DIODES, MICROWAVE,

GALLIUM ARSENIDE, GUNN,

BASED ON TYPES ML4921 TO 4923, ML4931 TO 4933,

ML4941 TO 4943, ML4951 TO 4953, ML4961 TO 4963,

ML4971 TO 4973 AND ML4981 TO 4983

ESCC Detail Specification No. 5511/001

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Pages 1 to 22

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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'A'	Jul'93	Cover Page		None
		DCN		None
		P17. Figure 4	: In Note, amend "Voltage" to read "Current"	23589
		P18. Table 5(a)	: No. 2, amend Unit to read "V"	23589
'B'	Dec. '93	Cover Page		None
		DCN		None
		P4. ToC, Table 1(a)	: 'Type Variant' changed to 'Type Variants'	23612
		P16 Table 3	: Format amended	23612

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FIGURES

APPENDICES (Applicable to specific Manufacturers only)

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Diode, Microwave, Gallium Arsenide, Gunn, based on Types ML4921 to 4923, ML4931 to 4933, ML4941 to 4943, ML4951 to 4953, ML4961 to 4963, ML4971 to 4973 and ML4981 to 4983. 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 (FIGURE 1)

Not applicable.

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 unclassified.

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.

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.

TABLE 1(a) - TYPE VARIANTS

(1) VARIANT	(2) BASED ON TYPE	(3) FIGURE	(4) OPERATING FREQUENCY f_o (GHz)		(5) OUTPUT POWER P_{out} (mW) (Minimum)	(6) BODY-LID AND LEAD MATERIAL AND FINISH
			MIN	MAX		
01	ML4921 - 111	2(a)	18	22	250	A7-D2
02	ML4921 - 118	2(b)	18	22	250	A7
03	ML4921 - 138	2(c)	18	22	250	A7
04	ML4921 - 275	2(d)	18	22	250	A7
05	ML4922 - 111	2(a)	18	22	100	A7-D2
06	ML4922 - 118	2(b)	18	22	100	A7
07	ML4922 - 138	2(c)	18	22	100	A7
08	ML4922 - 275	2(d)	18	22	100	A7
09	ML4923 - 111	2(a)	18	22	50	A7-D2
10	ML4923 - 118	2(b)	18	22	50	A7
11	ML4923 - 138	2(c)	18	22	50	A7
12	ML4923 - 275	2(d)	18	22	50	A7
13	ML4931 - 111	2(a)	22	27	250	A7-D2
14	ML4931 - 118	2(b)	22	27	250	A7
15	ML4931 - 138	2(c)	22	27	250	A7
16	ML4931 - 275	2(d)	22	27	250	A7
17	ML4932 - 111	2(a)	22	27	100	A7-D2
18	ML4932 - 118	2(b)	22	27	100	A7
19	ML4932 - 138	2(c)	22	27	100	A7
20	ML4932 - 275	2(d)	22	27	100	A7
21	ML4933 - 111	2(a)	22	27	50	A7-D2
22	ML4933 - 118	2(b)	22	27	50	A7
23	ML4933 - 138	2(c)	22	27	50	A7
24	ML4933 - 275	2(d)	22	27	50	A7
25	ML4941 - 111	2(a)	27	32	200	A7-D2
26	ML4941 - 118	2(b)	27	32	200	A7
27	ML4941 - 138	2(c)	27	32	200	A7
28	ML4941 - 275	2(d)	27	32	200	A7
29	ML4942 - 111	2(a)	27	32	100	A7-D2
30	ML4942 - 118	2(b)	27	32	100	A7
31	ML4942 - 138	2(c)	27	32	100	A7
32	ML4942 - 275	2(d)	27	32	100	A7
33	ML4943 - 111	2(a)	27	32	50	A7-D2
34	ML4943 - 118	2(b)	27	32	50	A7
35	ML4943 - 138	2(c)	27	32	50	A7
36	ML4943 - 275	2(d)	27	32	50	A7

TABLE 1(a) - TYPE VARIANTS (CONT'D)

