

# Transistors

## N-P-N silicon low/medium power transistors (cont.) book 1 parts 1 and 2

Type No.	Outline	Dwg. ref.	V <sub>CB0</sub> (V)	V <sub>CE0</sub> (V)	I <sub>CM</sub> (A)	I <sub>C(AV)</sub> (A)	T <sub>j</sub> (°C)	P <sub>tot</sub> at 25°C (mW)	h <sub>FE</sub> min.	h <sub>FE</sub> max.	I <sub>c</sub> (mA)	f <sub>T</sub> min. (MHz)	V <sub>CE(sat)</sub> max. (V)	I <sub>c</sub> (mA)	I <sub>B</sub> (mA)	t <sub>on</sub> (ns)	t <sub>off</sub> (ns)	Special Features at I <sub>c</sub> (mA)
<b>GENERAL PURPOSE</b>																		
BC337	TO-18	BB1	50	45	1.0	0.5	150	625	100	600	100	200*	0.7	500	50			
BC338			30	25														
§BCX31	SOT-25	Y1	100	80	1.0	0.5	150	730	30	75*	150	80	0.8	500	50			
§BCX32			80	60	2.0	1.0			90	120*			1.6	1.0A	100			
§BCX33			60	40	2.0	1.0			30	75*			1.6	1.0A	100			
§BCX34			40	30	2.0	1.0			90	120*			1.6	1.0A	100			
§BFX84	TO-39	AV3	100	60	1.0	1.0	200	800	30	—	150	50	0.35	150	15			
§BFX85			100	60					70									
§BFX86			40	35					70									
§BFY50	TO-39	AV3	80	35	1.0	1.0	200	800	30	—	150	60	0.2	150	15			
§BFY51			60	30					40			50	0.35					
§BFY52			40	20					60			50	0.35					
BFY53			40	20					30			50	0.35					
BF422	TO-18	BB5	250	250	0.1	0.02	150	830	50	—	25	60	—	—	—	—	—	C <sub>re</sub> < 1.6F at 0.5MHz
BF336	TO-39	AV3	185	180	—	0.1	200	3.0W <sup>1)</sup>	20	—	30	80	—	—	—	—	—	C <sub>re</sub> = 3.5 pF max. at 0.5 MHz
BF337			250	200														
BF338			300	225														
BF356	TO-39	AV3	300	225	0.16	0.1	200	3.0W <sup>1)</sup>	—	—	—	—	25	160	10			Line-driver in tv receivers
§BSX45	TO-39	AV3	80	40	—	1.0	200	5W <sup>2)</sup>	40	250	100	50	1.0	1A	100	200	850	100
§BSX46			100	60					40	250			1.0	1A	100			
§BSX47			120	80					40	160			0.9	500	25			
BFQ38	TO-39	AV3	300	250	—	1.0	125	5.7W <sup>2)</sup>	25	—	50	10	0.5	50	4			For telephony and similar applications
BFQ39			300	300									1.0	100	4			
BFQ40			450	350									0.5	50	4			
2N696	TO-39	AV3	60	40	0.5	—	175	600	20	60	150	40	1.5	150	15			
2N697									120	150								
2N1613	TO-39	AV3	75	30	0.5	—	200	800	40	120	150	60*	1.5	150	15			
2N1711	TO-39	AV3	75	30	1.0	—	200	800	100	300	150	70*	1.5	150	15			
2N2297	TO-39	AV3	80	35	—	1.0	200	800	40	120	150	60*	0.2	150	15			
2N3019	TO-39	AV3	140	80	—	1.0	200	800	100	300	150	100	0.5	500	50			
2N3020									40	120		80						Gain linearity
2N3053	TO-39	AV3	60	40	—	0.7	200	5.0W	50	250	150	100	1.4	150	15			

1) T<sub>case</sub> ≤ 140°C

2) T<sub>case</sub> = 25°C

\*Typical

§Also available to BS9000 (see page 7)

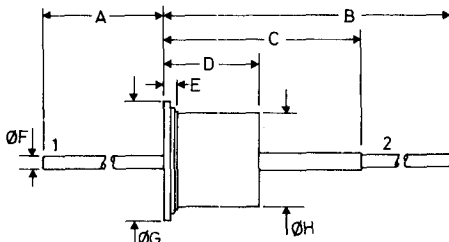
continued

# OUTLINES and DIMENSIONS (millimetres)

**A**

B.S.3934 SO-16

DO-1  
DO-2  
DO-3

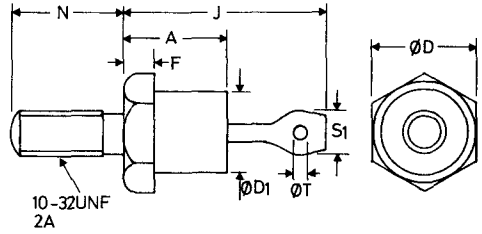


	1	2	A	B	C	D	E	ØF	ØG	ØH
	min.	min.	min.	min.	min.	max.	max.	max.	max.	max.
A1	a	k	35	51	17	7.7	1.6	1.1	9.6	7.1
A2	k	a	35	49	17	8.5	1.9	1.1	9.7	7.1
A3	k	a	35	51	17	7.7	1.6	1.1	9.6	7.1

**B**

B.S.3934 SO-10

DO-4



A 10.3 max.  
ØD 11.1 max.  
ØD1 9.3 max.  
F 3.2

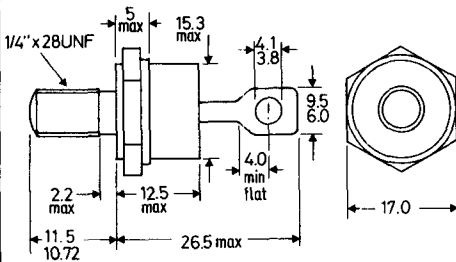
J 20.3 max.  
N 11.5 max.  
S1 4.8 max.  
ØT 1.6 min.

