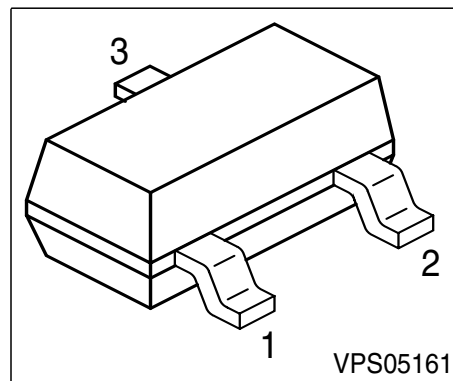


NPN Silicon Darlington Transistors

- High DC current gain
- High collector current
- Low collector-emitter saturation voltage



Type	Marking	Pin Configuration			Package
SMBTA13/ MMBTA13	s1M	1 = B	2 = E	3 = C	SOT23
SMBTA14/ MMBTA14	s1N	1 = B	2 = E	3 = C	SOT23

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CES}	30	V
Collector-base voltage	V_{CBO}	30	
Emitter-base voltage	V_{EBO}	10	
DC collector current	I_C	300	mA
Peak collector current	I_{CM}	500	mA
Base current	I_B	100	
Peak base current	I_{BM}	200	
Total power dissipation, $T_S = 81\text{ °C}$	P_{tot}	330	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Junction - soldering point ¹⁾	R_{thJS}	≤210	K/W
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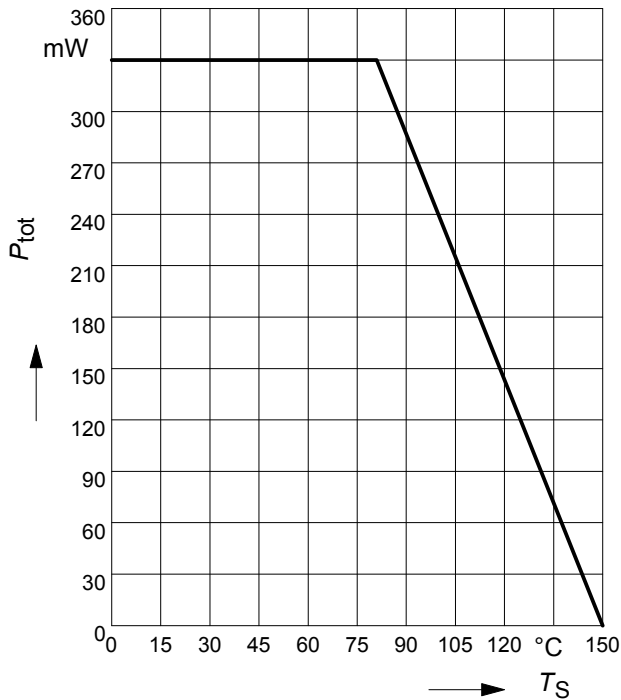
¹⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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

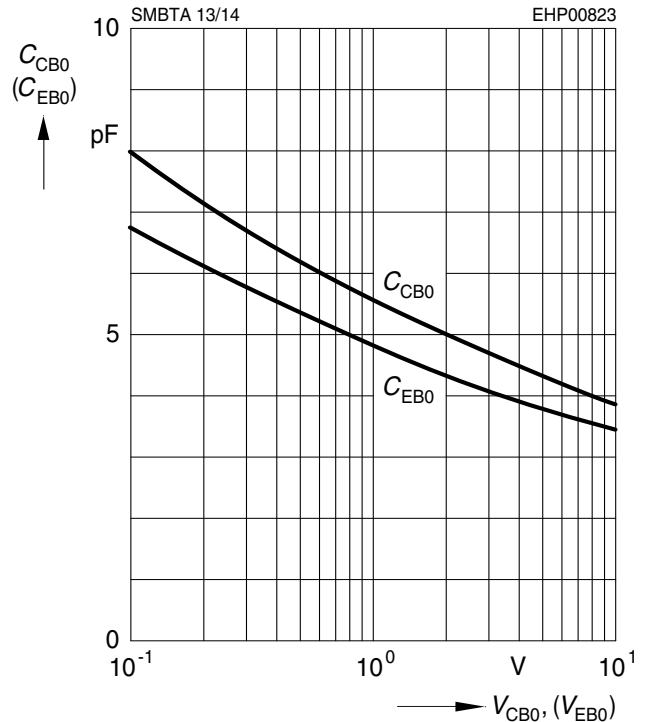
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 10\ \mu\text{A}$, $V_{BE} = 0$	$V_{(BR)CES}$	30	-	-	V
Collector-base breakdown voltage $I_C = 10\ \mu\text{A}$, $I_E = 0$	$V_{(BR)CBO}$	30	-	-	
Emitter-base breakdown voltage $I_E = 10\ \mu\text{A}$, $I_C = 0$	$V_{(BR)EBO}$	10	-	-	
Collector cutoff current $V_{CB} = 30\ \text{V}$, $I_E = 0$	I_{CBO}	-	-	100	nA
Collector cutoff current $V_{CB} = 30\ \text{V}$, $I_E = 0$, $T_A = 150\ ^\circ\text{C}$	I_{CBO}	-	-	10	μA
Emitter cutoff current $V_{EB} = 10\ \text{V}$, $I_C = 0$	I_{EBO}	-	-	100	nA
DC current gain 1) $I_C = 10\ \text{mA}$, $V_{CE} = 5\ \text{V}$ SMBTA13 SMBTA14 $I_C = 100\ \text{mA}$, $V_{CE} = 5\ \text{V}$ SMBTA13 SMBTA14	h_{FE}	5000 10000 10000 20000	- - - -	- - - -	-
Collector-emitter saturation voltage1) $I_C = 100\ \text{mA}$, $I_B = 0.1\ \text{mA}$	V_{CEsat}	-	-	1.5	
Base-emitter saturation voltage 1) $I_C = 100\ \text{mA}$, $I_B = 0.1\ \text{mA}$	V_{BEsat}	-	-	2	
AC Characteristics					
Transition frequency $I_C = 50\ \text{mA}$, $V_{CE} = 5\ \text{V}$, $f = 20\ \text{MHz}$	f_T	125	-	-	MHz

