NPN Silicon Planar Transistors

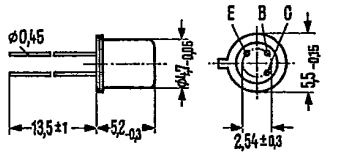
BCY 58
BCY 59
BCY 65 E

25C 04306 D

BCY 58, BCY 59, and BCY 65 E are epitaxial NPN silicon planar transistors in TO 18 cases (18 A 3 DIN 41876). The collector is electrically connected to the case. The transistors are particularly suitable for AF input and driver stages as well as for switching applications.

SIEMENS AKTIENGESELLSCHAF

Type	Ordering code
BCY 58	Q60203-Y58
BCY 58 VII	Q60203-Y58-G
BCY 58 VIII	Q60203-Y58-H
BCY 58 IX	Q60203-Y58-J
BCY 58 X	Q60203-Y58-K
BCY 59	Q60203-Y59
BCY 59 VII	Q60203-Y59-G
BCY 59 VIII	Q60203-Y59-H
BCY 59 IX	Q60203-Y59-J
BCY 59 X	Q60203-Y59-K
BCY 65 E	Q60203-Y65-S2
BCY 65 E VII	Q60203-Y65-E7
BCY 65 E VIII	Q60203-Y65-E8
BCY 65 E IX	Q60203-Y65-E9



Approx. weight 0.3 g Dimensions in mm

Maximum ratings		BCY 58	BCY 59	BCY 65 E	
Collector-emitter voltage	V_{CES}	32	45	60	V
Collector-emitter voltage	V_{CEO}	32	45	60	V
Emitter-base voltage	V_{EBO}	7	7	7	V
Collector current	I_C	200	200	100	mA
Base current	I_B	50	50	50	mA
Junction temperature	T_j	200	200	200	°C
Storage temperature range	T_{stg}	−65 to +200			°C
Total power dissipation ($T_{case} \leqq 45$ °C)	P_{tot}	1	1	1	W

Thermal resistance					
Junction to ambient air	R_{thJA}	≦450	≦450	≦450	K/W
Junction to case	R_{thJC}	≦150	≦150	≦150	K/W

Static characteristics (T_{amb} = 25 °C)

The transistors are grouped according to the DC current gain h_{FE} and marked by Roman numerals.

BCY 58
BCY 59
BCY 65E

T-29-23

Static characteristics (T_{amb} = 25°C)

Type		BCY 65 E	BCY 65 E	BCY 65 E	–	BCY 58
		BCY 58/59	BCY 58/59	BCY 58/59	BCY 58/59	BCY 59
h_{FE} group		VII	VIII	IX	X	BCY 65E
V_{CE} V	I_C mA	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	V_{BE} V
5	0.01	78	145 (>20)	220 (>40)	300 (>100)	0.5
5	2	170 (120 to 220)	250 (180 to 310)	350 (250 to 460)	500 (380 to 630)	0.62 (0.55 to 0.7)*
1	10	190 (>80)	260 (120 to 400)	380 (160 to 630)	550 (240 to 1000)	0.7
1	50[1]	>40	>45	>60	–	0.76
1	100[2]	>40	>45	>60	>60	0.76

Saturation voltages:	V_{CEsat}	V_{BEsat}	
(I_C = 10 mA; I_B = 0.25 mA)	0.12 (<0.35)	0.7 (<0.85)	V
(I_C = 10 mA; I_B = 2.5 mA)[2]	0.3 (<0.7)	0.9 (<1.2)	V
(I_C = 50 mA; I_B = 1.25 mA)[1]	0.1 (<0.7)	0.9 (<1.2)	V

