Digital transistors (built-in resistor)

DTC643TU / DTC643TK

●Features

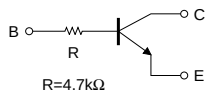
In addition to the features of regular digital transistors.

1) Low saturation voltage, typically
   $V_{CE(sat)}$ =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)

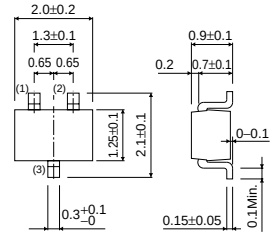
●Equivalent circuit



B : Base
C : Collector
E : Emitter

●External dimensions (Unit : mm)

UMT3
<SC-70>
SOT-323

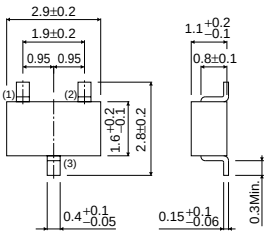


(1) Emitter
(2) Base
(3) Collector

Each lead has same dimensions

Abbreviated symbol : R03

SMT3
<SC-59>
SOT-346



(1) Emitter
(2) Base
(3) Collector

Each lead has same dimensions

Abbreviated symbol : R03

●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 / 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	VI=5V, R_L=1kΩ, f=1MHz

*Transition frequency of the device.

●Packaging specifications and h_{FE}

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

●Electrical characteristic curves

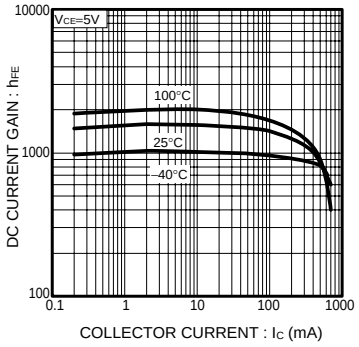


Fig.1 DC Current Gain vs. Collector Current

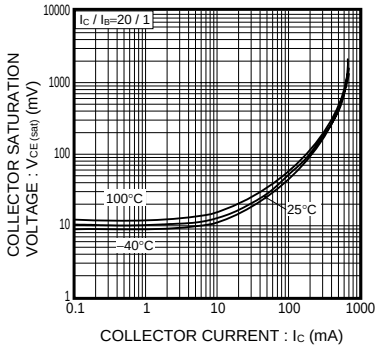


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

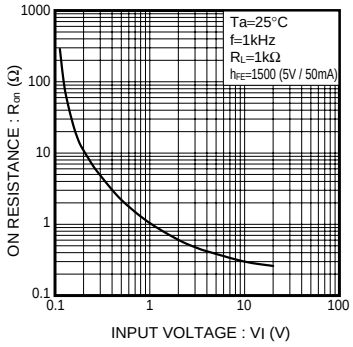


Fig.3 "ON" resistance vs. Input Voltage

●R_{on} measurement circuit

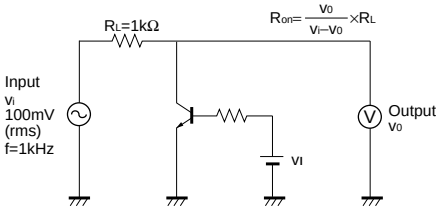


Fig.4 Output "ON" resistance (R_{on}) measurement circuit

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