

# UNR2111/2112/2113/2114/2115/2116/2117/2118/2119/2110/ 211D/211E/211F/211H/211L/211M/211N/211T/211V/211Z

## (UN2111/2112/2113/2114/2115/2116/2117/2118/2119/2110/ 211D/211E/211F/211H/211L/211M/211N/211T/211V/211Z)

### Silicon PNP epitaxial planer transistor

For digital circuits

#### Features

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

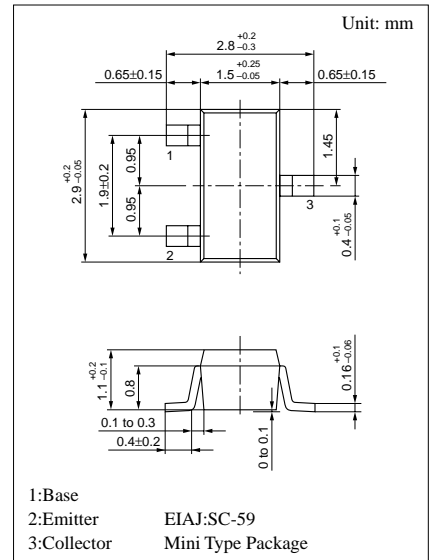
#### Resistance by Part Number

|           | Marking Symbol | (R <sub>1</sub> ) | (R <sub>2</sub> ) |
|-----------|----------------|-------------------|-------------------|
| • UNR2111 | 6A             | 10kΩ              | 10kΩ              |
| • UNR2112 | 6B             | 22kΩ              | 22kΩ              |
| • UNR2113 | 6C             | 47kΩ              | 47kΩ              |
| • UNR2114 | 6D             | 10kΩ              | 47kΩ              |
| • UNR2115 | 6E             | 10kΩ              | —                 |
| • UNR2116 | 6F             | 4.7kΩ             | —                 |
| • UNR2117 | 6H             | 22kΩ              | —                 |
| • UNR2118 | 6I             | 0.51kΩ            | 5.1kΩ             |
| • UNR2119 | 6K             | 1kΩ               | 10kΩ              |
| • UNR2110 | 6L             | 47kΩ              | —                 |
| • UNR211D | 6M             | 47kΩ              | 10kΩ              |
| • UNR211E | 6N             | 47kΩ              | 22kΩ              |
| • UNR211F | 6O             | 4.7kΩ             | 10kΩ              |
| • UNR211H | 6P             | 2.2kΩ             | 10kΩ              |
| • UNR211L | 6Q             | 4.7kΩ             | 4.7kΩ             |
| • UNR211M | EI             | 2.2kΩ             | 47kΩ              |
| • UNR211N | EW             | 4.7kΩ             | 47kΩ              |
| • UNR211T | EY             | 22kΩ              | 47kΩ              |
| • UNR211V | FC             | 2.2kΩ             | 2.2kΩ             |
| • UNR211Z | FE             | 4.7kΩ             | 22kΩ              |

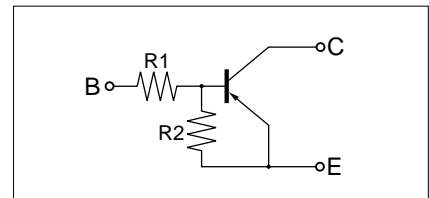
#### Absolute Maximum Ratings (T<sub>a</sub>=25°C)

| Parameter                    | Symbol           | Ratings     | Unit |
|------------------------------|------------------|-------------|------|
| Collector to base voltage    | V <sub>CBO</sub> | -50         | V    |
| Collector to emitter voltage | V <sub>CEO</sub> | -50         | V    |
| Collector current            | I <sub>C</sub>   | -100        | 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   |

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



#### Internal Connection



UNR2111/2112/2113/2114/2115/2116/2117/2118/2119/2110/  
**Transistors with built-in Resistor 211D/211E/211F/211H/211L/211M/211N/211T/211V/211Z**

**Electrical Characteristics** (Ta=25°C)

| Parameter                               |                                       | Symbol               | Conditions  | min     | typ  | max    | Unit  |      |
|---|---------------------------------------|----------------------|---|---------|------|--------|-------|------|
| Collector cutoff current                |                                       | I <sub>CBO</sub>     | V <sub>CB</sub> = -50V, I <sub>E</sub> = 0                          |         |      | -0.1   | μA    |      |
|   |                                       | I <sub>CEO</sub>     | V <sub>CE</sub> = -50V, I <sub>B</sub> = 0                          |         |      | -0.5   | μA    |      |
| Emitter cutoff current                  | UNR2111                               | I <sub>EBO</sub>     | V <sub>EB</sub> = -6V, I <sub>C</sub> = 0                           |         |      | -0.5   | mA    |      |
|   | UNR2112/2114/211E/211D/211M/211N/211T |                      |   |         |      | -0.2   |       |      |
|   | UNR2113                               |                      |   |         |      | -0.1   |       |      |
|   | UNR2115/2116/2117/2110                |                      |   |         |      | -0.01  |       |      |
|   | UNR211F/211H                          |                      |   |         |      | -1.0   |       |      |
|   | UNR2119                               |                      |   |         |      | -1.5   |       |      |
|   | UNR2118/211L/211V                     |                      |   |         |      | -2.0   |       |      |
|   | UNR211Z                               |                      |   |         |      | -0.4   |       |      |
| Collector to base voltage               |                                       | V <sub>CBO</sub>     | I <sub>C</sub> = -10mA, I <sub>E</sub> = 0                          | -50     |      |        | V     |      |
| Collector to emitter voltage            |                                       | V <sub>CEO</sub>     | I <sub>C</sub> = -2mA, I <sub>B</sub> = 0                           | -50     |      |        | V     |      |
| Forward current transfer ratio          | UNR2111                               | h <sub>FE</sub>      | V <sub>CE</sub> = -10V, I <sub>C</sub> = -5mA                       | 35      |      |        |       |      |
|   | UNR2112/211E                          |                      |   | 60      |      |        |       |      |
|   | UNR2113/2114/211M                     |                      |   | 80      |      |        |       |      |
|   | UNR2115*/2116*/2117*/2110*            |                      |   | 160     |      | 460    |       |      |
|   | UNR2119/211F/211D/211H                |                      |   | 30      |      |        |       |      |
|   | UNR2118/211L                          |                      |   | 20      |      |        |       |      |
|   | UNR211N/211T                          |                      |   | 80      |      | 400    |       |      |
|   | UNR211V                               |                      |   | 6       |      | 20     |       |      |
|   | UNR211Z                               |                      |   | 60      |      | 200    |       |      |
| Collector to emitter saturation voltage |                                       | V <sub>CE(sat)</sub> | I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.3mA                     |         |      | -0.25  | V     |      |
|   |                                       |                      |   | UNR211V |      | -0.07  | -0.25 | V    |
| Output voltage high level               |                                       | V <sub>OH</sub>      | V <sub>CC</sub> = -5V, V <sub>B</sub> = -0.5V, R <sub>L</sub> = 1kΩ | -4.9    |      |        | V     |      |
| Output voltage low level                |                                       | V <sub>OL</sub>      | V <sub>CC</sub> = -5V, V <sub>B</sub> = -2.5V, R <sub>L</sub> = 1kΩ |         |      | -0.2   | V     |      |
|   |                                       |                      |   | UNR2113 |      |        |       | -0.2 |
|   |                                       |                      |   | UNR211D |      |        |       | -0.2 |
|   |                                       |                      |   | UNR211E |      |        |       | -0.2 |
| Transition frequency                    |                                       | f <sub>T</sub>       | V <sub>CB</sub> = -10V, I <sub>E</sub> = 1mA, f = 200MHz            |         | 80   |        | MHz   |      |
| Input resistance                        | UNR2111/2114/2115                     | R <sub>I</sub>       |   | (-30%)  | 10   | (+30%) | kΩ    |      |
|   | UNR2112/2117/211T                     |                      |   |         | 22   |        |       |      |
|   | UNR2113/2110/211D/211E                |                      |   |         | 47   |        |       |      |
|   | UNR2116/211F/211L/211N/211Z           |                      |   |         | 4.7  |        |       |      |
|   | UNR2118                               |                      |   |         | 0.51 |        |       |      |
|   | UNR2119                               |                      |   |         | 1    |        |       |      |
|   | UNR211H/211M/211V                     |                      |   |         | 2.2  |        |       |      |

\* h<sub>FE</sub> rank classification (UNR2115/2116/2117/2110)

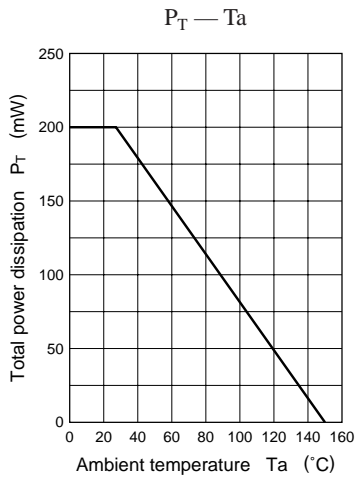
| Rank            | Q          | R          | S          |
|-----------------|------------|------------|------------|
| h <sub>FE</sub> | 160 to 260 | 210 to 340 | 290 to 460 |

UNR2111/2112/2113/2114/2115/2116/2117/2118/2119/2110/  
**Transistors with built-in Resistor 211D/211E/211F/211H/211L/211M/211N/211T/211V/211Z**

