# Digital transistors (built-in resistor)

## DTC623TU / DTC623TK

### ●Features

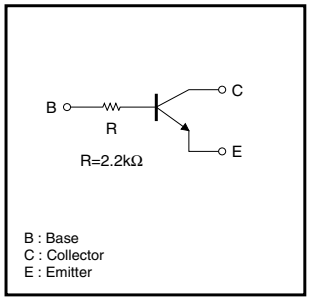
In addition to the features of regular digital transistors.

1) Low saturation voltage, typically
   $V_{CE\,(sat)}$ =40mV at $I_C$ / $I_B$=50mA / 2.5mA, makes these transistors ideal for muting circuits.
2) These transistors can be used at high current levels, $I_C$=600mA.

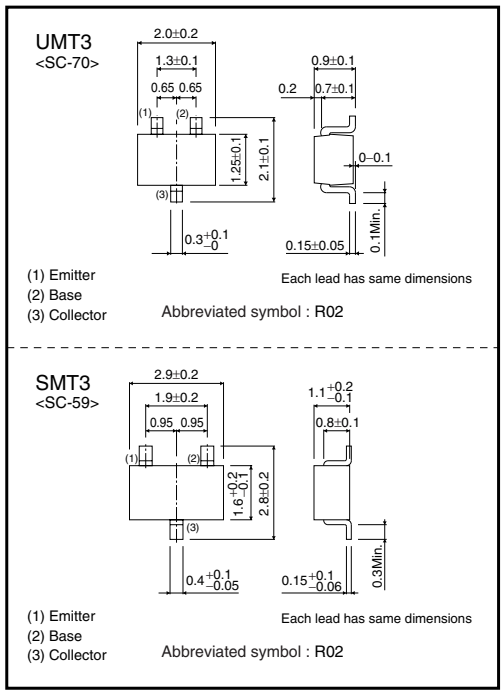
### ●Structure

NPN digital transistor
(Built-in resistor type)

### ●Equivalent circuit




### ●External dimensions (Unit : mm)




### ●Absolute maximum ratings (Ta=25°C)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | 20 | V |
| Collector-emitter voltage | $V_{CEO}$ | 20 | V |
| Emitter-base voltage | $V_{EBO}$ | 12 | V |
| Collector current | $I_C$ | 600 | mA |
| Collector power dissipation | $P_C$ | 200 | mW |
| Junction temperature | Tj | 150 | °C |
| Storage temperature | Tstg | −55 to +150 | °C |

●**Electrical characteristics** (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Collector-base breakdown voltage | $BV_{CBO}$ | 20 | – | – | V | $I_C$=50μA |
| Collector-emitter breakdown voltage | $BV_{CEO}$ | 20 | – | – | V | $I_C$=1mA |
| Emitter-base breakdown voltage | $BV_{EBO}$ | 12 | – | – | V | $I_E$=50μA |
| Collector cutoff current | $I_{CBO}$ | – | – | 0.5 | μA | $V_{CB}$=20V |
| Emitter cutoff current | $I_{EBO}$ | – | – | 0.5 | μA | $V_{EB}$=12V |
| Collector-emitter saturation voltage | $V_{CE\ (sat)}$ | – | 40 | 150 | mV | $I_C$=50mA, $I_B$=2.5mA |
| DC current transfer ratio | $h_{FE}$ | 820 | – | 2700 | – | $V_{CE}$=5V, $I_C$=50mA |
| Input resistance | $R_1$ | 1.54 | 2.2 | 2.86 | kΩ | – |
| Transition frequency | $f_T$ | – | 150 | – | MHz | $V_{CE}$=10V, $I_E$= –50mA, f=100MHz * |
| Output "ON" resistance | $R_{on}$ | – | 0.4 | – | Ω | VI=5V, $R_L$=1kΩ, f=1kHz |

*Transition frequency of the device.

●**Packaging specifications and $h_{FE}$**

| | | | |
|---|---|---|---|
| Type | Package | UMT3 | SMT3 |
| | Packaging type | Taping | Taping |
| | Code | T106 | T146 |
| | Basic ordering unit (pieces) | 3000 | 3000 |
| DTC623TU | | ○ | – |
| DTC623TK | | – | ○ |

●**Electrical characteristic curves**

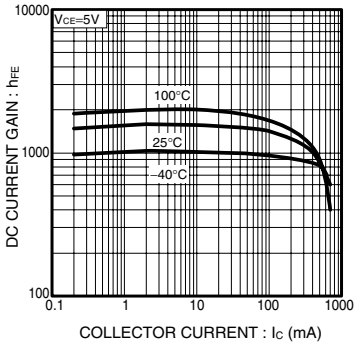



Fig.1 DC Current Gain vs. Collector Current

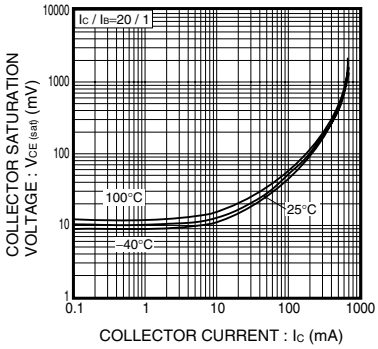



Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

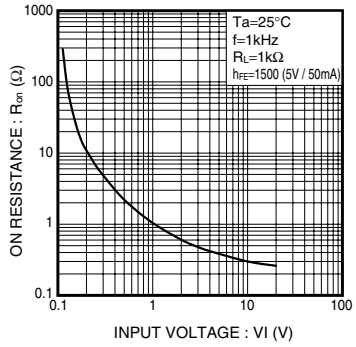



Fig.3 "ON" resistance vs. Input Voltage

●**$R_{on}$ measurement circuit**

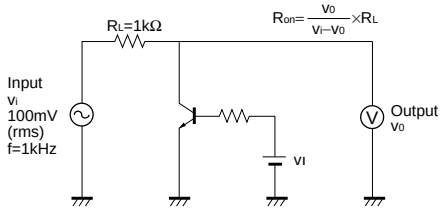



Fig.4 Output "ON" resistance ($R_{on}$) measurement circuit

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