# DIODES, MICROWAVE, SILICON,

# SCHOTTKY, MIXER,

# BASED ON TYPES DH301 THRU DH303,

# DH312 THRU DH315, DH322 THRU DH325

# ESCC Detail Specification No. 5512/017

**ISSUE 1**

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space components
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| | | Para. 4.7.3 | : Text amended to read, 'Section 9' | 221575 |
| | | P20. Table 5(b) | : Title amended to include, 'AND OPERATING LIFE TESTS' | 221575 |
| | | Table 5(c) | : Table deleted | 221575 |
| | | P22. Para. 4.8.4 | : In second sentence, 5(c) renumbered to 5(b) | 221575 |

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**APPENDICES** (Applicable to specific Manufacturers only)
None.

## 1. GENERAL

### 1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Diode, Microwave, Silicon, Schottky, Mixer, based on Types DH301, DH302, DH303, DH312, DH313, DH314, DH315, DH322, DH323, DH324 and DH325. It shall be read in conjunction with ESA/SCC Generic Specification No. 5010, the requirements of which are supplemented herein.

### 1.2 TYPE VARIANTS

Variants of the basic diodes specified herein, which are also covered by this specification are given in Table 1(a).

### 1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the diodes specified herein, are as scheduled in Table 1(b).

### 1.4 PARAMETER DERATING INFORMATION

The derating information applicable to the diodes specified herein is shown in Figure 1.

### 1.5 PHYSICAL DIMENSIONS

The physical dimensions of the diodes specified herein are shown in Figure 2.

### 1.6 FUNCTIONAL DIAGRAM

The functional diagram, showing lead identification, of the diodes specified herein, is shown in Figure 3.

### 1.7 HANDLING PRECAUTIONS

These devices are susceptible to damage by electrostatic discharge. Therefore, suitable precautions shall be employed for protection during all phases of manufacture, testing, packaging, shipment and any handling.

These components are Categorised as Class 1 with a Minimum Critical Path Failure Voltage of 250V.

## 2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESA/SCC Generic Specification No. 5010 for Discrete Microwave Semiconductor Components.

(b) MIL-STD-750, Test Methods for Semiconductor Devices.

## 3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply. In addition the following symbols are used:

$C_T$ = Total Capacitance.

NF = Noise Figure.

**TABLE 1(a) - TYPE VARIANTS**

| (1) VARIANT | (2) BASED ON TYPE | (3) FIGURE | (4) FREQUENCY RANGE (GHz) | (5) TOTAL CAPACITANCE $C_T$ (pF) (MAX.) | (6) NOISE FIGURE NF (dB) (MAX.) | (7) BODY-LID AND LEAD MATERIAL AND FINISH |
|---|---|---|---|---|---|---|
| 01 | DH301 | 2(a) | 1.0 - 6.0 | 0.48 | 6.5 | D7-E2 |
| 02 | DH301 | 2(b) | 1.0 - 6.0 | 0.48 | 6.5 | D7 |
| 03 | DH301 | 2(c) | 1.0 - 6.0 | 0.48 | 6.5 | D7-E2 |
| 04 | DH301 | 2(d) | 1.0 - 6.0 | 0.48 | 6.5 | D7-E2 |
| 05 | DH301 | 2(e) | 1.0 - 6.0 | 0.48 | 6.5 | D7-E2 |
| 06 | DH301 | 2(f) | 1.0 - 6.0 | 0.48 | 6.5 | D7-E2 |
| 07 | DH302 | 2(a) | 1.0 - 6.0 | 0.48 | 6.0 | D7-E2 |
| 08 | DH302 | 2(b) | 1.0 - 6.0 | 0.48 | 6.0 | D7 |
| 09 | DH302 | 2(c) | 1.0 - 6.0 | 0.48 | 6.0 | D7-E2 |
| 10 | DH302 | 2(d) | 1.0 - 6.0 | 0.48 | 6.0 | D7-E2 |
| 11 | DH302 | 2(e) | 1.0 - 6.0 | 0.48 | 6.0 | D7-E2 |
| 12 | DH302 | 2(f) | 1.0 - 6.0 | 0.48 | 6.0 | D7-E2 |
| 13 | DH303 | 2(a) | 1.0 - 6.0 | 0.48 | 5.5 | D7-E2 |
| 14 | DH303 | 2(b) | 1.0 - 6.0 | 0.48 | 5.5 | D7 |
| 15 | DH303 | 2(c) | 1.0 - 6.0 | 0.48 | 5.5 | D7-E2 |
| 16 | DH303 | 2(d) | 1.0 - 6.0 | 0.48 | 5.5 | D7-E2 |
| 17 | DH303 | 2(e) | 1.0 - 6.0 | 0.48 | 5.5 | D7-E2 |
| 18 | DH303 | 2(f) | 1.0 - 6.0 | 0.48 | 5.5 | D7-E2 |
| 19 | DH312 | 2(a) | 6.0 - 12 | 0.30 | 7.0 | D7-E2 |
| 20 | DH312 | 2(b) | 6.0 - 12 | 0.30 | 7.0 | D7 |
| 21 | DH312 | 2(c) | 6.0 - 12 | 0.30 | 7.0 | D7-E2 |
| 22 | DH312 | 2(d) | 6.0 - 12 | 0.30 | 7.0 | D7-E2 |
| 23 | DH312 | 2(e) | 6.0 - 12 | 0.30 | 7.0 | D7-E2 |
| 24 | DH312 | 2(f) | 6.0 - 12 | 0.30 | 7.0 | D7-E2 |
| 25 | DH313 | 2(a) | 6.0 - 12 | 0.30 | 6.5 | D7-E2 |
| 26 | DH313 | 2(b) | 6.0 - 12 | 0.30 | 6.5 | D7 |
| 27 | DH313 | 2(c) | 6.0 - 12 | 0.30 | 6.5 | D7-E2 |
| 28 | DH313 | 2(d) | 6.0 - 12 | 0.30 | 6.5 | D7-E2 |
| 29 | DH313 | 2(e) | 6.0 - 12 | 0.30 | 6.5 | D7-E2 |
| 30 | DH313 | 2(f) | 6.0 - 12 | 0.30 | 6.5 | D7-E2 |
| 31 | DH314 | 2(a) | 6.0 - 12 | 0.30 | 6.0 | D7-E2 |
| 32 | DH314 | 2(b) | 6.0 - 12 | 0.30 | 6.0 | D7 |
| 33 | DH314 | 2(c) | 6.0 - 12 | 0.30 | 6.0 | D7-E2 |
| 34 | DH314 | 2(d) | 6.0 - 12 | 0.30 | 6.0 | D7-E2 |
| 35 | DH314 | 2(e) | 6.0 - 12 | 0.30 | 6.0 | D7-E2 |
| 36 | DH314 | 2(f) | 6.0 - 12 | 0.30 | 6.0 | D7-E2 |

