Midium Power Transistors (±30V / ±3A)

QS5Y1

● Structure

PNP/NPN Silicon epitaxial planar transistor

● Features

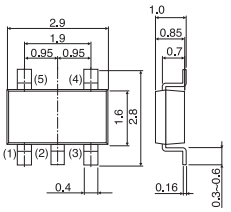
1) Low saturation voltage, typically
   $V_{CE\ (sat)}$ = -0.40V (Max.) (I_C / I_B= -1A / -50mA)
   $V_{CE\ (sat)}$ = 0.40V (Max.) (I_C / I_B= 1A / 50mA)
2) High speed switching

● Applications

Low Frequency Amplifier
Driver

● Dimensions (Unit : mm)

TSMT5
SOT-25T



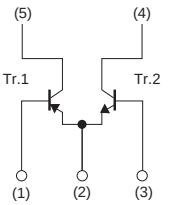
(1) Tr.1 Base
(2) Emitter
(3) Tr.2 Base
(4) Tr.2 Collector
(5) Tr.1 Collector

Abbreviated symbol : Y01

● 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}	-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.

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●**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

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●Electrical characteristic curves (Ta=25□C)

〈Tr.1〉

Fig.1 Typical Output Characteristics

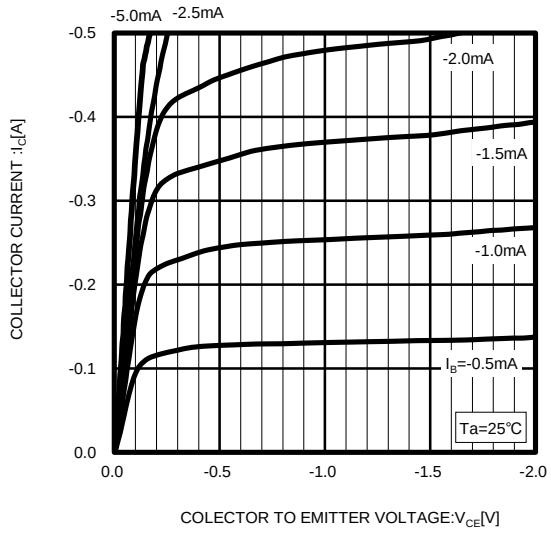


Fig.2 DC Current Gain vs. Collector Current (Ⅰ)

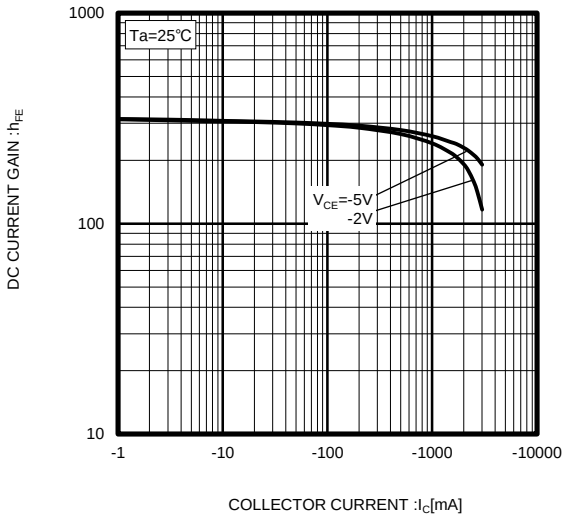


Fig.3 DC Current Gain vs. Collector Current(Ⅱ)

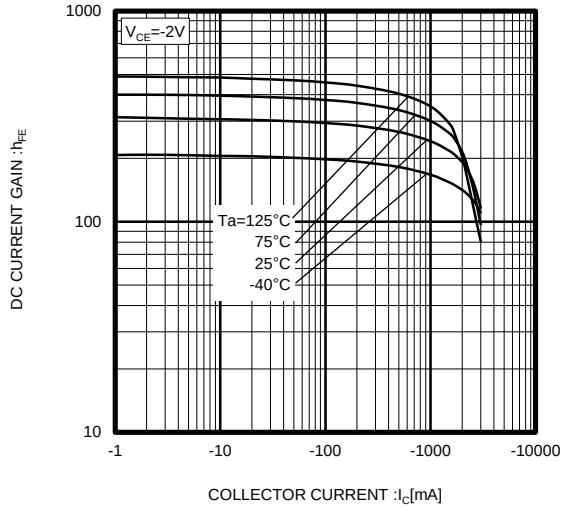


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current(Ⅰ)

