

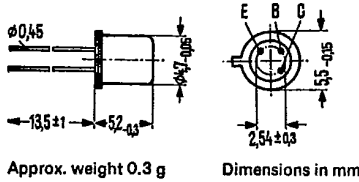
**NPN Transistors for Switching Applications**

**BSY 17  
BSY 18  
BSY 62  
BSY 63**

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BSY 17, BSY 18, BSY 62, and BSY 63 are double-diffused epitaxial NPN silicon planar RF transistors in TO 18 case (18 A 3 DIN 41876). Their collectors are electrically connected to their cases. Transistor BSY 17 corresponds to type 2 N 743, BSY 18 to 2 N 744, BSY 62, group A, to type 2 N 706 A, and BSY 63 to type 2 N 708. The transistors are especially suitable for high-speed logic gate applications.

Type	Ordering code
BSY 17	Q60218-Y17
BSY 18	Q60218-Y18
BSY 62 A	Q60218-Y62-A
BSY 62 B	Q60218-Y62-B
BSY 63	Q60218-Y63



**Maximum ratings**

	BSY 17 BSY 18	BSY 62	BSY 63	
Collector-emitter voltage	$V_{CE0}$ 12	15	15	V
Collector-base voltage	$V_{CBO}$ 20	25	40	V
Emitter-base voltage	$V_{EBO}$ 5	5	5	V
Collector current	$I_C$ 200	200	200	mA
Junction temperature	$T_j$ 200	200	200	°C
Storage temperature range	$T_{stg}$	-65 to +200		°C
Total power dissipation ( $T_{case} = 45^\circ\text{C}$ )	$P_{tot}$ 1	1	1	W

**Thermal resistance**

Junction to ambient air	$R_{thJA}$	≤ 500	≤ 500	≤ 500	K/W
Junction to case	$R_{thJC}$	≤ 150	≤ 150	≤ 150	K/W

**Static characteristics**

	BSY 17		°C	
	170	25		
Collector cutoff current ( $V_{CBO} = 20\text{ V}$ )	$I_{CBO}$	< 100	< 1*	μA
Collector-emitter breakdown voltage ( $I_{CEO} = 10\text{ mA}$ )	$V_{(BR)CEO}$	-	> 12	V
Emitter-base breakdown voltage ( $I_{EBO} = 10\text{ μA}$ )	$V_{(BR)EBO}$	-	> 5*	V
Collector-base breakdown voltage ( $I_{CBO} = 1\text{ μA}$ )	$V_{(BR)CBO}$	-	> 20	V

\* AQL = 0.66%

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**Static characteristics**

Collector cutoff current  
 ( $V_{CBO} = 20\text{ V}$ )  
 Collector-emitter breakdown voltage  
 ( $I_{CEO} = 10\text{ mA}$ )  
 Emitter-base breakdown voltage  
 ( $I_{EBO} = 10\text{ }\mu\text{A}$ )

BSY 18			
$T_{amb}$	170	25	$^{\circ}\text{C}$
$I_{CBO}$	<100	<1*	$\mu\text{A}$
$V_{(BR)CEO}$	-	>12	V
$V_{(BR)EBO}$	-	>5*	V

Collector cutoff current  
 ( $V_{CBO} = 15\text{ V}$ )  
 Collector-emitter breakdown voltage  
 ( $I_{CEO} = 10\text{ mA}$ )  
 Emitter-base breakdown voltage  
 ( $I_{EBO} = 10\text{ }\mu\text{A}$ )  
 Collector-base breakdown voltage  
 ( $I_{CBO} = 1\text{ }\mu\text{A}$ )

BSY 62			
$T_{amb}$	150	25	$^{\circ}\text{C}$
$I_{CBO}$	<30	<0.5*	$\mu\text{A}$
$V_{(BR)CEO}$	-	>15	V
$V_{(BR)EBO}$	-	>5*	V
$V_{(BR)CBO}$	-	>25	V