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

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

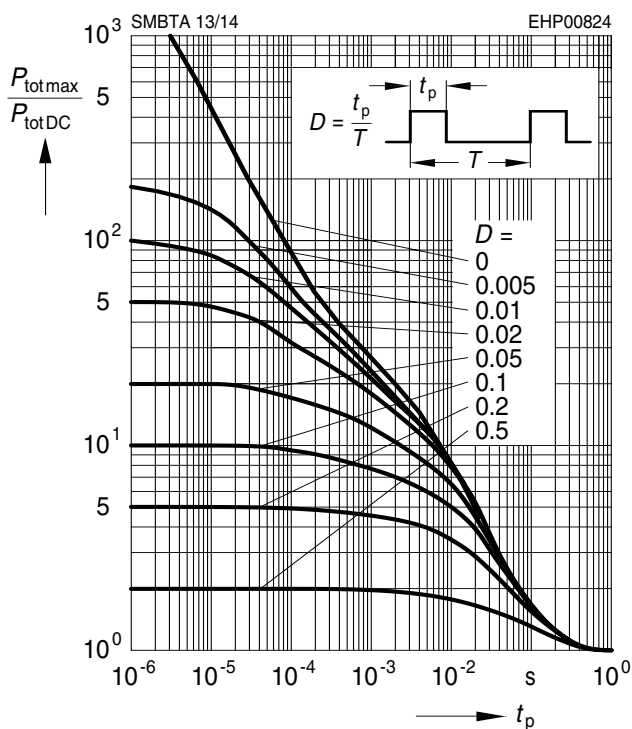


Collector-base capacitance $C_{\text{CB}} = f(V_{\text{CB0}})$
Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EB0}})$