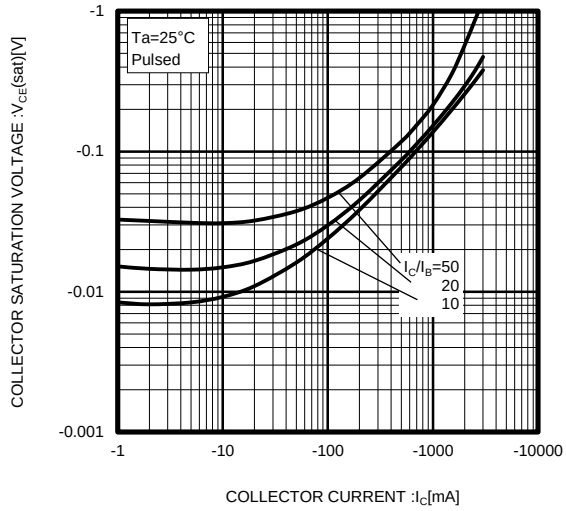


Fig.5 Collector-Emitter Saturation Voltage vs.Collector Current (Ⅱ)

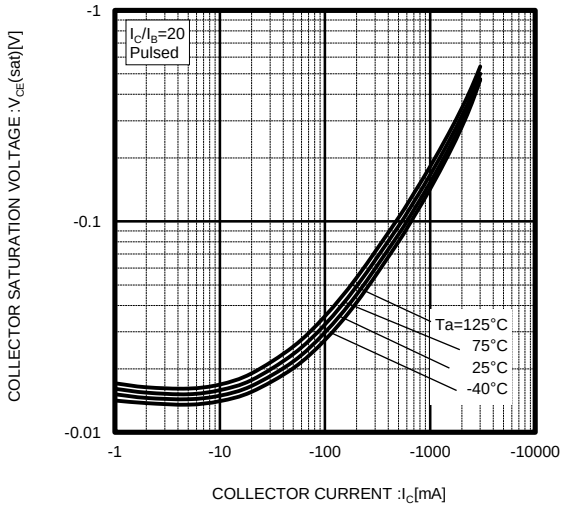
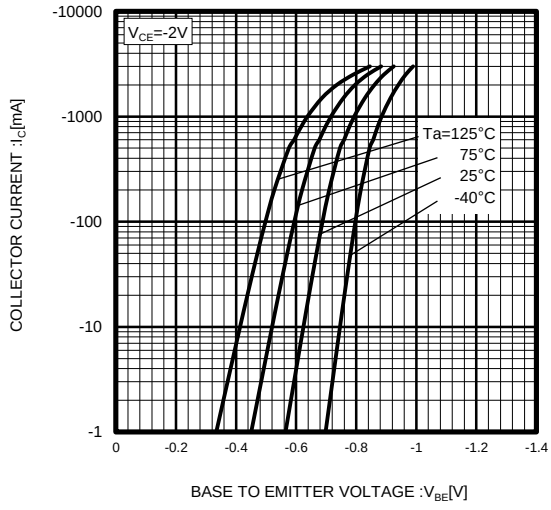