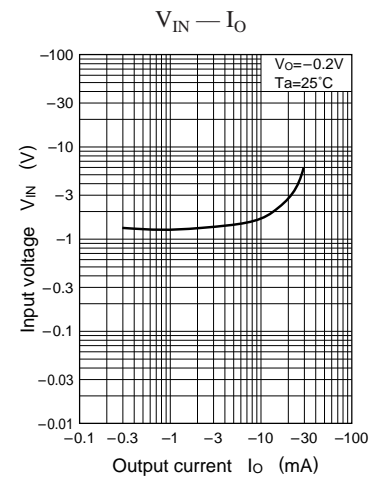
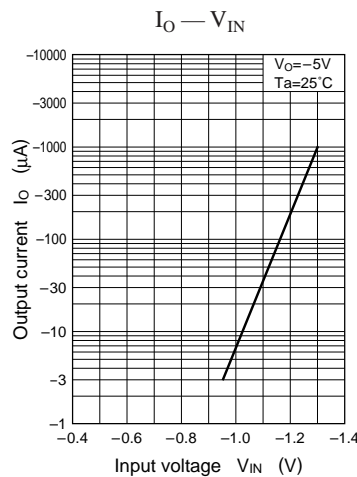
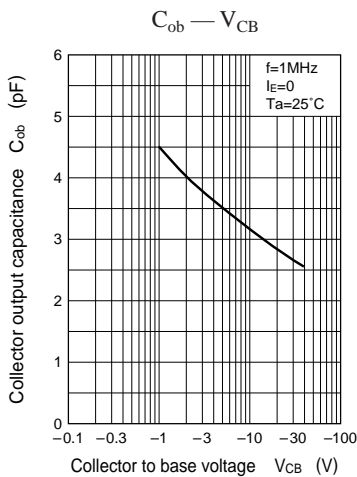
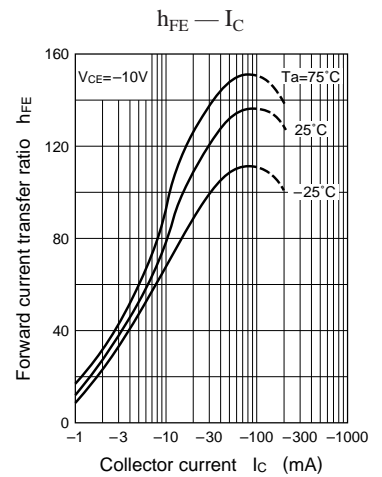
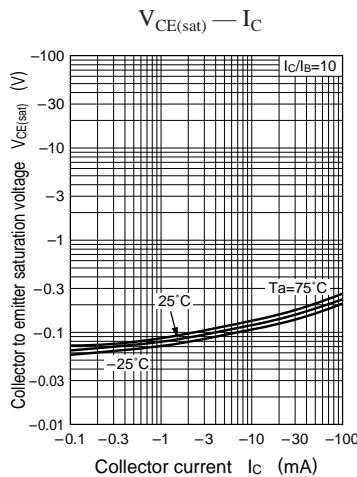
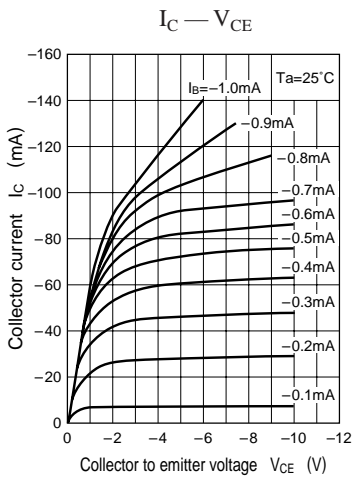
■ **Electrical Characteristics (continued)** (Ta=25°C)

| Parameter                |                        | Symbol    | Conditions | min  | typ   | max  | Unit |
|--------------------------|------------------------|-----------|------------|------|-------|------|------|
| Resis-<br>tance<br>ratio | UNR2111/2112/2113/211L | $R_1/R_2$ |            | 0.8  | 1.0   | 1.2  |      |
|                          | UNR2114                |           |            | 0.17 | 0.21  | 0.25 |      |
|                          | UNR2118/2119           |           |            | 0.08 | 0.1   | 0.12 |      |
|                          | UNR211D                |           |            |      | 4.7   |      |      |
|                          | UNR211E                |           |            |      | 2.14  |      |      |
|                          | UNR211F/211T           |           |            |      | 0.47  |      |      |
|                          | UNR211H                |           |            | 0.17 | 0.22  | 0.27 |      |
|                          | UNR211M                |           |            |      | 0.047 |      |      |
|                          | UNR211N                |           |            |      | 0.1   |      |      |
|                          | UNR211V                |           |            |      | 1.0   |      |      |
|                          | UNR211Z                |           |            |      | 0.21  |      |      |

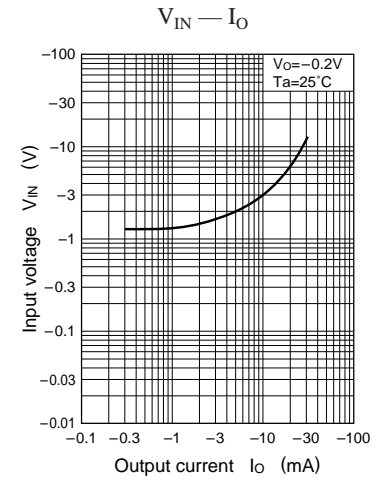
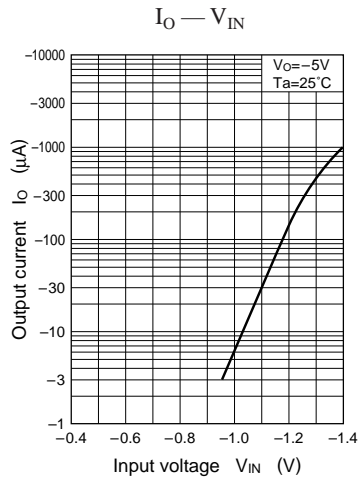
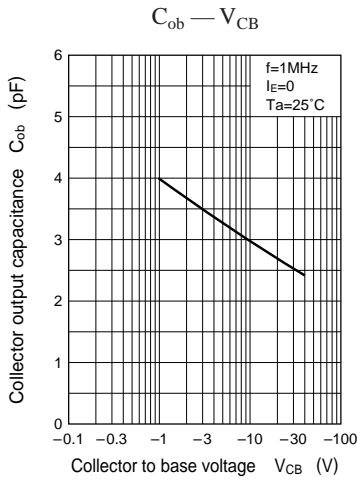
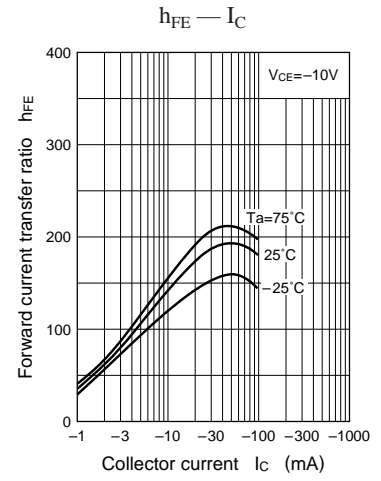
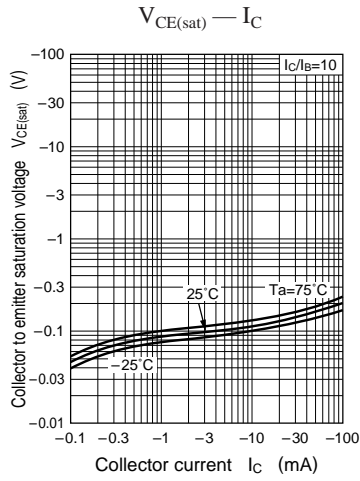
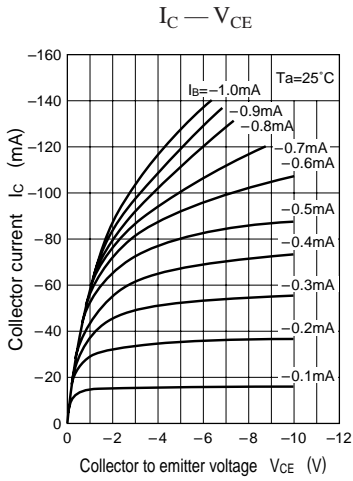
Common characteristics chart



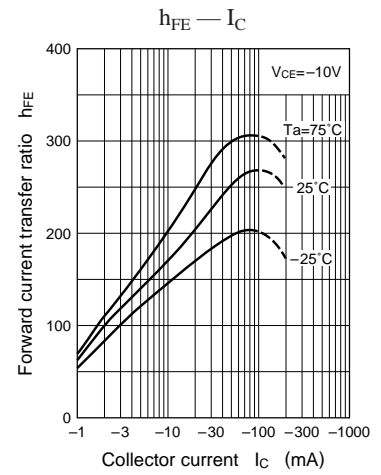
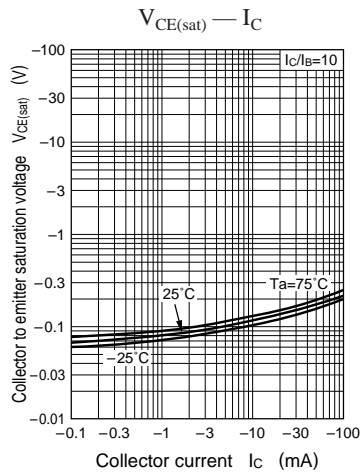
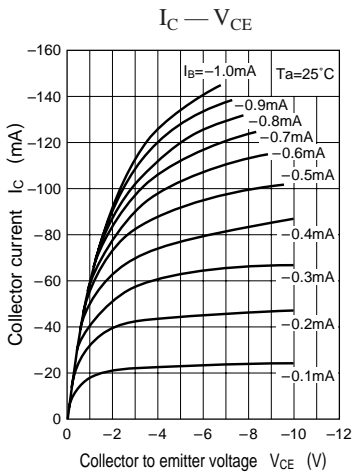
Characteristics charts of UNR2111