		BCY 58	BCY 59	BCY 65E	
Collector cutoff current (V_{CES} = 32 V)	I_{CES}	0.2 (<10)	–	–	nA*
(V_{CES} = 45 V)	I_{CES}	–	0.2 (<10)	–	nA*
(V_{CES} = 60 V)	I_{CES}	–	–	0.2 (<10)	nA*
Collector cutoff current (V_{CES} = 32 V, T_{amb} = 150°C)	I_{CES}	0.2 (<10)	–	–	µA
(V_{CES} = 45 V; T_{amb} = 150°C)	I_{CES}	–	0.2 (<10)	–	µA
(V_{CES} = 60 V; T_{amb} = 150°C)	I_{CES}	–	–	0.2 (<10)	µA
Collector cutoff current (V_{CE} = 32 V; V_{BE} = 0.2 V; T_{amb} = 100°C)	I_{CEX}	<20	–	–	µA
(V_{CE} = 45 V; V_{BE} = 0.2 V; T_{amb} = 100°C)	I_{CEX}	–	<20	–	µA
(V_{CE} = 60 V; V_{BE} = 0.2 V; T_{amb} = 100°C)	I_{CEX}	–	–	<20	µA
Emitter cutoff current (V_{EBO} = 5 V)	I_{EBO}	<10	<10	<10	nA*
Collector-emitter breakdown voltage (I_{CEO} = 2 mA)	$V_{(BR)CEO}$	>32	>45	>60	V*
Emitter-base breakdown voltage (I_{EBO} = 1 µA)	$V_{(BR)EBO}$	>7	>7	>7	V*

1) applies only to BCY 65 E
2) applies only to BCY 58, BCY 59
*) AQL = 0.65%

Dynamic characteristics (T_{amb} = 25 °C)		BCY 58	BCY 59	BCY 65 E	
Transition frequency (I_C = 10 mA; V_{CE} = 5 V; f = 100 MHz)	f_T	250 (>125)	250 (>125)	250 (>125)	MHz
Collector-base capacitance (V_{CBO} = 10 V; f = 1 MHz)	C_{CBO}	3.5 (<6)	3.5 (<6)	3.5 (<6)	pF
Emitter-base capacitance (V_{EBO} = 0.5 V; f = 1 MHz)	C_{EBO}	8 (<15)	8 (<15)	8 (<15)	pF
Noise figure (I_C = 0.2 mA; V_{CE} = 5 V; R_g = 2 kΩ; f = 1 kHz; Δf = 200 Hz)	NF	2 (<6)	2 (<6)	2 (<6)	dB

Four-pole characteristics (I_C = 2 mA; V_{CE} = 5 V; f = 1 kHz)

h_{FE} group	VII	VIII	IX	X	
h_{11e}	2.7 (1.6 to 4.5)	3.6 (2.5 to 6)	4.5 (3.2 to 8.5)	7.5 (4.5 to 12)	kΩ
h_{12e}	1.5	2	2	3	10^{-4}
h_{21e}	200	260	330	520	–
h_{22e}	18 (<30)	24 (<50)	30 (<60)	50 (<100)	µS

Switching times:
Operating point: BCY 58; BCY 59; BCY 65 E
I_C:I_{B1}:$-I_{B2}$ approx. 10:1:1 mA; R_1 = 5 kΩ; R_2 = 5 kΩ; V_{BB} = 3.6 V; R_L = 990 Ω

t_d	35	ns	t_s	400	ns
t_r	50	ns	t_f	80	ns
t_{on}	85 (<150)	ns	t_{off}	480 (<800)	ns

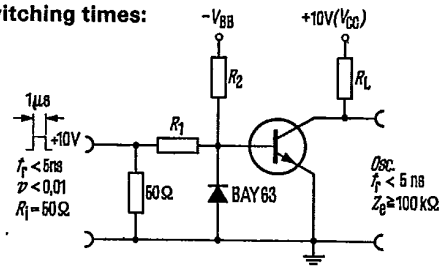
Switching times:
Operating point: BCY 58; BCY 59
I_C:I_{B1}:$-I_{B2}$ approx. 100:10:10 mA; R_1 = 500 Ω; R_2 = 700 Ω; V_{BB} = 5 V; R_L = 98 Ω

t_d	5	ns	t_s	250	ns
t_r	50	ns	t_f	200	ns
t_{on}	55 (<150)	ns	t_{off}	450 (<800)	ns