**TABLE 1(a) - TYPE VARIANTS (CONTINUED)**

| (1) VARIANT | (2) BASED ON TYPE | (3) FIGURE | (4) FREQUENCY RANGE (GHz) | (5) TOTAL CAPACITANCE $C_T$ (pF) (MAX.) | (6) NOISE FIGURE NF (dB) (MAX.) | (7) BODY-LID AND LEAD MATERIAL AND FINISH |
|---|---|---|---|---|---|---|
| 37 | DH315 | 2(a) | 6.0 - 12 | 0.30 | 5.5 | D7-E2 |
| 38 | DH315 | 2(b) | 6.0 - 12 | 0.30 | 5.5 | D7 |
| 39 | DH315 | 2(c) | 6.0 - 12 | 0.30 | 5.5 | D7-E2 |
| 40 | DH315 | 2(d) | 6.0 - 12 | 0.30 | 5.5 | D7-E2 |
| 41 | DH315 | 2(e) | 6.0 - 12 | 0.30 | 5.5 | D7-E2 |
| 42 | DH315 | 2(f) | 6.0 - 12 | 0.30 | 5.5 | D7-E2 |
| 43 | DH322 | 2(a) | 12 - 18 | 0.21 | 7.5 | D7-E2 |
| 44 | DH322 | 2(b) | 12 - 18 | 0.21 | 7.5 | D7 |
| 45 | DH322 | 2(c) | 12 - 18 | 0.21 | 7.5 | D7-E2 |
| 46 | DH322 | 2(d) | 12 - 18 | 0.21 | 7.5 | D7-E2 |
| 47 | DH322 | 2(e) | 12 - 18 | 0.21 | 7.5 | D7-E2 |
| 48 | DH322 | 2(f) | 12 - 18 | 0.21 | 7.5 | D7-E2 |
| 49 | DH323 | 2(a) | 12 - 18 | 0.21 | 7.0 | D7-E2 |
| 50 | DH323 | 2(b) | 12 - 18 | 0.21 | 7.0 | D7 |
| 51 | DH323 | 2(c) | 12 - 18 | 0.21 | 7.0 | D7-E2 |
| 52 | DH323 | 2(d) | 12 - 18 | 0.21 | 7.0 | D7-E2 |
| 53 | DH323 | 2(e) | 12 - 18 | 0.21 | 7.0 | D7-E2 |
| 54 | DH323 | 2(f) | 12 - 18 | 0.21 | 7.0 | D7-E2 |
| 55 | DH324 | 2(a) | 12 - 18 | 0.21 | 6.5 | D7-E2 |
| 56 | DH324 | 2(b) | 12 - 18 | 0.21 | 6.5 | D7 |
| 57 | DH324 | 2(c) | 12 - 18 | 0.21 | 6.5 | D7-E2 |
| 58 | DH324 | 2(d) | 12 - 18 | 0.21 | 6.5 | D7-E2 |
| 59 | DH324 | 2(e) | 12 - 18 | 0.21 | 6.5 | D7-E2 |
| 60 | DH324 | 2(f) | 12 - 18 | 0.21 | 6.5 | D7-E2 |
| 61 | DH325 | 2(a) | 12 - 18 | 0.21 | 6.0 | D7-E2 |
| 62 | DH325 | 2(b) | 12 - 18 | 0.21 | 6.0 | D7 |
| 63 | DH325 | 2(c) | 12 - 18 | 0.21 | 6.0 | D7-E2 |
| 64 | DH325 | 2(d) | 12 - 18 | 0.21 | 6.0 | D7-E2 |
| 65 | DH325 | 2(e) | 12 - 18 | 0.21 | 6.0 | D7-E2 |
| 66 | DH325 | 2(f) | 12 - 18 | 0.21 | 6.0 | D7-E2 |