(1) VARIANT	(2) BASED ON TYPE	(3) FIGURE	(4) OPERATING FREQUENCY f_o (GHz)		(5) OUTPUT POWER P_{out} (mW) (Minimum)	(6) LEAD MATERIAL AND FINISH
			MIN	MAX		
37	ML4951 - 118	2(b)	32	40	150	A7
38	ML4951 - 138	2(c)	32	40	150	A7
39	ML4951 - 275	2(d)	32	40	150	A7
40	ML4952 - 118	2(b)	32	40	100	A7
41	ML4952 - 138	2(c)	32	40	100	A7
42	ML4952 - 275	2(d)	32	40	100	A7
43	ML4953 - 118	2(b)	32	40	50	A7
44	ML4953 - 138	2(c)	32	40	50	A7
45	ML4953 - 275	2(d)	32	40	50	A7
46	ML4961 - 118	2(b)	40	50	100	A7
47	ML4961 - 138	2(c)	40	50	100	A7
48	ML4961 - 275	2(d)	40	50	100	A7
49	ML4962 - 118	2(b)	40	50	75	A7
50	ML4962 - 138	2(c)	40	50	75	A7
51	ML4962 - 275	2(d)	40	50	75	A7
52	ML4963 - 118	2(b)	40	50	50	A7
53	ML4963 - 138	2(c)	40	50	50	A7
54	ML4963 - 275	2(d)	40	50	50	A7
55	ML4971 - 118	2(b)	50	60	60	A7
56	ML4971 - 138	2(c)	50	60	60	A7
57	ML4971 - 275	2(d)	50	60	60	A7
58	ML4972 - 118	2(b)	50	60	45	A7
59	ML4972 - 138	2(c)	50	60	45	A7
60	ML4972 - 275	2(d)	50	60	45	A7
61	ML4973 - 118	2(b)	50	60	30	A7
62	ML4973 - 138	2(c)	50	60	30	A7
63	ML4973 - 275	2(d)	50	60	30	A7
64	ML4981 - 118	2(b)	90	100	5.0	A7
65	ML4981 - 138	2(c)	90	100	5.0	A7
66	ML4981 - 275	2(d)	90	100	5.0	A7
67	ML4982 - 118	2(b)	90	100	10	A7
68	ML4982 - 138	2(c)	90	100	10	A7
69	ML4982 - 275	2(d)	90	100	10	A7
70	ML4983 - 118	2(b)	90	100	15	A7
71	ML4983 - 138	2(c)	90	100	15	A7
72	ML4983 - 275	2(d)	90	100	15	A7

TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTIC	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Operating Frequency Range	f_o	18 to 100	GHz	
2	Operating Voltage Variants 01 to 12 Variants 13 to 24 Variants 25 to 45 Variants 46 to 54 and 64 to 72 Variants 55 to 63	V_G	 8.0 7.0 5.0 4.0 3.5	V	
3	Operating Temperature Range	T_{op}	−40 to +70	°C	T_{amb}
4	Storage Temperature Range	T_{stg}	−55 to +125	°C	
5	Soldering Temperature	T_{sol}	+230	°C	Note 1

NOTES

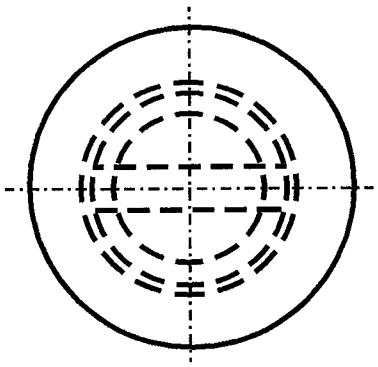
1. Duration 5 seconds maximum and the same termination shall not be resoldered until 3 minutes have elapsed.

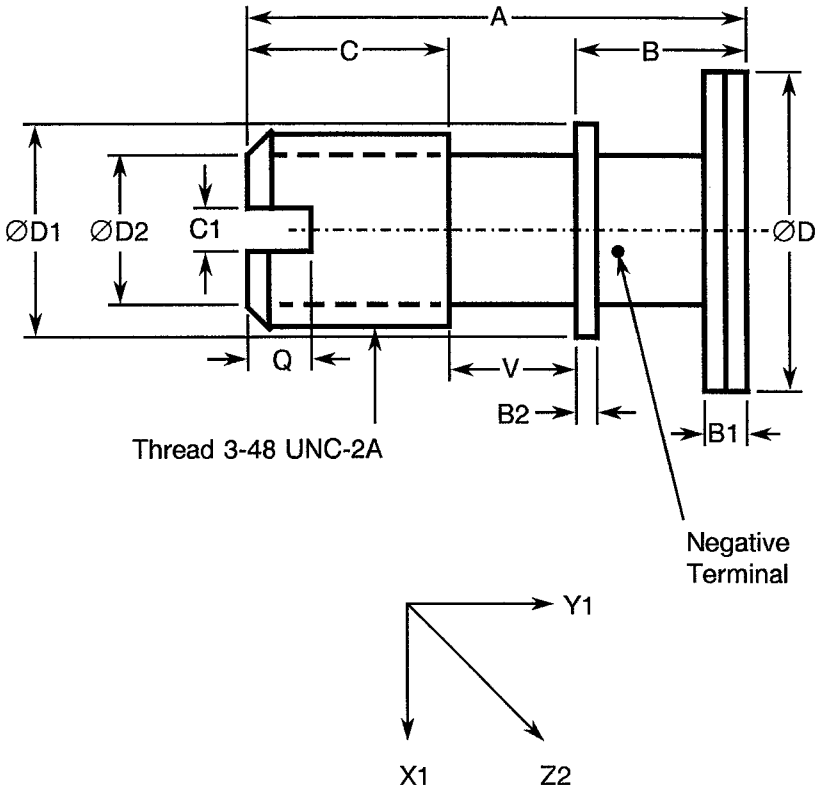
FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS

