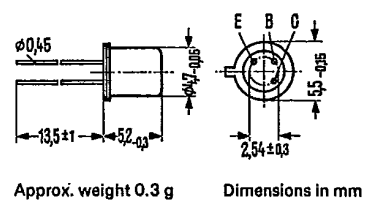


25C D ■ 8235605 0004306 3 ■ SIEG T-29-23  
**NPN Silicon Planar Transistors**  
 25C 04306 D **BCY 58**  
**BCY 59**  
**BCY 65 E**

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 AKTIENGESELLSCHAFT**

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



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 ( $T_{case} \leq 45^\circ C$ )	$P_{tot}$	1	1	1	W

Thermal resistance		BCY 58	BCY 59	BCY 65 E	
Junction to ambient air	$R_{thJA}$	$\leq 450$	$\leq 450$	$\leq 450$	K/W
Junction to case	$R_{thJC}$	$\leq 150$	$\leq 150$	$\leq 150$	K/W

**Static characteristics ( $T_{amb} = 25^\circ C$ )**  
 The transistors are grouped according to the DC current gain  $h_{FE}$  and marked by Roman numerals.

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

Type		BCY 65E	BCY 65E	BCY 65E	-	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 <sup>1)</sup>	>40	>45	>60	-	0.76
1	100 <sup>2)</sup>	>40	>45	>60	>60	0.76

Saturation voltages:

	$V_{CEsat}$	$V_{BEsat}$	
( $I_C = 10\text{ mA}$ ; $I_B = 0.25\text{ mA}$ )	0.12 (<0.35)	0.7 (<0.85)	V
( $I_C = 10\text{ mA}$ ; $I_B = 2.5\text{ mA}$ ) <sup>2)</sup>	0.3 (<0.7)	0.9 (<1.2)	V
( $I_C = 50\text{ mA}$ ; $I_B = 1.25\text{ mA}$ ) <sup>1)</sup>	0.1 (<0.7)	0.9 (<1.2)	V

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

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

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Dynamic characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )	BCY 58	BCY 59	BCY 65 E	
Transition frequency ( $I_C = 10\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $f = 100\text{ MHz}$ )	$f_T$	250 (>125)	250 (>125)	250 (>125) MHz
Collector-base capacitance ( $V_{CB0} = 10\text{ V}$ ; $f = 1\text{ MHz}$ )	$C_{CB0}$	3.5 (<6)	3.5 (<6)	3.5 (<6) pF
Emitter-base capacitance ( $V_{EB0} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$ )	$C_{EB0}$	8 (<15)	8 (<15)	8 (<15) pF
Noise figure ( $I_C = 0.2\text{ mA}$ ; $V_{CE} = 5\text{ V}$ ; $R_g = 2\text{ k}\Omega$ ; $f = 1\text{ kHz}$ ; $\Delta f = 200\text{ Hz}$ )	NF	2 (<6)	2 (<6)	2 (<6) dB

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

$h_{FE}$ 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)	k $\Omega$
$h_{12e}$	1.5	2	2	3	$10^{-4}$
$h_{21e}$	200	260	330	520	-
$h_{22e}$	18 (<30)	24 (<50)	30 (<60)	50 (<100)	$\mu\text{S}$

Switching times:

Operating point: BCY 58; BCY 59; BCY 65 E

$I_C: I_{B1}:-I_{B2}$  approx. 10:1:1 mA;  $R_1 = 5\text{ k}\Omega$ ;  $V_{BB} = 3.6\text{ V}$ ;  $R_L = 990\ \Omega$

$t_d$	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;  $R_1 = 500\ \Omega$ ;  $R_2 = 700\ \Omega$ ;  $V_{BB} = 5\text{ V}$ ;  $R_L = 98\ \Omega$

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

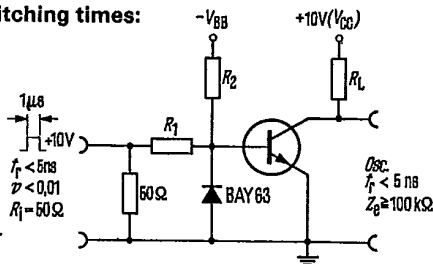
Switching times:

Operating point: BCY 65 E

$I_C: I_{B1}:-I_{B2}$  approx. 50:5:5 mA;  $R_1 = 1\text{ k}\Omega$ ;  $R_2 = 1.3\text{ k}\Omega$ ;  $V_{BB} = 4.7\text{ V}$ ;  $R_L = 195\ \Omega$

$t_d$	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:



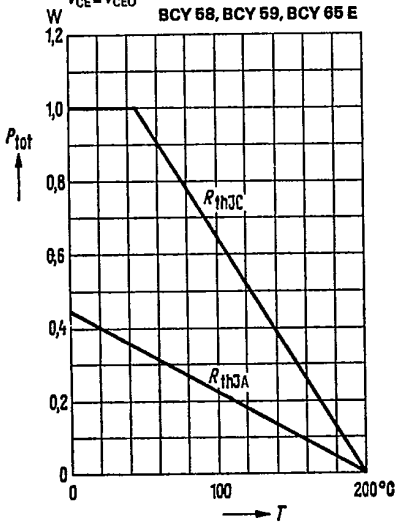
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BCY 58  
 BCY 59  
 BCY 65 E

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Total perm. power dissipation versus temperature

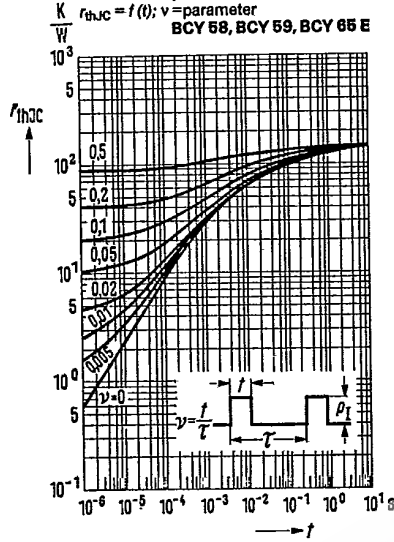
$P_{tot} = f(T)$ ;  $R_{th}$  = parameter;  
 $V_{CE} \leq V_{CEO}$



Permissible pulse load

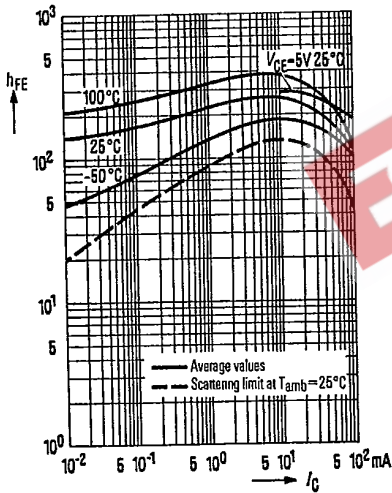
$r_{thJC} = f(t)$ ;  $v =$  parameter

BCY 58, BCY 59, BCY 65 E



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

$V_{CE} = 1V$ ;  $T_{amb}$  = parameter  
 (common emitter configuration)



Collector current  $I_C = f(V_{BE})$

$V_{CE} = 1V$

(common emitter configuration)

BCY 58, BCY 59, BCY 65 E