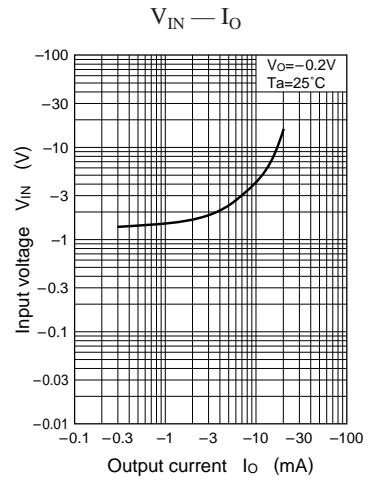
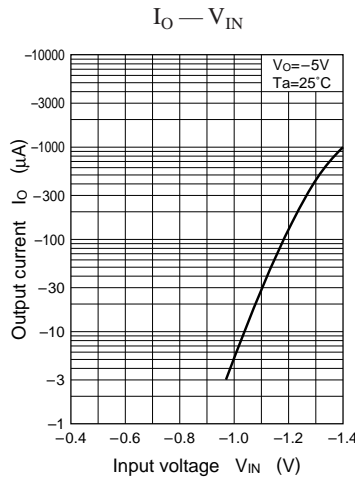
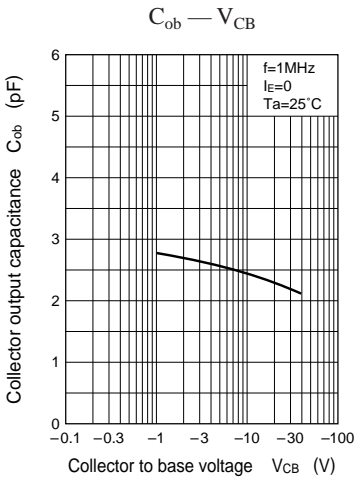


Characteristics charts of UNR2112

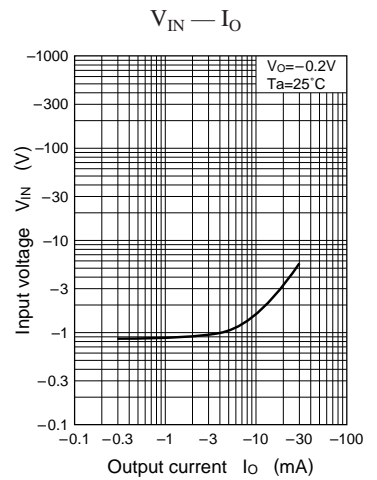
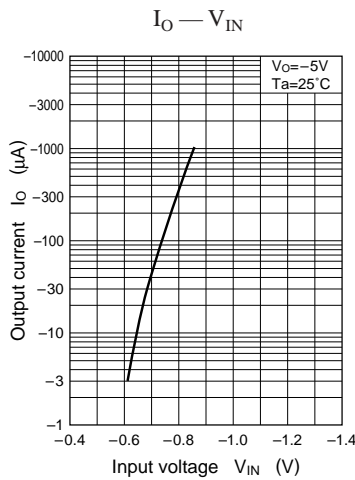
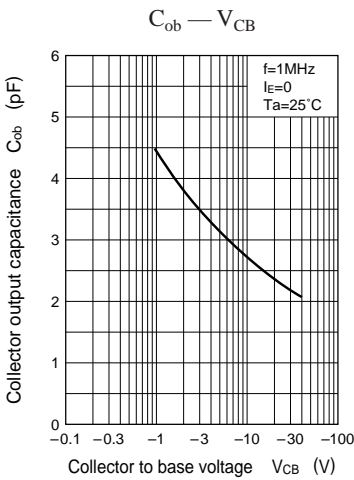
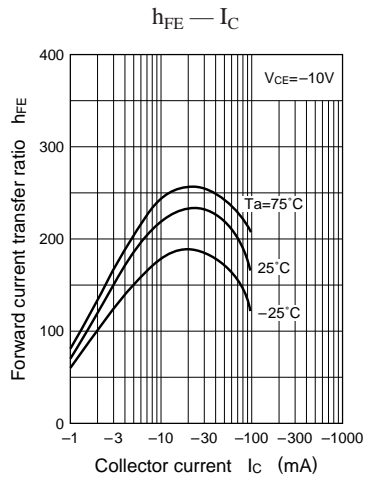
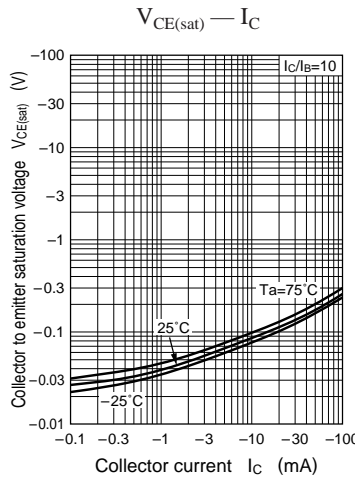
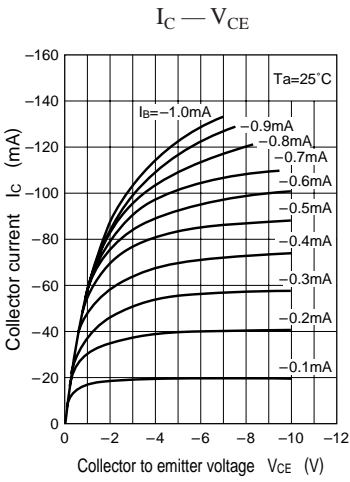


Characteristics charts of UNR2113

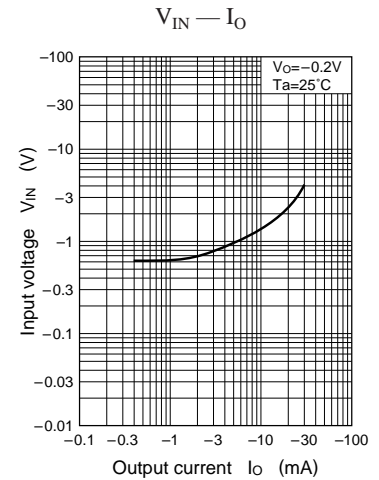
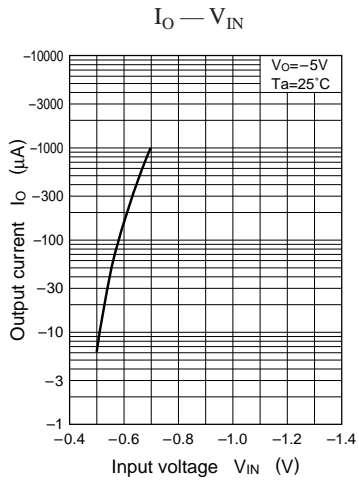
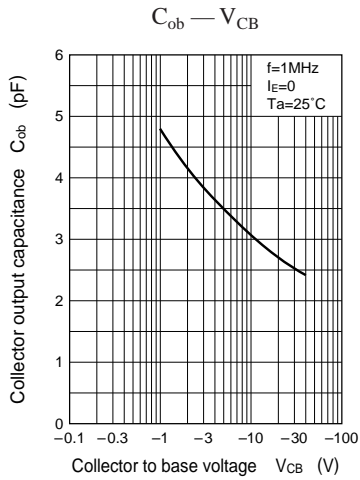
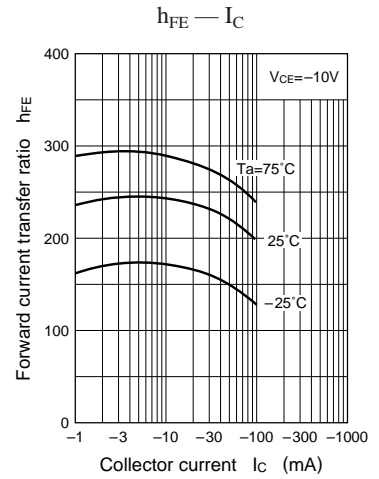
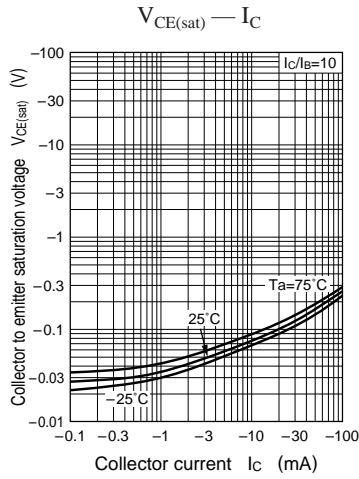
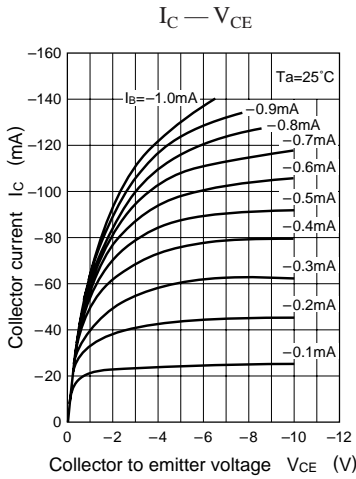




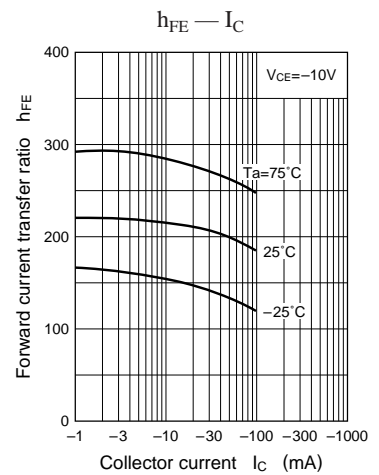
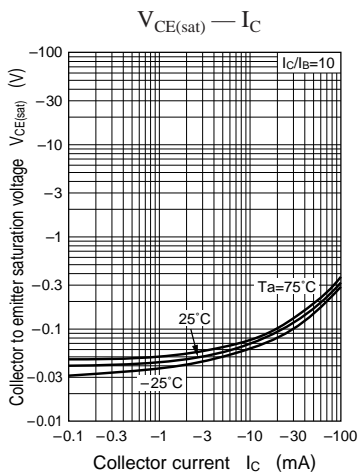
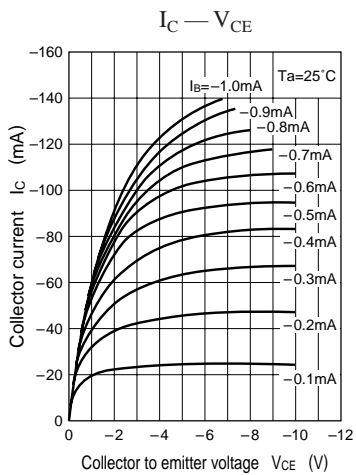
Characteristics charts of UNR2114

