

## NPN Silicon Planar Transistors

BSX 45

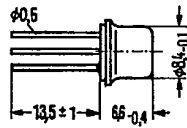
BSX 46

BSX 47

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BSX 45, BSX 46, and BSX 47 are epitaxial NPN silicon planar transistors in TO 39 case (5 C 3 DIN 41873). Their collectors are electrically connected to their cases. The transistors are particularly suitable for AF amplifiers and AF switching applications up to 1 A.

Type	Ordering code
BSX 45 <sup>1)</sup>	Q60218-X45
BSX 45-6	Q60218-X45-V6
BSX 45-10	Q60218-X45-V10
BSX 45-16	Q60218-X45-V16
BSX 46 <sup>1)</sup>	Q60218-X46
BSX 46-6	Q60218-X46-V6
BSX 46-10	Q60218-X46-V10
BSX 46-16	Q60218-X46-V16
BSX 47 <sup>1)</sup>	Q60218-X47
BSX 47-6	Q60218-X47-V6
BSX 47-10	Q60218-X47-V10



Approx. weight 1.5 g



Dimensions in mm

## Maximum ratings

		BSX 45	BSX 46	BSX 47	
Collector-emitter voltage	$V_{CEO}$	40	60	80	V
Collector-emitter voltage	$V_{CES}$	80	100	120	V
Emitter-base voltage	$V_{EBO}$	7	7	7	V
Collector current	$I_C$	1	1	1	A
Base current	$I_B$	0.2	0.2	0.2	A
Junction temperature	$T_j$	200	200	200	°C
Storage temperature range	$T_{stg}$		-65 to +200		°C
Total power dissipation ( $T_{case} \leq 25^\circ\text{C}$ )	$P_{tot}$	5	5	5	W

## Thermal resistance

Junction to ambient air	$R_{thJA}$	$\leq 200$	$\leq 200$	$\leq 200$	K/W
Junction to case	$R_{thJC}$	$\leq 35$	$\leq 35$	$\leq 35$	K/W

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

Transistors BSX 45, BSX 46, and BSX 47 are grouped according to their DC current gain  $h_{FE}$  at  $I_C = 100$  mA and  $V_{CE} = 1$  V. The different groups are marked by figures of the DIN-R 5 standard series.

Type	BSX 45 BSX 46 BSX 47	BSX 45 BSX 46 BSX 47	BSX 45 BSX 46 —	BSX 45 BSX 46 BSX 47
$h_{FE}$ 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 (> 10)	40 (> 15)	90 (> 25)	—
100	63 (40 to 100)	100 (63 to 160)	160 (100 to 250)	< 1
500	25 (> 15)	40 (> 25)	60 (> 35)	0.75 to 1.5
1000	15	20	30	1.3 (< 2)

1) In case of orders without an exact indication of the current amplification wanted, a transistor will be delivered of that current amplification group available at stock.

