Midium Power Transistors (±50V / ±3A)

QS5Y2

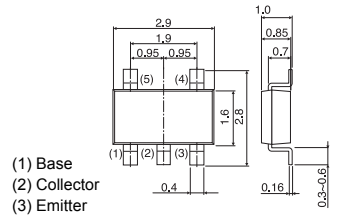
● Structure
NPN/PNP Silicon epitaxial planar transistor

● Features
1) Low saturation voltage, typically
$V_{CE\ (sat)}$ = -0.40V (Max.) (I_C / I_B= -1A / -50mA)
$V_{CE\ (sat)}$ = 0.35V (Max.) (I_C / I_B= $_1$A / 50mA)
2) High speed switching

● Applications
Low Frequency Amplifier
Driver

● Dimensions (Unit : mm)

TSMT5



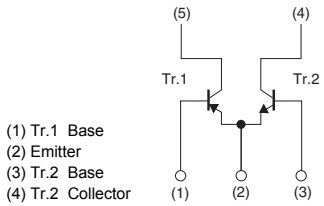
(1) Base
(2) Collector
(3) Emitter

Abbreviated symbol : Y02

● Packaging specifications

Type	Package	TSMT5
	Code	TR
	Basic ordering unit (pieces)	3000

● Inner circuit (Unit : mm)



(1) Tr.1 Base
(2) Emitter
(3) Tr.2 Base
(4) Tr.2 Collector
(5) Tr.1 Collector

● Absolute maximum ratings (Ta = 25°C)

<Tr.1>

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	-50	V
Collector-emitter voltage		V_{CEO}	-50	V
Emitter-base voltage		V_{EBO}	-6	V
Collector current	DC	I_C	-3	A
	Pulsed	I_{CP} *1	-6	A

<Tr.2>

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage		V_{EBO}	6	V
Collector current	DC	I_C	3	A
	Pulsed	I_{CP} *1	6	A

<Tr.1 and Tr.2>

Parameter	Symbol	Limits	Unit
Power dissipation	P_D *2	0.5	W/Total
	P_D *3	1.25	W/Total
	P_D *3	0.9	W/Element
Junction temperature	T_j	150	°C
Range of storage temperature	T_{stg}	-55 to 150	°C

*1 Pw=10ms, Single Pulse

*2 Mounted on a recommended land.

*3 Mounted on a 25 x 25 x 0.8[mm] ceramic board.

●**Electrical characteristics** (Ta=25°C)

<Tr.1>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV_{CEO}	-50	-	-	V	I_C= -1mA
Collector-base breakdown voltage	BV_{CBO}	-50	-	-	V	I_C= -100μA
Emitter-base breakdown voltage	BV_{EBO}	-6	-	-	V	I_E= -100μA
Collector cut-off current	I_{CBO}	-	-	-1	μA	V_{CB}= -50V
Emitter cut-off current	I_{EBO}	-	-	-1	μA	V_{EB}= -4V
Collector-emitter staturation voltage	$V_{CE(sat)}$ *1	-	-200	-400	mV	I_C=-1A, I_B=-50mA
DC current gain	h_{FE}	180	-	450	-	V_{CE}= -3V, I_C= -50mA
Transition frequency	f_T *1	-	300	-	MHz	V_{CE}= -10V I_E=500mA, f=100MHz
Collector output capacitance	C_{ob}	-	24	-	pF	V_{CB}= -10V, I_E=0A f=1MHz
Turn-on time	t_{on} *2	-	45	-	ns	I_C= -1.5A, I_{B1}= -150mA, I_{B2}=150mA, V_{CC}≃-12V
Storage time	t_{stg} *2	-	250	-	ns	
Fall time	t_f *2	-	35	-	ns	

*1 Pulsed

*2 See switching time test circuit

<Tr.2>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV_{CEO}	50	-	-	V	I_C= 1mA
Collector-base breakdown voltage	BV_{CBO}	50	-	-	V	I_C= 100μA
Emitter-base breakdown voltage	BV_{EBO}	6	-	-	V	I_E= 100μA
Collector cut-off current	I_{CBO}	-	-	1	μA	V_{CB}= 50V
Emitter cut-off current	I_{EBO}	-	-	1	μA	V_{EB}= 4V
Collector-emitter staturation voltage	$V_{CE(sat)}$ *1	-	130	350	mV	I_C= 1A, I_B= 50mA
DC current gain	h_{FE}	180	-	450	-	V_{CE}= 3V, I_C= 50mA
Transition frequency	f_T *1	-	320	-	MHz	V_{CE}= 10V I_E=-500mA, f=100MHz
Collector output capacitance	C_{ob}	-	13	-	pF	V_{CB}= 10V, I_E=0A f=1MHz
Turn-on time	t_{on} *2	-	50	-	ns	I_C= 1.5A, I_{B1}= 150mA, I_{B2}=-150mA, V_{CC}≃12V
Storage time	t_{stg} *2	-	450	-	ns	
Fall time	t_f *2	-	80	-	ns	

