DIODES, LOW NOISE, VOLTAGE REGULATOR,

BASED ON TYPES 1N6309 THRU 1N6355

ESCC Detail Specification No. 5102/021

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Diodes, Low Noise, Voltage Regulator, based on Types 1N6309 thru 1N6355. It shall be read in conjunction with ESA/SCC Generic Specification No. 5000, the requirements of which are supplemented herein.

1.2 COMPONENT 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 HIGH TEMPERATURE TEST PRECAUTIONS

After application of lead finish, all tests which are performed at a temperature that exceeds +125°C shall be carried out in a 100% inert atmosphere.

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. 5000 for Discrete Semiconductors.

(b) MIL-STD-750, Test Methods and Procedures 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:-

N_D = Noise Density.
Z_K = Knee Impedance.

TABLE 1(a) - TYPE VARIANTS

(1) Variant	(2) Based on Type	(3) V_{Z1} at I_{Z1} = 250µA (V)	(4) V_Z Min. at I_{Z2} (V)	(5) V_Z Nom. at I_{Z2} (V)	(6) V_Z Max. at I_{Z2} (V)	(7) I_{Z2} Test Current (mA)	(8) N_D at I_{Z1} = 250µA 1-3kHz (µV/√Hz)	(9) I_{ZM} (mA)	(10) I_{ZSM} Surge (A)	(11) Z_Z at I_{Z2} (Ω)	(12) V_R (V)	(13) I_{R1} Note 1 (µA)	(14) T_{CVZ} (%/°C)	(15) I_{R2} Note 2 (µA)	(16) I_{R3} Note 3 (µA)	(17) Z_K at I_{Z1} = 250µA (Ω)	(18) V_{Z2} Volt. Reg. (V)	(19) C at 0V (pF)
01	1N6309	1.1	2.28	2.4	2.52	20	1.0	177	2.5	30	1.0	100	−0.085	200	150	1200	1.5	2000
02	1N6310	1.2	2.565	2.7	2.835	20	1.0	157	2.2	30	1.0	60	−0.080	150	100	1300	1.5	1900
03	1N6311	1.3	2.85	3.0	3.15	20	1.0	141	2.0	29	1.0	30	−0.075	100	60	1400	1.5	1800
04	1N6312	1.5	3.135	3.3	3.465	20	1.0	128	1.8	24	1.0	5.0	−0.065	20	10	1400	1.6	1650
05	1N6313	1.8	3.42	3.6	3.78	20	1.0	117	1.65	22	1.0	3.0	−0.055 +0.020	12	6.0	1400	1.6	1600
06	1N6314	2.0	3.705	3.9	4.095	20	1.0	118	1.5	20	1.0	2.0	−0.043 +0.025	12	4.0	1700	1.6	1400
07	1N6315	2.4	4.085	4.3	4.515	20	1.0	99	1.4	18	1.0	2.0	−0.030 +0.030	12	4.0	1400	0.9	1350
08	1N6316	2.8	4.465	4.7	4.935	20	1.0	90	1.27	16	1.5	5.0	−0.028 +0.032	12	10	1500	0.5	1300
09	1N6317	3.3	4.485	5.1	5.355	20	1.0	83	1.17	14	2.0	5.0	+0.045	12	10	1300	0.4	1200
10	1N6318	4.3	5.32	5.6	5.88	20	2.0	76	1.10	8.0	2.5	5.0	+0.050	10	10	1200	0.4	1150
11	1N6319	5.2	5.89	6.2	6.51	20	5.0	68	0.97	3.0	3.5	5.0	+0.060	10	10	800	0.3	1050
12	1N6320	6.0	6.46	6.8	7.14	20	5.0	63	1.23	3.0	4.0	2.0	+0.062	50	4.0	400	0.35	1000
13	1N6321	6.6	7.125	7.5	7.875	20	5.0	57	1.16	4.0	5.0	2.0	+0.068	30	4.0	400	0.4	900
14	1N6322	7.5	7.79	8.2	8.61	20	20	52	1.07	5.0	6.0	1.0	+0.075	10	2.0	400	0.4	800
15	1N6323	8.4	8.645	9.1	9.555	20	40	47	0.97	6.0	7.0	1.0	+0.076	10	2.0	500	0.5	700

NOTES: See Page 8.

