

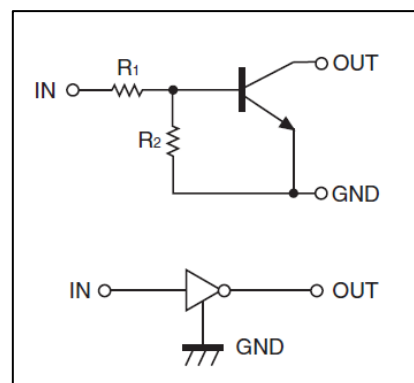
## Digital Transistors (Built-in Resistors)

DIGITAL TRANSISTOR (NPN)

### FEATURES

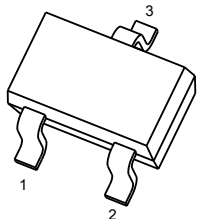
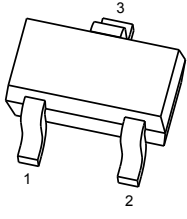
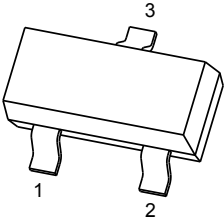
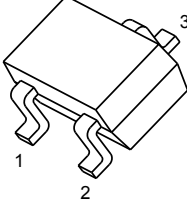
- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors(see equivalent circuit)
- The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input.They also have the advantage of almost completely eliminating parasitic effects
- Only the on/off conditions need to be set for operation, making device design easy

### • Equivalent Circuit



### MARKING: 23

### PIN CONNENCTIONS and MARKING

|                                                                                                         |                                             |                                                                                                           |                                               |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <b>DTC143EUA</b><br> | <b>SOT-323</b><br>1. IN<br>2. GND<br>3. OUT | <b>DTC143EE</b><br>  | <b>SOT-523</b><br>1. IN<br>2. GND<br>3. OUT   |
| <b>DTC143ECA</b><br> | <b>SOT-23</b><br>1. IN<br>2. GND<br>3. OUT  | <b>DTC143EKA</b><br> | <b>SOT-23-3L</b><br>1. IN<br>2. GND<br>3. OUT |


