

# Digital transistors (built-in resistors)

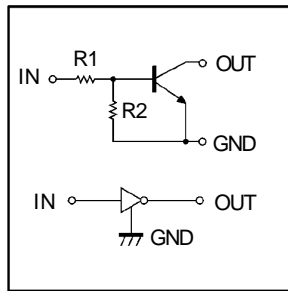
• **Features**

- 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.

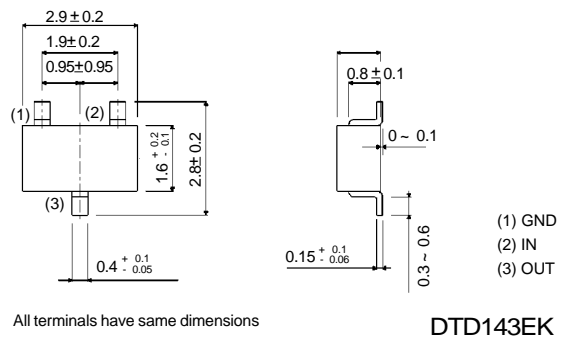
• **Structure**

PNP digital transistor (with built-in resistors)

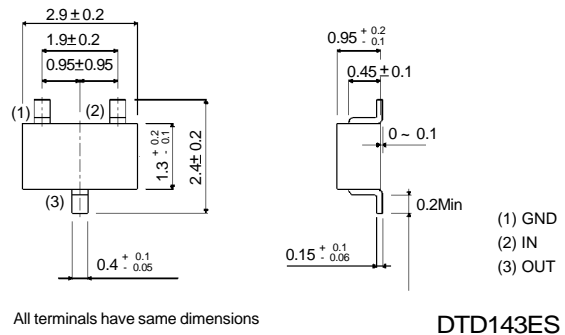
• **Equivalent circuit**



**DTD143EK**  
**DTD143ES**



EIAJ: SC—59



EIAJ: SOT—23

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

Parameter	symbol	limits( DTC143E□ )		unit
		K	S	
Supply voltage	$V_{cc}$	50		V
Input voltage	$V_{IN}$	-10~+30		V
Output current	$I_C$	500		mA
Power dissipation	$P_d$	200	300	mW
Junction temperature	$T_j$	150		$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55~+150		$^\circ\text{C}$

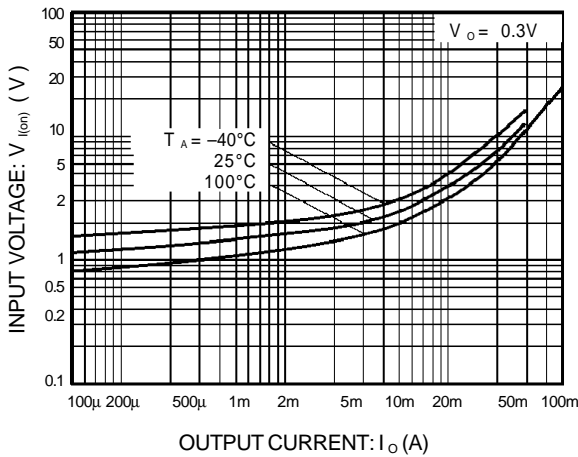
**DTD143EK DTD143ES**

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

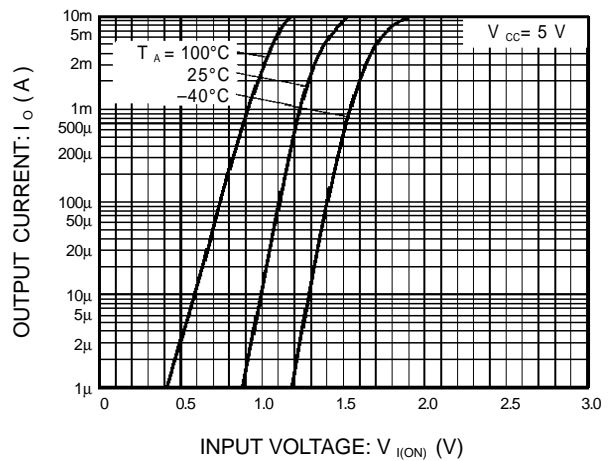
Parameter	symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	—	—	0.5	V	$V_{CC}=5\text{V}, I_O=100\mu\text{A}$
	$V_{I(on)}$	3	—	—		$V_O=0.3\text{V}, I_O=20\text{mA}$
Output Voltage	$V_{O(on)}$	—	0.1	0.3	V	$I_O/I_I=50\text{mA}/2.5\text{mA}$
Input current	$I_I$	—	—	1.8	mA	$V_I=5\text{V}$
Output current	$I_{O(off)}$	—	—	0.5	$\mu\text{A}$	$V_{CC}=50\text{V}, V_I=0\text{V}$
DC current gain	$G_I$	47	—	—	—	$V_O=5\text{V}, I_O=50\text{mA}$
Input resistance	$R_1$	3.29	4.7	6.11	$\text{K}\Omega$	—
Resistance ratio	$R_2/R_1$	0.8	1	1.2	—	—
Transition frequency	$f_T$	—	200	—	MHz	$V_{CE}=10\text{V}, I_E=-50\text{mA}, f=100\text{MHz}^*$

\*Transition frequency of the device

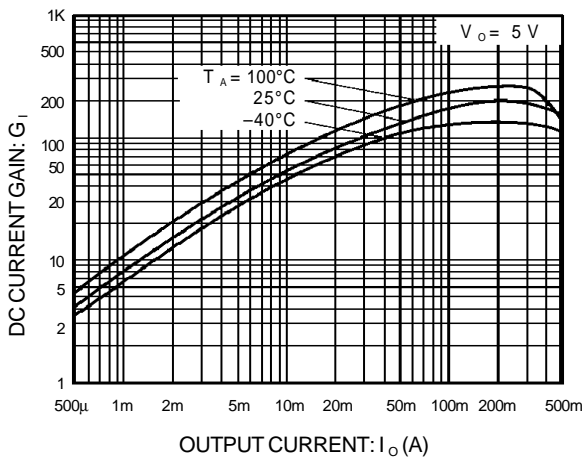
ELECTRICAL CHARACTERISTIC CURVES



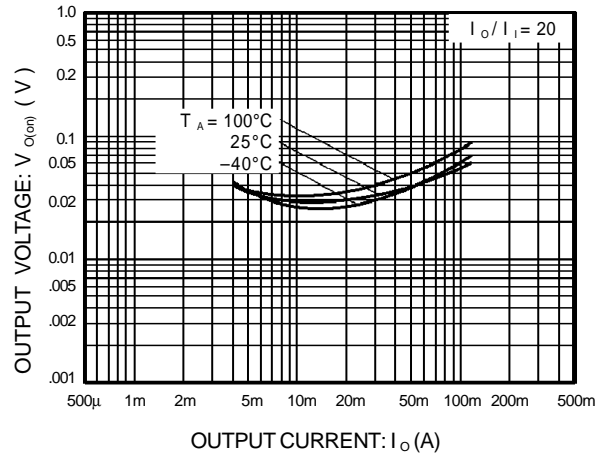
**Figure 1. Input voltage vs. output current (ON characteristics)**



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



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



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