DOCUMENT CHANGE REQUEST

DCR number 443	Changes required for: N/A	Originator: Benoit Cornanguer
Date: 2008/11/21	Date sent: 2008/11/21	Organisation: CNES
Status: IMPLEMENTED		

Title:	Diodes Switching, based on types 1N5802, 1N5804, 1N5806, 1N5802US, 1N5804US, 1N5806US and		
Number:	5101/014	Issue:	1

Other documents affected:

Page:

Page 6: Table 1(a) - Type Variants
Page 6: Table 1(b) - Maximun Ratings
Page 7: Figure 1 - Parameter Derating Information
Page 9: Figure 2 - Physical Dimensions
Page 9: Figure 3 - Functional Diagram
Page 10: paragraph 4.2.2 - Deviations from Final Produ

Paragraph:

Page 6: Table 1(a) - Type Variants
Page 6: Table 1(b) - Maximun Ratings
Page 7: Figure 1 - Parameter Derating Information
Page 9: Figure 2 - Physical Dimensions
Page 9: Figure 3 - Functional Diagram
Page 10: paragraph 4.2.2 - Deviations from Final Produ

Original wording:

Proposed wording:

See attached document

Justification:

New variants 13 & 14 introduction with LCC2 A package (gold finish and hot solder dip).

Attachments:

DCR443att.pdf, 5101014.pdf, null

Modifications:

Approved wording if different from 'Proposed Wording' above or reason for rejection

Additional changes as follows are included in this DCR as included in the attached 5101/014 issue 2 Draft E:

a) Rewording and restructure of various sections and paragraphs of the specification plus other editorial changes based on the layout and editorial content of other Detail Specifications already converted to ESCC format, as well as changes to make the Detail specification consistent with the current ESCC Generic Specification No. 5000.

b) Deletion of any redundant paragraphs and information, e.g.: Figure 1, mechanical paragraph, Figure 4, Appendix for Microsemi/I.

c) Table 1(b)
For VRWM, delete remark that rating applies at Tamb <=25C (simple correction)

d) Table 1(b), Figure 1
Maximum rating for Average Output Rectified Current IO amended to be 2.5A at Tcase (was 1A at Tamb)(to be consistent with new variants 13 & 14 and MIL-PRF-19500/477). Derating of IO amended for Tcase>75C (to be consistent with MIL-PRF-19500/477).

d) Tables 2, 3(b), 4, 6
Amend characteristics for new variants 13 & 14:
IR1
V(BR) (replaced by IR2)
as detailed in the attached 5101/014 issue 2 Draft E.

e) Appendix for ST
Replace ST appendix with the one as detailed in the attached 5101/014 issue 2 Draft E.

Approval signature:



Date signed:

2008-11-21

TABLE 1(a)- Type Variants

Variant	Based on Type	Case	Figure	Breakdown Voltage V(BR) (V)	Working Peak Reverse Voltage VRWM (V)	Lead/Terminal Material and Finish
13	1N5806U	LCC2A	2(d)	150	150	2
14	1N5806U	LCC2A	2(d)	150	150	4

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

TABLE 1(a)- MAXIMUM RATINGS

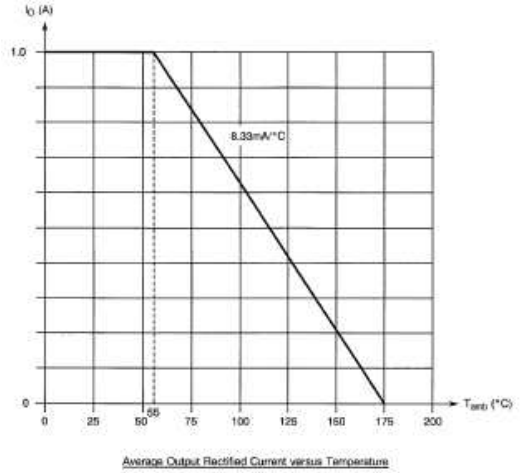
N°	Characteristics	Symbols	Maximum Ratings	Unit	Remarks
1	Forward Surge Current (per Diode) Variants 01 to 12 Variants 13 to 14	IFSM	35 33	A(pk) A	At Tamb ≤ +25°C Note 1 Note 7
3	Average Output Rectified Current Variants 01 to 12 Variants 13 to 14	IO	1 2.5	A A	50%Duty Cycle Note 3 Note 8
4	Operating Temperature Range Variants 01 to 12 Variants 13 to 14 (Case Temperature)	Top Top	-65 to +175 -65 to +175	°C °C	Tamb Note 9
added	Junction Temperature Variants 13 to 14	Tj	+175	°C	
5	Storage Temperature Range	Tstg	-65 to +175	°C	Note 9
6	Soldering Temperature Variant 01 to 09 Variant 10 to 12 Variant 13 to 14	Tsol	+245	°C	 Note 4 Note 5 Note 10
added	Thermal Resistance, Junction to Case Variant 13 to 14	Rth(j-c)	13	°C/W	Note 11