TABLE 1(a) - TYPE VARIANTS (CONTINUED)

(1) Variant	(2) Based on Type	(3) V_{Z1} at I_{Z1} = 250µA (V)	(4) V_Z Min. at I_{Z2} (V)	(5) V_Z Nom. at I_{Z2} (V)	(6) V_Z Max. at I_{Z2} (V)	(7) I_{Z2} Test Current (mA)	(8) N_D at I_{Z1} = 250µA 1-3kHz (µV/√Hz)	(9) I_{ZM} (mA)	(10) I_{ZSM} Surge (A)	(11) Z_Z at I_{Z2} (Ω)	(12) V_R (V)	(13) I_{R1} Note 1 (µA)	(14) T_{CVZ} (%/°C)	(15) I_{R2} Note 2 (µA)	(16) I_{R3} Note 3 (µA)	(17) Z_K at I_{Z1} = 250µA (Ω)	(18) V_{Z2} Volt. Reg. (V)	(19) C at 0V (pF)
16	1N6324	9.1	9.5	10	10.5	20	80	43	0.89	6.0	8.0	1.0	+0.079	10	2.0	500	0.5	600
17	1N6325	10	10.45	11	11.55	20	100	39	0.83	7.0	8.5	1.0	+0.082	10	2.0	550	0.5	500
18	1N6326	11	11.4	12	12.6	20	100	35	0.77	7.0	9.0	1.0	+0.083	10	2.0	550	0.55	450
19	1N6327	11.9	12.35	13	13.65	9.5	100	33	0.71	8.0	9.9	0.05	+0.079	10	0.1	550	0.55	400
20	1N6328	13.8	14.25	15	15.75	8.5	100	28	0.62	10	11	0.05	+0.082	10	0.1	600	0.7	350
21	1N6329	14.7	15.2	16	16.8	7.8	100	27	0.58	12	12	0.05	+0.083	10	0.1	600	0.75	325
22	1N6330	16.6	17.1	18	18.9	7.0	100	24	0.52	14	14	0.05	+0.085	10	0.1	600	0.85	300
23	1N6331	18.5	19	20	21	6.2	100	21	0.47	18	15	0.05	+0.086	10	0.1	500	0.95	275
24	1N6332	20.4	20.9	22	23.1	5.6	100	19	0.43	20	17	0.05	+0.087	10	0.1	500	1.05	260
25	1N6333	22.3	22.8	24	25.2	5.2	100	18	0.39	24	18	0.05	+0.088	10	0.1	500	1.15	240
26	1N6334	25.2	25.6	27	28.35	4.6	100	16	0.35	27	21	0.05	+0.090	10	0.1	500	1.3	220
27	1N6335	28	28.5	30	31.5	4.2	100	14	0.31	32	23	0.05	+0.091	10	0.1	500	1.45	200
28	1N6336	30.9	31.35	33	34.65	3.8	100	13	0.28	40	25	0.05	+0.092	10	0.1	600	1.6	185
29	1N6337	33.7	34.2	36	37.8	3.4	100	12	0.26	50	27	0.05	+0.093	10	0.1	600	1.75	175
30	1N6338	36.6	37.05	39	40.95	3.2	100	11	0.24	55	30	0.05	+0.094	10	0.1	700	1.9	170
31	1N6339	40.4	40.85	43	45.15	3.0	80	9.9	0.22	65	33	0.05	+0.095	10	0.1	800	2.1	165
32	1N6340	44.2	44.65	47	49.35	2.7	80	9.0	0.2	75	36	0.05	+0.095	10	0.1	900	2.25	155
33	1N6341	48	48.45	51	53.55	2.5	80	8.3	0.18	85	39	0.05	+0.096	10	0.1	1000	2.5	145

NOTES: See Page 8.

