

# UN9211/9212/9213/9214/9215/9216/9217/9218/9219/9210/921D/ 921E/921F/921K/921L/UNR921M/921N/921AJ/921BJ/921CJ

## Silicon NPN epitaxial planer transistor

For digital circuits

### Features

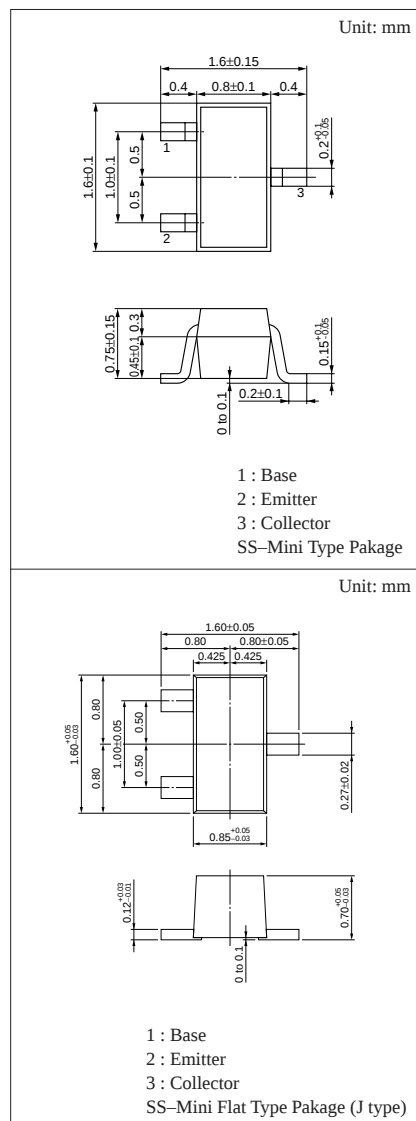
- Costs can be reduced through downsizing of the equipment and reduction of the number of parts.
- SS-Mini type package, allowing automatic insertion through tape packing and magazine packing.

### Resistance by Part Number

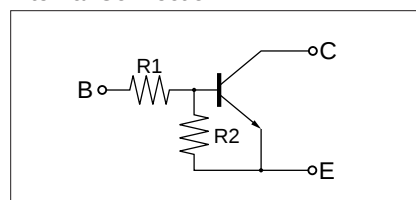
|            | Marking Symbol | (R <sub>1</sub> ) | (R <sub>2</sub> ) |
|------------|----------------|-------------------|-------------------|
| • UN9211   | 8A             | 10kΩ              | 10kΩ              |
| • UN9212   | 8B             | 22kΩ              | 22kΩ              |
| • UN9213   | 8C             | 47kΩ              | 47kΩ              |
| • UN9214   | 8D             | 10kΩ              | 47kΩ              |
| • UN9215   | 8E             | 10kΩ              | —                 |
| • UN9216   | 8F             | 4.7kΩ             | —                 |
| • UN9217   | 8H             | 22kΩ              | —                 |
| • UN9218   | 8I             | 0.51kΩ            | 5.1kΩ             |
| • UN9219   | 8K             | 1kΩ               | 10kΩ              |
| • UN9210   | 8L             | 47kΩ              | —                 |
| • UN921D   | 8M             | 47kΩ              | 10kΩ              |
| • UN921E   | 8N             | 47kΩ              | 22kΩ              |
| • UN921F   | 8O             | 4.7kΩ             | 10kΩ              |
| • UN921K   | 8P             | 10kΩ              | 4.7kΩ             |
| • UN921L   | 8Q             | 4.7kΩ             | 4.7kΩ             |
| • UNR921M  | EL             | 2.2kΩ             | 47kΩ              |
| • UNR921N  | EX             | 4.7kΩ             | 47kΩ              |
| • UNR921AJ | 8X             | 100kΩ             | 100kΩ             |
| • UNR921BJ | 8Y             | 100kΩ             | —                 |
| • UNR921CJ | 8Z             | —                 | 47kΩ              |

### Absolute Maximum Ratings (Ta=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>   | 125         | mW   |
| Junction temperature         | T <sub>j</sub>   | 125         | °C   |
| Storage temperature          | T <sub>stg</sub> | -55 to +125 | °C   |



### Internal Connection



UN9211/9212/9213/9214/9215/9216/9217/9218/9219/9210/921D/  
Transistors with built-in Resistor 921E/921F/921K/921L/UNR921M/921N/921AJ/921BJ/921CJ

■ 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                  | UN9211                             | I <sub>EBO</sub>     | V <sub>EB</sub> = 6V, I <sub>C</sub> = 0                          |        |      | 0.5     | mA   |
|                                         | UN9212/9214/921E/921D              |                      |                                                                   |        |      | 0.2     |      |
|                                         | UN9213/UNR921M/921N/UNR921AJ       |                      |                                                                   |        |      | 0.1     |      |
|                                         | UN9215/9216/9217/9210/UNR921BJ     |                      |                                                                   |        |      | 0.01    |      |
|                                         | UN921F/921K                        |                      |                                                                   |        |      | 1.0     |      |
|                                         | UN9219                             |                      |                                                                   |        |      | 1.5     |      |
|                                         | UN9218/921L/UNR921CJ               |                      |                                                                   |        |      | 2.0     |      |
| Collector to base voltage               |                                    | V <sub>CBO</sub>     | I <sub>C</sub> = 10μA, 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          | UN9211                             | h <sub>FE</sub>      | V <sub>CE</sub> = 10V, I <sub>C</sub> = 5mA                       | 35     |      |         |      |
|                                         | UN9212/921E                        |                      |                                                                   | 60     |      |         |      |
|                                         | UN9213/9214/921M/UNR921AJ/921CJ    |                      |                                                                   | 80     |      |         |      |
|                                         | UN9215*/9216*/9217*/9210*/UNR921BJ |                      |                                                                   | 160    |      | 460     |      |
|                                         | UN921F/921D/9219                   |                      |                                                                   | 30     |      |         |      |
|                                         | UN9218/921K/921L                   |                      |                                                                   | 20     |      |         |      |
|                                         | UN921N                             |                      |                                                                   | 80     |      | 400     |      |
| Collector to emitter saturation voltage |                                    | V <sub>CE(sat)</sub> | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.3mA                     |        |      | 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    |
|                                         |                                    |                      | V <sub>OC</sub> = 5V, V <sub>B</sub> = 3.5V, R <sub>1</sub> = 1kΩ |        |      | 0.2     |      |
|                                         |                                    |                      | V <sub>CC</sub> = 5V, V <sub>B</sub> = 10V, R <sub>1</sub> = 1kΩ  |        |      | 0.2     |      |
|                                         |                                    |                      | V <sub>CC</sub> = 5V, V <sub>B</sub> = 6V, R <sub>L</sub> = 1kΩ   |        |      | 0.2     |      |
|                                         |                                    |                      | V <sub>CC</sub> = 5V, V <sub>B</sub> = 5V, R <sub>L</sub> = 1kΩ   |        |      | 0.2     |      |
| Transition frequency                    |                                    | f <sub>T</sub>       | V <sub>CB</sub> = 10V, I <sub>E</sub> = −2mA, f = 200MHz          |        | 150  |         | MHz  |
| Input resistance                        | UN9211/9214/9215/921K              | R <sub>1</sub>       |                                                                   | (−30%) | 10   | ( +30%) | kΩ   |
|                                         | UN9212/9217                        |                      |                                                                   |        | 22   |         |      |
|                                         | UN9213/921D/921E/9210              |                      |                                                                   |        | 47   |         |      |
|                                         | UN9216/921F/921L/UNR921N           |                      |                                                                   |        | 4.7  |         |      |
|                                         | UN9218                             |                      |                                                                   |        | 0.51 |         |      |
|                                         | UN9219/UNR921M                     |                      |                                                                   |        | 1    |         |      |
|                                         | UNR921AJ/921BJ                     |                      |                                                                   |        | 100  |         |      |

\*  $h_{FE}$  rank classification (UN9215/9216/9217/9210)

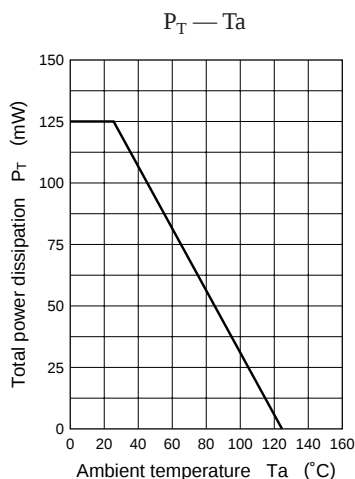
| Rank     | Q          | R          | S          |
|----------|------------|------------|------------|
| $h_{FE}$ | 160 to 260 | 210 to 340 | 290 to 460 |

