

MILITARY SPECIFICATION
CV 7535
 SEMICONDUCTOR DEVICE, DIODE

Description:- This specification covers the detail requirements for a Silicon coaxial resistive switching diode and is in accordance with K1007, except where otherwise stated.

Mechanical Dimensions and Outlines:- See page 11 (Also Note A this page)

Polarity:- Red mark on body indicates positive polarity of pin for forward bias.

Absolute Maximum Ratings:

Device	Rating	T _{amb}	T _{stg}	V _R	I _R	I _F	P _{tot}	P _{pk}	Shock	Vib
	Unit	°C	°C	V	mA	mA	W	W	g	g
CV7535	Min	-	-55	-	-	-	-	-	-	-
	Max	100	120	-50	-5	75	1	50	100	10
Note							B	C		

Note A. When plugged into a holder contact is made to the open face shown in plane AA' of the diode outline drawing on Page 11.

B. The maximum value quoted is the total power dissipation inclusive of that contributed by the d.c. switching.

C. The quoted value is the maximum value of incident power which may be applied to the diode when the mismatch in the coaxial mount presents a v.s.w.r. greater than 10:1 and when the r.f. pulse width does not exceed 10µsecs.

It is recommended that a small negative bias of about 5 volts be applied to the diode when it is used to switch power values which approach the maximum in order to reduce the effect of possible admittance changes.

Where the mismatch provides a v.s.w.r. less than 10:1 the maximum power value or pulse width must be reduced, for example should the diode present a matched condition the pulse width must not exceed 4 µsecs for an incident power level of 50 watts.

CV 7535

Primary Electrical Characteristics:-

Characteristic	I_F	V_R	I_R	V_F	Freq. Range	t_p	v.s.w.r.	v.s.w.r.
Unit	mA	V	mA	V	Mc/s	μ s	Ratio	Ratio
Min	-	-	-	-	1000	-	-	
Max	75	-50	-5	1.2	11,000	0.5	0.1	0.1
Note				D.	E.	F.	G,H	G,J

Note D. At 50mA. (A typical value at 50mA forward current is 0.85 volts).

E. The actual frequency band over which the diode operates will depend on the design of the mount used. With a suitable mount, switching discrimination greater than 20dB may be obtained. Typical operating characteristics are given on page 4.

F. The switching time quoted is that obtained when switching over 15dB range with diode set up in a suitable holder.

G. As measured in a coaxial-type holder previously adjusted for unity v.s.w.r. when terminated by a matched 67 ohms coaxial load.

H. At zero bias.

J. At 50mA I_F .

Reliability Assurance Requirements:-

Under discussion

Requirements:

Marking The device shall be marked first with the CV number and a polarity marking. The date code shall appear on multiple packs of 100 or more and the manufacturers code on individual packs. Additional marking as K1007, Issue 3, Section B, 1.3.4 shall be on the packing.

Quality Assurance Provisions:

Destructive Tests The tests listed in Table 2, Group B Inspection, Sub Group 3 are considered destructive.

Preparation for Delivery:

Packaging The device shall be packed according to K1007 Issue 3. Section A 1.2.(c). No lead shield is required.

Joint Services Catalogue Number:

CV7535 = 5960-99-037- 3785

This specification has been prepared by, and the Qualification Approval Authority is:-

Ministry of Aviation, Royal Radar Establishment, Malvern, Worcestershire,
England.

7th May 1964

TABLE 1 GROUP A INSPECTION

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym-bol	LIMITS		Units
	K1007/NATC Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u> Visual and Mechanical Inspection	5.1		0.65	I				
<u>SUB GROUP 2</u> Reverse Current	8A.2.2	$P(r.f.) = 0, V_R = -50V$ Notes 1 and 3	0.65	II	I_R	-	5	mA
v.s.w.r. (1)	8B.3.6	$f = 9375 \text{ Mc/s} \pm 25 \text{ Mc/s}$ $V = 0$ $P(r.f.) \leq 100\text{mW}$ Notes 1 and 3				-	0.1	Ratio
v.s.w.r. (2)	8B.3.6	$f = 9375 \text{ Mc/s} \pm 25 \text{ Mc/s}$ $I_o = 50\text{mA}$ $P(r.f.) \leq 100\text{mW}$ Notes 1 and 3				-	0.1	Ratio
Switching Attenuation		$if = 50\text{mA}$ Temp = 15 - 30°C Note 4 and 7				25	-	dB
Normalised Current Limits		Switching Attenuation Temp = 15 - 30°C (i) = 3 dB (ii) = 22.5 dB Note 5 and 7				0.35	0.55	Ratio
Absolute Current Limits		Switching Attenuation = 6dB Temp = 15 - 30°C			if	12.8	22.5	Ratio
						0.20	0.40	mA

