

# 100mA / 50V Digital transistors (with built-in resistors)

**DTC123EM / DTC123EE / DTC123EUA / DTC123EKA**

● **Applications**

Inverter, Interface, Driver

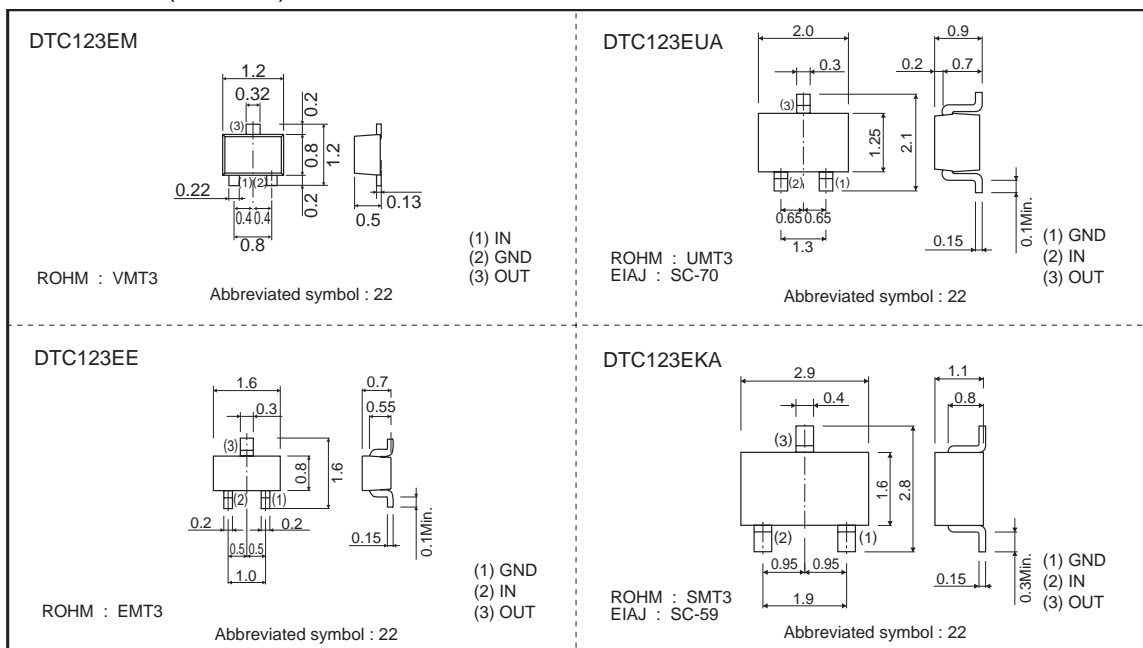
● **Features**

- 1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see the 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 the device design easy.

● **Structure**

NPN epitaxial planar silicon transistor (Resistor built-in type)

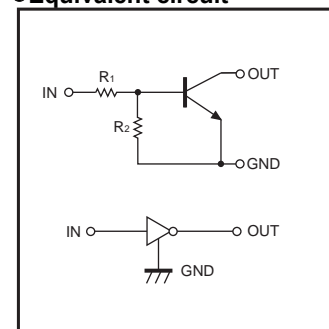
● **Dimensions (Unit : mm)**



● **Packaging specifications**

| Type      | Package                      | VMT3   | EMT3   | UMT3   | SMT3   |
|-----------|------------------------------|--------|--------|--------|--------|
|           | Packaging type               | Taping | Taping | Taping | Taping |
|           | Code                         | T2L    | TL     | T106   | T146   |
|           | Basic ordering unit (pieces) | 8000   | 3000   | 3000   | 3000   |
| DTC123EM  |                              | ○      | -      | -      | -      |
| DTC123EE  |                              | -      | ○      | -      | -      |
| DTC123EUA |                              | -      | -      | ○      | -      |
| DTC123EKA |                              | -      | -      | -      | ○      |