**MAXIMUM RATINGS**(Ta=25°C unless otherwise noted)

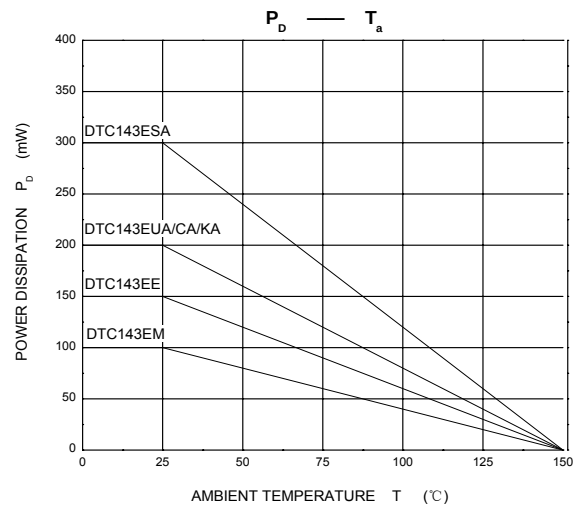
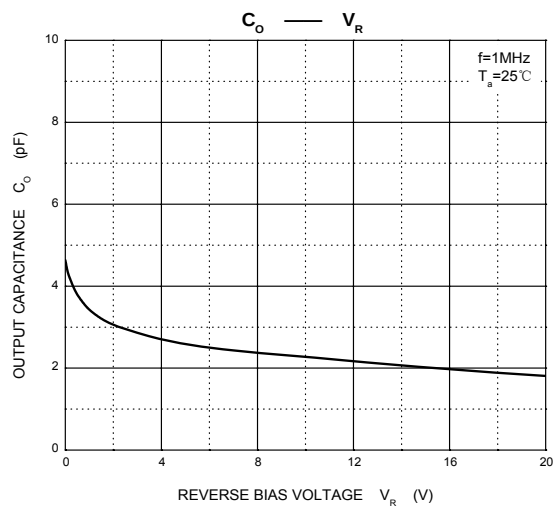
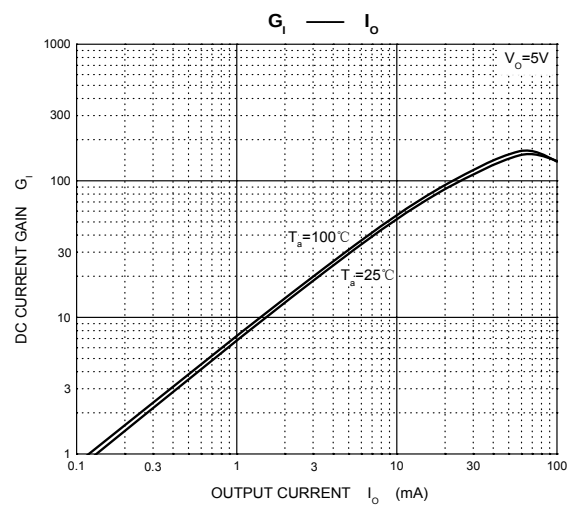
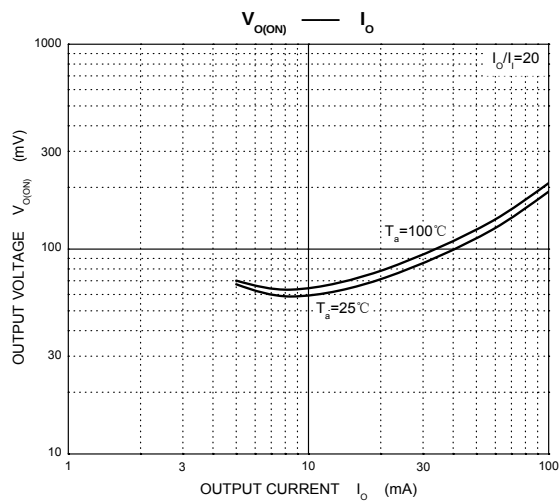
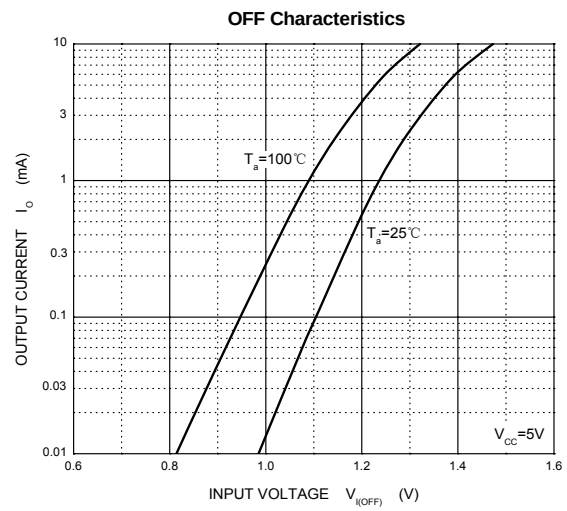
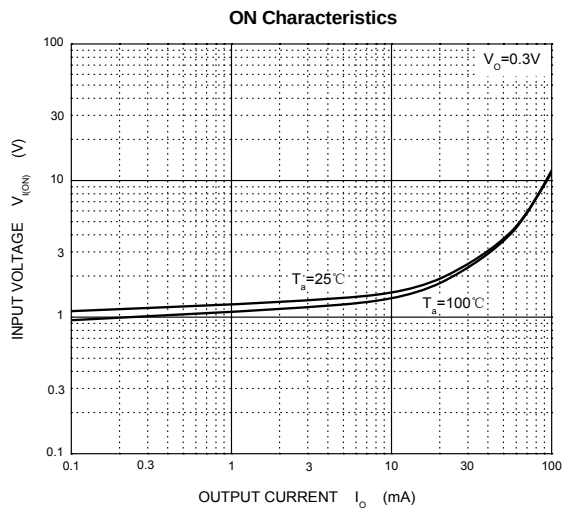
| Symbol           | Parameter            | Limits(DTC143E□) |     |     |     |     |  | Unit |
|------------------|----------------------|------------------|-----|-----|-----|-----|--|------|
|                  |                      |                  | E   | UA  | CA  | KA  |  |      |
| V <sub>CC</sub>  | Supply Voltage       | 50               |     |     |     |     |  | V    |
| V <sub>IN</sub>  | Input Voltage        | -10~+30          |     |     |     |     |  | V    |
| I <sub>O</sub>   | Output Current       | 100              |     |     |     |     |  | mA   |
| P <sub>D</sub>   | Power Dissipation    |                  | 150 | 200 | 200 | 200 |  | mW   |
| T <sub>j</sub>   | Junction Temperature | 150              |     |     |     |     |  | °C   |
| T <sub>stg</sub> | Storage Temperature  | -55~+150         |     |     |     |     |  | °C   |

