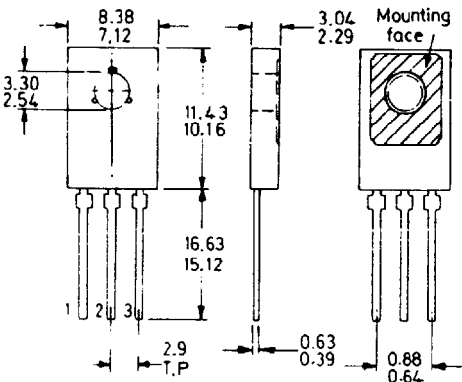


BRITISH STANDARDS INSTITUTION 2, PARK STREET, LONDON, W1A 2BS	BS CECC 50003-001 CECC 50003-001 ISSUE 1, AUGUST 1977  Page 1 of 17 pages
Specification available from:- MULLARD LIMITED Mullard House, Torrington Place, London, WC1E 7HD	
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS CECC 50000: 1977	MANUFACTURER'S TYPE NUMBER BD131, BDX35,36,37
Outline and dimensions Third angle projection For detail dimensions see BS 3934-SO136 IEC Publication No.191-1-56  1. Emitter 2. Collector 3. Base Note: Collector connected to Mounting face Marking information see page 4 All dimensions in mm	For ordering information see page 4
	CASE RATED BIPOLAR TRANSISTORS FOR LOW FREQUENCY AMPLIFICATION
	N-P-N SILICON PLANAR PLASTIC ENCAPSULATED TRANSISTOR
	ASSESSMENT LEVELS F AND L

1. LIMITING VALUES (over the full temperature range unless otherwise stated)

T_{case}	Case temperature (see note 6)	-55 to +150				°C
T_{stg}	Storage temperature	-55 to +150				°C
Voltage ratings (maximum)		BD131	BDX35	BDX36	BDX37	
V_{CBO}	Collector-base continuous (direct) voltage	70	100	120	120	V
V_{CEO}	Collector-emitter continuous (direct) voltage with zero base current. Use in conjunction with derating curves Figs.2A and 2B	45	60	60	80	V
V_{EBO}	Emitter-base continuous (direct) reverse voltage	6	5	5	5	V
Current ratings (maximum)						
I_C	Collector current	3	5	5	5	A
$I_{C peak}$	Peak collector current Use in conjunction with derating curves Figs.2A and 2B	6	10	10	10	A
I_B	Base current	0.5	1.0	1.0	1.0	A
$I_{B peak}$	Peak base current	1.0	2.0	2.0	2.0	A

Refer to Qualified Products List PD 9002 and/or CECC 00200 for details of manufacturers approved to this specification.

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Power ratings for $T_{case} \leq 60^\circ\text{C}$ BD131, $\leq 75^\circ\text{C}$ BDX35, BDX36, BDX37 (use in conjunction with derating curves Figs.1A to 2B)
(See Note 6)

		BD131	BDX35	BDX36	BDX37	
P_{tot}	Continuous total power (Notes 1 and 2)	15	15	15	15	W
P_p	Peak power (Note 3)	216	150	150	150	W
T_j	Maximum virtual junction temperature			+150		$^\circ\text{C}$

Mechanical ratings (when mounted on heat sink)

Maximum torque on nut	Notes 4 and 5	0.4	Nm
Minimum torque nut for good thermal contact	Notes 4 and 5	0.3	Nm

NOTES

- DC rating applied to power pulses of > 100 ms duration (see SOAR Figs.1A to 2B)
- The use of heat sink compound is essential. When a mica washer is used the compound must be applied to both sides.
- Peak power. Use in conjunction with safe operating area rating Figs.1A to 2B. This power can only be applied using pulse widths of $\leq 10 \mu\text{s}$ for BD131, and of $\leq 50 \mu\text{s}$ for BDX35/36/37.
- When mounted on a heatsink, it is essential that a plain washer be used to prevent damage to the device while tightening the mounting screw.
- Care should be taken not to bend the leads nearer than 2.5 mm from the body. The leads above this point should be clamped during any lead bending operation.
- T_{case} is measured at the metal mounting face (see outline drawing).

Accessories

Refer to Mullard Published Data for accessories.

2. CHARACTERISTICS (All at $T_{case} = 25^\circ\text{C}$ unless otherwise stated) (See Note 6)		Min.	Max.
$h_{21E(1)}$	Forward current transfer ratio $I_C = 0.5 \text{ A}, V_{CE} = 12 \text{ V}$ $I_C = 0.5 \text{ A}, V_{CE} = 10 \text{ V}$	BD131 40 BDX35) 45 BDX36) BDX37)	
$h_{21E(2)}$	Forward current transfer ratio $I_C = 2.0 \text{ A}, V_{CE} = 1.0 \text{ V}$ $I_C = 2.0 \text{ A}, V_{CE} = 2.0 \text{ V}$	BD131 20 BDX35) 23 BDX36) BDX37)	
f_T	Transition frequency $I_C = 0.25 \text{ A}, V_{CE} = 5.0 \text{ V}$ $f = 35 \text{ MHz}$	BD131) 60 BDX35) BDX36) BDX37)	MHz
$I_{CBO(1)}$	Collector-base cut-off current $V_{CB} = 50 \text{ V}, I_E = 0$ $V_{CB} = 80 \text{ V}, I_E = 0$ $V_{CB} = 100 \text{ V}, I_E = 0$	BD131 BDX35 BDX36) BDX37)	10 μA 10 μA 10 μA
$I_{CBO(2)}$	Collector-base cut-off current At $T_{amb} = 100^\circ\text{C}$ $V_{CB} = 50 \text{ V}, I_E = 0$ $V_{CB} = 80 \text{ V}, I_E = 0$ $V_{CB} = 100 \text{ V}, I_E = 0$	BD131 BDX35 BDX36) BDX37)	100 μA 100 μA 100 μA