UN9211/9212/9213/9214/9215/9216/9217/9218/9219/9210/921D/  
Transistors with built-in Resistor 921E/921F/921K/921L/UNR921M/921N/921AJ/921BJ/921CJ

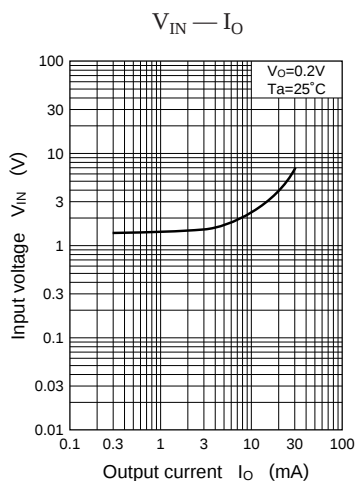
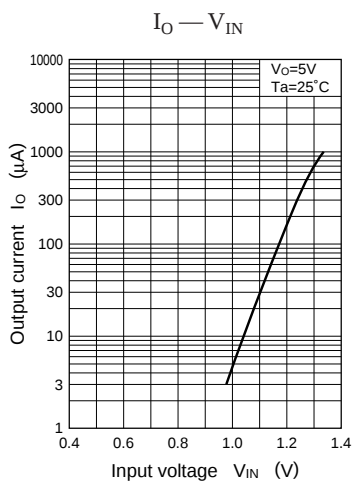
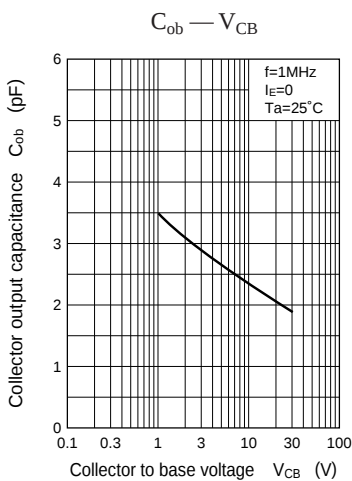
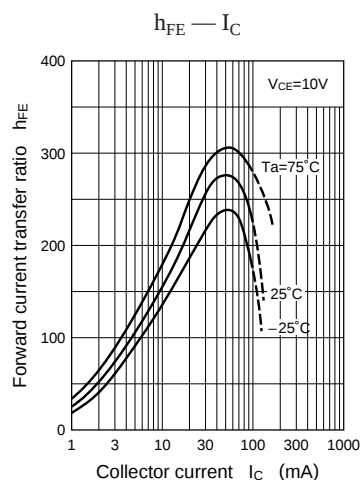
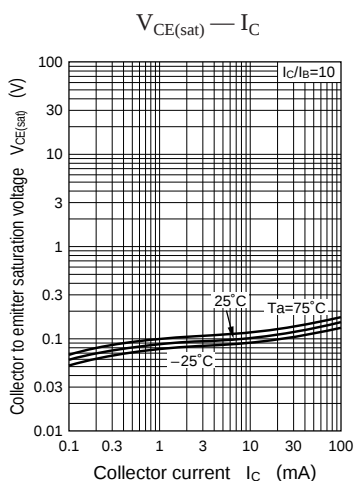
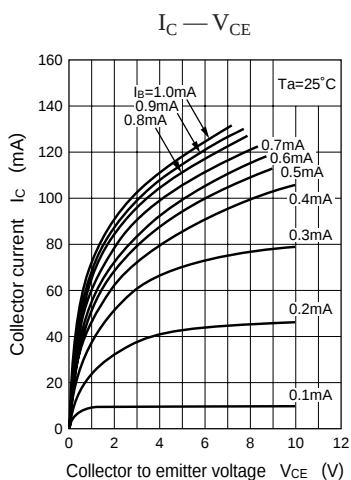
■ Electrical Characteristics (continued) (Ta=25°C)

| Parameter                          |                       | Symbol    | Conditions | min  | typ   | max  | Unit |
|------------------------------------|-----------------------|-----------|------------|------|-------|------|------|
| Resis-<br>tance<br>ratio           | UN9211/9212/9213/921L | $R_1/R_2$ |            | 0.8  | 1.0   | 1.2  |      |
|                                    | UN9214                |           |            | 0.17 | 0.21  | 0.25 |      |
|                                    | UN9218/9219           |           |            | 0.08 | 0.1   | 0.12 |      |
|                                    | UN921D                |           |            |      | 4.7   |      |      |
|                                    | UN921E                |           |            |      | 2.14  |      |      |
|                                    | UN921F                |           |            |      | 0.47  |      |      |
|                                    | UN921K                |           |            |      | 2.13  |      |      |
|                                    | UN921M                |           |            |      | 0.047 |      |      |
|                                    | UN921N                |           |            |      | 0.1   |      |      |
|                                    | UNR921AJ              |           |            |      | 1.0   |      |      |
| Resistance between Emitter to Base |                       | UNR921CJ  | $R_2$      | -30% | 47    | 30%  | kΩ   |

