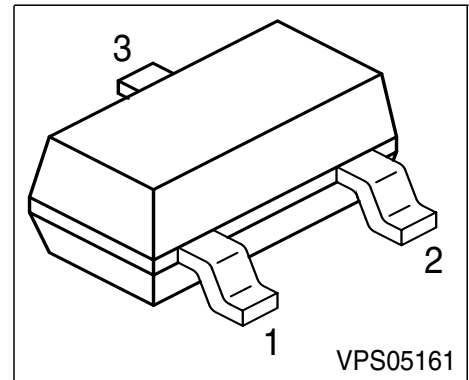


**NPN Silicon Darlington Transistors**

- 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 <sup>1)</sup>	$R_{thJS}$	≤210	K/W
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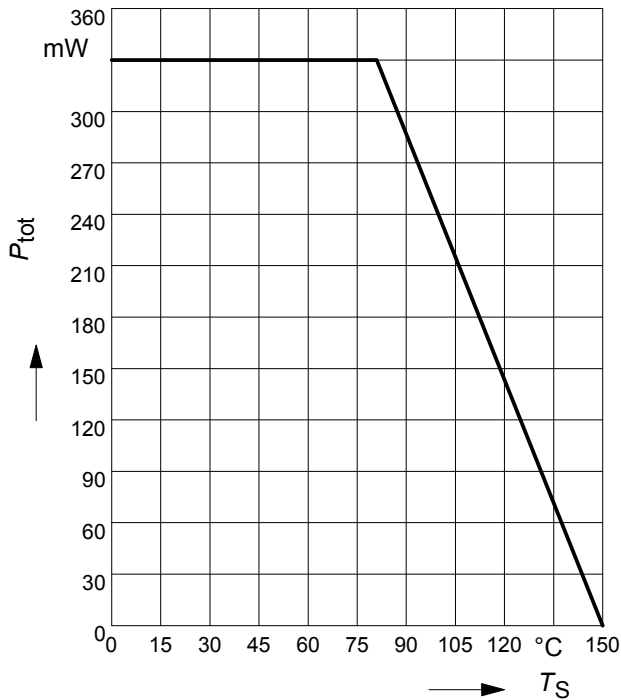
<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

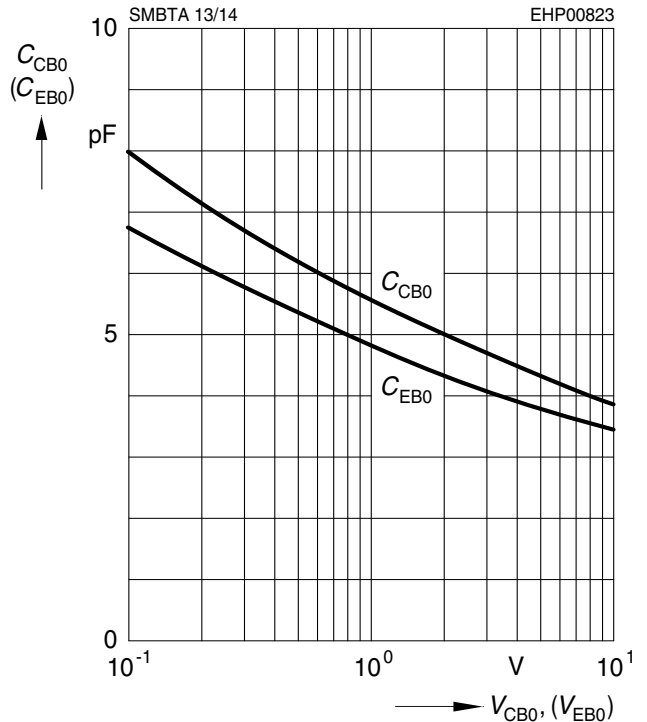
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 10\ \mu\text{A}$ , $V_{BE} = 0$	$V_{(BR)CES}$	30	-	-	V
Collector-base breakdown voltage $I_C = 10\ \mu\text{A}$ , $I_E = 0$	$V_{(BR)CBO}$	30	-	-	
Emitter-base breakdown voltage $I_E = 10\ \mu\text{A}$ , $I_C = 0$	$V_{(BR)EBO}$	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	$\mu\text{A}$
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**  $P_{\text{tot}} = f(T_S)$

