DIODES, VOLTAGE REFERENCE, 6.4 VOLTS,

IN DO-35 CASE,

BASED ON TYPES 1N4565A TO 1N4584A

ESCC Detail Specification No. 5102/004

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space components
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Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 4	October 1983	-	-
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This issue supersedes Issue 3 and incorporates all modifications agreed on the basis of Policy DCR 21025 and the following DCR's:-		
		Table of Contents	: Addition of Appendix B for deviations agreed with Siemens (U.S.)	24034
		Table 1(a)	: Addition of column 6	22179
		Para. 4.2.3	: Added "X-ray Inspection not applicable"	22236
		Para. 4.4.2	: "KOVAR" material changed to "DUMET"	22179
		Table 3	: Note 3 added	22179
		Table 6	: Note 3 added and Note 2 changed to read "see Table 1(a)"	22179
		Appendix B	: Added for deviations agreed with Siemens (U.S.)	24034
'A'	March '89	P1. Cover page		None
		P2. DCN		None
		P6. Table 1(a)	: Amended	22705
		P6A. Table 1(a)	: Added for Variants 21 to 40	22705
		P8. Figure 2	: Dimension G amended	22595
		P10. Para. 4.4.2	: Amended	22705
'B'	March '90	P1. Cover page		None
		P2. DCN		None
		P6. Table 1(a)	: Columns 5 and 6, headers amended	22774
		P6A.	: Notes added	22774
		P8. Figure 2	: Dimension G corrected	23374
		P14. Table 3	: No. 1, Characteristics, Symbol, Limits and Unit amended	22774
			: Note 2 deleted, Note 3 renumbered	22774
		P16. Table 6	: No. 3, Characteristics, Symbol, Limits and Unit amended	22774
			: Note 2 deleted, Note 3 renumbered	22774
'C'	July '93	P1. Cover Page		None
		P2. DCN		None
		P9. Para. 4.2.2	: PIND deviation amended	21043
		Para. 4.2.3	: Radiographic Inspection deviation amended	21049
		This document has been transferred from hardcopy to electronic format. The content is unchanged but minor differences in presentation exist.		

TABLE OF CONTENTS

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Diodes, Voltage Reference, 6.4 Volts, in DO-35 case, based on Types 1N4565A to 1N4584A.

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 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.

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.

TABLE 1(a) - TYPE VARIANTS

(1) Variant	(2) Based on Type	(3) I_Z (mA)	(4) Z_{Zmax} (Ω)	(5) (Note 1) TZ_{VZ} (%/°C) (max.)	(6) (Note 2) ΔV_Z (mV)	(7) Lead Material and Finish
01	1N4565A	0.5	200	0.01	100	C2
02	1N4566A	0.5	200	0.005	50	C2
03	1N4567A	0.5	200	0.002	20	C2
04	1N4568A	0.5	200	0.001	10	C2
05	1N4569A	0.5	200	0.0005	5	C2
06	1N4570A	1.0	100	0.01	100	C2
07	1N4571A	1.0	100	0.005	50	C2
08	1N4572A	1.0	100	0.002	20	C2
09	1N4573A	1.0	100	0.001	10	C2
10	1N4574A	1.0	100	0.0005	5	C2
11	1N4575A	2.0	50	0.01	100	C2
12	1N4576A	2.0	50	0.005	50	C2
13	1N4577A	2.0	50	0.002	20	C2
14	1N4578A	2.0	50	0.001	10	C2
15	1N4579A	2.0	50	0.0005	5	C2
16	1N4580A	4.0	25	0.01	100	C2
17	1N4581A	4.0	25	0.005	50	C2
18	1N4582A	4.0	25	0.002	20	C2
19	1N4583A	4.0	25	0.001	10	C2
20	1N4584A	4.0	25	0.0005	5	C2

NOTES: See Page 6A.