CHARACTERISTICS (contd.)

			Min.	Max.
I_{EBO}	Emitter-base cut-off current			
	$V_{EB} = 5 \text{ V}, I_C = 0$	BD131		5.0 μA
	$V_{EB} = 4 \text{ V}, I_C = 0$	BDX35) BDX36) BDX37)	10	μA
$V_{CEO(sust)}$	Collector-emitter sustaining voltage			
	$I_C^* = 50 \text{ mA}, I_B = 0$	BD131	45	V
	over the temperature range $T_{case} = -55^\circ\text{C}$ to $+150^\circ\text{C}$	BDX35	60	V
	(See Note 6)	BDX36	60	V
		BDX37	80	V
$V_{CE(sat)(1)}$	Collector-emitter saturation voltage			
	$I_C^* = 2.0 \text{ A}, I_B = 0.2 \text{ A}$	BD131	0.7	V
	$I_C^* = 7.0 \text{ A}, I_B = 0.7 \text{ A}$	BDX35) BDX37)	1.2	V
	$I_C^* = 10.0 \text{ A}, I_B = 1.0 \text{ A}$	BDX36	1.5	V
$V_{CE(sat)(2)}$	Collector-emitter saturation voltage			
	$I_C^* = 0.5 \text{ A}, I_B = 50 \text{ mA}$	BD131	0.3	V
	$I_C^* = 5.0 \text{ A}, I_B = 0.5 \text{ A}$	BDX35	0.9	V
		BDX36	0.7	V
		BDX37	0.9	V
$V_{BE(sat)(1)}$	Base-emitter saturation voltage			
	$I_C^* = 2.0 \text{ A}, I_B = 0.2 \text{ A}$	BD131	1.5	V
	$I_C^* = 7.0 \text{ A}, I_B = 0.7 \text{ A}$	BDX35) BDX37)	1.8	V
	$I_C^* = 10.0 \text{ A}, I_B = 1.0 \text{ A}$	BDX36	2.2	V
$V_{BE(sat)(2)}$	Base-emitter saturation voltage			
	$I_C^* = 0.5 \text{ A}, I_B = 50 \text{ mA}$	BD131	1.2	V
	$I_C^* = 5.0 \text{ A}, I_B = 0.5 \text{ A}$	BDX35) BDX36) BDX37)	1.6	V
$V_{(BR)CBO}$	Collector-base breakdown voltage			
	$I_C = 1.0 \text{ mA}, I_E = 0$	BD131	70	V
		BDX35	100	V
		BDX36	120	V
		BDX37	120	V
$V_{(BR)EBO}$	Emitter-base breakdown voltage			
	$I_E = 1.0 \text{ mA}, I_C = 0$	BD131	6.0	V
		BDX35) BDX36) BDX37)	5.0	V
t_{off}	Turn-off time			
	$I_C = 5.0 \text{ A}$	BD131	1.5	μs
	$I_{B(on)} = -I_{B(off)} = 0.5 \text{ A}$	BDX35) BDX36) BDX37)	0.8	μs

*Pulsed $t_p = 300 \mu\text{s}$ $\delta \leq 2\%$

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CHARACTERISTICS (contd.)

			Min.	Max.
t_{on}	Turn-on time $I_C = 5.0 \text{ A}$ $I_{B(on)} = -I_{B(off)} = 0.5 \text{ A}$	BD131 BDX35) BDX36) BDX37)		0.7 μs 0.4 μs
$R_{th(j-case)}$	Thermal resistance junction to case (See Note 6) Measured under d.c. conditions	BD131 BDX35) BDX36) BDX37)		6 $^{\circ}\text{C/W}$ 5 $^{\circ}\text{C/W}$

3. MARKING INFORMATION

Terminal identification. See outline drawing on Page 1.

Each transistor shall bear the following marking.

- Type number
- Factory identification code
- Date code

Each package containing one or more of these transistors shall bear all the above markings, in addition the BS detail specification number, i.e., BS CECC 50003-001F or BS CECC 50003-001L.

4. RELATED DOCUMENTS

BS 9000
CENEL 1 General requirements for electronic components of assessed quality.
BS E9300
BS CECC 50000 Generic specification for discrete semiconductor devices.
BS E9007
BS CECC 00007 Sampling plans and procedures for inspection by attributes.
PD 9002
CECC 00200 Qualified product list.

