

Digital transistors (built-in resistors)

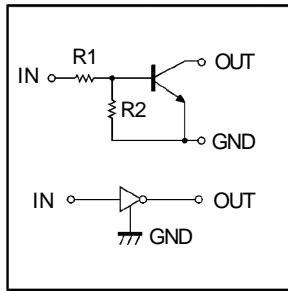
• **Features**

- 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 thinfilm resistors with complete isolation to allow positive 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.

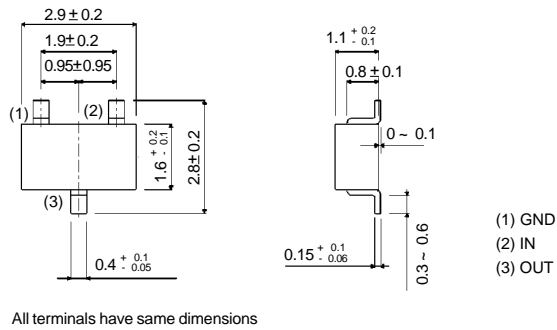
• **Structure**

PNP digital transistor (with built-in resistors)

• **Equivalent circuit**



DTC144EKA



EIAJ: SC—59

● Absolute maximum ratings($T_a=25^\circ\text{C}$)

| Parameter | symbol | limits | | | unit |
|----------------------|---------------|----------|-----|-----|------------------|
| Supply voltage | V_{CC} | 50 | | | V |
| Input voltage | V_{IN} | -10~+40 | | | V |
| Output current | I_O | 30 | | | mA |
| | $I_{C(Max.)}$ | 100 | | | |
| Power dissipation | P_d | 150 | 200 | 300 | mW |
| Junction temperature | T_j | 150 | | | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55~+150 | | | $^\circ\text{C}$ |

● Electrical characteristics($T_a=25^\circ\text{C}$)

| Parameter | symbol | Min. | Typ. | Max. | Unit | Conditions |
|----------------------|--------------|------|------|------|------------------|--|
| Input voltage | $V_{I(off)}$ | — | — | 0.5 | V | $V_{CC}=5V, I_O=100\mu\text{A}$ |
| | $V_{I(on)}$ | 3 | — | — | | $V_O=0.3V, I_O=2\text{mA}$ |
| Output Voltage | $V_{O(on)}$ | — | — | 0.3 | V | $I_O/I_I=10\text{mA}/0.5\text{mA}$ |
| Input current | I_I | — | — | 0.18 | mA | $V_I=5V$ |
| Output current | $I_{O(off)}$ | — | — | 0.5 | μA | $V_{CC}=50V, V_I=0V$ |
| DC current gain | G_I | 68 | — | — | — | $V_O=5V, I_O=5\text{mA}$ |
| Input resistance | R_1 | 32.9 | 47 | 61.1 | $\text{K}\Omega$ | — |
| Resistance ratio | R_2 / R_1 | 0.8 | 1 | 1.2 | — | — |
| Transition frequency | f_T | — | 250 | — | MHz | $V_{CE}=10V, I_E=-5\text{mA}, f=100\text{MHz}^*$ |

*Transition frequency of the device

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ELECTRICAL CHARACTERISTIC CURVES

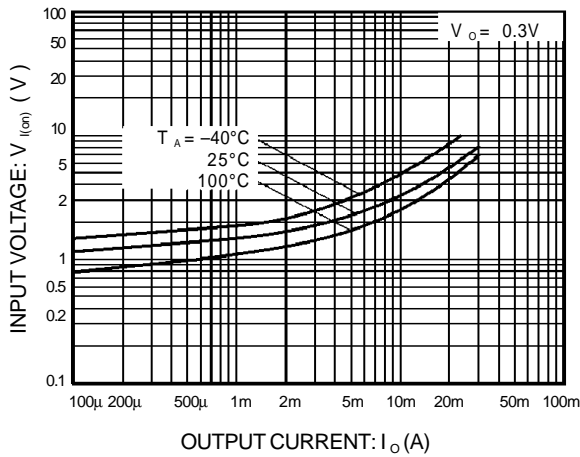


Figure 1. Input voltage vs.output current (ON characteristics)

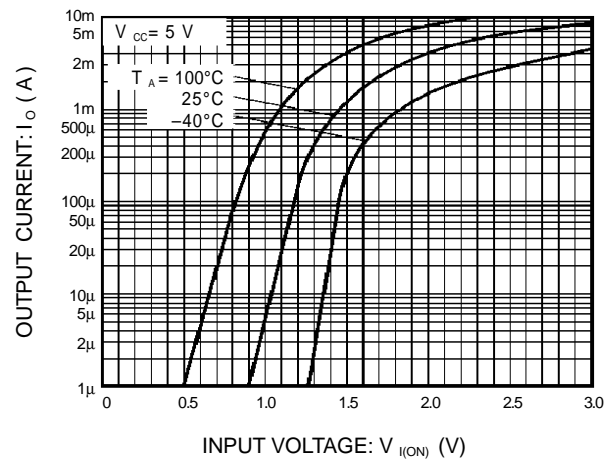


Figure 2. Output current vs.input voltage (OFF characteristics)

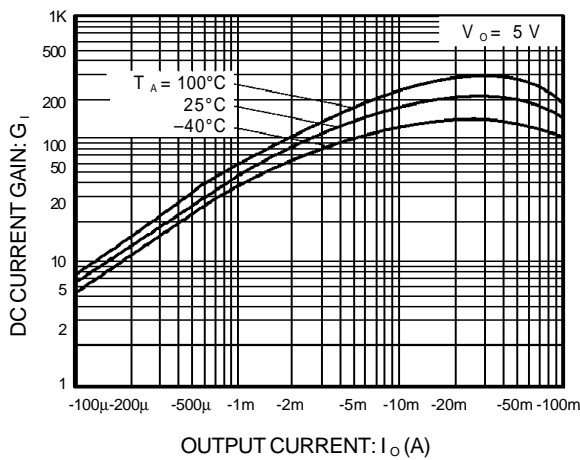


Figure 3. DC current gain vs.output current

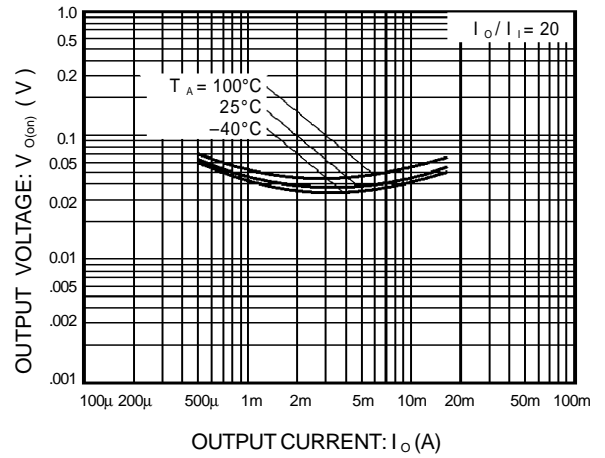


Figure 4. Output voltage vs.output current