Digital transistors (built-in resistors)

DTD123EK / DTD123ES

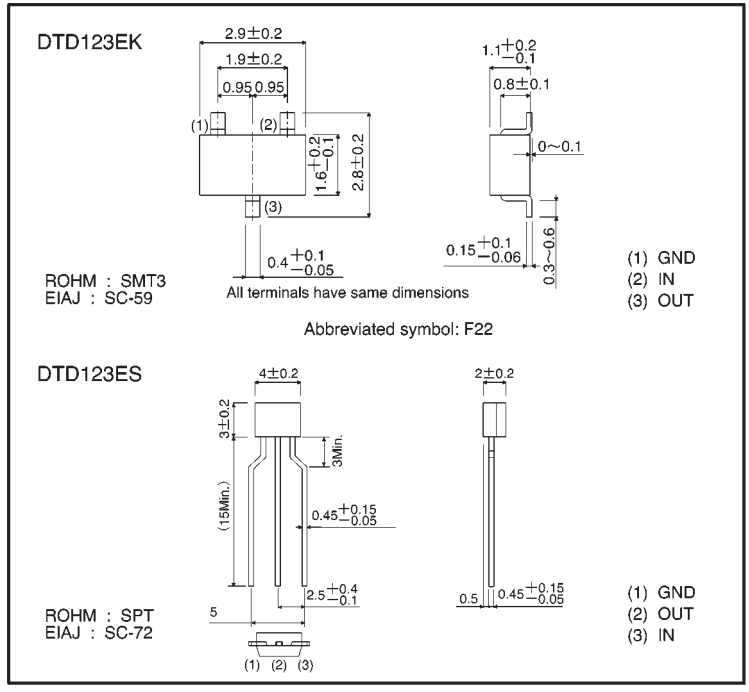
●Features

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 thin-film resistors with complete isolation to allow negative 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

NPN digital transistor
(Built-in resistor type)

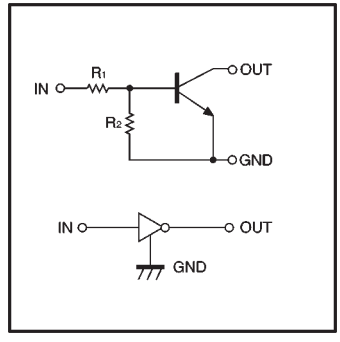
●External dimensions (Units: mm)



●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits(DTD123E□)		Unit
		K	S	
Supply voltage	V_{CC}	50		V
Input voltage	V_{IN}	−10～+12		V
Output current	I_C	500		mA
Power dissipation	Pd	200	300	mW
Junction temperature	Tj	150		℃
Storage temperature	Tstg	−55～+150		℃

●Equivalent circuit



(96-366-D123E)

●Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	—	—	0.5	V	V_{CC}=5V, I_O=100 μA
	$V_{I(on)}$	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	—	—	3.8	mA	V_I=5V
Output current	$I_{O(off)}$	—	—	0.5	μA	V_{CC}=50V, V_I=0V
DC current gain	G_I	39	—	—	—	V_O=5V, I_O=50mA
Input resistance	R_1	1.54	2.2	2.86	kΩ	—
Resistance ratio	R_2/R_1	0.8	1	1.2	—	—
Transition frequency	f_T	—	200	—	MHz	V_{CE}=10V, I_E=−5mA, f=100MHz ✻

✻ Transition frequency of the device

●Packaging specifications

Part No.	Package	SMT3	SPT
	Packaging type	Taping	Taping
	Code	T146	TP
	Basic ordering unit (pieces)	3000	5000
DTD123EK		○	—
DTD123ES		—	○

●Electrical characteristic curves

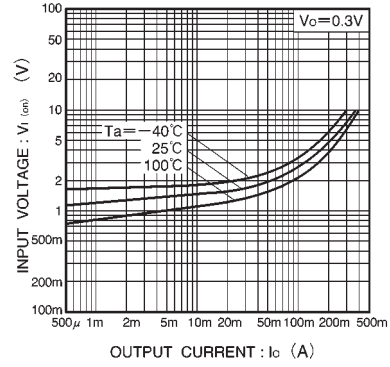


Fig.1 Input voltage vs. output current (ON characteristics)

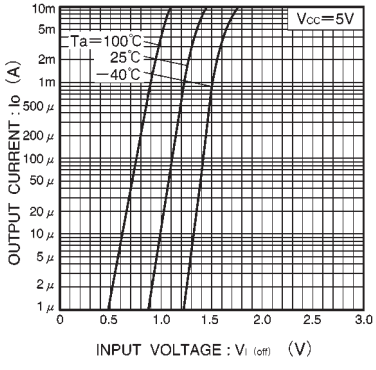


Fig.2 Output current vs. input voltage (OFF characteristics)

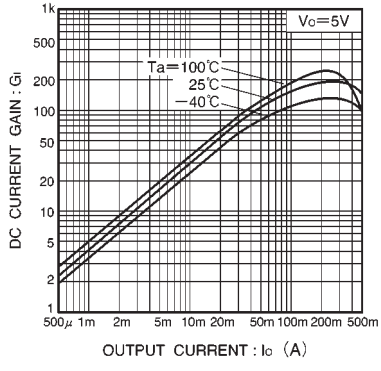


Fig.3 DC current gain vs. output current

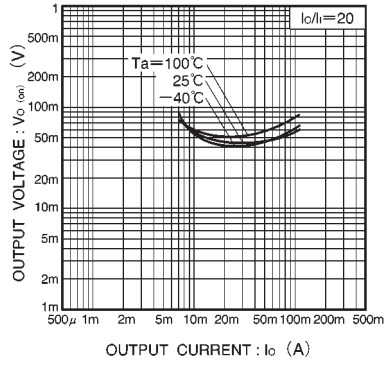


Fig.4 Output voltage vs. output current