Midium Power Transistors (±30V / ±3A)

QS5Y1

● Structure

PNP/NPN Silicon epitaxial planar transistor

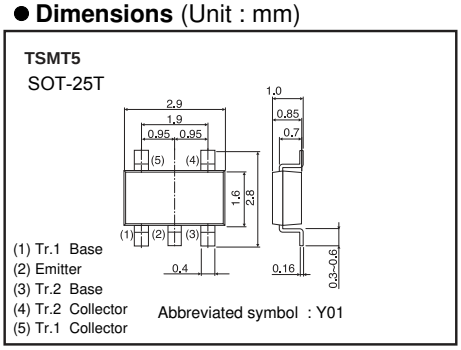
● Features

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

● Applications

Low Frequency Amplifier
Driver

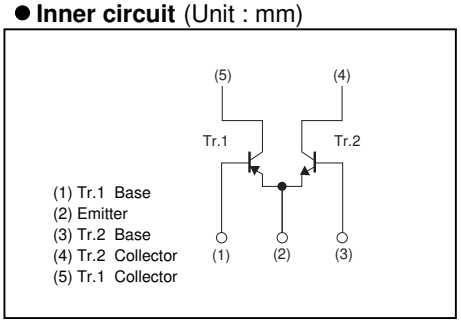
● Dimensions (Unit : mm)



● Packaging specifications

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

● Inner circuit (Unit : mm)



● Absolute maximum ratings (Ta = 25°C)

<Tr.1>

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	-30	V
Collector-emitter voltage		V_{CEO}	-30	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}	30	V
Collector-emitter voltage		V_{CEO}	30	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}	-30	-	-	V	I_C= -1mA
Collector-base breakdown voltage	BV_{CBO}	-30	-	-	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}= -30V
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}	200	-	500	-	V_{CE}= -2V, I_C= -500mA
Transition frequency	f_T *1	-	300	-	MHz	V_{CE}= -10V I_E=100mA, f=100MHz
Collector output capacitance	C_{ob}	-	26	-	pF	V_{CB}= -10V, I_E=0A f=1MHz
Turn-on time	t_{on} *2	-	35	-	ns	I_C= -1.5A, I_{B1}= -150mA, I_{B2}=150mA, V_{CC}≒-12V
Storage time	t_{stg} *2	-	210	-	ns	
Fall time	t_f *2	-	15	-	ns	

*1 Pulsed

*2 See switching time test circuit

<Tr.2>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV_{CEO}	30	-	-	V	I_C= 1mA
Collector-base breakdown voltage	BV_{CBO}	30	-	-	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}= 30V
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}	200	-	500	-	V_{CE}= 2V, I_C= 500mA
Transition frequency	f_T *1	-	270	-	MHz	V_{CE}= 10V I_E=-100mA, f=100MHz
Collector output capacitance	C_{ob}	-	16	-	pF	V_{CB}= 10V, I_E=0A f=1MHz
Turn-on time	t_{on} *2	-	25	-	ns	I_C= 1.5A, I_{B1}= 150mA, I_{B2}=-150mA, V_{CC}≒12V
Storage time	t_{stg} *2	-	300	-	ns	
Fall time	t_f *2	-	20	-	ns	

*1 Pulsed

*2 See switching time test circuit

●Electrical characteristic curves (Ta=25°C)

〈Tr.1〉

Fig.1 Typical Output Characteristics

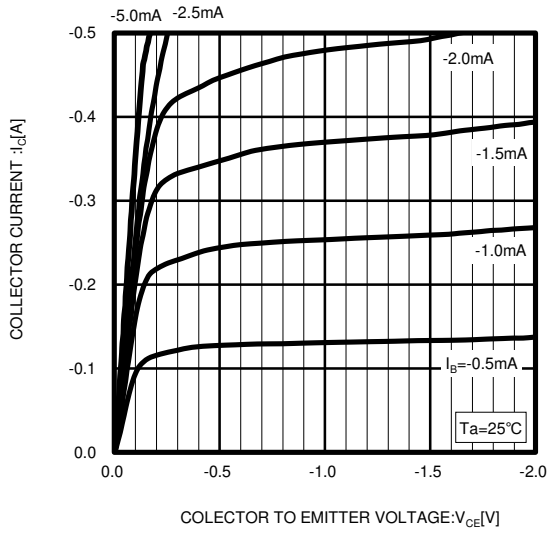


Fig.2 DC Current Gain vs. Collector Current (Ⅰ)