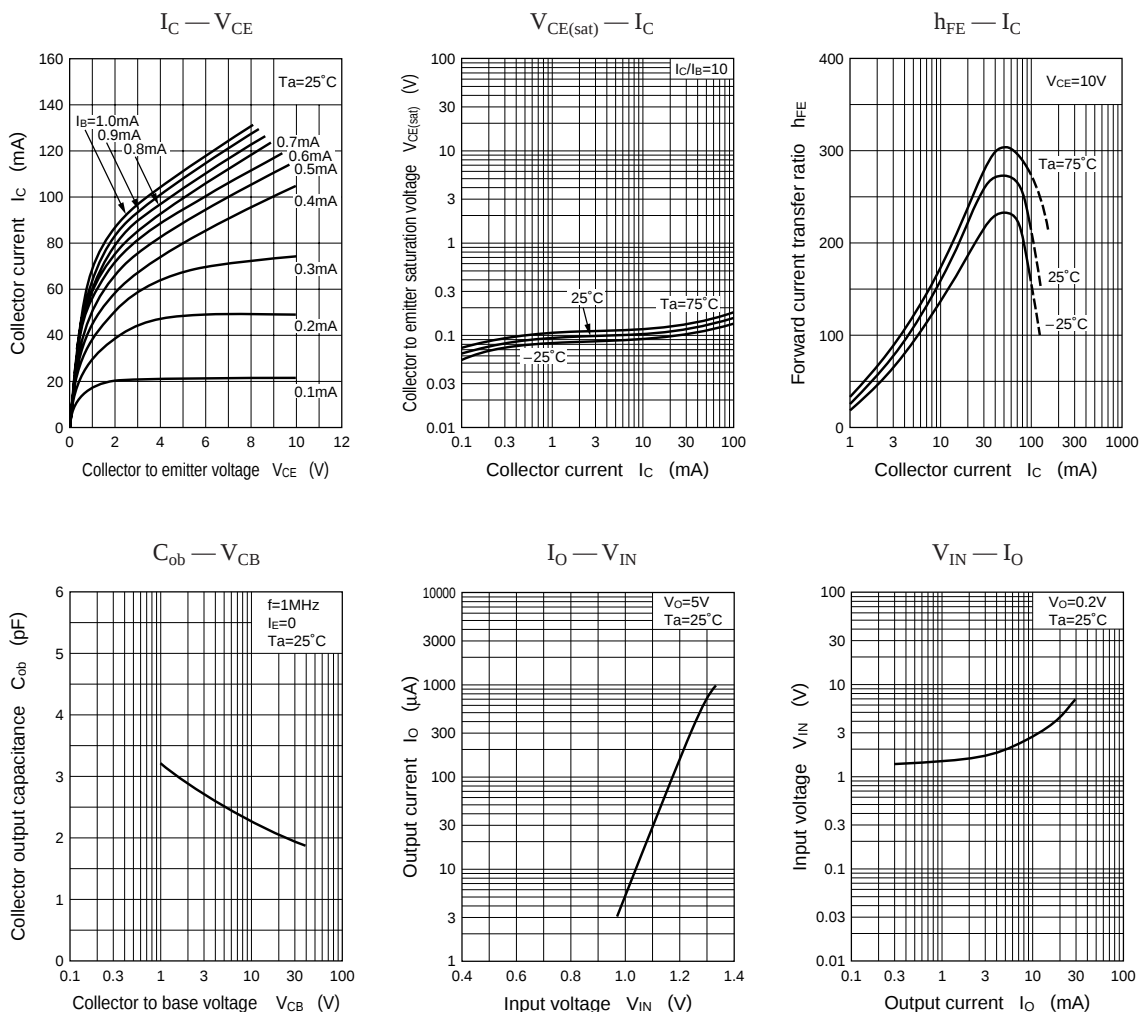
Common characteristics chart



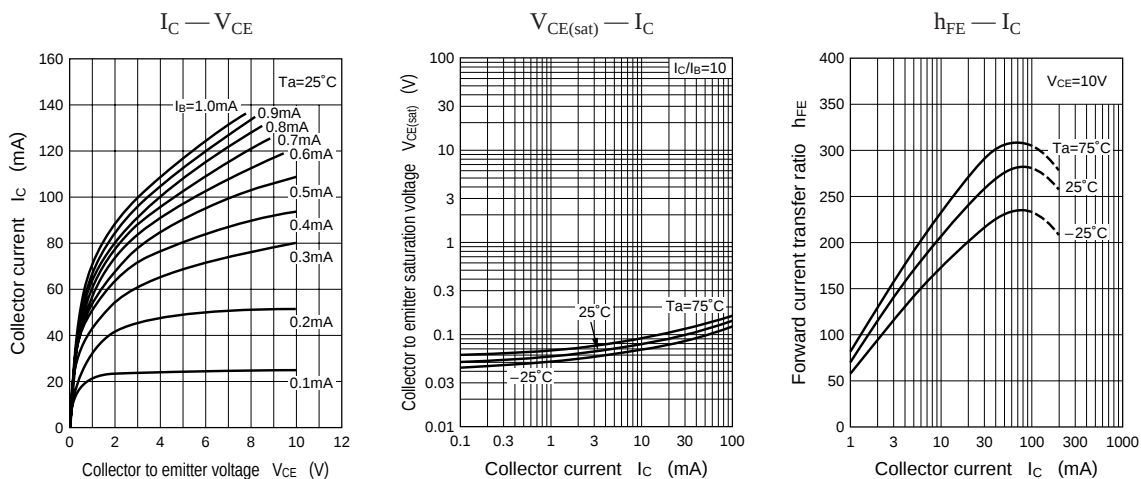
Characteristics charts of UN9211

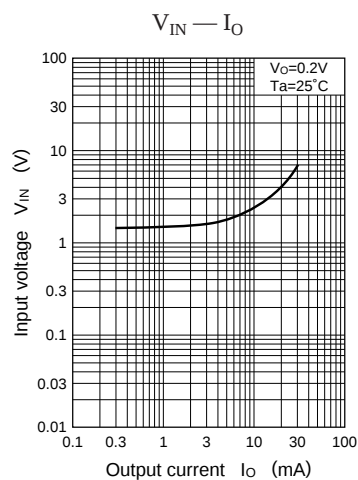
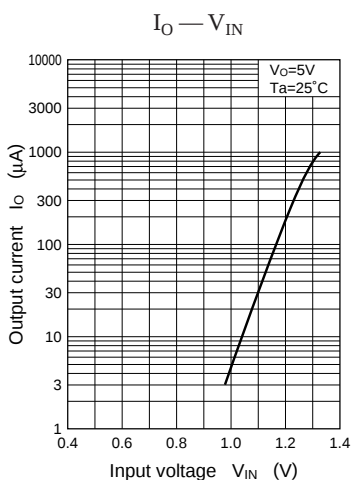
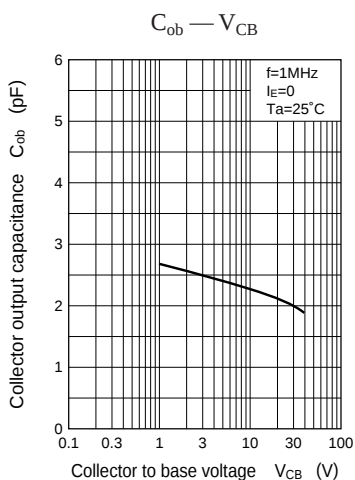


Characteristics charts of UN9212

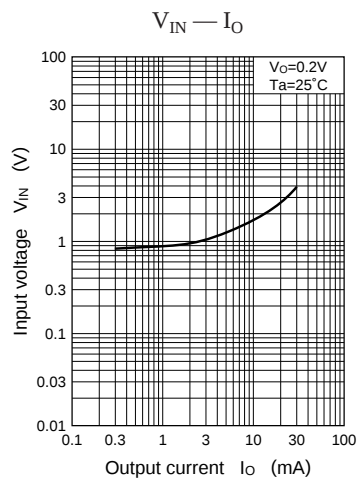
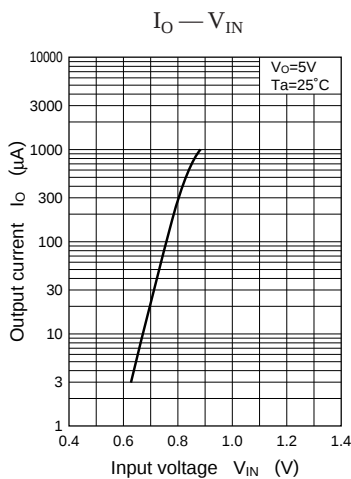
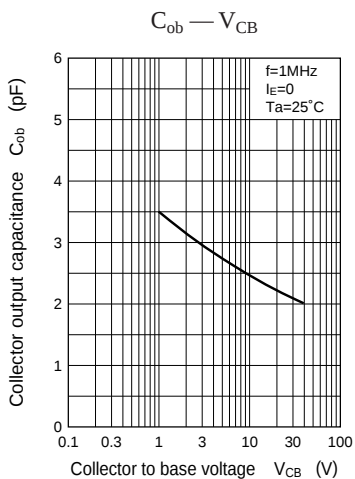
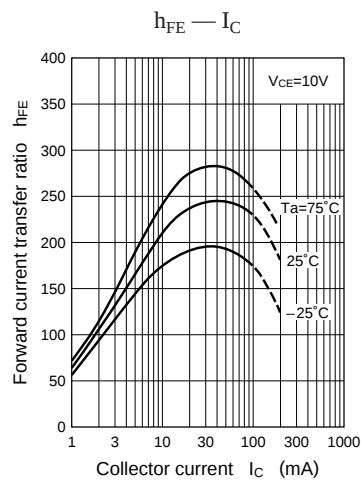
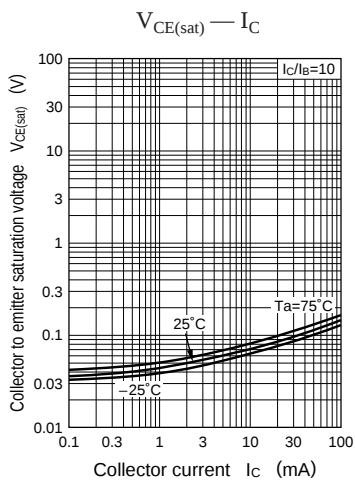
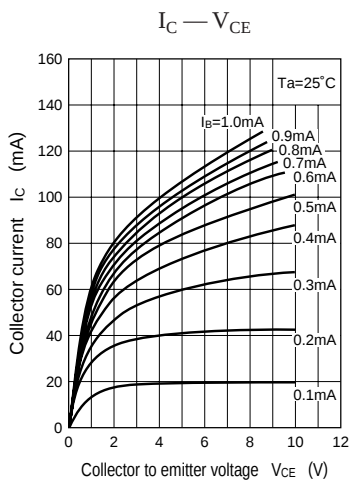


