DIODES, VOLTAGE REFERENCE,

BASED ON TYPE 1N4372A

ESCC Detail Specification No. 5102/014

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space components
coordination group

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		SCCG Chairman	ESA Director General or his Deputy
Issue 2	January 1987	-	-
Revision 'A'	July 1993		
Revision 'B'	July 1996		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This issue supersedes Issue 1 and incorporates all modifications agreed on the basis of the following Policy DCRs:		
		-	Incorporation of Lead Document	21025
		-	Changes due to format amendment	21025
		-	Addition of Appendix requirements and the following DCR's:-	21019
		Contents	: Para's. 4.7.2 and 4.7.3, "Power" added to Title	23275
			: Table 2, Titles expanded	23275
			: Table 3, "(a)" deleted and "3(b)" deleted in total	23275
			: Table 5, "Power" added to Title	23275
			: Figure 4, title added	23275
			: Figure 5, Title added	23275
		Table 1(a)	: "a" deleted from Figure column	23275
		Table 1(b)	: No. 1 unit amended	23217
			: No. 5, Symbol and Unit amended	23217
			: No. 9, "Temperature" added to Characteristics	23275
			: Note 1, Temperature amended to +50°C	22491
		Figure 1	: Derating curve corrected	22491
		Figure 2	: Table and Notes re-written with metric measurements as prime	23275
		Para. 2	: Subpara. "(d)" deleted	23275
		Para. 4.3.3	: In Test Condition, after 'a', "(tension)" added	23275
		Para. 4.4.1	: Paragraph re-written	23275

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		Para's 4.7.2 and 4.7.3:	"Power" added to Title and text	23275
		Table 2 a.c.	: Note 1 deleted and replaced with new Note 1	22491
		Tables 3(a) and 3(b)	: Tables combined into new Table 3	23275
		Figure 4	: Title added	23275
		Table 4	: Table characterised as per Table 2	23275
		Table 5	: "Power" added to Title	23275
			: No. 1, Limits " ±3" added	22491
		Figure 5	: Title added	23275
		Para. 4.8.2	: Second sentence added	23275
		Page heading	: Spec. Number corrected	23275
		Table 6	: Table characterised as per Table 2	23275
'A'	July '93	P1. Cover Page		None
		P2A. DCN		None
		P9. Para. 4.2.2	: PIND deviation amended	21043
			: Die Shear deviation deleted	23499
		Para. 4.2.3	: Radiographic Inspection deviation amended	21049
		P10. Para. 4.2.4	: Die Shear deviation deleted	23499
		This document has been transferred from hardcopy to electronic format. The content is unchanged but minor differences in presentation exist.		
'B'	July '96	P1. Cover Page		None
		P2A. DCN		None
		P5. Para. 1.7	: Text amended	21083

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TABLES

FIGURES

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 Diodes, Voltage Reference, based on Type 1N4372A.

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 listed 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.

1.7 HIGH TEMPERATURE TEST PRECAUTIONS

For tin-lead plated or solder-dipped lead finish, all tests to be performed at a temperature that exceeds +125°C shall be carried out in a 100% inert atmosphere.

