

Midium Power Transistors ($\pm 30V / \pm 1A$)

MP6Z11

● Structure

NPN/PNP Silicon epitaxial planar transistor

● Features

Low saturation voltage, typically

$$V_{CE(sat)} = 0.35V \text{ (Max.) } (I_C / I_B = 500mA / 25mA)$$

$$V_{CE(sat)} = -0.35V \text{ (Max.) } (I_C / I_B = -500mA / -25mA)$$

● Applications

Low Frequency Amplifier
Driver

● Packaging specifications

Type	Package	MPT6
	Code	TR
	Basic ordering unit (pieces)	1000

● 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	1	A
	Pulsed	I_{CP}^{*1}	2	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	-1	A
	Pulsed	I_{CP}^{*1}	-2	A

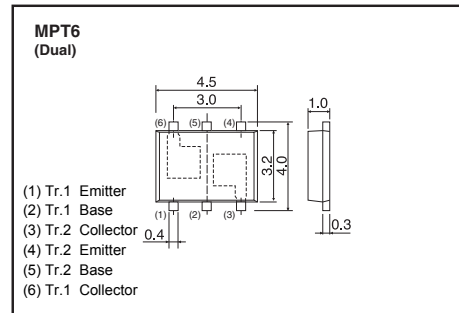
<Tr.1 and Tr.2>

Parameter	Symbol	Limits	Unit
Power dissipation	P_D^{*2}	2.0	W/Total
	P_D^{*2}	1.4	W/Element
Junction temperature	T_J	150	°C
Range of storage temperature	T_{stg}	-55 to 150	°C

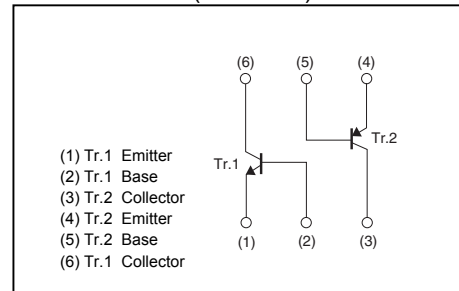
*1 $P_w=10ms$, Single Pulse

*2 Mounted on a 40 x 40 x 0.7[mm] ceramic board.

● Dimensions (Unit : mm)



● Inner circuit (Unit : mm)



●Electrical characteristics (Ta=25°C)

<Tr.1>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV_{CEO}	30	-	-	V	$I_C = 1\text{mA}$
Collector-base breakdown voltage	BV_{CBO}	30	-	-	V	$I_C = 10\mu\text{A}$
Emitter-base breakdown voltage	BV_{EBO}	6	-	-	V	$I_E = 10\mu\text{A}$
Collector cut-off current	I_{CBO}	-	-	100	nA	$V_{CB} = 30\text{V}$
Emitter cut-off current	I_{EBO}	-	-	100	nA	$V_{EB} = 6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}^{*1}$	-	120	350	mV	$I_C = 500\text{mA}$, $I_B = 25\text{mA}$
DC current gain	h_{FE}	270	-	680	-	$V_{CE} = 2\text{V}$, $I_C = 100\text{mA}$
Transition frequency	f_T^{*1}	-	320	-	MHz	$V_{CE} = 2\text{V}$ $I_E = -100\text{mA}$, $f = 100\text{MHz}$
Collector output capacitance	C_{ob}	-	7	-	pF	$V_{CB} = 10\text{V}$, $I_E = 0\text{A}$ $f = 1\text{MHz}$
Turn-on time	t_{on}^{*2}	-	90	-	ns	$I_C = 0.5\text{A}$, $I_{B1} = 25\text{mA}$, $I_{B2} = -25\text{mA}$, $V_{CC} \approx 5\text{V}$
Storage time	t_{stg}^{*2}	-	300	-	ns	
Fall time	t_f^{*2}	-	60	-	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	$I_C = -1\text{mA}$
Collector-base breakdown voltage	BV_{CBO}	-30	-	-	V	$I_C = -10\mu\text{A}$
Emitter-base breakdown voltage	BV_{EBO}	-6	-	-	V	$I_E = -10\mu\text{A}$
Collector cut-off current	I_{CBO}	-	-	-100	nA	$V_{CB} = -30\text{V}$
Emitter cut-off current	I_{EBO}	-	-	-100	nA	$V_{EB} = -6\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}^{*1}$	-	-150	-350	mV	$I_C = -500\text{mA}$, $I_B = -25\text{mA}$
DC current gain	h_{FE}	270	-	680	-	$V_{CE} = -2\text{V}$, $I_C = -100\text{mA}$
Transition frequency	f_T^{*1}	-	320	-	MHz	$V_{CE} = -2\text{V}$ $I_E = 100\text{mA}$, $f = 100\text{MHz}$
Collector output capacitance	C_{ob}	-	7	-	pF	$V_{CB} = -10\text{V}$, $I_E = 0\text{A}$ $f = 1\text{MHz}$
Turn-on time	t_{on}^{*2}	-	60	-	ns	$I_C = -0.5\text{A}$, $I_{B1} = -25\text{mA}$, $I_{B2} = 25\text{mA}$, $V_{CC} \approx -5\text{V}$
Storage time	t_{stg}^{*2}	-	160	-	ns	
Fall time	t_f^{*2}	-	50	-	ns	

