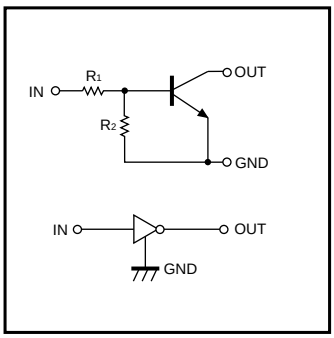
# Digital transistors (built-in resistors)

## DTC143ZM / DTC143ZE / DTC143ZUA / DTC143ZKA / DTC143ZSA

### ●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.

### ●Equivalent circuit

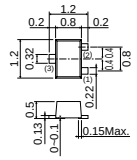



### ●Structure

NPN digital transistor
(Built-in resistor type)

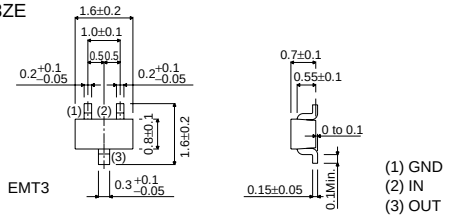
### ●External dimensions (Unit : mm)

DTC143ZM



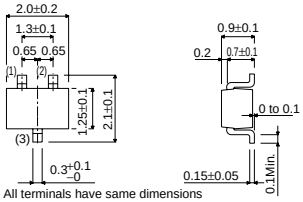
ROHM : VMT3
Abbreviated symbol : E23
(1) IN
(2) GND
(3) OUT

DTC143ZE



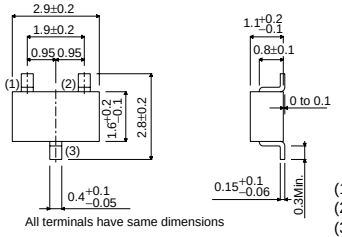
ROHM : EMT3
Abbreviated symbol : E23
(1) GND
(2) IN
(3) OUT

DTC143ZUA



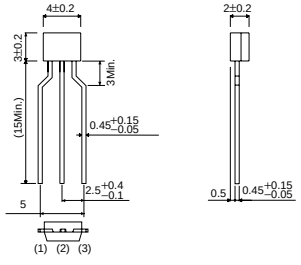
ROHM : UMT3
EIAJ : SC-70
All terminals have same dimensions
Abbreviated symbol : 123
(1) GND
(2) IN
(3) OUT

DTC143ZKA



ROHM : SMT3
EIAJ : SC-59
All terminals have same dimensions
Abbreviated symbol : E23
(1) GND
(2) IN
(3) OUT

DTC143ZSA



ROHM : SPT
EIAJ : SC-72
(1) GND
(2) OUT
(3) IN

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

| Parameter | Symbol | Limits(DTC143Z□) | | | | | Unit |
|---|---|---|---|---|---|---|---|
| | | M | E | UA | KA | SA | |
| Supply voltage | $V_{CC}$ | 50 | | | | | V |
| Input voltage | $V_{IN}$ | −5 to +30 | | | | | V |
| Output current | $I_O$ | 100 | | | | | mA |
| | $I_{C(Max.)}$ | 100 | | | | | |
| Power dissipation | Pd | 150 | | 200 | | 300 | mW |
| Junction temperature | Tj | 150 | | | | | °C |
| Storage temperature | Tstg | −55 to +150 | | | | | °C |

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Input voltage | $V_{I(off)}$ | – | – | 0.5 | V | $V_{CC}$=5V, $I_O$=100μA |
| | $V_{I(on)}$ | 1.3 | – | – | | $V_O$=0.3V, $I_O$=5mA |
| Output voltage | $V_{O(on)}$ | – | 0.1 | 0.3 | V | $I_O/I_I$=5mA/0.25mA |
| Input current | $I_I$ | – | – | 1.8 | mA | $V_I$=5V |
| Output current | $I_{O(off)}$ | – | – | 0.5 | μA | $V_{CC}$=50V, $V_I$=0V |
| DC current gain | $G_I$ | 80 | – | – | – | $V_O$=5V, $I_O$=10mA |
| Input resistance | $R_1$ | 3.29 | 4.7 | 6.11 | kΩ | – |
| Resistance ratio | $R_2/R_1$ | 8 | 10 | 12 | – | – |
| Transition frequency | $f_T$ | – | 250 | – | MHz | $V_{CE}$=10V, $I_E$= −5mA, f=100MHz ＊ |

＊Transition frequency of the device

●**Packaging specifications**

| Type | Package | VMT3 | EMT3 | UMT3 | SMT3 | SPT |
|---|---|---|---|---|---|---|
| | Packaging type | Taping | Taping | Taping | Taping | Taping |
| | Code | T2L | TL | T106 | T146 | TP |
| | Basic ordering unit (pieces) | 8000 | 3000 | 3000 | 3000 | 5000 |
| DTC143ZM | | ○ | – | – | – | – |
| DTC143ZE | | – | ○ | – | – | – |
| DTC143ZUA | | – | – | ○ | – | – |
| DTC143ZKA | | – | – | – | ○ | – |
| DTC143ZSA | | – | – | – | – | ○ |

●**Electrical characteristic curves**

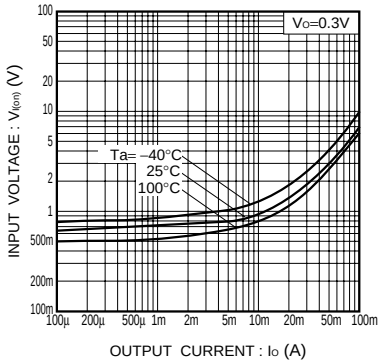



Fig.1 Input voltage vs. output current (ON characteristics)

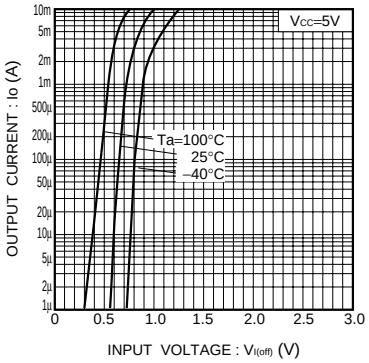



Fig.2 Output current vs. input voltage (OFF characteristics)

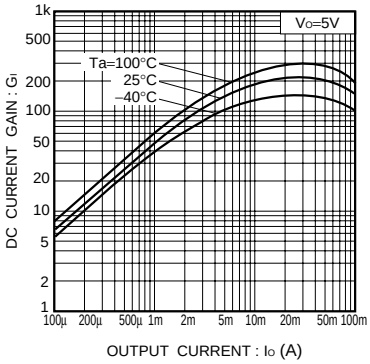



Fig.3 DC current gain vs. output current

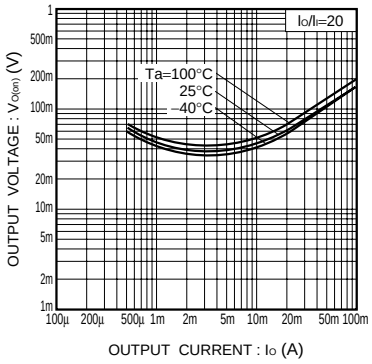



Fig.4 Output voltage vs. output current

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