

# Digital transistors (built-in resistors)

## DTD113ZK / DTD113ZU / DTD113ZS

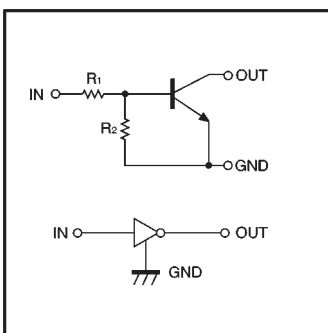
●Features

- 1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see equivalent circuit).
- 2) 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.
- 3) Only the on/off conditions need to be set for operation, making device design easy.

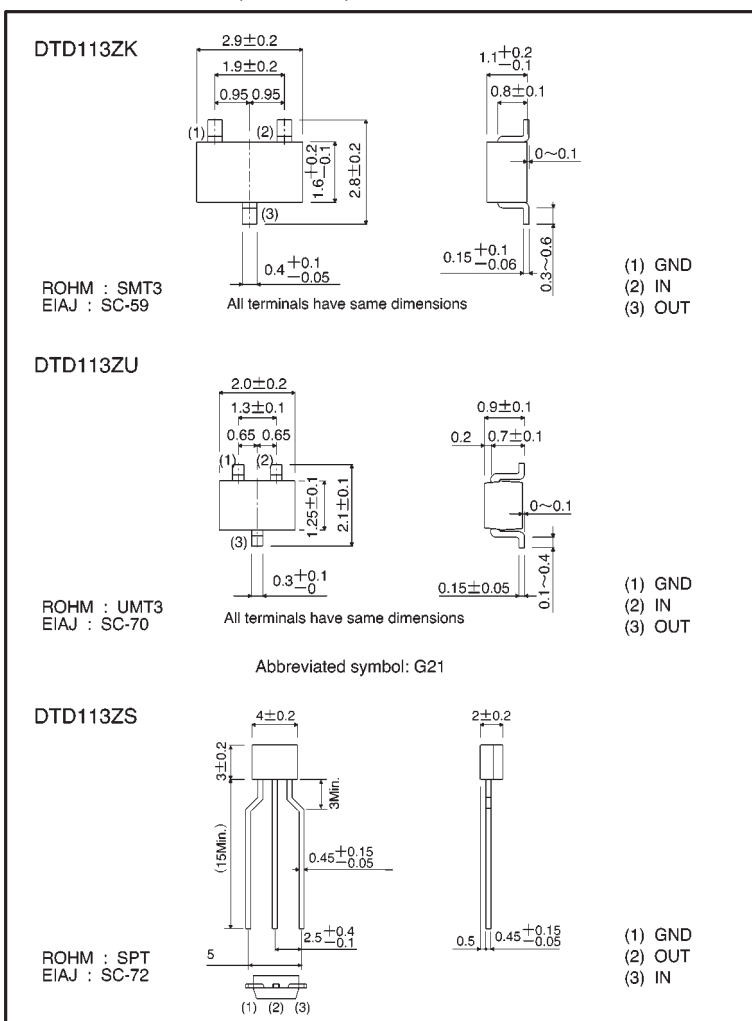
●Structure

NPN digital transistor  
(Built-in resistor type)

●Equivalent circuit



●External dimensions (Units: mm)



## ● Absolute maximum ratings (Ta = 25°C)

| Parameter            | Symbol           | Limits(DTD113Z□) |     |   | Unit |
|----------------------|------------------|------------------|-----|---|------|
|                      |                  | U                | K   | S |      |
| Supply voltage       | V <sub>CC</sub>  | 50               |     |   | V    |
| Input voltage        | V <sub>IN</sub>  | -5~+10           |     |   | V    |
| Output current       | I <sub>c</sub>   | 500              |     |   | mA   |
| Power dissipation    | P <sub>d</sub>   | 200              | 300 |   | mW   |
| Junction temperature | T <sub>j</sub>   | 150              |     |   | °C   |
| Storage temperature  | T <sub>stg</sub> | -55~+150         |     |   | °C   |