*1 Pulsed

*2 See switching time test circuit

●Electrical characteristic curves (Ta=25°C)

<Tr.1>

Fig.1 Typical Output Characteristics

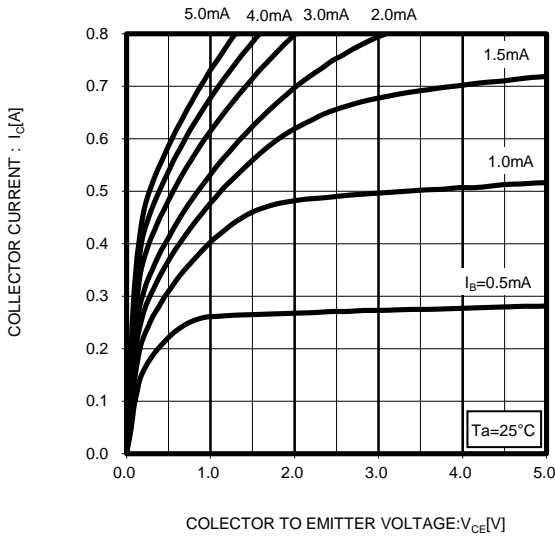


Fig.3 DC Current Gain vs. Collector Current (II)

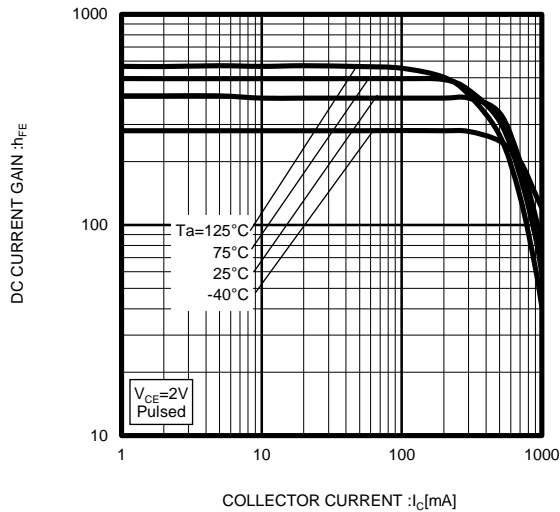


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (II)

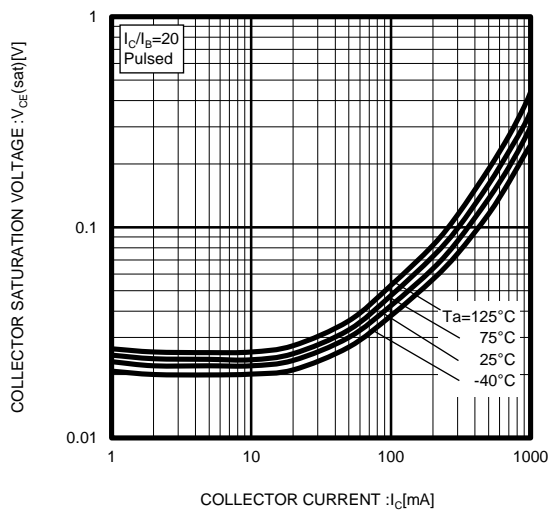


Fig.2 DC Current Gain vs. Collector Current (I)