TABLE 1(a) - TYPE VARIANTS (CONTINUED)

(1) Variant	(2) Based on Type	(3) V_{Z1} at I_{Z1} = 250µA (V)	(4) V_Z Min. at I_{Z2} (V)	(5) V_Z Nom. at I_{Z2} (V)	(6) V_Z Max. at I_{Z2} (V)	(7) I_{Z2} Test Current (mA)	(8) N_D at I_{Z1} = 250µA 1-3kHz (µV/√Hz)	(9) I_{ZM} (mA)	(10) I_{ZSM} Surge (A)	(11) Z_Z at I_{Z2} (Ω)	(12) V_R (V)	(13) I_{R1} Note 1 (µA)	(14) T_{CVZ} (%/°C)	(15) I_{R2} Note 2 (µA)	(16) I_{R3} Note 3 (µA)	(17) Z_K at I_{Z1} = 250µA (Ω)	(18) V_{Z2} Volt. Reg. (V)	(19) C at 0V (pF)
34	1N6342	52.7	53.2	56	58.8	2.2	80	7.6	0.17	100	43	0.05	+0.097	10	0.1	1200	2.7	135
35	1N6343	58.4	58.9	62	65.1	2.0	80	6.8	0.15	125	47	0.05	+0.097	10	0.1	1300	2.9	130
36	1N6344	64.1	64.6	68	71.4	1.8	80	6.3	0.13	155	52	0.05	+0.098	10	0.1	1500	3.2	120
37	1N6345	70.8	71.25	75	78.75	1.7	80	5.7	0.125	180	56	0.05	+0.098	10	0.1	1600	3.4	110
38	1N6346	77.4	77.9	82	86.1	1.5	80	5.2	0.115	220	62	0.05	+0.099	10	0.1	1800	3.8	105
39	1N6347	86	86.45	91	95.55	1.4	80	4.7	0.1	270	69	0.05	+0.099	10	0.1	2100	4.2	100
40	1N6348	94.5	95	100	105	1.3	80	4.3	0.095	340	76	0.05	+0.110	10	0.1	2400	4.4	95
41	1N6349	104	104.5	110	115.5	1.1	80	3.9	0.085	500	84	0.05	+0.110	10	0.1	2800	4.8	90
42	1N6350	113	114	120	126	1.0	80	3.5	0.08	600	91	0.05	+0.110	10	0.1	3200	5.2	70
43	1N6351	122	123.5	130	136.5	0.95	80	3.3	0.07	850	99	0.05	+0.110	10	0.1	4100	5.6	70
44	1N6352	141	142.5	150	157.5	0.85	80	2.8	0.065	1000	114	0.05	+0.110	10	0.1	4500	7.0	65
45	1N6353	151	152	160	168	0.8	80	2.7	0.06	1200	122	0.05	+0.110	10	0.1	5000	7.5	65
46	1N6354	170	171	180	189	0.68	80	2.4	0.05	1500	137	0.05	+0.110	10	0.1	5600	9.0	60
47	1N6355	189	190	200	210	0.65	80	2.1	0.045	1800	152	0.05	+0.110	10	0.1	6500	12	55

