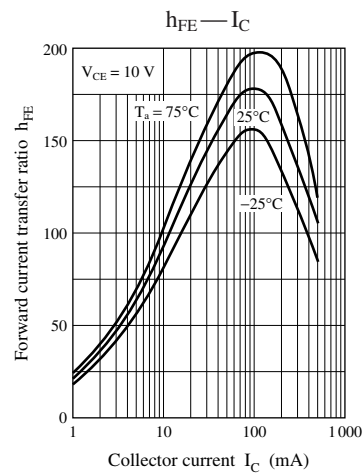
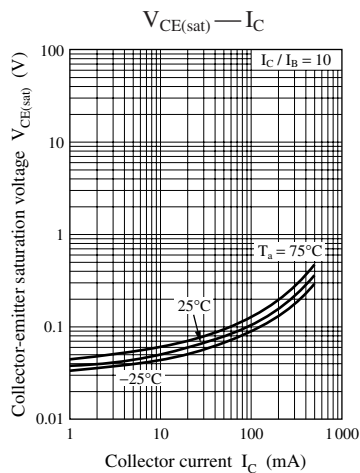
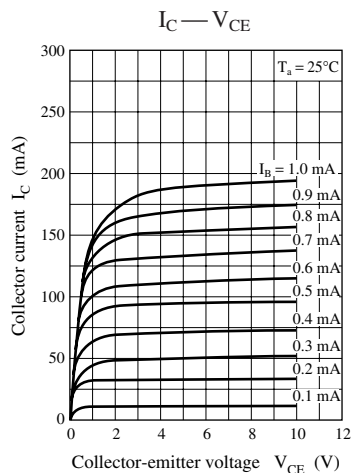
Characteristics charts of UNR2222

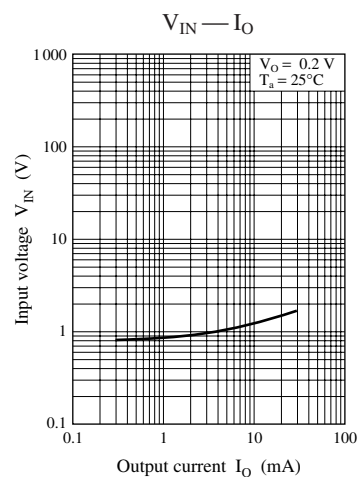
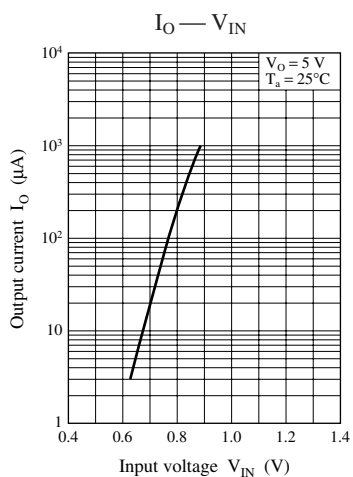
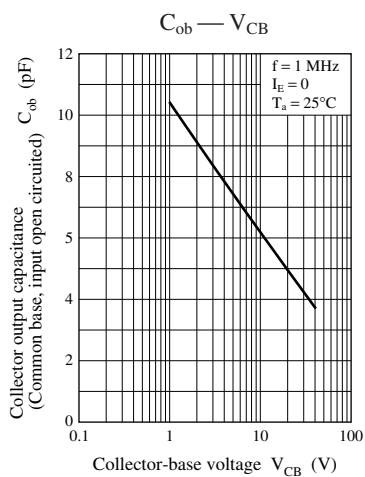


Characteristics charts of UNR2223



Characteristics charts of UNR2224





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