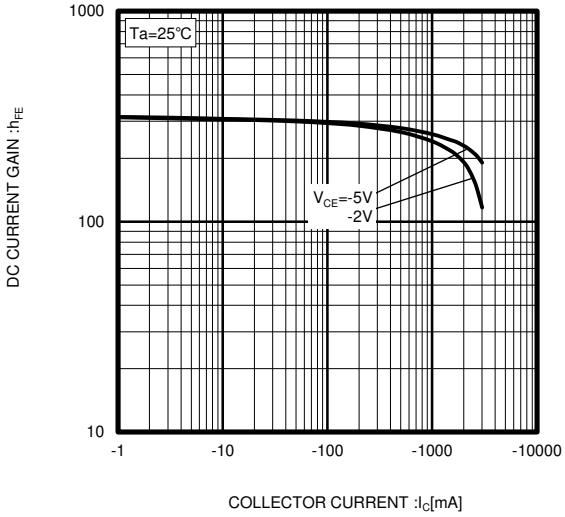


Fig.3 DC Current Gain vs. Collector Current(Ⅱ)

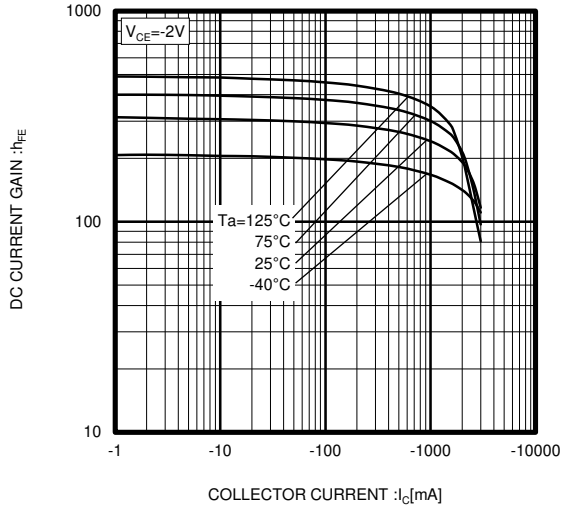


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current(Ⅰ)

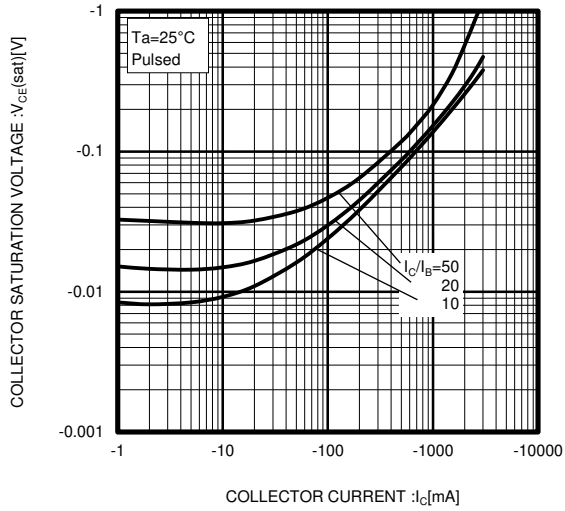


Fig.5 Collector-Emitter Saturation Voltage vs.Collector Current (Ⅱ)