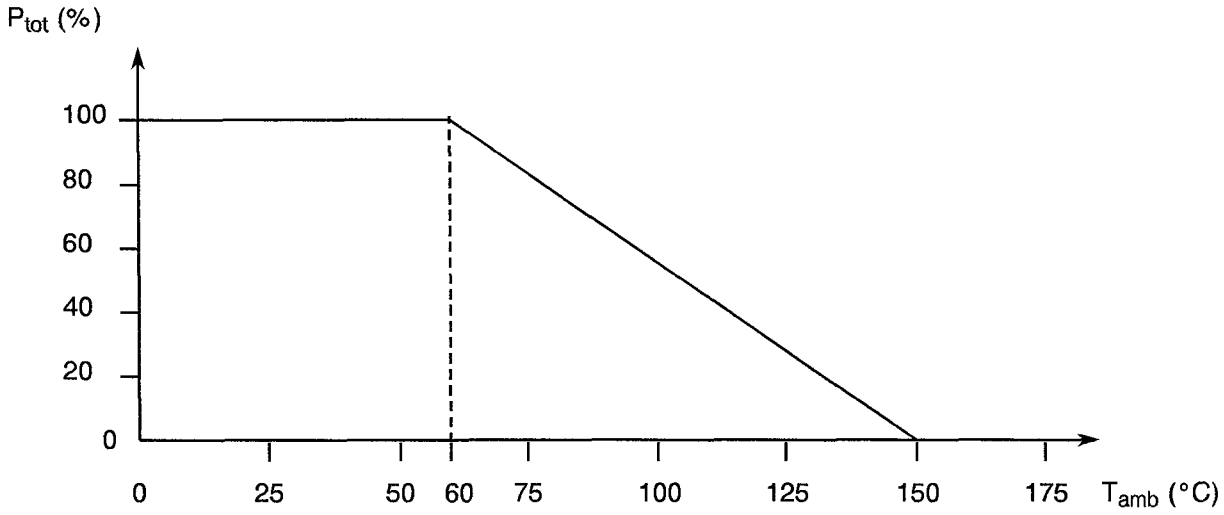
## TABLE 1(b) - MAXIMUM RATINGS

| No. | CHARACTERISTIC | SYMBOL | MAXIMUM RATINGS | UNIT | REMARKS |
|---|---|---|---|---|---|
| 1 | D.C. Reverse Voltage | $V_R$ | −3.0 | V | |
| 2 | D.C. Forward Current | $I_F$ | 50 | mA | |
| 3 | Power Dissipation | $P_{tot}$ | 50 | mW | Note 1 |
| 4 | Burn-out Energy | $E_B$ | 5.0 | Erg | Note 2 |
| 5 | Operating Temperature Range | $T_{op}$ | −55 to +150 | °C | $T_{case}$ |
| 6 | Storage Temperature Range | $T_{stg}$ | −65 to +175 | °C | |
| 7 | Soldering Temperature | $T_{sol}$ | +220 | °C | Note 3 |

**NOTES**

1. At $T_{amb}$ = +25°C. For derating at $T_{amb}$ > +25°C, see Figure 1.
2. Quoted for a single discharge of Torry line during the first 2.4ns current flow in the forward direction. General criterion for burn-out energy is a 3.0dB increase in Noise Figure.
3. Duration 5 seconds maximum (at a distance of not less than 2.5mm from the body and the same termination shall not be resoldered until 3 minutes have elapsed.

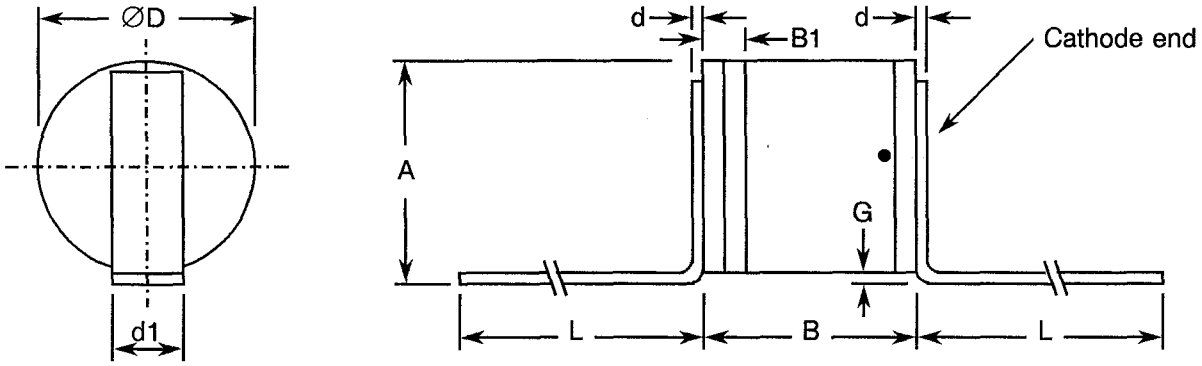
## FIGURE 1 - PARAMETER DERATING INFORMATION




Power Dissipation versus Temperature

## FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) - VARIANTS 01, 07, 13, 19, 25, 31, 37, 43, 49, 55, 61




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| A | 1.30 | 1.90 |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| d | 0.06 | 0.10 |
| d1 | 0.55 | 0.65 |
| ØD | 1.07 | 1.47 |
| G | 0.10 | 0.50 |
| L | 2.50 | - |

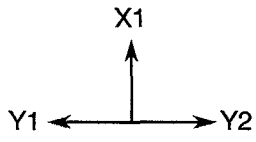
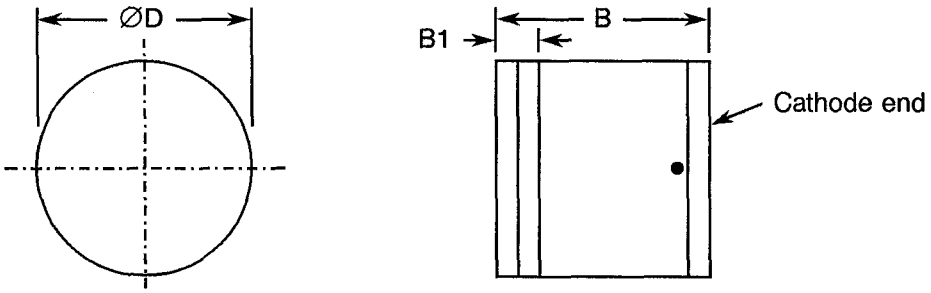