*1 Pulsed

*2 See switching time test circuit

●Electrical characteristic curves (Ta = 25°C)

〈Tr.1〉

Fig.1 Typical Output Characteristics

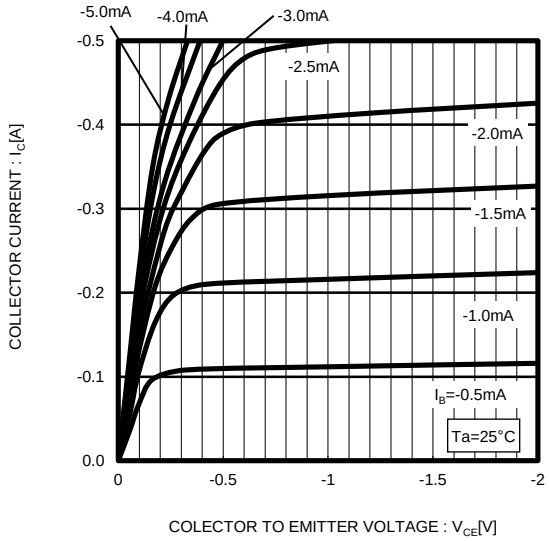


Fig.2 DC Current Gain vs. Collector Current (I)

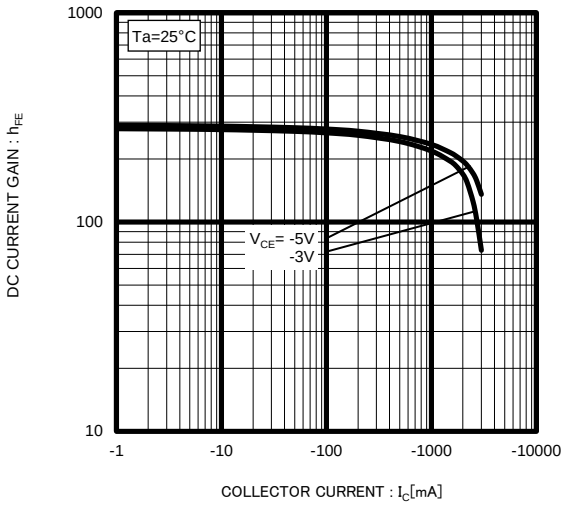


Fig.3 DC Current Gain vs. Collector Current (II)