TABLE 1(a) - TYPE VARIANTS

VARIANT	CASE	FIGURE	LEAD MATERIAL AND FINISH
01	D07	2	D2
02	D07	2	D3 OR D4

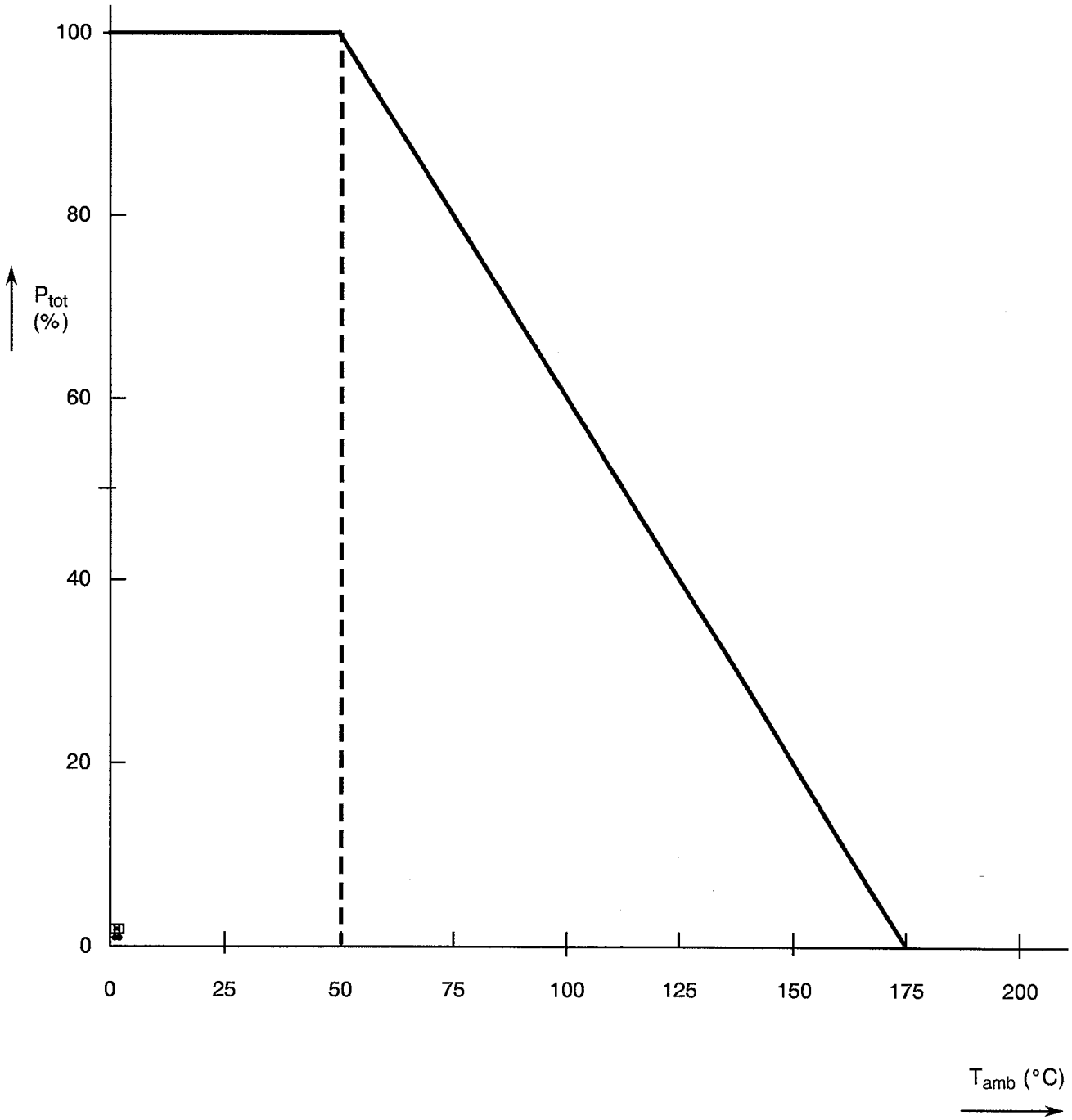
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Power Dissipation	P_{tot}	400	mW	See Note 1
2	Zener Voltage (Nominal)	VZ	3.0	Vdc	See Note 2
3	Zener Voltage (Max)	$V_{Z(max)}$	3.15	Vdc	See Note 2
4	Zener Voltage (Min)	$V_{Z(min)}$	2.85	Vdc	See Note 2
5	Dynamic Impedance	Z_Z	29	Ω	
6	Temperature Coefficient	TCV	-0.075	%/°C	
7	Operating Temperature Range	T_{op}	−65 to +175	°C	T_{amb}
8	Storage Temperature Range	T_{stg}	−65 to +175	°C	
9	Soldering Temperature	T_{sol}	+260	°C	See Note 3

NOTES

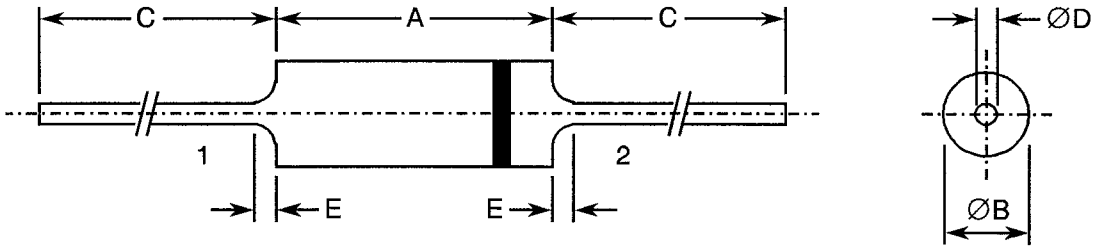
1. For derating characteristics above ambient temperature of +50°C see Figure 1.
2. At I_Z = 20mA.
3. Duration 10 seconds maximum at a distance of not less than 1.5m from the body, and the same lead shall not be resoldered until 3 minutes have elapsed.