Characteristics charts of UN9213

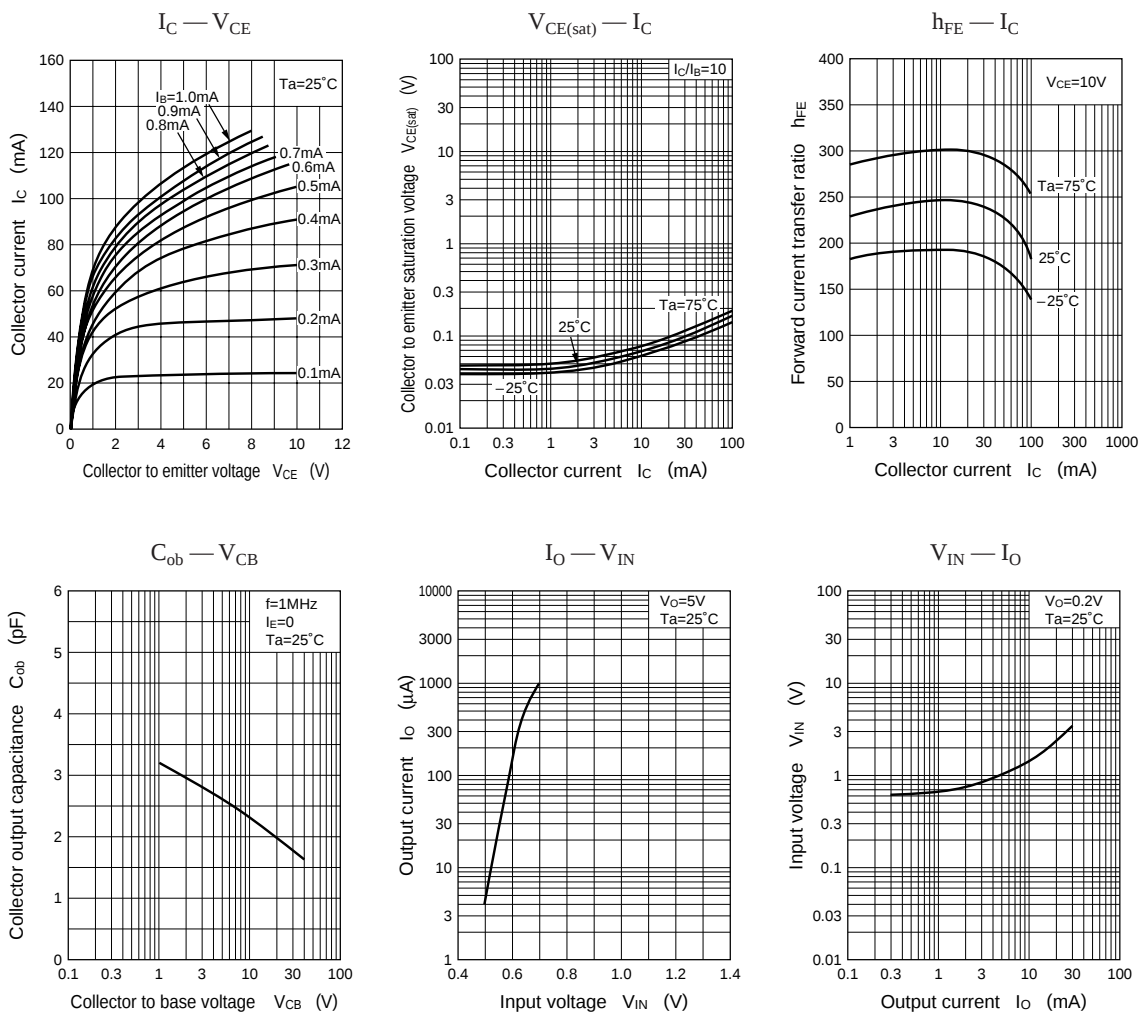




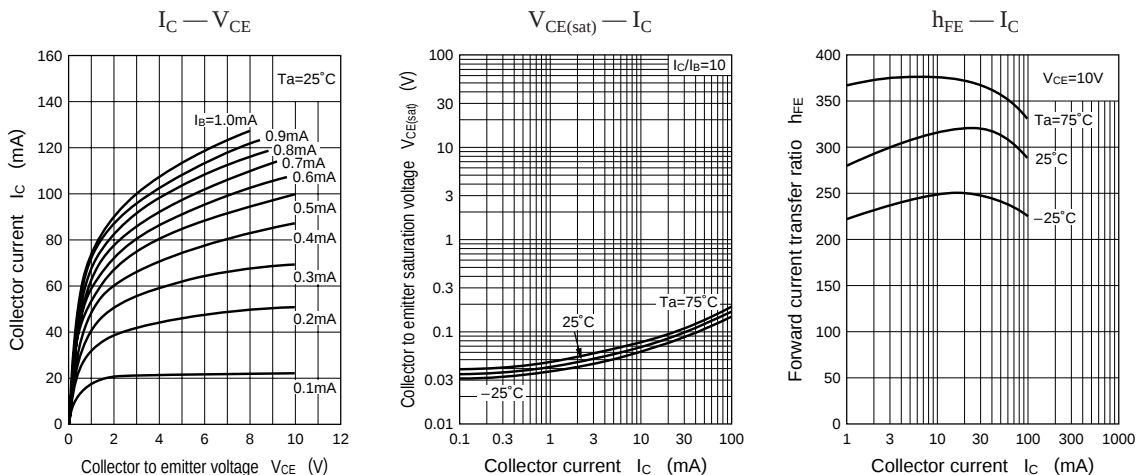
Characteristics charts of UN9214

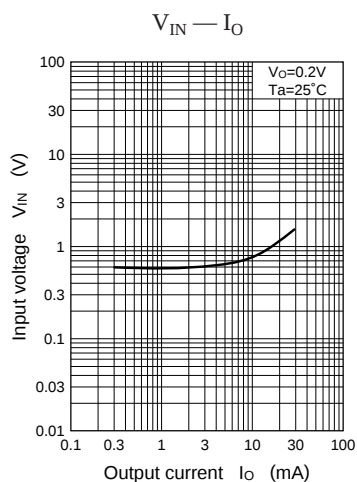
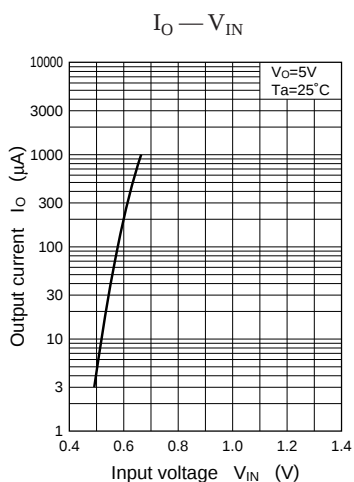
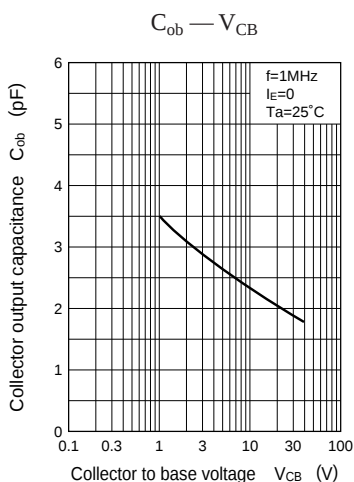


Characteristics charts of UN9215

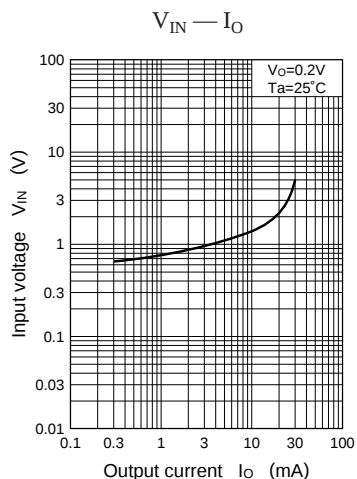
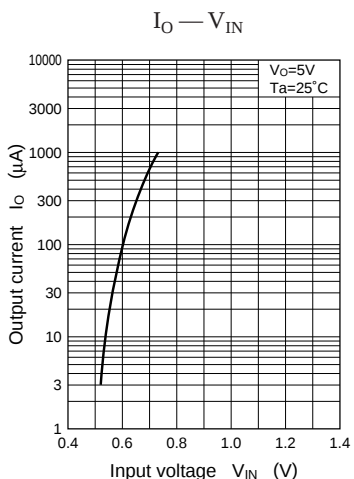
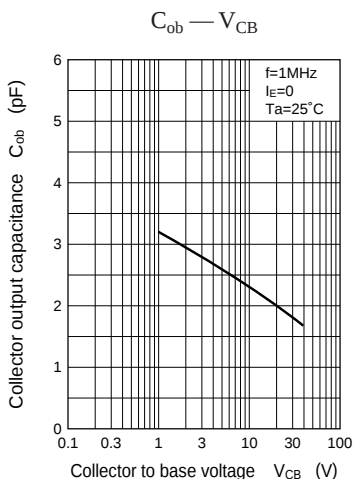
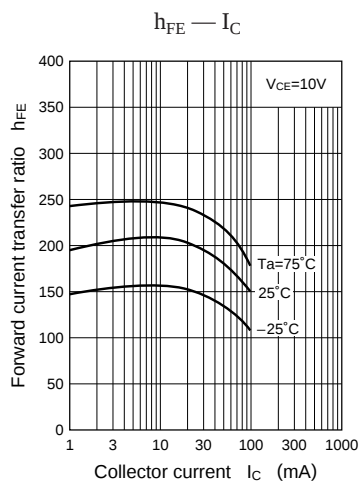
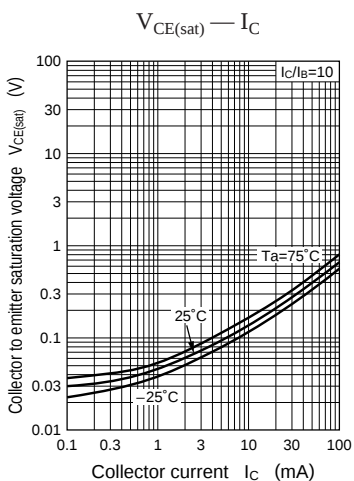
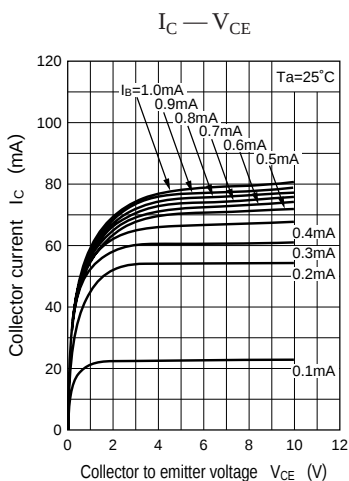


