Philips Components

Data sheet	
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BDS943/945/947

NPN silicon epitaxial base power transistors

DESCRIPTION

NPN silicon epitaxial base transistors in a miniature SMD envelope (SOT223) intended for general purpose and switching applications. PNP complements are BDS944/946/948.

PINNING - SOT223

PIN	DESCRIPTION
1	base
2	collector
3	emitter
4	collector

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	BDS943		-	22	V
	BDS945		-	32	V
	BDS947		-	45	V
V_{CEO}	collector-emitter voltage	open base			
	BDS943		-	22	V
	BDS945		-	32	V
	BDS947		-	45	V
I_C	collector current	average value	-	3	A
I_{CM}	collector current	peak value	-	7	A
P_{tot}	total power dissipation	T_{tab} = 25 °C	-	8	W
		note 1	-	1.5	W
T_j	junction temperature		-	150	°C
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 5 V	25	-	
h_{FE}	DC current gain	I_C = 500 mA; V_{CE} = 1 V	85	475	
h_{FE}	DC current gain	I_C = 2 A; V_{CE} = 1 V			
	BDS943		50	-	
	BDS945		50	-	
	BDS947		40	-	

Note

1. Mounted on PCB.

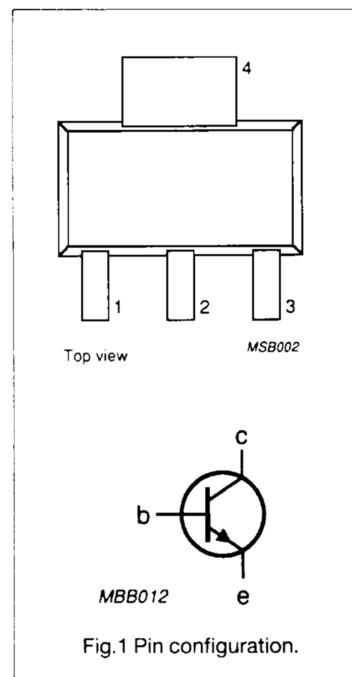

Fig.1 Pin configuration.

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LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter			
	BDS943		-	22	V
	BDS945		-	32	V
	BDS947		-	45	V
V_{CEO}	collector-emitter voltage	open base			
	BDS943		-	22	V
	BDS945		-	32	V
	BDS947		-	45	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I_C	collector current	average value	-	3	A
I_{CM}	collector current	peak value	-	7	A
I_B	base current		-	1	A
P_{tot}	total power dissipation	T_{tab} = 25 °C	-	8	W
T_{stg}	storage temperature range		−65	+150	°C
T_j	junction temperature		-	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	NOM.	UNIT
$R_{th\ j\text{-}t}$	from junction to tab		15.5	K/W
$R_{th\ j\text{-}a}$	from junction to ambient	on PCB	83.3	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = V_{CBO\ max}$	-	50	μA
I_{CEO}	collector cut-off current	$I_B = 0$; V_{CE} = 15 V (BDS943)	-	0.1	mA
I_{CEO}	collector cut-off current	$I_B = 0$; V_{CE} = 20 V (BDS945)	-	0.1	mA
I_{CEO}	collector cut-off current	$I_B = 0$; V_{CE} = 25 V (BDS947)	-	0.1	mA
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = V_{CBO\ max}$; T_j = 150 °C	-	1	mA
I_{EBO}	emitter cut-off current	$I_C = 0$; V_{EB} = 5 V	-	0.2	mA
V_{BE}	base-emitter voltage	I_C = 2 A; V_{CE} = 1 V; note 1	-	1.2	V
$V_{CE\ sat}$	collector-emitter saturation voltage	I_C = 2 A; I_B = 0.2 A; note 1	-	0.5	V
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 5 V note 1	25	-	
h_{FE}	DC current gain	I_C = 500 mA; V_{CE} = 1 V; note 1	85	475	
h_{FE}	DC current gain	I_C = 2 A; V_{CE} = 1 V; note 1 (BDS943/945)	50	-	
h_{FE}	DC current gain	I_C = 250 mA; V_{CE} = 1 V; note 1 (BDS947)	40	-	
f_T	transition frequency	f = 1 MHz; I_C = 250 mA; V_{CE} = 1 V	3	-	MHz

Note

1. Measured under pulse conditions: $t_p < 300$ μs, duty cycle < 2%.

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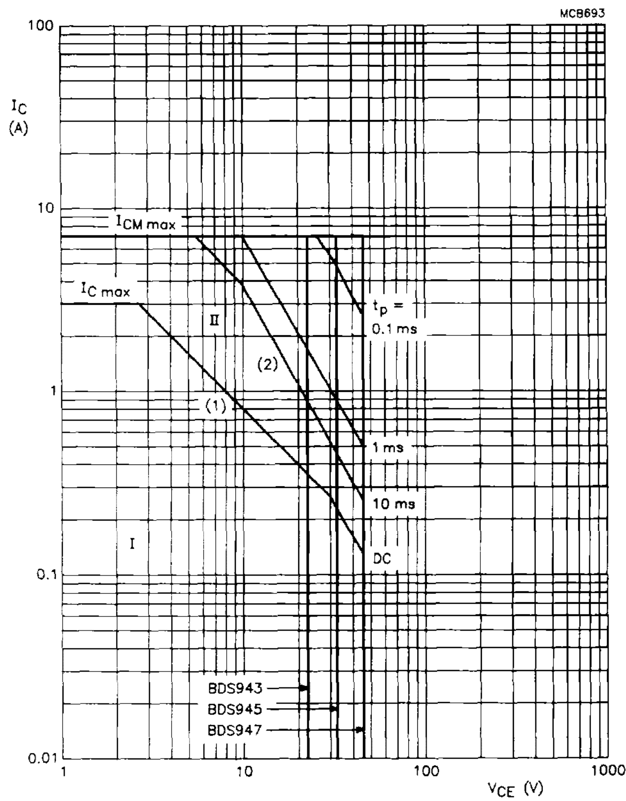

1. Region of permissible DC operation.
2. Permissible extension for repetitive pulse operation.

(1) $P_{tot\ max}$ and $P_{peak\ max}$ lines.

