



## 2SD965/A

## NPN SILICON TRANSISTOR

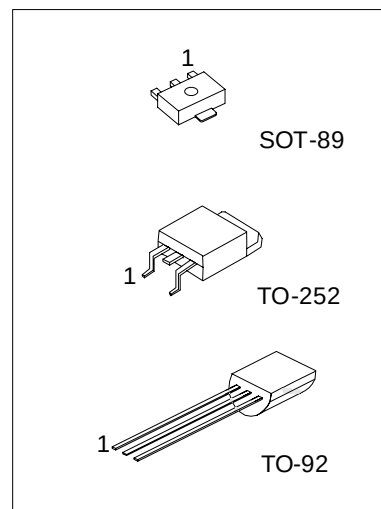
### LOW VOLTAGE HIGH CURRENT TRANSISTOR

#### ■ FEATURES

- \* Collector current up to 5A
- \* UTC **2SD965**: Collector-Emitter voltage up to 20 V
- \* UTC **2SD965A**: Collector-Emitter voltage up to 30 V

#### ■ APPLICATIONS

- \* Audio amplifier
- \* Flash unit of camera
- \* Switching circuit



\*Pb-free plating product number:  
2SD965L/2SD965AL

#### ■ ORDERING INFORMATION

| Order Number    |                   | Package | Pin Assignment |   |   | Packing   |
|-----------------|-------------------|---------|----------------|---|---|-----------|
| Normal          | Lead Free Plating |         | 1              | 2 | 3 |           |
| 2SD965-x-AB3-R  | 2SD965L-x-AB3-R   | SOT-89  | B              | C | E | Tape Reel |
| 2SD965-x-T92-B  | 2SD965L-x-T92-B   | TO-92   | E              | C | B | Tape Box  |
| 2SD965-x-T92-K  | 2SD965L-x-T92-K   | TO-92   | E              | C | B | Bulk      |
| 2SD965-x-TN3-R  | 2SD965L-x-TN3-R   | TO-252  | B              | C | E | Tape Reel |
| 2SD965-x-TN3-T  | 2SD965L-x-TN3-T   | TO-252  | B              | C | E | Tube      |
| 2SD965A-x-AB3-R | 2SD965AL-x-AB3-R  | SOT-89  | B              | C | E | Tape Reel |
| 2SD965A-x-T92-B | 2SD965AL-x-T92-B  | TO-92   | E              | C | B | Tape Box  |
| 2SD965A-x-T92-K | 2SD965AL-x-T92-K  | TO-92   | E              | C | B | Bulk      |
| 2SD965A-x-TN3-R | 2SD965AL-x-TN3-R  | TO-252  | B              | C | E | Tape Reel |
| 2SD965A-x-TN3-T | 2SD965AL-x-TN3-T  | TO-252  | B              | C | E | Tube      |

|  |                 |                                                                                                                                                                                                           |
|--|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | (1)Packing Type | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel, T: Tube<br/>(2) AB3: SOT-89, T92: TO-92, TN3: TO-252<br/>(3) x: refer to Classification of <math>h_{FE2}</math><br/>(4) L: Lead Free Plating, Blank: Pb/Sn</p> |
|  | (2)Package Type |                                                                                                                                                                                                           |
|  | (3)Rank         |                                                                                                                                                                                                           |
|  | (4)Lead Plating |                                                                                                                                                                                                           |

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER                 |         | SYMBOL    | RATINGS    | UNIT |
|---------------------------|---------|-----------|------------|------|
| Collector-Base Voltage    |         | $V_{CBO}$ | 40         | V    |
| Collector-Emitter Voltage | 2SD965  | $V_{CEO}$ | 20         | V    |
|                           | 2SD965A |           | 30         | V    |
| Emitter-Base Voltage      |         | $V_{EBO}$ | 7          | V    |
| Collector Dissipation     | SOT-89  | $P_C$     | 500        | mW   |
|                           | TO-92   |           | 750        | mW   |
|                           | TO-252  |           | 1          | W    |
| Collector Current         |         | $I_C$     | 5          | A    |
| Junction Temperature      |         | $T_J$     | 150        | °C   |
| Storage Temperature       |         | $T_{STG}$ | -65 ~ +150 | °C   |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified)