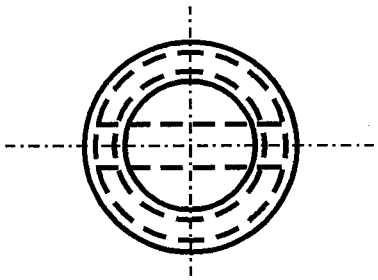
FIGURE 2(a) - VARIANTS 01, 05, 09, 13, 17, 21, 25, 29, 33

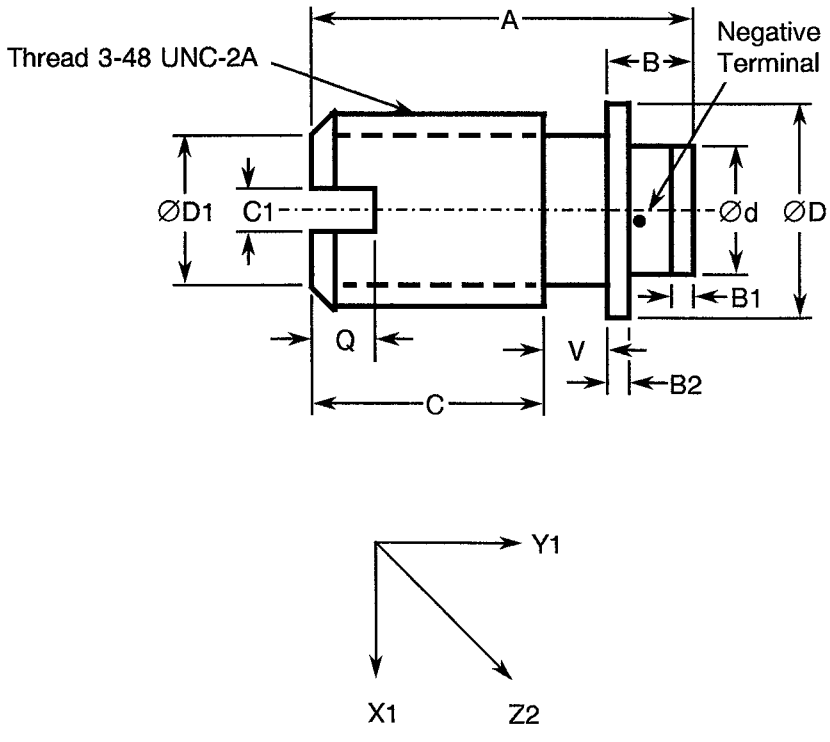




SYMBOL	MILLIMETRES	
	MIN	MAX
A	4.71	5.30
B	1.47	1.80
B1	0.41	0.61
B2	0.20	0.30
C	1.50	2.80
C1	0.38	0.64
ØD	3.00	3.23
ØD1	2.49	2.59
ØD2	0.90	2.20
Q	0.76	1.02
V	0.11	2.33

FIGURE 2(b) - VARIANTS 02, 06, 10, 14, 18, 22, 26, 30, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67, 70