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

| Parameter            | Symbol                         | Conditions                                         | Min  | Typ | Max  | Unit |
|----------------------|--------------------------------|----------------------------------------------------|------|-----|------|------|
| Input voltage        | V <sub>I(off)</sub>            | V <sub>CC</sub> =5V, I <sub>O</sub> =100μA         | 0.5  |     |      | V    |
|                      | V <sub>I(on)</sub>             | V <sub>O</sub> =0.3V, I <sub>O</sub> =20mA         |      |     | 3    | V    |
| Output voltage       | V <sub>O(on)</sub>             | I <sub>O</sub> /I <sub>I</sub> =10mA/0.5mA         |      |     | 0.3  | V    |
| Input current        | I <sub>I</sub>                 | V <sub>I</sub> =5V                                 |      |     | 1.8  | mA   |
| Output current       | I <sub>O(off)</sub>            | V <sub>CC</sub> =50V, V <sub>I</sub> =0            |      |     | 0.5  | μA   |
| DC current gain      | G <sub>I</sub>                 | V <sub>O</sub> =5V, I <sub>O</sub> =10mA           | 20   |     |      |      |
| Input resistance     | R <sub>1</sub>                 |                                                    | 3.29 | 4.7 | 6.11 | kΩ   |
| Resistance ratio     | R <sub>2</sub> /R <sub>1</sub> |                                                    | 0.8  | 1   | 1.2  |      |
| Transition frequency | f <sub>T</sub>                 | V <sub>O</sub> =10V, I <sub>O</sub> =5mA, f=100MHz |      | 250 |      | MHz  |