TABLE 1. GROUP A INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQI %	Insp. Level	Sym-bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 2</u> (Cont'd) Voltage Transmission Ratio (Self biasing effect)		$P_{in} = 1$ Watt peak 0.3 μ Sec pulse length 1000:1 duty cycle (The bias current shall be that which gives a voltage transmission ratio of 0.9 when measured at low power. $1mW \cdot f = 9375Mc/s \pm 25Mc/s$) Note 6 and 7					0.1	R
Insertion Loss		$V_f = 0$			I.L	0.5	3.0	dB
<u>SUB GROUP 3</u> Omitted			6.5	IA				
<u>SUB GROUP 4</u> Forward Voltage	8A.3.2	$I_F = 50mA, P_{(r.f.)} = 0$			V_F	-	1.2	V
Minimum v.s.w.r.	8B.3.6	$f = 9375 Mc/s \pm 25 Mc/s$ $P_{(r.f.)} \leq 100mW$ $I_0 = 0$ Notes 1, 2 and 3			L_1	1.73	1.97	cms
Position (1)		$I_0 = 50mA$ Notes 1, 2 and 3			L_2	0.93	1.17	cms
Position (2)		Note 9			L_1, L_2	160	200	
Electrical Angle Differential between minima positions L_1 and L_2								

TABLE 2 GROUP B INSPECTION
(See Page 3, Quality Assurance Provisions, Destructive Tests)

Examination or Test	K1007/NATO Ref.	TEST CONDITIONS		AQL %	Insp. Level	Sym-bol	LIMITS		Units
		Specific Conditions					Min.	Max.	
<u>SUB GROUP 1</u> Physical	5.1	As in Drawing Page 11		6.5	IA				
<u>SUB GROUP 2</u> Temperature Cycling	5.5	3 cycles -55°C to 100°C							
Thermal Shock	5.6.2	0°C to 100°C							
Moisture Resistance	5.3.1	Max. Temp. 33°C ± 2°C							
<u>Post Sub-Group 2 Tests</u> Reverse Current	8A.2.2	As in Group A, Sub-Group 2				I _R	-	5	mA
Forward Voltage	8A.3.2	As in Group A, Sub-Group 4		6.5	I	V _F	-	1.2	V
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1.								
<u>Post Sub-Group 3 Tests</u> Reverse Current	8A.2.2	As in Group A, Sub-Group 2				I _R	-	5	mA
Forward Voltage	8A.3.2	As in Group A, Sub-Group 4				V _F	-	1.2	V
<u>SUB-GROUPS 4, 5 & 6</u> Omitted									

TABLE 2 GROUP B INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 7</u> High and Low Temperature Life (Non operating)			6.5	I				
High Temperature	6.2.1	No Voltages. T _{amb} = 120°C				150	-	Hours
Low Temperature	6.2.2	No Voltages. T _{amb} = -55°C				150	-	Hours
Post High and Low Temperature Tests								
v.s.w.r. (1)	8B.3.6	As in Group A. Sub-Group 2				-	0.1	Ratio
v.s.w.r. (2)								
Electrical Angle Differential between minima positions L ₁ and L ₂		As in Group A, Sub-Group 4			∅ L ₁ L ₂	160	200	degs
<u>SUB GROUP 8</u> Operating Life								
	6.3	I ₀ = 80 mA, V _R 40V pk f = 50 c/s T _{amb} at any single temperature between 25°C and 120°C				1000	-	Hours
<u>Life Test end points</u> 500 hours <u>Post Life Tests</u>								
v.s.w.r. (1)	8B.3.6	As in Group A. Sub-Group 2				-	0.1	Ratio
v.s.w.r. (2)	8B.3.6	As in Group A. Sub-Group 2				-	0.1	Ratio