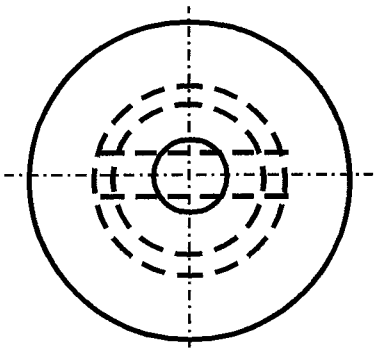


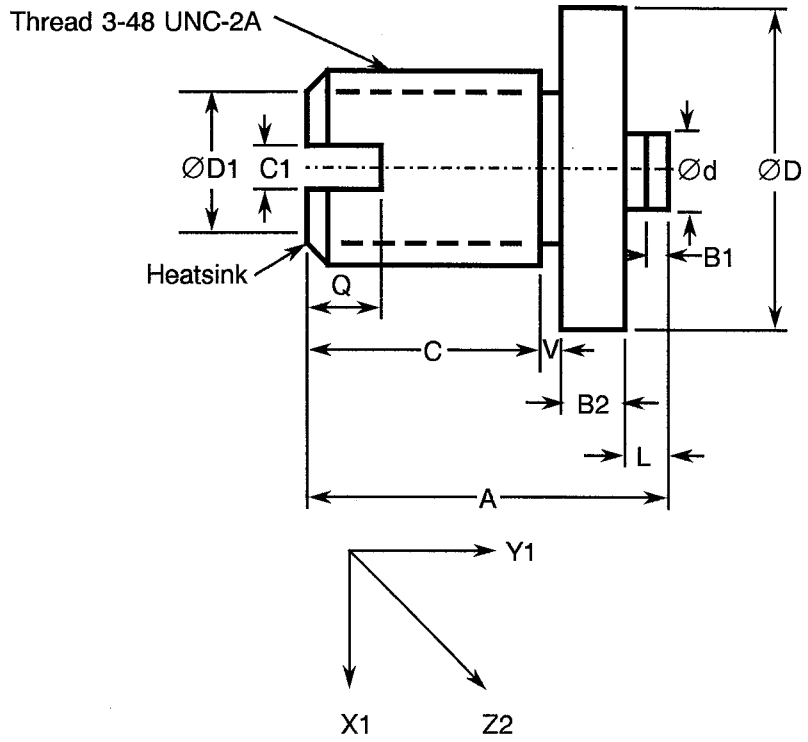


SYMBOL	MILLIMETRES	
	MIN	MAX
A	4.19	4.70
B	0.77	1.04
B1	0.20	0.30
B2	0.22	0.28
C	2.21	3.29
C1	0.38	0.64
Ød	1.22	1.32
ØD	2.49	2.59
ØD1	1.60	2.00
Q	0.64	1.14
V	0.64	0.94

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(c) - VARIANTS 03, 07, 11, 15, 19, 23, 27, 31, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68, 71

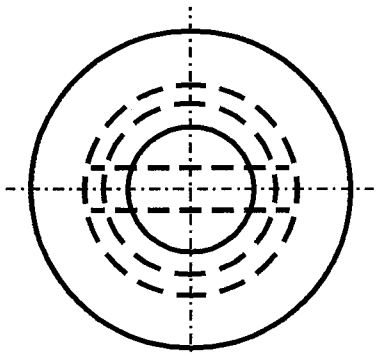


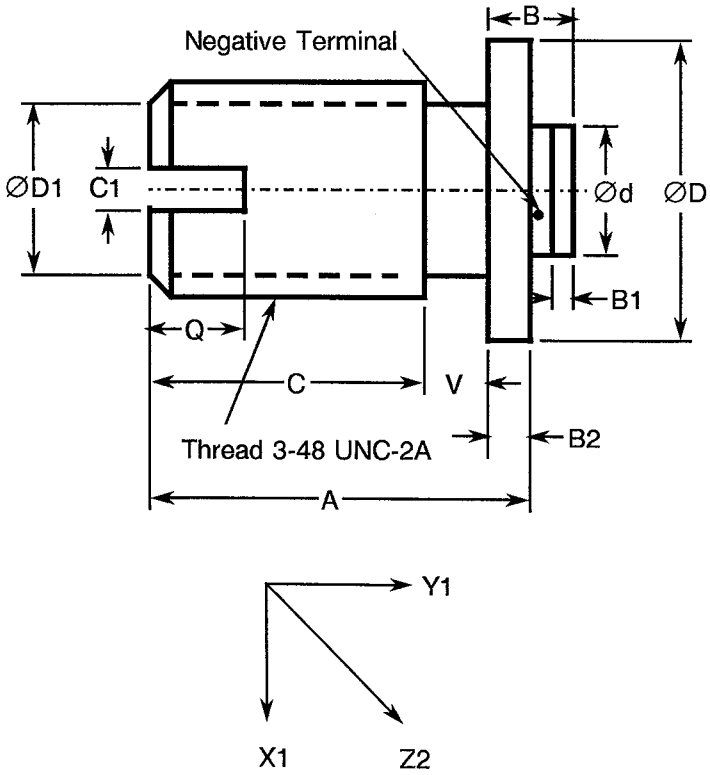


SYMBOL	MILLIMETRES	
	MIN	MAX
A	3.56	3.68
B1	0.20	0.30
B2	0.46	0.56
C	2.36	3.02
C1	0.38	0.64
Ød	0.69	0.86
ØD	2.87	3.00
ØD1	1.60	2.00
L	0.41	0.48
Q	0.64	1.14
V	0.20	0.64

NOTES 1. Due to its small size, this package will not be marked.

