



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDTA)
- Built-In Biasing Resistors, R1 = R2

### Mechanical Data

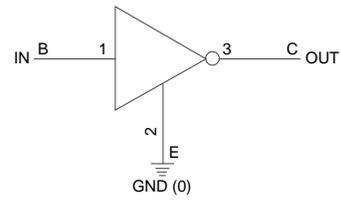
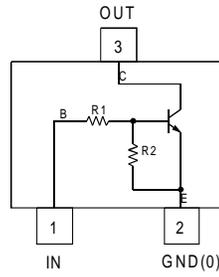
- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.008 grams (Approximate)

| Part Number   | R1, R2 (NOM) |
|---------------|--------------|
| NK-DDTC123EUA | 2.2kΩ        |
| NK-DDTC143EUA | 4.7kΩ        |
| NK-DDTC114EUA | 10kΩ         |
| NK-DDTC124EUA | 22kΩ         |
| NK-DDTC144EUA | 47kΩ         |
| NK-DDTC115EUA | 100kΩ        |

SOT323



Top View



**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                   | Symbol              | Value  | Unit |
|----------------------------------|---------------------|--|------|
| Supply Voltage <Pin: (3) to (2)> | V <sub>CC</sub>     | 50   | V    |
| Input Voltage <Pin: (1) to (2)>  | V <sub>IN</sub>     | -10 to +12<br>-10 to +30<br>-10 to +40<br>-10 to +40<br>-10 to +40<br>-10 to +40 | V    |
| Output Current                   | I <sub>O</sub>      | 100<br>100<br>50<br>30<br>100<br>20  | mA   |
| Output Current                   | I <sub>C(MAX)</sub> | 100  | mA   |

**Thermal Characteristics**

| Characteristic                                       | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                           | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient Air (Note 6) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol                         | Min                                    | Typ | Max  | Unit | Test Condition  |
|--|--------------------------------|--|-----|--|------|---|
| Input Voltage                              | V <sub>I(OFF)</sub>            | 0.5                                    | 1.1 | —  | V    | V <sub>CC</sub> = 5V, I <sub>O</sub> = 100μA  |
|  | V <sub>I(ON)</sub>             | —                                      | 1.9 | 3  | V    | VO = 0.3V, IO = 20mA, NK-DDTC123EUA<br>VO = 0.3V, IO = 20mA, NK-DDTC143EUA<br>VO = 0.3V, IO = 10mA, NK-DDTC114EUA<br>VO = 0.3V, IO = 5mA, NK-DDTC124EUA<br>VO = 0.3V, IO = 1mA, NKDDTC115EUA<br>VO = 0.3V, IO = 2mA, NK-DDTC144EUA  |
| Output Voltage                             | V <sub>O(ON)</sub>             | —                                      | 0.1 | 0.3  | V    | IO/II = 10mA/0.5mA, NK-DDTC123EUA<br>IO/II = 10mA/0.5mA, NK-DDTC143EUA<br>IO/II = 10mA/0.5mA, NK-DDTC114EUA<br>IO/II = 10mA/0.5mA, NK-DDTC124EUA<br>IO/II = 10mA/0.5mA, NK-DDTC144EUA<br>IO/II = 5mA/0.25mA, NK-DDTC115EUA  |
| Input Current                              | I <sub>I</sub>                 | —                                      | —   | 3.8<br>1.8<br>0.88<br>0.36<br>0.18<br>0.15 | mA   | V <sub>I</sub> = 5V   |
| Output Current                             | I <sub>O(OFF)</sub>            | —                                      | —   | 0.5  | μA   | V <sub>CC</sub> = 50V, V <sub>I</sub> = 0V  |
| DC Current Gain                            | G <sub>I</sub>                 | 20<br>20<br>30<br>56<br>68<br>80<br>82 | —   | —  | —    | V <sub>O</sub> = 5V, I <sub>O</sub> = 20mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 10mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA<br>V <sub>O</sub> = 5V, I <sub>O</sub> = 5mA |
| Input Resistor (R <sub>1</sub> ) Tolerance | ΔR <sub>1</sub>                | -30                                    | —   | +30  | %    | —   |
| Resistance Ratio                           | R <sub>2</sub> /R <sub>1</sub> | 0.8                                    | 1   | 1.2  | —    | —   |
| Gain-Bandwidth Product (Note 7)            | f <sub>T</sub>                 | —                                      | 250 | —  | MHz  | V <sub>CE</sub> = 10V, I <sub>E</sub> = 5mA,<br>f = 100MHz  |

Notes: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.  
7. Transistor - For Reference Only.