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

(1) Variant	(2) Based on Type	(3) I_Z (mA)	(4) Z_{Zmax} (Ω)	(5) (Note 1) TZ_{VZ} (%/°C) (max.)	(6) (Note 2) ΔV_Z (mV)	(7) Lead Material and Finish
21	1N4565A	0.5	200	0.01	100	C3 or C4
22	1N4566A	0.5	200	0.005	50	C3 or C4
23	1N4567A	0.5	200	0.002	20	C3 or C4
24	1N4568A	0.5	200	0.001	10	C3 or C4
25	1N4569A	0.5	200	0.0005	5	C3 or C4
26	1N4570A	1.0	100	0.01	100	C3 or C4
27	1N4571A	1.0	100	0.005	50	C3 or C4
28	1N4572A	1.0	100	0.002	20	C3 or C4
29	1N4573A	1.0	100	0.001	10	C3 or C4
30	1N4574A	1.0	100	0.0005	5	C3 or C4
31	1N4575A	2.0	50	0.01	100	C3 or C4
32	1N4576A	2.0	50	0.005	50	C3 or C4
33	1N4577A	2.0	50	0.002	20	C3 or C4
34	1N4578A	2.0	50	0.001	10	C3 or C4
35	1N4579A	2.0	50	0.0005	5	C3 or C4
36	1N4580A	4.0	25	0.01	100	C3 or C4
37	1N4581A	4.0	25	0.005	50	C3 or C4
38	1N4582A	4.0	25	0.002	20	C3 or C4
39	1N4583A	4.0	25	0.001	10	C3 or C4
40	1N4584A	4.0	25	0.0005	5	C3 or C4

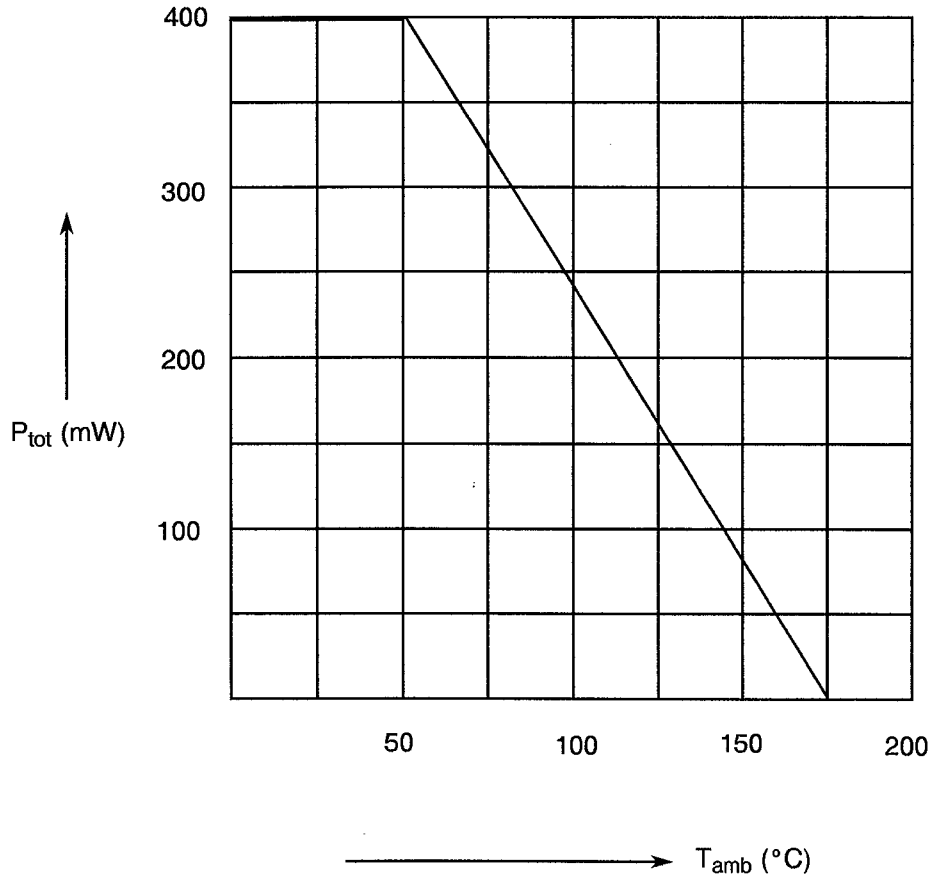
NOTES

1. To be used for reference purposes only.
2. The breakdown voltage shall be measured and recorded at each of the temperatures specified in Table 3. The lowest measured voltage shall be subtracted from the highest measured voltage and the difference value obtained shall not exceed the value given for each diode type.