	Stud	Eyelet
B1	k	a
B2	a	k

**C**

B.S.3934 SO-13

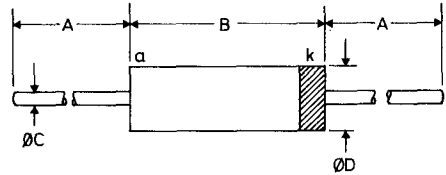
DO-5



	Stud	Eyelet
C1	k	a
C2	a	k

**D**

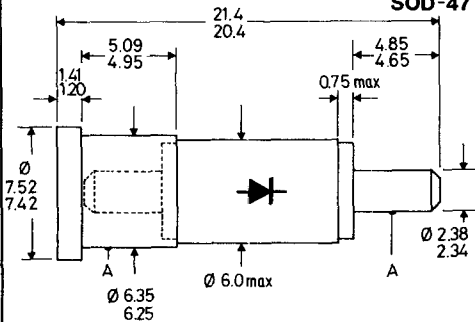
DO-7  
DO-14  
DO-15



		A	B	ØC	ØD
		min.	max.	nom.	max.
D1	DO-7	25.4	7.6	0.52	2.5
D2	DO-14	25.4	7.6	0.5	3.3
D3	DO-15	25.4	6.4	0.8	3.2

**E**

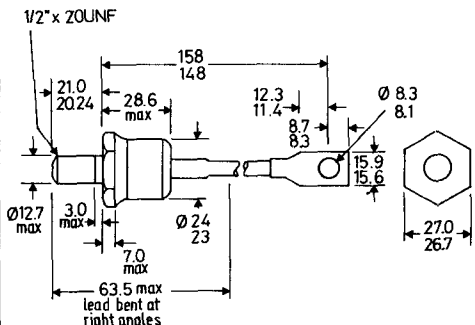
DO-22  
SOD-47



A = concentricity tolerance = ± 0.20

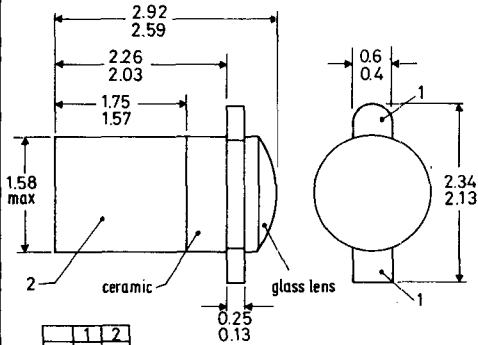
**F**

DO-30



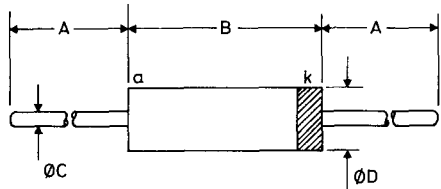
BZW86 Blue sleeve - anode to eyelet  
BZW86R Red sleeve - anode to stud

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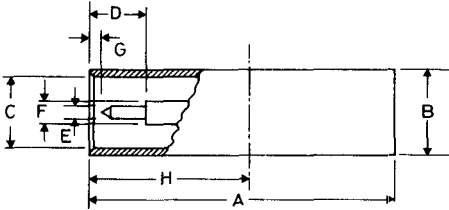
**G****DO-31**

	1	2
G1	k	a
G2	e	c

For LED's the overall length = 3.60/2.97

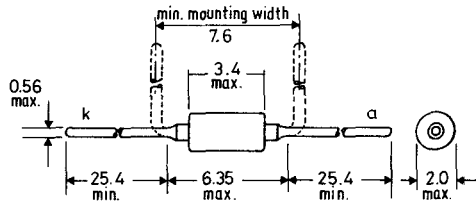
**H****DO-35**

A	B	ØC	ØD
min.	max.	max.	max.
25.4	4.25	0.56	1.85

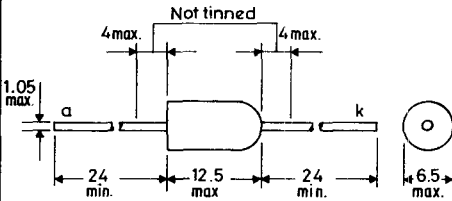
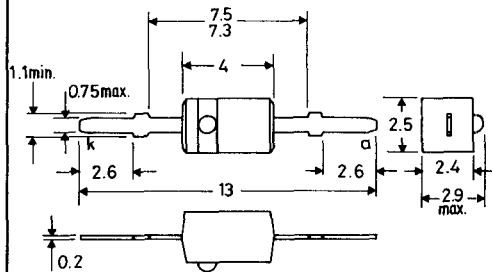
**J****DO-37  
SOD-49**