**Typical Curves – NK-DDTC143EUA** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

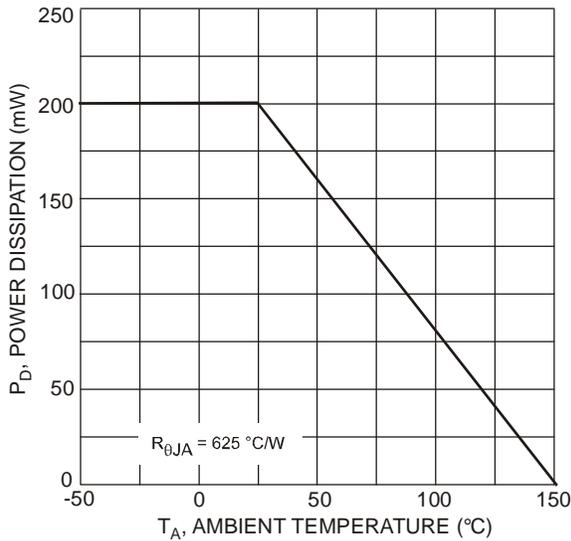


Fig. 1 Power Dissipation vs. Ambient Temperature

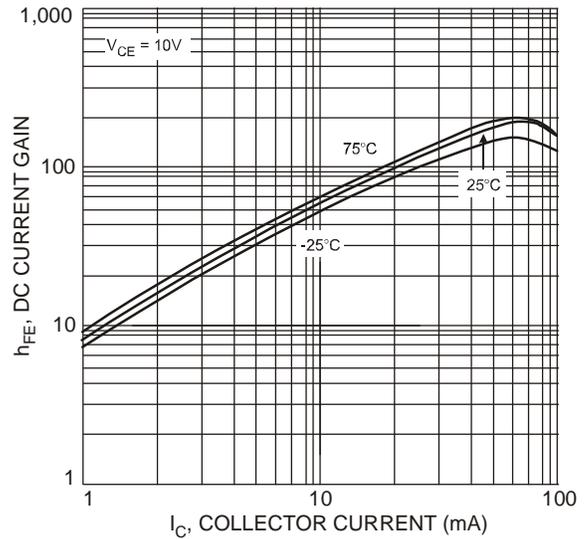


Fig. 2 Typical DC Current Gain vs. Collector Current

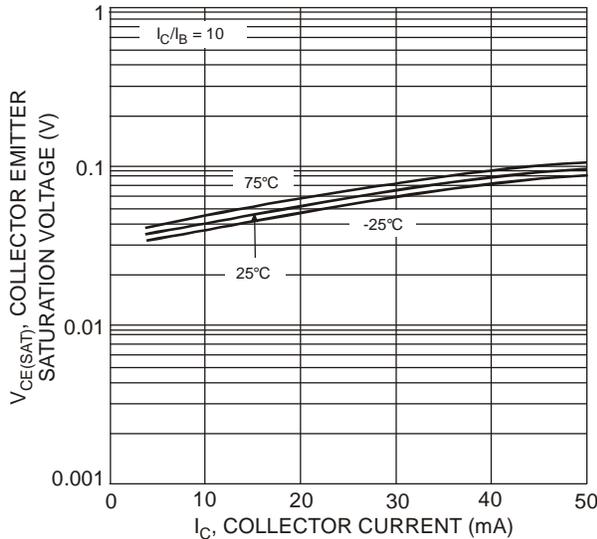


Fig. 3 Collector Emitter Saturation Voltage vs. Collector Current

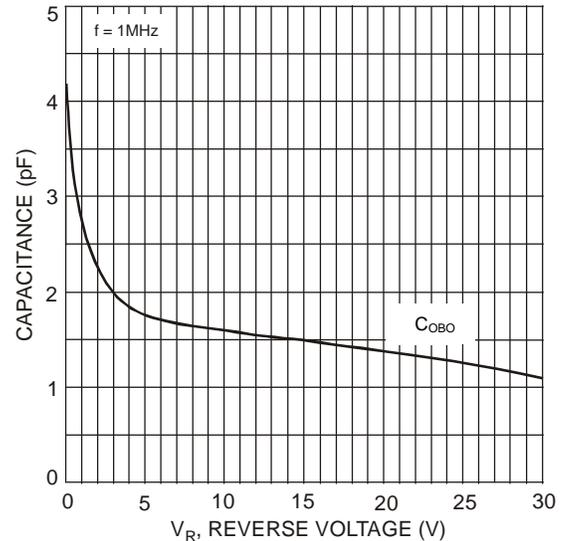


Fig. 4 Typical Capacitance Characteristics

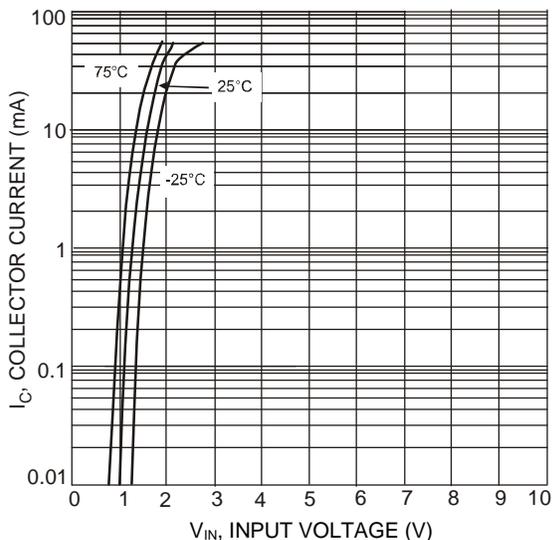


Fig. 5 Collector Current vs. Input Voltage

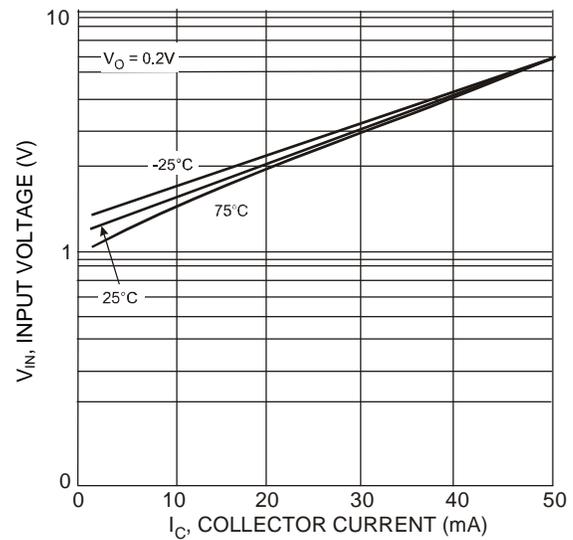
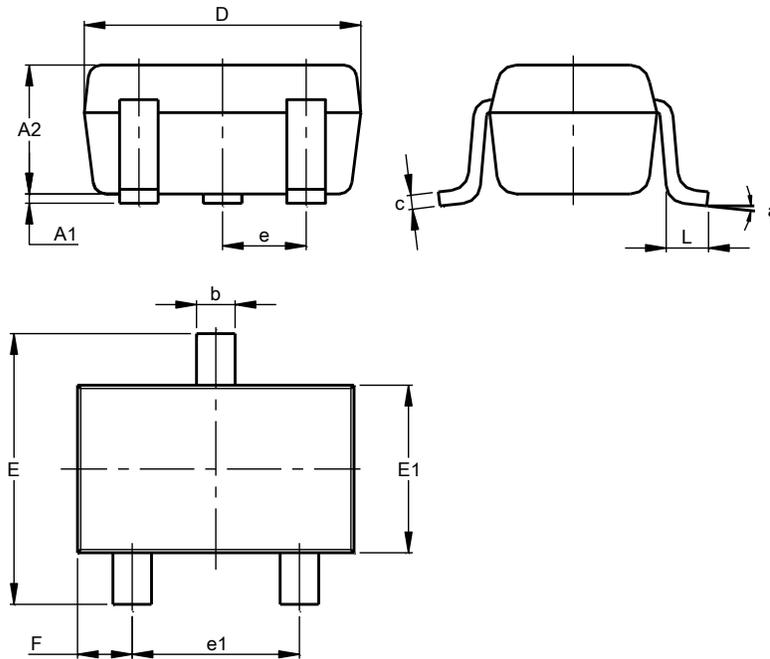


Fig. 6 Input Voltage vs. Collector Current

## Package Outline Dimensions

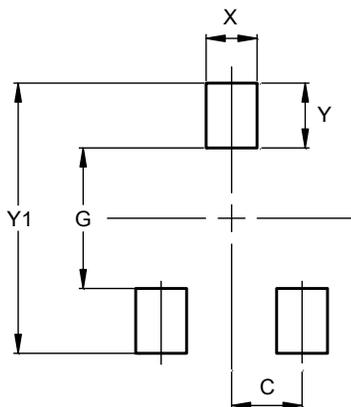
SOT323



| SOT323                      |           |       |       |
|-----------------------------|-----------|-------|-------|
| Dim                         | Min       | Max   | Typ   |
| A1                          | 0.00      | 0.10  | 0.05  |
| A2                          | 0.90      | 1.00  | 0.95  |
| b                           | 0.25      | 0.40  | 0.30  |
| c                           | 0.10      | 0.18  | 0.11  |
| D                           | 1.80      | 2.20  | 2.15  |
| E                           | 2.00      | 2.20  | 2.10  |
| E1                          | 1.15      | 1.35  | 1.30  |
| e                           | 0.650 BSC |       |       |
| e1                          | 1.20      | 1.40  | 1.30  |
| F                           | 0.375     | 0.475 | 0.425 |
| L                           | 0.25      | 0.40  | 0.30  |
| a                           | 0°        | 8°    | --    |
| <b>All Dimensions in mm</b> |           |       |       |

## Suggested Pad Layout

SOT323



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.470         |
| Y          | 0.600         |
| Y1         | 2.500         |