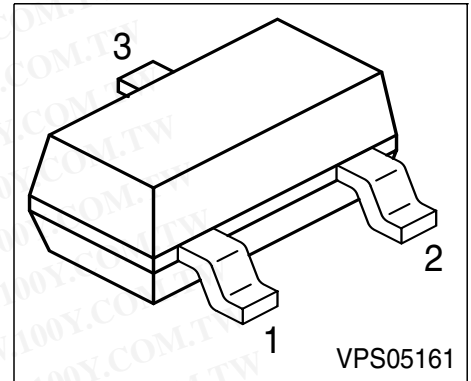


PNP Silicon Switching Transistor

- High DC current gain: 0.1mA to 500 mA
- Low collector-emitter saturation voltage
- Complementary type:
SMBT2222A/ MMBT2222A (NPN)



Type	Marking	Pin Configuration			Package
SMBT2907A/MMBT2907A	s2F	1=B	2=E	3=C	SOT23

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	60	V
Collector-base voltage	V_{CBO}	60	
Emitter-base voltage	V_{EBO}	5	
DC collector current	I_C	600	mA
Total power dissipation, $T_S = 77\text{ °C}$	P_{tot}	330	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Junction - soldering point ¹⁾	R_{thJS}	≤220	K/W
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¹⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 10\text{ mA}, I_B = 0$	$V_{(BR)CEO}$	60	-	-	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}, I_E = 0$	$V_{(BR)CBO}$	60	-	-	
Emitter-base breakdown voltage $I_E = 10\text{ }\mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	5	-	-	
Collector cutoff current $V_{CB} = 50\text{ V}, I_E = 0$	I_{CBO}	-	-	10	nA
Collector cutoff current $V_{CB} = 50\text{ V}, I_E = 0, T_A = 150\text{ }^\circ\text{C}$	I_{CBO}	-	-	10	μA
Emitter cutoff current $V_{EB} = 3\text{ V}, I_C = 0$	I_{EBO}	-	-	10	nA
DC current gain 1) $I_C = 100\text{ }\mu\text{A}, V_{CE} = 10\text{ V}$ $I_C = 1\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}, V_{CE} = 10\text{ V}$	h_{FE}	75 100 100 100 50	- - - - -	- - - 300 -	-
Collector-emitter saturation voltage 1) $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$	V_{CEsat}	- -	- -	0.4 1.6	V
Base-emitter saturation voltage 1) $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$	V_{BEsat}	- -	- -	1.3 2.6	

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 1) Pulse test: $t \leq 300\mu\text{s}$, $D = 2\%$

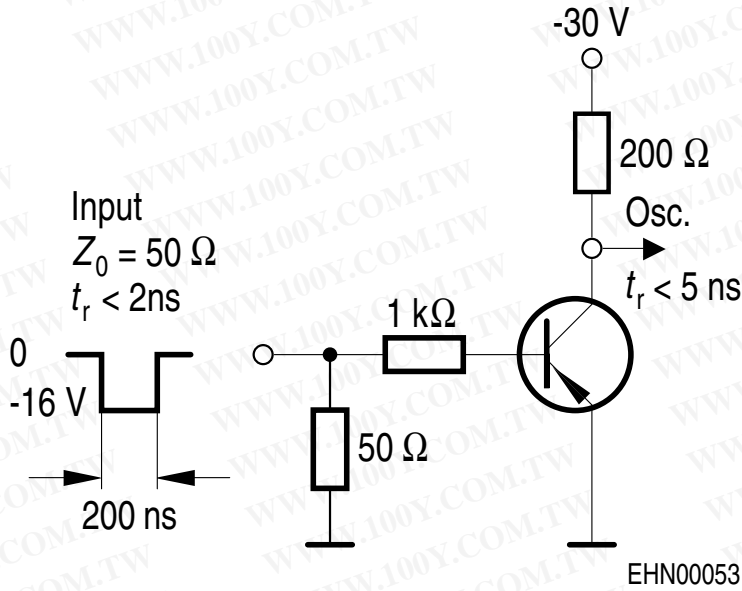
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency $I_C = 20\text{ mA}, V_{CE} = 20\text{ V}, f = 100\text{ MHz}$	f_T	200	-	-	MHz
Collector-base capacitance $V_{CB} = 10\text{ V}, f = 1\text{ MHz}$	C_{cb}	-	-	8	pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}, f = 1\text{ MHz}$	C_{eb}	-	-	30	
Delay time $V_{CC} = 30\text{ V}, I_C = 150\text{ mA}, I_{B1} = 15\text{ mA}, V_{BE(off)} = 0.5\text{ V}$	t_d	-	-	10	ns
Rise time $V_{CC} = 30\text{ V}, I_C = 150\text{ mA}, I_{B1} = 15\text{ mA}, V_{BE(off)} = 0.5\text{ V}$	t_r	-	-	40	
Storage time $V_{CC} = 30\text{ V}, I_C = 150\text{ mA}, I_{B1} = I_{B2} = 15\text{ mA}$	t_{stg}	-	-	80	
Fall time $V_{CC} = 30\text{ V}, I_C = 150\text{ mA}, I_{B1} = I_{B2} = 15\text{ mA}$	t_f	-	-	30	