NOTES

1. Measured at T_{amb} = +25°C.
2. Measured at T_{amb} = +150°C.
3. Life Test End-point.

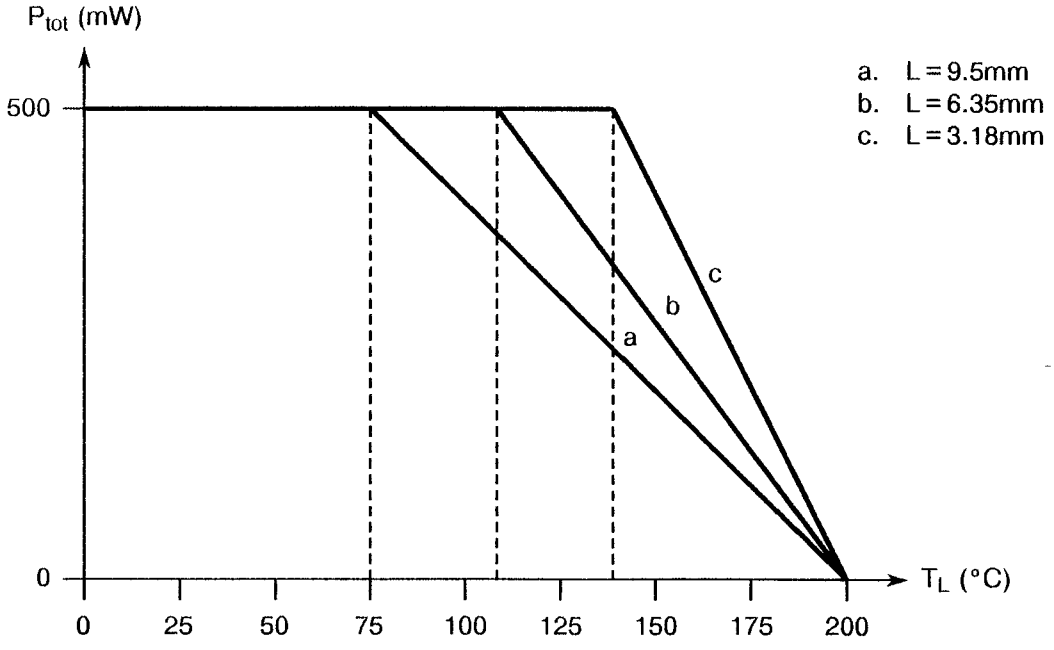
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Power Dissipation	P_{tot}	500	mW	Note 1
2	Operating Temperature Range	T_{op}	– 65 to + 200	°C	T_L
3	Storage Temperature Range	T_{stg}	– 65 to + 200	°C	-
4	Soldering Temperature	T_{sol}	+ 260	°C	Note 2

NOTES

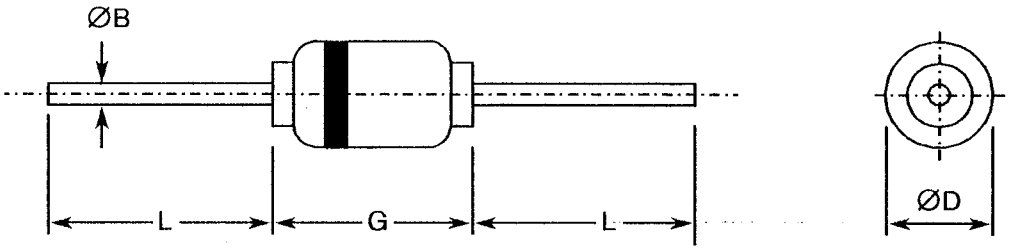
1. At $T_L \leq +75°C$. For derating at $T_L > +75°C$, see Figure 1 (L = 9.5mm from device body).
2. Duration 10 seconds maximum at a distance of not less than 1.5mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.

FIGURE 1 - PARAMETER DERATING INFORMATION



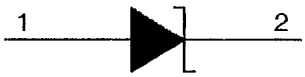
Power Dissipation versus Lead Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



SYMBOL	MILLIMETRES		NOTES
	MIN.	MAX.	
ØB	0.46	0.56	-
ØD	1.52	2.29	-
G	3.05	5.08	-
L	25.40	-	-

FIGURE 3 - FUNCTIONAL DIAGRAM



1. Anode
2. Cathode

NOTES

1. The cathode end shall be marked with a coloured ring.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the integrated circuits specified herein are stated in this specification and ESA/SCC Generic Specification No. 5000 for Discrete Semiconductors. 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

None.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.2.1, "Bond Strength Test": Shall not be performed.

(b) Para. 9.2.2, "Die Shear Test": Shall not be performed.

(c) Para. 9.6, "Constant Acceleration": Shall not be performed.

(d) Para. 9.7, "Particle Impact Noise Detection (PIND) Test": Shall not be performed.

(e) Para. 9.8.1, "Seal Test, Fine Leak": Shall not be performed.

(f) Para. 9.8.2, "Seal Test, Gross Leak": Shall be performed in accordance with MIL-STD-750, Method 1071, Test Condition 'E'.