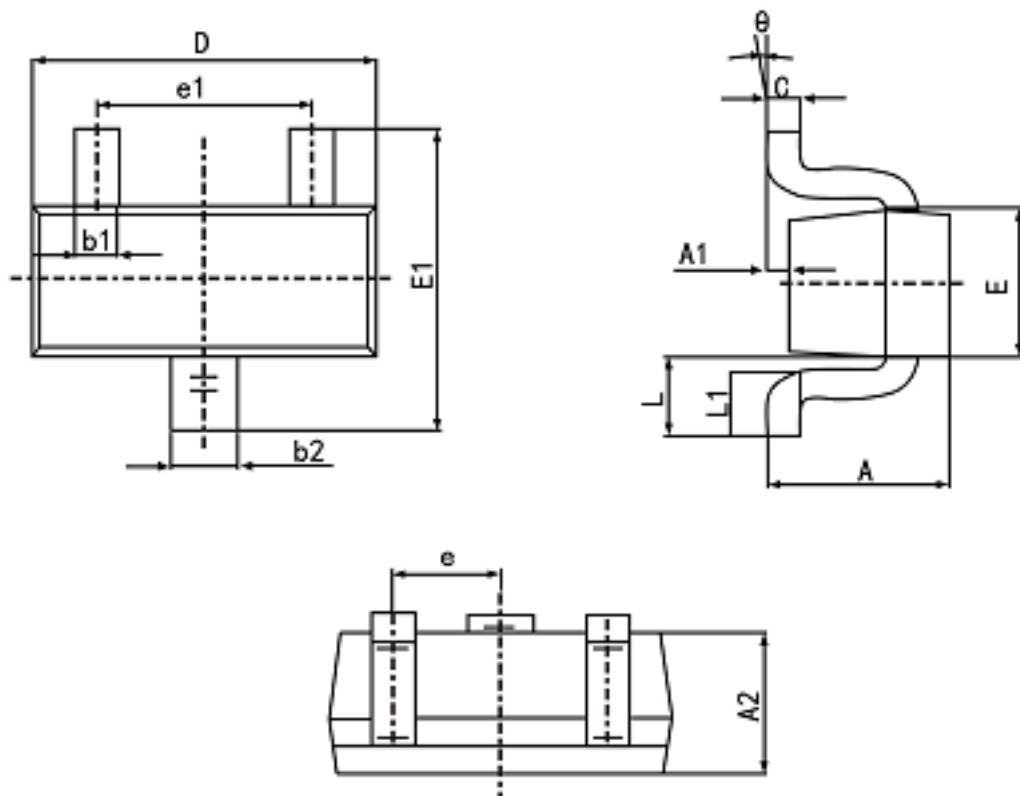


## Typical Characteristics



**PACKAGE OUTLINE**

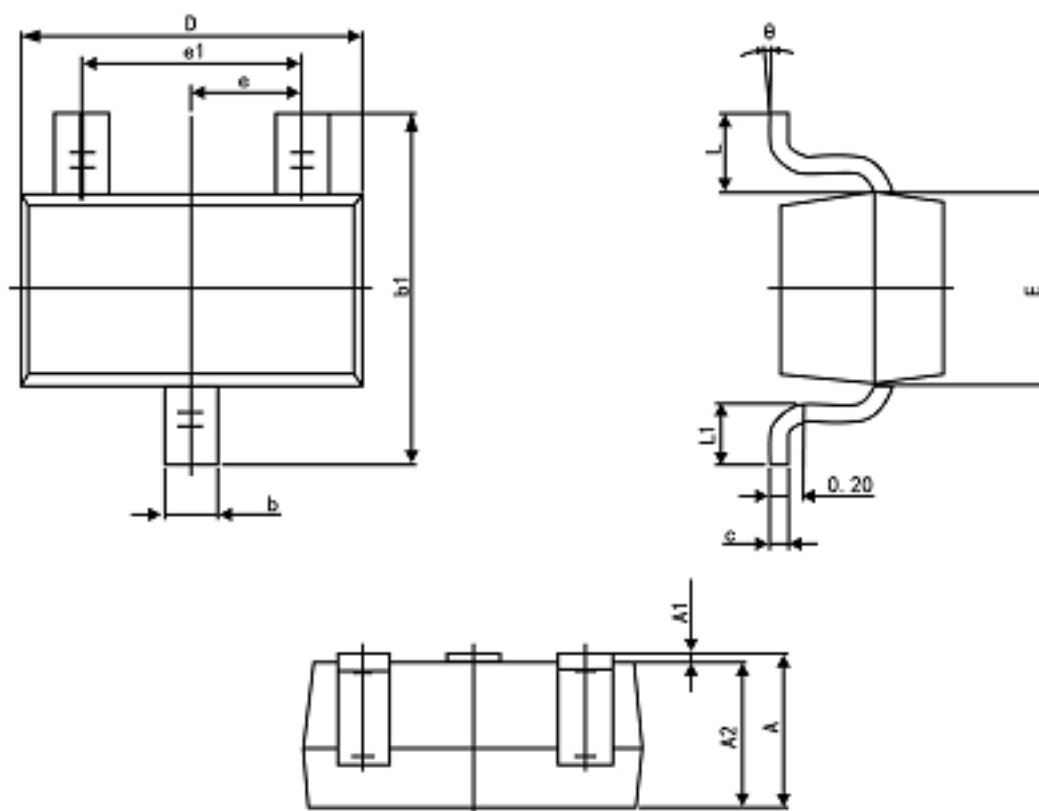
Plastic surface mounted package; 3 leads

