Silicon epitaxial-base transistors BD434/436/438/440/442

DESCRIPTION

PNP transistors in a TO-126 (SOT32) plastic envelope, intended for use in complementary output stages of audio amplifiers up to 15 W. The complementary pairs are BD433, BD435, BD437, BD439 and BD441 respectively.

PINNING - TO-126 (SOT32)

PIN	DESCRIPTION
1	emitter
2	collector
3	base

Collector connected to metal part of mounting surface.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$-V_{CES}$	collector-emitter voltage	$-V_{BE} = 0$			
	BD434		–	22	V
	BD436		–	32	V
	BD438		–	45	V
	BD440		–	60	V
	BD442		–	80	V
$-V_{CEO}$	collector-emitter voltage	open base			
	BD434		–	22	V
	BD436		–	32	V
	BD438		–	45	V
	BD440		–	60	V
	BD442		–	80	V
$-I_C$	collector current	average value	–	4	A
$-I_{CM}$	collector current	peak value	–	7	A
P_{tot}	total power dissipation	$T_{mb} = 25$ °C	–	36	W
h_{FE}	DC current gain	$-I_C = 2$ A; $-V_{CE} = 1$ V			
	BD434		50	–	
	BD436		50	–	
	BD438		40	–	
	BD440		25	–	
	BD442		15	–	
f_T	transition frequency	$-I_C = 250$ mA; $-V_{CE} = 1$ V	7	–	MHz

PIN CONFIGURATION

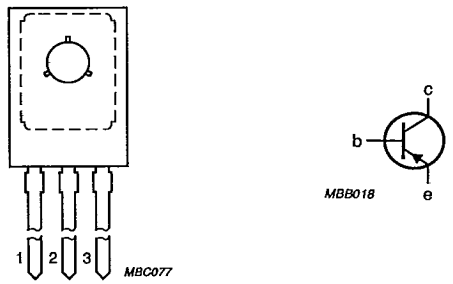

Fig.1 Simplified outline and symbol.

Silicon epitaxial-base transistors BD434/436/438/440/442

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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			
	BD434		–	22	V
	BD436		–	32	V
	BD438		–	45	V
	BD440		–	60	V
	BD442		–	80	V
$-V_{CES}$	collector-emitter voltage	$-V_{BE} = 0$			
	BD434		–	22	V
	BD436		–	32	V
	BD438		–	45	V
	BD440		–	60	V
	BD442		–	80	V
$-V_{CEO}$	collector-emitter voltage	open base			
	BD434		–	22	V
	BD436		–	32	V
	BD438		–	45	V
	BD440		–	60	V
	BD442		–	80	V
$-V_{EBO}$	emitter-base voltage	open collector	–	5	V
$-I_C$	collector current	average value	–	4	A
$-I_{CM}$	collector current	peak value	–	7	A
$-I_B$	base current	$T_{mb} = 25$ °C	–	1	A
P_{tot}	total power dissipation	$T_{mb} = 25$ °C	–	36	W
T_{stg}	storage temperature range		-65	+150	°C
T_j	junction temperature		–	+150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	NOM.	UNIT
$R_{th\ j\text{-}mb}$	from junction to mounting base		3.5	K/W
$R_{th\ j\text{-}a}$	from junction to ambient	in free air	100	K/W