Fig.6 Ground Emitter Propagation Characteristics



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

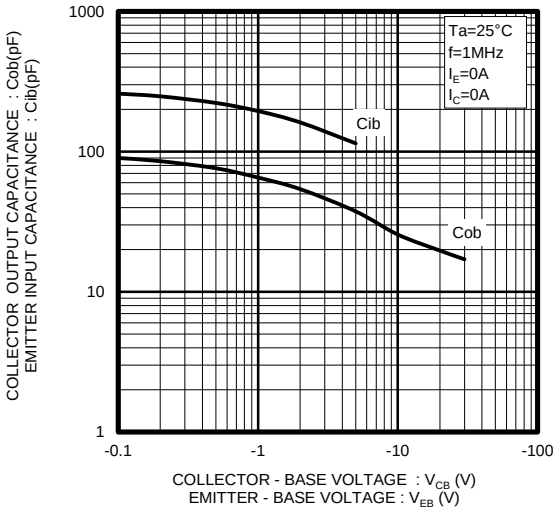


Fig8. Gain Bandwidth Product vs. Emitter Current

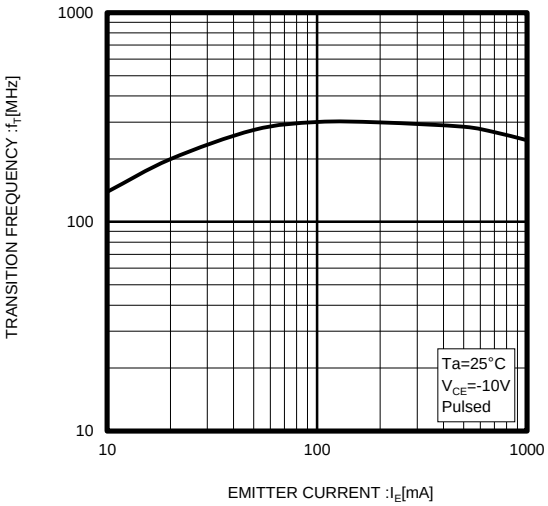
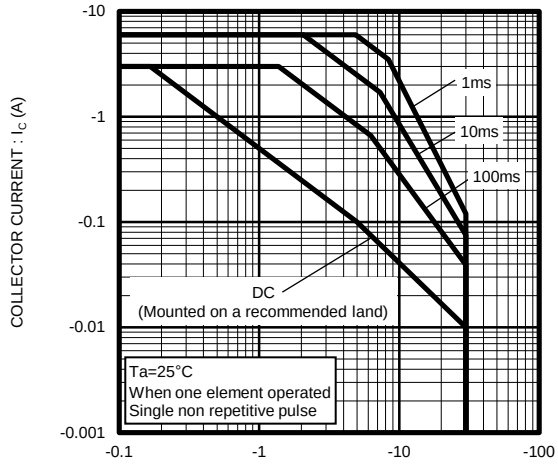


Fig9. Safe Operating Area



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〈Tr.2〉

Fig.1 Typical Output Characteristics

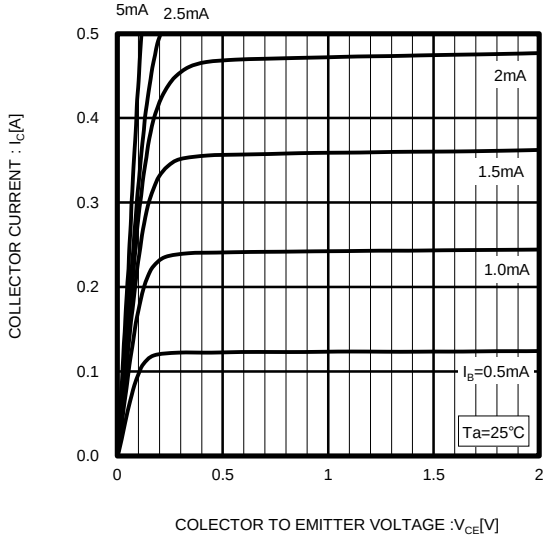


Fig.2 DC Current Gain vs. Collector Current (I)

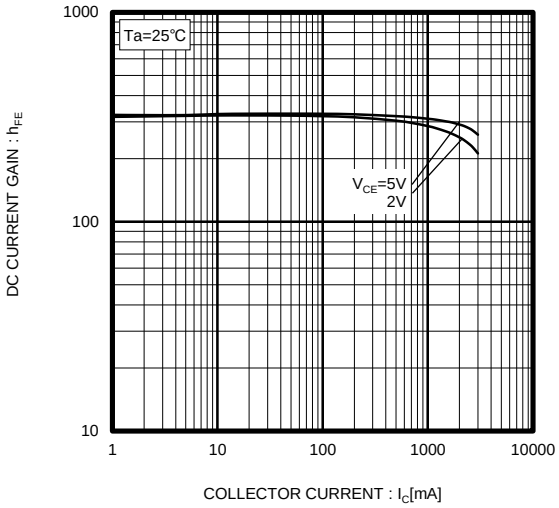


Fig3. DC Current Gain vs. Collector Current (II)