**SOT-523**

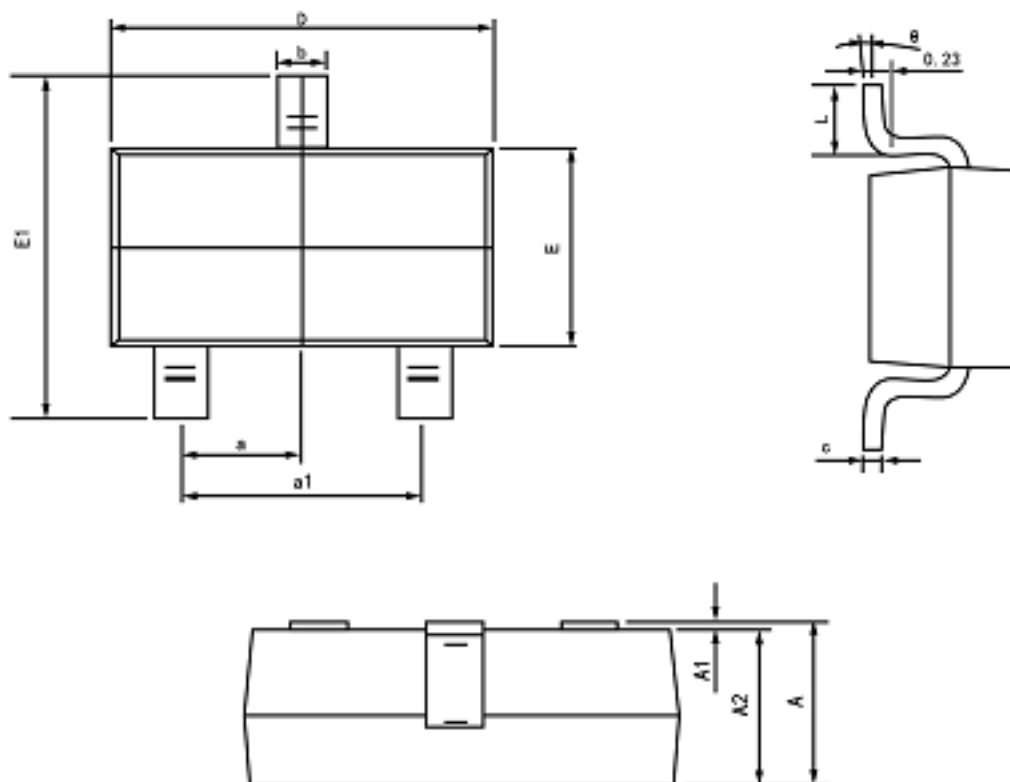
| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min                      | Max   |
| A      | 0.700                    | 0.900 |
| A1     | 0.000                    | 0.100 |
| A2     | 0.700                    | 0.800 |
| b1     | 0.150                    | 0.250 |
| b2     | 0.250                    | 0.350 |
| c      | 0.100                    | 0.200 |
| D      | 1.500                    | 1.700 |
| E      | 0.700                    | 0.900 |
| E1     | 1.450                    | 1.750 |
| e      | 0.500                    | TYP.  |
| e1     | 0.900                    | 1.100 |
| L      | 0.400 REF.               |       |
| L1     | 0.260                    | 0.460 |
| θ      | 0°                       | 8°    |

