

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.

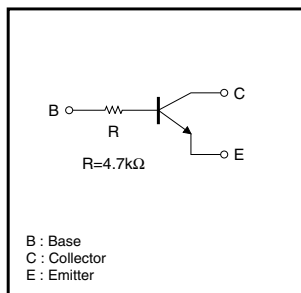
2) These transistors can be used at high current levels,
 $I_C = 600\text{mA}$.

●Structure

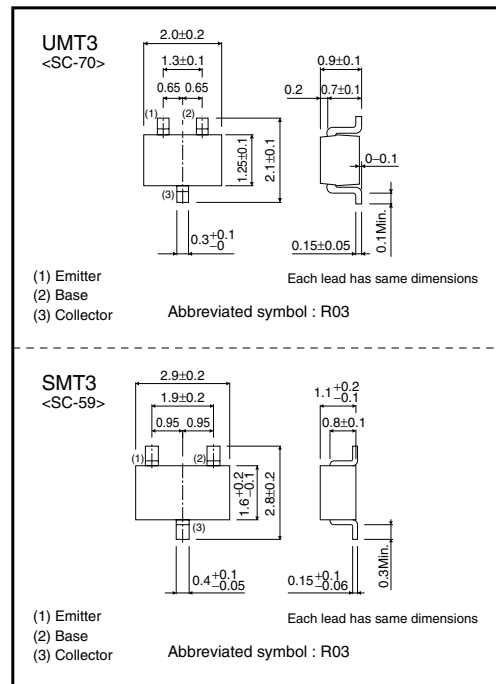
NPN digital transistor

(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_{CBO}	20	—	—	V	$I_C=50\mu A$
Collector-emitter breakdown voltage	BV_{CEO}	20	—	—	V	$I_C=1mA$
Emitter-base breakdown voltage	BV_{EBO}	12	—	—	V	$I_E=50\mu A$
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	$I_C / I_B=50mA / 2.5mA$
DC current transfer ratio	h_{FE}	820	—	2700	—	$V_{CE}=5V, I_C=50mA$
Input resistance	R_1	3.29	4.7	6.11	$k\Omega$	—
Transition frequency	f_T	—	150	—	MHz	$V_{CE}=10V, I_E=-50mA, f=100MHz$ *
Output "ON" resistance	R_{on}	—	0.55	—	Ω	$V_I=5V, R_L=1k\Omega, f=1MHz$

*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

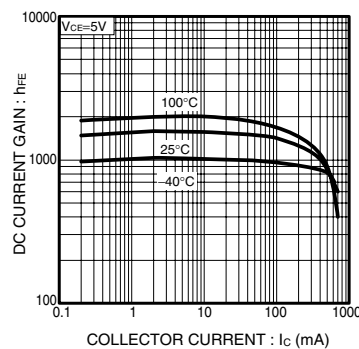


Fig.1 DC Current Gain vs. Collector Current

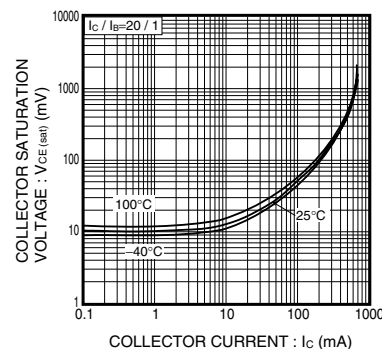


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

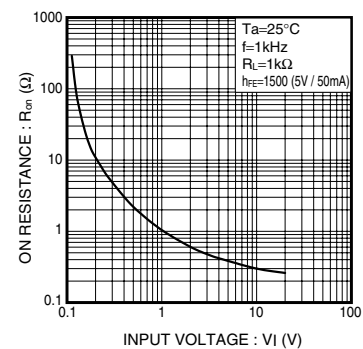
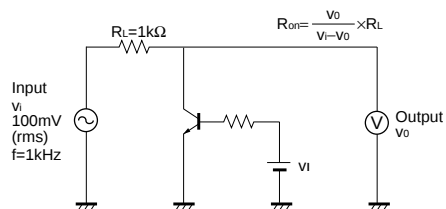


Fig.3 "ON" resistance vs. Input Voltage

● R_{on} measurement circuitFig.4 Output "ON" resistance (R_{on}) measurement circuit

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