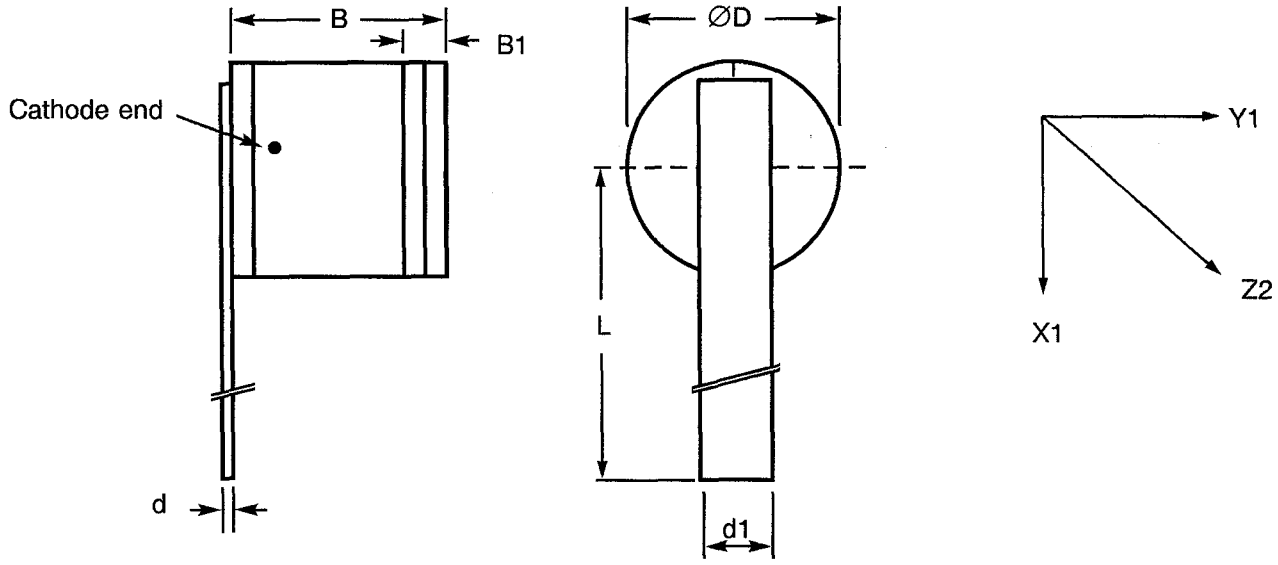

FIGURE 2(b) - VARIANTS 02, 08, 14, 20, 26, 32, 38, 44, 50, 56, 62




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| ØD | 1.07 | 1.47 |

## FIGURE 2 - PHYSICAL DIMENSIONS

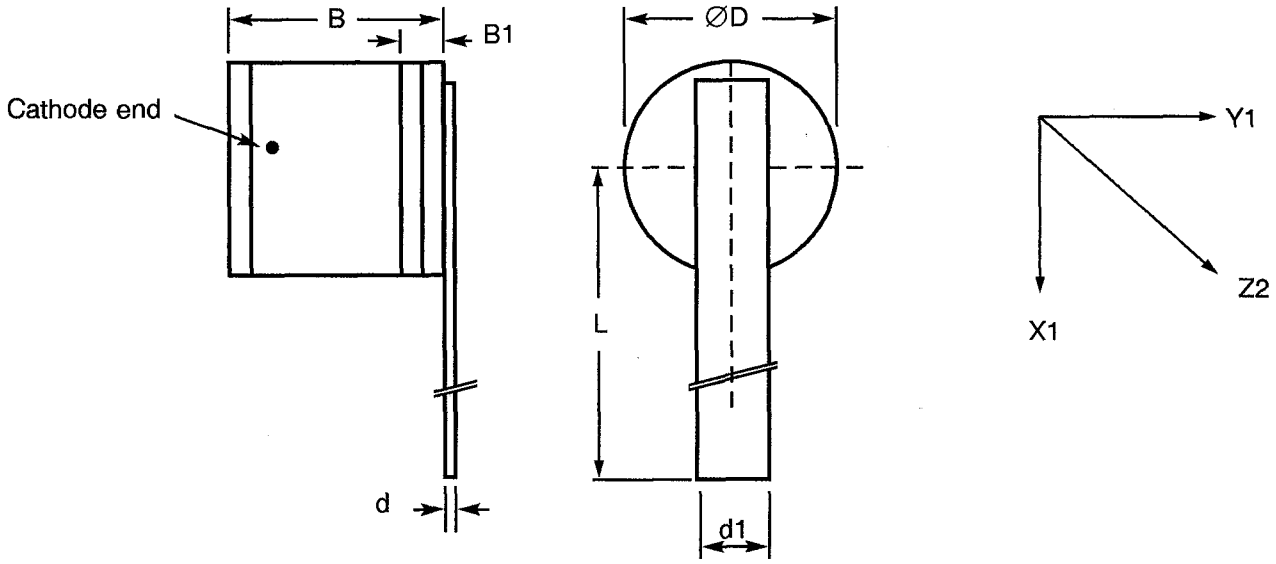
FIGURE 2(c) - VARIANTS 03, 09, 15, 21, 27, 33, 39, 45, 51, 57, 63




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| ØD | 1.07 | 1.47 |
| d | 0.06 | 0.10 |
| d1 | 0.55 | 0.65 |
| L | 5.00 | - |