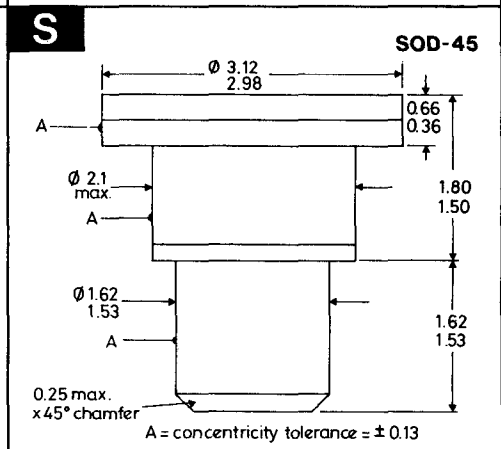
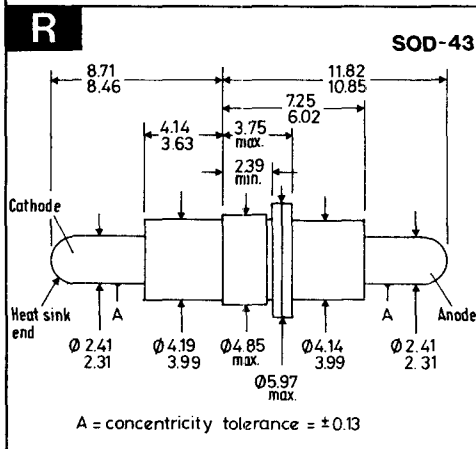
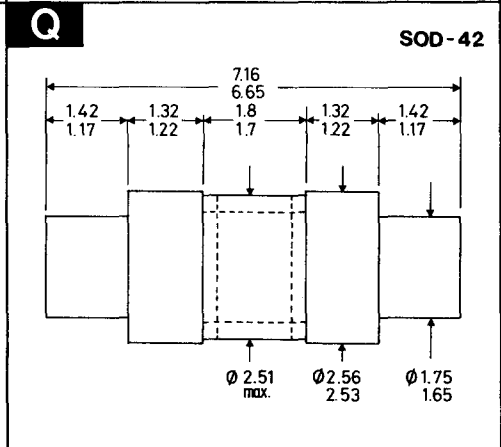
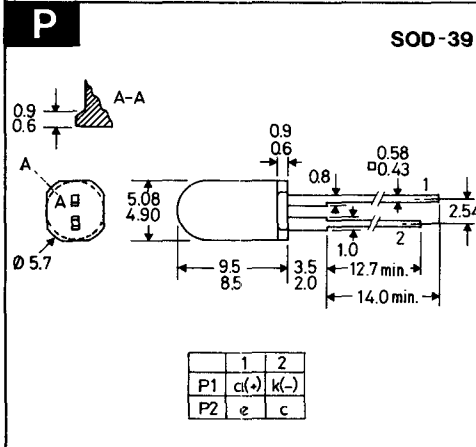
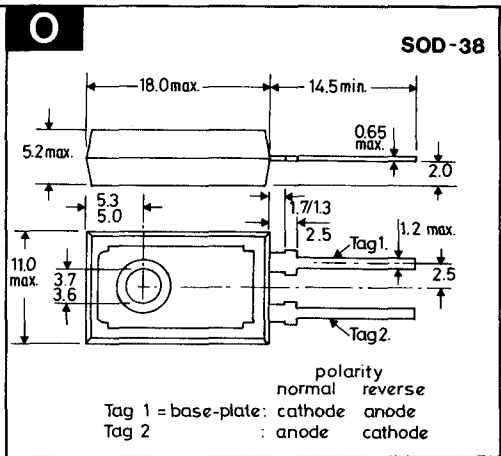
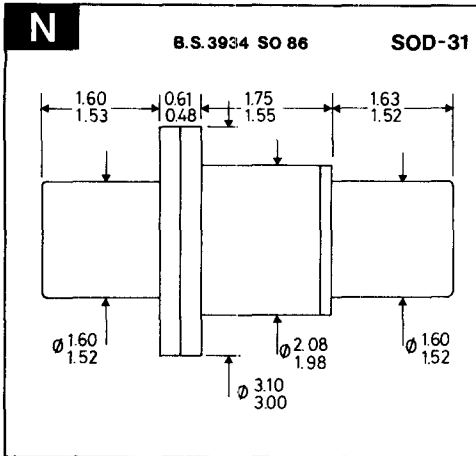
A	19.43/18.67	ØE	0.84/0.79
ØB*	5.59/5.49	ØF	1.57/1.52
ØC	4.80/4.72	G	0.71/0.15
D	3.73 min.	H	10.32 nom.

\*These tolerances apply only over H

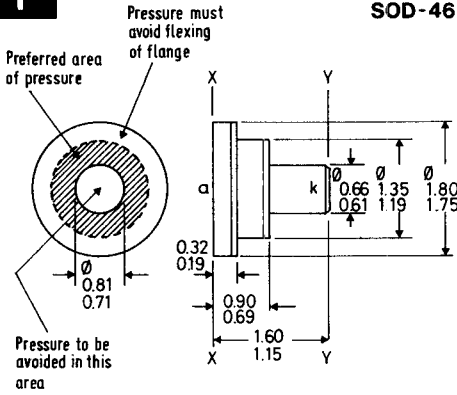
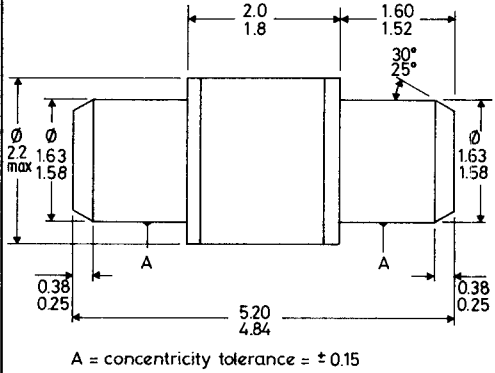
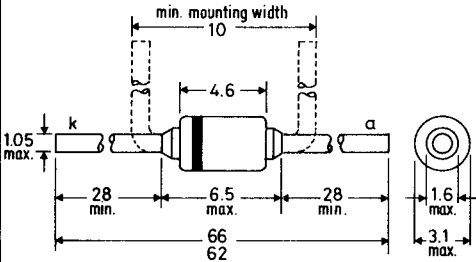
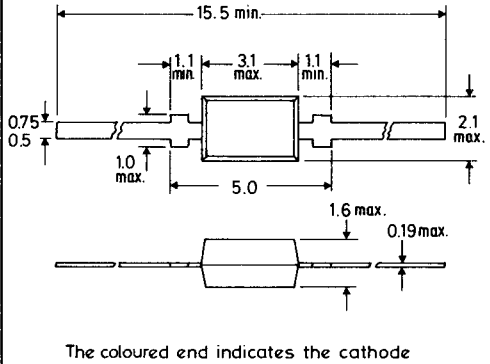
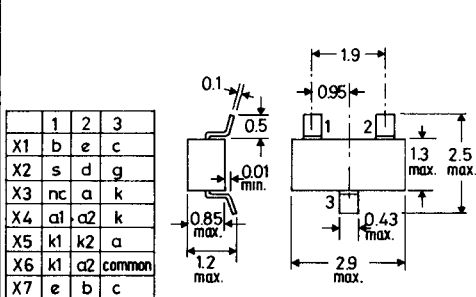
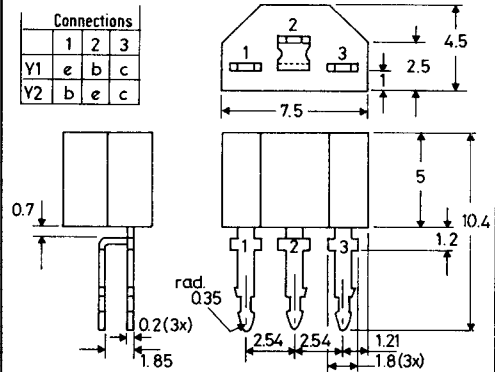
**K****SOD-17**