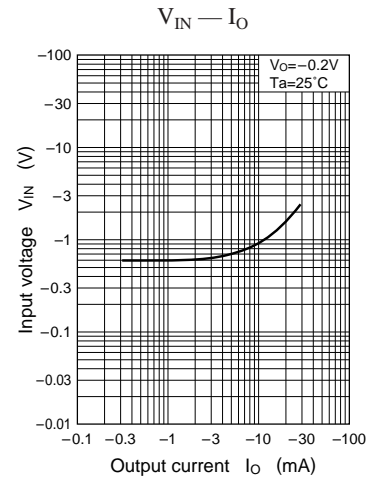
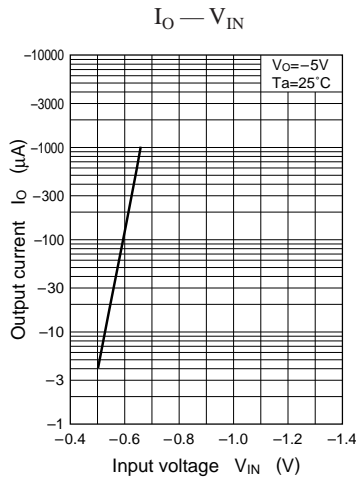
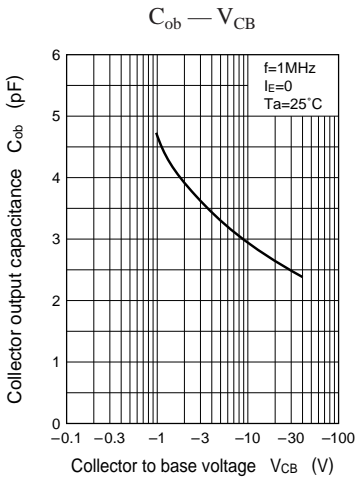


Characteristics charts of UNR2115

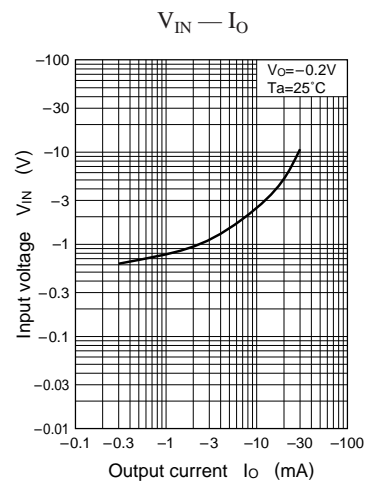
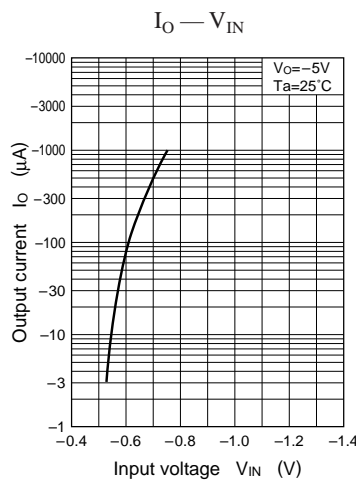
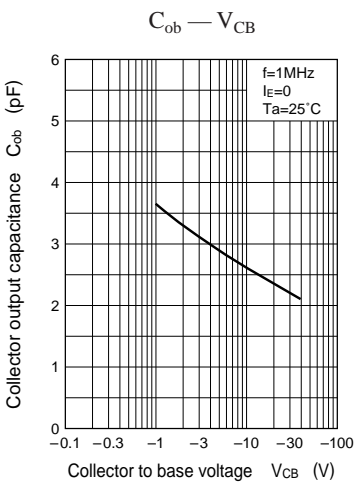
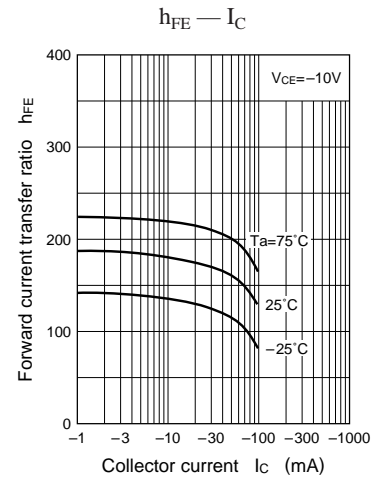
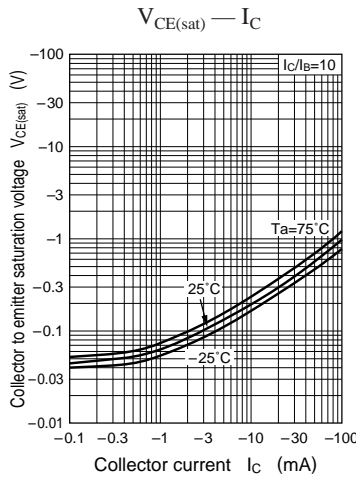
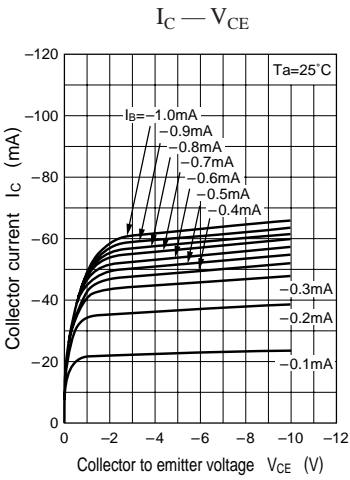


Characteristics charts of UNR2116



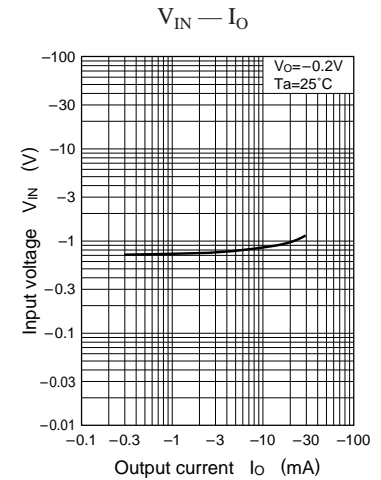
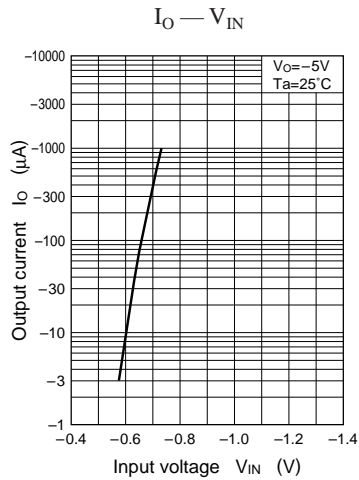
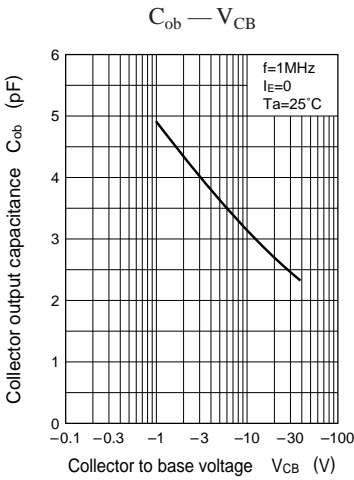
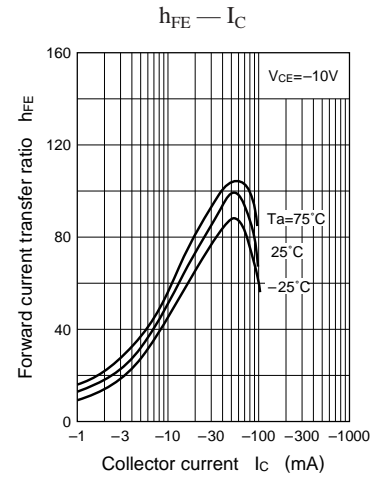
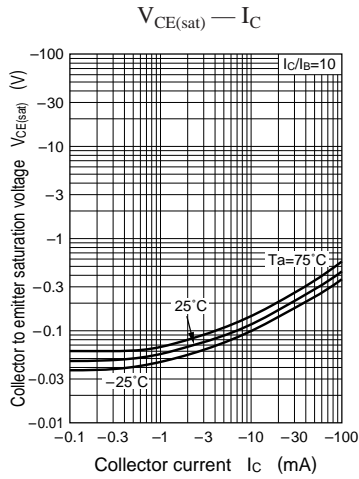
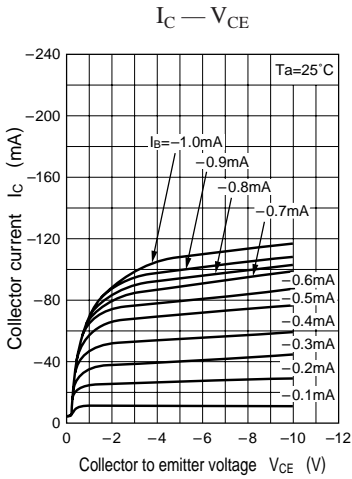


