T-33-11

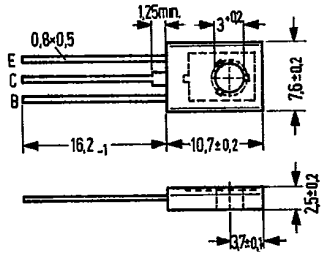
NPN Silicon Epibase Transistors

SIEMENS AKTIENGESELLSCHAF D

BD 433
BD 435
BD 437
BD 439
BD 441

The transistors BD 433, BD 435, BD 437, BD 439, and BD 441 are NPN silicon epibase power transistors in TO 126 plastic package (12 A 3 DIN 41 869, sheet 4). The collector is electrically connected to the metallic mounting area. The transistors are particularly suitable for use in push-pull output stages, driver stages as well as for general AF applications. Their complementary types are the PNP transistors BD 434, BD 436, BD 438, BD 440, and BD 442.

Type	Ordering code
BD 433	Q62702-D201
BD 433/BD 434 paired	Q62702-D217
BD 435	Q62702-D203
BD 435/BD 436 paired	Q62702-D218
BD 437	Q62702-D212
BD 437/BD 438 paired	Q62702-D219
BD 439	Q62702-D280
BD 439/BD 440 paired	Q62702-D284
BD 441	Q62702-D285
BD 441/BD 442 paired	Q62702-D325
Mica washer	Q62902-B62
Spring washer A 3 DIN 137	Q62902-B63



Approx. weight 0.5 g Dimensions in mm

Transistor fixing with M 3 screw. Starting torque < 0.8 Nm, washer or spring washer should be used.

1) If a 50 µ mica washer (ungreased) is used, the thermal resistance increases by 8 K/W and in case of a greased one by 4 K/W.

Maximum ratings		BD 433	BD 435	BD 437	BD 439	BD 441	
Collector-emitter voltage	V_{CEO}	22	32	45	60	80	V
Collector-emitter voltage	V_{CES}	22	32	45	60	80	V
Collector-base voltage	V_{CBO}	22	32	45	60	80	V
Emitter-base voltage	V_{EBO}	5	5	5	5	5	V
Collector current	I_C	4	4	4	4	4	A
Collector peak current	I_{CM}	7	7	7	7	7	A
Emitter peak current	I_{EM}	7	7	7	7	7	A
Base current	I_B	1	1	1	1	1	A
Junction temperature	T_j	150	150	150	150	150	°C
Storage temperature range	T_{stg}		−55 to +150				°C
Total power dissipation ($T_{case} \leq 25$ °C; $V_{CE} \leq 12$)	P_{tot}	36	36	36	36	36	W
Thermal resistance							
Junction to ambient air	R_{thJA}	≤100	≤100	≤100	≤100	≤100	K/W
Junction to mounting area	R_{thJC}[1]	≤3,5	≤3,5	≤3,5	≤3,5	≤3,5	K/W

— SIEMENS AKTIENGESELLSCHAF —

BD 433
BD 435
BD 437
BD 439
BD 441

Static characteristics (T_{case} = 25 °C)

		BD 433	BD 435	BD 437	BD 439	BD 441	
Collector-emitter breakdown voltage (I_C = 1000 mA)	$V_{(BR)CEO}$	>22	>32	>45	>60	>80	V
Collector-emitter breakdown voltage (I_C = 100 µA)	$V_{(BR)CES}$	>22	>32	>45	>60	>80	V
Collector-base breakdown voltage (I_C = 100 µA)	$V_{(BR)CBO}$	>22	>32	>45	>60	>80	V
Emitter-base breakdown voltage (I_E = 1 mA)	$V_{(BR)EBO}$	>5	>5	>5	>5	>5	V
Collector cutoff current (V_{CB} = 22 V)	I_{CBO}	<100	–	–	–	–	µA
Collector cutoff current (V_{CB} = 32 V)	I_{CBO}	–	<100	–	–	–	µA
Collector cutoff current (V_{CB} = 45 V)	I_{CBO}	–	–	<100	–	–	µA
Collector cutoff current (V_{CB} = 60 V)	I_{CBO}	–	–	–	<100	–	µA
Collector cutoff current (V_{CB} = 80 V)	I_{CBO}	–	–	–	–	<100	µA
Collector cutoff current (V_{CB} = 40 V; T_{amb} = 150 °C)	I_{CBO}	<1	<1	<1	<1	<1	mA
Collector cutoff current (V_{CB} = $V_{CB\,max}$; T_{amb} = 150 °C)	I_{CBO}	<3	<3	<3	<3	<3	mA
Base-emitter forward voltage (I_C = 2 A; V_{CE} = 1 V)	V_{BE}	<1.1	<1.1	<1.2	<1.5	<1.5	V
Base-emitter forward voltage (I_C = 3 A; V_{CE} = 1 V)	V_{BE}	–	–	<1.3	<1.6	<1.6	V
Collector-emitter saturation voltage (I_C = 2 A)[1]	V_{CEsat}	<0.8	<0.8	–	–	–	V
Collector-emitter saturation spannung (I_C = 2A; I_B = 0.2A)	V_{CEsat}	<0.5	<0.5	<0.6	<0.8	<0.8	V
Collector-emitter saturation voltage (I_C = 3A; I_B = 0.3A)	V_{CEsat}	–	–	<0.7	<0.9	<0.9	V
DC current gain (I_C = 10 mA; V_{CE} = 5 V)	h_{FE}	>40	>40	>30	>20	>15	–
(I_C = 500 mA; V_{CE} = 1 V)[2]	h_{FE}	>85	>85	>85	>40	>40	–
(I_C = 2 A; V_{CE} = 1 V)	h_{FE}	>50	>50	>40	>25	>15	–

