

# Digital transistors (built-in resistors)

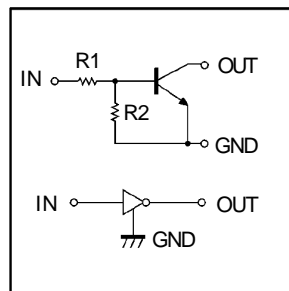
**• Features**

- 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.

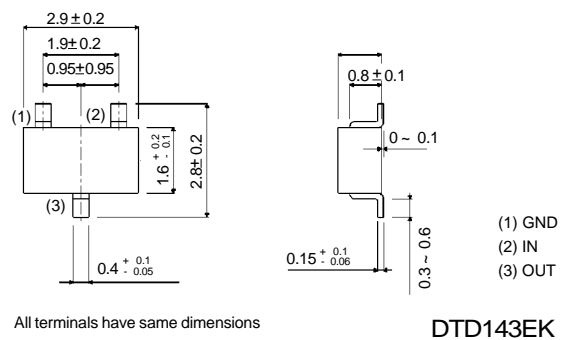
**• Structure**

PNP digital transistor (with built-in resistors)

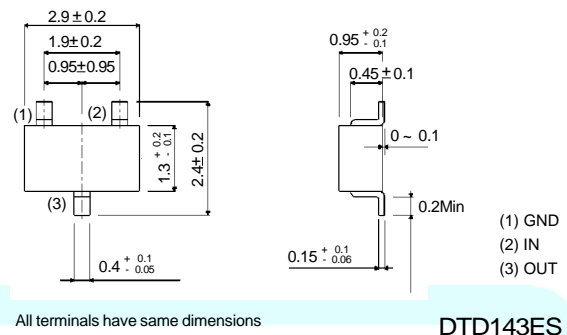
**•Equivalent circuit**



**DTD143EK**  
**DTD143ES**



EIAJ: SC—59



EIAJ: SOT—23

**• Absolute maximum ratings(T<sub>a</sub>=25 °C)**

Parameter	symbol	limits( DTC143E□ )		unit
		K	S	
Supply voltage	V <sub>cc</sub>	50		V
Input voltage	V <sub>IN</sub>	-10~+30		V
Output current	I <sub>C</sub>	500		mA
Power dissipation	P <sub>d</sub>	200	300	mW
Junction temperature	T <sub>j</sub>	150		°C
Storage temperature	T <sub>stg</sub>	-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	—	—		$V_O=0.3V, I_O=20mA$
Output Voltage	$V_{O(on)}$	—	0.1	0.3	V	$I_O/I_I=50mA/2.5mA$
Input current	$I_I$	—	—	1.8	mA	$V_I=5V$
Output current	$I_{O(off)}$	—	—	0.5	$\mu A$	$V_{CC}=50V, V_I=0V$
DC current gain	$G_I$	47	—	—	—	$V_O=5V, I_O=50mA$
Input resistance	$R_1$	3.29	4.7	6.11	$K\Omega$	—
Resistance ratio	$R_2/R_1$	0.8	1	1.2	—	—
Transition frequency	$f_T$	—	200	—	MHz	$V_{CE}=10V, I_E=-50mA, f=100MHz^*$

\*Transition frequency of the device

ELECTRICAL CHARACTERISTIC CURVES

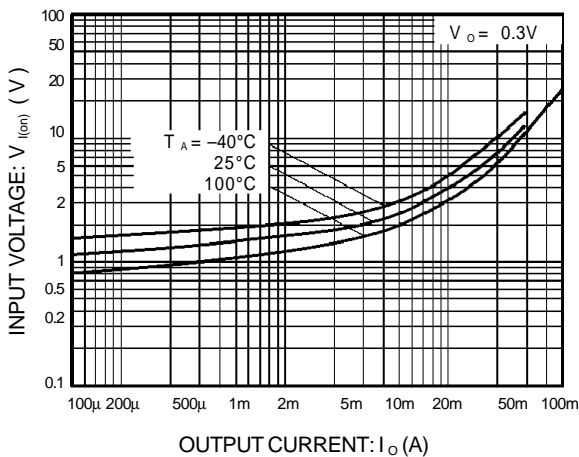


Figure 1. Input voltage vs. output current (ON characteristics)

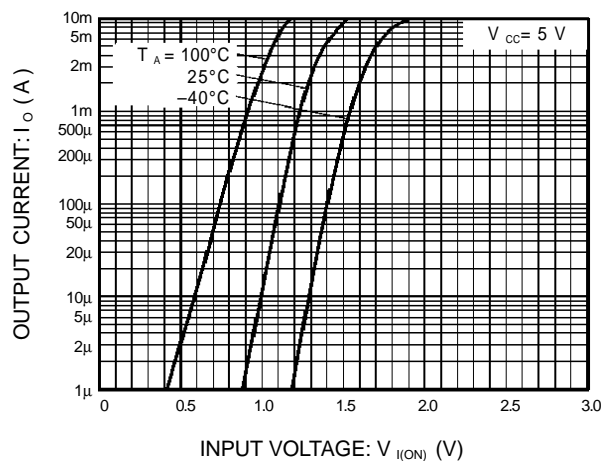


Figure 2. Output current vs. input voltage (OFF characteristics)

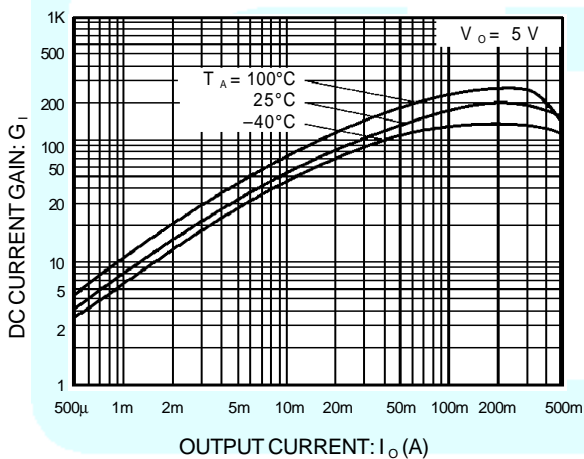


Figure 3. DC current gain vs. output current

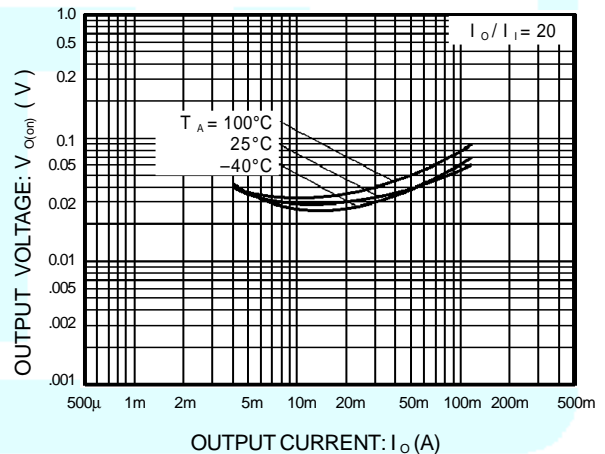


Figure 4. Output voltage vs. output current