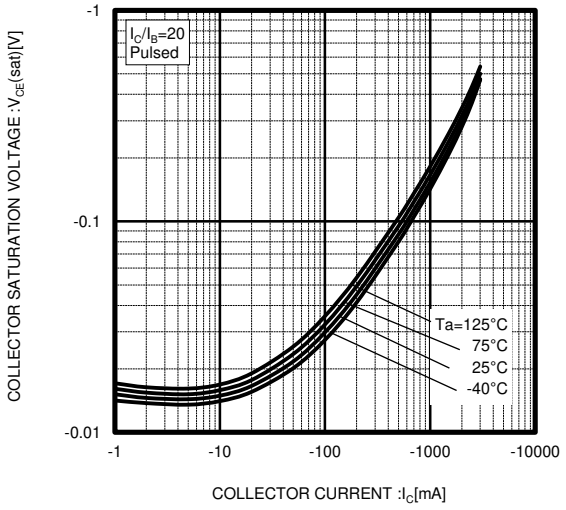


Fig.6 Ground Emitter Propagation Characteristics

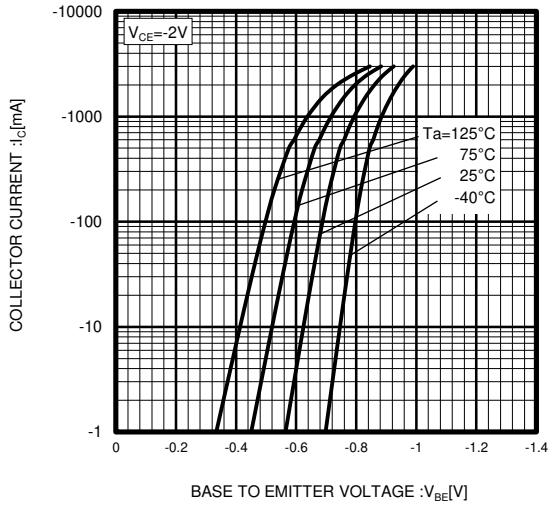


Fig.7 Emitter input capacitance vs. Emitter-Base Voltage
Collector output capacitance vs.Collector-Base Voltage

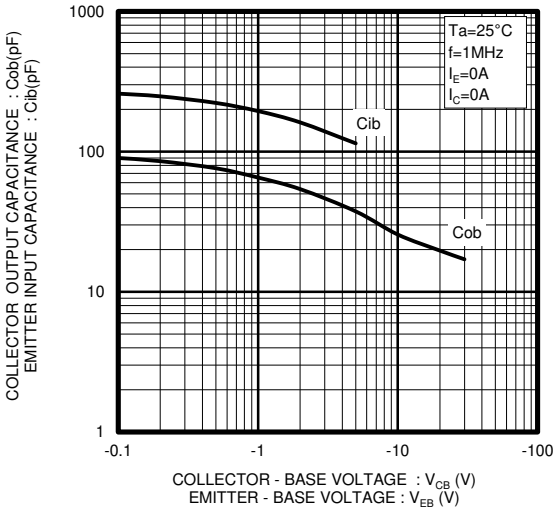


Fig8. Gain Bandwidth Product vs. Emitter Current

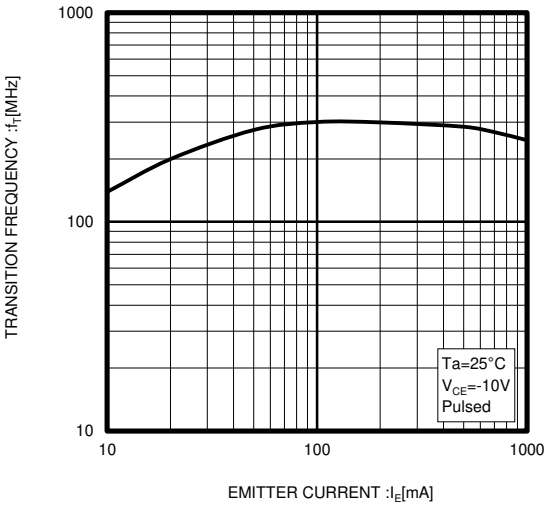
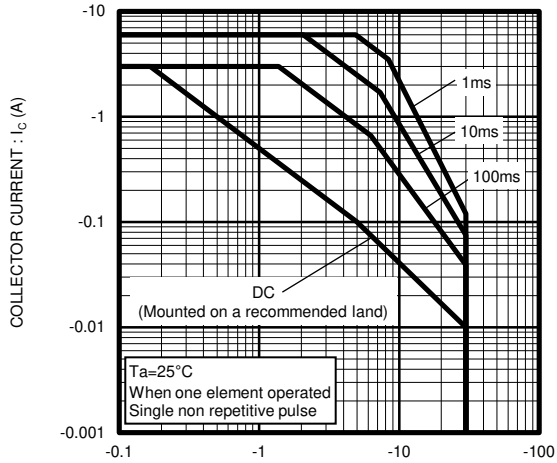