Characteristics charts of UNR2117

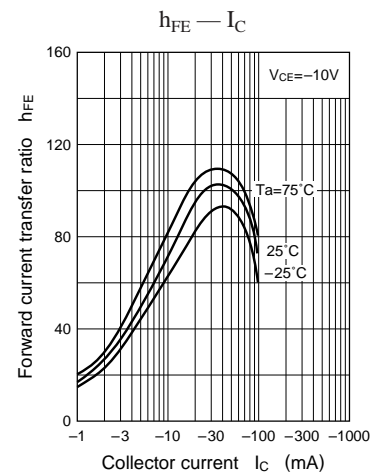
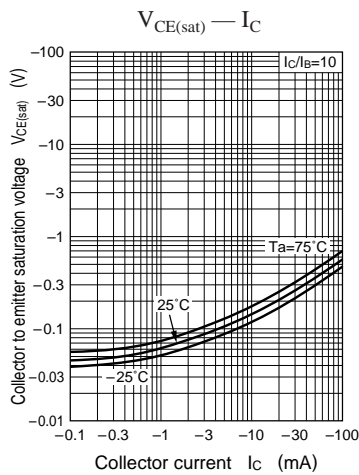
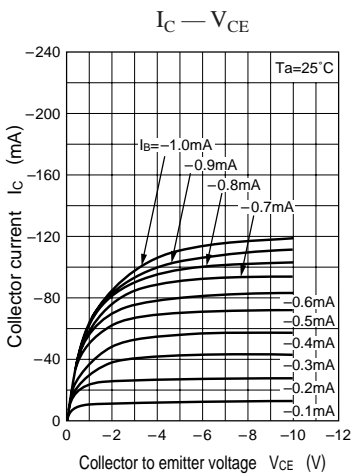


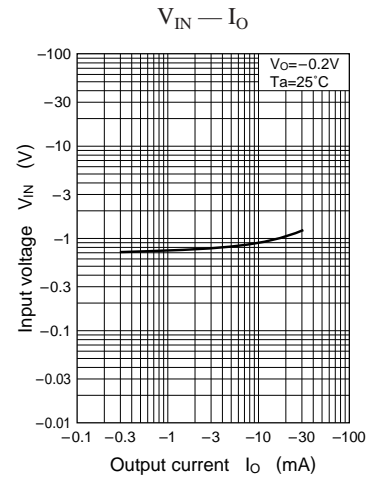
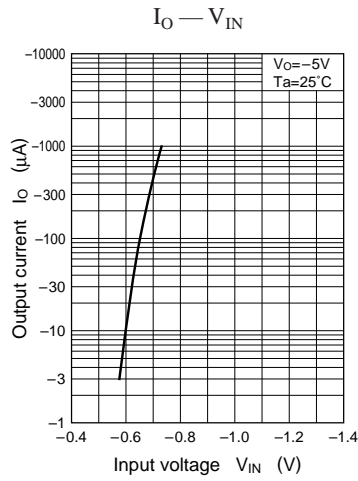
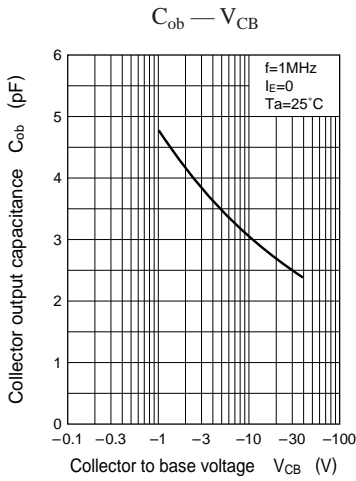


Characteristics charts of UNR2118

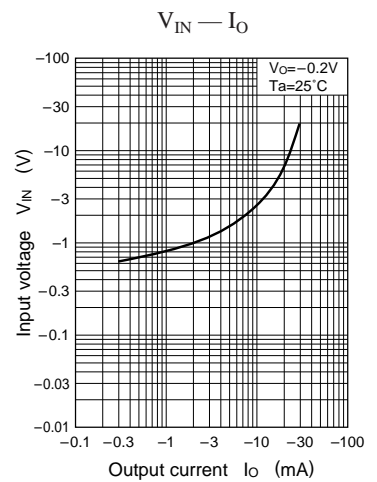
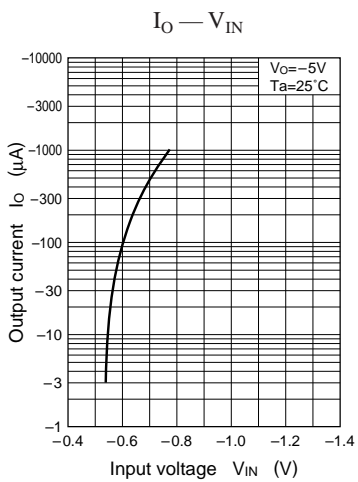
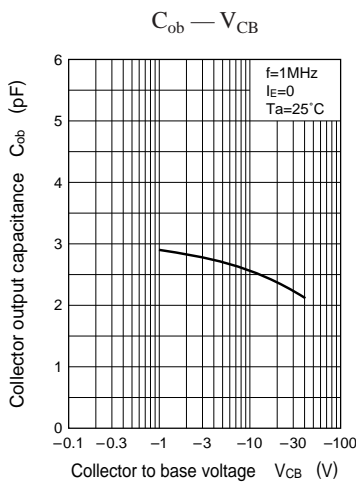
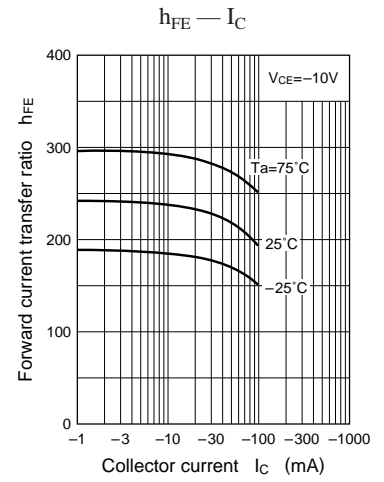
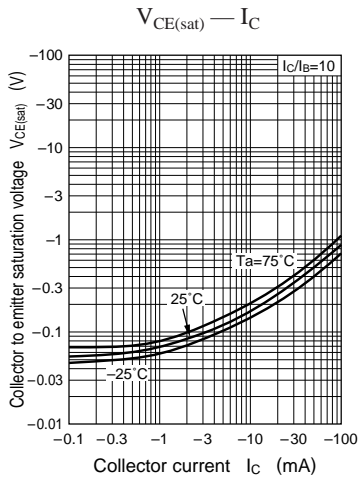
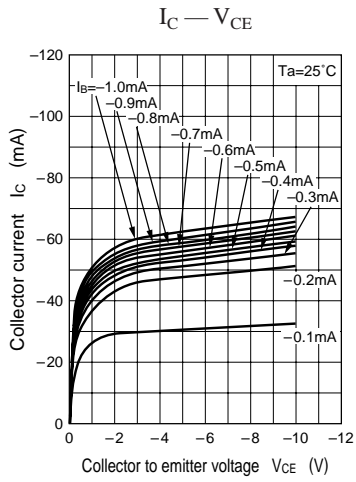


Characteristics charts of UNR2119

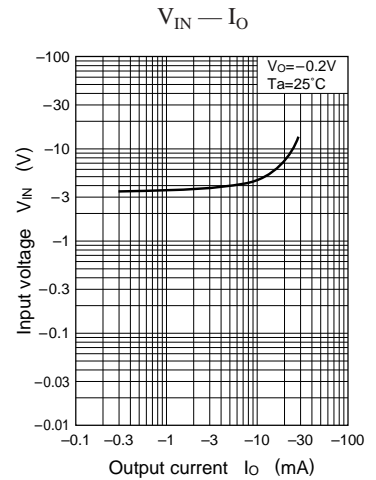
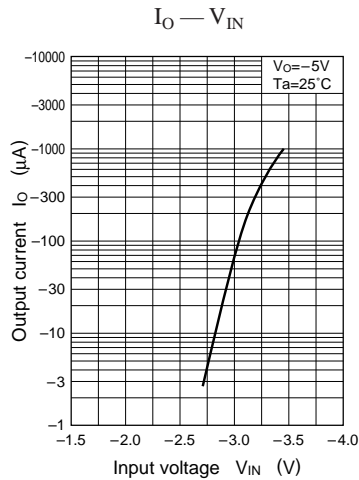
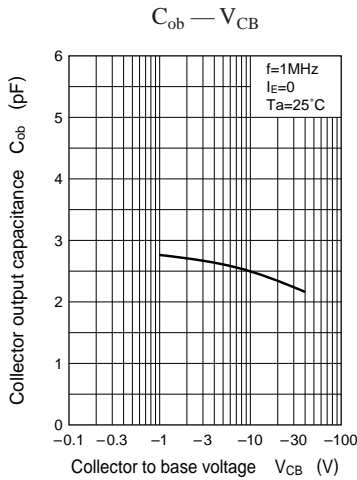
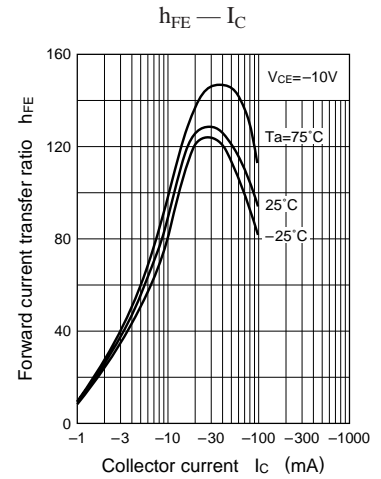
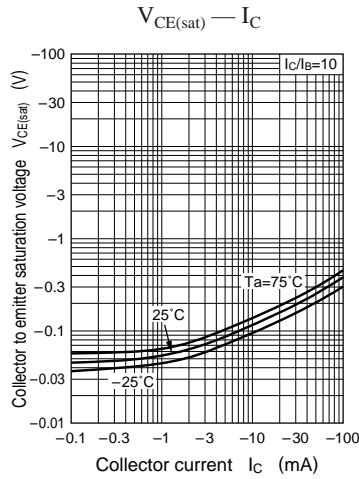
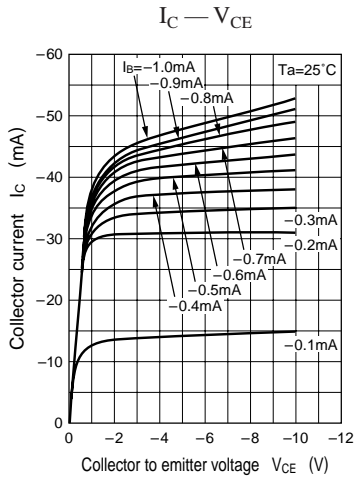