(g) Immediately following Para. 9.3.3, Electrical Measurements at Room Temperature, a Surge Current test shall be performed in accordance with MIL-STD-750, Test Method 4066. The peak currents shown in column 10 of Table 1(a) shall be applied in the reverse direction and shall be superimposed on an I_{R2} as shown in column 7 of Table 1(a), a total of 5 times, at 1.0 minute intervals. Each surge shall be a ½ square wave pulse of 0.08 seconds duration or equivalent ½ sinewave with the same effective rms current. Immediately following completion, Table 2 Items 1, 2, 3 and 11 shall be measured on a go-no-go basis.

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

(a) Para. 7.1.1(a), "High Temperature Reverse Bias (H.T.R.B.) Test": Shall not be performed for devices with V_Z (nom.) $\leq$ 10V.

(b) Para. 9.8.1, "Seal Test, Fine Leak": Shall not be performed.

(c) Para. 9.8.2, "Seal Test, Gross Leak": Shall be performed in accordance with MIL-STD-750, Method 1071, Test Condition 'E'.

(d) Para. 9.12, "Radiographic Inspection": Shall not be performed

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.2.3, "Bond Strength Test": Shall not be performed.

(b) Para. 9.2.4, "Die Shear Test": Shall be replaced by a Thermal Resistance Test in accordance with MIL-STD-750, Method 3101 or 4081.

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

(d) Para. 9.8.1, "Seal Test, Fine Leak": Shall not be performed.

(e) Para. 9.8.2, "Seal Test, Gross Leak": Shall be performed in accordance with MIL-STD-750, Method 1071, Test Condition 'E'.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.8.1, "Seal Test, Fine Leak": Shall not be performed.

(b) Para. 9.8.2, "Seal Test, Gross Leak": Shall be performed in accordance with MIL-STD-750, Method 1071, Test Condition 'E'.

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

4.3 MECHANICAL 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 0.3 grammes.

4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The test conditions shall be as follows:-

Test Condition : 'A' (Tension).
Applied Force : 5.0 Newtons.
Duration : 10 seconds

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 does not guarantee acceptance of the finished product.

4.4.1 Case

Hard glass, hermetically sealed.

4.4.2 Lead Material and Finish

The lead material shall be Type 'L' with Type '4' 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 as 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:

510202101B

Detail Specification Number
Type Variant (see Table 1(a))
Testing Level (B or C, as applicable)

4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of 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 $T_{amb} = +125(+0-5)$ °C and $-65(+5-0)$ °C respectively

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing the electrical measurements listed in Tables 2 and 3 of this specification are shown in Figure 4.

4.7 BURN-IN TESTS

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, measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified for a given parameter in Table 2 shall not be exceeded.

4.7.2 Conditions for High Temperature Reverse Bias Burn-in

The requirements for high temperature reverse bias burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5000. 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 7 of ESA/SCC Generic Specification No. 5000. 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 Burn-in (Figure 5(a))

Not applicable.

4.7.5 Electrical Circuits for Power Burn-in (Figure 5(b))

Not applicable.

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	Zener Voltage	V_Z	4022	I_{Z2} = Note 1	Note 2	Note 3	V
2	Forward Voltage	V_F	4011	I_F = 1.0Adc pulsed	-	1.4	V
3	Reverse Current	I_R	4016	V_R = Note 4 d.c. Method	-	Note 5	µA
4	Knee Voltage	V_{Z1}	4022	I_Z = 250µAdc	Note 6	-	V
5	Voltage Regulation	V_{Z2}	4022	I_{Z2} = Notes 1 and 7	-	Note 8	V
6	Thermal Resistance	$R_{TH(J-L)}$	3101 or 4081	I_H = 200mA to 400mA t_H = 25s minimum I_M = 1.0mA to 10mA t_{MD} = 100µs maximum Lead Spacing = 9.53mm Note 9	-	250	°C/W