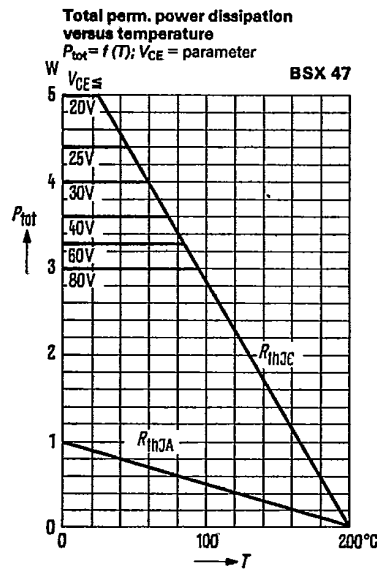
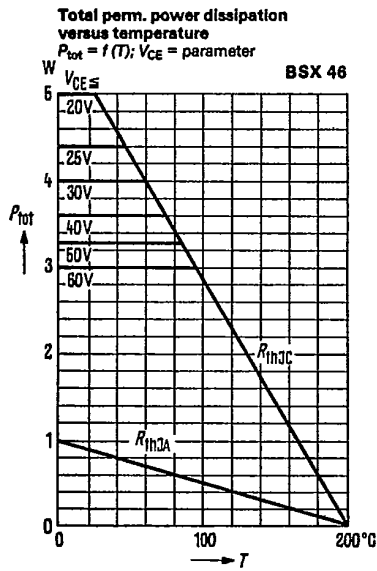
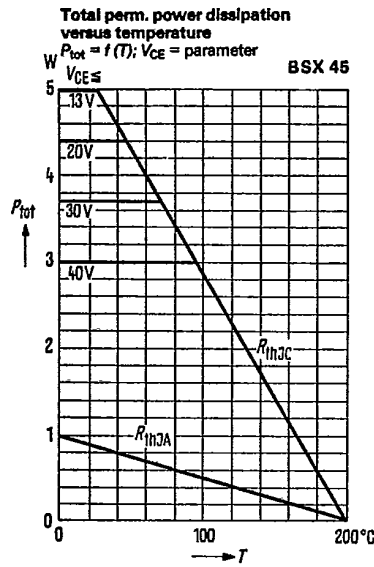
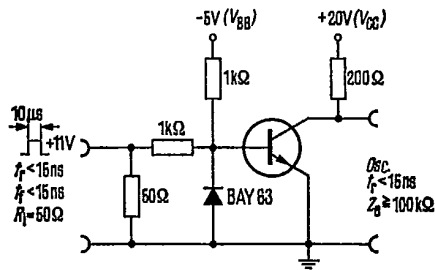
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Static characteristics ( $T_{amb} = 25^{\circ}\text{C}$ )		BSX 45	BSX 46	BSX 47	
Collector-emitter saturation voltage ( $I_C = 1\text{ A}$ ; $h_{FE} = 10$ )	$V_{CEsat}$	0.7 (<1)	0.7 (<1)	—	V
Collector-emitter saturation voltage ( $I_C = 0.5\text{ A}$ ; $h_{FE} = 20$ )	$V_{CEsat}$	—	—	0.5 (<0.9)	V
Collector cutoff current ( $V_{CES} = 60\text{ V}$ )	$I_{CES}$	1 (<30)	1 (<30)	—	nA
Collector cutoff current ( $V_{CES} = 60\text{ V}$ ; $T_{amb} = 150^{\circ}\text{C}$ )	$I_{CES}$	1 (<10)	1 (<10)	—	$\mu\text{A}$
Collector cutoff current ( $V_{CES} = 80\text{ V}$ )	$I_{CES}$	—	—	<30	nA
Collector cutoff current ( $V_{CES} = 80\text{ V}$ ; $T_{amb} = 150^{\circ}\text{C}$ )	$I_{CES}$	—	—	<10	$\mu\text{A}$
Collector cutoff current ( $V_{CE} = 60\text{ V}$ ; $V_{BE} = 0.2\text{ V}$ ; $T_{amb} = 100^{\circ}\text{C}$ )	$I_{CEX}$	<50	<50	—	$\mu\text{A}$
Collector cutoff current ( $V_{CE} = 80\text{ V}$ ; $V_{BE} = 0.2\text{ V}$ ; $T_{amb} = 100^{\circ}\text{C}$ )	$I_{CEX}$	—	—	<50	$\mu\text{A}$
Emitter cutoff current ( $V_{EBO} = 5\text{ V}$ )	$I_{EBO}$	<10	<10	<10	nA
Collector-emitter breakdown voltage ( $I_{CE} = 50\text{ mA}$ ; pulse length = 200 $\mu\text{s}$ ; duty cycle 1%)	$V_{(BR)CEO}$	>40	>60	>80	V
Collector-emitter breakdown voltage ( $I_{CES} = 100\text{ }\mu\text{A}$ )	$V_{(BR)CES}$	>80	>100	>120	V
Emitter-base breakdown voltage ( $I_{EBO} = 100\text{ }\mu\text{A}$ )	$V_{(BR)EBO}$	>7	>7	>7	V

