

BRITISH STANDARDS INSTITUTION

2, PARK STREET, LONDON, W1A 2BS

Specification available from:— AS SHOWN IN PD 9002,
CECC00200

SGS-ATES(UK) LTD.,

**GRANGEMOUTH ROAD,
FALKIRK, STIRLINGSHIRE.**

TELEPHONE 0324 24949

TELEX 778252

BS CECC 50 004-048



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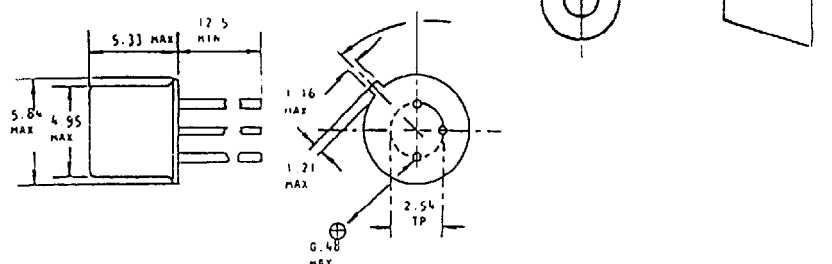
ELECTRONIC COMPONENTS OF ASSESSED QUALITY
DETAIL SPECIFICATION IN ACCORDANCE WITH
BS CECC 50 000:1977

MANUFACTURER'S TYPE NUMBER

C1440

Outline and dimensions

Third angle projection



For detail dimensions see IEC 191-2B11

Equivalent To BS3934 SO-132A JEDEC TO-18

Marking information see clause 3

**For ordering information
see clause 5**

AMBIENT RATED
SWITCHING
BIPOLAR TRANSISTORS

NPN SILICON PLANAR
EXPTAXIAL TRANSISTOR
IN HERMETICALLY SEALED
METAL CASE

ASSESSMENT LEVEL F AND SCREENING
SEE FLOW CHARTS IN CLAUSE 6

1. LIMITING VALUES (absolute system)

		Min.	Max.	Unit
T_{amb}	Ambient operating temperature range	-55	+175	$^{\circ}C$
T_{stg}	Storage temperature range	-55	+200	$^{\circ}C$
V_{CBO}	Maximum collector-to-base continuous (direct) voltage		45	V
V_{CEO}	Maximum collector-to-emitter continuous (direct) voltage with zero base current		45	V
V_{EB0}	Maximum emitter-to-base continuous (direct) voltage		5	V
I_C	Maximum continuous collector current		250	mA
I_B	Maximum continuous base current		5	mA
P_{tot}	Maximum total power dissipation at an ambient temperature of $25^{\circ}C$ (See derating curve Figure 1).		360	mW

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



Documents

Document Sharing Hub

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2. CHARACTERISTICS.

 $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated.

PARAMETER AND TEST CONDITIONS			MIN.	MAX.	UNITS
h_{21E}	MINIMUM STATIC VALUE OF COMMON-EMITTER FORWARD-CURRENT TRANSFER RATIO				
$h_{21E(1)}$	$I_C = 1 \text{ mA}$	$V_{CE} = 0.4 \text{ V}$	175	500	-
$h_{21E(2)}$	$I_C = 10 \text{ A}$	$V_{CE} = 0.4 \text{ V}$	40	-	-
$h_{21E(3)}$	$I_C = 10 \text{ mA}$	$V_{CE} = 0.4 \text{ V}$	225	550	-
V_{CEsat}	MAXIMUM COLLECTOR-EMITTER SATURATION VOLTAGE				
$V_{CEsat(1)}$	$I_C = 10 \text{ mA}^*$	$I_B = 0.5 \text{ mA}$	-	0.25	V
$V_{CEsat(3)}$	$I_C = 100 \text{ mA}^*$	$I_B = 5 \text{ mA}$	-	0.6	V
V_{BEsat}	MAXIMUM BASE-EMITTER SATURATION VOLTAGE				
$V_{BEsat(1)}$	$I_C = 10 \text{ mA}^*$	$I_B = 1 \text{ mA}$	-	0.9	V
$V_{BEsat(2)}$	$I_C = 50 \text{ mA}^*$	$I_B = 2.5 \text{ mA}$	-	1.6	V
I_{CBO}	MAXIMUM COLLECTOR-BASE CUT-OFF CURRENT WITH THE BASE SHORT CIRCUITED TO THE EMITTER				
$I_{CBO(1)}$	$V_{CB} = 30 \text{ V}$		-	100	nA
$I_{CBO(2)}$	$V_{CB} = 30 \text{ V}$	$T_{amb} = 100^{\circ}\text{C}$	-	15	μA
I_{EBO}	MAXIMUM EMITTER-BASE CUT-OFF CURRENT				
	$V_{EB} = 5 \text{ V}$		-	0.5	mA
$V_{CE0(sus)}$	MINIMUM COLLECTOR EMITTER SUSTAINING VOLTAGE				
	$I_C = 10 \text{ mA}^*$		45	-	V

* Measured under pulse conditions: Pulse length = 300 μs , duty cycle = 1%

2. CHARACTERISTICS.

 $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated.