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CHARACTERISTICS

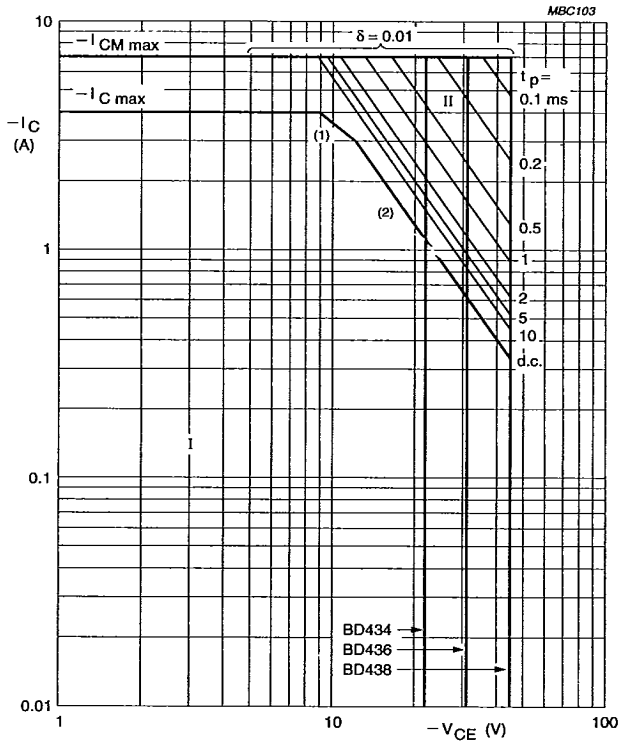
T_j = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$-I_{CBO}$	collector cut off current	$I_E = 0$; $-V_{CB} = -V_{CBO\ max}$	–	–	50	µA
		$I_E = 0$; $-V_{CB}$ = 10 V; T_j = 150 °C	–	–	1	mA
		$I_E = 0$; $-V_{CB} = -V_{CBO\ max}$ T_j = 150 °C	–	–	1	mA
$-I_{EBO}$	emitter cut off current	$I_C = 0$; $-V_{EB}$ = 5 V	–	–	0.2	mA
$-V_{CEK}$	knee voltage	$-I_C$ = 2 A; $-I_B$ = value for which $-I_C$ = 2.2 A at $-V_{CE}$ = 1 V				
	BD434, BD436, BD438		–	–	0.8	V
$-V_{BE}$	base-emitter voltage	$-I_C$ = 10 mA; $-V_{CE}$ = 5 V; note 1	–	580	–	mV
		$-I_C$ = 2 A; $-V_{CE}$ = 1 V; note 1				
	BD434, BD436		–	–	1.1	V
	BD440, BD442		–	–	1.5	V
		$-I_C$ = 3 A; $-V_{CE}$ = 1 V; note 1				
	BD438		–	–	1.3	V
$-V_{CE\ sat}$	collector-emitter saturation voltage	$-I_C$ = 2 A; $-I_B$ = 0.2 A				
	BD434, BD436		–	–	0.5	V
	BD440, BD442		–	–	0.8	V
		$-I_C$ = 3 A; $-I_B$ = 0.3 A				
	BD438		–	–	0.7	V

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
h_{FE}	DC current gain	$-I_C$ = 10 mA; $-V_{CB}$ = 5 V				
	BD434		25	–	–	
	BD436		25	–	–	
	BD438		25	–	–	
	BD440		20	–	–	
	BD442		15	–	–	
		$-I_C$ = 500 mA; $-V_{CB}$ = 1 V				
	BD434		85	–	475	
	BD436		85	–	475	
	BD438		85	–	375	
	BD440		40	–	–	
	BD442		40	–	–	
		$-I_C$ = 2 A; $-V_{CB}$ = 1 V				
	BD434		50	–	–	
	BD436		50	–	–	
	BD438		40	–	–	
	BD440		25	–	–	
	BD442		15	–	–	
		$-I_C$ = 3 A; $-V_{CB}$ = 1 V				
	BD438		30	–	–	
f_T	transition frequency	at f = 1 MHz; $-I_C$ = 250 mA; $-V_{CE}$ = 1 V	7	–	–	MHz
h_{FE1} / h_{FE2}	DC current gain ratio of the complementary pairs	$-I_C$ = 500 mA; $-V_{CB}$ = 1 V				
	BD433/BD434		–	–	1.4	
	BD435/BD436		–	–	1.4	
	BD437/BD438		–	–	1.8	
	BD439/BD440		–	–	1.4	
	BD441/BD442		–	–	1.4	