Characteristics charts of UN9216

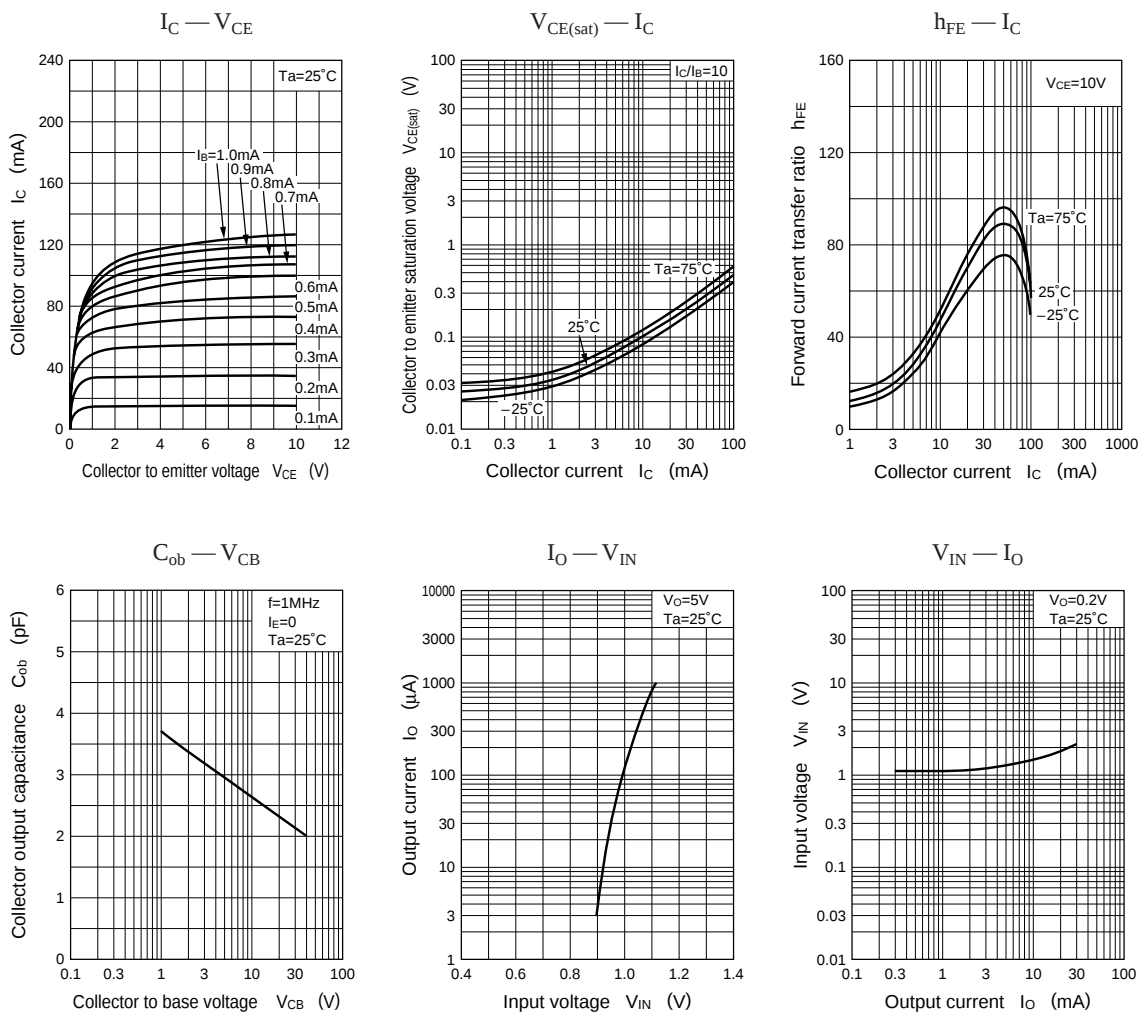




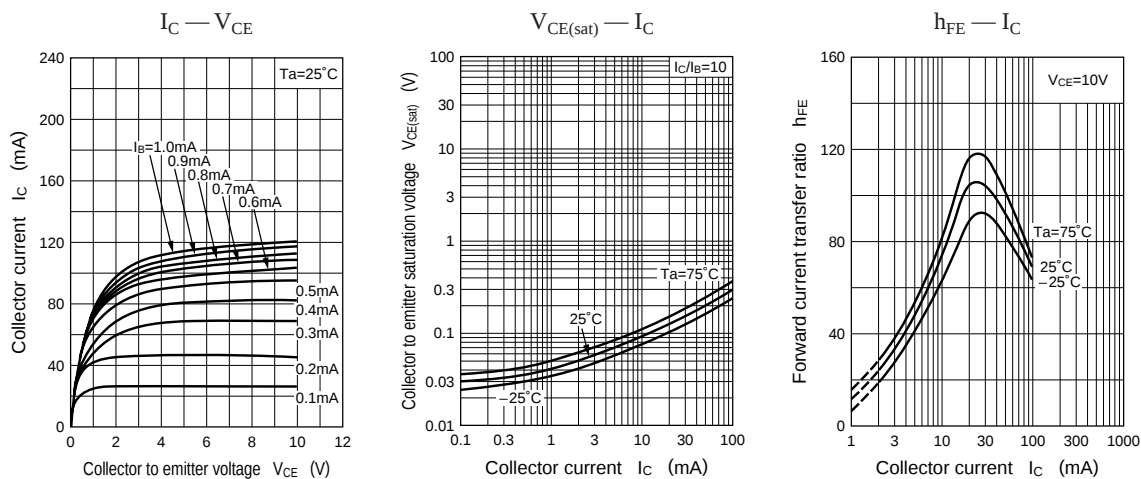
Characteristics charts of UN9217

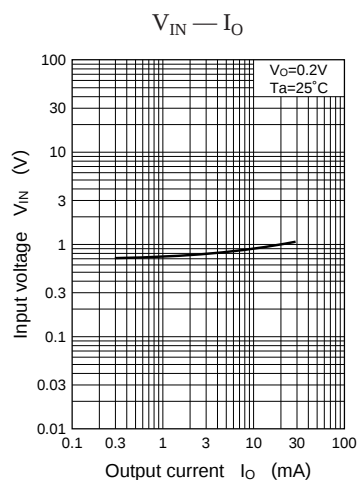
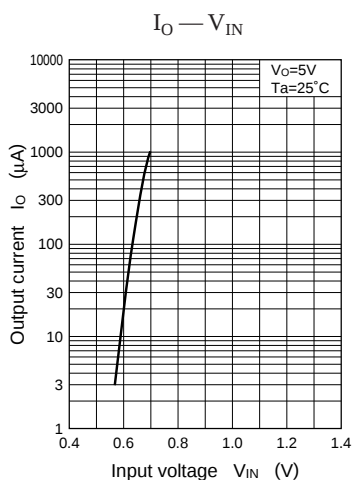
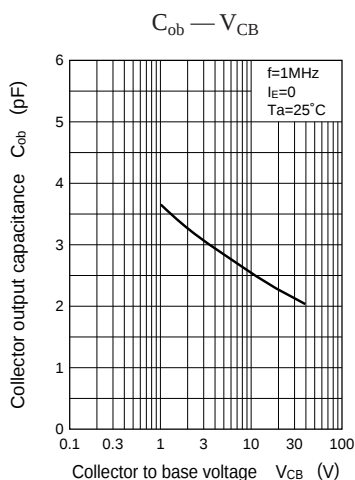