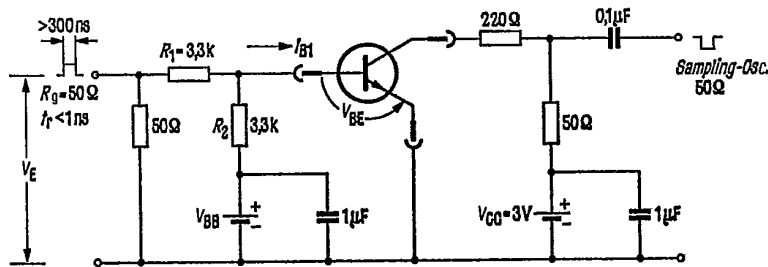
Collector cutoff current  
 ( $V_{CBO} = 20\text{ V}$ )  
 Collector cutoff current  
 ( $V_{CE} = 20\text{ V}; V_{BE} = 0.25\text{ V};$   
 $T_{amb} = 125^{\circ}\text{C}$ )  
 Collector-emitter breakdown voltage  
 ( $I_{CEO} = 10\text{ mA}$ )  
 Emitter-base breakdown voltage  
 ( $I_{EBO} = 10\text{ }\mu\text{A}$ )  
 Collector-base breakdown voltage  
 ( $I_{CBO} = 1\text{ }\mu\text{A}$ )

BSY 63			
$T_{amb}$	150	25	$^{\circ}\text{C}$
$I_{CBO}$	<15	0.003	$\mu\text{A}$
$I_{CEV}$	<10	( $<0.025$ )*	$\mu\text{A}$
$V_{(BR)CEO}$	-	>15	V
$V_{(BR)EBO}$	-	>5*	V
$V_{(BR)CBO}$	-	>40	V

\* AQL = 0.65%

**Test circuit for turn-on and turn-off time measurements**

Duty cycle <2%



BSY 17  
 BSY 18  
 BSY 62  
 BSY 63

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

BSY 17

$V_{CE}$ V	$I_B$ mA	$I_C$ mA	$h_{FE}$ $I_C/I_B$	$V_{BEsat}^{1)}$ V	$V_{CEsat}^{1)}$ V
0.25	<0.1	1	>10*	0.65	-
0.35	0.167 to 0.5	10	20 to 60*	0.7 (<0.85)	<0.28*
1.0	<10	100	>10*	<1.5	-

BSY 18

$V_{CE}$ V	$I_B$ mA	$I_C$ mA	$h_{FE}$ $I_C/I_B$	$V_{BEsat}^{1)}$ V	$V_{CEsat}^{1)}$ V
0.25	<0.05	1	>20*	0.66	-
0.35	0.083 to 0.25	10	40 to 120*	0.7 (<0.85)	<0.28*
1.0	<5.0	100	>20*	<1.5	-

BSY 62 The transistors are grouped according to the DC current gain  $h_{FE}$  and identified by the code letters "A" or "B".

$h_{FE}$ group	$V_{CE}$ V	$I_B$ mA	$I_C$ mA	$h_{FE}$ $I_C/I_B$
A	1	0.17 to 0.5	10	20 to 60*
B	1	0.033 to 0.33	10	30 to 300*

Saturation voltage ( $I_C = 10\text{ mA}$ ;  $I_B = 10\text{ mA}$ )  $V_{BEsat}^{1)} = <0.9\text{ V}$   
 $V_{CEsat}^{1)} = <0.6^*\text{ V}$

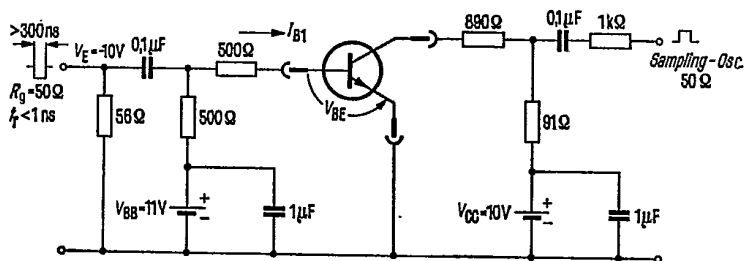
BSY 63

$V_{CE}$ V	$I_B$ mA	$I_C$ mA	$h_{FE}$ $I_C/I_B$
1	<0.033	0.5	>15*
1	0.083 to 0.33	10	30 to 120*

