

## Section 5C

### ACCEPTANCE TESTS FOR SEMICONDUCTOR DIODES

5.C.1 Unless otherwise stated in the Test Specification, Semi-Conductor Diodes shall comply with all Sections of this specification except sections 5.2 to 5.10 inclusive, 5.13, 5A, 5B, 5D, 5E, 5F, 7, 12 and 13.

In addition, the following tests may be required and when specified they shall be applied on a Sampling Inspection basis in accordance with the procedure given in Appendix XI Section 1 "Sampling Inspection by Attributes".

#### 5.C.2 MECHANICAL TESTS

5.C.2.1 Fatigue Test. This test shall be applied in accordance with Section 11.3 except that the force shall be in two directions mutually at right angles. One of the directions shall be along the axis of the diode. For diodes having both connecting leads at one end, one of the directions shall be at right angles to the plane through the leads.

5.C.2.2 Shock Test. This test shall be applied in accordance with Section 11.4 except that the directions of shock shall be:-

- (a) in the plane through the connecting leads.
- (b) at right angles to the plane through the connecting leads.

For diodes having both connecting leads at one end the shock shall also be applied in the third mutually perpendicular plane both towards and away from the base.

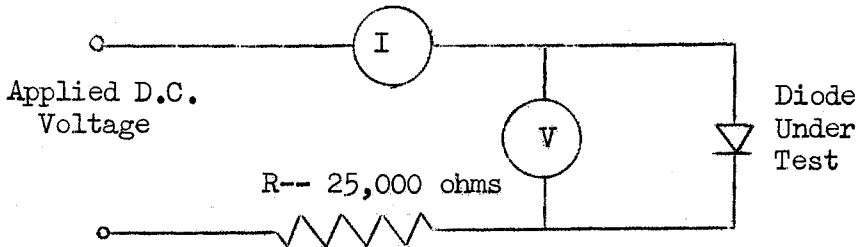
5.C.3 TEMPERATURE CYCLING TEST. The diodes shall be subjected to the specified number of complete cycles of temperature change. The specified extremes of temperature shall be maintained for at least 15 minutes. The time of changing from one temperature extreme to the other shall be not less than 15 minutes nor exceed 30 minutes. The test may start at any point in the cycle.

5.C.4 CLIMATIC CYCLING. This test shall comply with Section 10.1 except that the duration of the test shall be as given in the Test Specification. The Test Specification will also state the electrical tests to be applied during or after the Climatic treatment.

5.C.5 LIFE TESTS. When required by the Test Specification these shall be applied in accordance with the relevant sections of Appendix VI and with the following additional requirements.

5.C.5.1 Storage Life Test. The diodes shall be stored under the temperature conditions and for the duration stated in the Test Specification. The Test Specification will also state the electrical tests to be applied after the Storage Life Tests.

5.C.6 PEAK INVERSE VOLTAGE TEST. Diodes shall be tested in a circuit equivalent to that shown below.



The applied voltage shall be adjusted until a condition is reached at which a further increase in the applied voltage shows no further increase in voltage across the diode. The voltage across the diode at which this condition occurs shall be considered to be the peak inverse voltage.

5.C.7 ADDITIONAL REQUIREMENTS FOR MIXER AND DETECTOR DIODES.

5.C.7.1 Marking. To avoid mechanical deformation by die marking after construction, single ended mixer and detector diodes shall be marked by means of an anodized aluminium or plastic disc inserted and secured into the end of the body. The disc shall be marked with the C.V. number, the factory code letters and the date code. It shall be coloured to indicate the polarity of the pin, viz. red when the pin corresponds to the cathode terminal of a thermionic diode and green when the pin corresponds to the anode terminal of a thermionic diode. The appropriate colour coding will be stated in the Test Specification.

5.C.7.2 Mechanical Stability. A sample of production diodes shall be subjected to a tension test in an approved test instrument in which an axial tensile force of not less than 15 lbs is applied between tip and cap. The diodes shall be tested to 1% AQL at Inspection Level 1A and any breakage shall be deemed to be a failure.

5.C.7.3 Resistance to Breakdown Voltages. The resistance of a diode to breakdown caused by pulse voltages shall be assessed by applying the process described below. The conditions for acceptance or rejection will be stated in the Test Specification.

The diode shall be subjected to 3,000 uni-directional voltage pulses derived from a section of concentric line giving a pulse length of  $2.5 \times 10^{-9}$  seconds, or from an 18 pF condenser at an energy level defined in the Test Specification. The specified energy shall be dissipated in the diode. The repetition rate shall not exceed 5,000 p.p.s. to ensure that the diode does not reach thermal equilibrium. The test equipment shall be subject to the approval of the Inspection Authority.

5.C.7.4 R.F. Properties (Noise Factor, Rectification efficiency, Admittance etc.)

When these tests are required by the Test Specification absolute methods of measurement shall be used where possible.

When applicable, measurements of admittance may be made using holders specified in terms of the RF normalised admittance at some chosen frequency. This shall be measured at an input reference plane when the diode is replaced by a resistive load which matches the feeder in which the diode is situated.

The input reference plane shall be at a position of voltage minimum in the input line when the diode is replaced by a short circuit at some other specified plane.

In these circumstances, the normalised admittance at the input reference plane is related to the normalised crystal admittance at the plane of the short circuit by the expression

$$y_1 = ay_c + jb$$

where  $a$  and  $jb$  are the real and imaginary parts of the normalised admittance defined above.

The normalised diode admittance to match the holder, measured at the plane of the short circuit is then

$$y_c = \frac{y_1 - jb}{a}$$

In other cases, where the absolute accuracy of the measurements is deemed to be inadequate, appropriate approved transfer standards may be used. Standard diodes will not be used for this purpose.

#### 5.C.8 ADDITIONAL REQUIREMENTS FOR GENERAL PURPOSE DIODES

5.C.8.1 Marking. General Purpose Diodes shall be marked with the CV number and other marking as required by the Test Specification. In addition the polarity shall be shown either by "+" and "-" signs or by marking the positive end or connection with red paint. The positive end or connection shall correspond to the cathode terminal of a thermionic diode.

5.C.8.2 Protective Sleeve. An approved protective sleeve shall be fitted to glass envelope diodes to prevent exposure of the diode element to light. The sleeve, when fitted, may carry the marking.