Cathode indicated by the broad band of colour code

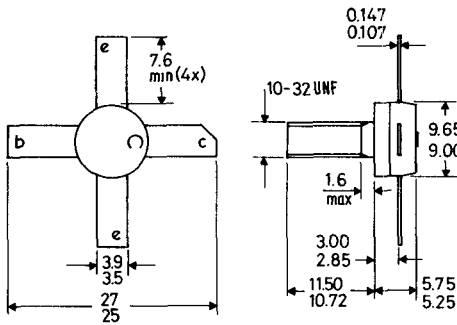
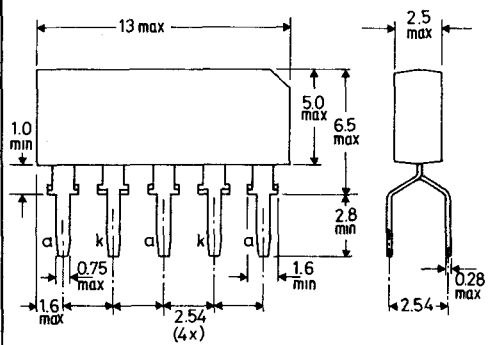
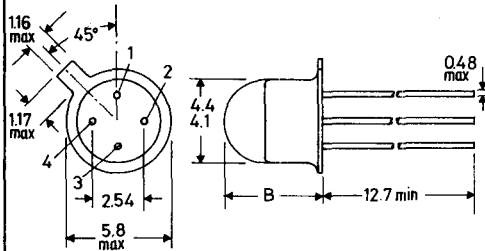
**L****SOD-18****M****SOD-23**



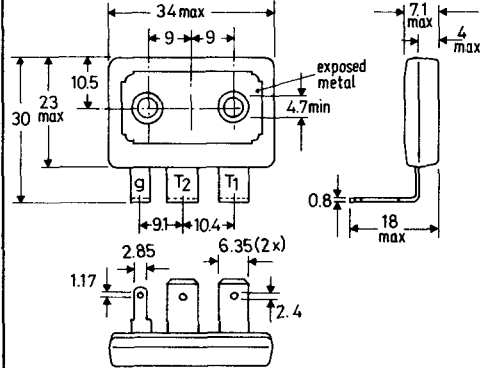
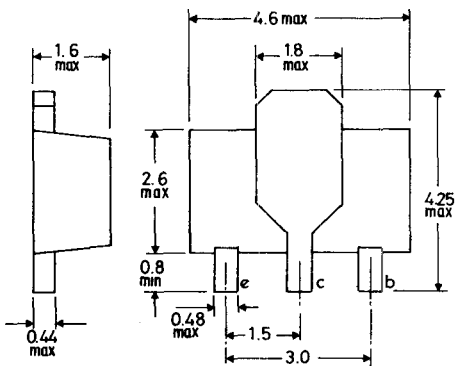
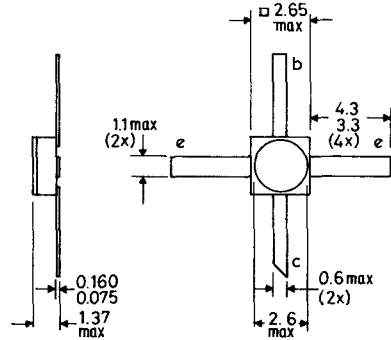
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**T****SOD-46****U****SOD-50****V****SOD-51****W****SOD-52****X****SOT-23****Y****SOT-25**



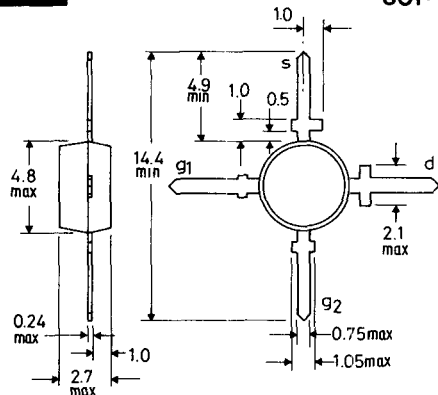
**AH****SOT-56****AJ****SOT-60****AK****SOT-70**

