DIODES, SILICON, POWER RECTIFIER,

BASED ON TYPES 1N4383, 1N4384, 1N4385,

1N4585 AND 1N4586

ESCC Detail Specification No. 5103/003

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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	CHANGE Reference	CHANGE Item	Approved DCR No.
		This issue incorporates all modifications agreed on the basis of Policy DCR 21016 for adaptation to new qualification requirements.		
'A'	July '93	P1. Cover Page		None
		P2. DCN		None
		P4. T of C	: "Appendices" title added	21019
		P6. Table 1(a)	: "Lead Material and/or Finish" column added	21025
		P9. Para. 2	: MIL-STD-1276 deleted	21025
		Para. 4.1	: Additional text added	21019
		Para. 4.2.2	: PIND deviation amended	21043
		Para. 4.2.3	: H.T.R.B. deviation deleted	23499
		P10. Para. 4.4.2	: Paragraph amended	21025
		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
		P2. DCN		None
		P3. T of C	: Para. 1.7 entry added	21083
		P5. Para. 1.7	: Paragraph added	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 a Diode, Silicon, Power Rectifier, based on Types 1N4383, 1N4384, 1N4385, 1N4585 and 1N4586.

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.

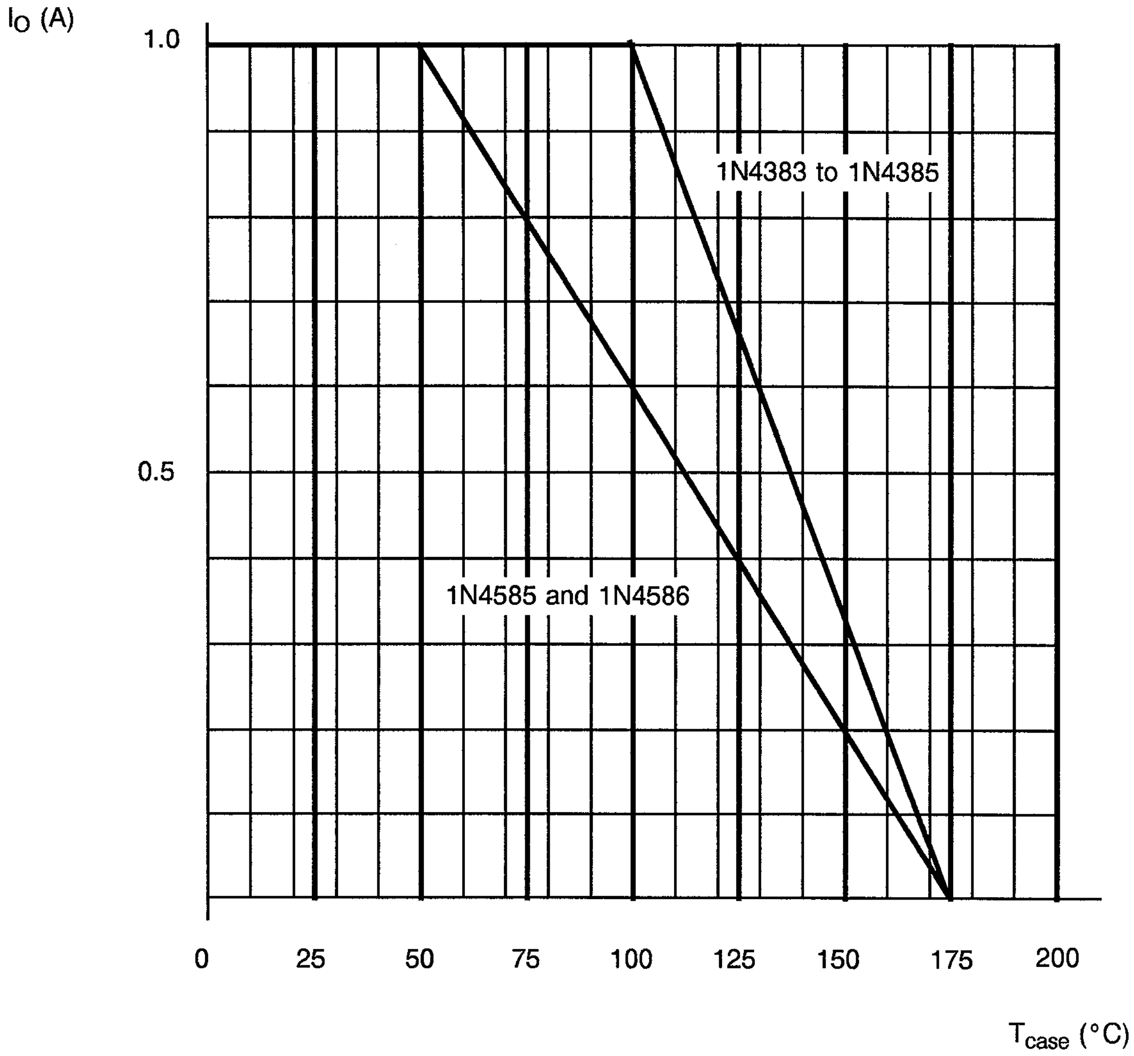
TABLE 1(a) - TYPE VARIANTS

(1) Variant	(2) Equivalent JEDEC Type	(3) V_R (V)	(4) I_R (μA) $T_{amb} = +25°C$	(5) I_R (μA) $T_{amb} = +150°C$	(6) I_O (A)	(7) V_F (V)	(8) Lead Material and Finish
01	1N4383	200	10	250	1.0	1.0	C3 or C4
02	1N4384	400	10	250	1.0	1.0	C3 or C4
03	1N4385	600	10	250	1.0	1.0	C3 or C4
04	1N4585	800	10	250	1.0	1.0	C3 or C4
05	1N4586	1000	10	250	1.0	1.0	C3 or C4