Fig9. Safe Operating Area



〈Tr.2〉

Fig.1 Typical Output Characteristics

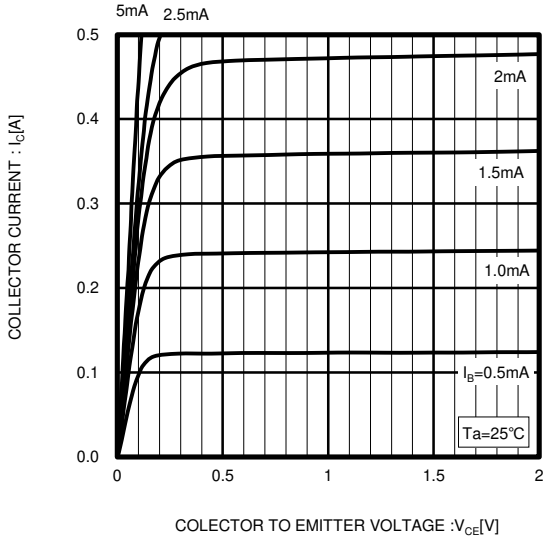


Fig.2 DC Current Gain vs. Collector Current (I)

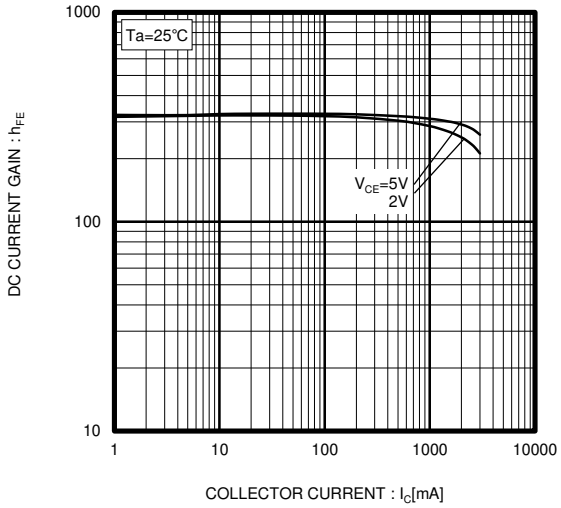


Fig3. DC Current Gain vs. Collector Current (II)