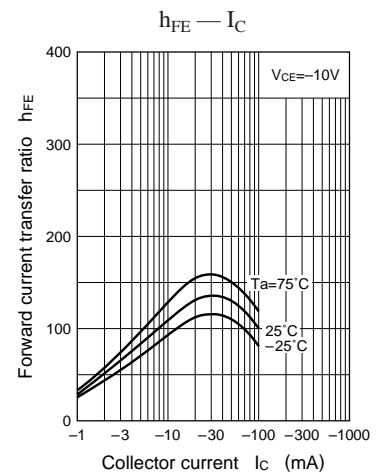
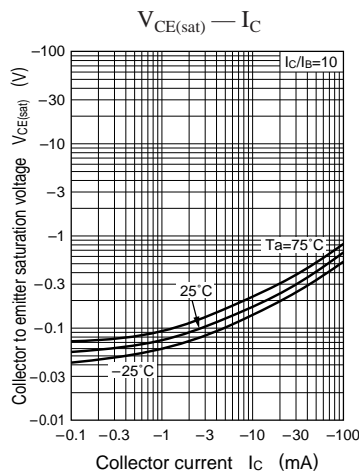
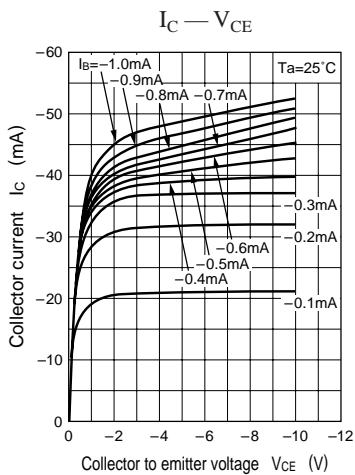
Characteristics charts of UNR2110

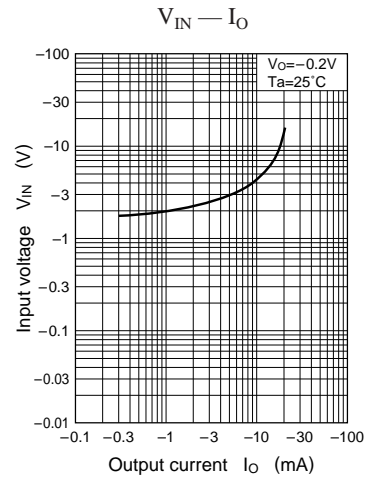
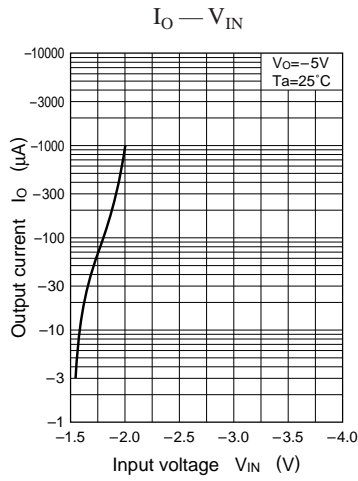
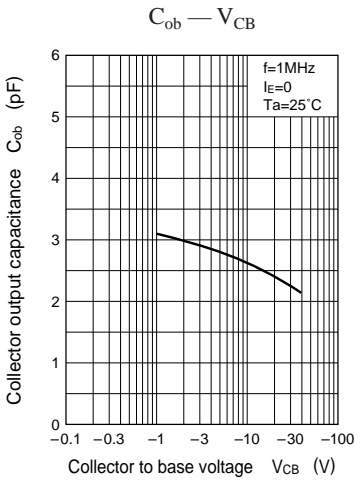


Characteristics charts of UNR211D

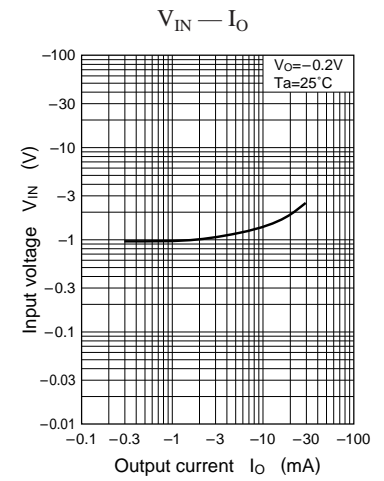
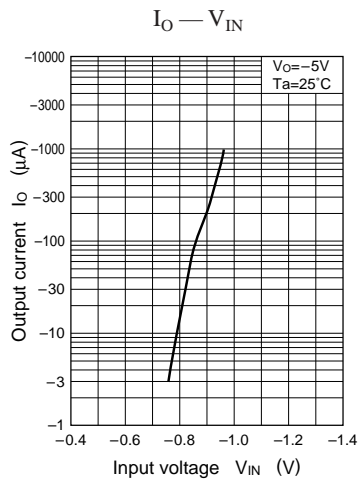
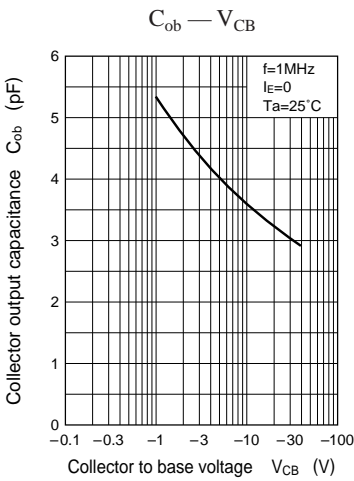
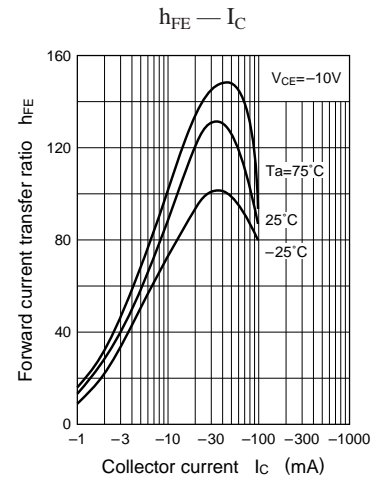
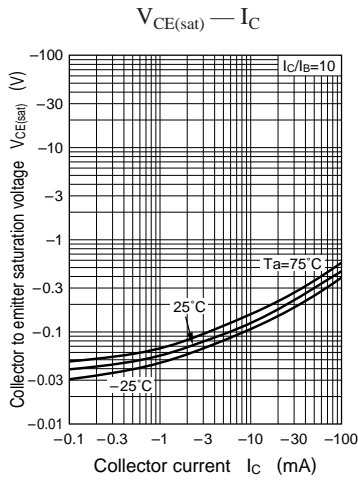
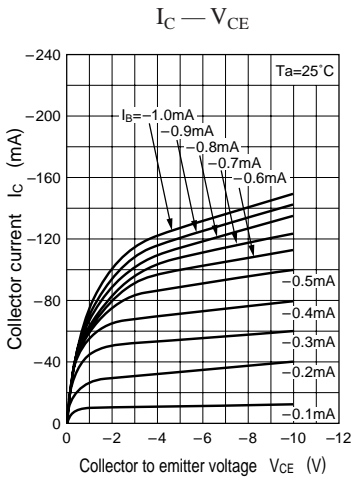


Characteristics charts of UNR211E

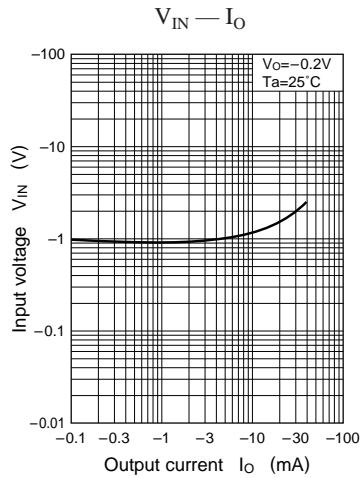
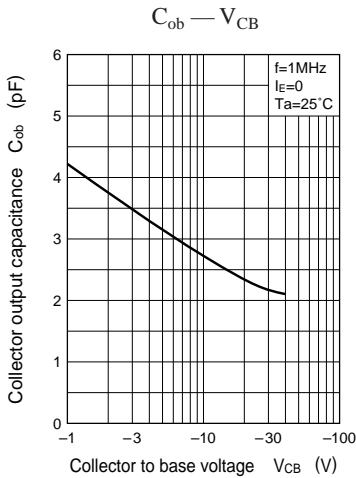
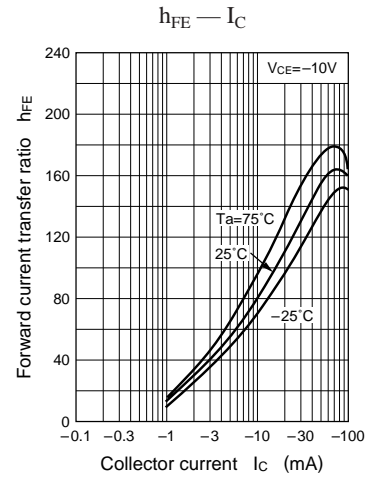
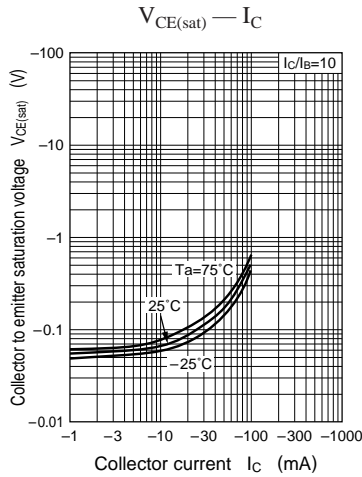
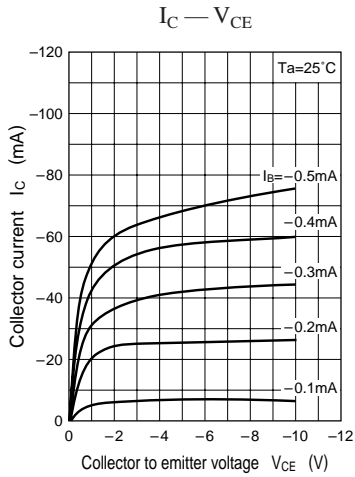