	1	2	3	4	B max
AK1	a	—	k	—	5.08
AK2	e	b	c	—	4.5
AK3	Vp	IP	GND	OP	5.08

**AL****SOT-80****AM****SOT-89****AN****SOT-100**

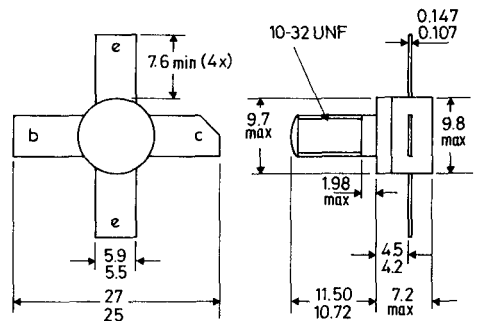
# AO

SOT-103



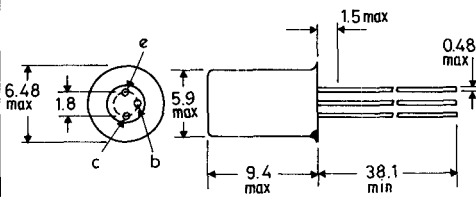
# AP

SOT-105



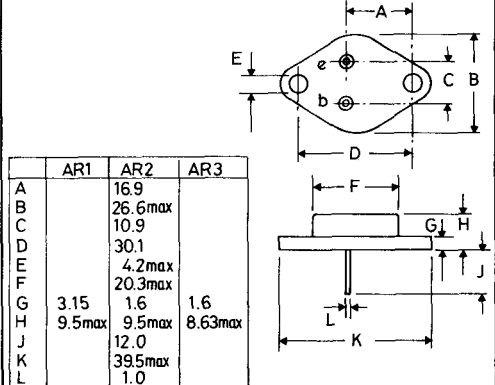
# AQ

B.S.3934 SO-21/SB3-10 TO-1



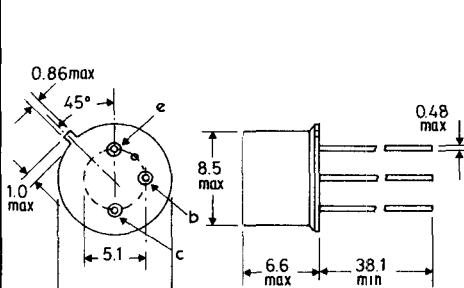
# AR

B.S.3934 SO-5B/SB2-2 TO-3



# AS

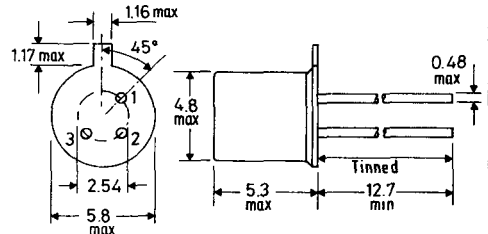
B.S.3934 SO-3/SB3-3B TO-5



AS1: collector connected to case  
AS2: base connected to case

# AT

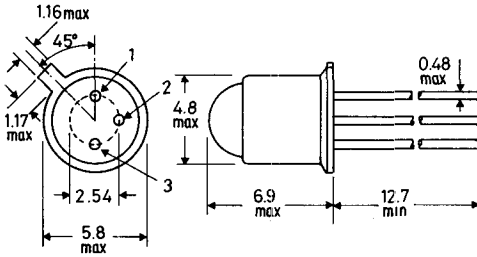
B.S.3934 SO-12A/SB3-6A TO-18



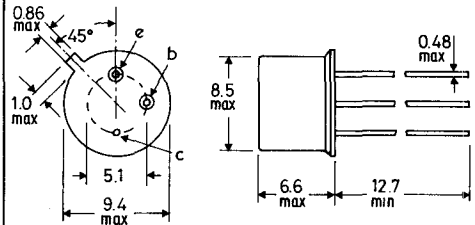
	1	2	3
AT1	e	b	c + env.
AT2	s	d	g + env.
AT3	d	g	s + env.
AT4	k	-	a
AT5	a	-	k
AT6	k	-	a

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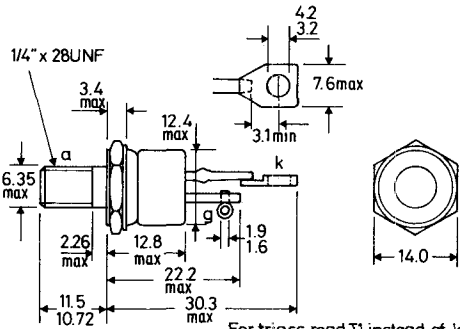
**AU****TO-18**  
(with lens)

	1	2	3
AU1	a	a	k
AU2	e	b	c+case
AU3	k	-	a

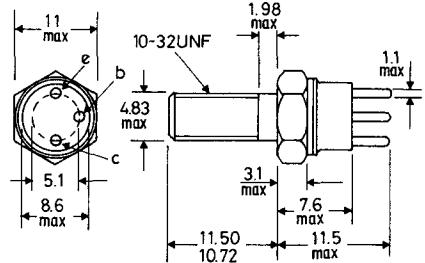
**AV****B.S.3934 SO-3/SB3-3A TO-39**

AV1: b+case  
 AV2: case isolated  
 AV3: c+case  
 AV4: e.cathode  
       b.gate  
       c.anode+case

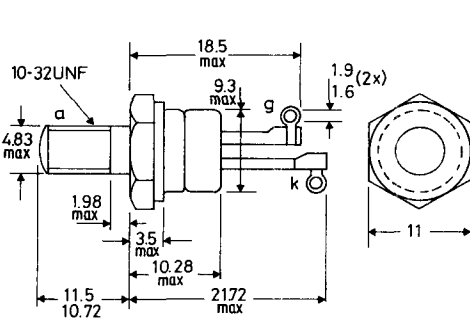
AV5: e.b. cell connections  
 c. metal case  
 AV6: red spot indicates  
       +ve connection

**AW****B.S.3932 SO-36 TO-48**

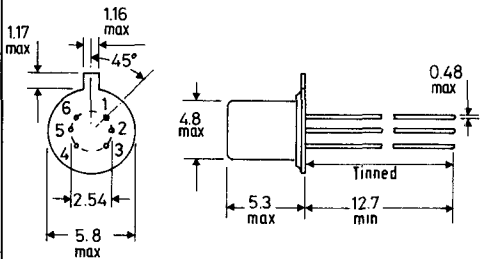
For triacs read T1 instead of k  
 T2 instead of a

**AX****TO-60**

Emitter connected to envelope

**AY****B.S.3934 SO-35A TO-64**

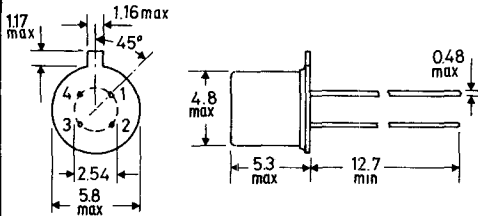
For triacs read T1 instead of k  
 T2 instead of a

**AZ****TO-71**

Pin	1	2	3	4	5	6
AZ1	e1	e2	c2	b2	b1	c1
AZ2	s1	d1	g1	s2	d2	g2

**BA**

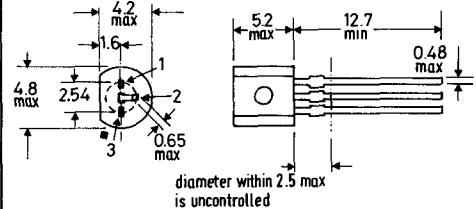
B.S.3934 SO-12A/SB4-3 TO-72



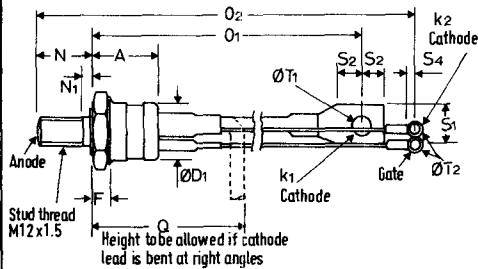
	1	2	3	4
BA1	b	e	c	s+envelope
BA2	e	b	c	s+envelope
BA3	s	d	g	screen+envelope
BA4	d	g	g	s+b+envelope
BA5	d	s	g	b+envelope
BA6	k	gk	ga	a