TABLE 1(b) - MAXIMUM RATINGS

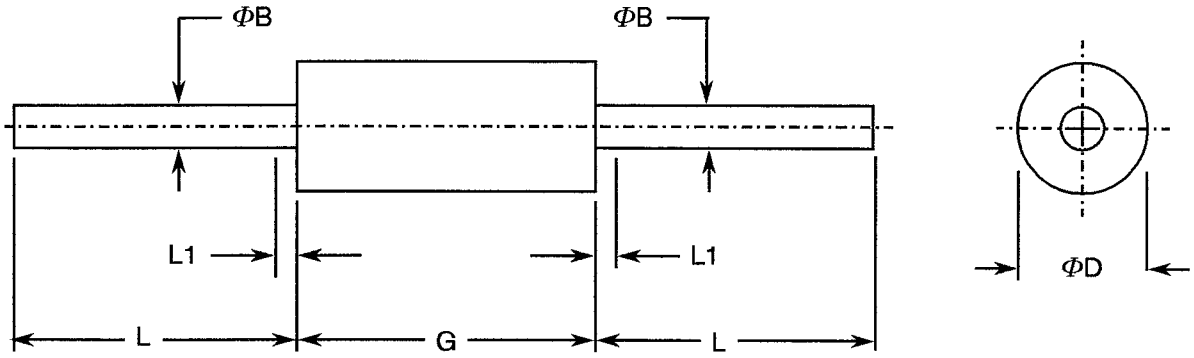
No.	CHARACTERISTIC	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Power Dissipation	P_{tot}	400	mW	$T_{amb} \leq +50°C$
2	Operating Temperature Range	T_{op}	−55 to +175	°C	T_{amb}
3	Storage Temperature Range	T_{stg}	−65 to +175	°C	
4	Soldering Temperature	T_{sol}	+260	°C	Time: ≤10 seconds; Distance from case: ≥ 1.5mm

FIGURE 1 - PARAMETER DERATING INFORMATION



Power Dissipation Versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Millimetre dimensions are derived from original inch dimensions.

SYMBOL	INCHES		MILLIMETRES		NOTES
	MIN.	MAX.	MIN.	MAX.	
ΦB	.018	.022	0.458	0.558	-
ΦD	.060	.090	1.53	2.28	1
G	.120	.200	3.05	5.08	1
L	.500	-	12.70	-	-
L1	-	.050	-	1.27	2

NOTES

1. Package contour optional within cylinder of diameter ΦD and length G. Slugs, if any, shall be included within this cylinder but shall not be subject to the minimum limit of ΦD.
2. Lead diameter not controlled in this zone to allow for flash, lead finish build-up, and minor irregularities other than slugs.

FIGURE 3 - FUNCTIONAL DIAGRAM

1. Anode
2. Cathode

NOTES

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

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.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the diodes 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

Not applicable.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.2.1, Bond Strength Test: Not applicable.

(b) Para. 9.2.2, Die Shear Test: Not applicable.

(c) Para. 9.7, Particle Impact Noise Detection (PIND) Test: Not applicable.

(d) Para. 9.5, Thermal Shock test: shall be performed according to MIL-STD-202, Test Method 107, Test Condition 'B'.

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

(a) Para. 7.1.1(a), H.T.R.B. Test: Shall not be performed.

(b) Para. 7.1.1(b), Burn-in test shall be performed under the reverse conditions specified in Para. 4.7 of this specification.

(c) Para. 9.12, Radiographic Inspection: Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)

The Bond Strength and Die-shear tests shall not be performed.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

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 0.2 grammes.

4.3.4 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'.
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

Glass, hermetically sealed.

4.4.2 Lead Material and Finish

The lead material shall be Type 'C' with either Type '2' or Type '3 or 4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500. (See Table 1(a) for Type Variants).

