

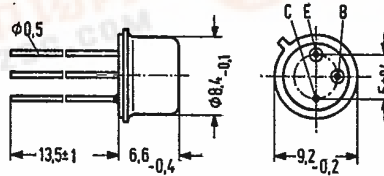
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T-29-23

**NPN Silicon Transistors SIEMENS AKTIENGESELLSCHAFT 3C 140 BC 141**

BC 140 and BC 141 are epitaxial NPN silicon transistors in TO 39 case (5 C 3 DIN 41 873). The collector is electrically connected to the case. The transistors are intended for use in AF amplifiers and as complementary transistors to BC 160 and BC 161, as well as for AF switching applications up to 1 A. The transistors BC 140 and BC 141 are available upon request as matched pairs.

Type	Ordering code
BC 140 <sup>1)</sup>	Q60203-X140
BC 140-6	Q60203-X140-V6
BC 140-10	Q60203-X140-V10
BC 140-16	Q60203-X140-V16
BC 140 paired	Q60203-X140-P
BC 140/BC 160 paired	Q62702-C228-S2
BC 141 <sup>1)</sup>	Q62702-C719
BC 141-6	Q62702-C234
BC 141-10	Q62702-C235
BC 141-16	Q62702-C236
BC 141 paired	Q62702-C209
BC 141/BC 161 paired	Q62702-C230-S2



Approx. weight 1.5 g Dimensions in mm

Maximum ratings		BC 140	BC 141	
Collector-base voltage	$V_{CBO}$	80	100	V
Collector-emitter voltage	$V_{CEO}$	40	60	V
Emitter-base voltage	$V_{EBO}$	7	7	V
Collector current	$I_C$	1	1	A
Base current	$I_B$	0.1	0.1	A
Junction temperature	$T_j$	175	175	°C
Storage temperature range	$T_{stg}$	-55 to +175	-55 to +175	°C
Total power dissipation	$P_{tot}$	3.7	3.7	W

Thermal resistance		BC 140	BC 141	
Junction to ambient air	$R_{thJA}$	$\leq 200$	$\leq 200$	K/W
Junction to case	$R_{thJC}$	$\leq 35$	$\leq 35$	K/W

**Static characteristics ( $T_{amb} = 25^\circ\text{C}$ )**

The transistors BC 140 and BC 141 are grouped at  $I_C = 100$  mA and  $V_{CE} = 1$  V according to the DC current gain  $h_{FE}$  and are marked by numerals of the DIN standard series. For the operating points quoted below, the following values apply:

Type	BC 140, BC 141			
$h_{FE}$ -group	6	10	16	
$I_C$ mA	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$h_{FE}$ $I_C/I_B$	$V_{BE}$ V
0.1	28	40	90	-
100	63 (40 to 100)	100 (63 to 160)	160 (100 to 250)	-
1000	15	20	30	1.2 (<1.8)

1) If the order does not include any exact indication of the current amplification group desired, a transistor of a current amplification group just available from stock will be delivered.

150

1580

A-07



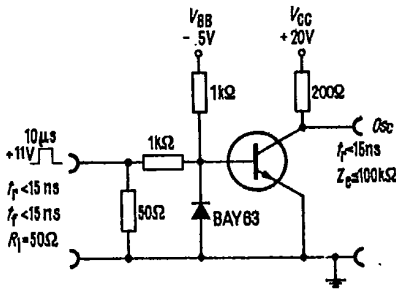
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Static characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )		BC 140	BC 141	
Collector cutoff current ( $V_{CES} = 60\text{ V}$ )	$I_{CES}$	10 (<100)	10 (<100)	nA
Collector cutoff current ( $V_{CES} = 60\text{ V}; T_{amb} = 150^{\circ}\text{C}$ )	$I_{CES}$	10 (<100)	10 (<100)	$\mu\text{A}$
Collector-emitter breakdown voltage ( $I_{CEO} = 30\text{ mA}$ ; pulse width = 200 $\mu\text{sec}$ ; duty cycle 1%)	$V_{(BR)CEO}$	>40	>60	V
Collector-emitter breakdown voltage ( $I_{CES} = 100\text{ }\mu\text{A}$ )	$V_{(BR)CES}$	>80	>100	V
Emitter-base breakdown voltage ( $I_{EBO} = 100\text{ }\mu\text{A}$ )	$V_{(BR)EBO}$	>7	>7	V
Collector emitter saturation voltage ( $I_C = 0.5\text{ A}; I_B = 25\text{ mA}$ )	$V_{CEsat}^{1)}$	0.6 (<1.0)	0.6 (<1.0)	V
Conditions for matching pairs: ( $I_C = 100\text{ mA}; V_{CE} = 1\text{ V}$ )	$\frac{h_{FE1}}{h_{FE2}}$	$\leq 1.25$	$\leq 1.25$	

**Dynamic characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )**

Transition frequency ( $I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}; f = 20\text{ MHz}$ )	$f_T$	>50	>50	MHz
Collector-base capacitance ( $V_{CB} = 10\text{ V}; f = 1\text{ MHz}$ )	$C_{CBO}$	<25	<25	pF
Emitter-base capacitance ( $V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$ )	$C_{EBO}$	<80	<80	pF

**Test circuit**



**Switching times for transistors**

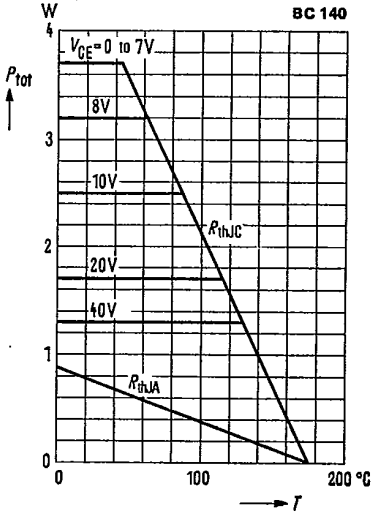
BC 140, BC 141:

( $I_C = 100\text{ mA}; I_{B1} \text{ approx. } -I_{B2} \text{ approx. } 5\text{ mA}$ )

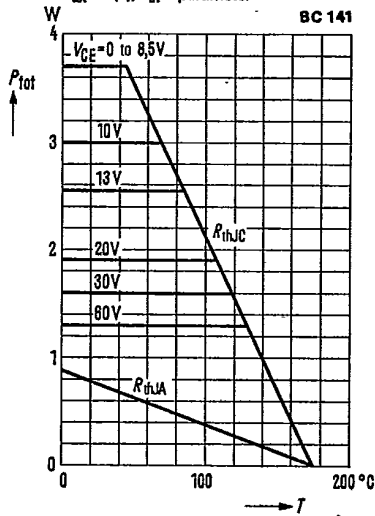
$t_{on}$	<250	ns
$t_{off}$	<850	ns

1) The transistor is overloaded to such an extent that the DC current gain decreases to  $h_{FE} = 20$ .

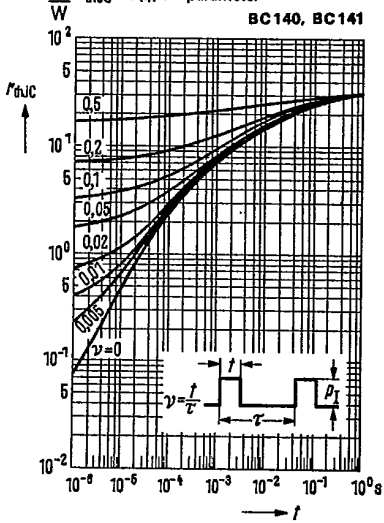
**Total perm. power dissipation versus temperature**  
 $P_{tot} = f(T), R_{th} = \text{parameter}$



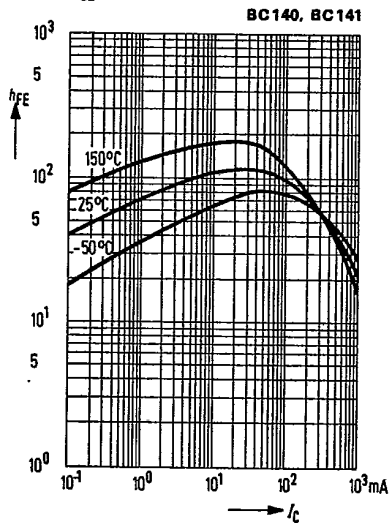
**Total perm. power dissipation versus temperature**  
 $P_{tot} = f(T), R_{th} = \text{parameter}$



**Permissible pulse load**  
 $r_{thJC} = f(t); v = \text{parameter}$

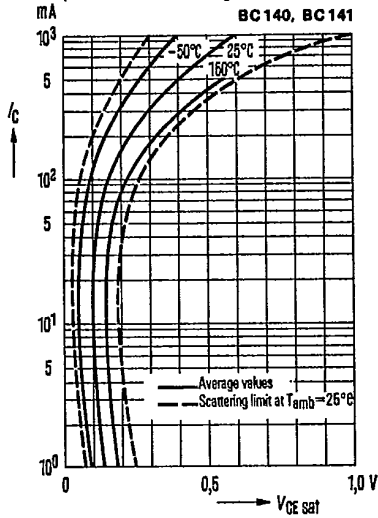


**Transition frequency  $f_T = f(I_C)$**   
 $V_{CE} = 10V$



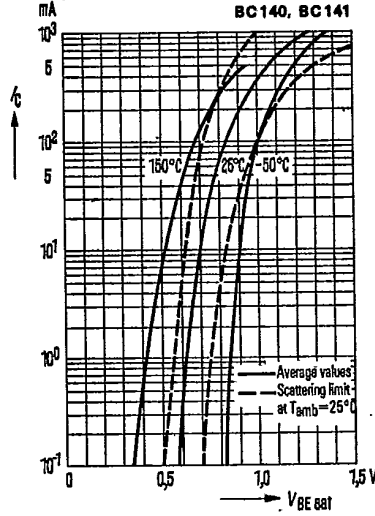
**Collector-emitter saturation voltage**

$V_{CE sat} = f(I_C)$   
 $h_{FE} = 10; T_{amb} = \text{parameter}$   
(common emitter configuration)



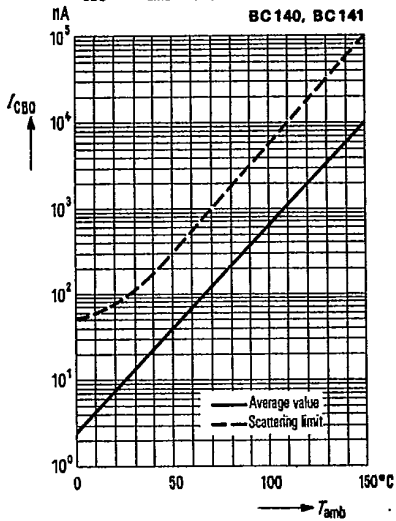
**Base-emitter saturation voltage**

$V_{BE sat} = f(I_C)$   
 $h_{FE} = 10; T_{amb} = \text{parameter}$   
(common emitter configuration)



**Collector cutoff current versus temperature**

$I_{CBO} = f(T_{amb}; V_{CBO} = 60V)$



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

( $V_{CE} = 10V$ )