**BB**TO-92  
variant

Pin	1	2	3
BB1	e	b	c
BB2	b	e	c
BB3	d	s	g
BB4	g	a	k
BB5	b	c	e

**BC**

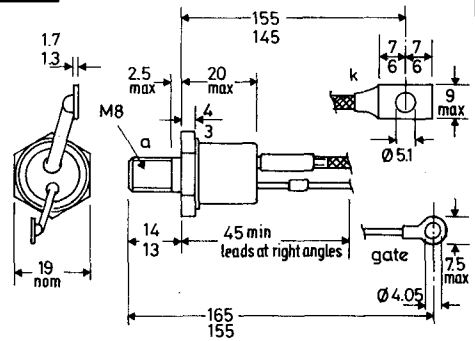
B.S.3934 SO-30C TO-94



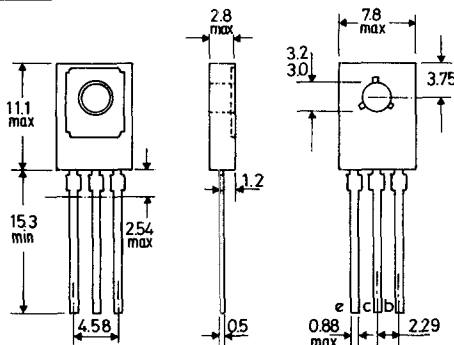
A	28.5max	O1	158 max	S4	3.8 min
ØD1	24.1max	O2	190max	ØT1	8.3max
F	8.9max	Q	63.5max	ØT2	4.2max
N	21.0max	S1	16.5max		
N1	3.0max	S2	9.6min		

**BD**

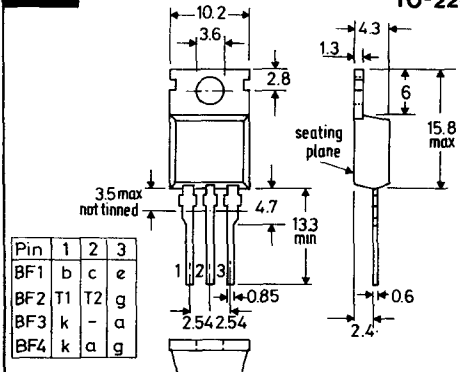
TO-103

For triacs read T1 instead of k  
T2 instead of a**BE**

TO-126

**BF**

TO-220



Pin	1	2	3
BF1	b	c	e
BF2	T1	T2	g
BF3	k	-	a
BF4	k	a	g

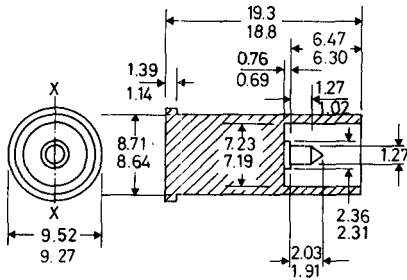
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# BN

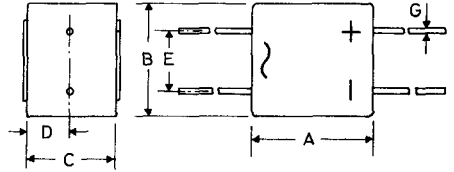
B.S.3934

SO-26

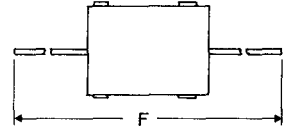


(All dimensions max.)

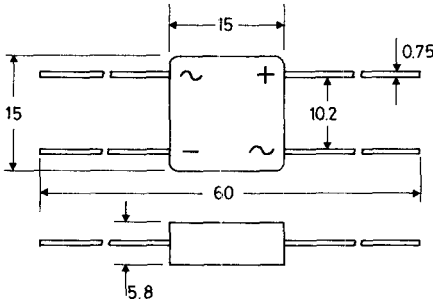
# BO



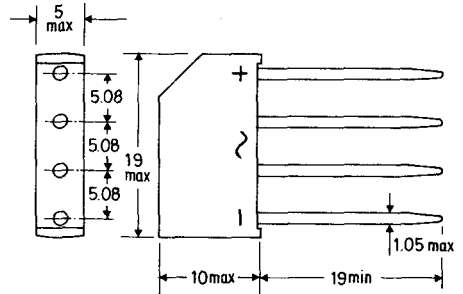
	BO1	BO2	BO3
A	12	20	12
B	10	19	10
C	8	15	8
D	4	7.5	4
E	5	10	5
F	58	60	48
G	0.75	1.0	1.1