## ● Electrical characteristics (Ta = 25°C)

| Parameter            | Symbol                         | Min. | Typ. | Max. | Unit | Conditions   |
|----------------------|--------------------------------|------|------|------|------|--|
| Input voltage        | V <sub>I(off)</sub>            | —    | —    | 0.3  | V    | V <sub>CC</sub> =5V, I <sub>o</sub> =100 μA            |
|                      | V <sub>I(on)</sub>             | 3    | —    | —    |      | V <sub>o</sub> =0.3V, I <sub>o</sub> =20mA             |
| Output voltage       | V <sub>O(on)</sub>             | —    | 0.1  | 0.3  | V    | I <sub>o</sub> /I <sub>i</sub> =50mA/2.5mA             |
| Input current        | I <sub>i</sub>                 | —    | —    | 7.2  | 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>                 | 56   | —    | —    | —    | V <sub>o</sub> =5V, I <sub>o</sub> =50mA               |
| Input resistance     | R <sub>i</sub>                 | 0.7  | 1    | 1.3  | kΩ   | —  |
| Resistance ratio     | R <sub>2</sub> /R <sub>1</sub> | 8    | 10   | 12   | —    | —  |
| Transition frequency | f <sub>r</sub>                 | —    | 200  | —    | MHz  | V <sub>CE</sub> =10V, I <sub>E</sub> =-5mA, f=100MHz * |

\* Transition frequency of the device

## ● Packaging specifications

| Part No. | Package                      | SMT3   | UMT3   | SPT    |
|----------|------------------------------|--------|--------|--------|
|          | Package type                 | Taping | Taping | Taping |
|          | Code                         | T146   | T106   | TP     |
|          | Basic ordering unit (pieces) | 3000   | 3000   | 5000   |
| DTD113ZK |                              | ○      | —      | —      |
| DTD113ZU |                              | —      | ○      | —      |
| DTD113ZS |                              | —      | —      | ○      |

●Electrical characteristic curves

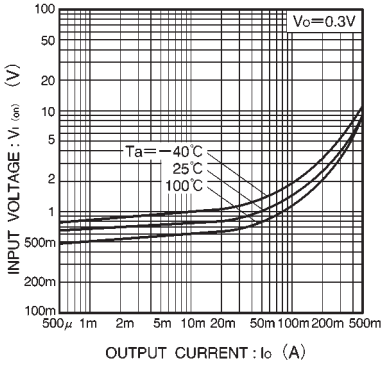


Fig.1 Input voltage vs. output current (ON characteristics)

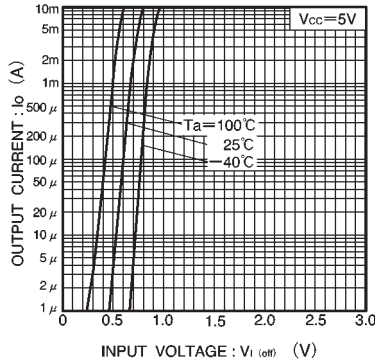


Fig.2 Output current vs. input voltage (OFF characteristics)

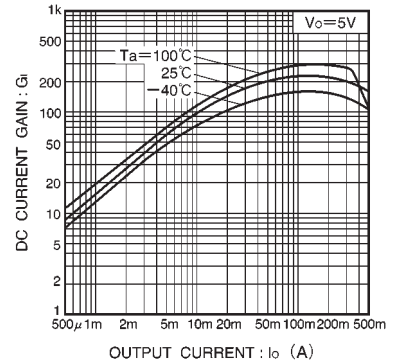


Fig. 3 DC current gain vs. output current

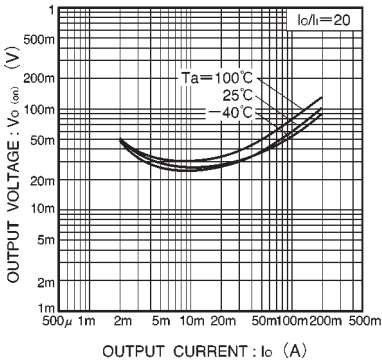


Fig.4 Output voltage vs. output current