Characteristics charts of UN9218

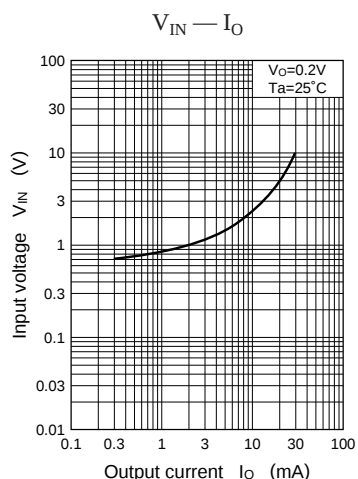
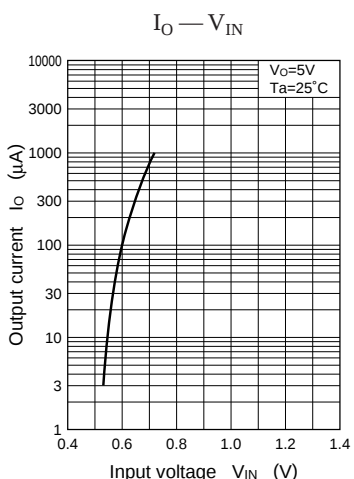
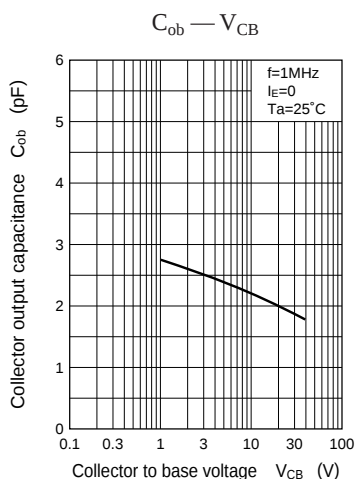
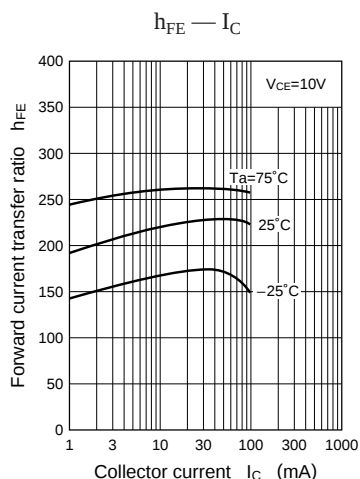
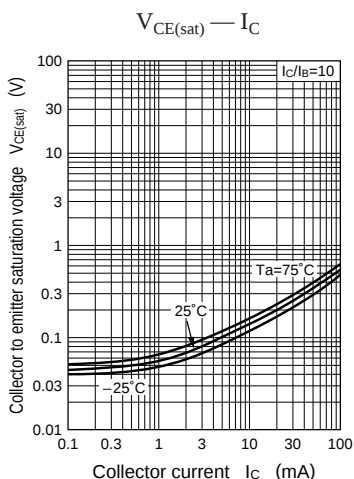
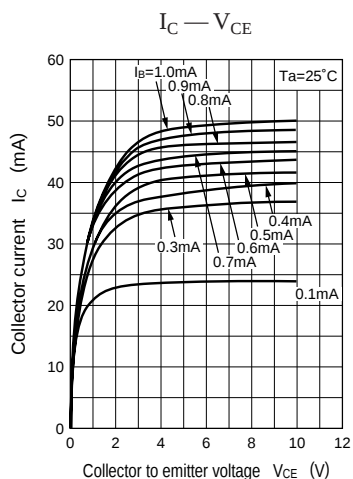