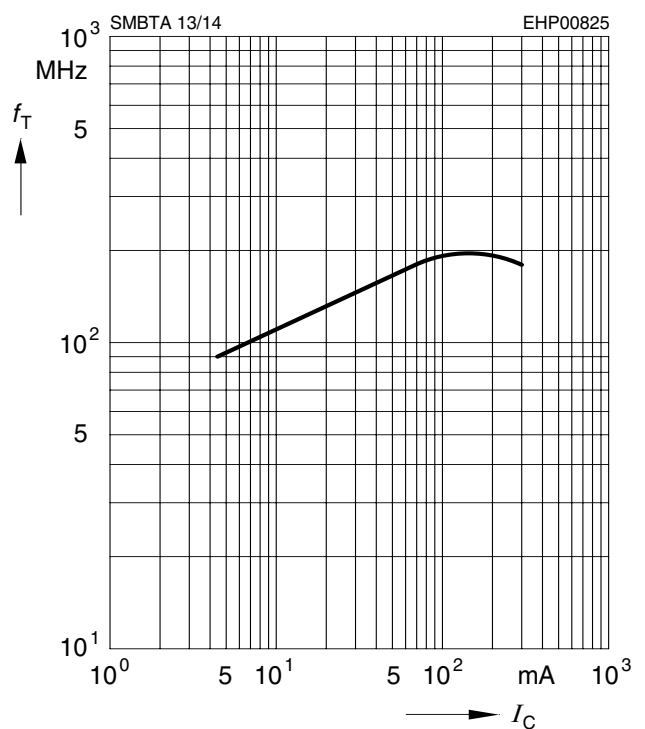
Permissible pulse load

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



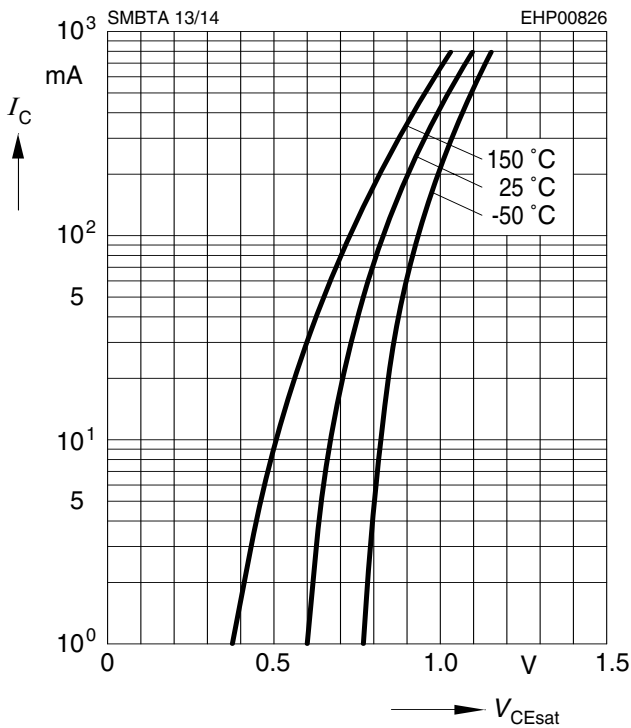
Transition frequency $f_T = f(I_C)$

$$V_{\text{CE}} = 5\text{V}, f = 20\text{MHz}$$

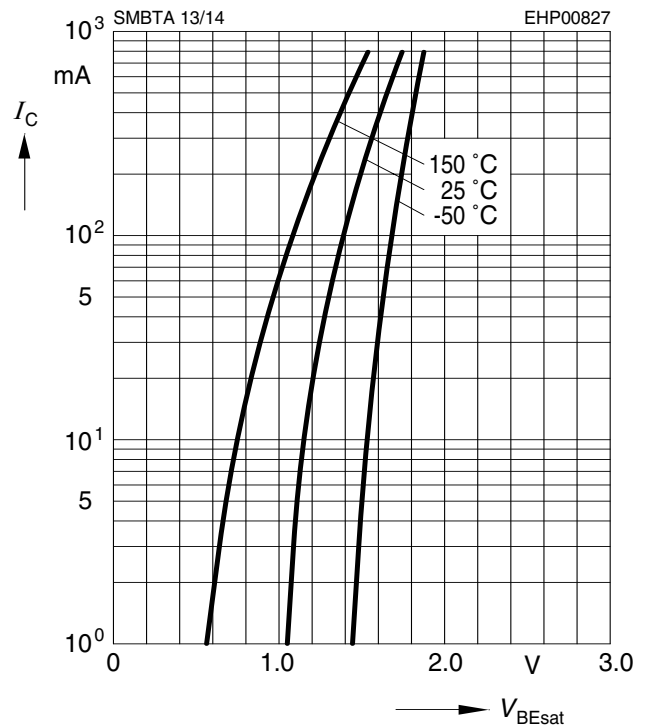


Collector-emitter saturation voltage

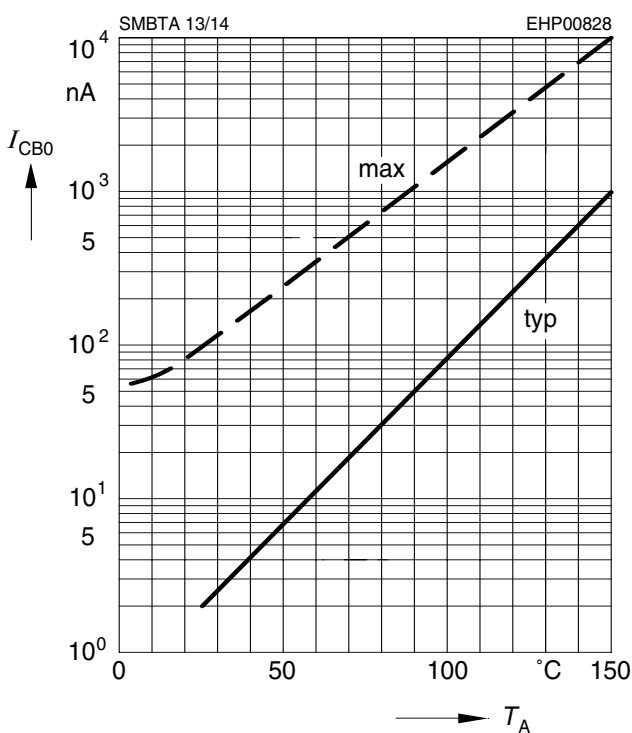
$$I_C = f(V_{CEsat}), h_{FE} = 1000$$


Base-emitter saturation voltage

$$I_C = f(V_{BEsat}), h_{FE} = 1000$$


Collector cutoff current $I_{CBO} = f(T_A)$

$$V_{CB} = 30V$$


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

$$V_{CE} = 5V$$