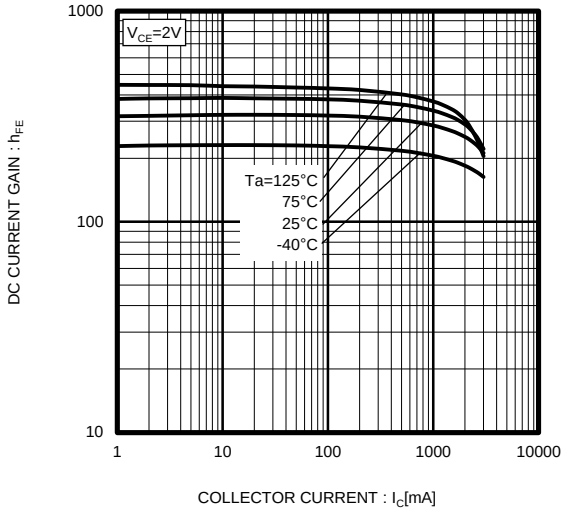


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

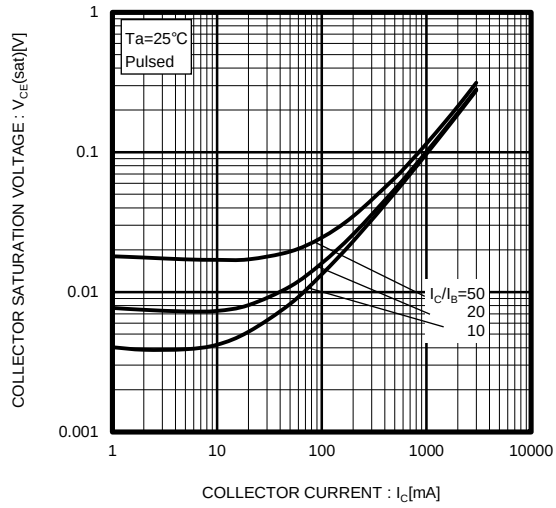


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

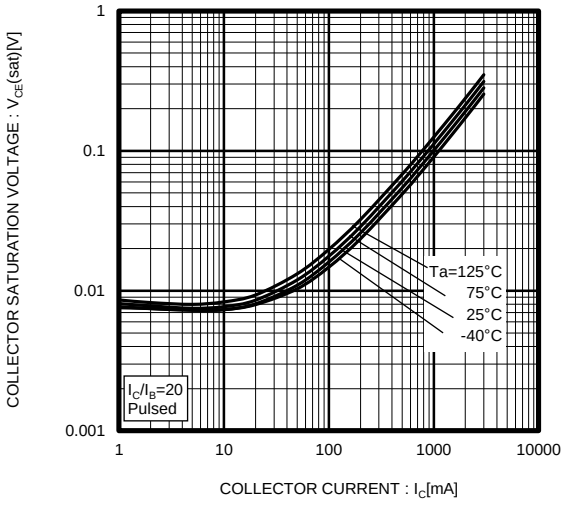
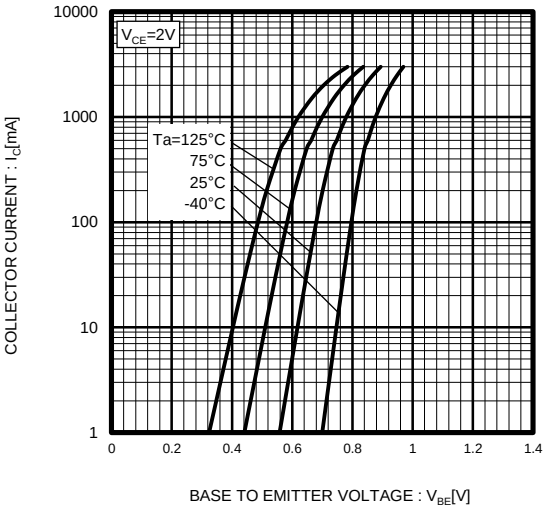