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

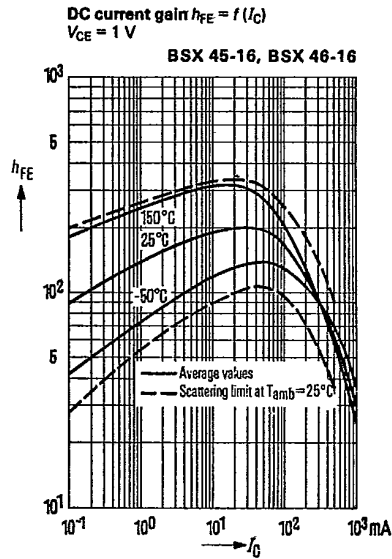
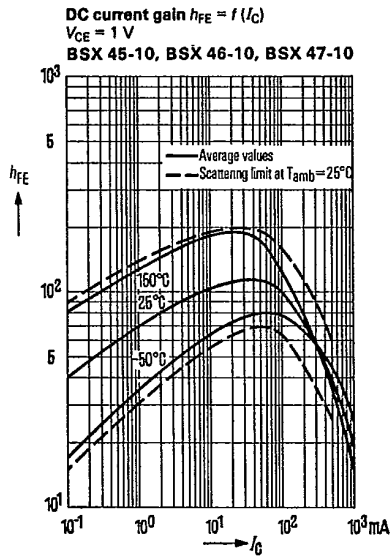
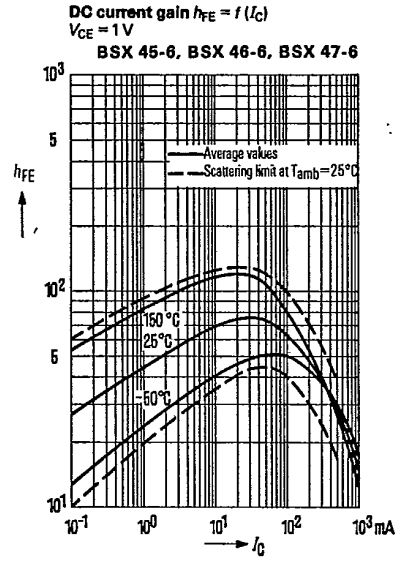
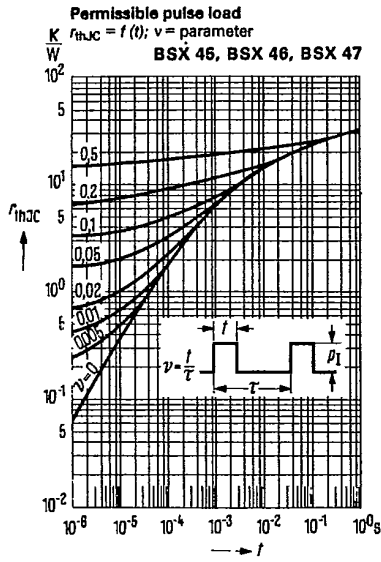
Transition frequency ( $I_C = 50\text{ mA}$ ; $V_{CE} = 10\text{ V}$ ; $f = 20\text{ MHz}$ )	$f_T$	>50	>50	>50	MHz
Collector-base capacitance ( $V_{CBO} = 10\text{ V}$ ; $f = 1\text{ MHz}$ )	$C_{CBO}$	<25	<20	<15	pF
Emitter-base capacitance ( $V_{EBO} = 0.5\text{ V}$ ; $f = 1\text{ MHz}$ )	$C_{EBO}$	<80	<80	<80	pF
Noise figure ( $I_C = 100\text{ }\mu\text{A}$ ; $V_{CE} = 10\text{ V}$ ; $f = 1\text{ kHz}$ ; $\Delta f = 200\text{ Hz}$ ; $R_g = 1\text{ k}\Omega$ )	NF	3.5	3.5	3.5	dB
Switching times $I_C = 100\text{ mA}$ ; $I_{B1}$ approx. $-I_{B2}$ approx. 5 mA	$t_{on}$ $t_{off}$	<200 <850	<200 <850	<200 <850	ns ns

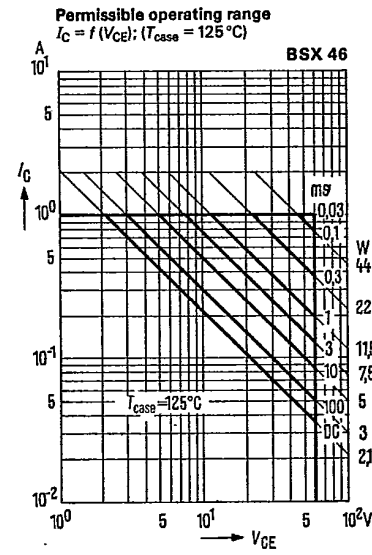
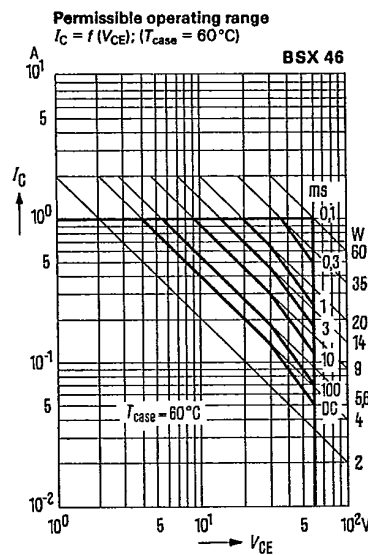
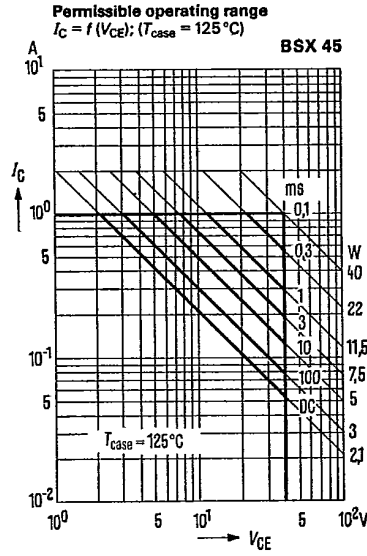
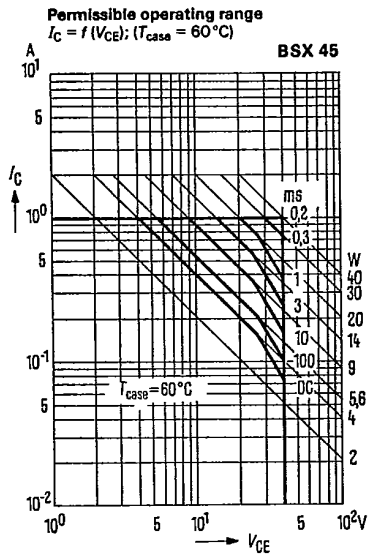
Test circuit for switching times