Characteristics charts of UN9219

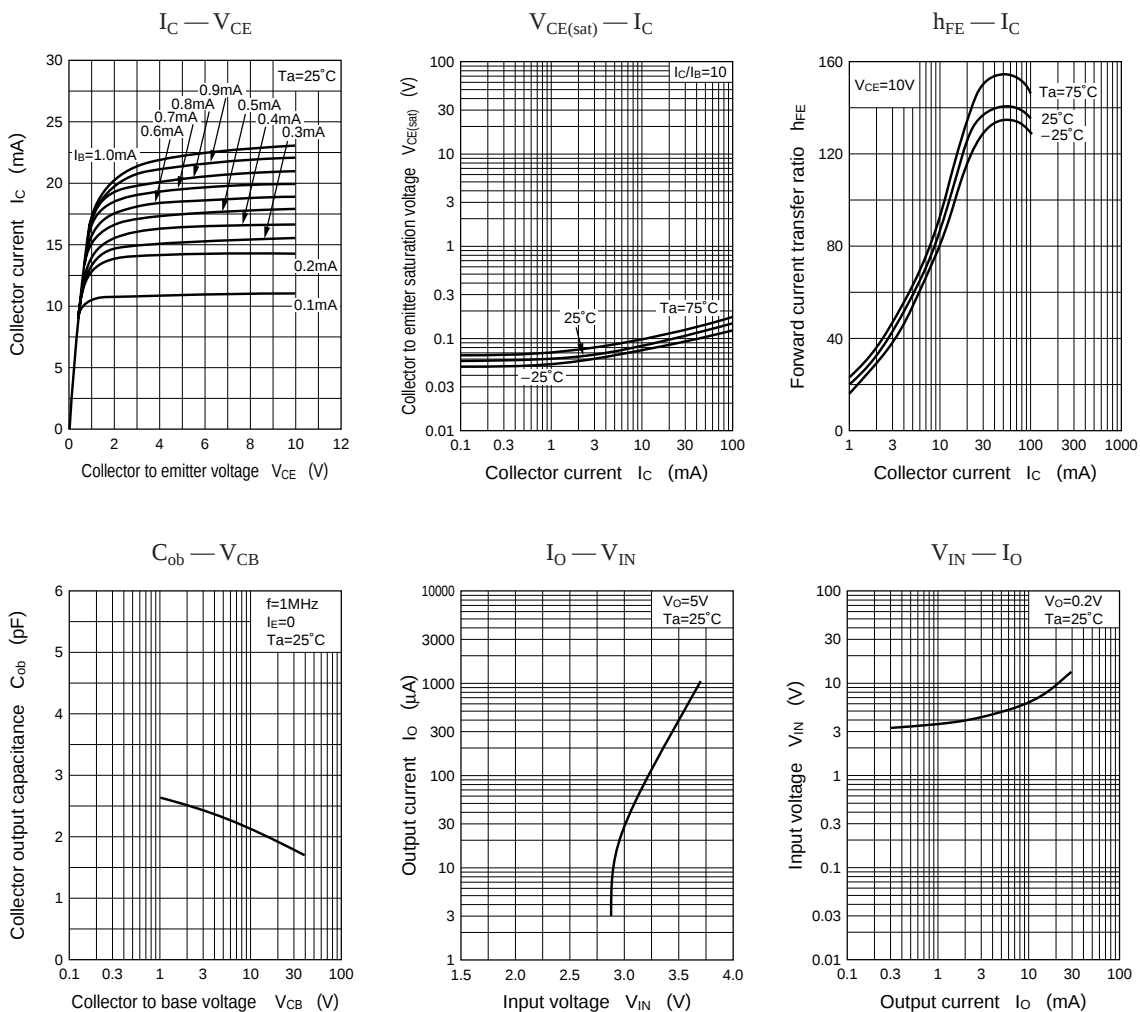




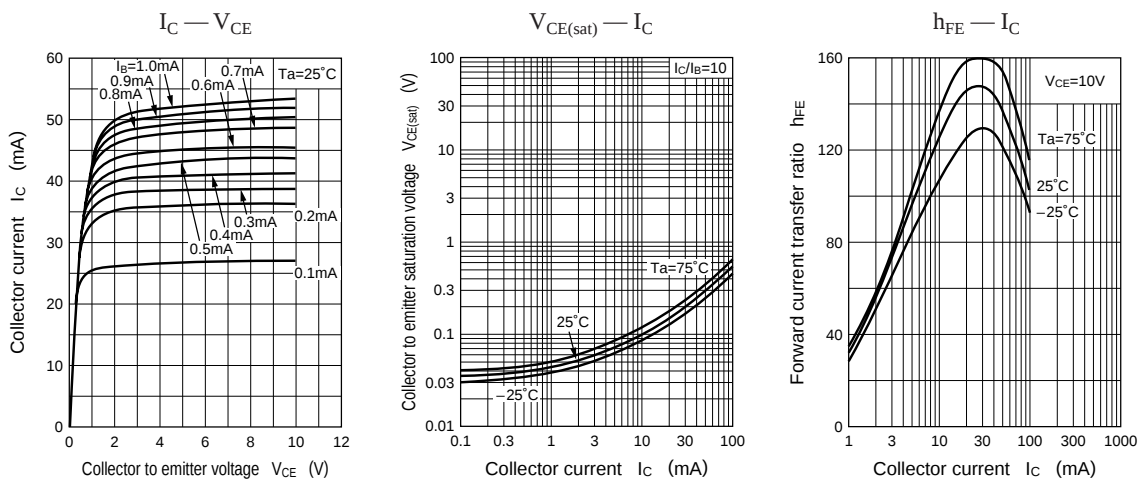
Characteristics charts of UN9210

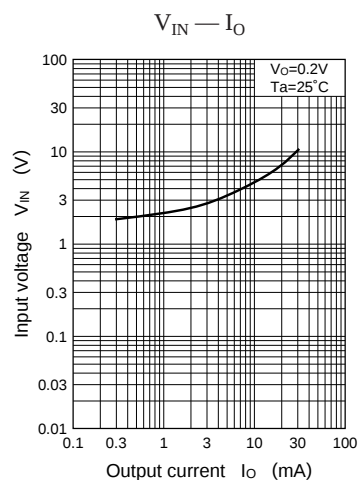
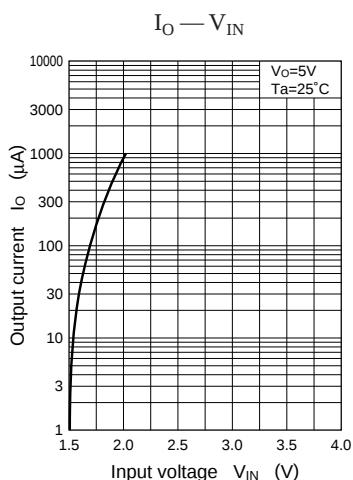
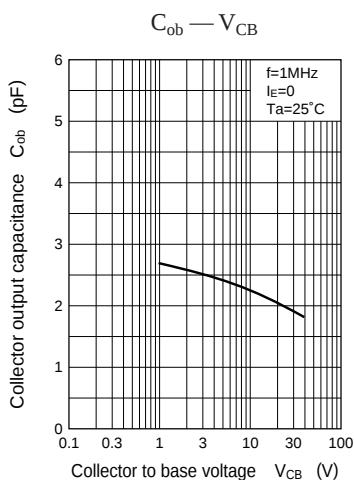


Characteristics charts of UN921D

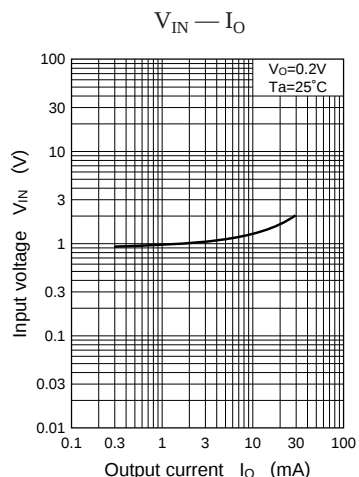
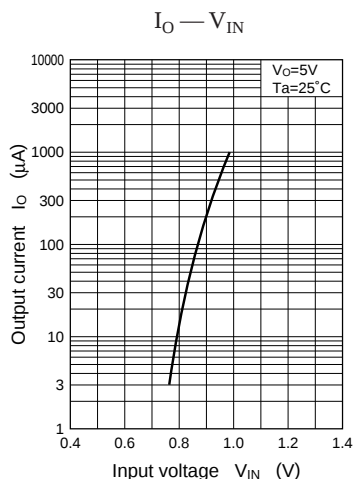
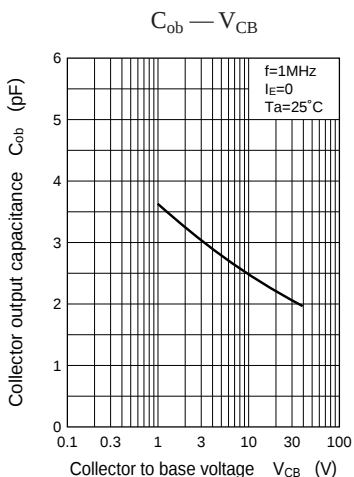
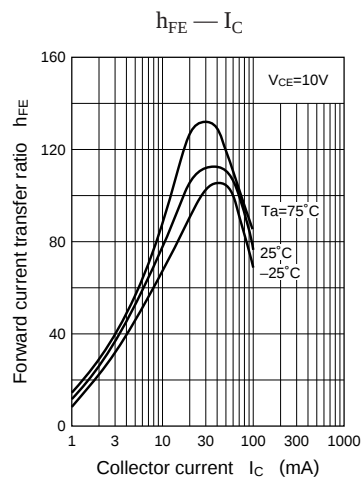
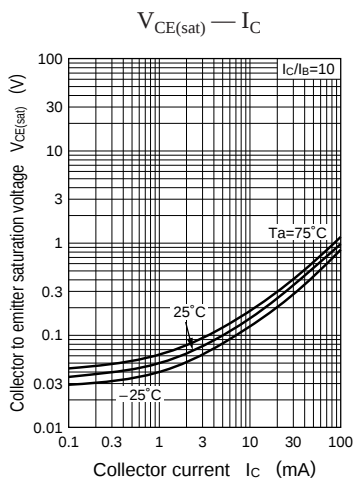
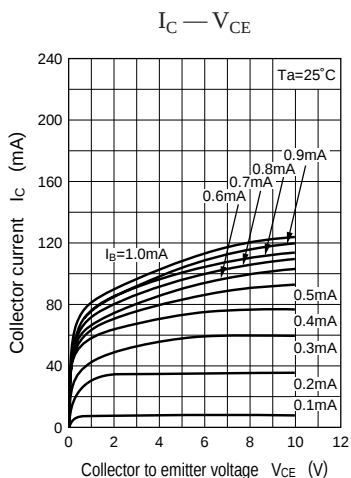