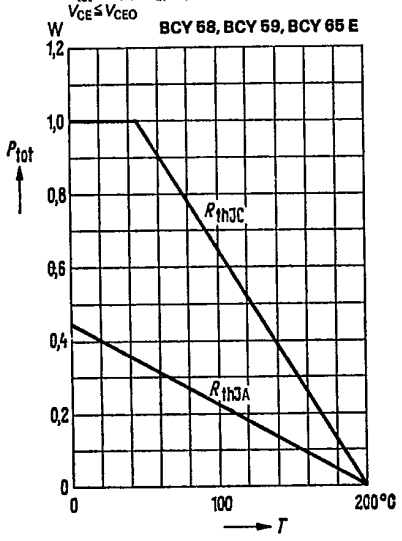
Switching times:
Operating point: BCY 65 E
I_C:I_{B1}:$-I_{B2}$ approx. 50:5:5 mA; R_1 = 1 kΩ; R_2 = 1.3 kΩ; V_{BB} = 4.7 V; R_L = 195 Ω

t_d	15	ns	t_s	300	ns
t_r	50	ns	t_f	150	ns
t_{on}	65 (<150)	ns	t_{off}	450 (<800)	ns

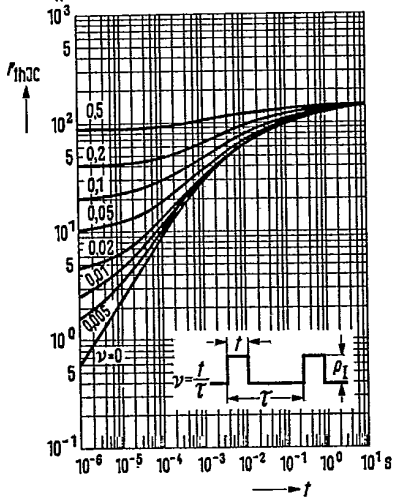
Test circuit for switching times:



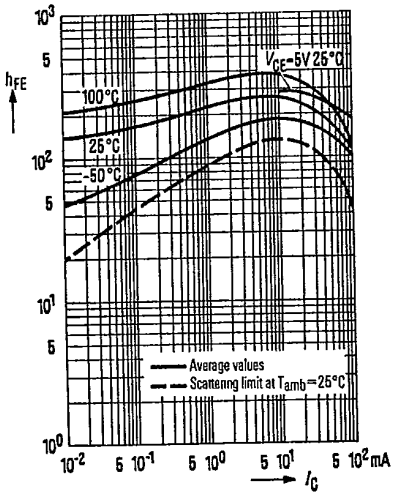
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter;
$V_{CE} \leq V_{CEO}$
BCY 58, BCY 59, BCY 65 E



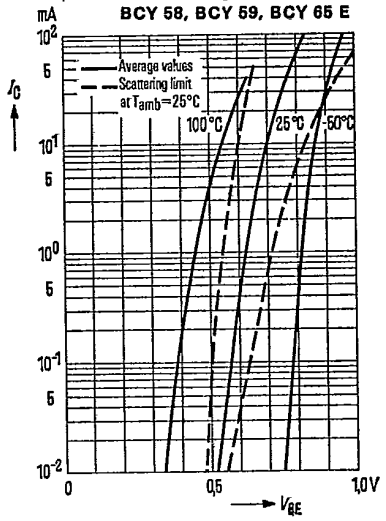
Permissible pulse load
$\frac{K}{W}$ $r_{thJC} = f(t)$; ν = parameter
BCY 58, BCY 59, BCY 65 E



DC current gain $h_{FE} = f(I_C)$
$V_{CE} = 1$ V; T_{amb} = parameter
(common emitter configuration)



Collector current $I_C = f(V_{BE})$
$V_{CE} = 1$ V
(common emitter configuration)
BCY 58, BCY 59, BCY 65 E



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