NOTES:

7. Sinusoidal pulse of 10ms duration.
8. For Variants 13 to 14 at Tcase ≥ +142°C per Diode, derate linearly to 0A at +175°C.
9. For Variants with hot solder dip lead finish all testing performed at Tamb>+125°C shall be carried out in a 100% inert atmosphere.
10. Duration 5 seconds maximum. The same package must not be resoldered until 3 minutes have elapsed.
11. Package mounted on infinite heatsink.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

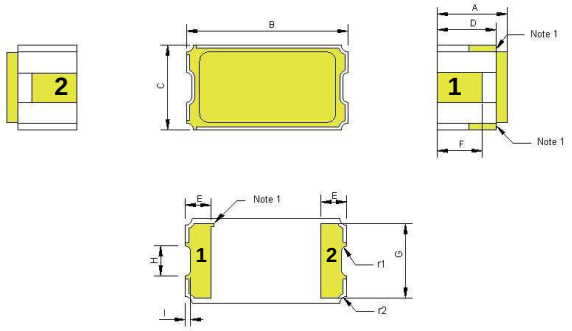
FIGURE 1 – PARAMETER DERATING INFORMATION (Not Applicable for the variants 13 to 14)



Average Output Rectified Current versus Temperature

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

Figure 2(d)- Variant 13 to 14 - Leadless Chip Carrier 2 (LCC2A) – 2 Terminal



Ref	Dimensions					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A(2)	1.86	2.03	2.20	0.073	0.080	0.087
B	4.54	4.67	4.87	0.179	0.184	0.192
C	2.33	2.46	2.59	0.092	0.097	0.102
D	1.53	1.7	1.87	0.060	0.067	0.074
E	0.48		0.71	0.019		0.031
F	1.3			0.051		
G	2.16			0.085		
H	0.86			0.034		
I	0.15			0.006		
r1	0.15			0.006		
r2	0.20			0.008		

Notes:

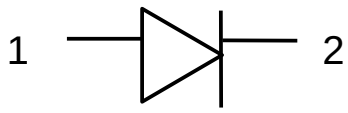
1. The anode is identified by metallization in two castellation and by the index mark on the bottom metallization n°1.
2. Measurement prior to solder coating the mounting pads on bottom of package.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

FIGURE 3 - FUNCTIONAL DIAGRAM

Variants 13 to 14

Terminal 1: Anode
Terminal 2: Cathode



Notes:
1. For LCC2, the lid is not connected to any lead.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.2.1, Bond Strenght Test: Not applicable; excepted for the variants 13 to 14 (Applicable in the Chart F2 of the ESCC N°5000 Issue 3).

(b) Para. 9.2.2, Die Shear Test: Not applicable; excepted for the variants 13 to 14 (Applicable in the Chart F2 of the ESCC N°5000 Issue 3).

(c) At any time following Para. 9.5.1, Thermal Shock Test, Thermal impedance measurements shall be performed in accordance with MIL-STD-750, TEST Method 3101 as specified in Table 2, item 9. For the variants 13 to 14 (the thermal impedance and the thermal shock applicable in the Chart F3 of the ESCC N°5000 Issue 3).

(d) Para. 9.6, Constant Acceleration: Not applicable; excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 1 of the ESCC N°5000 Issue 3).

(e) Para. 9.7 Particle Impact Noise Detection (PIND) test: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F3 of the ESCC N°5000 Issue 3).

(f) Para. 9.8.1, Seal Test Fine Leak: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F3 of the ESCC N°5000 Issue 3).

(g) ……..Excepted for the variants 13 to 14: N/A.

(h) ……..Excepted for the variants 13 to 14: N/A

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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

(b) Para. 9.8.1 Seal Test Fine Leak: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F3 of the ESCC N°5000 Issue 3).