**PACKAGE OUTLINE**

Plastic surface mounted package; 3 leads

**SOT-323**

| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min                      | Max   |
| A      | 0.900                    | 1.100 |
| A1     | 0.000                    | 0.100 |
| A2     | 0.900                    | 1.000 |
| b      | 0.200                    | 0.400 |
| c      | 0.080                    | 0.150 |
| D      | 2.000                    | 2.200 |
| E      | 1.150                    | 1.350 |
| E1     | 2.150                    | 2.450 |
| e      | 0.650 TYP.               |       |
| e1     | 1.200                    | 1.400 |
| L      | 0.525 REF.               |       |
| L1     | 0.260                    | 0.460 |
| theta  | 0°                       | 8°    |

**Package outline dimensions     SOT23-3L**

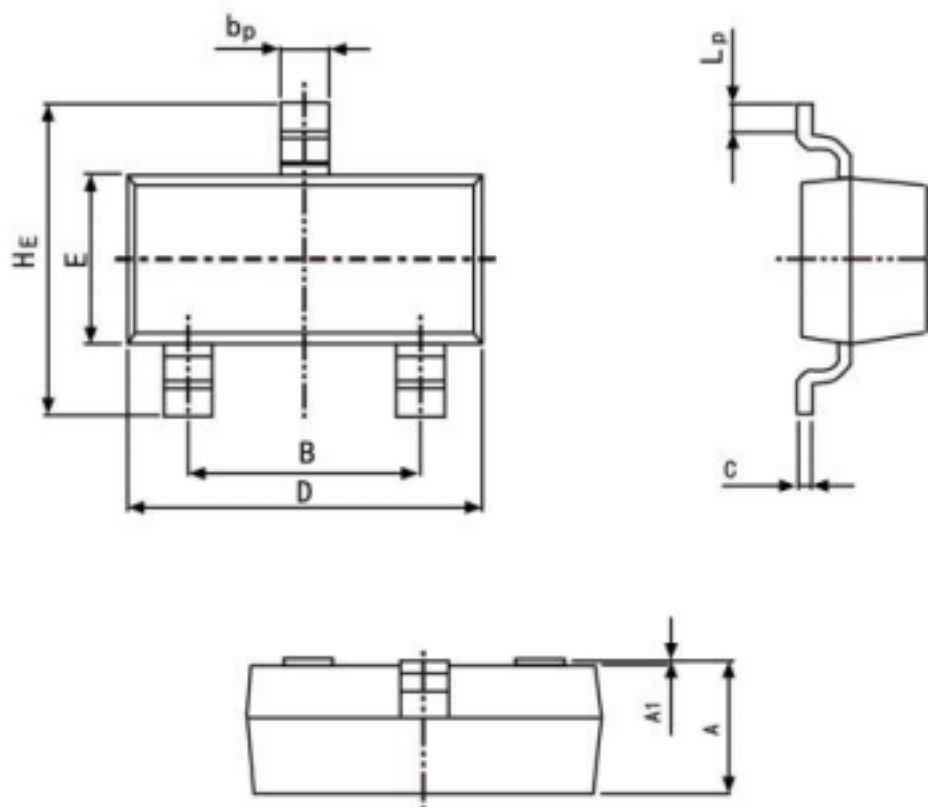
| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min                      | Max   |
| A      | 1.050                    | 1.250 |
| A1     | 0.000                    | 0.100 |
| A2     | 1.050                    | 1.150 |
| b      | 0.300                    | 0.500 |
| c      | 0.100                    | 0.200 |
| D      | 2.820                    | 3.020 |
| E      | 1.500                    | 1.700 |
| E1     | 2.650                    | 2.950 |
| e      | 0.950 (Basic)            |       |
| e1     | 1.800                    | 2.000 |
| L      | 0.300                    | 0.600 |
| θ      | 0°                       | 8°    |



## PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT-23



| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min                      | Max   |
| A      | 0.95                     | 1.40  |
| B      | 1.78                     | 2.04  |
| $b_p$  | 0.35                     | 0.50  |
| C      | 0.08                     | 0.19  |
| D      | 2.70                     | 3.10  |
| E      | 1.20                     | 1.65  |
| $H_E$  | 2.20                     | 3.00  |
| $A_1$  | 0.100                    | 0.013 |
| $L_p$  | 0.20                     | 0.50  |