

# Digital transistors (built-in resistors)

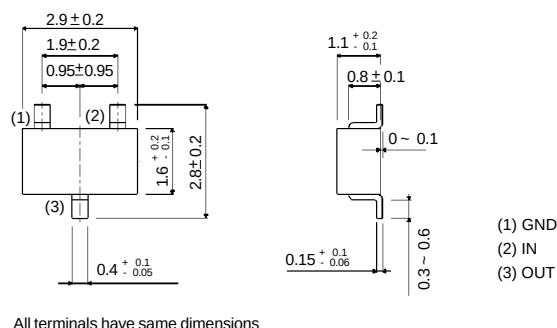
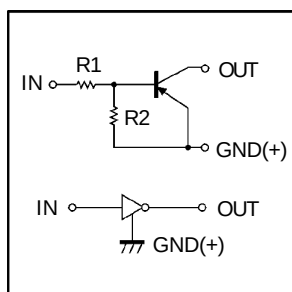
## • Features

- 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



EIAJ: SC—59

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

| Parameter            | symbol        | limits   | unit             |
|----------------------|---------------|----------|------------------|
| Supply voltage       | $V_{CC}$      | - 50     | V                |
| Input voltage        | $V_{IN}$      | -40~+10  | V                |
| Output current       | $I_O$         | -30      | 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 | $^\circ\text{C}$ |

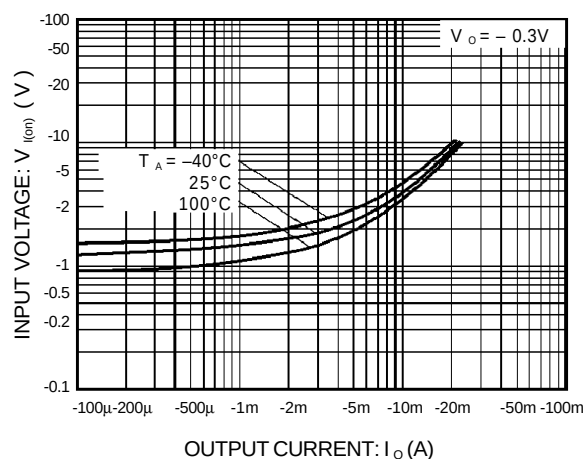
## • Electrical characteristics( $T_a=25^\circ\text{C}$ )

| Parameter            | symbol       | Min. | Typ. | Max.  | Unit       | Conditions                               |
|----------------------|--------------|------|------|-------|------------|------------------------------------------|
| Input voltage        | $V_{I(off)}$ | —    | —    | -0.5  | V          | $V_{CC} = -5V, I_O = -100\mu A$          |
|                      | $V_{I(on)}$  | -3.0 | —    | —     |            | $V_O = -0.3V, I_O = -2mA$                |
| Output Voltage       | $V_{O(on)}$  | —    | -0.1 | -0.3  | V          | $I_O / I_I = -10mA / -0.5mA$             |
| Input current        | $I_I$        | —    | —    | -0.18 | mA         | $V_I = -5V$                              |
| Output current       | $I_{O(off)}$ | —    | —    | -0.5  | $\mu A$    | $V_{CC} = -50V, V_I = 0V$                |
| DC current gain      | $G_I$        | 68   | —    | —     | —          | $V_O = -5V, I_O = -5mA$                  |
| Input resistance     | $R_1$        | 32.9 | 47   | 61.1  | K $\Omega$ | —                                        |
| Resistance ratio     | $R_2 / R_1$  | 0.8  | 1    | 1.2   | —          | —                                        |
| Transition frequency | $f_T$        | —    | 250  | —     | MHz        | $V_{CE} = -10V, I_E = 5mA, f = 100MHz^*$ |

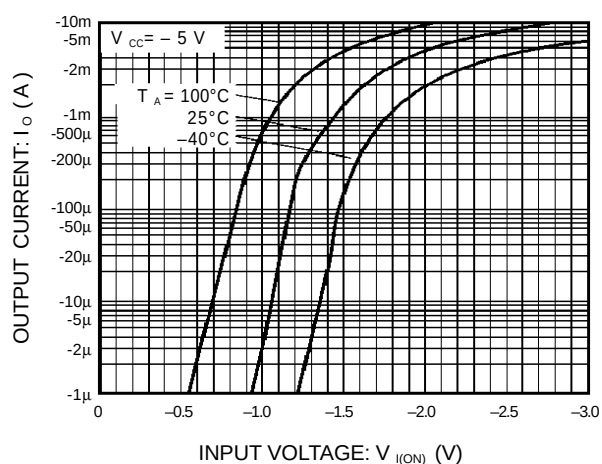
\*Transition frequency of the device

# DTA144EKA

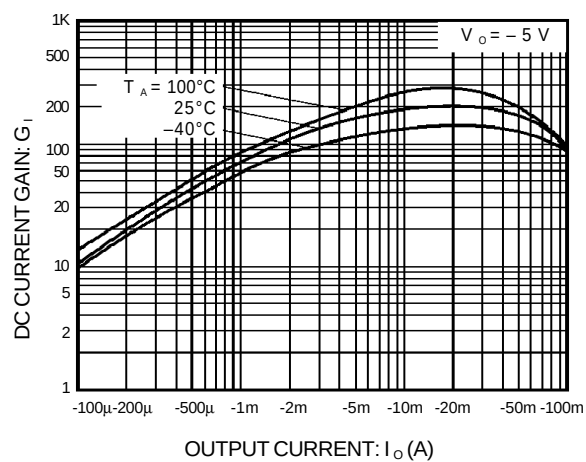
## ELECTRICAL CHARACTERISTIC CURVES



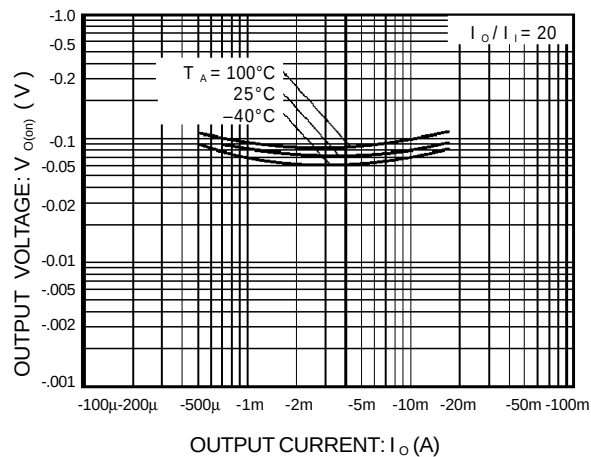
**Figure 1. Input voltage vs. output current (ON characteristics)**



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



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



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