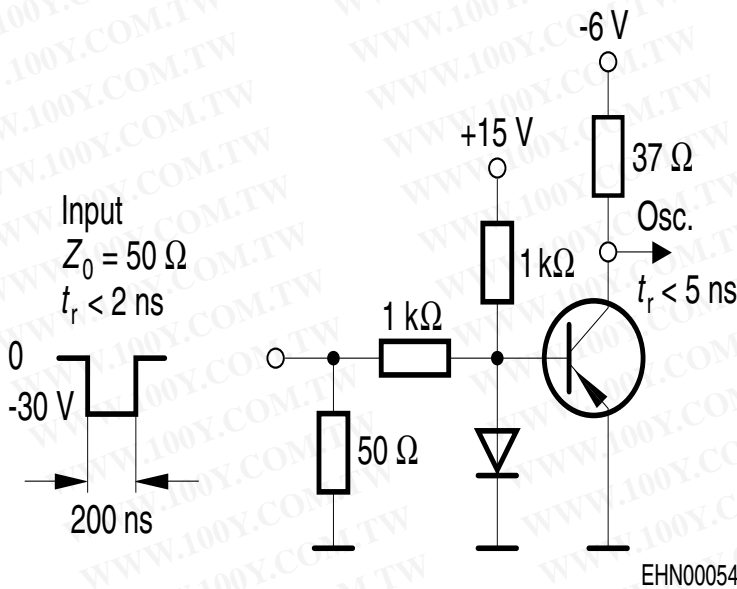
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Test circuits