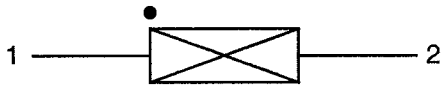
FIGURE 2(d) - VARIANTS 04, 08, 12, 16, 20, 24, 28, 32, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72





SYMBOL	MILLIMETRES	
	MIN	MAX
A	4.04	4.55
B	0.84	1.12
B1	0.20	0.30
B2	0.46	0.56
C	2.54	3.45
C1	0.38	0.64
Ød	1.22	1.32
ØD	2.87	3.00
ØD1	1.60	2.00
Q	0.89	1.14
V	0.64	0.94

FIGURE 3 - FUNCTIONAL DIAGRAM



1. Negative Terminal
2. Positive Terminal

NOTES

1. The negative terminal shall be marked with a black dot or band. The marking will not be on the terminal but adjacent to it.
2. The heatsink end shall be the same as the negative terminal end.

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. 5.2.2, Total Dose Irradiation Testing: Shall be performed during qualification and extension of qualification.

(b) Para. 5.2.2, Total Dose Irradiation Testing: Shall be performed during procurement on a lot acceptance basis at the total dose irradiation level specified in the purchase order.

(c) Para. 5.3, Wafer Lot Acceptance: Shall be performed as an S.E.M. Inspection only.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.1, Internal Visual Inspection: For Variants 03, 07, 11, 15, 19, 23, 27, 31, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68 and 71, the 3 devices prepared for the Bond Strength Test shall be exempt from the maximum height of bond wire above die requirement.

(b) Para. 9.2.1, Bond Strength: For Variants 03, 07, 11, 15, 19, 23, 27, 31, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68 and 71, 3 devices shall have bonds which are long enough to permit this test to be performed.

(c) Para. 9.2.2, Die Shear: Shall not be performed and no additional thermal tests shall be performed to replace this test.

(d) Para. 9.14, Vibration, Variable Frequency: Shall not be performed.

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

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.2.3, Bond Strength: Shall not be performed for Variants 03, 07, 11, 15, 19, 23, 27, 31, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68 and 71.

(b) Para. 9.2.4, Die Shear: Shall not be performed. Output power measurements shall be performed in accordance with Table 2 of this specification.

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

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) 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:

- Variants 01, 02, 05, 06, 09, 10, 13, 14, 17, 18, 21, 22, 25, 26, 29, 30, 33, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64, 67 and 70: 0.14 grammes.
- Variants 03, 04, 07, 08, 11, 12, 15, 16, 19, 20, 23, 24, 27, 28, 31, 32, 35, 36, 38, 39, 41, 42, 44, 45, 47, 48, 50, 51, 53, 54, 56, 57, 59, 60, 62, 63, 65, 66, 68, 69, 71 and 72: 0.15 grammes.

4.3.3 Terminal Strength

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

(a) **Condition: 'D2' (Stud Torque)**

Variants 01, 05, 09, 13, 17, 21, 25, 29 and 33:

- Torque: 56mNm.
- Duration: 5 seconds.

Variants 02, 03, 04, 06, 07, 08, 10, 11, 12, 14, 15, 16, 18, 19, 20, 22, 23, 24, 26, 27, 28, 30, 31, 32 and 34 to 72:

- Torque: 42mNm.
- Duration: 5 seconds.

(b) **Condition: Compression**

Variants 01, 05, 09, 13, 17, 21, 25, 29 and 33:

- Force: 50N.
- Duration: 5 seconds.

Variants 02, 04, 06, 08, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, 54, 55, 57, 58, 60, 61, 63, 64, 66, 67, 69, 70 and 72:

- Force: 10N.
- Duration: 5 seconds.

Variants 03, 07, 11, 15, 19, 23, 27, 31, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68 and 71:

- Force: 5N.
- Duration: 5 seconds.

The compression test shall be performed by applying the specified force to the end-cap by means of a suitable weight applied for the specified time. On completion of the test, a visual examination shall be performed to check for damage to the end-cap or the ceramic body.

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'.

(b) Separation Force : Variants 01 to 54 and 64 to 72 = 0.04N minimum.
: Variants 55 to 63 = 0.02N minimum.

4.3.5 Die Shear

Not applicable.

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 brazed, welded or preform soldered.