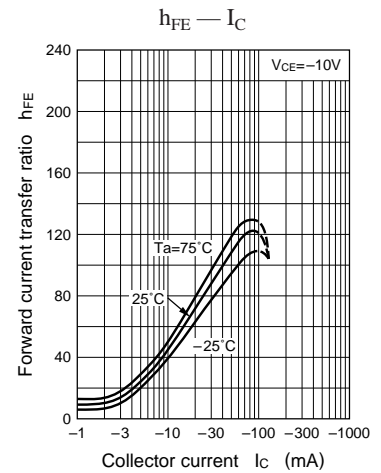
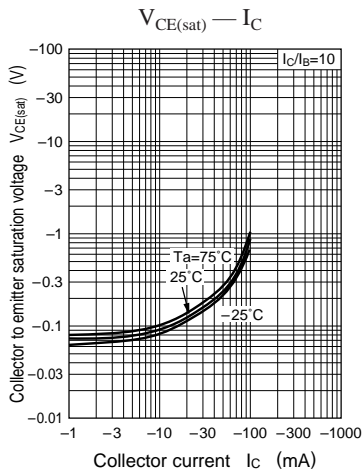
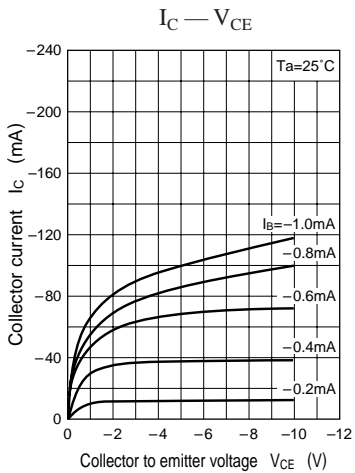
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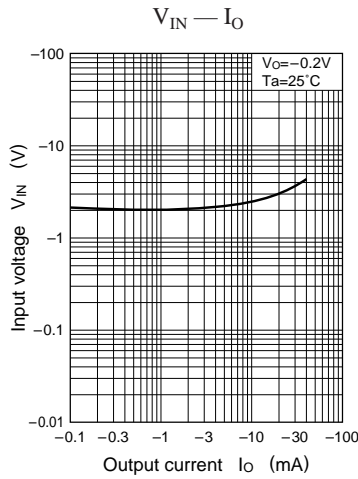
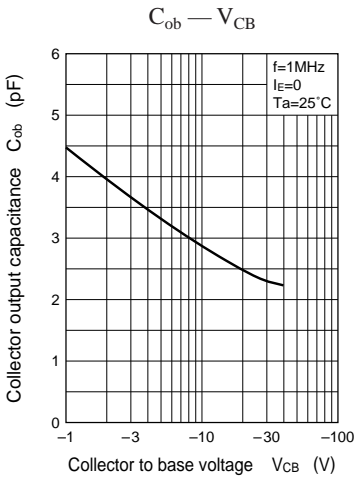


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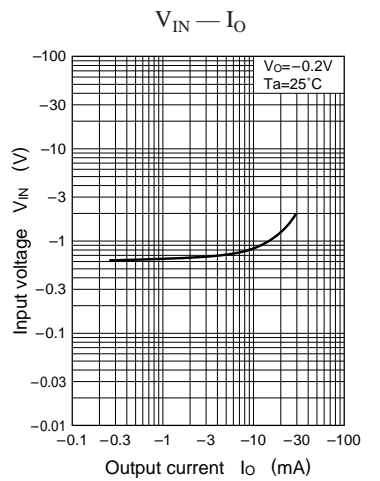
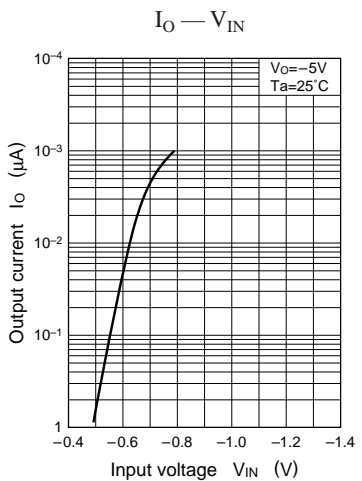
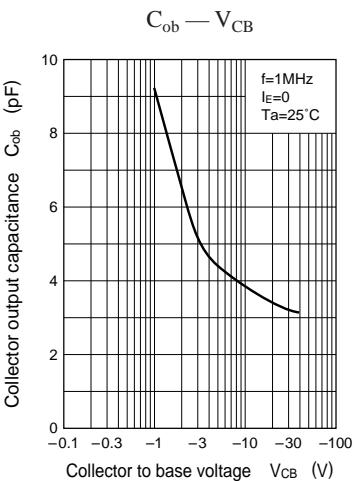
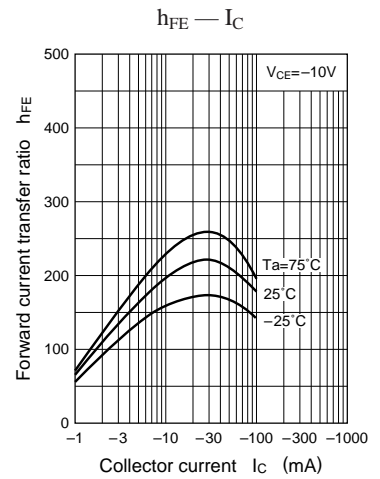
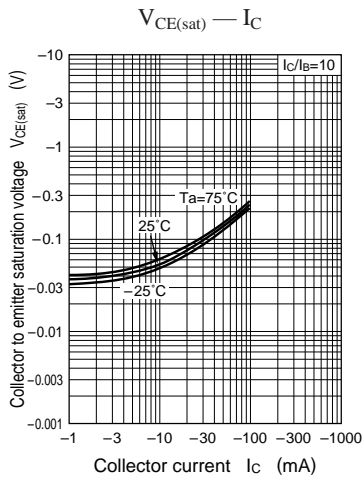
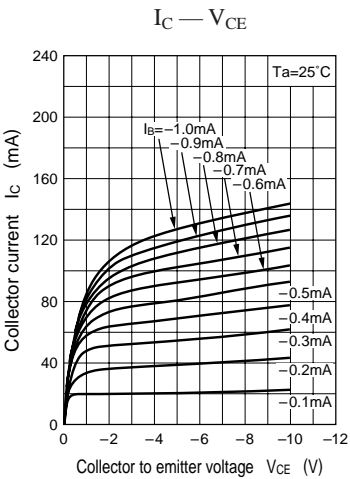


Characteristics charts of UNR211L

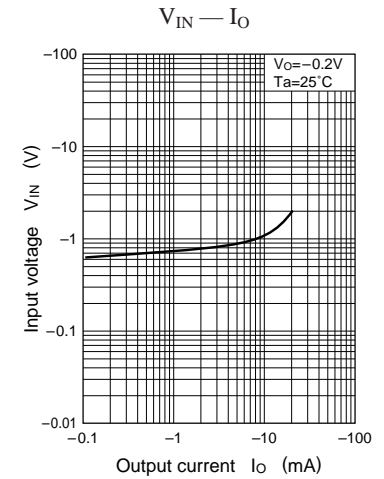
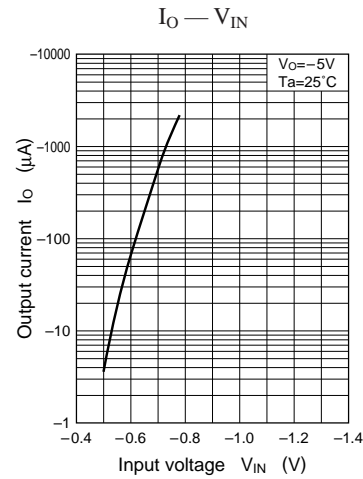
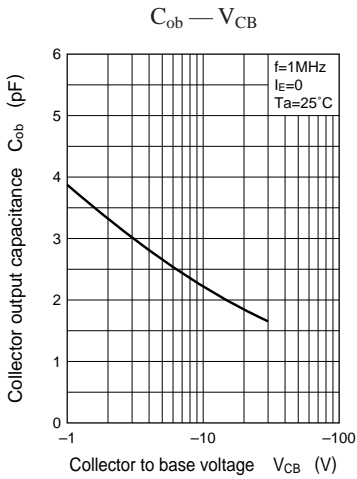
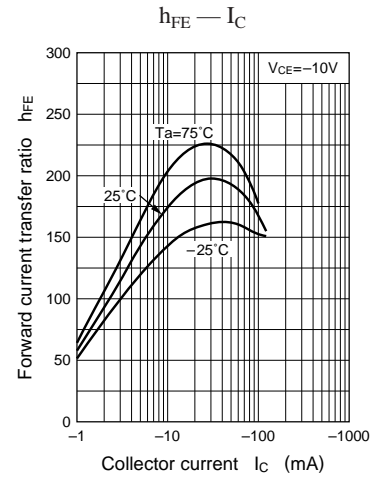
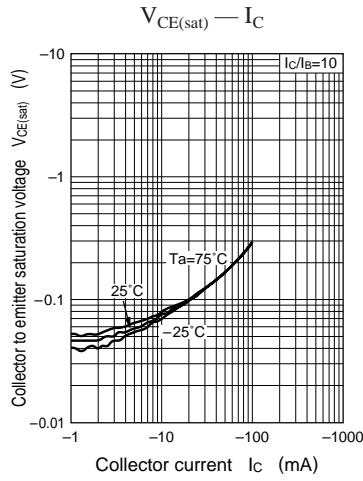
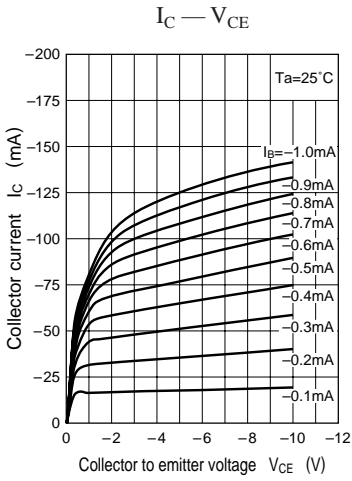