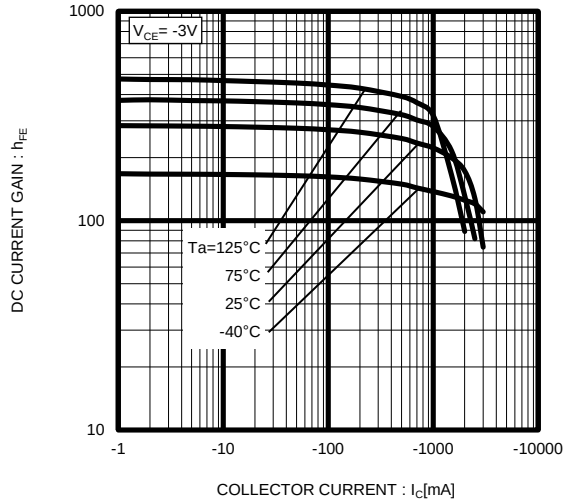


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

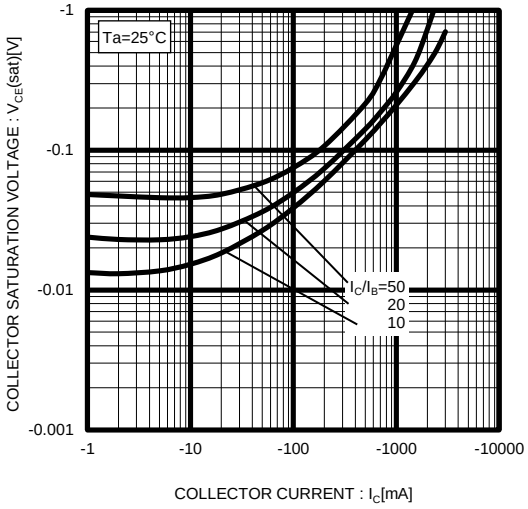


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current

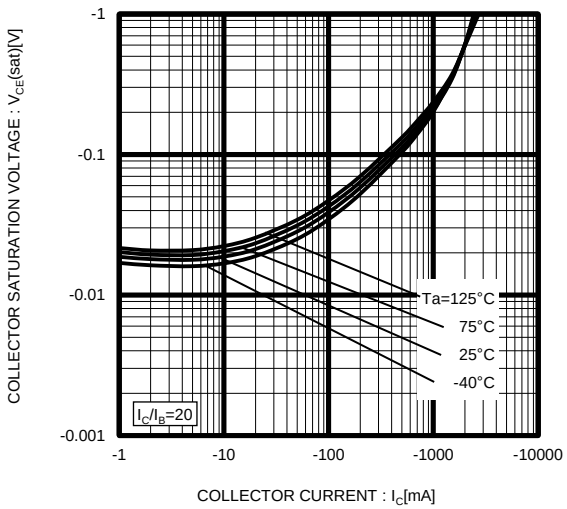


Fig.6 Ground Emitter Propagation Characteristics

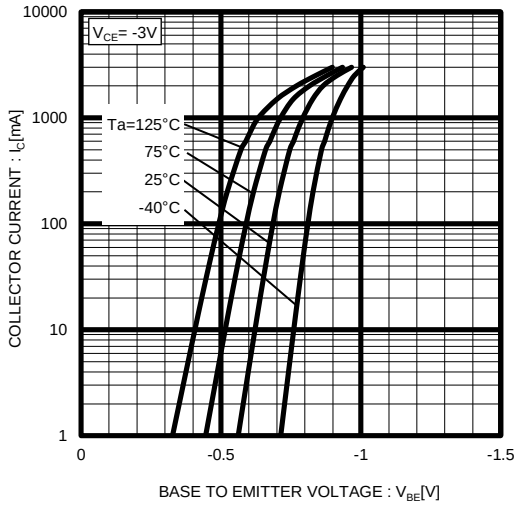


Fig.7 Gain Bandwidth Product vs. Emitter Current

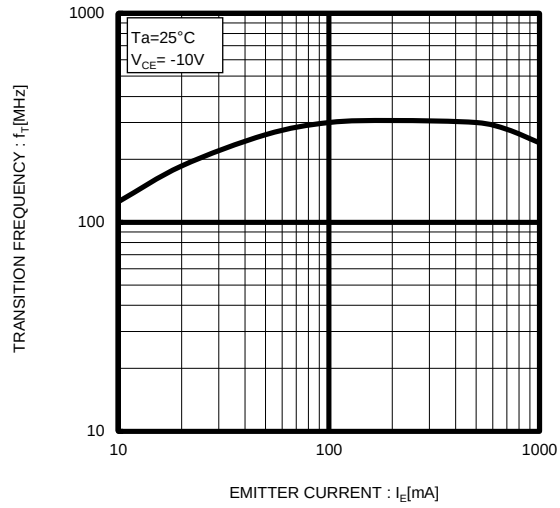


Fig.8 Emitter Input Capacitance vs. Emitter-Base Voltage
Collector Output Capacitance vs. Collector-Base Voltage