● **Equivalent circuit**



●Absolute maximum ratings (Ta=25°C)

| Parameter            | Symbol               | Limits      |          |           |           | Unit |
|----------------------|----------------------|-------------|----------|-----------|-----------|------|
|                      |                      | DTC123EM    | DTC123EE | DTC123EUA | DTC123EKA |      |
| Supply voltage       | V <sub>CC</sub>      | 50          |          |           |           | V    |
| Input voltage        | V <sub>IN</sub>      | -10 to +12  |          |           |           | V    |
| Output current       | I <sub>o</sub>       | 100         |          |           |           | mA   |
|                      | I <sub>C(Max.)</sub> | 100         |          |           |           |      |
| Power dissipation    | P <sub>d</sub>       | 150         | 200      |           |           | mW   |
| Junction temperature | T <sub>j</sub>       | 150         |          |           |           | °C   |
| Storage temperature  | T <sub>stg</sub>     | -55 to +150 |          |           |           | °C   |

●Electrical characteristics (Ta=25°C)

| Parameter            | Symbol                         | Min. | Typ. | Max. | Unit | Conditions  |
|----------------------|--------------------------------|------|------|------|------|---|
| Input voltage        | V <sub>I(off)</sub>            | -    | -    | 0.5  | V    | V <sub>CC</sub> =5V, I <sub>o</sub> =100μA            |
|                      | 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> =10mA/0.5mA            |
| Input current        | I <sub>i</sub>                 | -    | -    | 3.8  | 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   | -    | -    | -    | V <sub>o</sub> =5V, I <sub>o</sub> =20mA              |
| Input resistance     | R <sub>1</sub>                 | 1.54 | 2.2  | 2.86 | kΩ   | -   |
| Resistance ratio     | R <sub>2</sub> /R <sub>1</sub> | 0.8  | 1    | 1.2  | -    | -   |
| Transition frequency | f <sub>T</sub> *               | -    | 250  | -    | MHz  | V <sub>CE</sub> =10V, I <sub>E</sub> = -5mA, f=100MHz |

\* Characteristics of built-in transistor

●Electrical characteristic curves

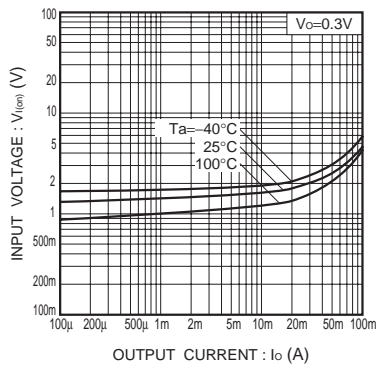


Fig.1 Input voltage vs. output current (ON characteristics)

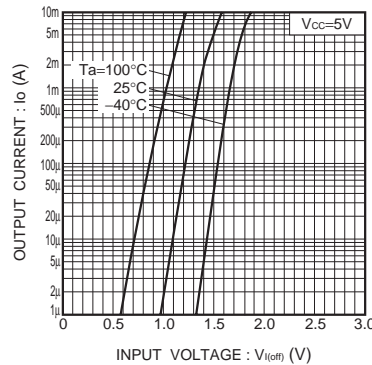


Fig.2 Output current vs. input voltage (OFF characteristics)

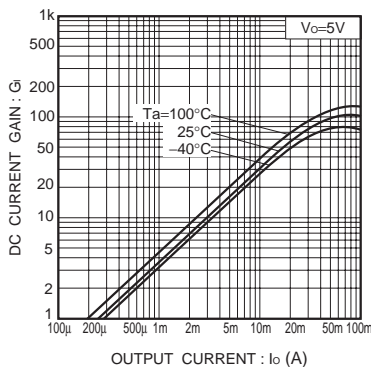


Fig.3 DC current gain vs. output current

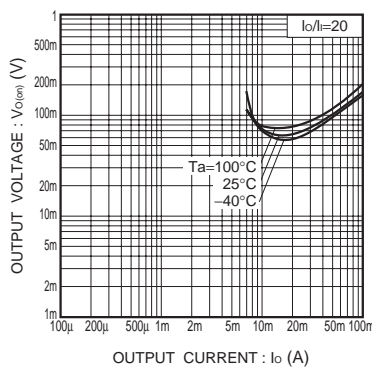


Fig.4 Output voltage vs. output current

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