

# 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.

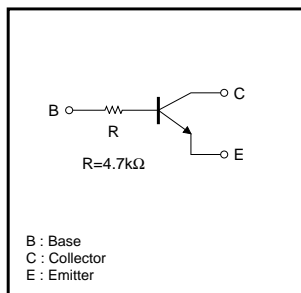
2) These transistors can be used at high current levels,  
 $I_C=600\text{mA}$ .

### ●Structure

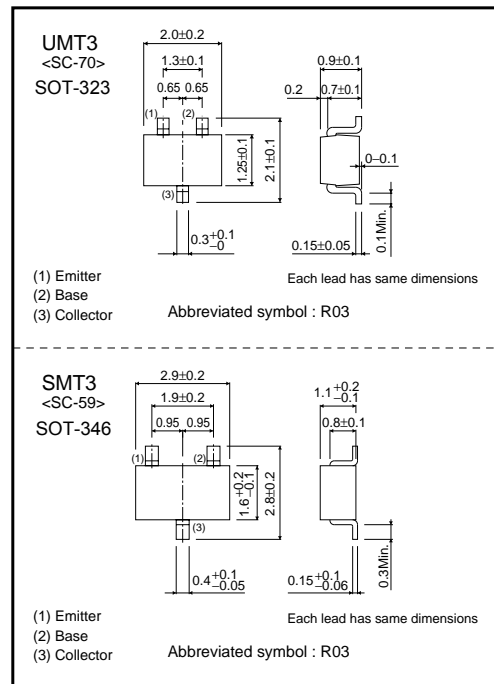
NPN digital transistor

(Built-in resistor type)

### ●Equivalent circuit



### ●External dimensions (Unit : mm)



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

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	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

Transistors

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	20	–	–	V	I <sub>c</sub> =50μA
Collector-emitter breakdown voltage	BV <sub>CEO</sub>	20	–	–	V	I <sub>c</sub> =1mA
Emitter-base breakdown voltage	BV <sub>EB0</sub>	12	–	–	V	I <sub>E</sub> =50μA
Collector cutoff current	I <sub>CB0</sub>	–	–	0.5	μA	V <sub>CB</sub> =20V
Emitter cutoff current	I <sub>EB0</sub>	–	–	0.5	μA	V <sub>EB</sub> =12V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	–	40	150	mV	I <sub>c</sub> / I <sub>B</sub> =50mA / 2.5mA
DC current transfer ratio	h <sub>FE</sub>	820	–	2700	–	V <sub>CE</sub> =5V, I <sub>c</sub> =50mA
Input resistance	R <sub>1</sub>	3.29	4.7	6.11	kΩ	–
Transition frequency	f <sub>T</sub>	–	150	–	MHz	V <sub>CE</sub> =10V, I <sub>E</sub> =–50mA, f=100MHz *
Output "ON" resistance	R <sub>on</sub>	–	0.55	–	Ω	V <sub>I</sub> =5V, R <sub>L</sub> =1kΩ, f=1MHz

\*Transition frequency of the device.

●Packaging specifications and h<sub>FE</sub>

Type	Package	UMT3	SMT3
	Packaging type	Taping	Taping
	Code	T106	T146
	Basic ordering unit (pieces)	3000	3000
DTC643TU		○	–
DTC643TK		–	○

●Electrical characteristic curves

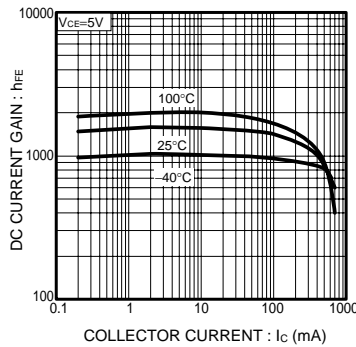


Fig.1 DC Current Gain vs. Collector Current

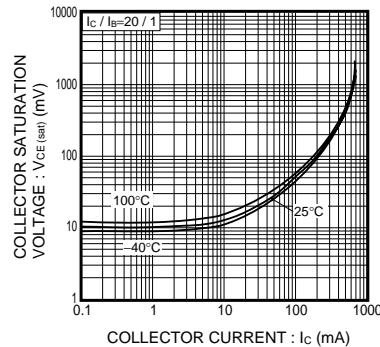


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

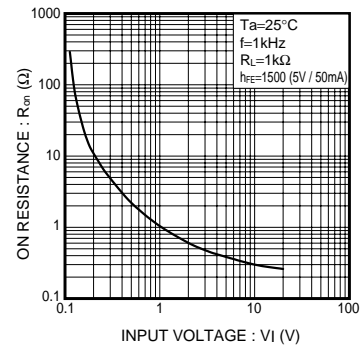


Fig.3 "ON" resistance vs. Input Voltage

●Ron measurement circuit

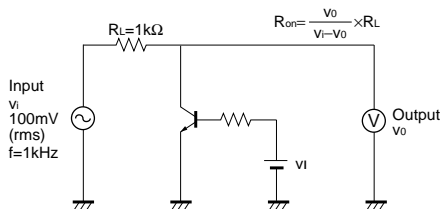


Fig.4 Output "ON" resistance (Ron) measurement circuit

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