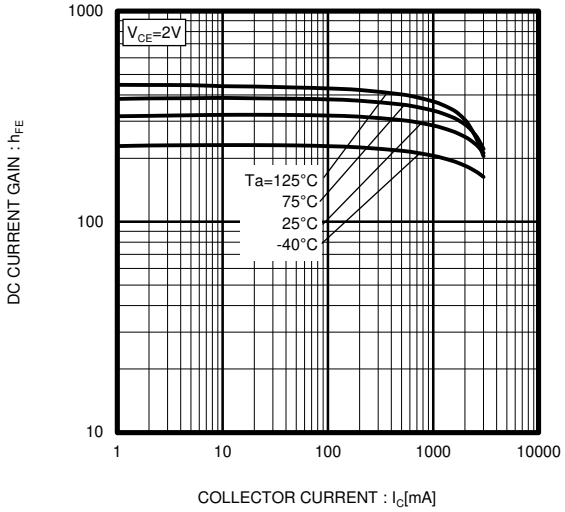


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

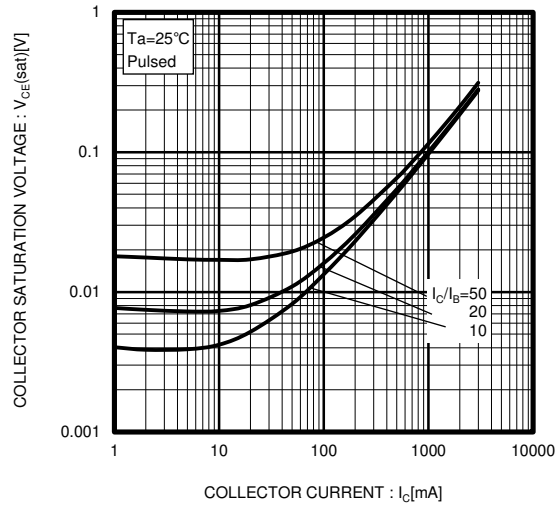


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

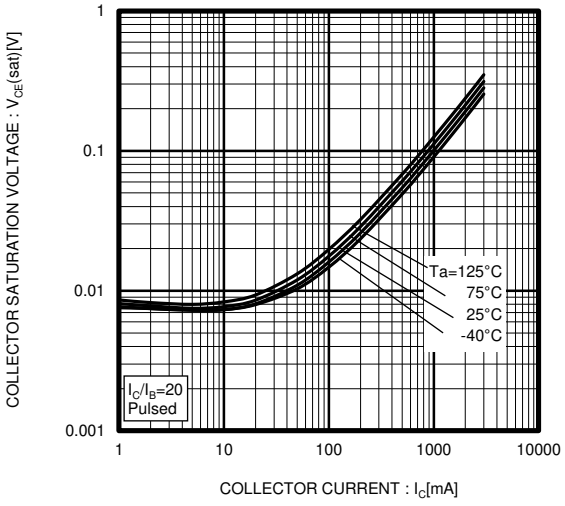


Fig.6 Ground Emitter Propagation Characteristics

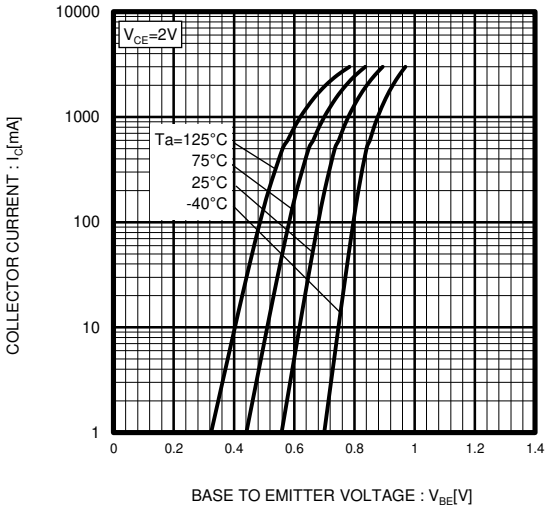


Fig.7 Emitter Input Capacitance vs. Emitter-Base Voltage
Collector Output Capacitance vs. Collector-Base Voltage