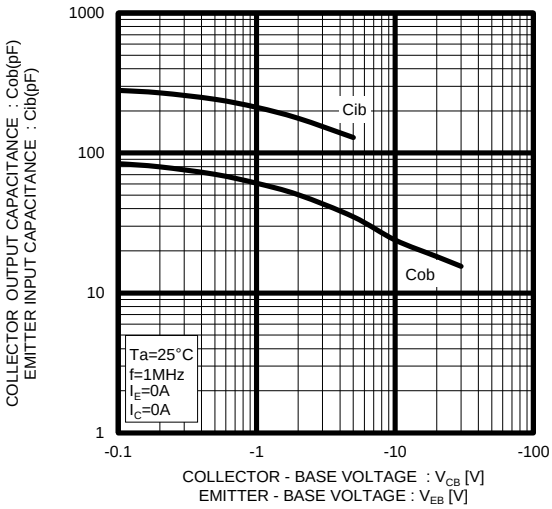
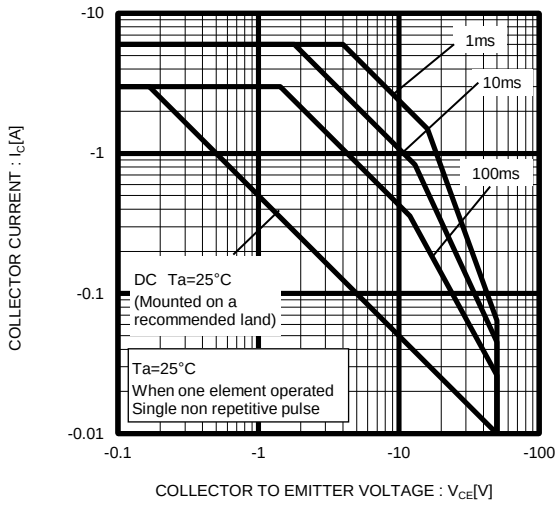


Fig.9 Safe Operating Area



〈Tr.2〉

Fig.1 Typical OutputCharacteristics

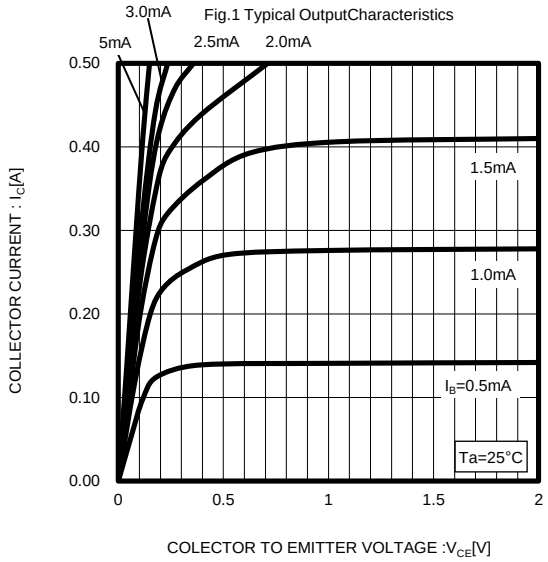


Fig.2 DC Current Gain vs. Collector Current (I)

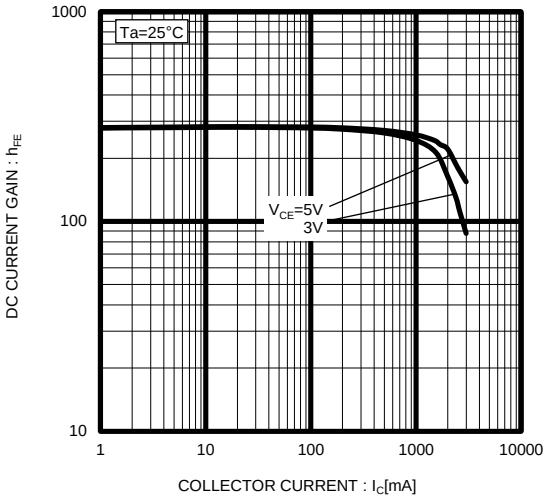


Fig3. DC Current Gain vs. Collector Current (II)

