

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.

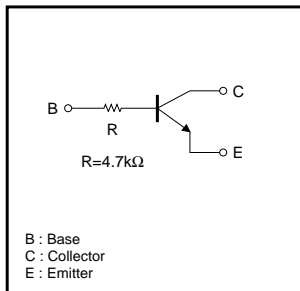
2) These transistors can be used at high current levels,
 $I_C=600\text{mA}$.

●Structure

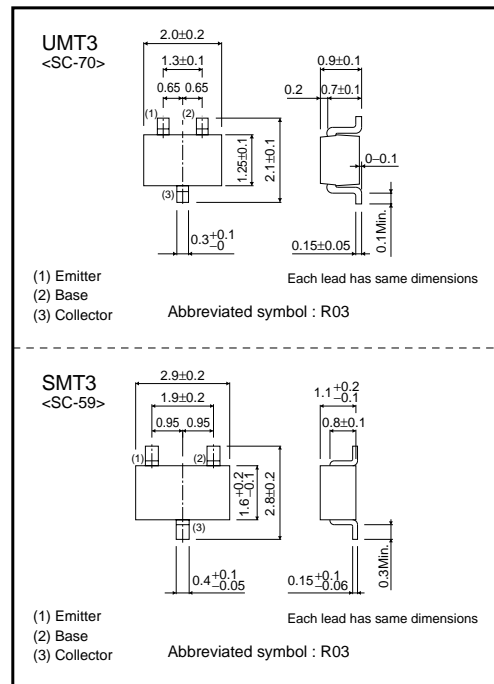
NPN digital transistor

(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 _{CB0}	20	–	–	V	I _C =50μA
Collector-emitter breakdown voltage	BV _{CEO}	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

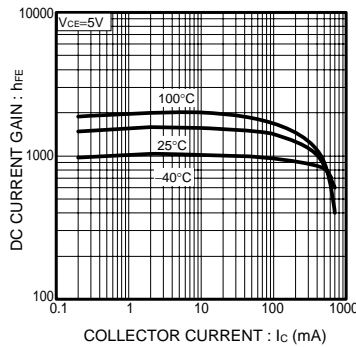


Fig.1 DC Current Gain vs. Collector Current

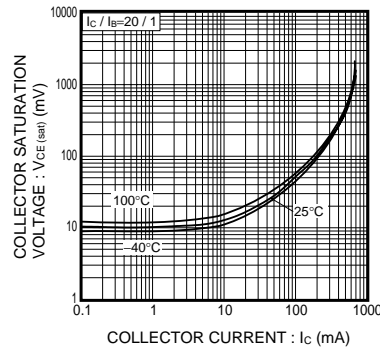


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

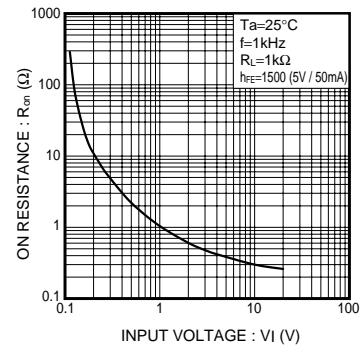


Fig.3 "ON" resistance vs. Input Voltage

●Ron measurement circuit

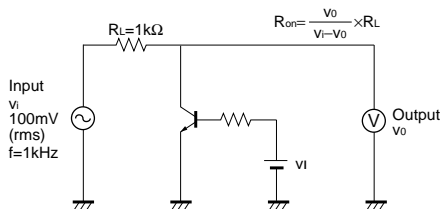


Fig.4 Output "ON" resistance (Ron) measurement circuit

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