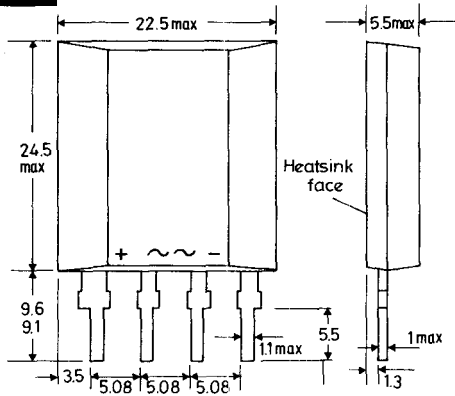
# BP



# BQ

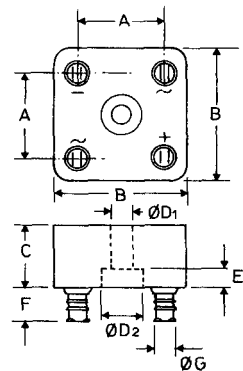


# BR



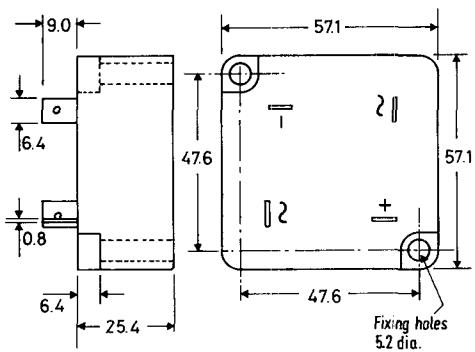
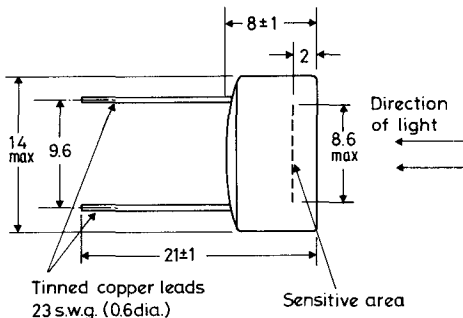
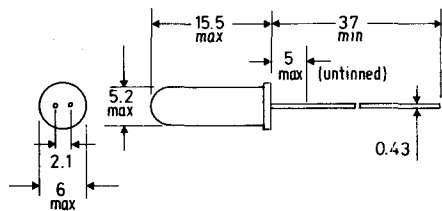
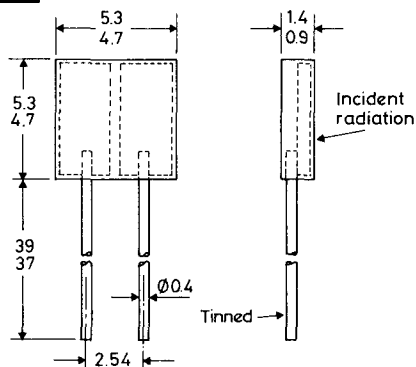
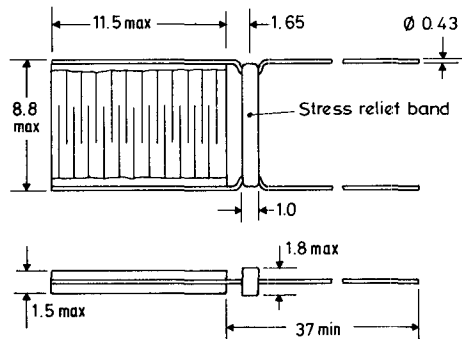
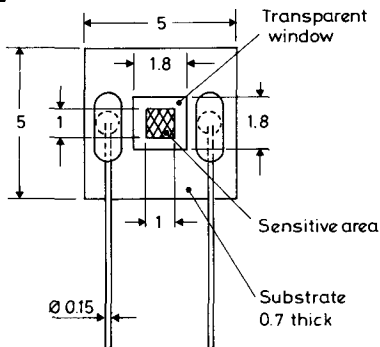
# BS

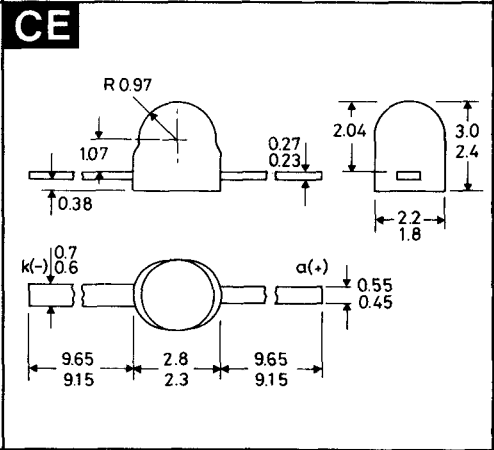
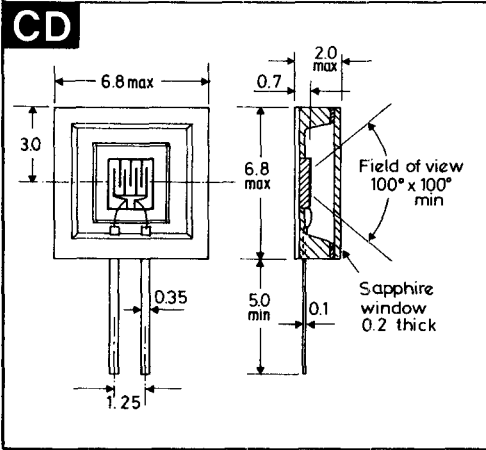
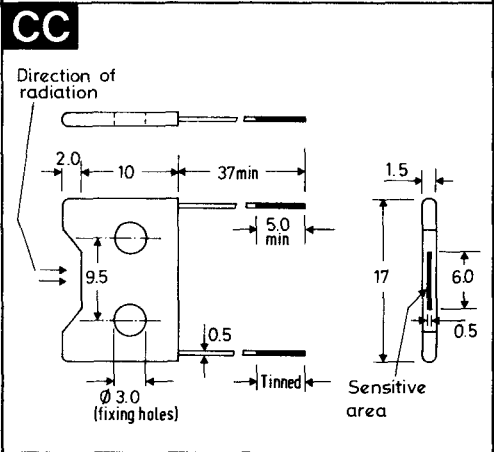
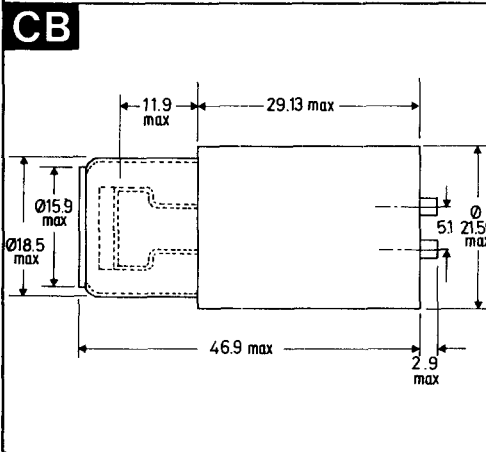
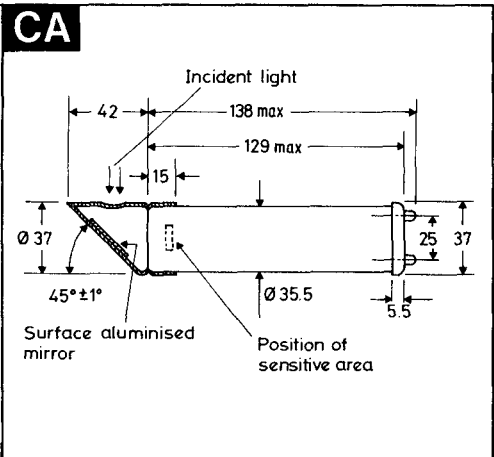
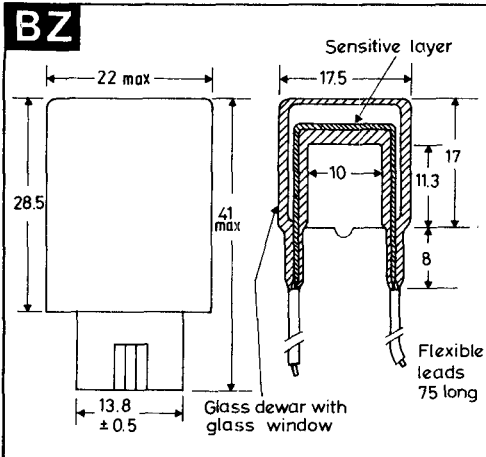
B.S.3934 SO-67