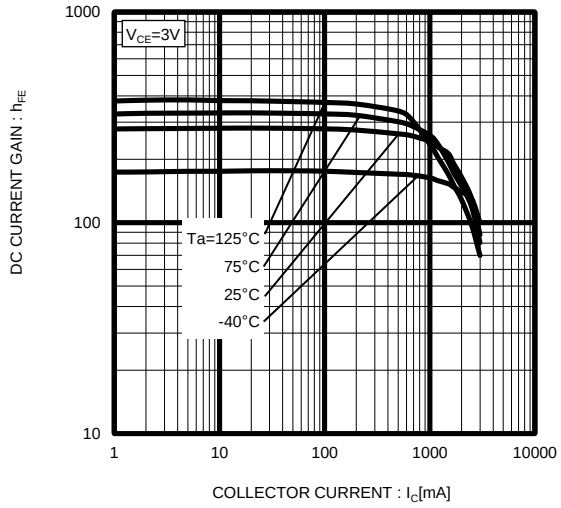


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

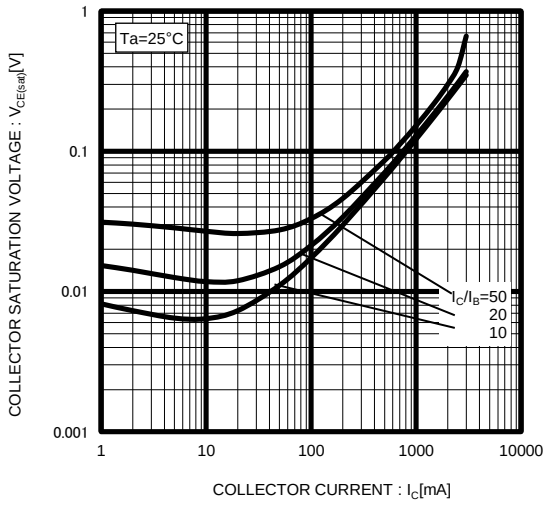


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

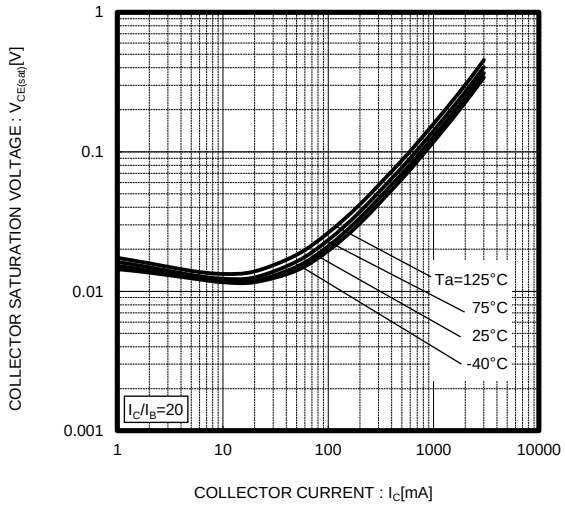


Fig.6 Ground Emitter Propagation Characteristics

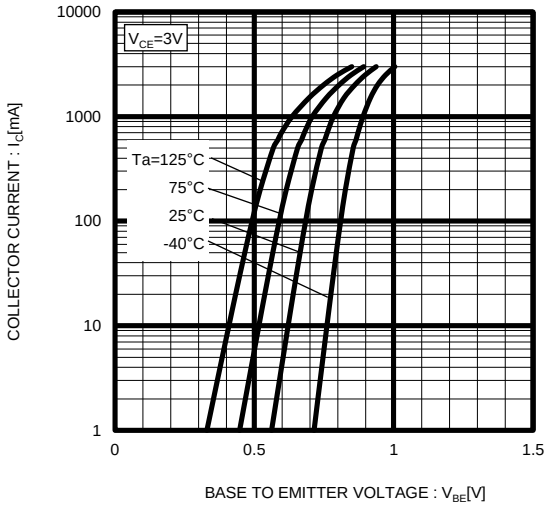


Fig.7 Gain Bandwidth Product vs. Emitter Current

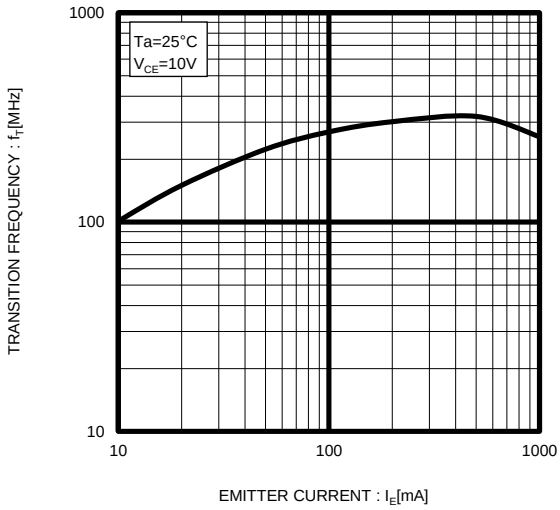


Fig.8 Emitter Input Capacitance vs. Emitter-Base Voltage
Collector Output Capacitance vs. Collector-Base Voltage