## FIGURE 2 - PHYSICAL DIMENSIONS

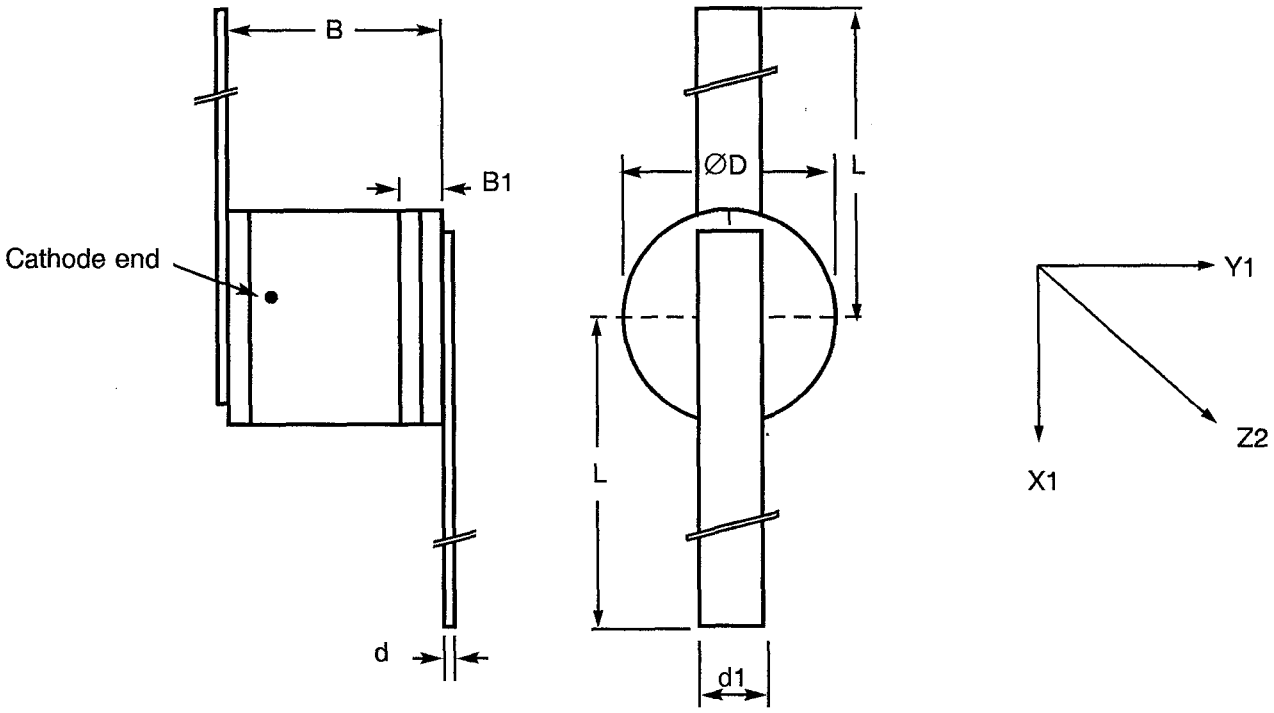
FIGURE 2(d) - VARIANTS 04, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| ØD | 1.07 | 1.47 |
| d | 0.06 | 0.10 |
| d1 | 0.55 | 0.65 |
| L | 5.00 | - |

## FIGURE 2 - PHYSICAL DIMENSIONS

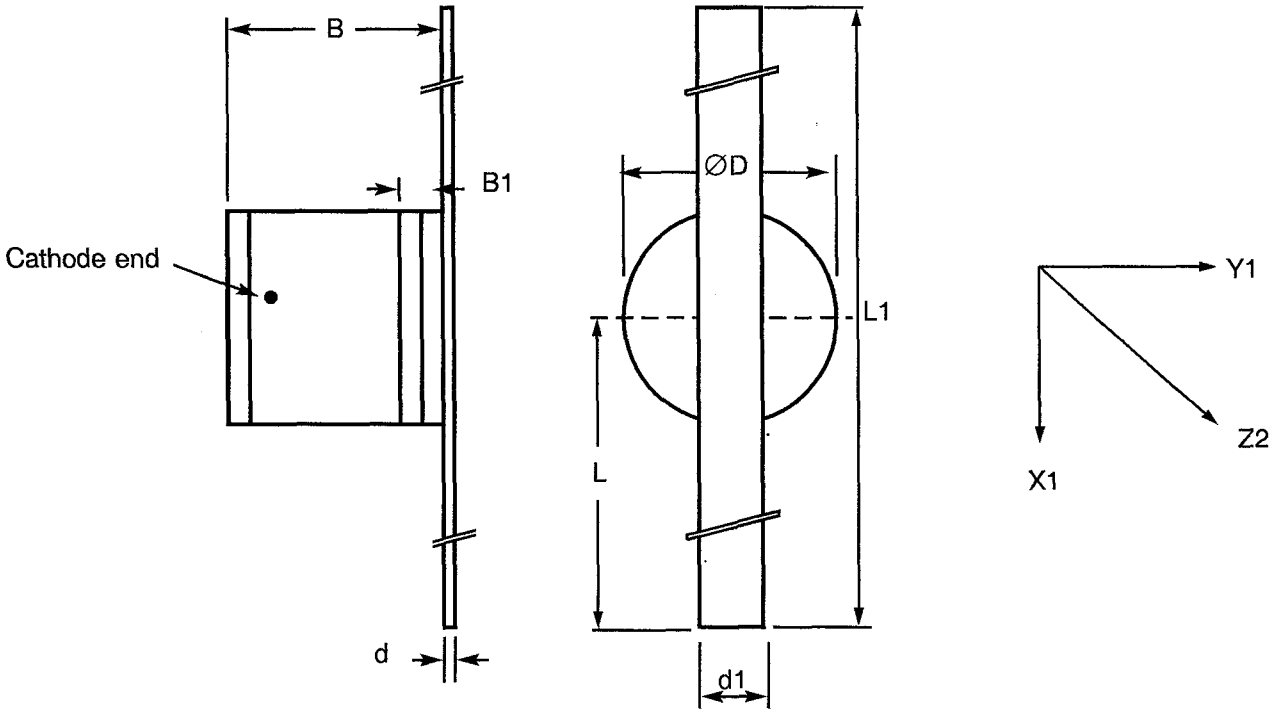
FIGURE 2(e) - VARIANTS 05, 11, 17, 23, 29, 35, 41, 47, 53, 59, 65