1) For the characteristic which passes through the point I_C = 2.2 mA and V_{CE} = 1 V at constant base current.
2) Available as matching pairs with BD 434, BD 436, BD 438, BD 440, and BD 442. Condition for matching pairs $h_{FE1}/h_{FE2} \leq 1.41$.

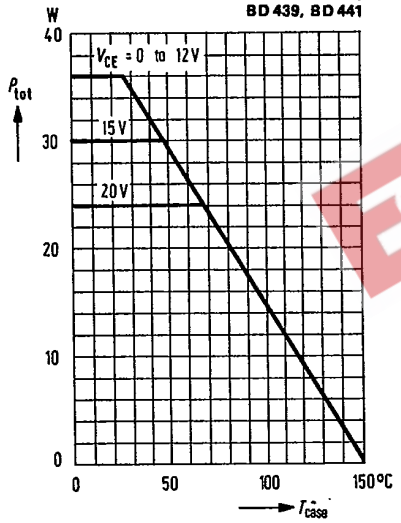
SIEMENS AKTIENGESELLSCHAF

BD 433
BD 435
BD 437
BD 439
BD 441

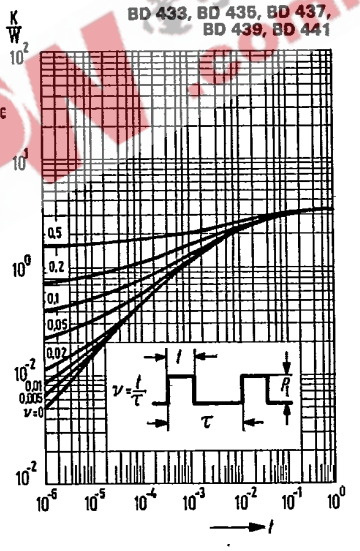
Dynamic characteristics (T_{case} = 25 °C)

		BD 433	BD 435	BD 437	BD 439	BD 441	
Transition frequency (I_C = 0.25 A; V_{CE} = 1 V; f = 1 MHz)	f_T	>3	>3	>3	>3	>3	MHz
Cutoff frequency in common emitter configuration (I_C = 0.25 A; V_{CE} = 1 V)	f_{hfe}	>20	>20	>20	>20	>20	kHz

Total perm. power dissipation versus temperature
$P_{tot} = f(T_{case})$; V_{CE} = 0 to 12 V
BD 433, BD 435, BD 437, BD 439, BD 441

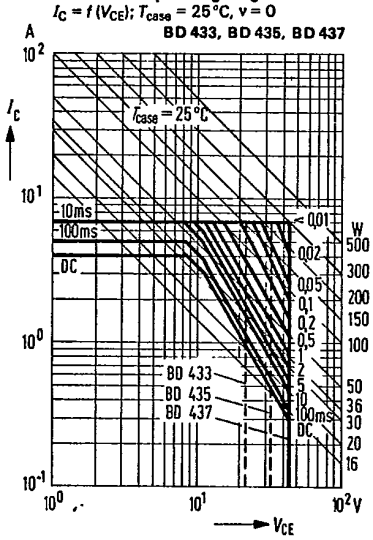


Permissible pulse load
$r_{thJC} = f(t)$; ν = parameter
BD 433, BD 435, BD 437, BD 439, BD 441

