

Digital transistors (built-in resistor)

DTC643TU / DTC643TK

●Features

In addition to the features of regular digital transistors.

1) Low saturation voltage, typically

$V_{CE(sat)}=40\text{mV}$ at $I_C / I_B=50\text{mA} / 2.5\text{mA}$, makes these transistors ideal for muting circuits.

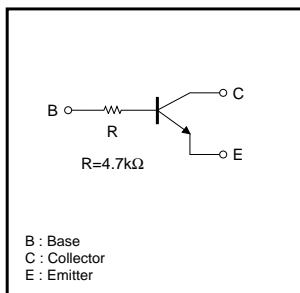
2) These transistors can be used at high current levels,
 $I_C=600\text{mA}$.

●Structure

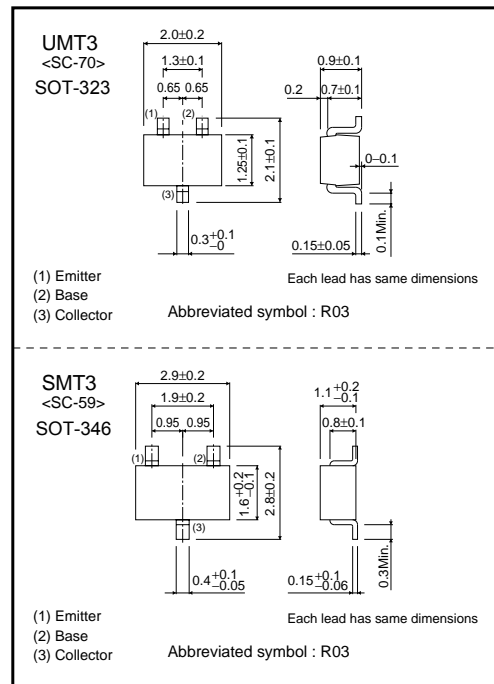
NPN digital transistor

(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 | T_j | 150 | °C |
| Storage temperature | T_{stg} | -55 to +150 | °C |

Transistors

●Electrical characteristics (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--------------------------------------|----------------------|------|------|------|------|---|
| Collector-base breakdown voltage | BV _{CB0} | 20 | – | – | V | I _c =50μA |
| Collector-emitter breakdown voltage | BV _{CE0} | 20 | – | – | V | I _c =1mA |
| Emitter-base breakdown voltage | BV _{EB0} | 12 | – | – | V | I _E =50μA |
| Collector cutoff current | I _{CB0} | – | – | 0.5 | μA | V _{CB} =20V |
| Emitter cutoff current | I _{EB0} | – | – | 0.5 | μA | V _{EB} =12V |
| Collector-emitter saturation voltage | V _{CE(sat)} | – | 40 | 150 | mV | I _c / I _B =50mA / 2.5mA |
| DC current transfer ratio | h _{FE} | 820 | – | 2700 | – | V _{CE} =5V, I _c =50mA |
| Input resistance | R ₁ | 3.29 | 4.7 | 6.11 | kΩ | – |
| Transition frequency | f _T | – | 150 | – | MHz | V _{CE} =10V, I _E =–50mA, f=100MHz * |
| Output "ON" resistance | R _{on} | – | 0.55 | – | Ω | V _I =5V, R _L =1kΩ, f=1MHz |

*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 |
| DTC643TU | | ○ | – |
| DTC643TK | | – | ○ |

●Electrical characteristic curves

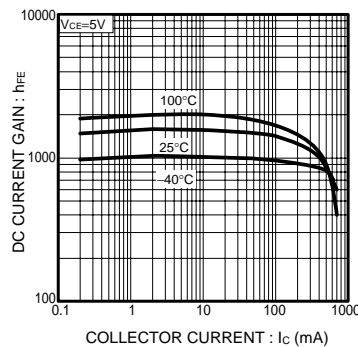


Fig.1 DC Current Gain vs. Collector Current

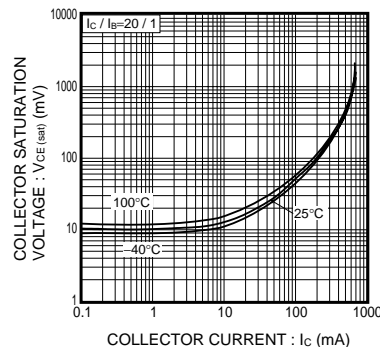


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

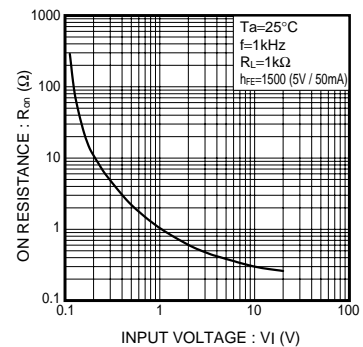


Fig.3 "ON" resistance vs. Input Voltage

●Ron measurement circuit

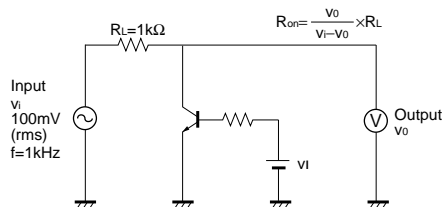


Fig.4 Output "ON" resistance (Ron) measurement circuit

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