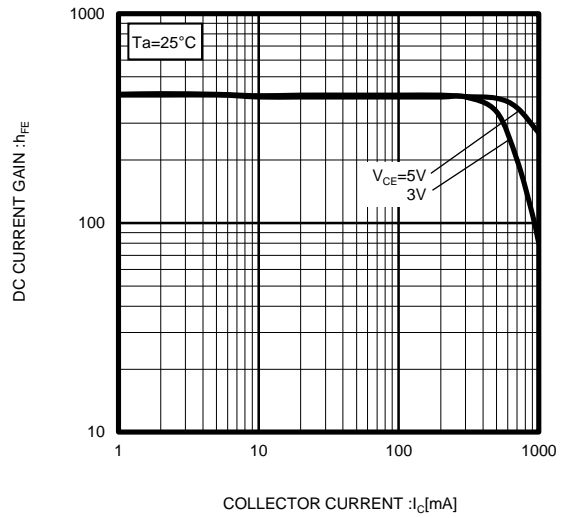


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

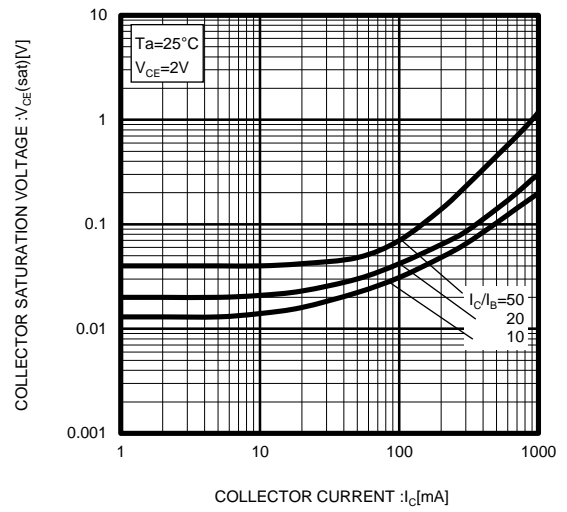


Fig.6 Ground Emitter Propagation Characteristics

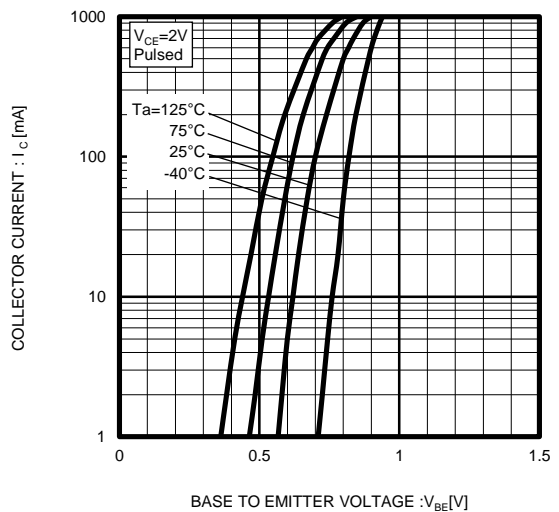


Fig.7 Emitter input capacitance vs. Emitter-Base Voltage
Collector output capacitance vs. Collector-Base Voltage