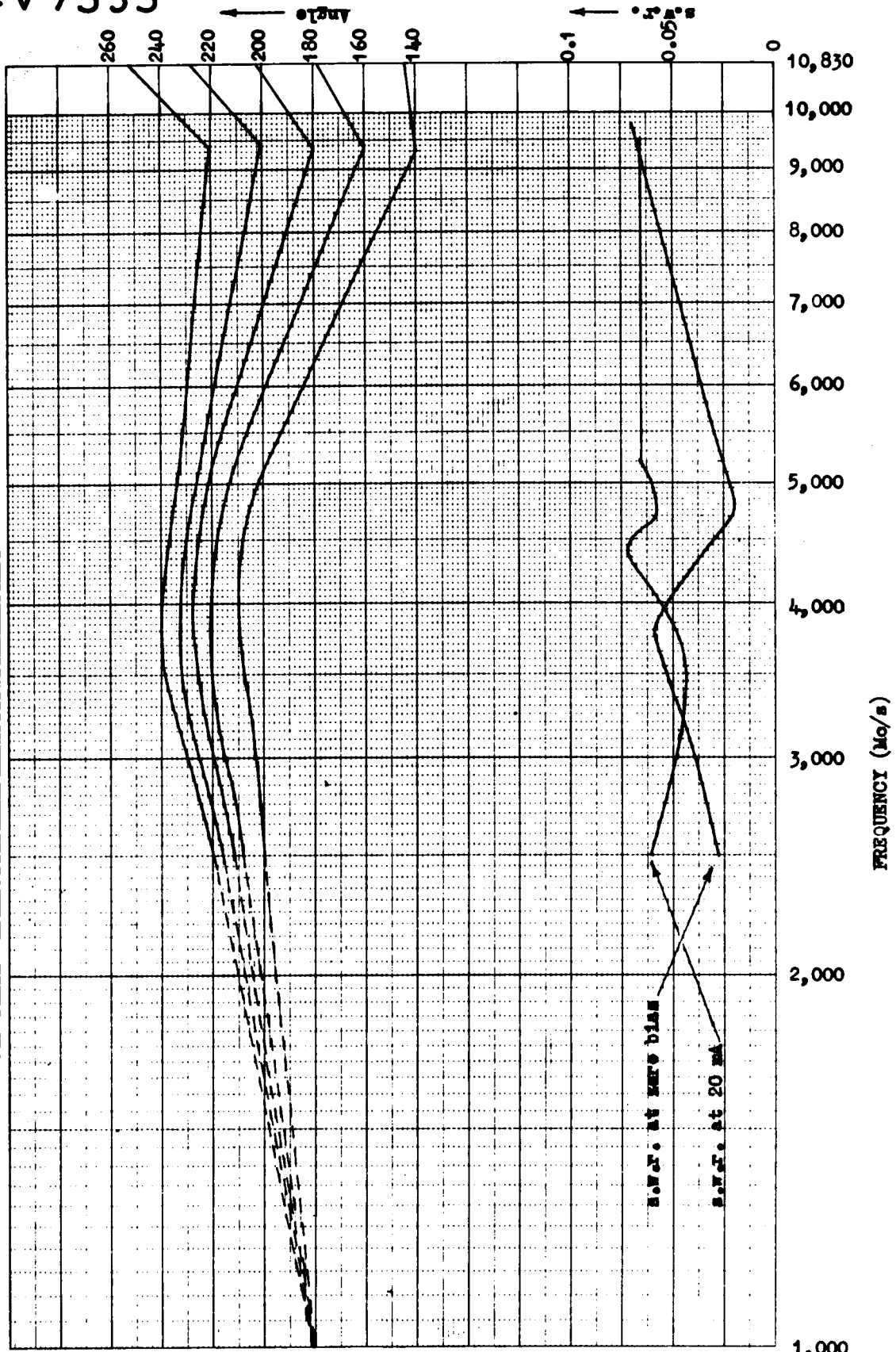
TABLE 3 GROUP D INSPECTION

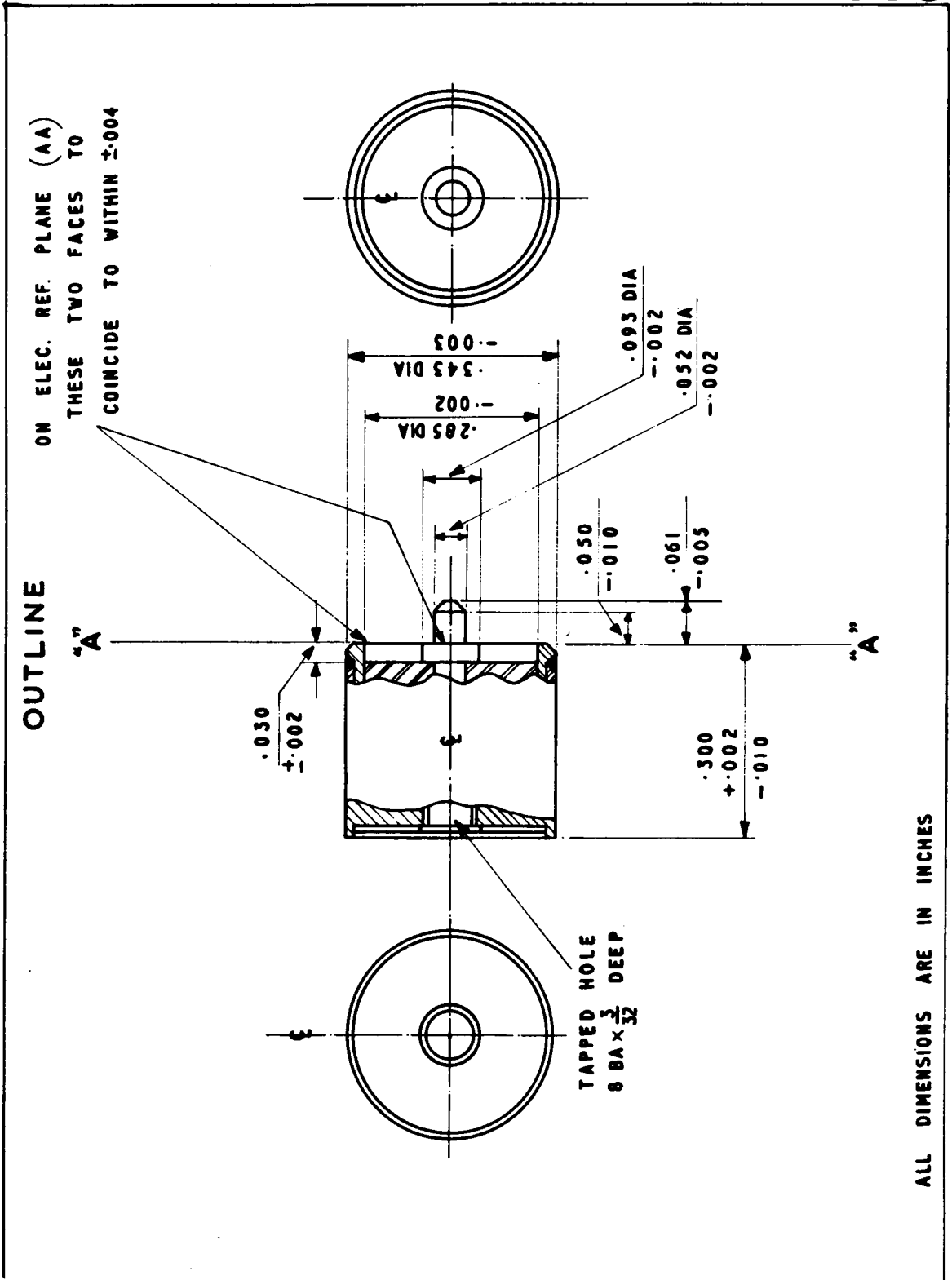
Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>Sub Group 1</u> Retest after 28 days holding period v.s.w.r (1) v.s.w.r (2) <u>Electrical Angle</u> <u>Differential</u> between measured minima positions L_1 and L_2		GROUP C OMITTED		100%				
	8B.3.6	As in Group A Sub Group 2		-		0.1	Ratio	
	8B.3.6	As in Group A Sub Group 2		-		0.1	Ratio	
		As in Group A Sub Group 4		ϕ_{L_1, L_2}				

