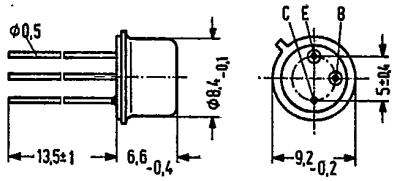
NPN Silicon Transistors SIEMENS AKTIENGESELLSCHAF BC 140 BC 141

BC 140 and BC 141 are epitaxial NPN silicon transistors in TO 39 case (5 C 3 DIN 41873). 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[1)]	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[1)]	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				
Junction to ambient air	R_{thJA}	≤200	≤200	K/W
Junction to case	R_{thJC}	≤35	≤35	K/W

Static characteristics (T_{amb} = 25 °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.

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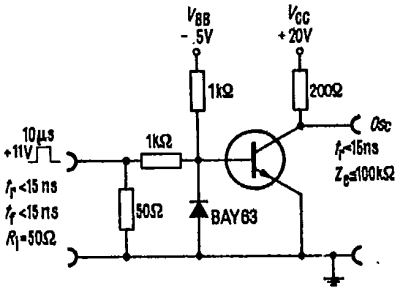
Static characteristics (T_{amb} = 25 °C)		BC 140	BC 141	
Collector cutoff current (V_{CES} = 60 V)	I_{CES}	10 (<100)	10 (<100)	nA
Collector cutoff current (V_{CES} = 60 V; T_{amb} = 150 °C)	I_{CES}	10 (<100)	10 (<100)	µA
Collector-emitter breakdown voltage (I_{CEO} = 30 mA; pulse width = 200 µsec: duty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

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

Test circuit

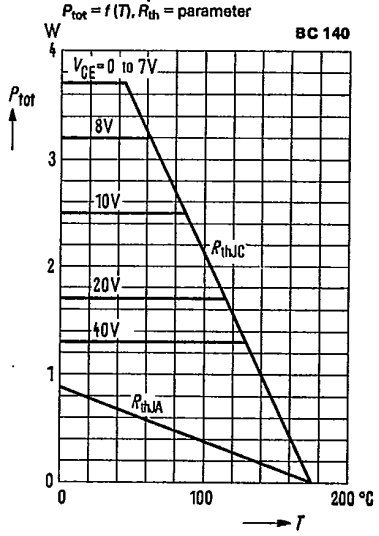


Switching times for transistors BC 140, BC 141:
(I_C = 100 mA; I_{B1} approx. $-I_{B2}$ approx. 5 mA)

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} = parameter



Total perm. power dissipation versus temperature
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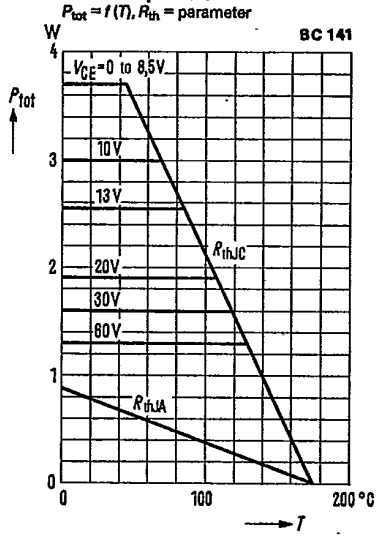
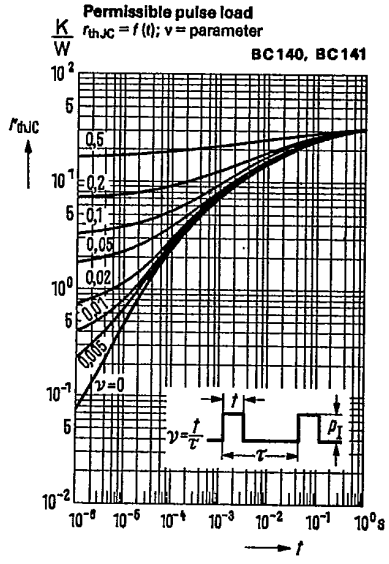
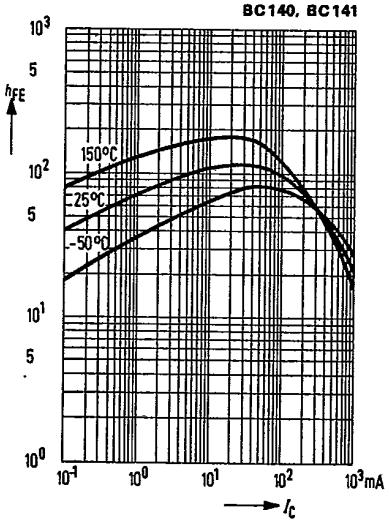


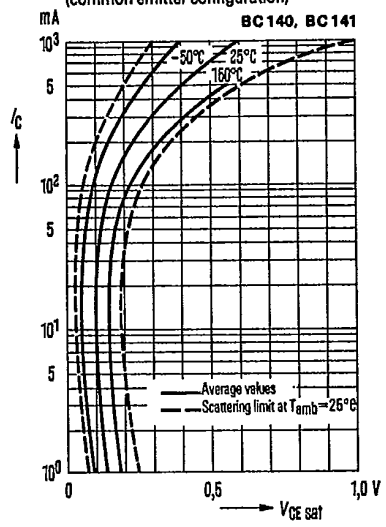
Permissible pulse load
$r_{thJC} = f(t)$; ν = parameter
BC140, BC141



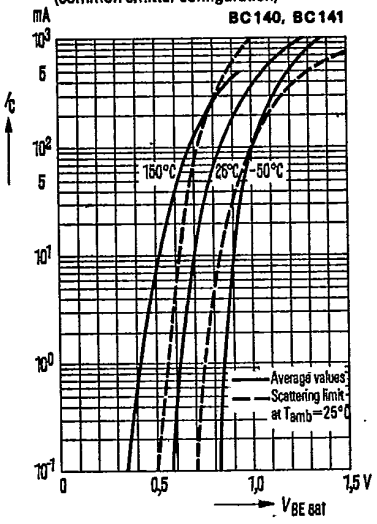
Transition frequency $f_T = f(I_C)$
V_{CE} = 10 V
BC140, BC141



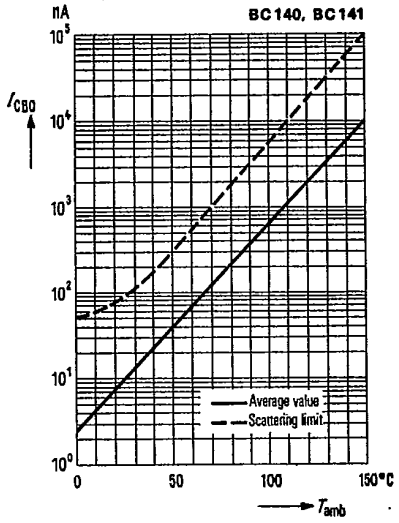
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$
$h_{FE} = 10$; T_{amb} = parameter
(common emitter configuration)



Base-emitter saturation voltage
$V_{BEsat} = f(I_C)$
$h_{FE} = 10$; T_{amb} = parameter
(common emitter configuration)



Collector cutoff current versus temperature
$I_{CBO} = f(T_{amb})$; V_{CBO} = 60 V



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