4.4.2 Lead Materials and Finish

(a) For Variants 01, 05, 09, 13, 17, 21, 25, 29 and 33, the body material shall be Type 'A' with Type '7' finish and the lid material shall be Type 'D' with Type '2' finish, in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

(b) For Variants 02, 03, 04, 06, 07, 08, 10, 11, 12, 14, 15, 16, 18, 19, 20, 22, 23, 24, 26, 27, 28, 30, 31, 32 and 34 to 72, the lead material shall be Type 'A' with Type '7' finish 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) Negative Terminal Identification.

(b) The SCC Component Number.

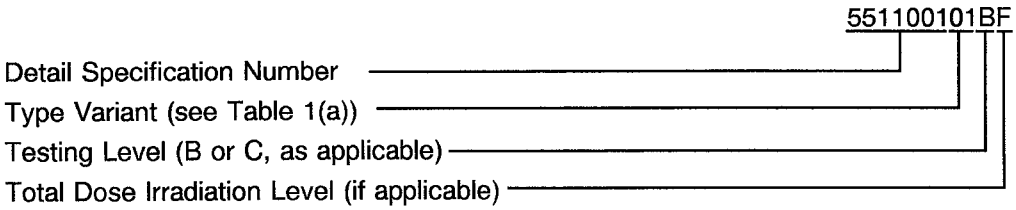
(c) Traceability Information.

4.5.2 Negative Terminal Identification

Negative terminal 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:



The Total Dose Irradiation Level designation shall be added for those devices for which a sample has been successfully tested to the level in question. For these devices, a code letter shall be added in accordance with the requirements of ESA/SCC Basic Specification No. 22900.

4.5.4 Traceability Information

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

4.6 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 $+70(+0-3)$ °C.

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing electrical measurements listed in Tables 2 and 3 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 (Δ) 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 Power Burn-in

The requirements for power burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5010. The conditions for power burn-in shall be as specified in Table 5(a) of this specification.

4.7.3 Electrical Circuit for Power Burn-in

The circuit for use in performing the power burn-in test is shown in Figure 5 of this specification.

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

No.	CHARACTERISTICS	SYMBOL	TEST FIG.	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Threshold Current	I_{TH}	4	Note 1			A
				Variants 01 to 04, 13 to 16, 25 to 28, 37 to 39, 46 to 48 and 55 to 57.	-	2.6	
				Variants 05 to 08, 17 to 20, 29 to 32, 40 to 42, 49 to 51 and 58 to 60.	-	1.8	
				Variants 09 to 12, 21 to 24, 33 to 36, 43 to 45, 52 to 54 and 61 to 63.	-	1.2	
				Variants 64 to 66	-	1.7	
				Variants 67 to 69	-	2.0	
				Variants 70 to 72	-	2.3	
2	Operating Current	I_{OP}	4	$V_G = 8.0V$			A
				Variants 01 to 04	-	1.7	
				Variants 05 to 08	-	1.2	
				Variants 09 to 12	-	0.8	
				$V_G = 7.0V$			
				Variants 13 to 16	-	1.7	
				Variants 17 to 20	-	1.2	
				Variants 21 to 24	-	0.8	
				$V_G = 5.0V$			
				Variants 25 to 28	-	1.7	
				Variants 29 to 32	-	1.2	
				Variants 33 to 36	-	0.8	
				Variants 37 to 39	-	1.7	
				Variants 40 to 42	-	1.2	
				Variants 43 to 45	-	0.8	
				$V_G = 4.0V$			
				Variants 46 to 48	-	1.7	
				Variants 49 to 51	-	1.2	
				Variants 52 to 57	-	0.8	
				Variants 64 to 66	-	1.1	
				Variants 67 to 69	-	1.3	
				Variants 70 to 72	-	1.5	
				$V_G = 3.5V$			
				Variants 55 to 57	-	1.7	
				Variants 58 to 60	-	1.2	
				Variants 61 to 63	-	0.8	

NOTES

1. See Note 1 to Figure 4.

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

No.	CHARACTERISTICS	SYMBOL	TEST FIG.	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
3	Operating Frequency	f_o	4	V_G = Note 1	Note 2		GHz
4	Output Power	P_{out}	4	f_o = Note 2	Note 3		mW

NOTES

1. See Table 1(b), Item 2.
2. See Column 4 of Table 1(a).
3. See Column 5 of Table 1(a).

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	SPEC.AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
4	Output Power	P_{out}	As per Table 2	As per Table 2	Note 1		mW

NOTES

1. ±50% of the value recorded during Table 2 measurements.