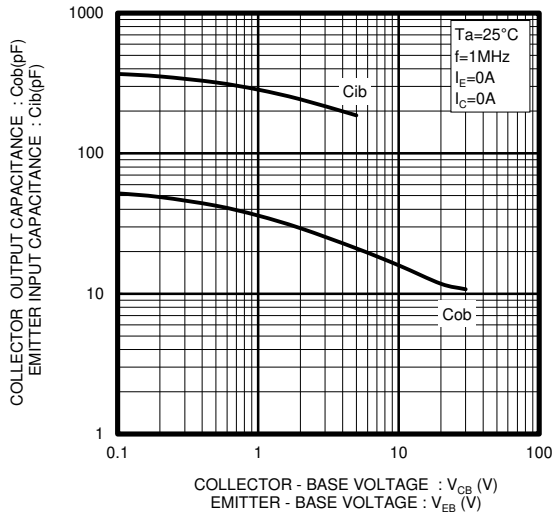


Fig.8 Gain Bandwidth Product vs. Emitter Current

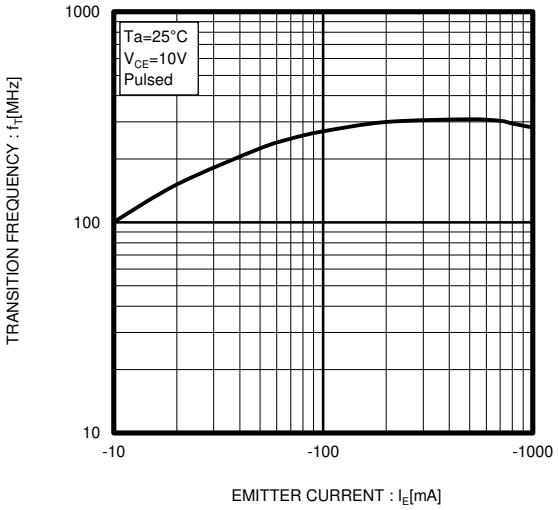
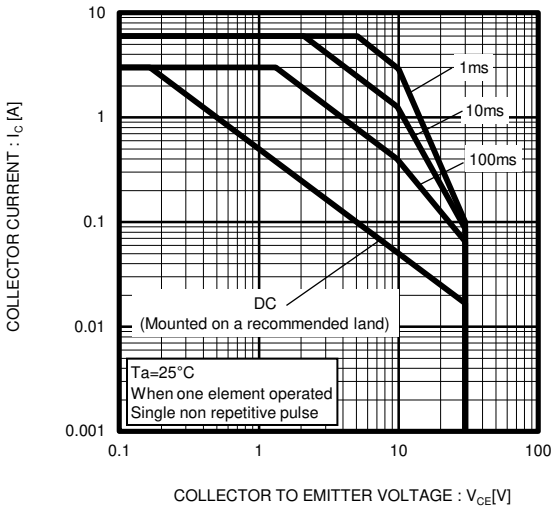
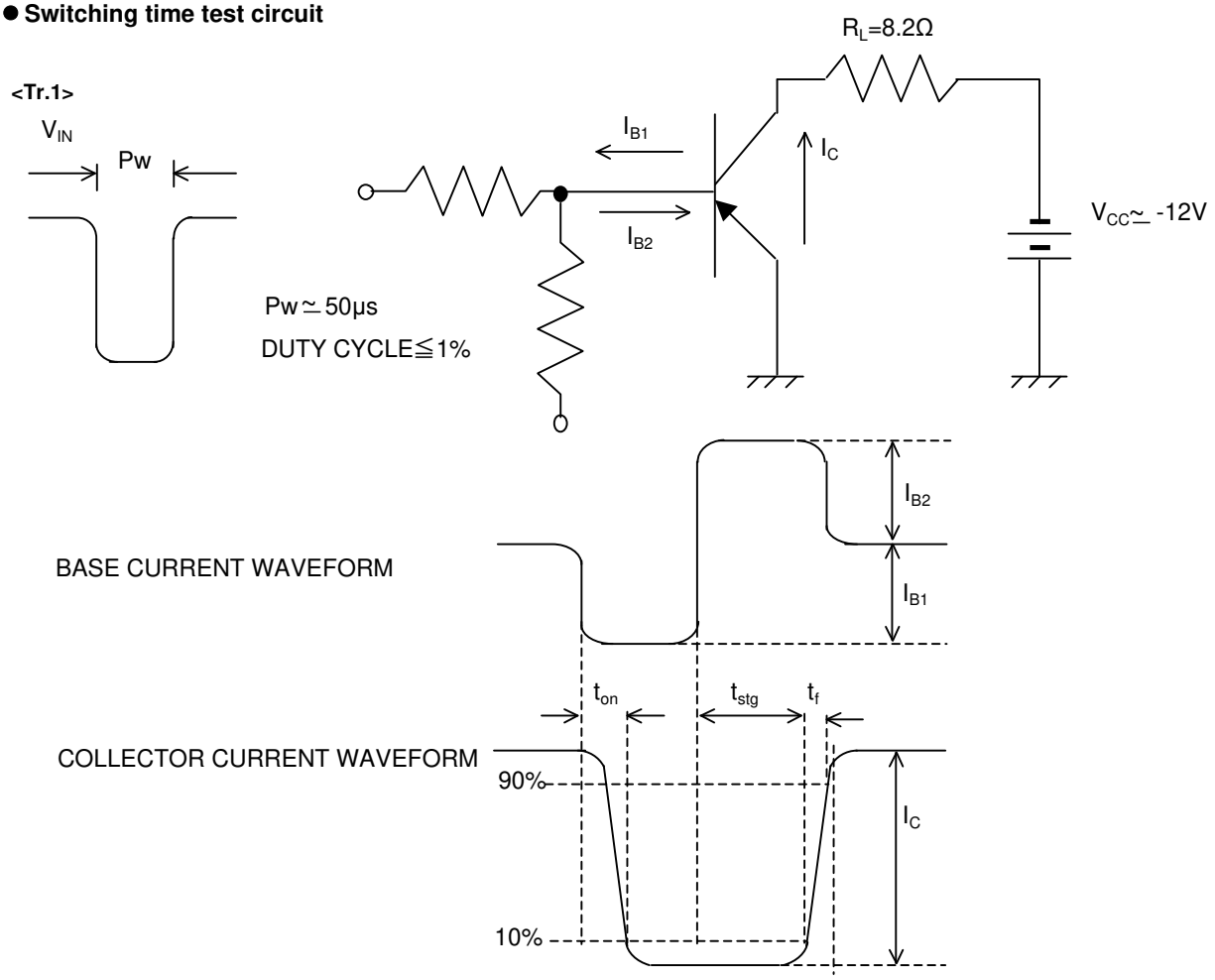


