

Digital transistors (built-in resistors)

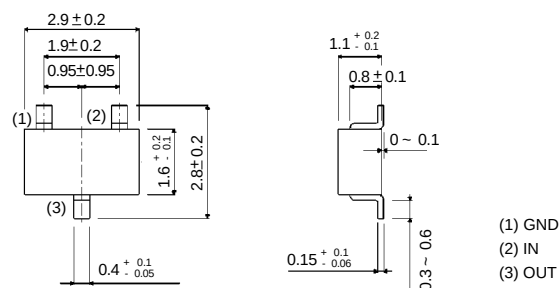
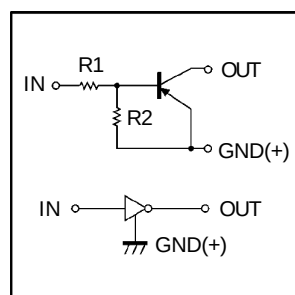
• Features

- 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($T_a=25^\circ\text{C}$)

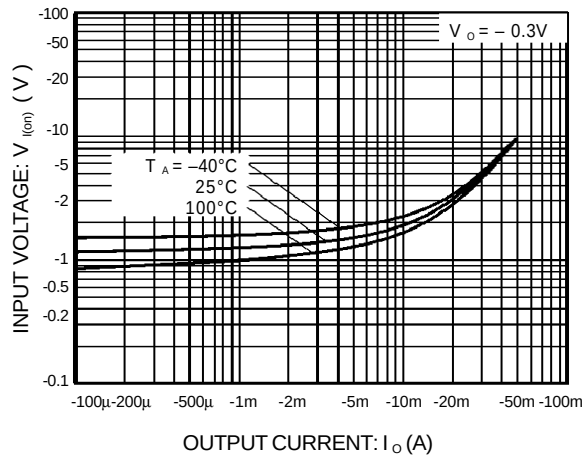
Parameter	symbol	limits	unit
Supply voltage	V_{CC}	-50	V
Input voltage	V_{IN}	-40~+10	V
Output current	I_O	-50	mA
	$I_{C(Max.)}$	-100	
Power dissipation	P_d	200	mW
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55~+150	$^\circ\text{C}$

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

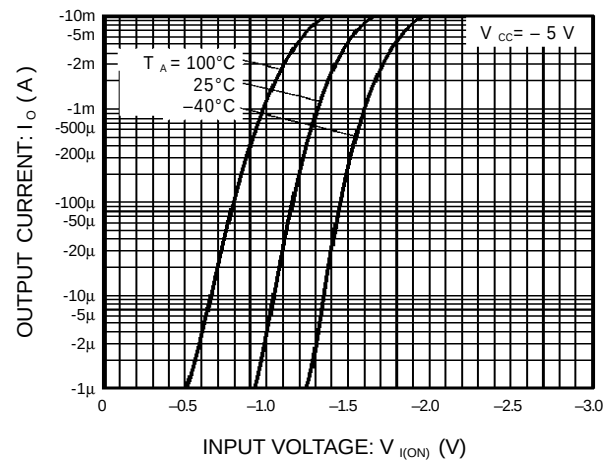
Parameter	symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	—	—	-0.5	V	$V_{CC} = -5V, I_O = -100 \mu A$
	$V_{I(on)}$	-3	—	—		$V_O = -0.3V, I_O = -10 \text{ mA}$
Output Voltage	$V_{O(on)}$	—	—	-0.3	V	$I_O / I_I = -10 \text{ mA} / -0.5 \text{ mA}$
Input current	I_I	—	—	-0.88	mA	$V_I = -5V$
Output current	$I_{O(off)}$	—	—	-0.5	μA	$V_{CC} = -50V, V_I = 0V$
DC current gain	G_I	30	—	—	—	$V_O = -5V, I_O = -5 \text{ mA}$
Input resistance	R_I	7	10	13	K Ω	—
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

ELECTRICAL CHARACTERISTIC CURVES



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



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

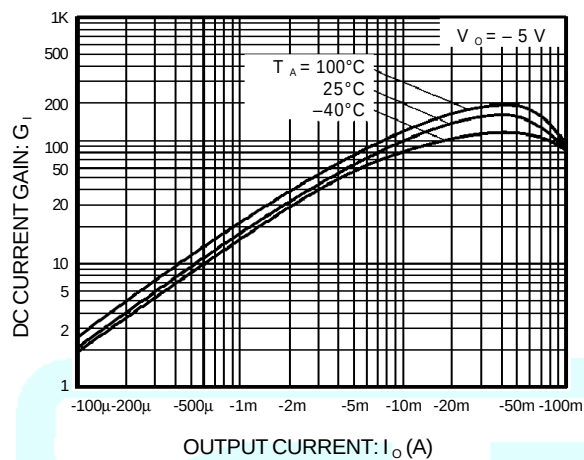


Figure 3. DC current gain vs. output current

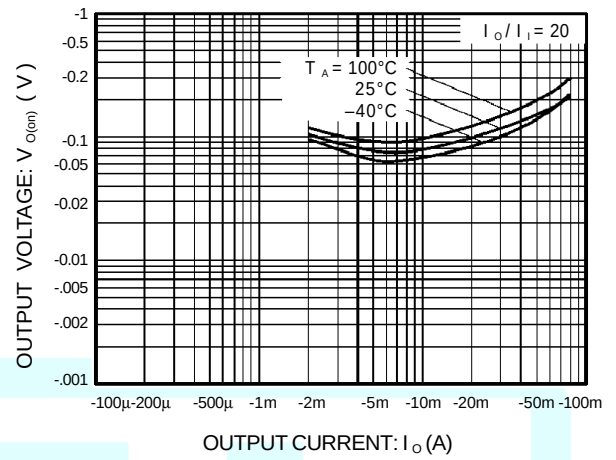


Figure 4. Output voltage vs. output current