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| ØD | 1.07 | 1.47 |
| d | 0.06 | 0.10 |
| d1 | 0.55 | 0.65 |
| L | 5.00 | - |

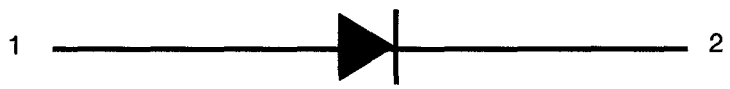
## FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(f) - VARIANTS 06, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66




| SYMBOL | MILLIMETRES | |
|---|---|---|
| | MIN. | MAX. |
| B | 0.95 | 1.35 |
| B1 | 0.23 | 0.33 |
| ØD | 1.07 | 1.47 |
| d | 0.06 | 0.10 |
| d1 | 0.55 | 0.65 |
| L | 5.00 | - |
| L1 | 10 | 10.4 |

## FIGURE 3 - FUNCTIONAL DIAGRAM




1. Anode
2. Cathode

**NOTES**

1. The cathode end shall be marked with a black dot.

## 4. REQUIREMENTS

### 4.1 GENERAL

The complete requirements for procurement of the diodes specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 5010 for Discrete Microwave Semiconductor Components. Deviations from the Generic Specification applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

### 4.2 DEVIATIONS FROM GENERIC SPECIFICATION

#### 4.2.1 Deviations from Special In-process Controls

(a) Para. 5.3, Wafer Lot Acceptance: Prior to the start of high reliability processing, 5 encapsulated samples - representative of the lot - shall be submitted to the User for wafer approval. These samples shall be shipped to the Orderer. When the User has tested the samples and granted his approval, the Orderer shall inform the Manufacturer who will then continue processing the wafer to ESA/SCC requirements.

(b) Para. 5.3, Wafer Lot Acceptance: S.E.M. inspection shall be performed on 3 dies, after die separation.

(c) Para. 5.3, Wafer Lot Acceptance: Noise Figure measurements shall be performed on 10 devices assembled in standard case.

#### 4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.12, Radiographic inspection: Shall be performed after PIND test.

#### 4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

(a) Para. 9.12, Radiographic inspection: Shall be performed in Chart II.

#### 4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.13, Shock Test: Shall not be performed.

(b) Para. 9.14, Vibration: Shall not be perfromed.

(c) Para. 9.15, Constant Acceleration: Shall not be performed.

(d) Para. 9.19, Terminal Strength: Shall not be performed for Variants 02, 08, 14, 20, 26, 32, 38, 44, 50, 56 and 62.

(e) Para. 9.23, Special Testing: Shall not be performed.

#### 4.2.5 Deviations from Lot Acceptance Tests (Chart V))

(a) Para. 9.13, Shock Test: Shall not be performed.

(b) Para. 9.14, Vibration: Shall not be perfromed.

(c) Para. 9.15, Constant Acceleration: Shall not be performed.

(d) Para. 9.19, Terminal Strength: Shall not be performed for Variants 02, 08, 14, 20, 26, 32, 38, 44, 50, 56 and 62.

(e) Para. 9.23, Special Testing: Shall not be performed.

## 4.3 MECHANICAL AND ENVIRONMENTAL REQUIREMENTS

### 4.3.1 Dimension Check

The dimensions of the diodes specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the diodes specified herein shall be 0.02g.

4.3.3 Terminal Strength

The requirements for terminal strength are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The test conditions shall be as follows:

(a) **Condition**: 'A' (tension).

(b) **Separation Force**: 1.25N.

(c) **Duration**: 10s.

4.3.4 Bond Strength

The requirements for bond strength are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The test conditions shall be as follows:

(a) **Condition**: 'A' (tension).

(b) **Separating Force**: 0.004N minimum.

4.3.5 Die Shear

The requirements for die shear are specified in Section 9 of ESA/SCC Generic Specification No.5010. The test conditions shall be as follows:-

(a) **Semiconductor material remaining**: 50% minimum.

4.3.6 High Temperature Stabilisation Bake

The requirements for high temperature stabilisation bake are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The temperature to be applied shall be + 175(+0 - 3)°C.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the diodes specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material shall not guarantee acceptance of the finished product.

4.4.1 Case

The case shall be hermetically sealed and have a ceramic body. The lid shall be welded or preform soldered.

4.4.2 Lead Materials and Finish

The body material shall be Type 'D' with Type '7' finish and the lid material shall be Type 'D' with Type '7' finish and the lead material shall be Type 'E' with Type '2' finish (except for variants 02, 08, 14, 20, 26, 32, 38, 44, 50, 56, 62) in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

4.5 MARKING

4.5.1 General

The marking of components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

(a) Cathode Identification.

(b) The SCC Component Number.

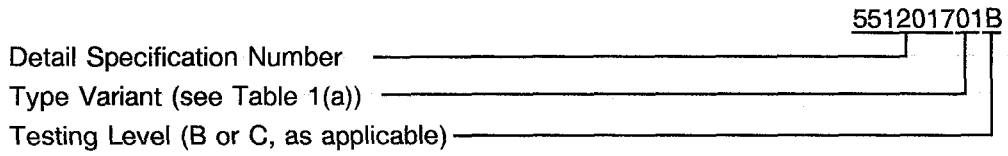
(c) Traceability Information.

4.5.2 Cathode Identification

Cathode identification shall be as shown in Figures 2 and 3 of this specification.