Fig.9 Safe Operating Area

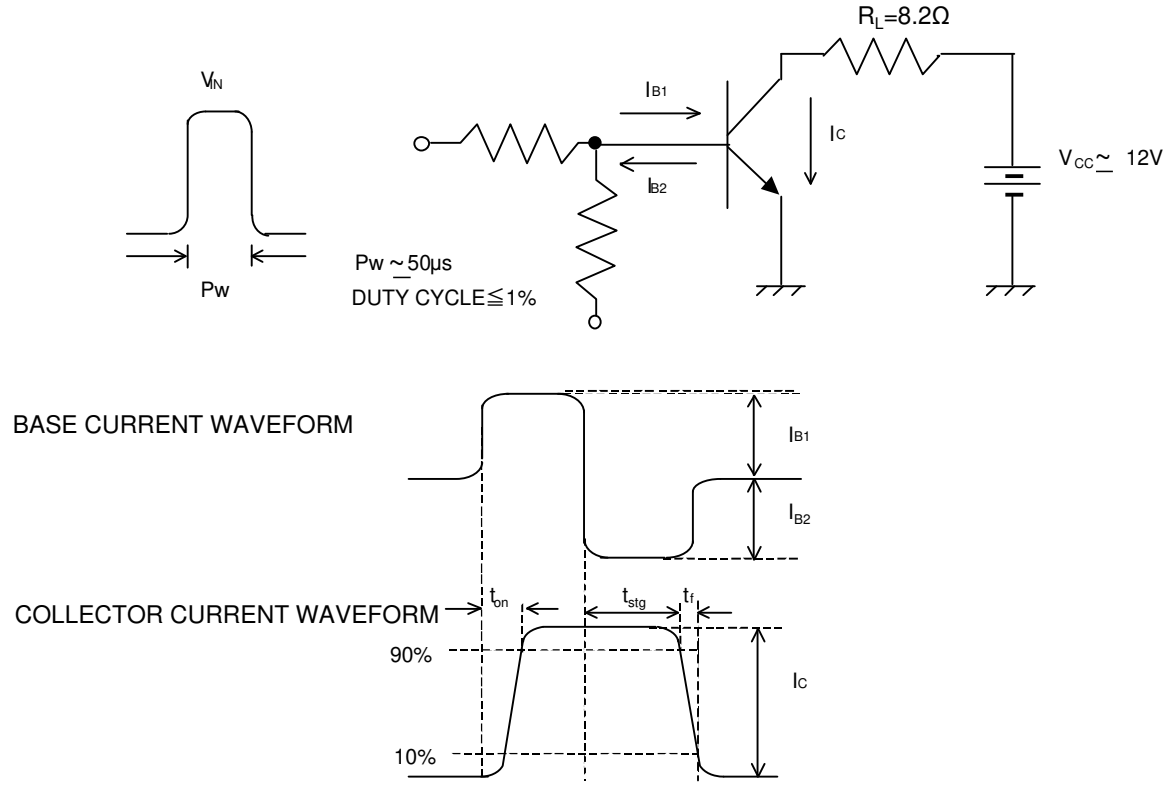


● **Switching time test circuit**

<Tr.1>



<Tr.2>



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