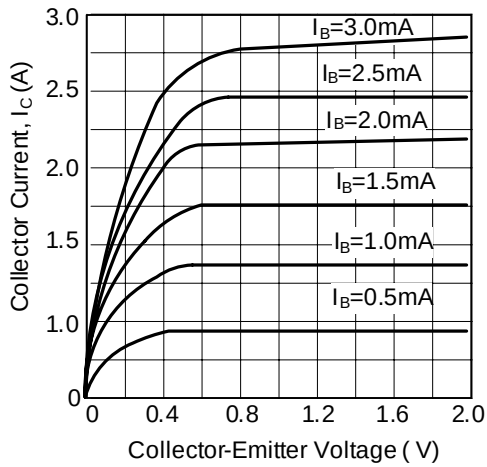
| PARAMETER                            |         | SYMBOL               | TEST CONDITIONS                                 | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------|----------------------|-------------------------------------------------|-----|-----|-----|------|
| Collector-Base Breakdown Voltage     |         | BV <sub>CBO</sub>    | I <sub>C</sub> =100μA, I <sub>E</sub> =0        | 40  |     |     | V    |
| Collector-Emitter Breakdown Voltage  | 2SD965  | BV <sub>CEO</sub>    | I <sub>C</sub> =1mA, I <sub>B</sub> =0          | 20  |     |     | V    |
|                                      | 2SD965A |                      |                                                 | 30  |     |     | V    |
| Emitter-Base Breakdown Voltage       |         | BV <sub>EBO</sub>    | I <sub>E</sub> =10μA, I <sub>C</sub> =0         | 7   |     |     | V    |
| Collector Cut-off Current            |         | I <sub>CBO</sub>     | V <sub>CB</sub> =10V, I <sub>E</sub> =0         |     |     | 100 | nA   |
| Emitter Cut-off Current              |         | I <sub>EBO</sub>     | V <sub>EB</sub> =7V, I <sub>C</sub> =0          |     |     | 100 | nA   |
| DC Current Gain(note)                |         | h <sub>FE</sub>      | V <sub>CE</sub> =2V, I <sub>C</sub> =1mA        |     | 200 |     |      |
|                                      |         |                      | V <sub>CE</sub> =2V, I <sub>C</sub> =0.5A       | 230 |     | 800 |      |
|                                      |         |                      | V <sub>CE</sub> =2V, I <sub>C</sub> =2A         | 150 |     |     |      |
| Collector-Emitter Saturation Voltage |         | V <sub>CE(SAT)</sub> | I <sub>C</sub> =3A, I <sub>B</sub> = 0.1A       |     |     | 1   | V    |
| Current Gain Bandwidth Product       |         | f <sub>T</sub>       | V <sub>CE</sub> =6V, I <sub>C</sub> =50mA       |     | 150 |     | MHz  |
| Output Capacitance                   |         | C <sub>ob</sub>      | V <sub>CB</sub> =20V, I <sub>E</sub> =0, f=1MHz |     |     | 50  | pF   |

■ CLASSIFICATION OF  $h_{FE2}$

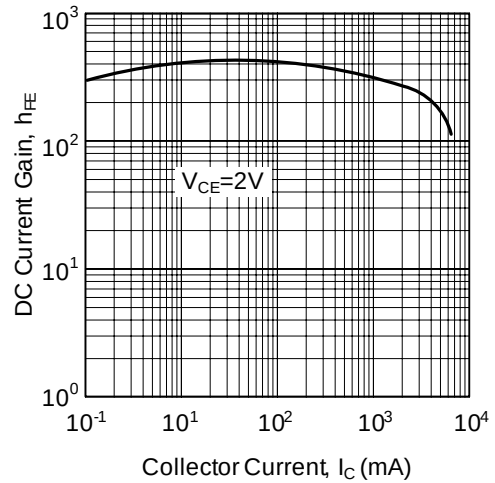
| RANK  | Q       | R       | S       |
|-------|---------|---------|---------|
| RANGE | 230-380 | 340-600 | 560-800 |