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:




4.5.4 Traceability Information

Each component shall be marked in respect of traceability information as defined in ESA/SCC Basic Specification No. 21700.

4.5.5 Marking of Small Components

When it is considered that the component is too small to accommodate the marking as specified above, as much as space permits shall be marked. The order of precedence shall be as follows:-

(a) Cathode Identification.

(b) The SCC Component Number.

(c) Traceability Information.

The marking ifnormation, in full, shall accompany each component in its primary package.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. Unless otherwise specified, the measurements shall be performed at $+100(+0-5)$ °C.

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing electrical measurements listed in Table 2 of this specification are shown in Figure 4.

4.7 BURN-IN TESTS

Burn-in shall be Category 2 of Chart III(a).

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values ($\Delta$) applicable to the scheduled parameters shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for High Temperature Reverse Bias Burn-in

The requirements for the high temperature reverse bias burn-in are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The conditions for high temperature reverse bias burn-in shall be as specified in Table 5(a) of this specification.

4.7.3 Conditions for Power Burn-in

The requirements for power burn-in are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The conditions for power burn-in shall be as specified in Table 5(b) of this specification.

4.7.4 Electrical Circuits for High Temperature Reverse Bias and Power Burn-in

Circuits for use in performing the H.T.R.B and power burn-in tests are shown in Figures 5(a) and 5(b) of this specification.

## TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - D.C. PARAMETERS

| No. | CHARACTERISTICS | SYMBOL | MIL-STD-750 TEST METHOD | TEST CONDITIONS | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | | MIN. | MAX. | |
| 1 | Breakdown Voltage | $V_{BR}$ | 4021 | $I_R$ = 10µA | 3.0 | - | V |
| 2 | Reverse Current | $I_R$ | 4016 | $V_R$ = -1.5V | - | 1.0 | µA |
| 3 | Forward Voltage 1 | $V_{F1}$ | 4011 | $I_F$ = 1.0mA | - | 0.45 | V |
| 4 | Forward Voltage 2 | $V_{F2}$ | 4011 | $I_F$ = 10mA | - | 0.60 | V |

## TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - A.C. PARAMETERS

| No. | CHARACTERISTICS | SYMBOL | MIL-STD-750 TEST METHOD | TEST FIG. | TEST CONDITIONS | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | MIN. | MAX. | |
| 5 | Total Capacitance | $C_T$ | 4001 | 4 | $V_R$ = 0V<br>f = 1.0MHz | Note 1 | | pF |
| 6 | Noise Figure | NF | 4126 | 4 | I.F. = 30MHz<br>LO Power = 0dBm<br>D.C. Load = 10Ω<br>Variants 01 to 18:<br>L.O. = 3.0GHz<br>Variants 19 to 42:<br>L.O. = 9.3GHz<br>Variants 43 to 66:<br>L.O. = 15GHz | Note 2<br>Note 3 | | dB |

**NOTES**

1. See column (6) of Table 1(a).
2. See column (5) of Table 1(a).
3. Measurements to be performed on a sample basis, LTPD 7 or less.

## TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

| No. | CHARACTERISTICS | SYMBOL | SPEC. AND/OR TEST METHOD | TEST CONDITIONS | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | | MIN. | MAX. | |
| 2 | Reverse Current | $I_R$ | As per Table 2 | As per Table 2 | - | 10 | µA |

## TABLE 4 - PARAMETER DRIFT VALUES

| No. | CHARACTERISTICS | SYMBOL | SPEC.AND/OR TEST METHOD | TEST CONDITIONS | CHANGE LIMITS (Δ) | UNIT |
|---|---|---|---|---|---|---|
| 2 | Reverse Current | $I_R$ | As per Table 2 | As per Table 2 | ±100 (1) or (2)<br>±100 (1) | nA<br>% |
| 3 | Forward Voltage 1 | $V_{F1}$ | As per Table 2 | As per Table 2 | ±10 (1) | % |
| 4 | Forward Voltage 2 | $V_{F2}$ | As per Table 2 | As per Table 2 | ±10 (1) | % |
| 5 | Total Capacitance | $C_T$ | As per Table 2 | As per Table 2 | ±5.0 (2) (3) | % |

**NOTES**

1. Whichever is the greater, referred to the initial measurement.
2. $\Delta 1 = \Delta 2 = \Delta 3$.
3. Rounded upwards to nearest 0.01pF value.

## FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

FIGURE 4(a) - NOISE FIGURE MEASUREMENT

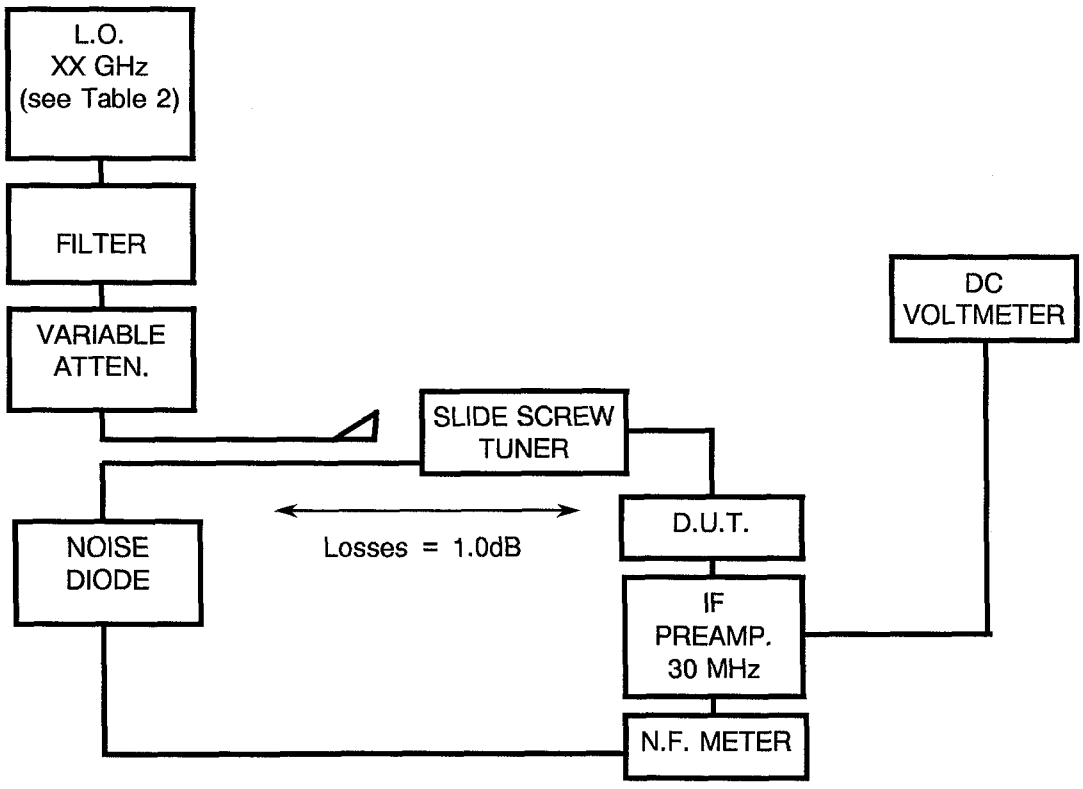


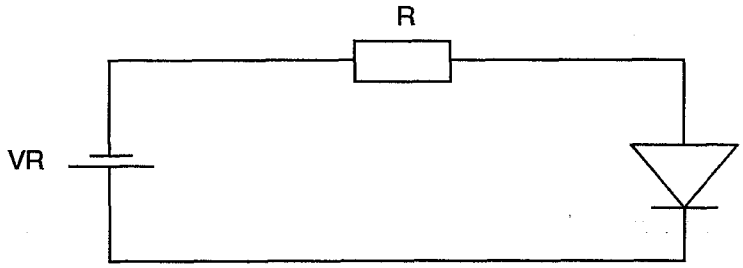
**TABLE 5(a) - CONDITIONS FOR HIGH TEMPERATURE REVERSE BIAS BURN-IN**

| No. | CHARACTERISTICS | SYMBOL | CONDITIONS | UNIT |
|---|---|---|---|---|
| 1 | Ambient Temperature | $T_{amb}$ | +150(+0-3) | °C |
| 2 | Reverse Voltage | $V_R$ | -1.5 | V |

**TABLE 5(b) - CONDITIONS FOR POWER BURN-IN AND OPERATING LIFE TESTS**

| No. | CHARACTERISTICS | SYMBOL | CONDITIONS | UNIT |
|---|---|---|---|---|
| 1 | Ambient Temperature | $T_{amb}$ | +125(+0-3) | °C |
| 2 | Forward Current | $I_F$ | 10 | mA |

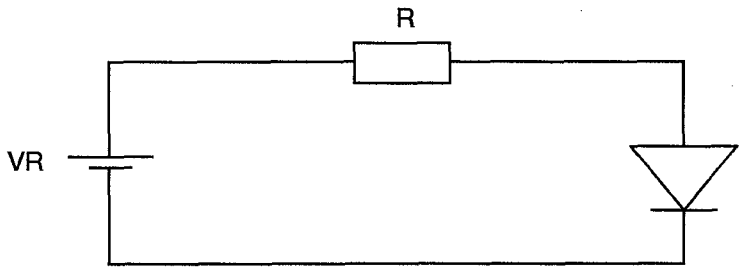
**FIGURE 5(a) - ELECTRICAL CIRCUIT FOR HIGH TEMPERATURE REVERSE BIAS BURN-IN**




**NOTES**

1. At the end of the HTRB, $T_{amb}$ shall be decreased to room temperature and the reverse bias shall remain applied until $T_{amb} < +35°C$.

**FIGURE 5(b) - ELECTRICAL CIRCUIT FOR POWER BURN-IN AND OPERATING LIFE TESTS**



4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 5010)

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 2. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.2 Electrical Measurements at Intermediate Points and on Completion of Endurance Tests

The parameters to be measured at intermediate points and on completion of endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.3 Conditions for Operating Life Tests (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 5010. The conditions for operating life testing are specified in Table 5(b) of this specification.

4.8.4 Electrical Circuits for Operating Life Tests

The circuit to be used for performance of the operating life test shall be the same as shown in Figure 5(b) for Power Burn-in.

4.9 TOTAL DOSE IRRADIATION TESTING

Not applicable.

4.10 SPECIAL TESTING

Not applicable.

## TABLE 6 - ELECTRICAL MEASUREMENTS AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

| No. | CHARACTERISTICS | SYMBOL | SPEC. AND/OR TEST METHOD | TEST CONDITIONS | LIMITS | | UNIT |
|---|---|---|---|---|---|---|---|
| | | | | | MIN. | MAX. | |
| 1 | Breakdown Voltage | $V_{BR}$ | As per Table 2 | As per Table 2 | As per Table 2 | | V |
| 2 | Reverse Current | $I_R$ | As per Table 2 | As per Table 2 | As per Table 2 | | µA |
| 3 | Forward Voltage 1 | $V_{F1}$ | As per Table 2 | As per Table 2 | As per Table 2 | | V |
| 4 | Forward Voltage 2 | $V_{F2}$ | As per Table 2 | As per Table 2 | As per Table 2 | | V |
| 5 | Total Capacitance | $C_T$ | As per Table 2 | As per Table 2 | As per Table 2 | | pF |