Characteristics charts of UN921E

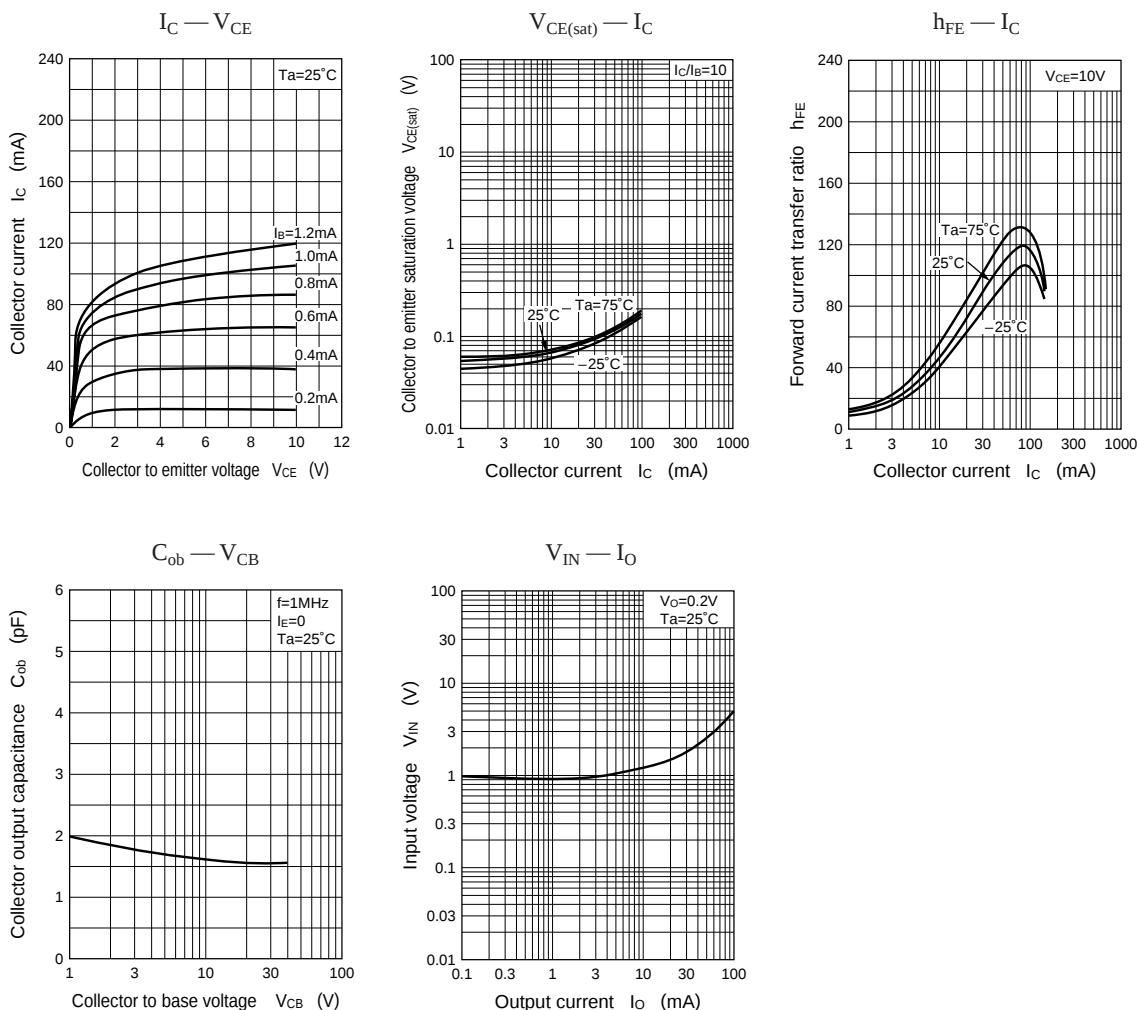




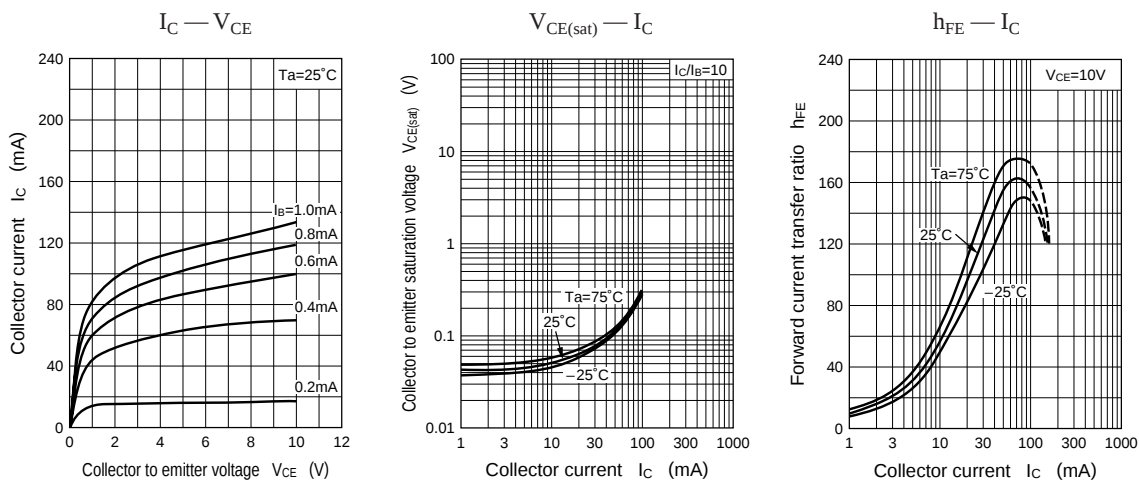
Characteristics charts of UN921F

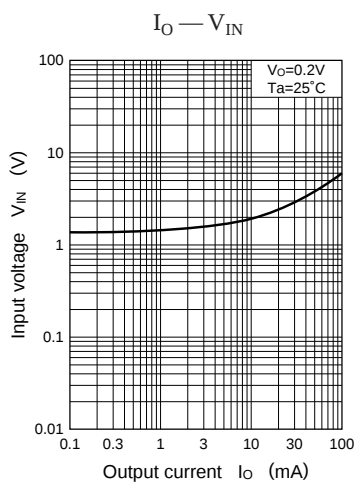
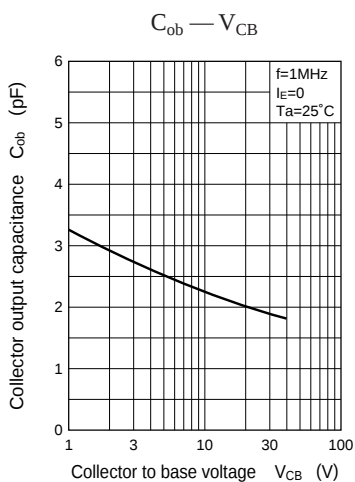


Characteristics charts of UN921K

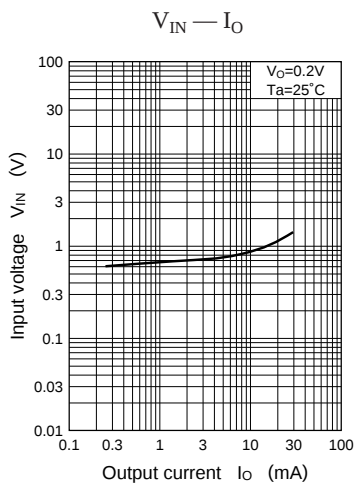
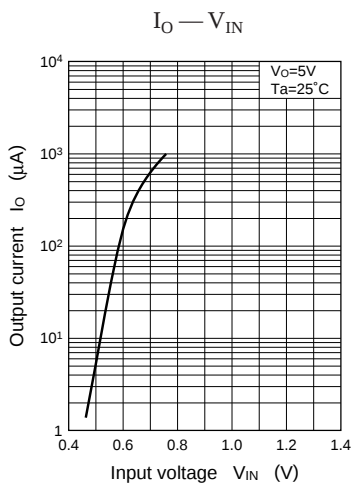
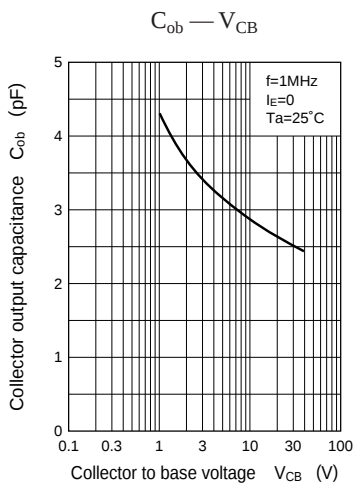
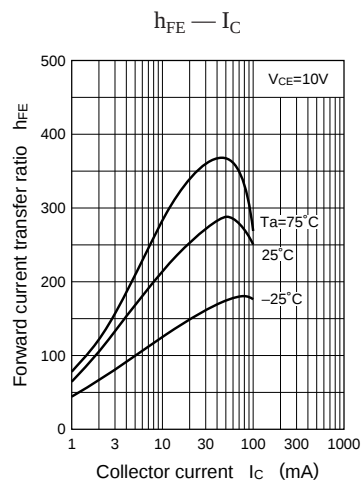
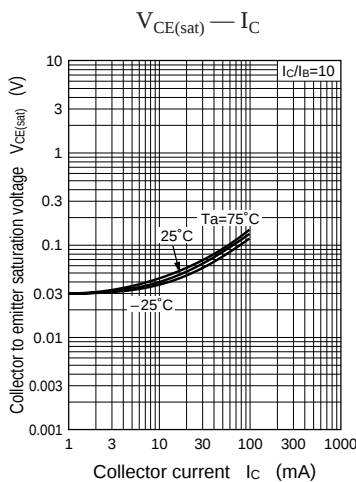
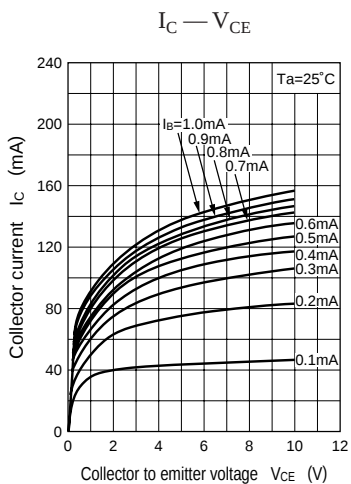


Characteristics charts of UN921L





Characteristics charts of UN921M



Characteristics charts of UN921N

