

## Digital transistors (built-in resistors)

• Features

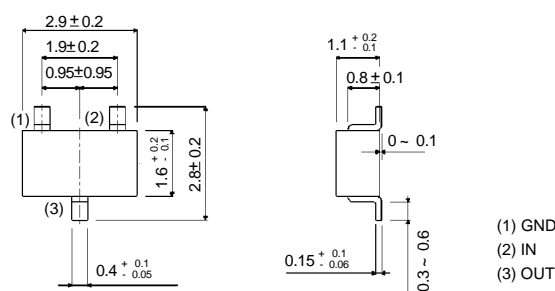
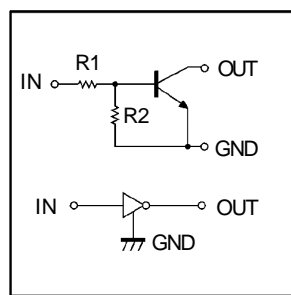
- 1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see equivalent circuit).
- 2) The bias resistors consist of thinfilm resistors with complete isolation to allow positive biasing of the input. They also have the advantage of almost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

**DTC143EKA**

• Structure

PNP digital transistor ( built-in resistors)

• Equivalent circuit



All terminals have same dimensions

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~+30  | V                |
| Output current       | $I_O$        | 100      | mA               |
|                      | $I_{C(Max)}$ | 100      |                  |
| Power dissipation    | $P_d$        | 200      | mW               |
| Junction temperature | $T_j$        | 150      | $^\circ\text{C}$ |
| Storage temperature  | $T_{stg}$    | -55~+150 | $^\circ\text{C}$ |

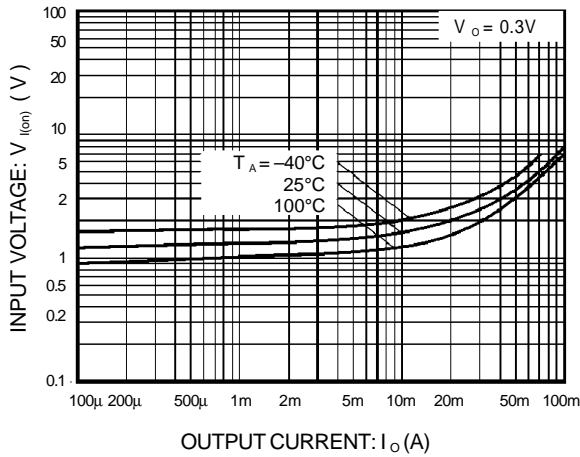
● Electrical characteristics( $T_a=25^\circ\text{C}$ )

| Parameter            | symbol       | Min. | Typ. | Max. | Unit       | Conditions                         |
|----------------------|--------------|------|------|------|------------|------------------------------------|
| Input voltage        | $V_{I(off)}$ | —    | —    | 0.5  | V          | $V_{CC}=5V, I_O=100\mu A$          |
|                      | $V_{I(on)}$  | 3    | —    | —    |            | $V_O=0.3V, I_O=20mA$               |
| Output Voltage       | $V_{O(on)}$  | —    | 0.1  | 0.3  | V          | $I_O/I_I=10mA/0.5mA$               |
| Input current        | $I_I$        | —    | —    | 1.8  | mA         | $V_I=5V$                           |
| Output current       | $I_{O(off)}$ | —    | —    | 0.5  | $\mu A$    | $V_{CC}=50V, V_I=0V$               |
| DC current gain      | $G_I$        | 20   | —    | —    | —          | $V_O=5V, I_O=20mA$                 |
| Input resistance     | $R_I$        | 3.29 | 4.7  | 6.11 | K $\Omega$ | —                                  |
| Resistance ratio     | $R_2/R_1$    | 0.8  | 1    | 1.2  | —          | —                                  |
| Transition frequency | $f_T$        | —    | 250  | —    | MHz        | $V_{CE}=10V, I_E=-5mA, f=100MHz^*$ |

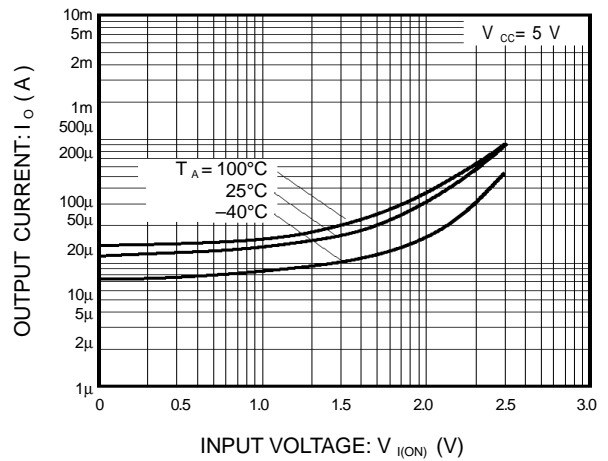
\*Transition frequency of the device

**DTC143EKA**

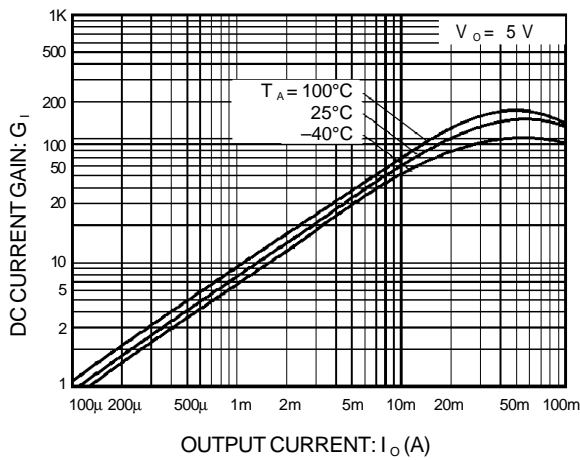
ELECTRICAL CHARACTERISTIC CURVES



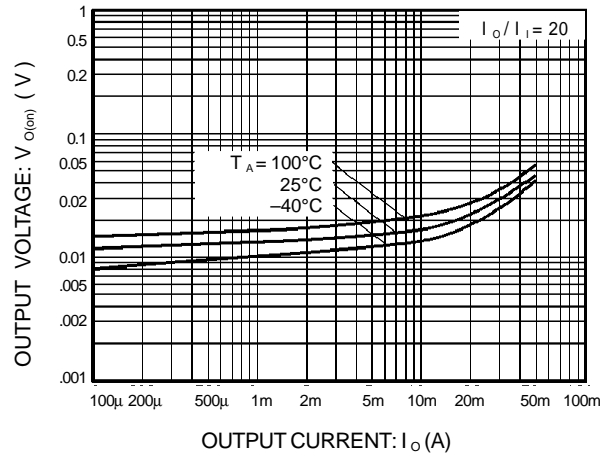
**Figure 1. Input voltage vs.output current (ON characteristics)**



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



**Figure 3. DC current gain vs.output current**



**Figure 4. Output voltage vs.output current**