Saturation voltage ( $I_C = 10\text{ mA}$ ;  $I_B = 1\text{ mA}$ )  $V_{BEsat}^{1)} = 0.72 (<0.8)\text{ V}$   
 $V_{CEsat}^{1)} = <0.4^*\text{ V}$

Test circuit for storage time ( $t_s$ )

Duty cycle <2%



1) The transistor is saturated to such an extent that the DC current gain decreases to  $h_{FE} = 10$ .  
 \* AQL = 0.65%

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**Dynamic characteristics**

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

Transition frequency

( $I_C = 10\text{ mA}$ ;  $V_{CE} = 10\text{ V}$ ;  
 $f = 100\text{ MHz}$ )

Collector-base capacitance  
( $V_{CBO} = 5\text{ V}$ )

	BSY 17	BSY 18	BSY 62	BSY 63	
$f_T$	>280	>280	>280	>300	MHz
$C_{CBO}$	2.7 (<5)	2.7 (<5)	2.7 (<5)	2.7 (<6)	pF

**Switching times:**

Operating point:

$I_C = 10\text{ mA}$ ;  $I_{B1} = 3\text{ mA}$ ;  
 $-I_{B2} = 1.5\text{ mA}$ ;  $R_L = 270\ \Omega$

$t_{on}$	<16	<16	<40	<40	ns
$t_{off}$	<24	<24	<75	<75	ns

Operating point:

$I_C = 100\text{ mA}$ ;  $I_{B1} = 40\text{ mA}$ ;  
 $-I_{B2} = 20\text{ mA}$ ;  $R_L = 50\ \Omega$

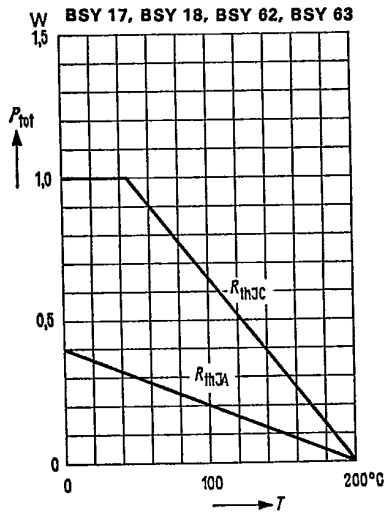
$t_{on}$	7	7	-	-	ns
$t_{off}$	25	25	-	-	ns

$I_C = I_{B1} = -I_{B2} = 10\text{ mA}$ ;  
 $R_L = 1\text{ k}\Omega$

$t_{stg}$	<14	<18	<25	<25	ns
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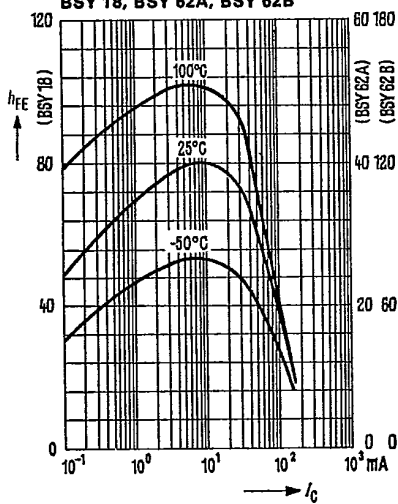
Total perm. power dissipation  
versus temperature  
 $P_{tot} = f(T)$ ;  $R_{th}$  = parameter

BSY 17, BSY 18, BSY 62, BSY 63



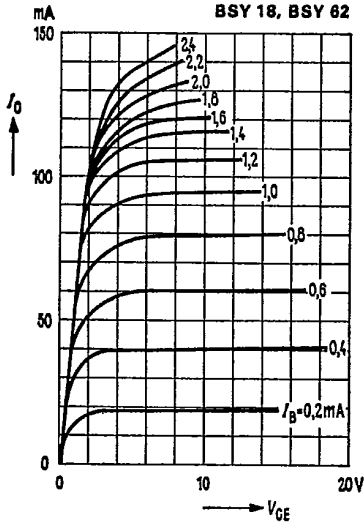
DC current gain  $h_{FE} = f(I_C)$   
 $V_{CE} = 1\text{ V}$ ;  $T_{amb} = \text{parameter}$   
(common emitter configuration)