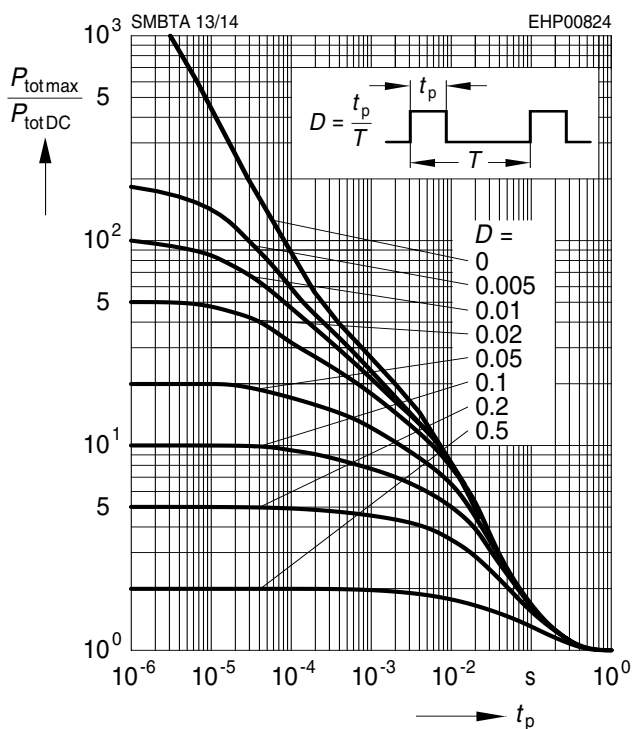


**Collector-base capacitance**  $C_{\text{CB}} = f(V_{\text{CB0}})$   
**Emitter-base capacitance**  $C_{\text{EB}} = f(V_{\text{EB0}})$