PARAMETER AND TEST CONDITIONS		MIN.	MAX.	UNITS
V_{BE}	BASE-EMITTER VOLTAGE $I_C = 2 \text{ mA}$ $V_{CE} = 5 \text{ V}$	0.55	0.7	V
t_s	STORAGE TIME $I_L = 10 \text{ mA}$ $I_{B1} = -I_{B2} = 1.0 \text{ mA}$	-	750	ns
f_T	TRANSITION FREQUENCY $I_C = 10 \text{ mA}$ $V_{CE} = 5 \text{ V}$ $f = 100 \text{ MHz}$	125	-	MHz
C_{22b}	OUTPUT CAPACITANCE $I_E = 0 \text{ V}$ $V_{CB} = 10 \text{ V}$ $f = 1 \text{ MHz}$	-	6	pF
C_{11b}	INPUT CAPACITANCE $I_C = 0 \text{ V}$ $V_{EB} = 0.5 \text{ V}$ $f = 1 \text{ MHz}$	-	15	pF
$R_{th_{j-amb}}$	THERMAL RESISTANCE JUNCTION TO AMBIENT P_{tot} maximum at 25°C , 0.36 W	-	430	$^{\circ}\text{C/W}$
$R_{th_{j-case}}$	THERMAL RESISTANCE JUNCTION TO CASE P_{tot} maximum at $T_{case} = 25^{\circ}\text{C}$, 1.2 W	-	146	$^{\circ}\text{C/W}$

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3. MARKING

3.1 Each device shall bear the following marking:

- a) Type number
- b) Date code
- c) Manufacturer's trade mark or factory identification code SGF

3.2 Each package containing one or more of these transistors shall bear all the above markings and, in addition, this detail specification number BS CECC 50 004-048 Issue 1 dated AUG 1978

4. RELATED DOCUMENTS

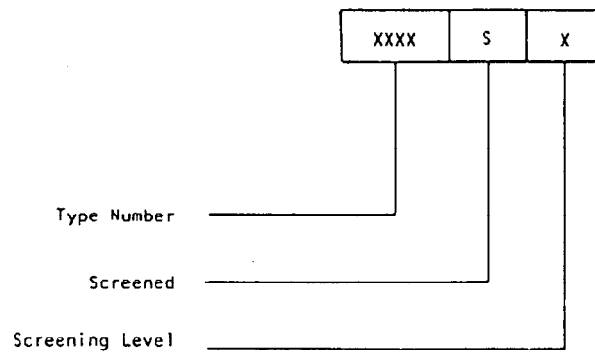
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|----------------------------------|--|
| BS 2011/IEC 68 | 'Methods for the Environmental Testing of Electronic Components and Electronic Equipment'. |
| BS 3934/IEC 191 | 'Dimensions of Semiconductor Devices'. |
| BS E9000/
CECC 00100 to 00113 | 'General Requirements for Electronic Components of assessed quality'. |
| BS E9007/CECC 00 087 | 'Sampling Plans and Procedures for Inspection by Attributes'. |
| BS/CECC 50 000 | 'Harmonised Generic Specification for Discrete Semiconductor Devices'. |
| IEC 147-2 | 'General Principles of Measuring Methods'. |
| PD 9002/CECC 00200 | 'BS 9000 component selection guide'. |

5. ORDERING INFORMATION

Orders for these transistors should contain the following minimum information:

- a) The device type number and this detail specification number.
- b) The quantity required.
- c) Screening levels. (See Flow Chart Clause 6 and Clause 5a).

INTERPRETATION OF MANUFACTURERS TYPE NUMBER



Key:

Type Number:- e.g:-

S = Screened

(Blank indicates Assessment Level F)

Screening Level (See Flow Chart)

A = Screening Level A

B = Screening Level B

C = Screening Level C

D = Screening Level D

TABLE 1

MANUFACTURERS REFERENCE

C1440	to BS CECC 50 004-048	Issue 1	Dated 1 AUG 1978
C1440 SA	to BS CECC 50 004-048	Issue 1	Dated 1 AUG 1978
C1440 SB	to BS CECC 50 004-048	Issue 1	Dated 1 AUG 1978
C1440 SC	to BS CECC 50 004-048	Issue 1	Dated 1 AUG 1978
C1440 SD	to BS CECC 50 004-048	Issue 1	Dated 1 AUG 1978