5. ORDERING INFORMATION

Orders for this transistor shall contain the following minimum information:

Qty. Transistor type

BD131 to BS CECC 50003-001F Issue 1 dated August 1977
or BDX35 to BS CECC 50003-001L Issue 1 dated August 1977
or BDX36 to BS CECC 50003-001F Issue 1 dated August 1977
or BDX37 to BS CECC 50003-001L Issue 1 dated August 1977

Note: Suffix F or L indicates assessment level F or L.

6. TEST CONDITIONS AND INSPECTION REQUIREMENTS

All tests are non-destructive (3.5.6 of CECC 50000)

Group A

Lot by lot

Examination or test	Ref.	Conditions at T _{case} = 25 °C unless otherwise stated (see Note 6)	Inspection requirements					
			Limits		Units	Levels	IL	AQL %
			Min.	Max.				
Subgroup A1								
Visual inspection	4.2.1.	4.2.1.				F L	I I	1.5 1.5
Subgroup A2								
i _{CBO(1)}	4.3.4. T001	V _{CB} = 50 V, I _E = 0 BD131 V _{CB} = 80 V BDX35 V _{CB} = 100 V BDX36) BDX37)		10 10 10	μA μA μA	F L	II II	1.0 1.0
h _{21E(1)}	4.3.4. T006	I _C * = 0.5A, V _{CE} = 12 V BD131 I _C = 0.5 A, V _{CE} = 10 V BDX35) BDX36) BDX37)	40 45					
V _{BE(sat)(1)}	4.3.4. T004	I _C * = 2 A, I _B = 0.2 A BD131 I _C = 7 A, I _B = 0.7 A BDX35) BDX37) I _C = 10 A, I _B = 1 A BDX36		1.5 1.8 2.2	V V V			
h _{21E(2)}	4.3.4. T006	I _C * = 2 A, V _{CE} = 1 V BD131 I _C = 2 A, V _{CE} = 2 V BDX35) BDX36) BDX37)	20 23					
V _{(BR)EBO}	See App.B	I _E = 1 mA, I _C = 0 BD131 BDX35) BDX36) BDX37)	6 5		V V			
Subgroup A3								
I _{EBO}	4.3.4. T002	V _{EB} = 5 V, I _C = 0 BD131 V _{EB} = 4 V, I _C = 0 BDX35) BDX36) BDX37)		5 10	μA μA	F L	I I	4.0 4.0
V _{CE(sat)(1)}	4.3.4. T003	I _C * = 2 A, I _B = 0.2 A BD131 I _C = 7 A, I _B = 0.7 A BDX35) BDX37) I _C = 10 A, I _B = 1 A BDX36		0.7 1.2 1.5	V V V			

*Pulsed $t_p = 300 \mu s$ $\delta \leq 2\%$

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GROUP A – Lot by lot (contd.)

Examination or test	Ref.	Conditions at $T_{\text{case}} = 25^{\circ}\text{C}$ unless otherwise stated (see Note 6)	Inspection requirements					
			Limits		Units	Levels	IL	AQL %
			Min.	Max.				
Subgroup A3 (contd.)						F	I	4.0
$V_{\text{CEO(sust)}}$	See App.C	$I_{\text{C}}^* = 50 \text{ mA}, I_{\text{B}} = 0$				L	I	4.0
		BD131	45		V			
		BDX35)	60		V			
		BDX36)						
		BDX37	80		V			
$V_{\text{(BR)CBO}}$	See App.B	$I_{\text{C}} = 1 \text{ mA}, I_{\text{E}} = 0$						
		BD131	70		V			
		BDX35	100		V			
		BDX36)	120		V			
		BDX37)						

Subgroup A4 Not applicable

GROUP B

Lot by lot

Only tests marked (D) are destructive (3.5.6 of CECC 50 000)

n.a.: not applied

Subgroup B1							F	S2	2.5
Dimensions	4.2.2.	4.2.2./App.III IEC 191-I-56	A	2.29	3.04	mm	L	S2	2.5
			D	10.16	11.43	mm			
			E	7.12	8.38	mm			
			φP	2.54	3.30	mm			
Subgroup B3				No broken lead			F	S3	2.5
Lead bending (D)	4.4.9.	F = 2.5 N					L	S2	4.0
Subgroup B4							F	S4	2.5
Solderability	4.4.7.	Solder bath method		Good wetting			L	S4	2.5
Subgroup B5							F	S4	2.5
Change of temperature followed by	4.4.4.	IEC 68-2-14, Test Nb. Duration of exposures (t ₁) = 10 min. Rate of temperature variation = 20 °C/min. T _A = -55 °C T _B = +150 °C					L	na	na
Accelerated damp heat (D)	4.4.2.	Method 1							
Post-test end-points									
I _{CBO(1)}		As in A2	BD131 BDX35 BDX36) BDX37)		10 10 10	μA μA μA			
h _{21E(1)}		As in A2	BD131 BDX35/BDX36/BDX37	40 45					

*Pulsed $t_p = 300 \mu\text{s}$ $\delta \leq 2\%$