NOTES

1. See Column 7 of Table 1(a).
2. See Column 4 of Table 1(a).
3. See Column 6 of Table 1(a).
4. See Column 12 of Table 1(a).
5. See Column 13 of Table 1(a).
6. See Column 3 of Table 1(a).
7. The test current shall be applied until thermal equilibrium is attained (90 sec. min.) prior to reading the breakdown voltage. For this test, the diode shall be suspended by its leads with mounting clips whose inside edge is located at 9.53mm from the device body and the mounting clips shall be maintained at a temperature of +25(+8−2)°C. This measurement may be performed after a shorter time following application of the test current than that which provides thermal equilibrium if correlation to established readings can be established to the satisfaction of the Customer.
8. See Column 18 of Table 1(a).
9. To be performed instead of the Die Shear Test in Chart IV only.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS (NOTE 1)	LIMITS		UNIT
					MIN.	MAX.	
7	Small Signal Reverse Breakdown Impedance	Z_Z	4051	I_{Z2} = Note 2 I_{sig} = 10% of I_Z	-	Note 3	Ω
8	Noise Density	N_D	Figure 4(a)	I_{ZK} = 250µA f = 1-3kHz Note 4	-	Note 5	µV/√Hz
9	Knee Impedance	Z_K	4051	I_{ZK} = 250µA I_{sig} = 25µA(rms)	-	Note 6	Ω
10	Capacitance	C	4001	V_Z = 0V f = 1.0kHz	-	Note 7	pF
11	Thermal Impedance	$Z_{TH(J-X)}$	3101	I_H = 2.0A minimum t_H = 10ms I_M = 1.0mA to 10mA t_{MD} = 100µs maximum Note 8	-	15	°C/W

NOTES

1. Tests to be performed on a sample basis, LTPD 7 or less.
2. See Column 7 of Table 1(a).
3. See Column 11 of Table 1(a).
4. Noise Voltage shall be measured using a noise density test circuit as shown in Figure 4(a). Place a low-noise resistor, equivalent in value to the dynamic impedance of the diode under test, in the test clips, and adjust test current (I_{ZT}) to 250µAdc and measure output-noise voltage. Remove the resistor, insert diode under test in test clips, readjust test current to 250µAdc and measure output-noise voltage again. To obtain noise density (N_D), subtract rms resistor output-noise voltage from rms diode output-noise voltage and divide by product of overall system gain and square root of bandwidth. All measurements shall be made at T_{amb} = +25°C.
5. See Column 8 of Table 1(a).
6. See Column 17 of Table 1(a).
7. See Column 19 of Table 1(a).
8. To be performed in Chart II only.

TABLE 3(a) - ELECTRICAL MEASUREMENTS AT HIGH TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS (NOTE 1)	LIMITS		UNIT
					MIN.	MAX.	
3	Reverse Current	I_R	4016	V_R = Note 2 T_{amb} = +150°C d.c. Method	-	Note 3	µA
12	Temperature Coefficient of Zener Voltage	T_{CVZ}	4071	I_{Z2} = Notes 4 and 5 T_1 = +25 ± 5°C T_2 = +125°C	-	Note 6	%/°C

NOTES

1. Tests to be performed on a sample basis, LTPD 7 or less.
2. See Column 12 of Table 1(a).
3. See Column 15 of Table 1(a).
4. See Column 7 of Table 1(a).
5. Temperature coefficient of zener voltage. The device shall be temperature stabilised with current applied prior to reading breakdown voltage at the specified ambient temperature.
6. See Column 14 of Table 1(a).

TABLE 3(b) - ELECTRICAL MEASUREMENTS AT LOW TEMPERATURE

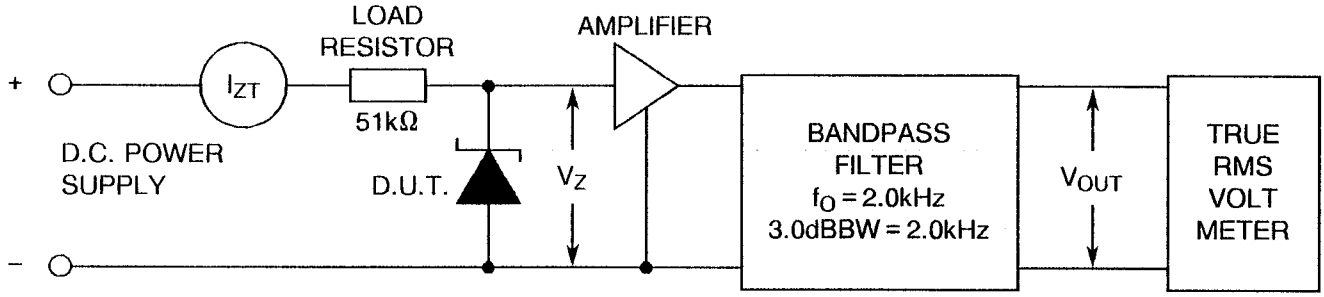
No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS (NOTE 1)	LIMITS		UNIT
					MIN.	MAX.	
12	Temperature Coefficient of Zener Voltage	T_{CVZ}	4071	I_{Z2} = Notes 2 and 3 T_1 = +25 ± 5°C T_2 = −65°C	-	Note 4	%/°C