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700. Each component shall be marked in respect of:-

(a) Lead Identification.

(b) The SCC Component Number.

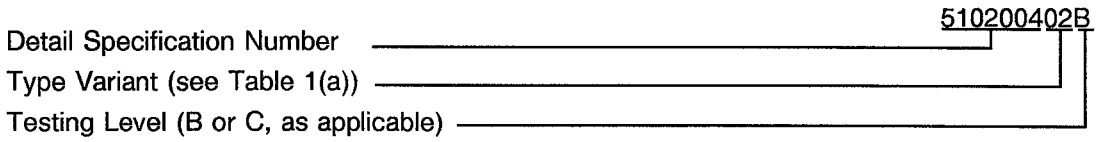
(c) Traceability Information.

4.5.2 Lead Identification

Lead 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 in accordance with the requirements of 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) Lead Identification.

(b) The SCC Component Number.

(c) Traceability Information.

The marking information 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. 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.

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, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift value (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 Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions for burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuits for Burn-in

Circuits for use in performing the burn-in tests are shown in Figure 5 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	Zener Voltage	V_Z	4022	I_Z = (1) mA	6.08	6.72	V
2	Reverse Current	I_R	4016	V_R = 4.8 V	-	150	µA

NOTES
1. See Table 1(a), Column 3.

a.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Small Signal Breakdown Impedance	Z_Z	4051	I_Z = (1)	-	(2)	Ω

NOTES
1. See Table 1(a), Column 3.
2. See Table 1(a), Column 4.

FIGURE 4 - TEST CIRCUITS

Not applicable.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Voltage Temperature Stability	ΔV_Z	4071	T_{amb} = -55, +25, +100 °C I_Z = (1)	-	(2)	mV

NOTES

1. See Table 1(a), Column 3.
2. See Table 1(a), Column 6.

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITION	CHANGE LIMITS (Δ)	UNIT
1	Zener Voltage	V_Z	4022	I_Z = (1) mA	±10	mV

NOTES

1. See Table 1(a), Column 3.

TABLE 5 - CONDITIONS FOR BURN-IN

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+100	°C
2	Zener Current	I_Z	See Table 1(a), Column 3 of this specification	mA

FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN

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. 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 scheduled in Table 6.

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 for the burn-in test.

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 burn-in.

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 CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Zener Voltage	V_Z	4022	I_Z = (1) mA	6.08	6.72	V
2	Reverse Current	I_R	4016	V_R = 4.8V	150	-	µA
3	Voltage Temperature Stability	ΔV_Z	4071	I_Z = (1) mA T_{amb} = -55, +25, +100 °C	-	(2)	mV

NOTES

1. See Table 1(a), Column 3.
2. See Table 1(a), Column 6.

APPENDIX 'A'

AGREED DEVIATIONS FOR THOMSON-CSF

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS	APPROVED DCR
Para's 4.2.4 and 4.2.5	Deviations from Environmental and Endurance Tests (Chart IV) and from Lot Acceptance Tests (Chart V) 1. "Moisture Resistance", Para 9.16, according to MIL-STD-750, Method 1021, shall be replaced by "Climatic Sequence" according to IEC 68-1 with the following conditions: - Phase 'D': Option 2, 5 cycles. - Phase 'F' (Low Air Pressure): Not applicable. 2. "Seal Test", Para's 9.8.1 and 9.8.2 according to MIL-STD-750, Method 1071, Conditions 'C' and 'H', shall be replaced by "Seal Test" according to IEC 68-2-17, Test Ql (Bomb Pressure Test) with the following conditions: - The pressure within the vessel shall be 210N. - The duration of conditioning shall be 4 hours. - Final measurements: I_R with the limits as specified in Table 2 of this Detail Specification.	24013

APPENDIX 'B'

AGREED DEVIATIONS FOR SIEMENS (U.S.)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS	APPROVED DCR
Table 3	Alternative test methods for the measurements of TCVZ. The breakdown voltage shall be measured and recorded at each of the specified test temperatures. The difference between the lowest and highest values recorded for each part shall not exceed the specified limit.	24034