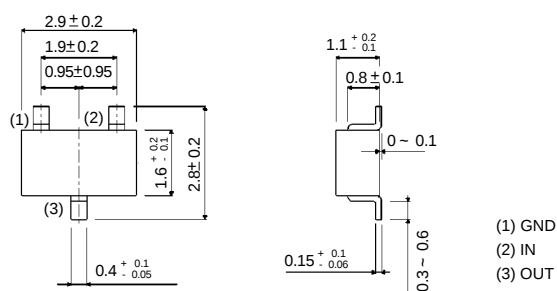
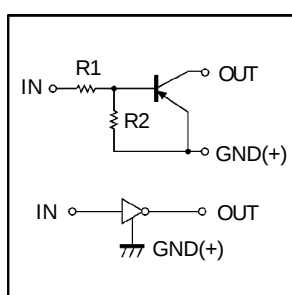


## Digital transistors (built-in resistors)

### • 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.

### • Equivalent circuit



All terminals have same dimensions

EIAJ: SC—59

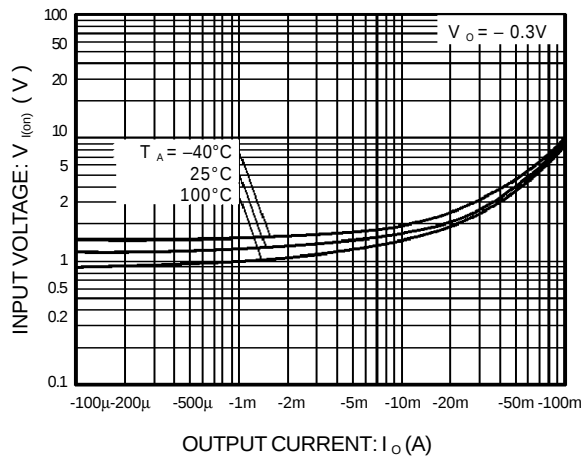
### • Absolute maximum ratings( $T_a=25^\circ\text{C}$ )

| Parameter            | symbol        | limits   | unit             |
|----------------------|---------------|----------|------------------|
| Supply voltage       | $V_{CC}$      | -50      | V                |
| Input voltage        | $V_{IN}$      | -12~+10  | 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 | $^\circ\text{C}$ |

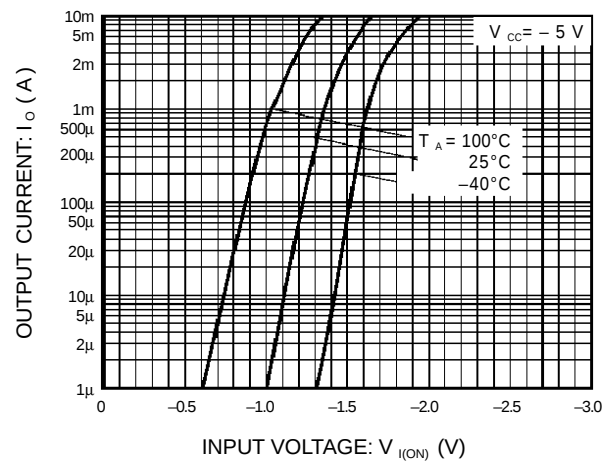
### • Electrical characteristics( $T_a=25^\circ\text{C}$ )

| Parameter            | symbol       | Min. | Typ. | Max. | Unit             | Conditions                                             |
|----------------------|--------------|------|------|------|------------------|--------------------------------------------------------|
| Input voltage        | $V_{I(off)}$ | —    | —    | -0.5 | V                | $V_{CC} = -5V, I_O = -100\mu\text{A}$                  |
|                      | $V_{I(on)}$  | -3   | —    | —    |                  | $V_O = -0.3V, I_O = -20\text{mA}$                      |
| Output Voltage       | $V_{O(on)}$  | —    | -0.1 | -0.3 | V                | $I_O/I_i = -10\text{mA}/-0.5\text{mA}$                 |
| Input current        | $I_i$        | —    | —    | -3.8 | mA               | $V_i = -5V$                                            |
| Output current       | $I_{O(off)}$ | —    | —    | -0.5 | $\mu\text{A}$    | $V_{CC} = -50V, V_i = 0V$                              |
| DC current gain      | $G_i$        | 20   | —    | —    | —                | $V_O = -5V, I_O = -20\text{mA}$                        |
| Input resistance     | $R_i$        | 1.54 | 2.2  | 2.86 | $\text{k}\Omega$ | —                                                      |
| Resistance ratio     | $R_2/R_1$    | 0.8  | 1    | 1.2  | —                | —                                                      |
| Transition frequency | $f_T$        | —    | 250  | —    | MHz              | $V_{CE} = -10V, I_E = 5\text{mA}, f = 100\text{MHz}^*$ |

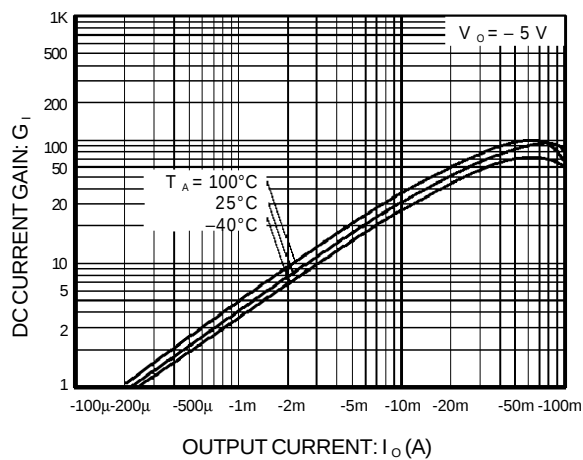
\*Transition frequency of the device

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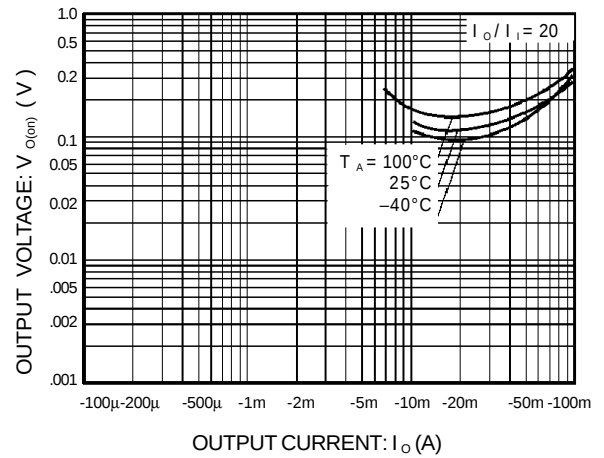
**Figure 1. Input voltage vs.output current  
(ON characteristics)**



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



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



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