BSY 18, BSY 62A, BSY 62B

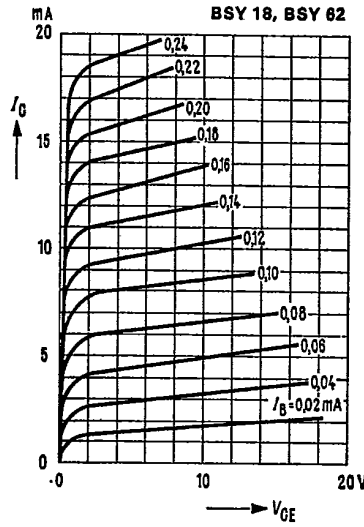


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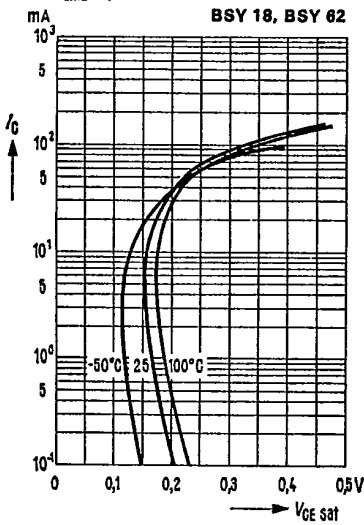
Output characteristics  $I_C = f(V_{CE})$   
 $I_B = \text{parameter}$   
 (common emitter configuration)



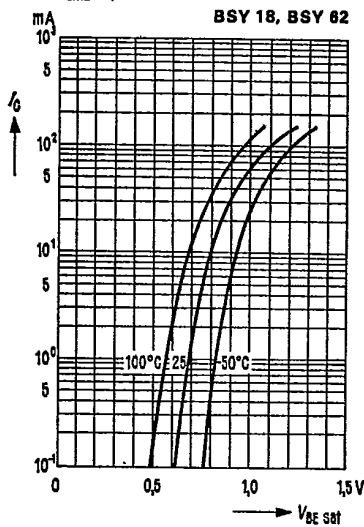
Output characteristics  $I_C = f(V_{CE})$   
 $I_B = \text{parameter}$   
 (common emitter configuration)

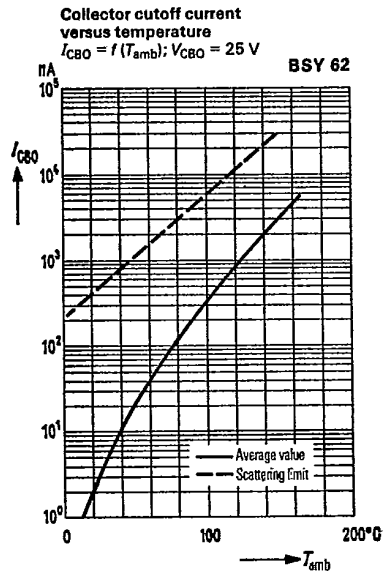
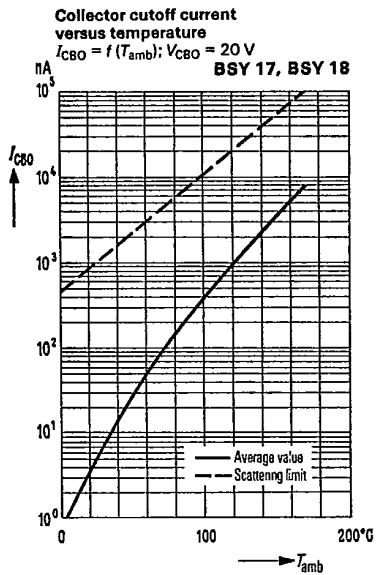
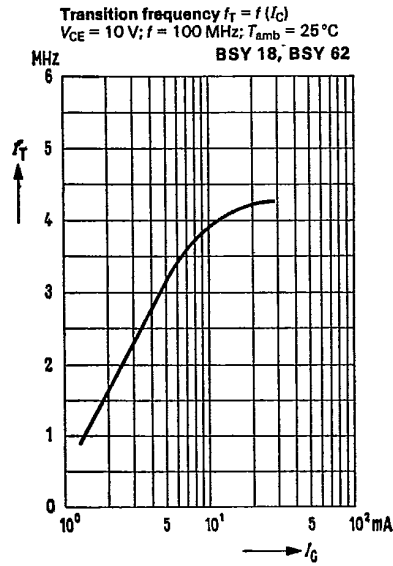
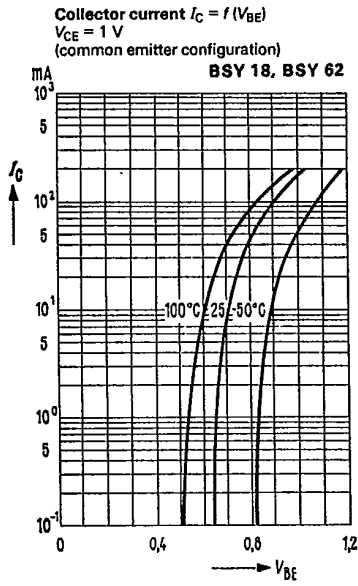


