

Digital transistors (built-in resistors)

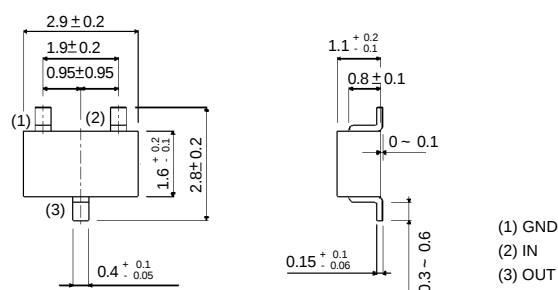
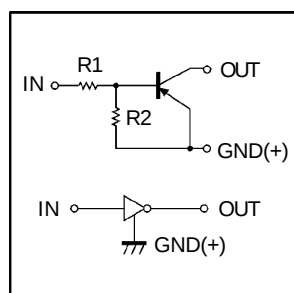
• Features

- 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 (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}	-40~+10	V
Output current	I_o	-50	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	$^\circ\text{C}$

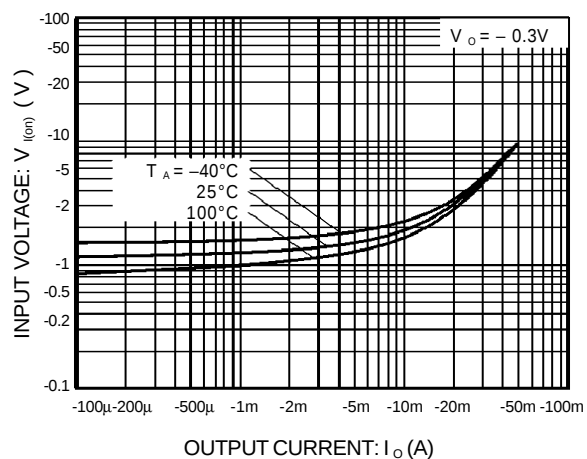
• Electrical characteristics($T_a=25^\circ\text{C}$)

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	—	—		$V_o = -0.3V, I_o = -10 \text{ mA}$
Output Voltage	$V_{O(on)}$	—	—	-0.3	V	$I_o / I_i = -10\text{mA} / -0.5\text{mA}$
Input current	I_i	—	—	-0.88	mA	$V_i = -5V$
Output current	$I_{O(off)}$	—	—	-0.5	μA	$V_{cc} = -50 \text{ V}, V_i = 0 \text{ V}$
DC current gain	G_i	30	—	—	—	$V_o = -5V, I_o = -5\text{mA}$
Input resistance	R_i	7	10	13	$\text{K}\Omega$	—
Resistance ratio	R_2 / R_1	0.8	1	1.2	—	—
Transition frequency	f_T	—	250	—	MHz	$V_{CE} = -10V, I_E = 5 \text{ mA}, f = 100\text{MHz}^*$

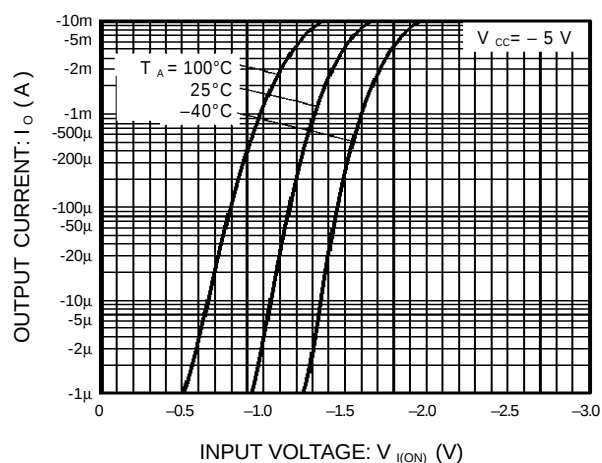
*Transition frequency of the device

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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)**

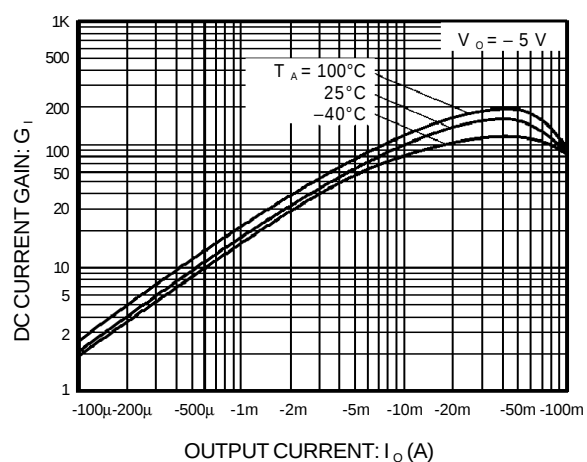


Figure 3. DC current gain vs. output current

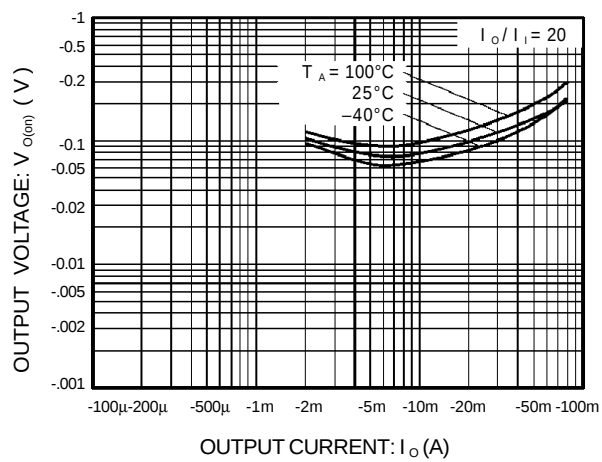


Figure 4. Output voltage vs. output current