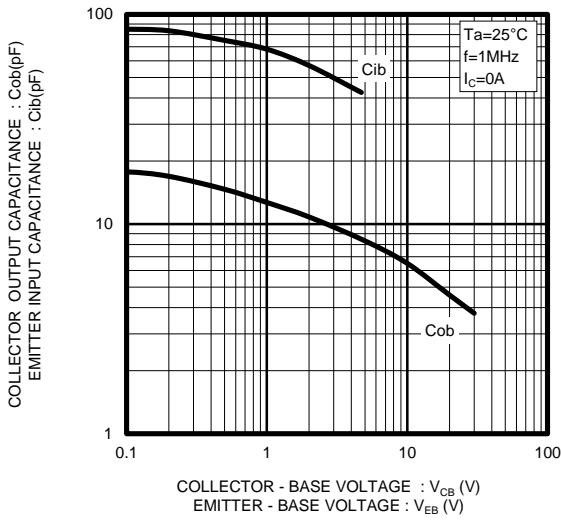


Fig.8 Gain Bandwidth Product vs. Emitter Current

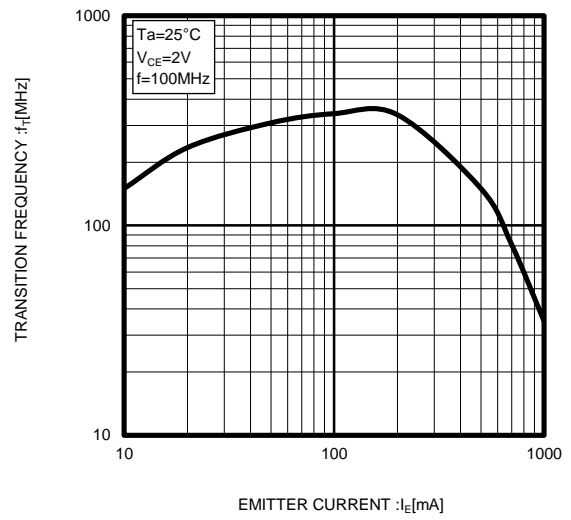
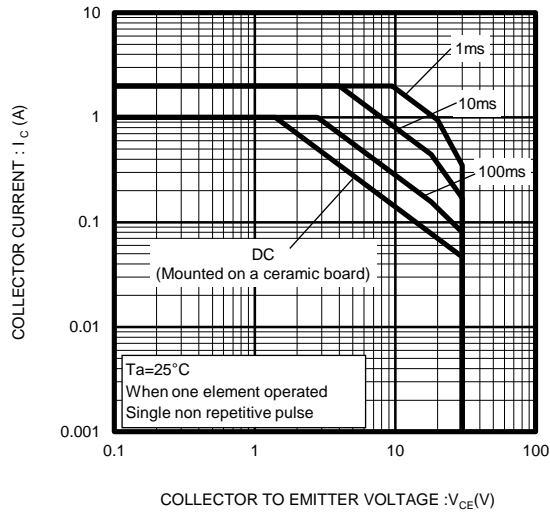


Fig.9. SAFE OPERATING AREA



<Tr.2>

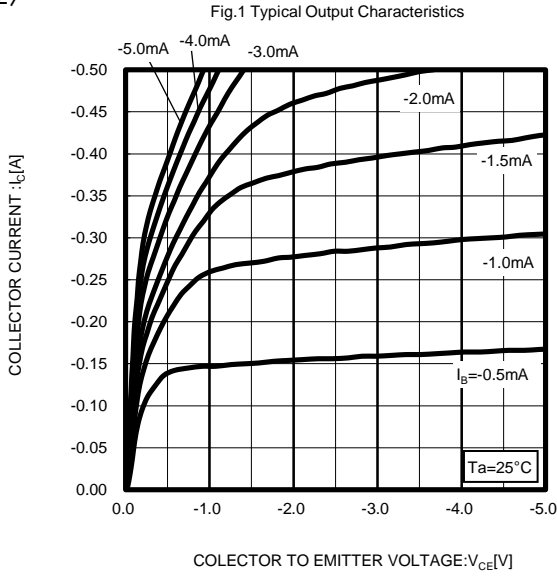


Fig.1 Typical Output Characteristics

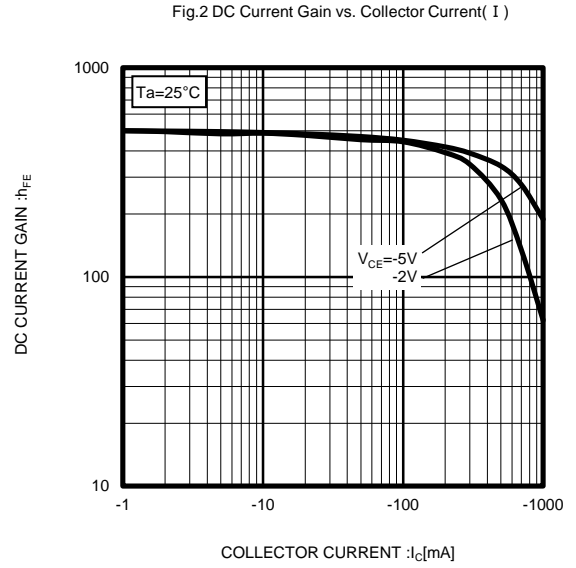


Fig.2 DC Current Gain vs. Collector Current (I)