TABLE 1(b) - MAXIMUM RATINGS

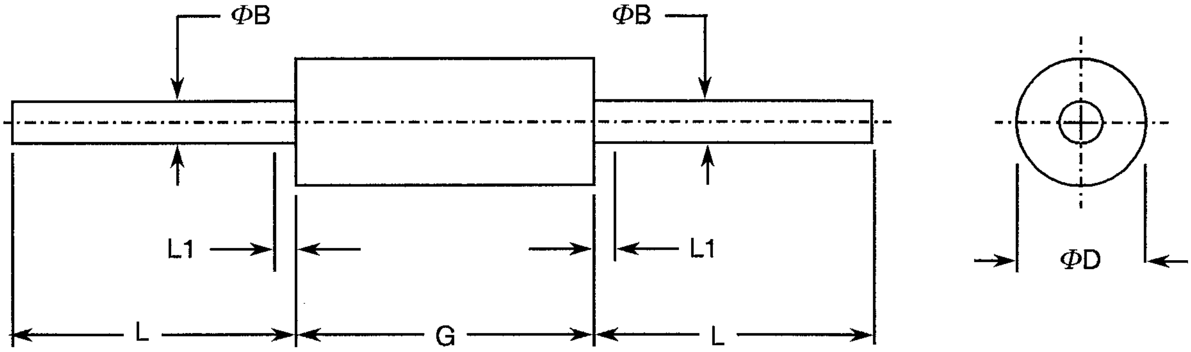
No.	CHARACTERISTIC	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Operating Junction Temperature Range	T_j	−65 to +150	°C	$T_{amb} = +50°C$
2	Storage Temperature Range	T_{stg}	−65 to +175	°C	
3	Soldering Temperature	T_{sol}	+260	°C	Time: ≤10 seconds; Distance from case: ≥ 1.5mm
4	Peak Surge Forward Current	I_{FSM}	50	A	$T_{amb} = +25°C$; t = 10ms

FIGURE 1 - PARAMETER DERATING INFORMATION



Maximum Forward Current versus Case Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Millimeter dimensions are derived from original inch dimensions.

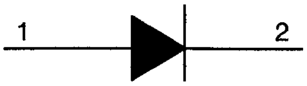
SYMBOL	INCHES		MILLIMETRES		NOTES
	MIN.	MAX.	MIN.	MAX.	
ΦB	0.029	0.033	0.737	0.838	-
ΦD	0.120	0.150	3.05	3.81	1
G	0.315	0.360	8.01	9.14	1
L	1.000	-	25.40	-	-
L1	-	0.050	-	1.27	2

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.

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 Test: Not applicable.

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

(c) Para. 9.5, Thermal Shock Test: To 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)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Bond Strength Test (Subgroup III): 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 0.5 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 : 10 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 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.

4.5.3 The SCC Component Number

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

510300302B

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.

4.5.5 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 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 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.

4.7.4 Conditions and Electrical Circuits for High Temperature Reverse Bias.

The requirements for the High Temperature Reverse Bias test are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions shall be as specified in Table 5, the electrical circuits to be used are shown in Figure 5 of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Reverse Current	I_R	MIL-STD-750 Method 4016.2	$V_R = (1)$	-	10	µA
2	Forward voltage	V_F	MIL-STD-750 Method 4011.3	$I_F = I_O = (2)$	-	1.0	V

NOTES
1. See Column 3 of Table 1(a).
2. See Column 6 of Table 1(a).

FIGURE 4 - TEST CIRCUIT

Not applicable.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Reverse Current	I_R	MIL-STD-750 Method 4016.2	T_{amb} = +150°C V_R = (1)	-	250	µA

NOTES

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

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	CHANGE LIMITS (Δ)	UNIT
1	Reverse Current	I_R	MIL-STD-750 Method 4016.2	V_R = (2)	±100 (1)	%
2	Forward Voltage	V_F	MIL-STD-750 Method 4011.3	$I_F = I_O$ = (3)	±10	%

NOTES

1. Or +1.0% of I_R limit (Column 4 of Table 1(a)), whichever is greater.
2. See Column 3 of Table 1(a).
3. See Column 6 of Table 1(a).

TABLE 5 - CONDITIONS FOR BURN-IN AND HIGH TEMPERATURE REVERSE BIAS

BURN-IN

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+25	°C
2	Forward Current	I_F	$I_F = I_O = (1)$	A

HIGH TEMPERATURE REVERSE BIAS

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+175	°C
2	Reverse Voltage	V_R	(2)	V

NOTES
1. See Column 6 of Table 1(a).
2. See Column 3 of Table 1(a).

FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN AND HTRB

BURN-IN

Not applicable.

HIGH TEMPERATURE REVERSE BIAS

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	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Forward Voltage	V_F	MIL-STD-750 Method 4011	$I_F = I_O = (2)$	-	1.0	V
2	Reverse Current	I_R	MIL-STD-750 Method 4016	$V_R = (1)$	-	10	µA

NOTES

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