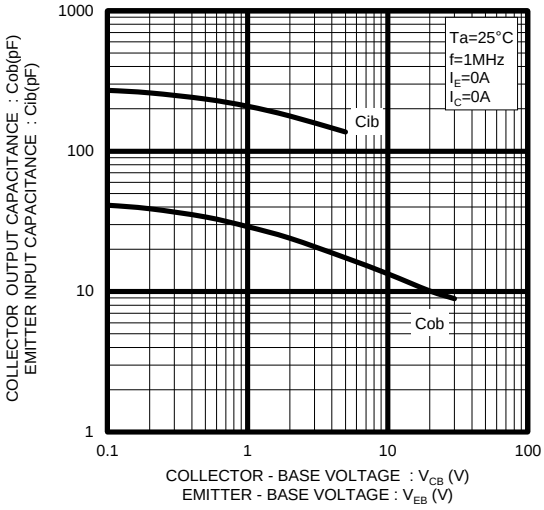
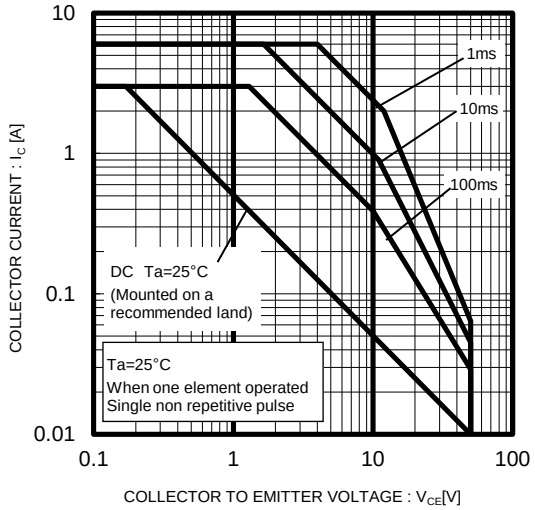
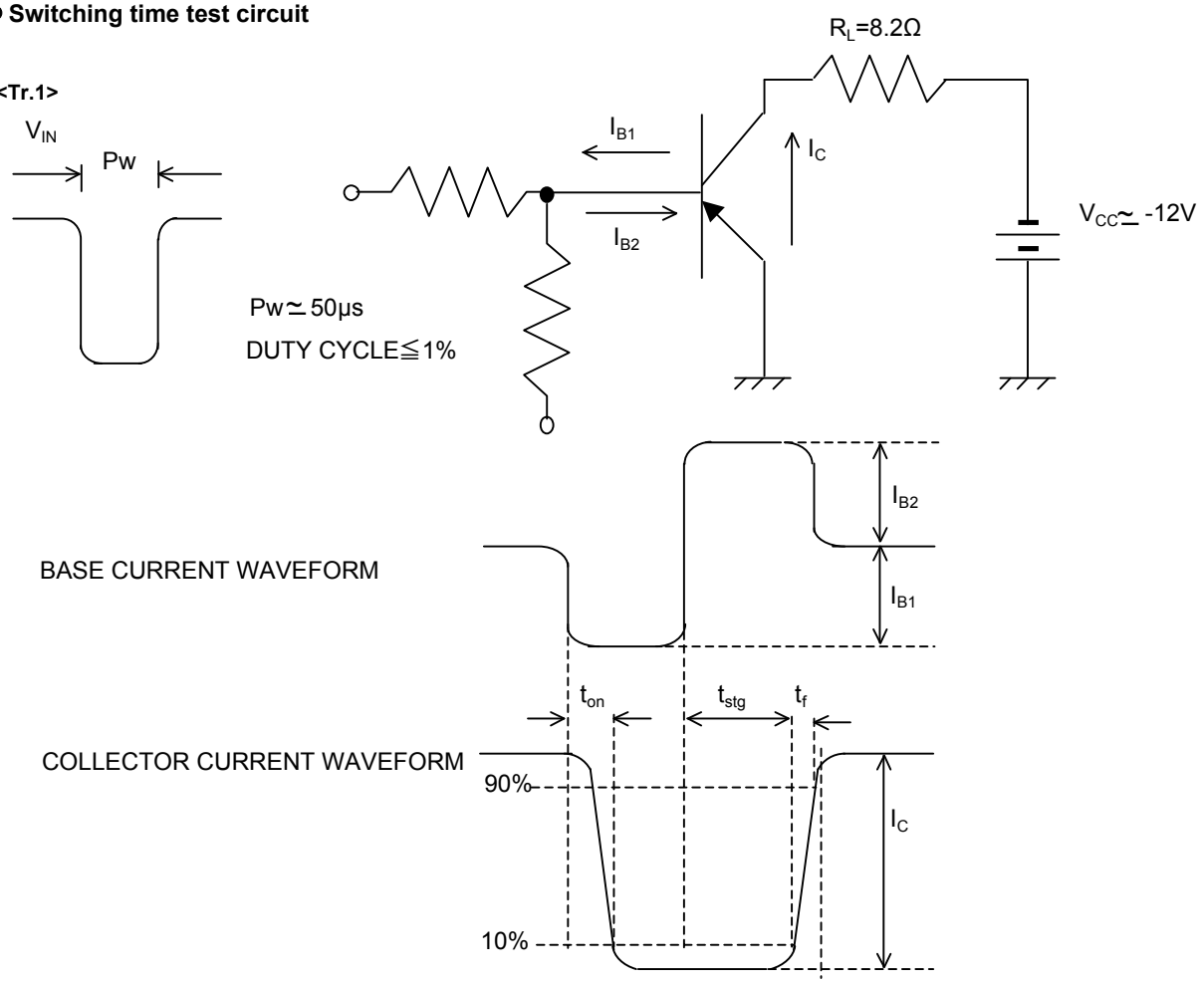