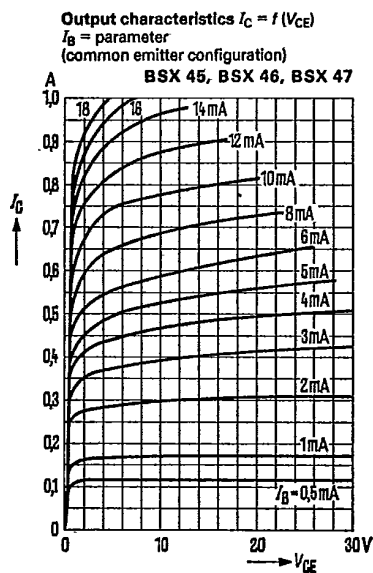
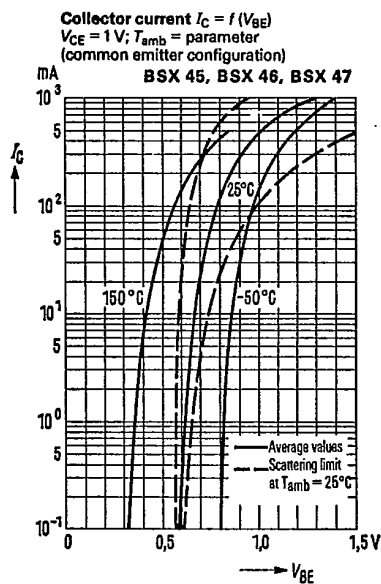
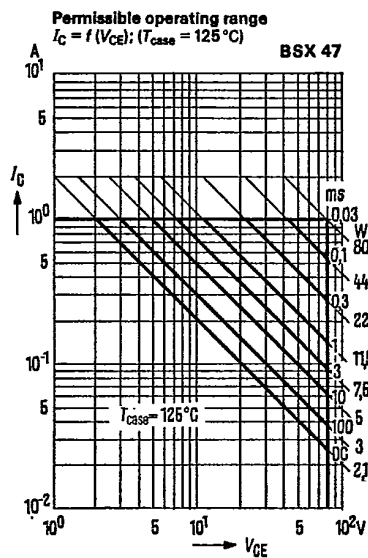
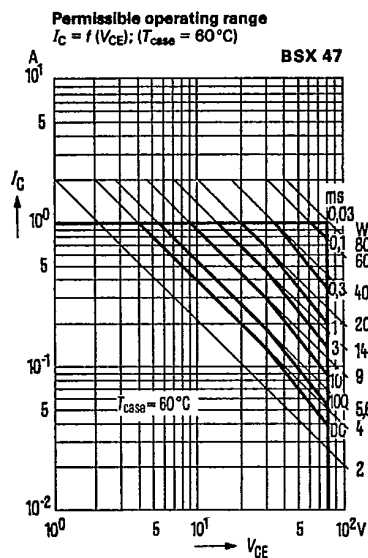
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BSX 45  
BSX 46  
BSX 47





The permissible operating ranges apply to single pulses ( $v = 0$ ). For pulse sequences the power dissipation has to be reduced in accordance with the diagram "permissible pulse load".