Fig.6 Ground Emitter Propagation Characteristics



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

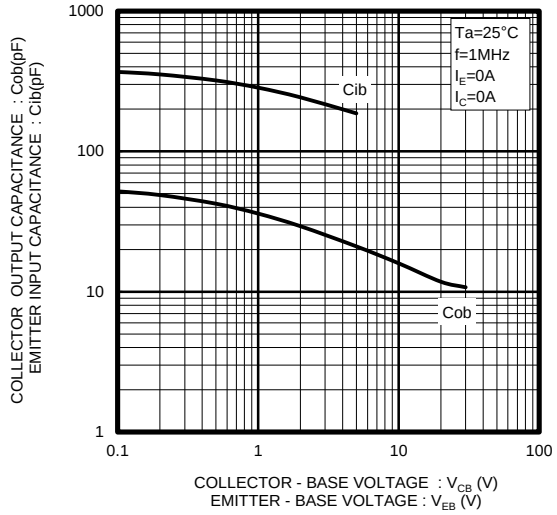


Fig.8 Gain Bandwidth Product vs. Emitter Current

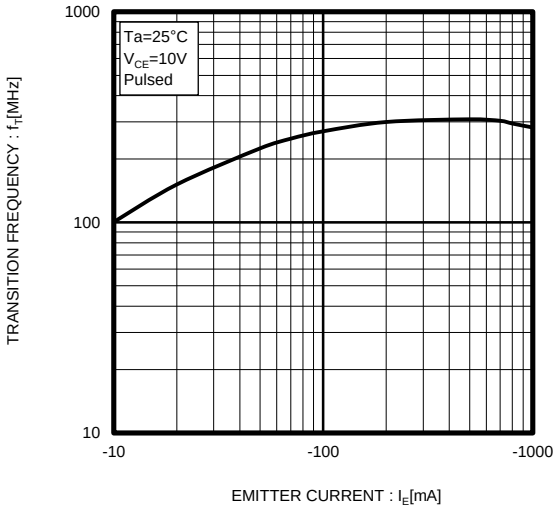
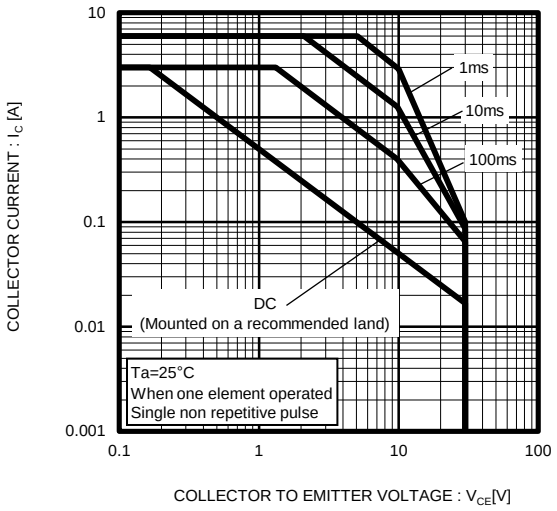