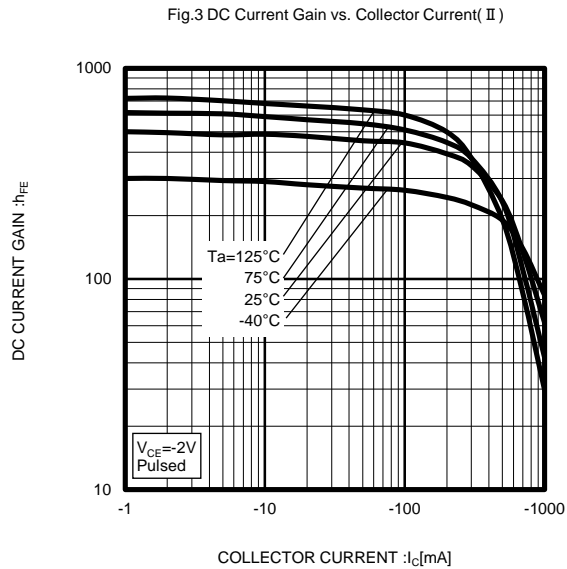


Fig.3 DC Current Gain vs. Collector Current(II)

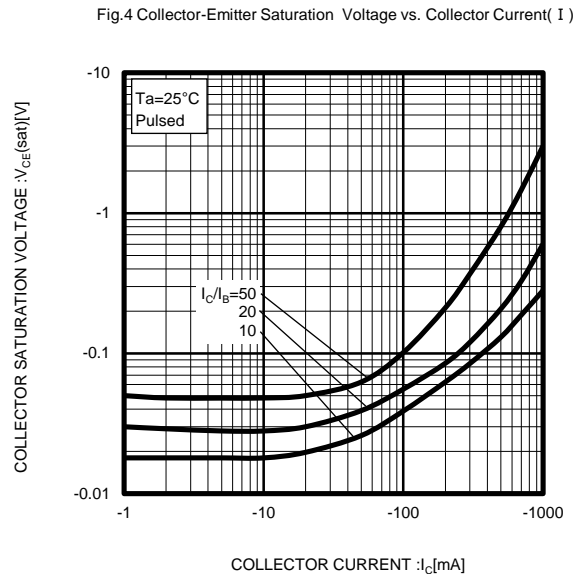


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current (I)

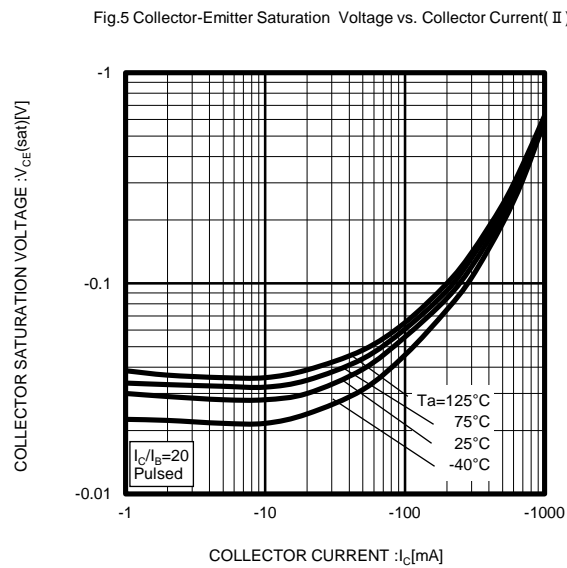


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current(II)