■ TYPICAL CHARACTERISTICS

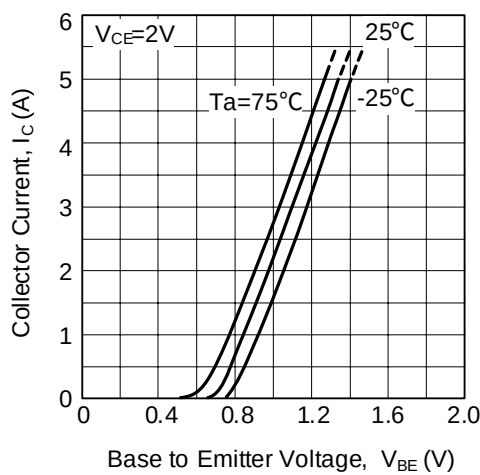
Static Characteristics



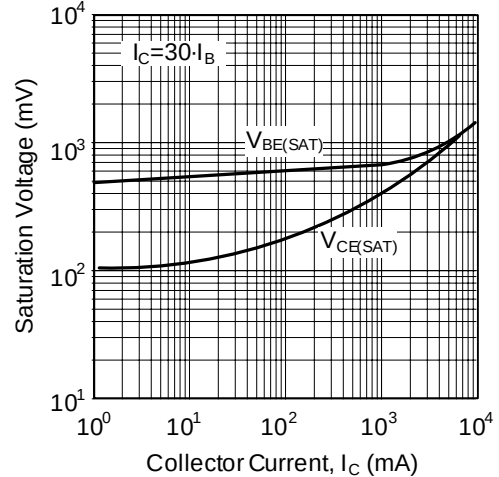
DC Current Gain



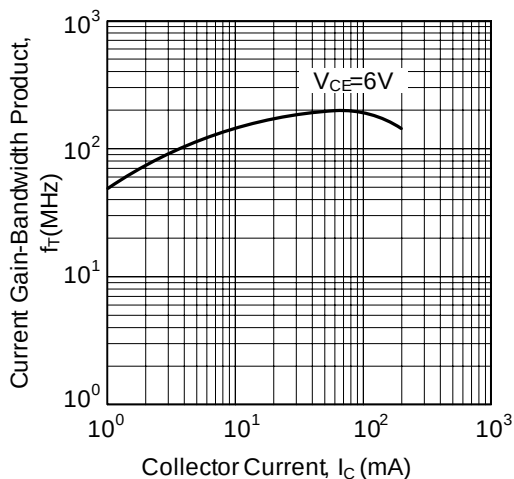
Base-Emitter on Voltage



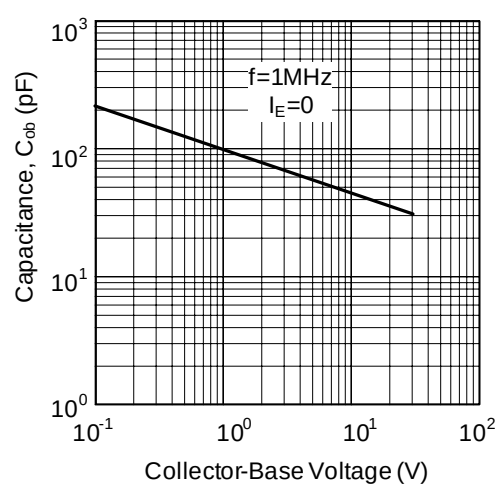
Saturation Voltage



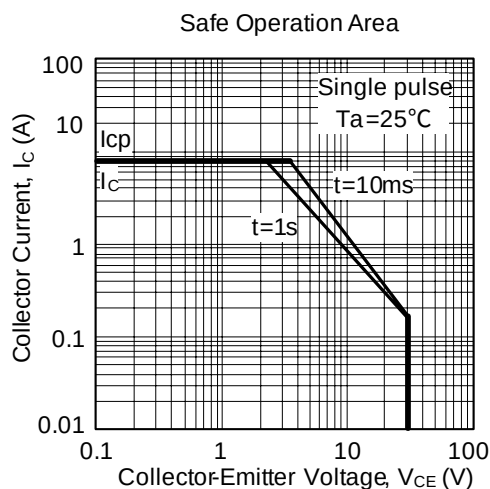
Current Gain-Bandwidth Product



Collector Output Capacitance



# ■ TYPICAL CHARACTERISTICS



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