Delay and rise time



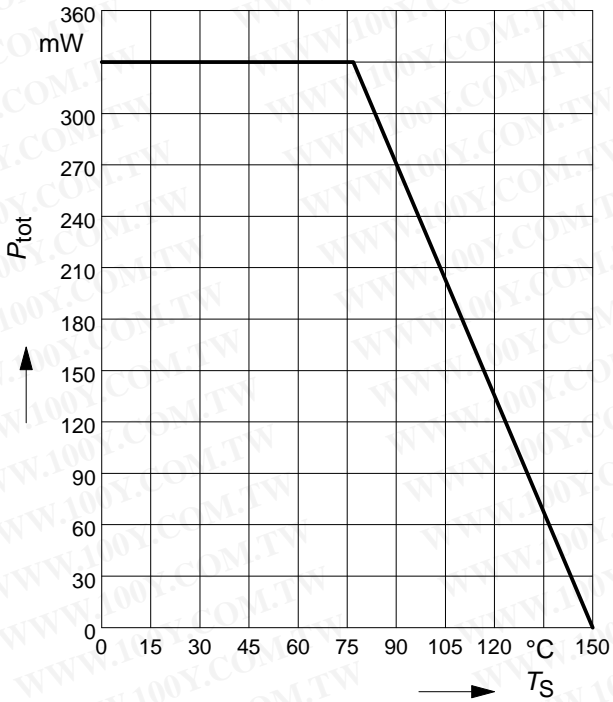
Storage and fall time



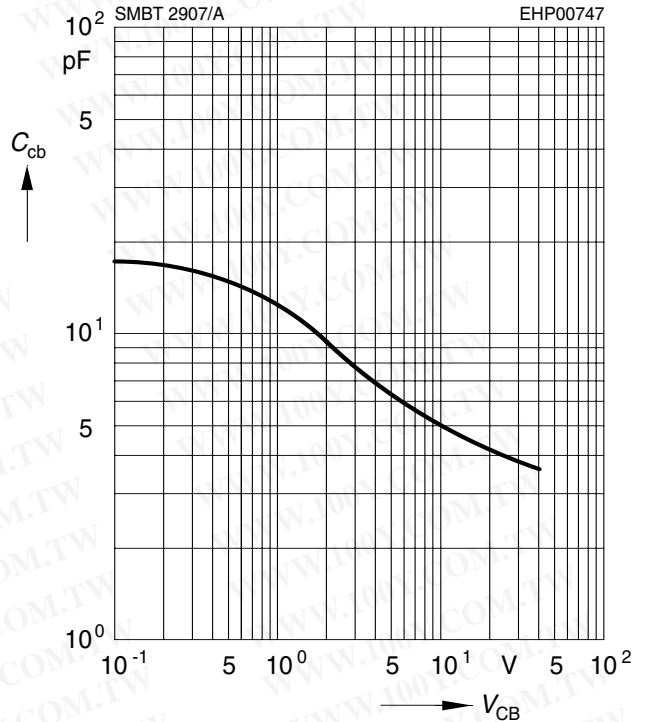
Oscilloscope: $R > 100\Omega$, $C < 12\text{pF}$, $t_r < 5\text{ns}$

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Total power dissipation $P_{tot} = f(T_S)$