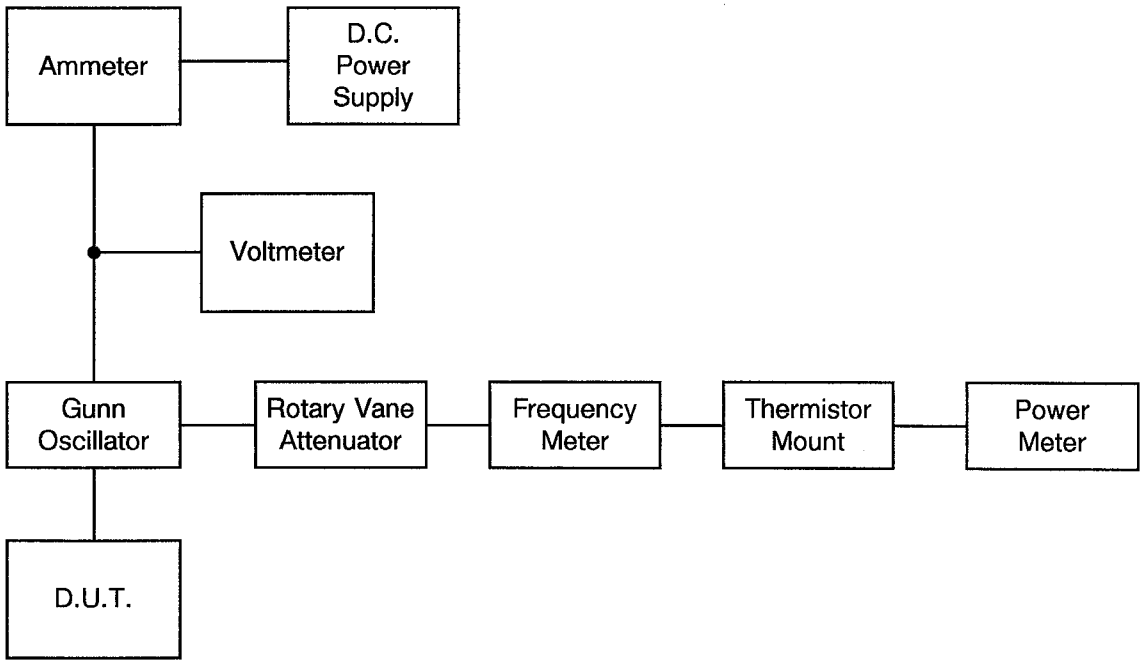
TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC.AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
4	Output Power	P_{out}	As per Table 2	As per Table 2	±25 (1)	%

NOTES

1. Δ1 = Δ2.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS



NOTES

1. For the measurement of Threshold Voltage, the D.C. Power Supply current is to be increased until maximum current is reached.

TABLE 5(a) - CONDITIONS FOR POWER BURN-IN

No.	CHARACTERISTICS	SYMBOL	CONDITIONS	UNIT
1	Ambient Temperature	T_{amb}	+70(+0−3)	°C
2	Operating Voltage	V_G	Note 1	V

NOTES

1. See Table 1(b), Item 2.

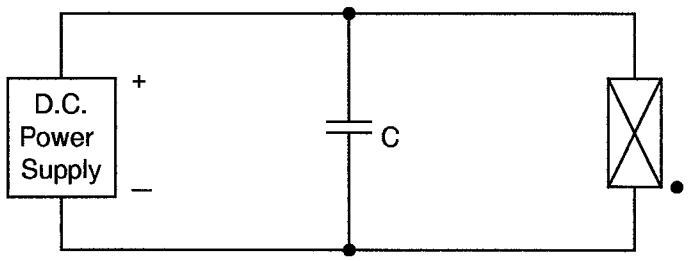
TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TESTS

No.	CHARACTERISTICS	SYMBOL	CONDITIONS	UNIT
1	Ambient Temperature 1	T_{amb1}	+60(+0−3)	°C
2	Operating Voltage 1	V_{G1}	Note 1	V
3	Ambient Temperature 2	T_{amb2}	+70(+0−3)	°C
4	Operating Voltage 2	V_{G2}	Note 1	V

NOTES

1. See Table 1(b), Item 2.

FIGURE 5 - 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 for Power Burn-in.

4.9 TOTAL DOSE IRRADIATION TESTING

4.9.1 Application

If specified in Para. 4.2.1 of this specification, total dose irradiation testing shall be performed in accordance with the requirements of ESA/SCC Basic Specification No. 22900.

4.9.2 Bias Conditions

Continuous bias shall be applied during irradiation testing as shown in Figure 6 of this specification.

4.9.3 Electrical Measurements

The parameters to be measured prior to irradiation exposure are scheduled in Table 2 of this specification. Only devices which meet the requirements of Table 2 shall be included in the test sample.

The parameters to be measured during and on completion of irradiation testing are scheduled in Table 7 of this specification.