Fig.9 Safe Operating Area

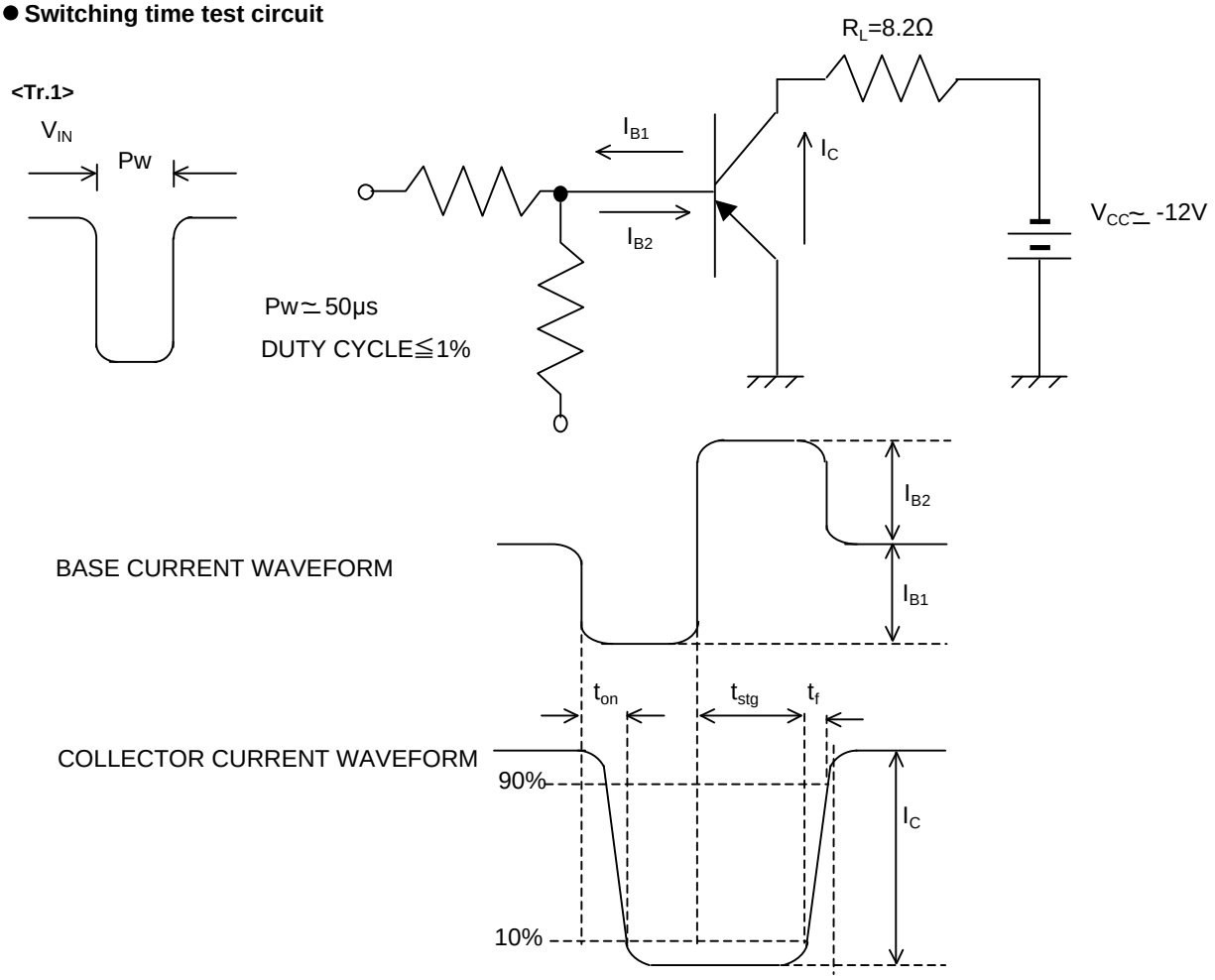


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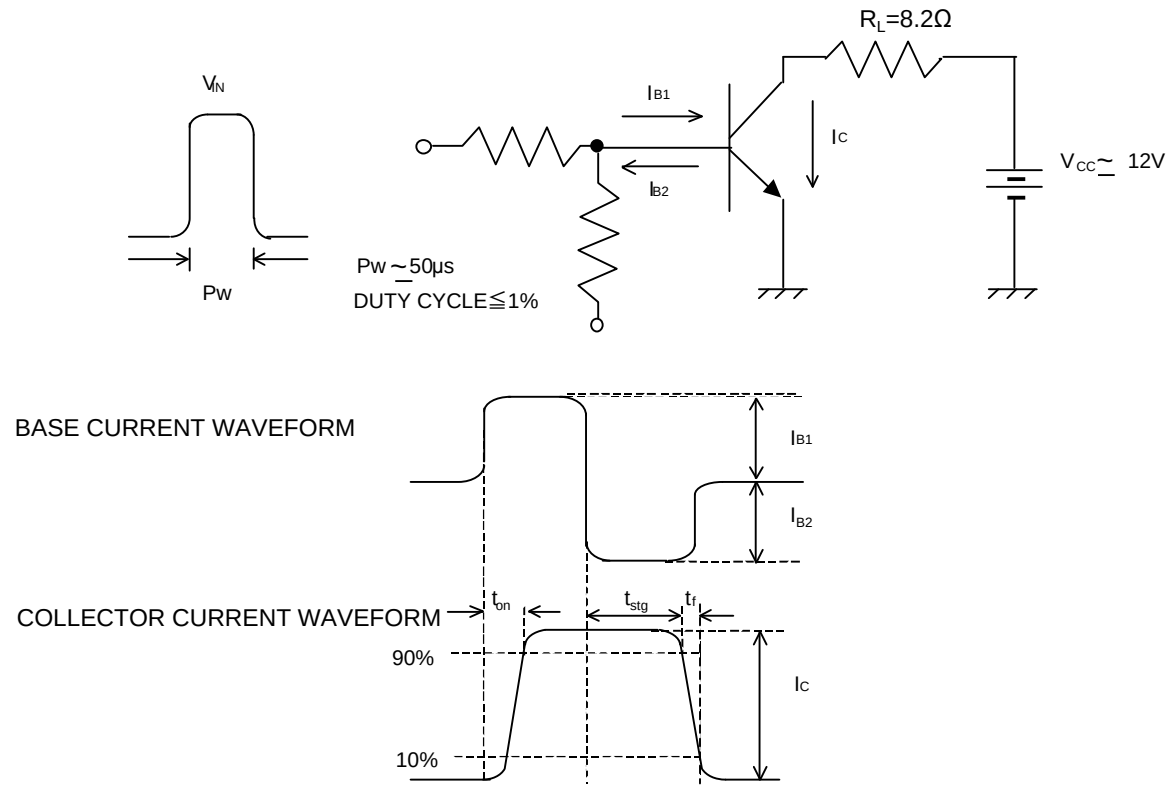
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● **Switching time test circuit**

<Tr.1>



<Tr.2>



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