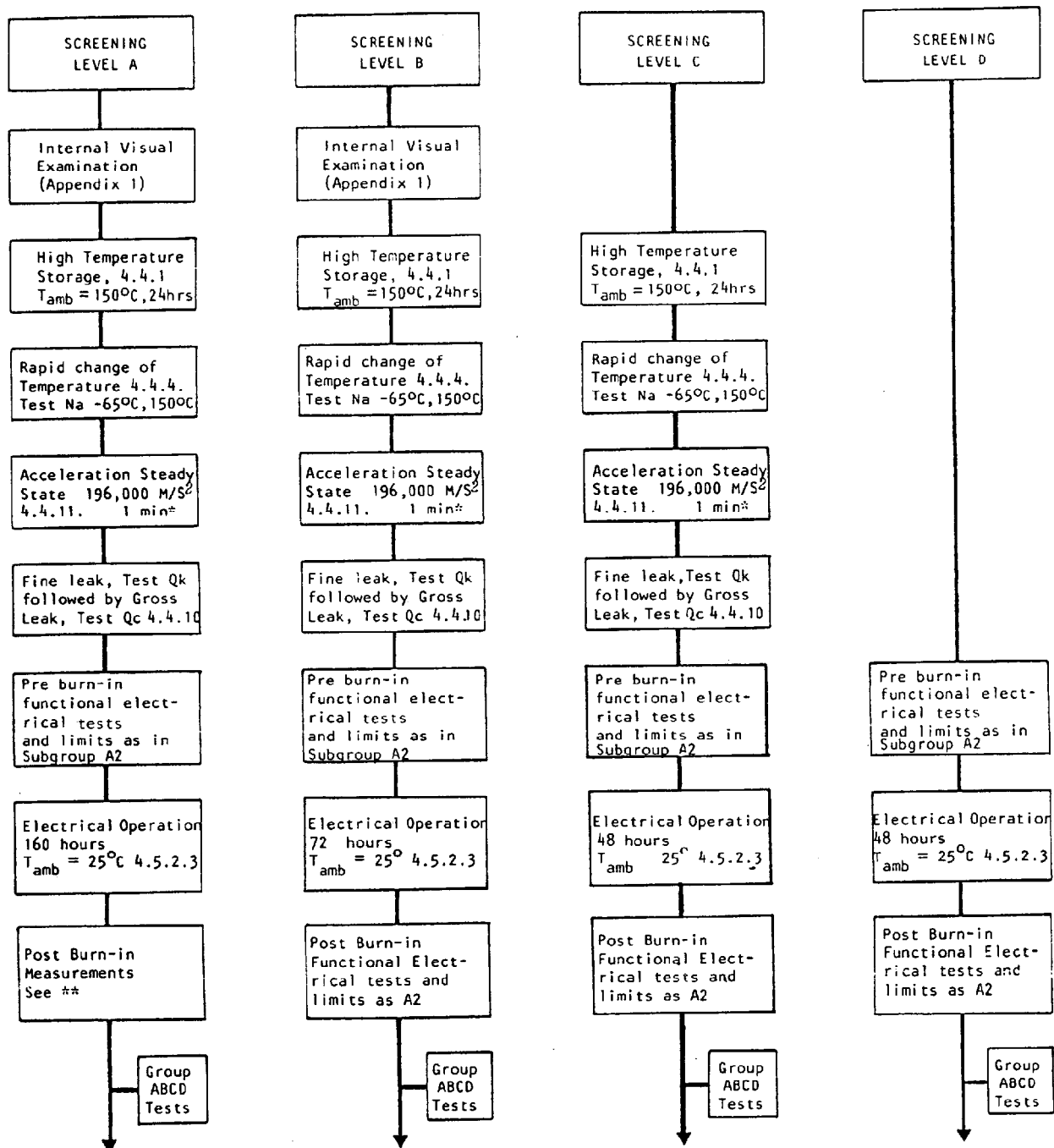
* MARKING

C1440
C1440 SA
C1440 SB
C1440 SC
C1440 SD

* Not for ordering purposes.

6. SCREENING LEVELS FOR DISCRETE DEVICES

If during tests after Burn-In more than 10% defectives are found the production lot will be rejected.
(All references to CECC 50 000)



* Case mounted leads inwards.

** Post burn-in rejection criteria

- Reject devices failing Subgroup A2 limits.
- Reject devices having changes from the pre burn-in measurements of greater than the following:-
 h_{21E} or h_{21E}' or V_{CESat} $\pm 20\%$
 Leakage or cut-off current + 100% or 5 na whichever is the greater.