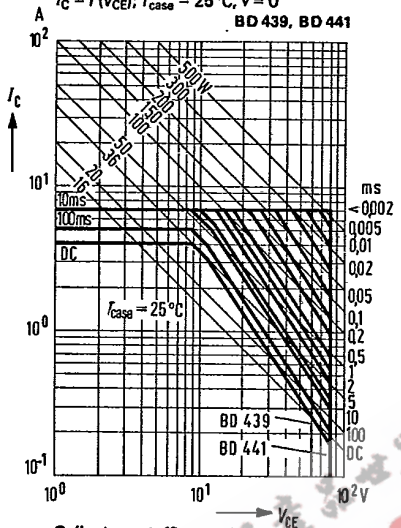


BD 433
BD 435
BD 437
BD 439
BD 441

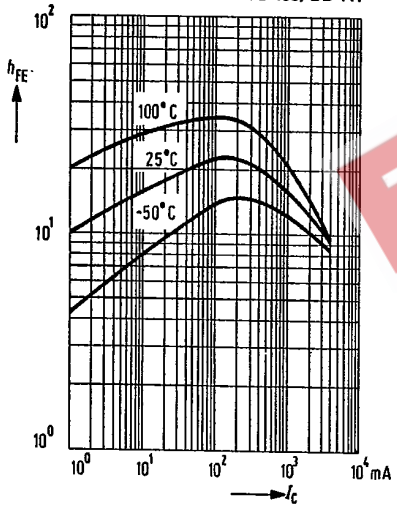
Permissible operating range
$I_C = f(V_{CE})$; $T_{case} = 25\,°C$, $v = 0$
BD 433, BD 435, BD 437



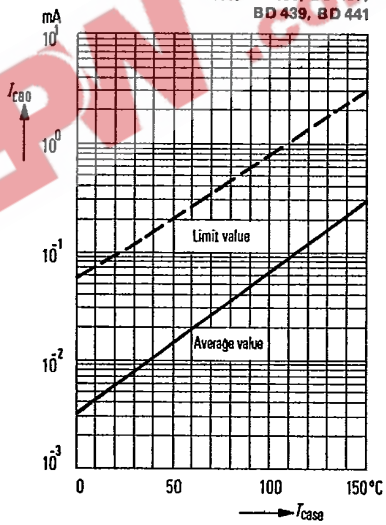
Permissible operating range
$I_C = f(V_{CE})$; $T_{case} = 25\,°C$, $v = 0$
BD 439, BD 441



DC current gain $h_{FE} = f(I_C)$;
$V_{CE} = 1\,V$; T_{case} = parameter
BD 433, BD 435, BD 437, BD 439, BD 441

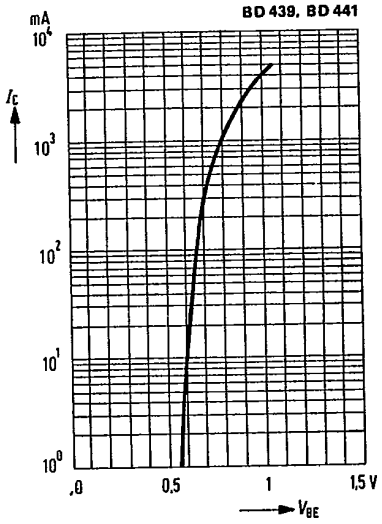


Collector cutoff current versus temperature $I_{CBO} = f(T_{case})$
$V_{CB} = V_{CBmax}$
BD 433, BD 435, BD 437, BD 439, BD 441

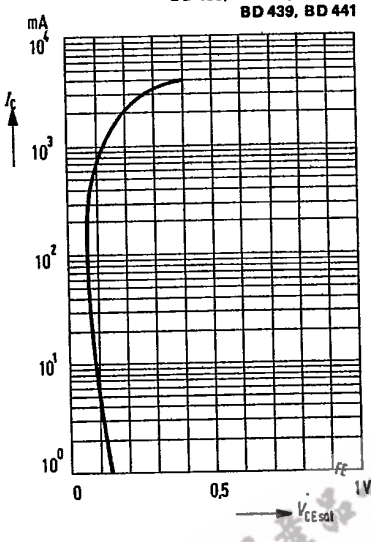


BD 433
BD 435
BD 437
BD 439
BD 441

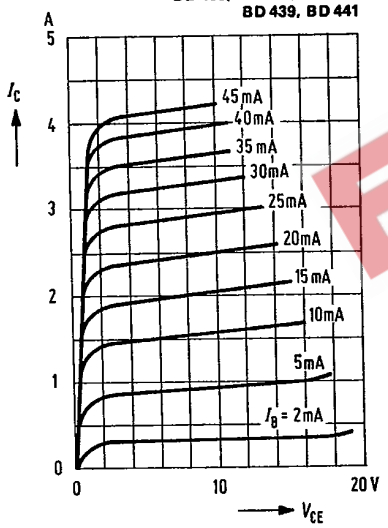
Collector current $I_C = f(V_{BE})$;
$V_{CE} = 2$ V; $T_{case} = 25°$
BD 433, BD 435, BD 437, BD 439, BD 441



Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$; $h_{FE} = 10$; $T_{amb} = 25°C$
BD 433, BD 435, BD 437, BD 439, BD 441



Output characteristics $I_C = f(V_{CE})$
I_B = parameter
(common emitter configuration)
BD 433, BD 435, BD 437, BD 439, BD 441



Transition frequency $f_T = f(I_C)$
$T_{case} = 25°C$
BD 433, BD 435, BD 437, BD 439, BD 441