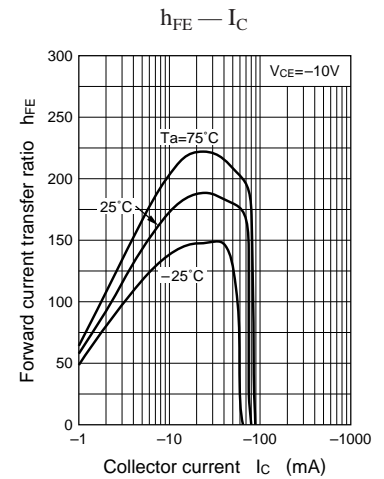
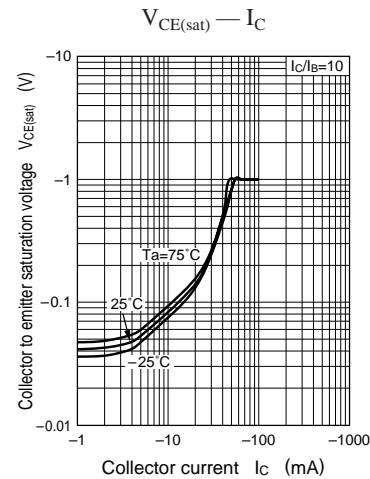
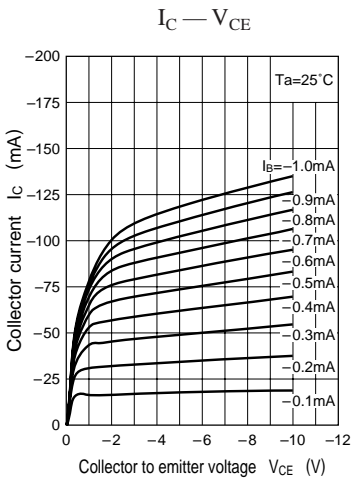
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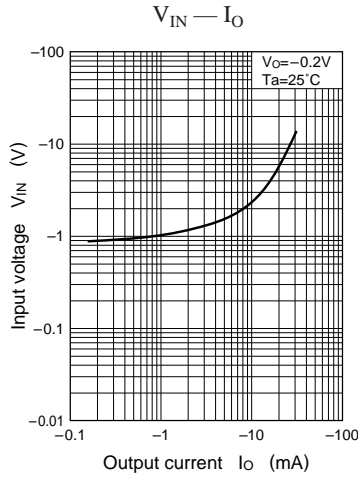
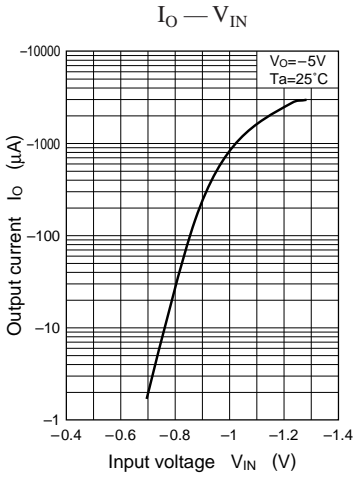


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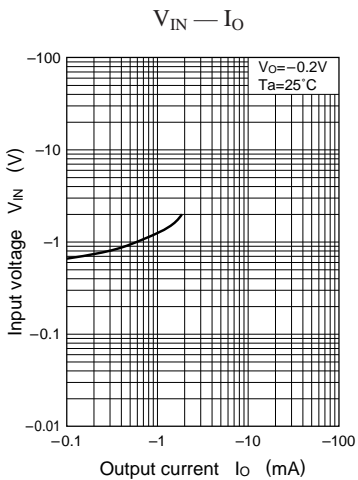
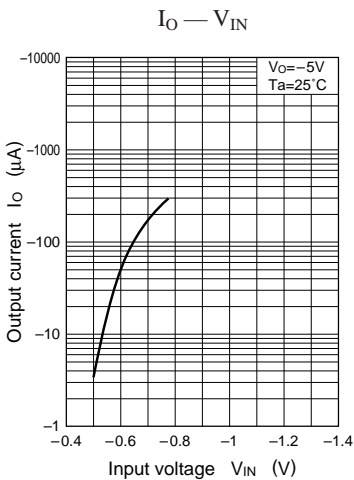
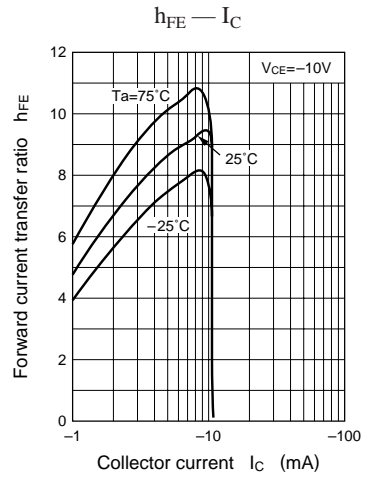
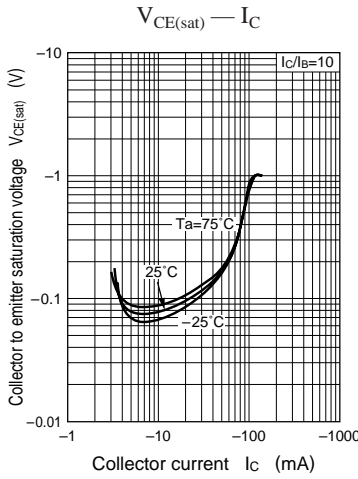
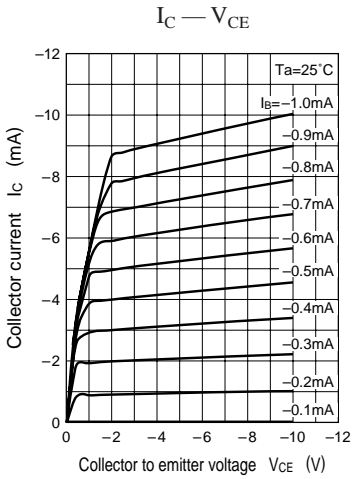


Characteristics charts of UNR211T



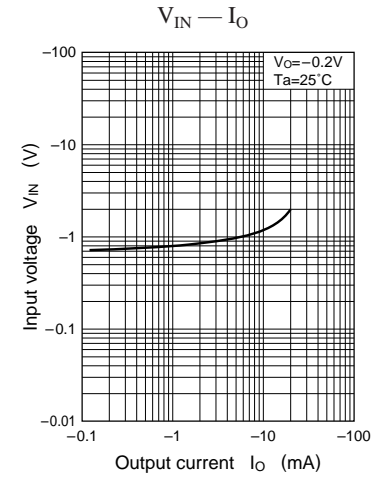
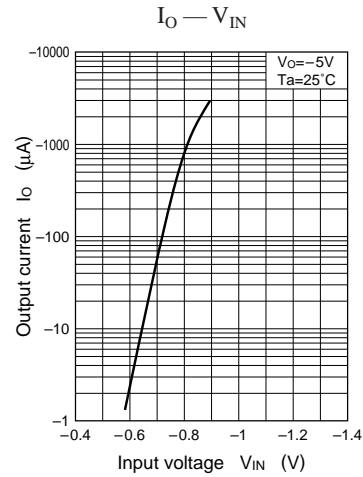
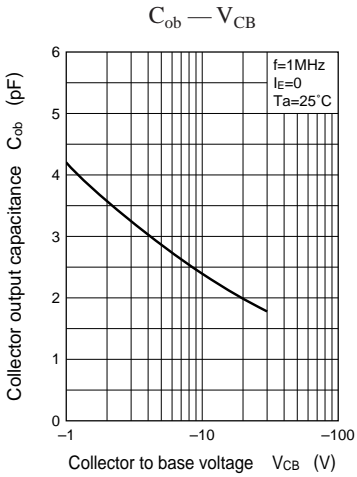
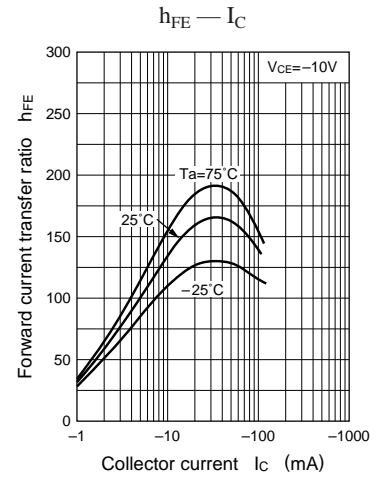
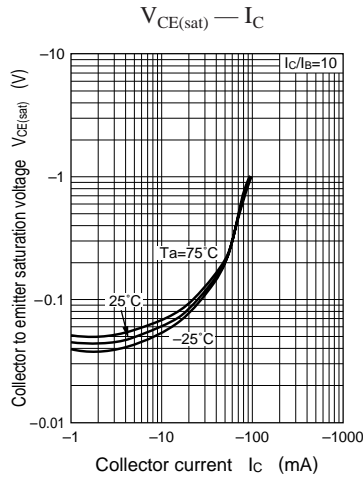
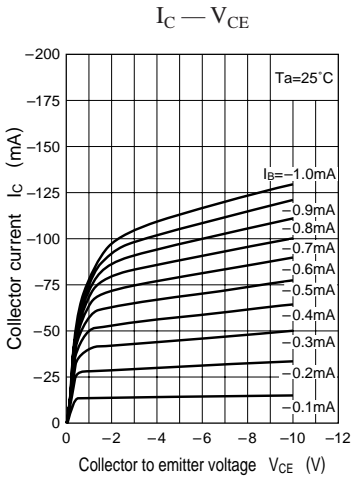


Characteristics charts of UNR211V





Characteristics charts of UNR211Z



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