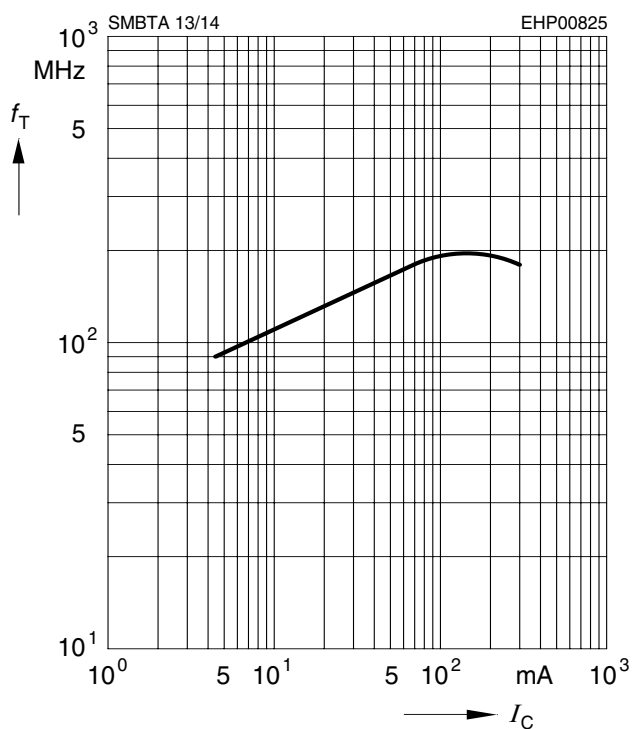
**Permissible pulse load**

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



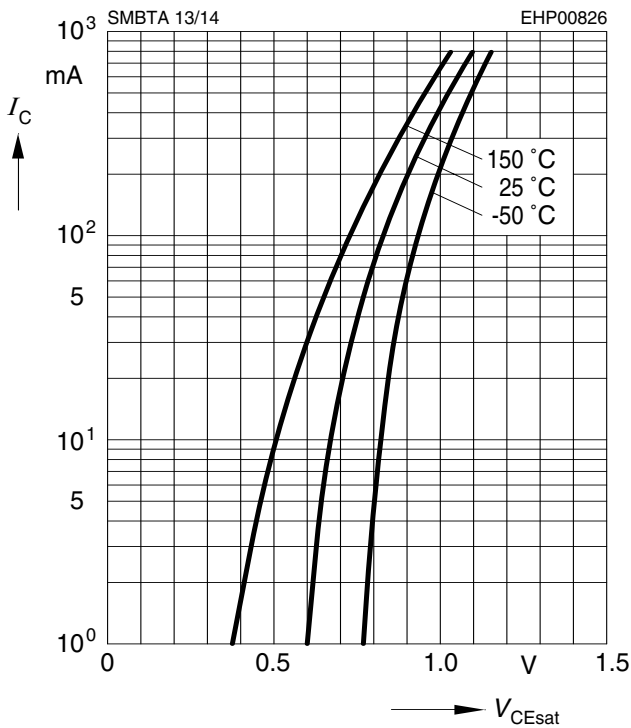
**Transition frequency**  $f_T = f(I_C)$

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

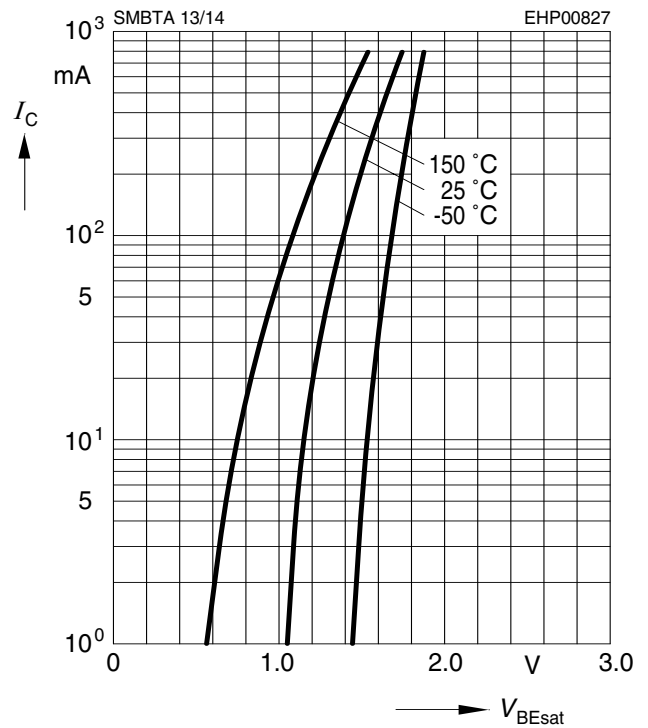


**Collector-emitter saturation voltage**

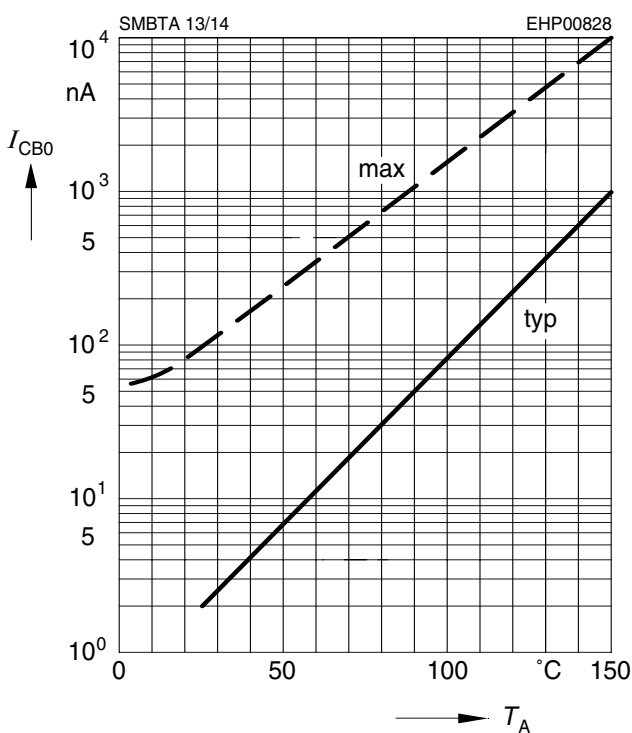
$$I_C = f(V_{CEsat}), h_{FE} = 1000$$


**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  $h_{FE} = f(I_C)$** 

$$V_{CE} = 5V$$