FIGURE 1 - PARAMETER DERATING INFORMATION



Power Dissipation versus Temperature (T_{amb})

FIGURE 2 - PHYSICAL DIMENSIONS

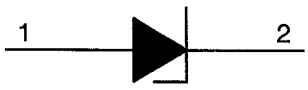


SYMBOL	MILLIMETRES		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	5.85	7.62	0.230	0.300	
B	2.16	2.71	0.085	0.107	
C	25.40	-	1.000	-	See Note
D	0.458	0.558	0.018	0.022	
E	-	1.27	-	0.050	

NOTES

1. The lead diameter not controlled between the diode body and 1.27mm (0.050 inches) from the diode body.

FIGURE 3 - FUNCTIONAL DIAGRAM



1. Anode
2. Cathode

NOTES

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

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.

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

None.

4.2.2 Deviations from Final Production Tests (Chart II)

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

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

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

(a) Para. 9.22, H.T.R.B. Test: Shall not be performed.

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

4.2.4 Deviations from Qualification, Environmental and Endurance Tests (Chart IV)

(a) Para. 9.2.3, Bond Strength Test: 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' (Tension).
Applied Force : 20 Newtons.
Duration : 15 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

The case shall be hermetically sealed and have a glass body.

4.4.2 Lead Material and Finish

The lead material shall be Type 'D' 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.

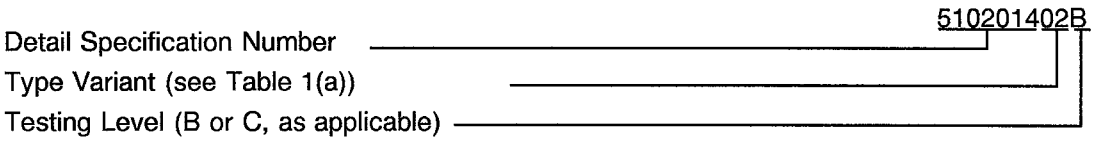
(c) Traceability Information.

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. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +25 \pm 3$ °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 (Figure 4)

Not applicable.

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 $T_{amb} = +25 \pm 3$ °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 in Table 2 for a given parameter 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. 5000. The conditions for power burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuits for Power Burn-in (Figure 5)

Not applicable.

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

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD-750	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Breakdown Voltage 1	$V_{(BR)1}$	4022	$I_Z = 250\mu A$	1.3	3.15	Vdc
2	Breakdown Voltage 2	$V_{(BR)2}$	4022	$I_Z = 20mA$	2.85	3.15	Vdc
3	Reverse Current	I_R	4016	$V_R = 1.0$ Vdc	-	30	µA
4	Forward Voltage	V_F	4011	$I_F = 200mA$	-	1.5	V

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

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD-750	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
5	Small Signal Breakdown Impedance	Z_Z	4051	$I_Z = 20mAdc$ $I_{sig} = 10\% I_Z$ See Note 1	-	29	Ω

NOTES

1. Measurements performed on a sample basis, LTPD7 or less.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD-750	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
3	Reverse Current	I_R	4016	$T_{amb} = +150\ (+0\text{-}5)$ $V_R = 1.0$ Vdc	-	100	µA
6	Temperature Coeff. of Breakdown Voltage	$TCV_{(BR)}$	4071	$T_{amb} = -55/+25/+125$ °C $I_Z = 7.5mAdc$ See Note 1 of Table 2	-	-0.075	%/°C

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

Not applicable.

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMIT (Δ)	UNIT
2	Breakdown Voltage 2	$V_{(BR)2}$	As per Table 2	As per Table 2	±2.0	%
3	Reverse Current	I_R	As per Table 2	As per Table 2	±10	%

TABLE 5 - CONDITIONS FOR POWER BURN-IN

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+25 ±3	°C
2	Zener Current	I_Z	125	mA
3	Duration	-	168	Hours
4	Test Method 1026 of MIL-STD-750	-	A	-

FIGURE 5 - ELECTRICAL CIRCUIT FOR POWER 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 $T_{amb} = +25 \pm 3$ °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. The measurements shall be performed at $T_{amb} = +25 \pm 3$ °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 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	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
2	Breakdown Voltage 2	$V_{(BR)\,2}$	As per Table 2	As per Table 2	2.85	3.15	Vdc
3	Reverse Current	I_R	As per Table 2	As per Table 2	-	30	µA