	BS1	BS2
	typ.	max.
A	23	21
B	35	34.6
C	17	15.2
Ø D1	5	5.05
Ø D2	11	11
E	5	3.7
F	9	9
Ø G	4.8	4.8

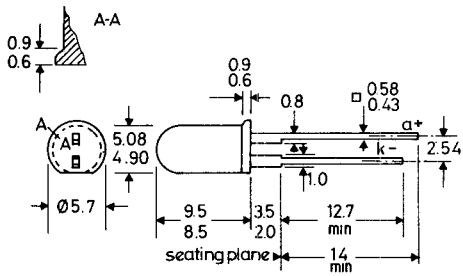
These drawings give limited information for quick reference purposes. For equipment design more complete information should be obtained from individual data sheets in the Technical Handbook or from standard B.S. or JEDEC outline drawings.

**BT****BU****BV****BW****BX****BY**

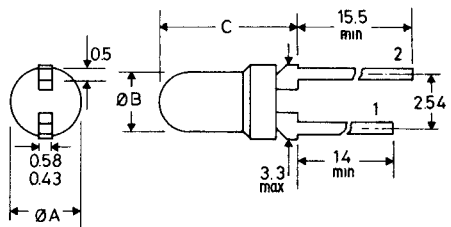


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# CF

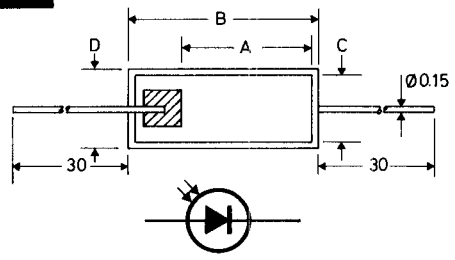


# CG



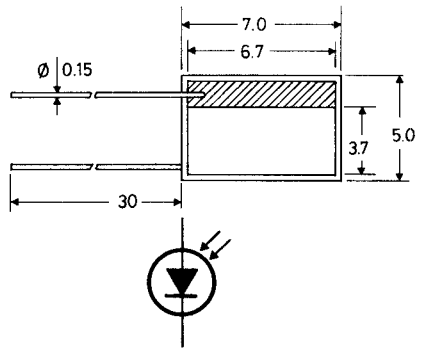
	1	2	$\varnothing A$	$\varnothing B$	C
CG1	k(-)	$\alpha(+)$	3.0-3.17	2.4-2.6	5.8-6.3
CG2	$\alpha(+)$	k(-)	3.0-3.17	2.4-2.6	5.8-6.3
CG3	k(-)	$\alpha(+)$	3.3 max	2.65-3.17	4.8-6.3

# CH

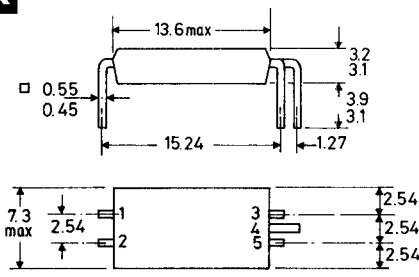


	CH1	CH2
A	2.2	3.5
B	3.35	4.55
C	0.95	1.85
D	1.25	2.15

# CJ

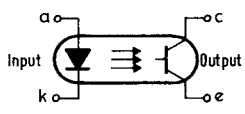
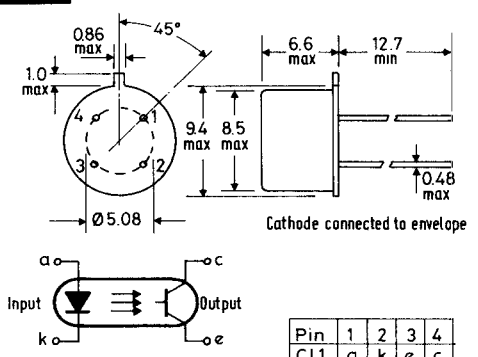


# CK



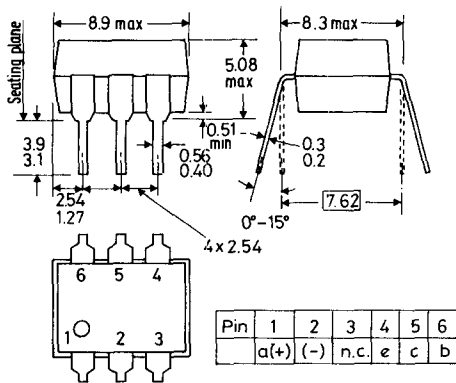
Pin	1	2	3	4	5
CK1	a	k	b	c	e
CK2	k	a	e	omitted	c

# CL

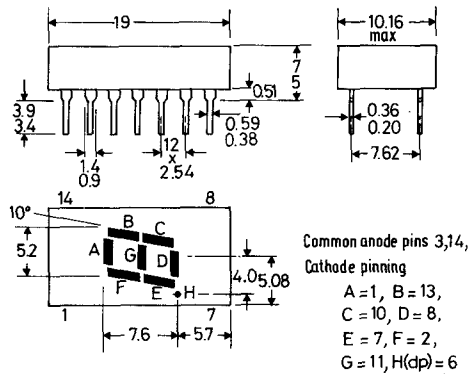


Pin	1	2	3	4
CL1	a	k	e	c
CL2	e	c	a	k

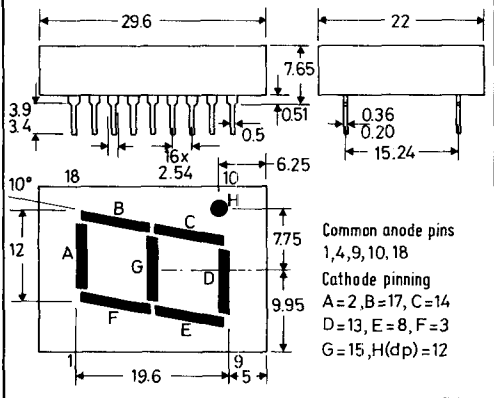
# CM



# CN



# CO



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