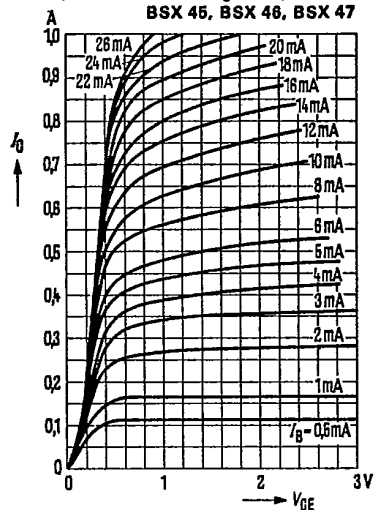


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Output characteristics  $I_C = f(V_{CE})$  $I_B$  = parameter

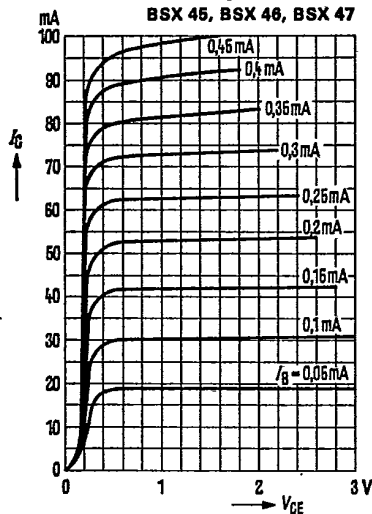
(common emitter configuration)

BSX 45, BSX 46, BSX 47

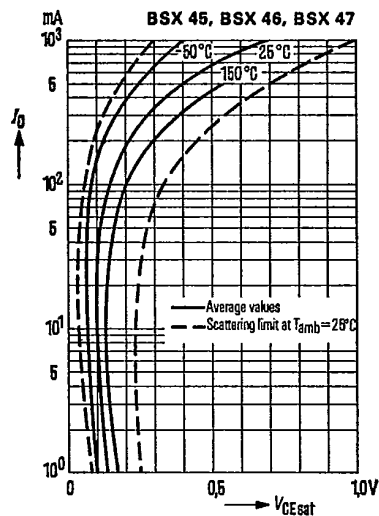
Output characteristics  $I_C = f(V_{CE})$  $I_B$  = parameter

(common emitter configuration)

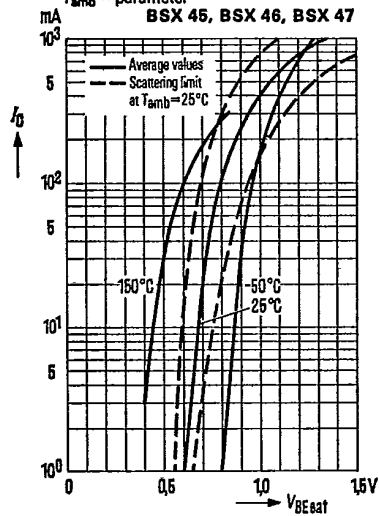
BSX 45, BSX 46, BSX 47

Saturation voltage  $V_{CEsat} = f(I_C)$  $h_{FE} = 10$ ;  $T_{amb}$  = parameter

BSX 45, BSX 46, BSX 47

Saturation voltage  $V_{BEsat} = f(I_C)$  $h_{FE} = 10$ ;  $V_{CE} = 1$  V; $T_{amb}$  = parameter

BSX 45, BSX 46, BSX 47

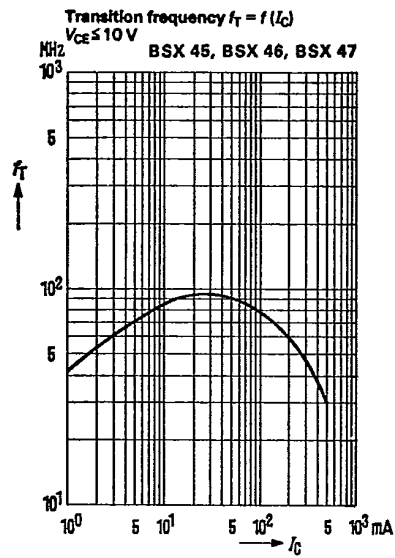
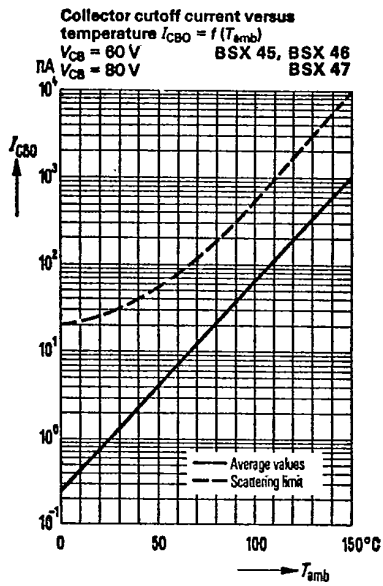


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