Note

1. V_{BE} decreases by typ. 2.3 mV/K with increasing temperature.



BD434, BD436, BD438

T_{mb} = 25 °C

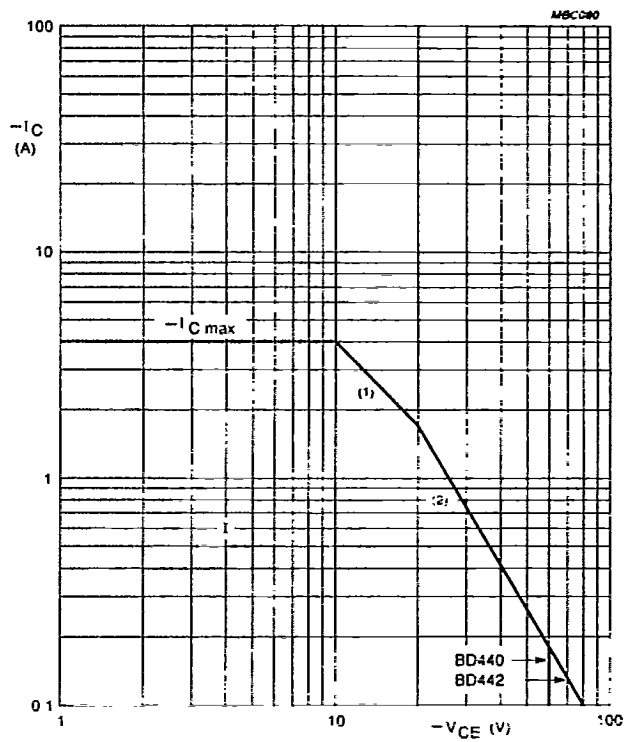
I Region of permissible DC operation.

II Permissible extension for repetitive pulse operation.

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

(2) Second breakdown limits.

Fig.2 Safe operating area.



BD440, BD442

T_{mb} = 25 °C

I Region of permissible DC operation.

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

(2) Second breakdown limits.

Fig.3 Safe operating area.