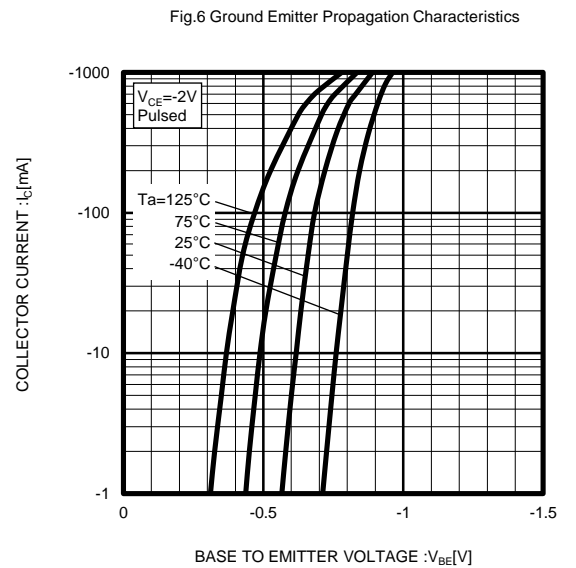


Fig.6 Ground Emitter Propagation Characteristics

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

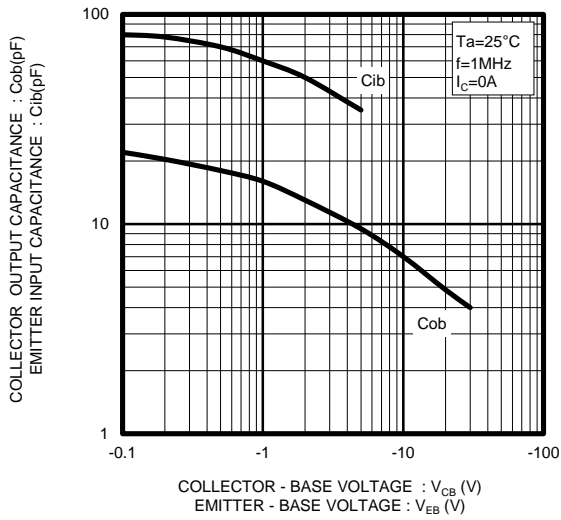


Fig.8 Gain Bandwidth Product vs. Emitter Current

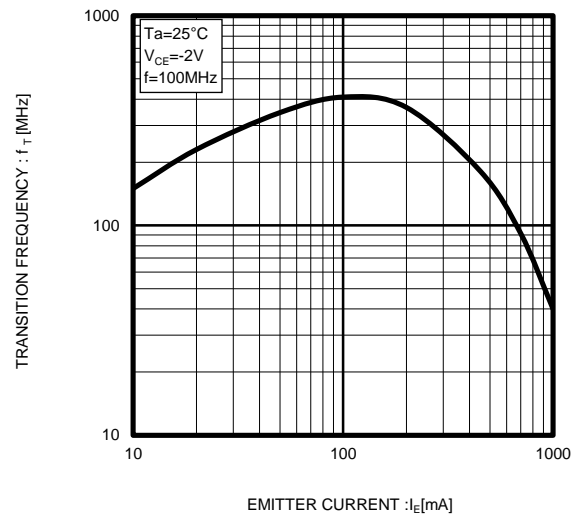
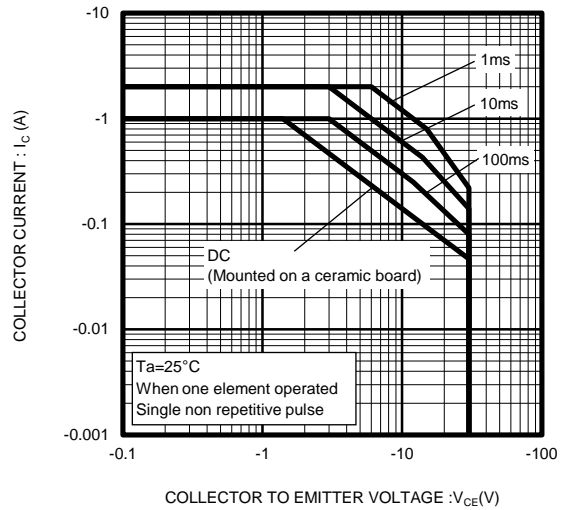
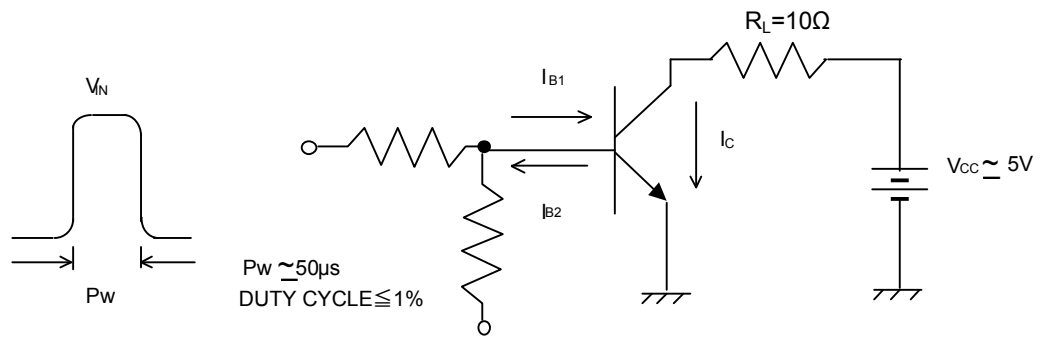