(2) Second breakdown limits.

Fig.2 Safe operating area; T_{tab} = 25 °C.

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Fig.3 Pulse power rating chart.

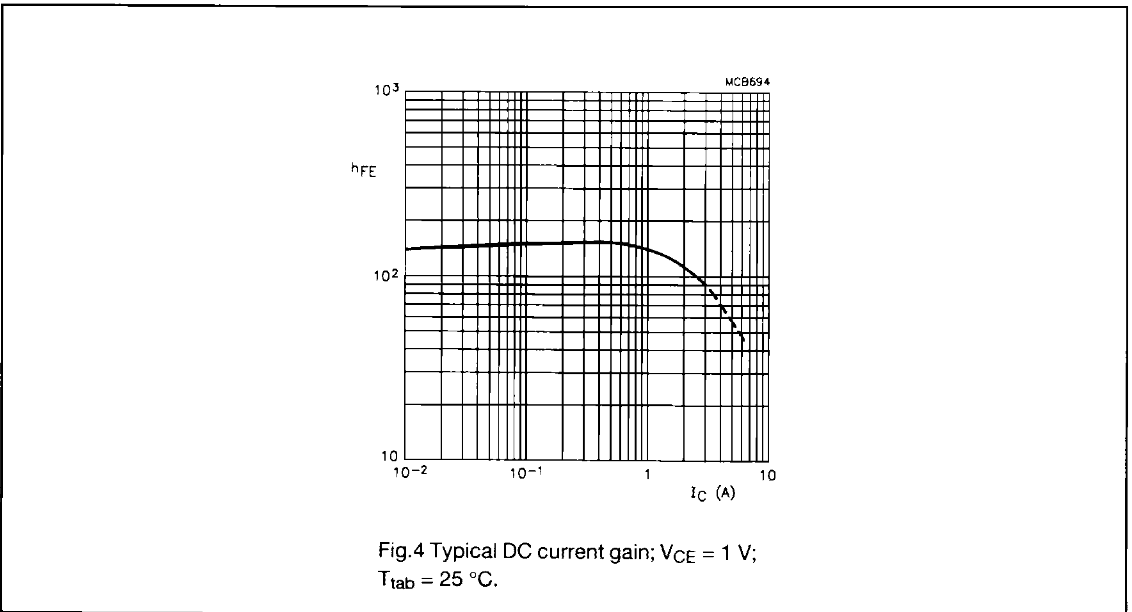

Fig.4 Typical DC current gain; V_{CE} = 1 V; T_{tab} = 25 °C.

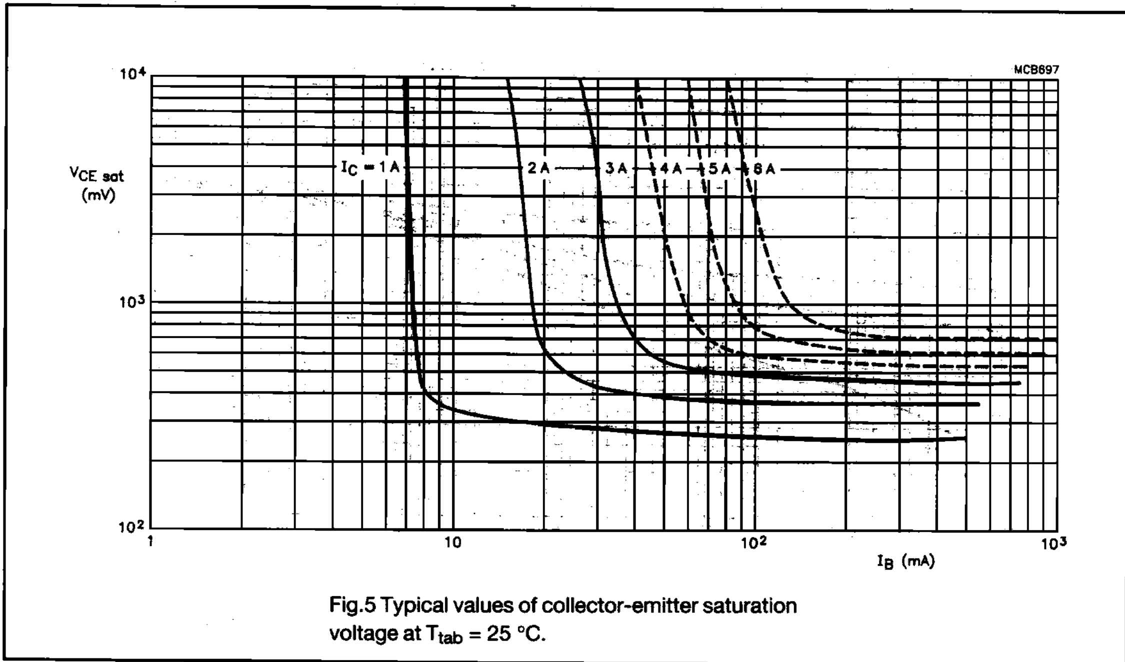

Fig.5 Typical values of collector-emitter saturation voltage at T_{tab} = 25 °C.