NOTES

1. Tests to be performed on a sample basis, LTPD 7 or less.
2. See Column 7 of Table 1(a).
3. Temperature coefficient of zener voltage. The device shall be temperature stabilised with current applied prior to reading breakdown voltage at the specified ambient temperature.
4. See Column 14 of Table 1(a).

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

CIRCUIT FOR DETERMINATION OF NOISE DENSITY



NOTES

1. Input voltage and load resistance should be high so that the zener can be driven from a constant current source.
2. Input impedance of band pass filter should be high compared with dynamic impedance of the diode under test.
3. Filter bandwidth characteristics shall be as follows:

   F_O = 2000Hz.
   Shape factor, −40dB to −3.0dB, approximately 2.
   Passband at the −3.0db point is 1000 ± 50Hz to 3000 ± 150Hz.
   Passband at the −40db point is 500 ± 50Hz to 6000 ± 600Hz.

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
3	Reverse Current	I_R	As per Table 2	As per Table 2	± 50 or (1) ± 100	nA %
5	Voltage Regulation	V_{Z2}	As per Table 2	As per Table 2	± 1.0	%

NOTES

1. Whichever is greater, referred to the initial value.

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

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+125(+0−5)	°C
2	Reverse Voltage	V_R	Note 1	V
3	Duration	t	48	Hrs

NOTES

1. 80% of Table 1(a), Column 5 for devices where V_Z (nom.) ≥ 10V.

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

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+30 ± 5	°C
2	Working Current	I_{ZM}	Notes 1 and 2	mA
3	Mounting Conditions	-	As per MIL-STD-750, Test Method 1026	-

NOTES

1. See Column 9 of Table 1(a).
2. I_{ZM} (min.) = 50% at +25°C. I_{ZM} to be adjusted for +150°C ≤ T_J ≤ +175°C.

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

Not applicable.

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

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 5000)

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 testing are as scheduled in Table 6 of this specification. 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. 5000. The conditions for operating life testing shall be the same as specified in Table 5(b) for power burn-in.

4.8.4 Electrical Circuits for Operating Life Tests (Figure 5(b))

Not applicable.

4.8.5 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 5000. The temperature to be applied shall be the maximum storage temperature specified in Table 1(b) of this specification.

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

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	LIMITS		UNIT
						MIN.	MAX.	
1	Zener Voltage	V_Z	As per Table 2	As per Table 2	- ±1.0	Note 1	Note 2	V %
2	Forward Voltage	V_F	As per Table 2	As per Table 2	-	-	1.4	V
3	Reverse Current	I_R	As per Table 2	As per Table 2	±0.05 or (3) 100	- -	Note 4 -	µA %
9	Knee Impedance	Z_K	As per Table 2	As per Table 2	-	-	Note 5	Ω

NOTES

1. See Column 4 of Table 1(a).
2. See Column 6 of Table 1(a).
3. Whichever is greater, referred to the initial value.
4. See Column 16 of Table 1(a).
5. See Column 17 of Table 1(a).

APPENDIX 'A'

AGREED DEVIATIONS FOR MICROSEMI (U.S.A.)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
General deviations from ESA/SCC Generic Specification No. 5000	Para. 9.1, Internal Visual Inspection: Test Method 2074 of MIL-STD-750 may be used. Internal Visual Inspection may be performed at any point prior to painting the diode. Para. 9.10, External Visual Inspection: Test Method 2071 of MIL-STD-750 may be used. Para. 9.18, Permanence of Marking: Test Method 1022 of MIL-STD-750 may be used.