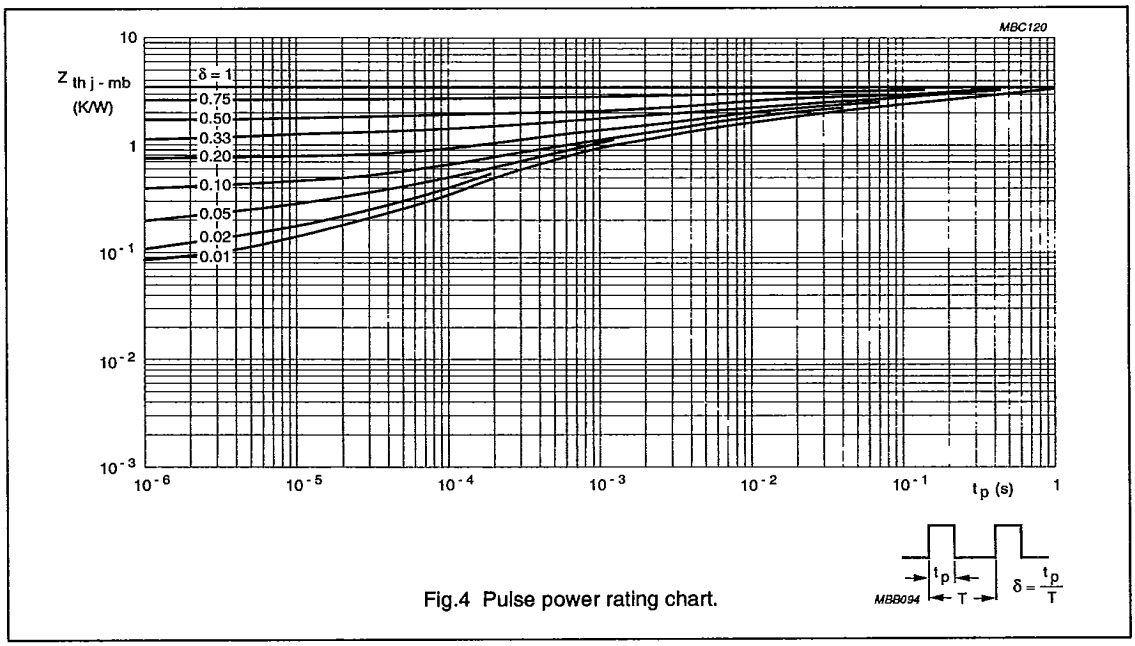
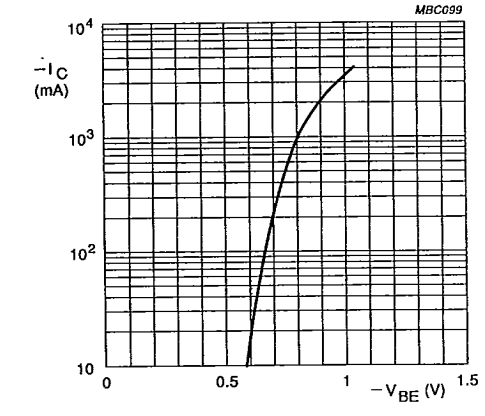
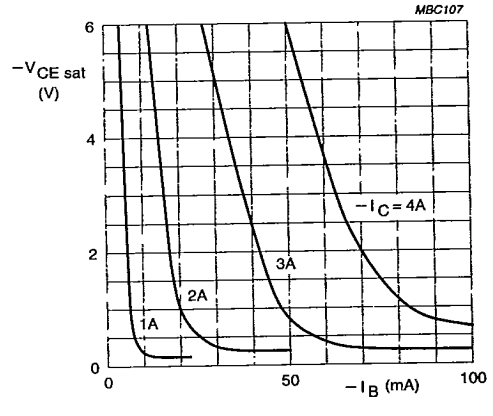


Fig.4 Pulse power rating chart.



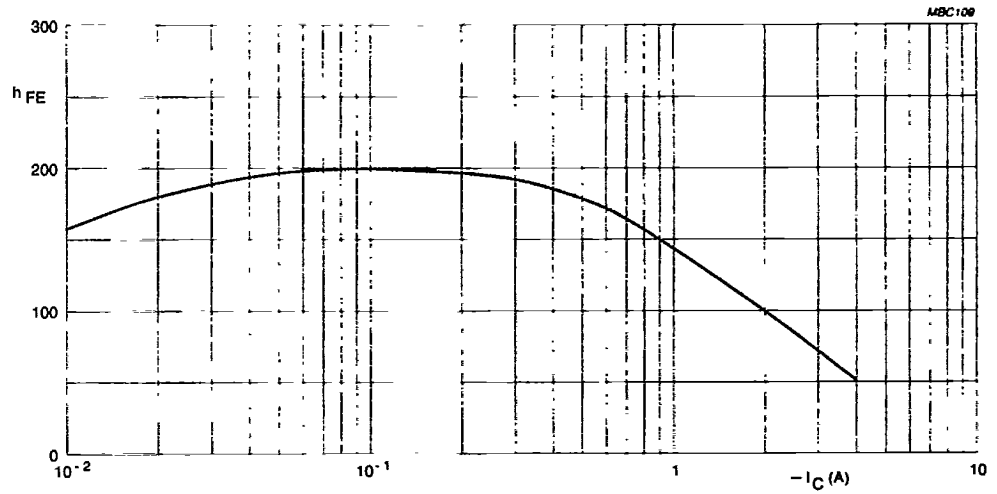
$-V_{CE}$ = 1 V; T_j = 25 °C.

Fig.5 Base-emitter voltage as a function of collector current.