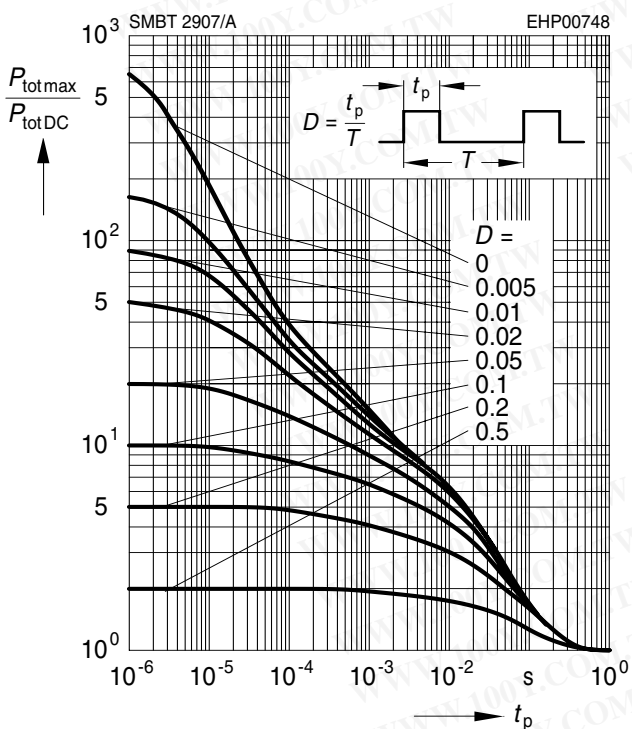


**Collector-base capacitance $C_{CB} = f(V_{CB})$
 $f = 1\text{MHz}$**



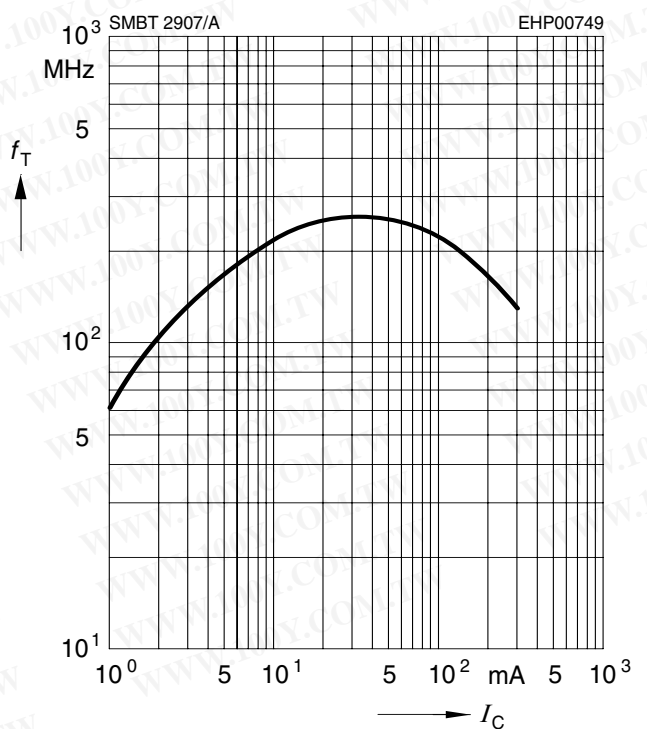
Permissible pulse load

$P_{totmax} / P_{totDC} = f(t_p)$



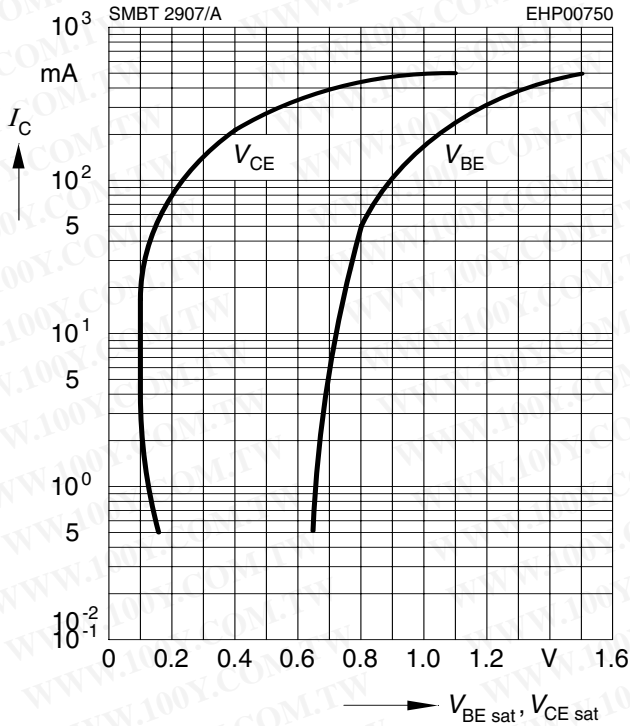
Transition frequency $f_T = f(I_C)$

$V_{CE} = 5V$



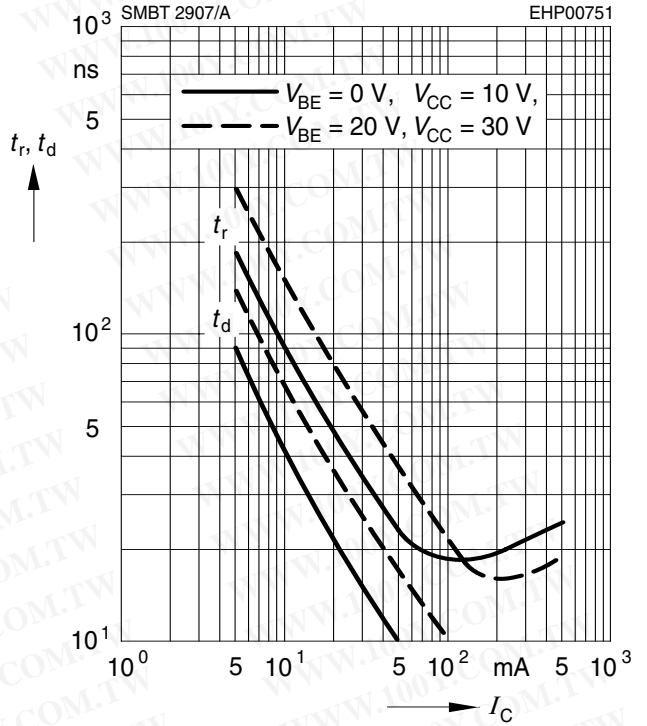
Saturation voltage $I_C = f(V_{BEsat}, V_{CEsat})$

