

Digital transistors (built-in resistors)

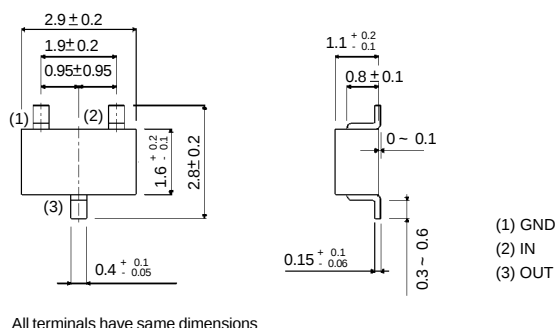
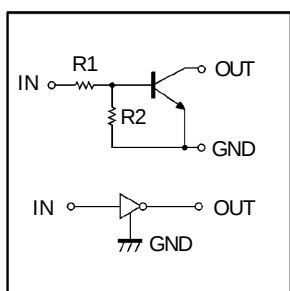
• Features

- 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}	-10~+40			V
Output current	I _o	30			mA
	I _{C(Max.)}	100			
Power dissipation	P _d	150	200	300	mW
Junction temperature	T _j	150			°C
Storage temperature	T _{stg}	-55~+150			°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	—	—		$V_O=0.3V, I_O=2mA$
Output Voltage	$V_{O(on)}$	—	—	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	μA	$V_{CC}=50V, V_I=0V$
DC current gain	G_I	68	—	—	—	$V_O=5V, I_O=5mA$
Input resistance	R_I	32.9	47	61.1	K Ω	—
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

ELECTRICAL CHARACTERISTIC CURVES

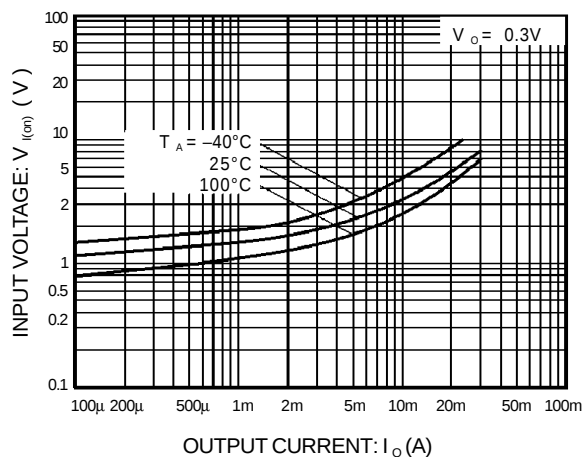


Figure 1. Input voltage vs. output current (ON characteristics)

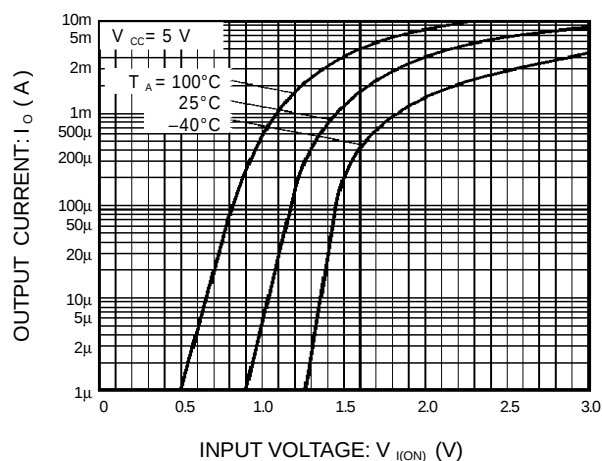


Figure 2. Output current vs. input voltage (OFF characteristics)

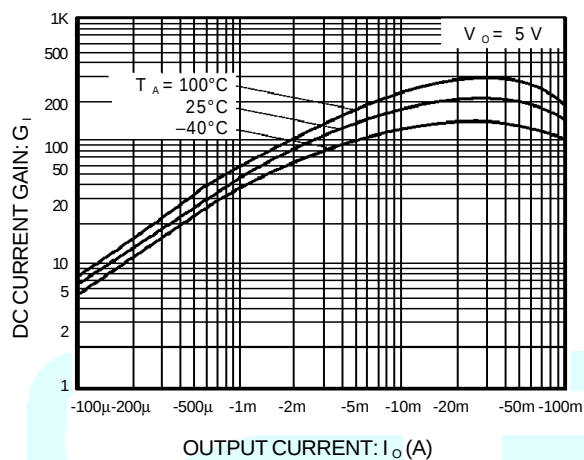


Figure 3. DC current gain vs. output current

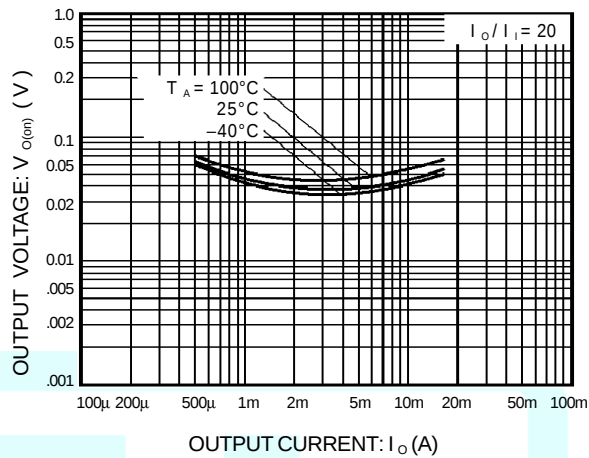


Figure 4. Output voltage vs. output current