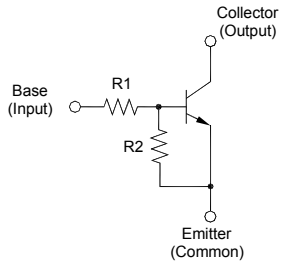
# Digital Transistors (Built-in Resistors)

DIGITAL TRANSISTOR (NPN)

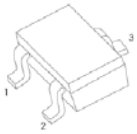
## FEATURES

- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors(see equivalent circuit)
- 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
- Only the on/off conditions need to be set for operation, making device design easy

### Equivalent Circuit




**SOT-523**



1. IN
2. GND
3. OUT

**MARKING: E42**

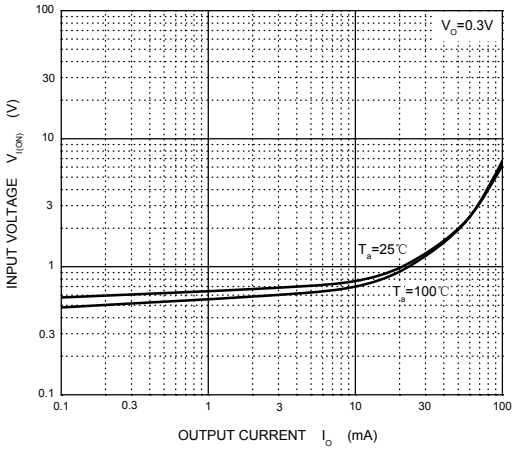
## MAXIMUM RATINGS(Ta=25℃ unless otherwise noted)

| Symbol | Parameter | Limits(DTC123JE) | Unit |
|---|---|---|---|
| $V_{CC}$ | Supply Voltage | 50 | V |
| $V_{IN}$ | Input Voltage | -5～+12 | V |
| $I_O$ | Output Current | 100 | mA |
| $P_D$ | Power Dissipation | 150 | |
| $T_j$ | Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -55～+150 | ℃ |

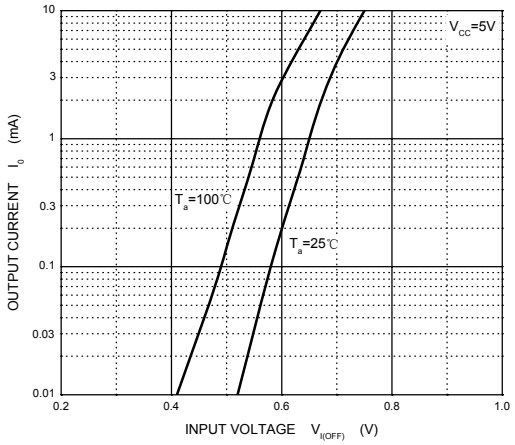
## ELECTRICAL CHARACTERISTICS (Ta=25℃ unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Input voltage** | $V_{I(off)}$ | $V_{CC}$=5V,$I_O$=100μA | 0.5 | | | V |
| | $V_{I(on)}$ | $V_O$=0.3V,$I_O$=5mA | | | 1.1 | V |
| **Output voltage** | $V_{O(on)}$ | $I_O/I_I$=5mA/0.25mA | | 0.1 | 0.3 | V |
| **Input current** | $I_I$ | $V_I$=5V | | | 3.6 | mA |
| **Output current** | $I_{O(off)}$ | $V_{CC}$=50V,$V_I$=0 | | | 0.5 | μA |
| **DC current gain** | $G_I$ | $V_O$=5V,$I_O$=10mA | 80 | | | |
| **Input resistance** | $R_1$ | | 1.54 | 2.2 | 2.86 | kΩ |
| **Resistance ratio** | $R_2/R_1$ | | 17 | 21 | 26 | |
| **Transition frequency** | $f_T$ | $V_O$=10V,$I_O$=5mA,f=100MHz | | 250 | | MHz |

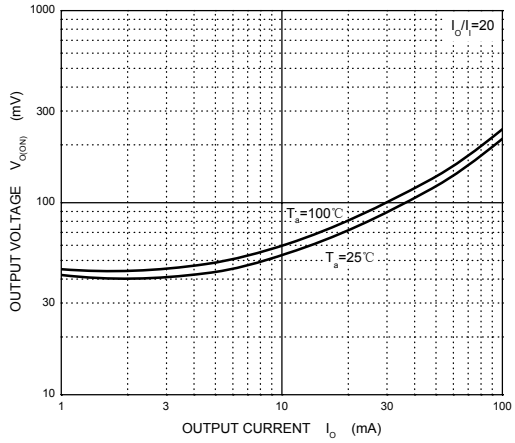
**ON Characteristics**



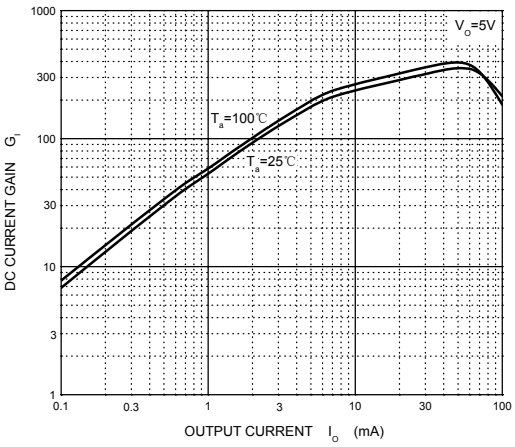

**OFF Characteristics**



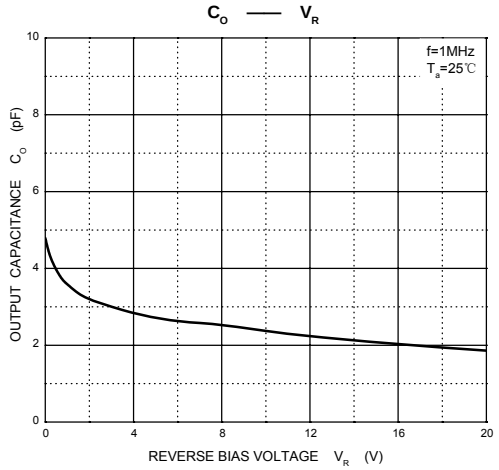

**$V_{O(ON)}$ —— $I_O$**




**$G_I$ —— $I_O$**




**$C_O$ —— $V_R$**




**$P_D$ —— $T_a$**