Fig.9. SAFE OPERATING AREA

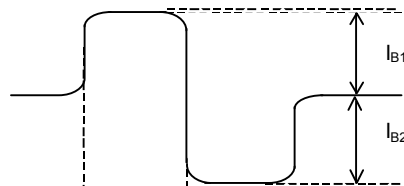


● Switching time test circuit

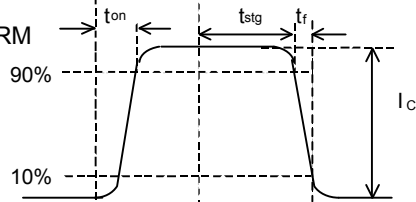
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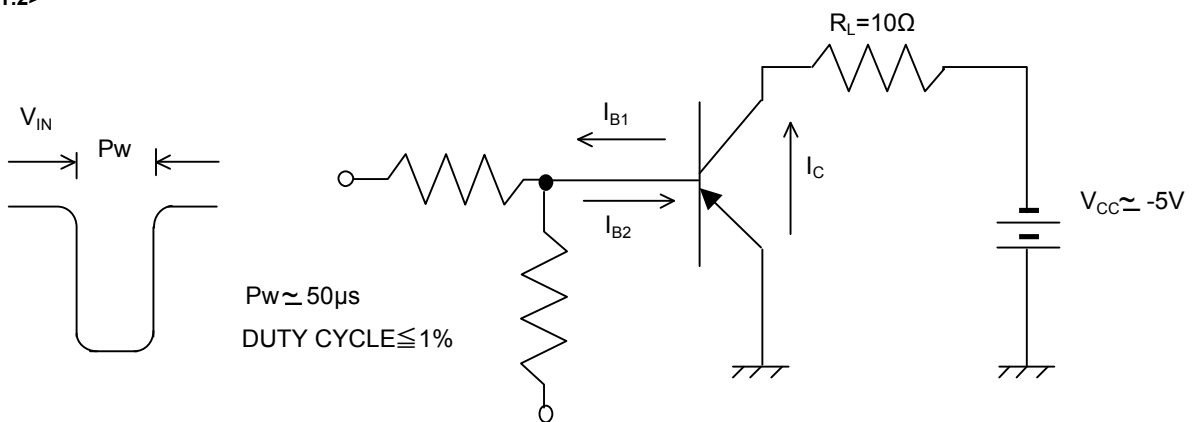
BASE CURRENT WAVEFORM



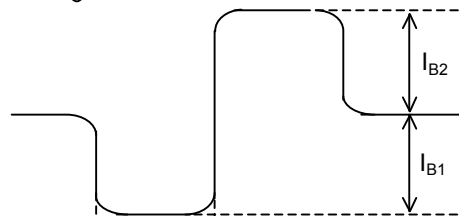
COLLECTOR CURRENT WAVEFORM



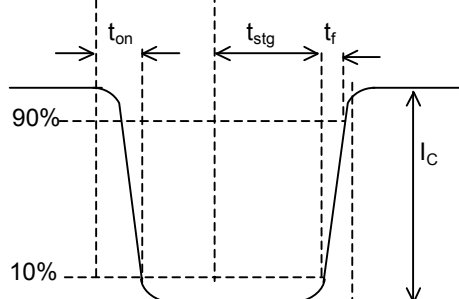
<Tr.2>



BASE CURRENT WAVEFORM



COLLECTOR CURRENT WAVEFORM



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