$h_{FE} = 10$



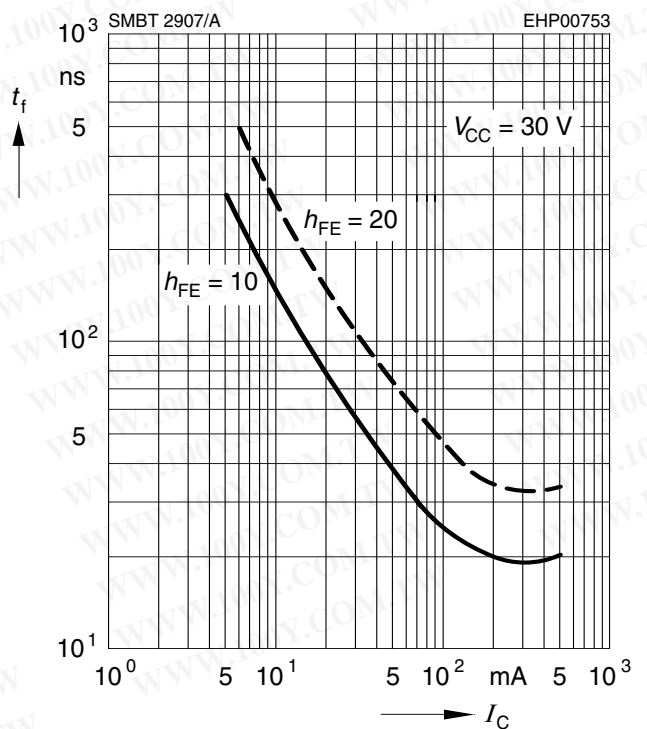
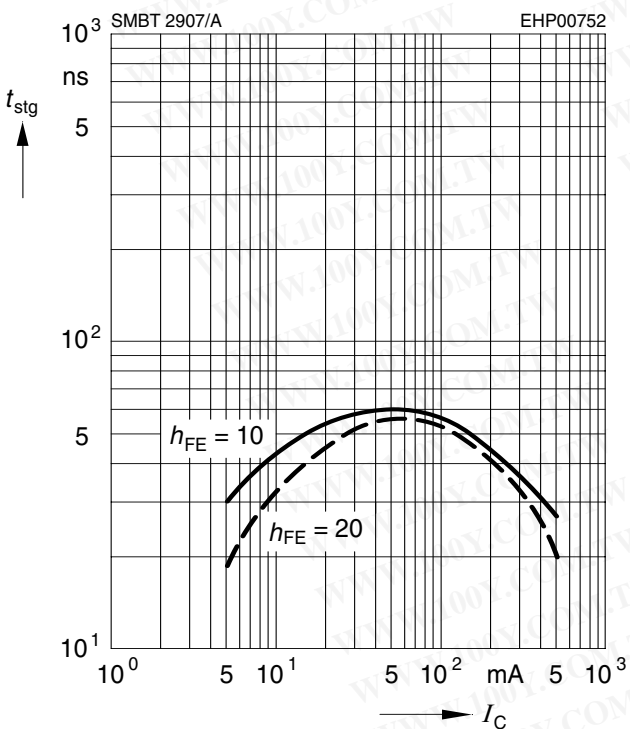
Delay time $t_d = f(I_C)$

Rise time $t_r = f(I_C)$



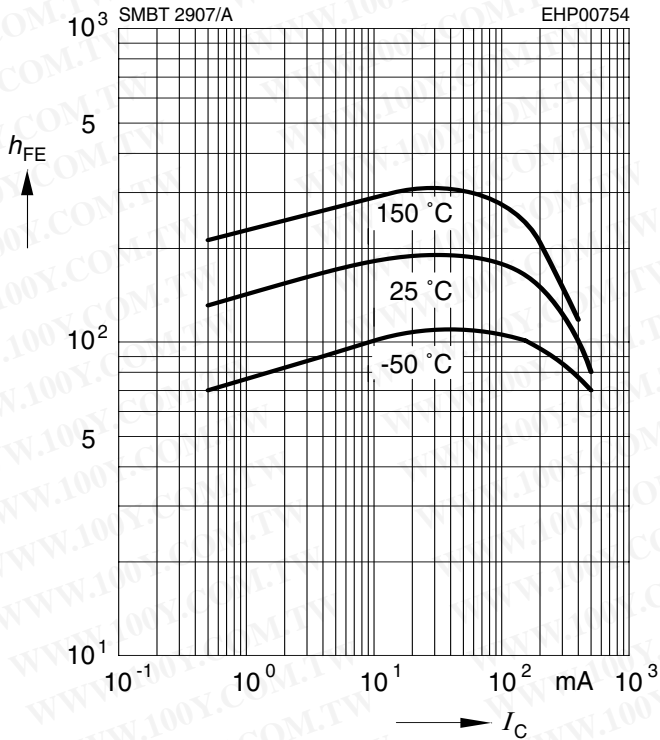
Storage time $t_{stg} = f(I_C)$

Fall time $t_f = f(I_C)$



DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$



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