NOTES

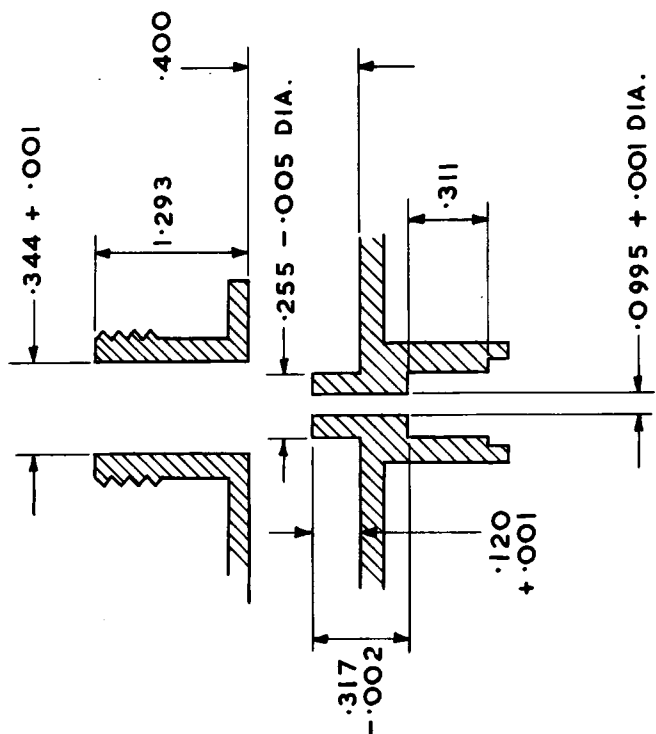
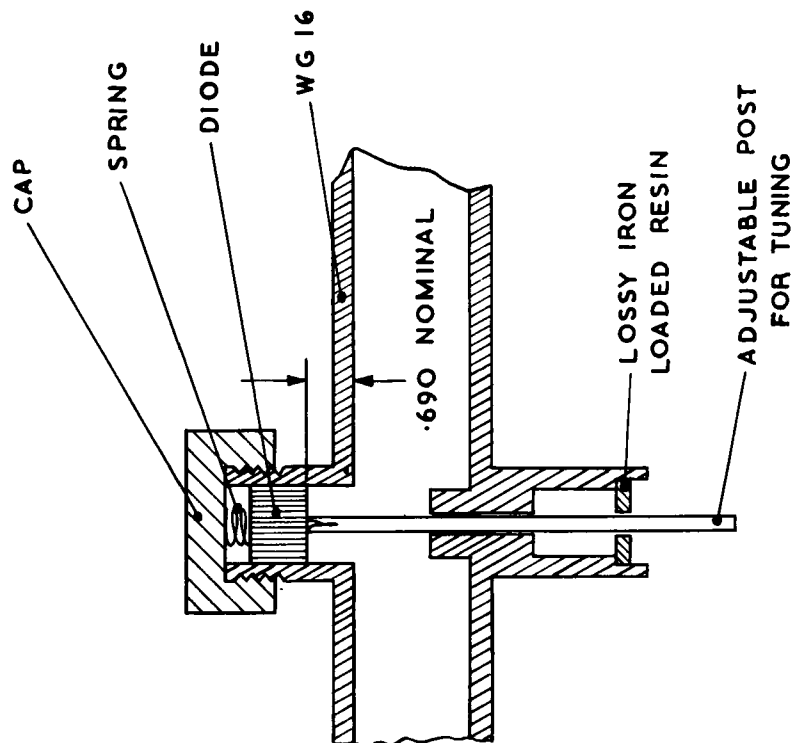
1. All r.f. measurements shall be made in a coaxial type holder which has previously been adjusted to unity v.s.w.r. when terminated by a matched 67 ohm coaxial load.
2. The minimum position to be measured in a direction towards the load from the plane 'AA' as given in the outline drawing page 11.
3. Applied d.c. source resistance not greater than 50 ohms.
4. The switching attenuation is measured relative to the attenuation for zero bias.
5. The current is normalised to that required for 6dB switching attenuation.
6. The transmission ratio is measured relative to the transmission at zero bias.
7. Measurements to be made in a standard waveguide mount as per drawing on page 12.
8. The diode is satisfactory for use at 9375 Mc/s at temperatures up to 80°C. For setting up purposes, a diode current of 150mA at 80°C may be used.
9. This is defined as the phase variation of v.s.w.r. minima which is obtained when the d.o. current applied to the diode is changed from that when $I_0 = 0$ to a value of $I_0 = 50\text{mA}$. It is expressed as the electrical angle which corresponds to the difference between the measured values of v.s.w.r. position L_1 and L_2 .

BEHAVIOUR OF TYPICAL DIODES OVER FREQUENCY BAND





DETAILS OF MOUNT.



POST .0934
 .0006 DIA.

DIMENSIONS IN INCHES.