

# Digital transistors (built-in resistors)

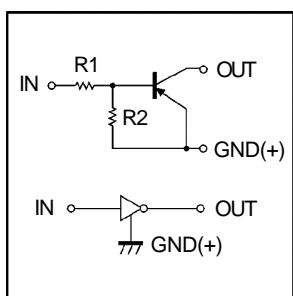
• Features

- 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.

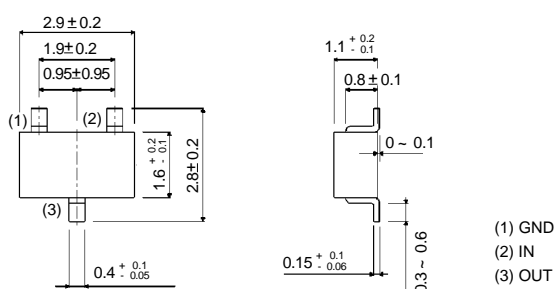
• Structure

PNP digital transistor (with built-in resistors)

•Equivalent circuit



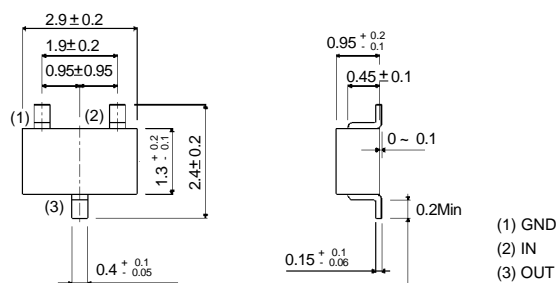
**DTC114EKA**  
**DTC114ECA**



All terminals have same dimensions

DTA114EKA

EIAJ: SC—59



All terminals have same dimensions

DTA114ECA

EIAJ: SOT—23

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

Parameter	symbol	limits	unit
Supply voltage	$V_{cc}$	-50	V
Input voltage	$V_{IN}$	-10~+40	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	$^\circ\text{C}$

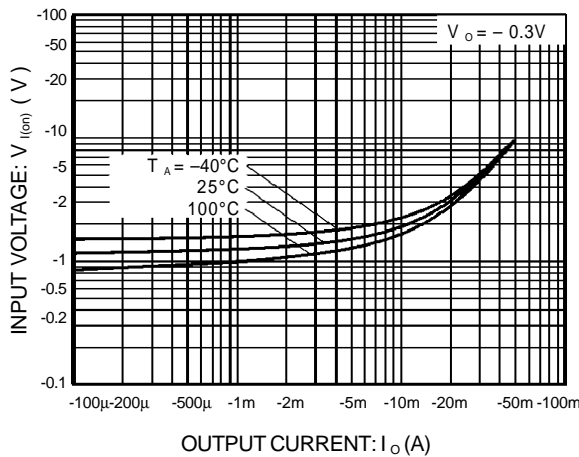
**DTC114EKA DTC114ECA**

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

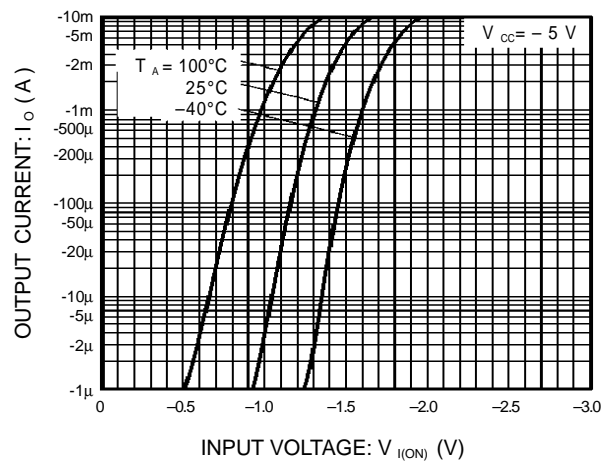
Parameter	symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	—	—	0.5	V	$V_{CC}=5V, I_O=100\mu A$
	$V_{I(on)}$	3	—	—		$V_O=0.3V, I_O=10mA$
Output Voltage	$V_{O(on)}$	—	0.1	0.3	V	$I_O/I_I=10mA/0.5mA$
Input current	$I_I$	—	—	0.88	mA	$V_I=5V$
Output current	$I_{O(off)}$	—	—	0.5	$\mu A$	$V_{CC}=50V, V_I=0V$
DC current gain	$G_I$	30	—	—	—	$V_O=5V, I_O=5mA$
Input resistance	$R_1$	7	10	13	$K\Omega$	—
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

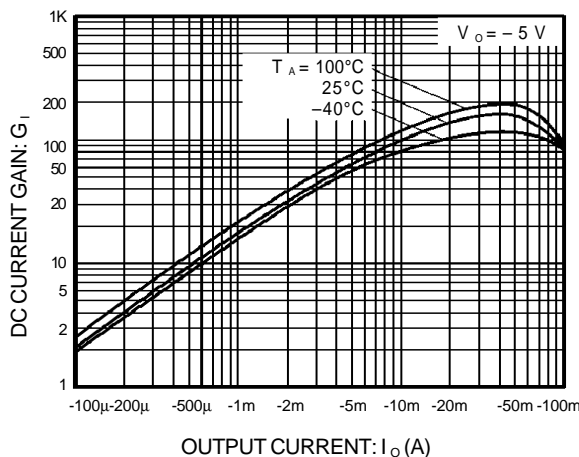
ELECTRICAL CHARACTERISTIC CURVES



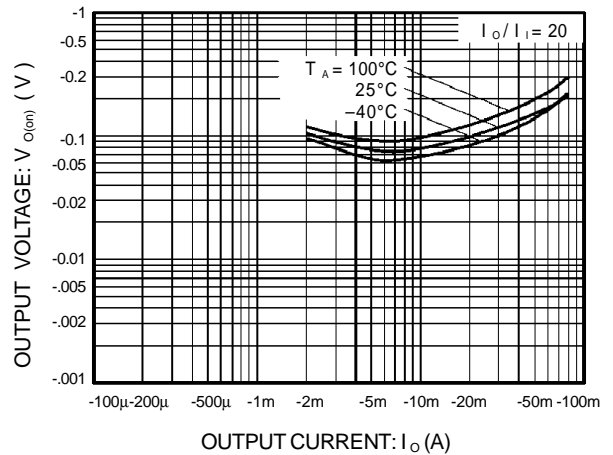
**Figure 1. Input voltage vs.output current (ON characteristics)**



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



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



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