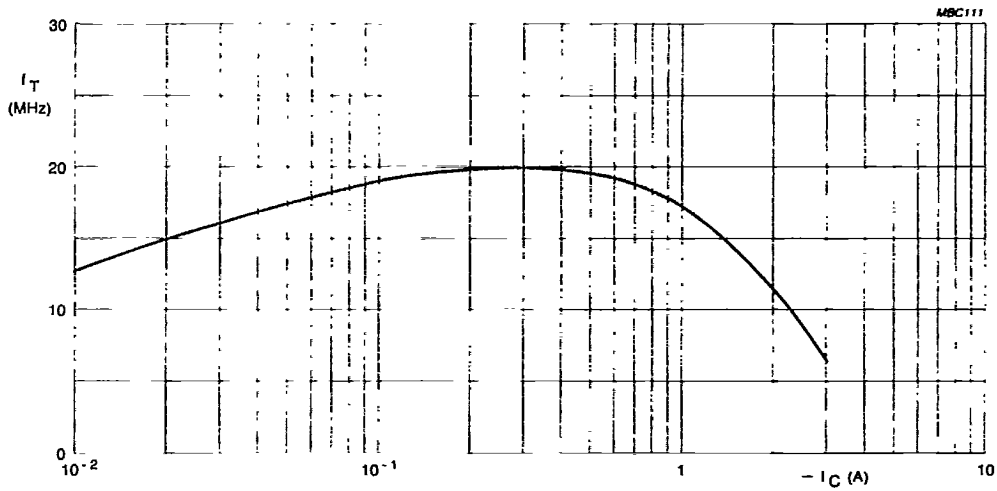
T_j = 25 °C

Fig.6 Typical values collector-emitter saturation voltage.



$-V_{CE}$ = 1 V; T_j = 25 °C.

Fig.7 Typical values DC current gain.



f = 1 MHz; $-V_{CE}$ = 1 V; T_j = 25 °C.

Fig.8 Transition frequency.

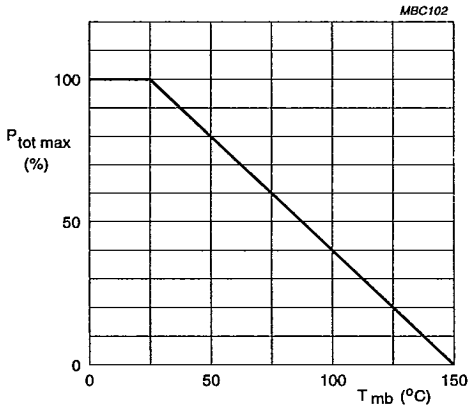


Fig.9 Power derating curve.

PACKAGE OUTLINE

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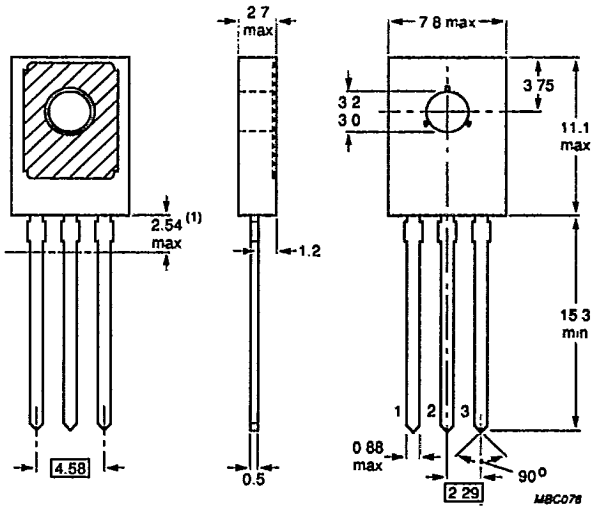

Dimensions in mm

Collector connected to metal part of mounting surface

(1) Within this region the cross-section of the leads is uncontrolled

Fig.10 TO-126 (SOT32).