Collector-emitter saturation voltage  
 $V_{CEsat} = f(I_C); h_{FE} = 10$   
 $T_{amb} = \text{parameter}$

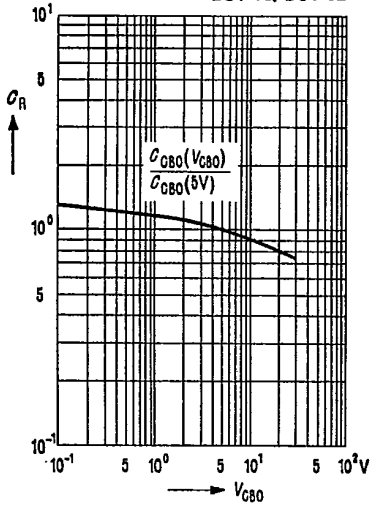


Base-emitter saturation voltage  
 $V_{BEsat} = f(I_C); h_{FE} = 10$   
 $T_{amb} = \text{parameter}$

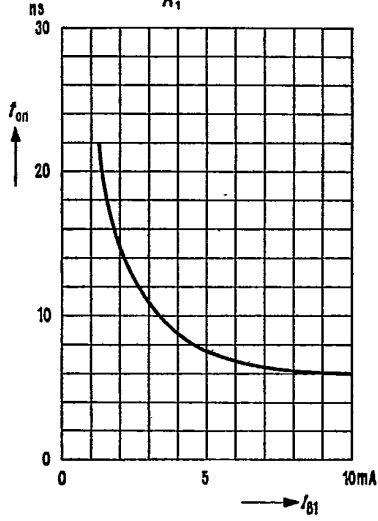




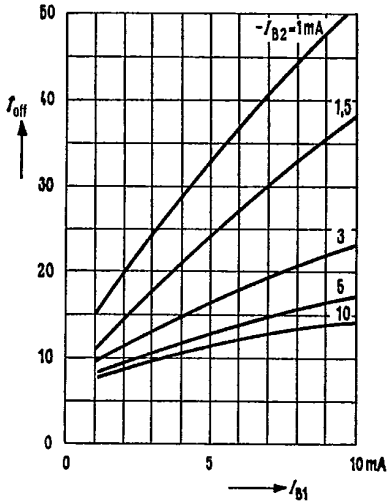
Collector-base capacitance  
 $C_R = f(V_{CB0})$   
 BSY 18, BSY 62



Turn-on time  $t_{on} = f(h_{FE1})$   
 $I_C = 10 \text{ mA}; T_{amb} = 25^\circ\text{C}$   
 $V_{ES} = -3 \text{ V}; \frac{R_2}{R_1} = 1$  BSY 18



Turn-off time  $t_{off} = f(I_{B1})$   
 $-I_{B2} = \text{parameter}$   
 $I_C = 10 \text{ mA}; T_{amb} = 25^\circ\text{C}$  BSY 18



Storage time  $t_s = f(I_{B1})$   
 $-I_{B2} = \text{parameter}$   
 $I_C = 10 \text{ mA}; T_{amb} = 25^\circ\text{C}$  BSY 18