Fig.9 Safe Operating Area

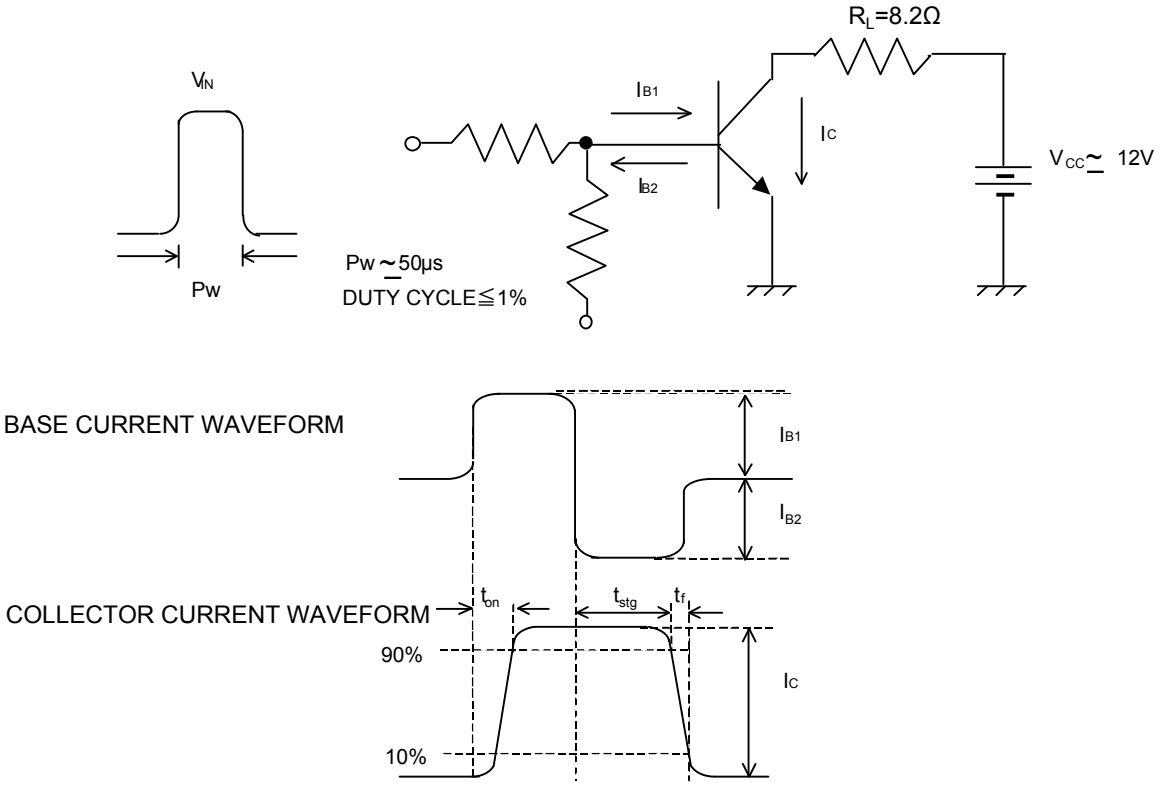


● **Switching time test circuit**

<Tr.1>



<Tr.2>



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