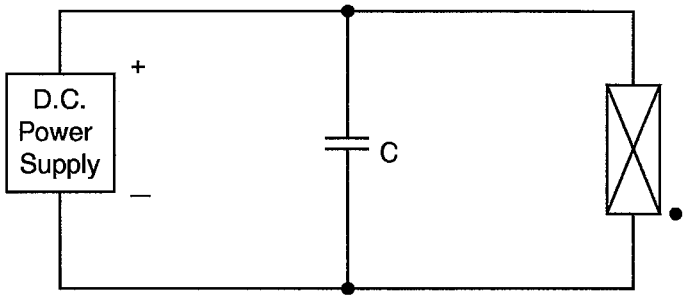
4.10 SPECIAL TESTING

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	Threshold Current	I_{TH}	As per Table 2	As per Table 2	As per Table 2		A
2	Operating Current	I_{OP}	As per Table 2	As per Table 2	As per Table 2		A
3	Operating Frequency	f_o	As per Table 2	As per Table 2	As per Table 2		GHz
4	Output Power	P_{out}	As per Table 2	As per Table 2	As per Table 2		mW

FIGURE 6 - BIAS CONDITIONS FOR IRRADIATION TESTING



NOTES

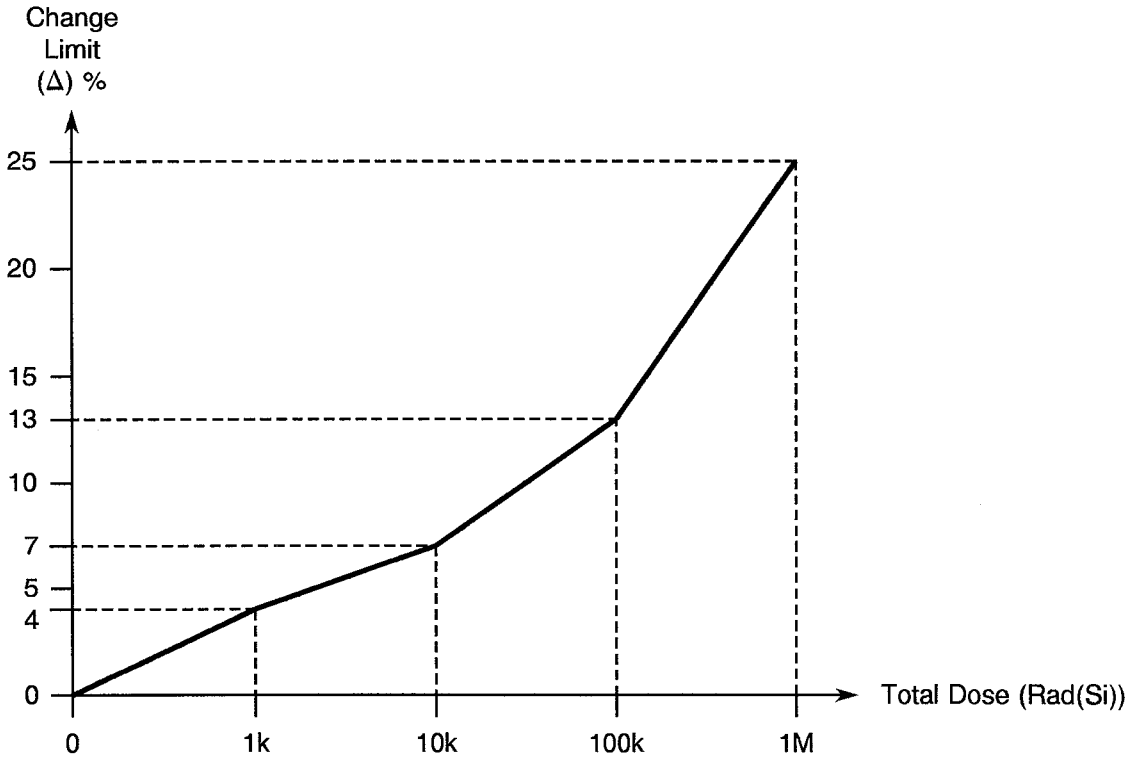
1. A bias as specified in Table 1(b), Item 2, shall be applied.

TABLE 7 - ELECTRICAL MEASUREMENTS DURING AND ON COMPLETION OF IRRADIATION TESTING

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
4	Output Power	P_{out}	As per Table 2	As per Table 2	Note 1	%

NOTES

1. The graph given below shall be used to determine the maximum permitted change.



APPENDIX 'A'

AGREED DEVIATIONS FOR M/A-Com LTD. (G.B.)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.2	Para. 9.4, "High Temperature Stabilisation Bake": May be performed at +125(+0−3) °C.