(c) Para. 9.12, Radiographic Inspection: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F3 of the ESCC N°5000 Issue 3).

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.2.3, Bond Strenght Test: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 3 of the ESCC N°5000 Issue 3).

(b) Para. 9.2.4, Die Shear Test: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 3 of the ESCC N°5000 Issue 3).

(c) Para. 9.8.1, Seal Test Fine Leak: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 1 and 2 of the ESCC N°5000 Issue 3).

(d) Para. 9.15, Constant Acceleration: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 1 of the ESCC N°5000 Issue 3).

Justification .

Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.8.1, Seal Test Fine Leak: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 1 and 2 of the ESCC N°5000 Issue 3).

(b) Para. 9.15, Constant Acceleration: Not applicable excepted for the variants 13 to 14 (Applicable in the Chart F4 Subgroup 1 of the ESCC N°5000 Issue 3).

Justification .

Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.3.2 Weight

The maximum weight of the diodes specified herein shall be 0.25 grammes for the variants 01 to 06, 0.4 grammes for variant 07 to 09, 0.3 grammes for variant 10 to 12 and 0.12 grammes for the variants 13 to 14.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.3.3 Terminal Strength

For the variants 13 to 14: MIL-STD-883 test method 2004 Cond D (Applicable in the Chart F4 Subgroup 3 of the ESCC N°5000 Issue 3).

4.4.1 Case

The case shall be hermetically sealed and have an Aln body with kovar lid for the variants 13 to 14.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.4.2 Lead Material and Finish

For the variants 13 to 14 leads/terminals as specified in the Table 1a.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.5.1 General

For the variants 13 to 14 the marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

(a) The ESCC qualified components symbol (for ESCC qualified components only).

(b) The ESCC Component Number.

(c) Traceability information.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.6.2 Electrical Measurements at high an Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3(a) and 3(b).
For the variants 01 to 12, the measured shall be performed at Tamb = +100 (+0-5) and tamb = 65 (+5-0) °C respectively.
For the variants 13 to 14, the measured shall be performed at Tamb = +125 (+0-5) and tamb = -65 (+5-0) °C respectively.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

4.6.3 Circuits for Electrical Measurements

For the variants 13 to 14: Not Applicable.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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.

For the variants 01 to 12 the conditions for power burn-in are specified in Table 5(b) of this specification.

For the variants 13 to 14 the conditions for power burn-in are specified in Table 5(c) of this specification.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits			Units
					Min	Typ	Max	
1	Forward Voltage	V_{F1}	4011	Pulse Method I_F=1A, Variants 01 to 12 (Note 1)	-	-	0.875	V
				Pulse Method I_F=1A, Variants 13 to 14 **(Note 4)**	-	-	0.880	V
2	Forward Voltage	V_{F2}	4011	Pulse Method I_F=2.5A, Variants 01 to 12 (Note 1)	-	-	0.975	V
				Pulse Method I_F=2.5A, Variants 13 to 14 **(Note 4)**	-	-	1	V
3	Reverse Current	I_{R1}	4016	DC Method Variant 01 to 12 $V_R=V_{RWM}$=(Note 2)	-	-	1	µA
				DC Method Variants13 to 14 $V_R=V_{RWM}$=150V	-	-	1	µA
4	Breakdown Voltage	$V_{(BR)}$	4021	I_R=-100µA Variants 01 to 12	Note 3	-	-	V
				I_R=-100µA Variants 13 to 14	150	-	-	V

Notes

1. Pulse measurement: tp = 8.3ms maximum.
2. See Column 6 of (Table1 (a)Pulse test: tp ≤ 680µs; Duty Cycle ≤ 2%
3. See Column 6 of (Table1 (a)
4. Pulse Width ≤ 680µs; Duty Cycle ≤ 2%

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits			Units
					Min	Typ	Max	
5	Junction Capacitance	C_J	4001	Variant 01 to 12 V_R=10Vdc; f=1MHz Vsig=50mV(p-p)max (Note 1)	-	-	25	pF
				Variant 13 to 14 V_R=10Vdc; f=1MHz Vsig=50mV(p-p)max **(Note 4)**	-	-	25	pF
6	Reverse Recovery Time	Trr1	4031 Cond. 'A'	Variants 01 to 12 I_F=I_R=0.5A; I_{RR}=50mA(pk) DI/dt=-65A/µS (Note 1)	-	-	25	nS
		Trr2	4031 Cond. 'A'	Variants 13 to 14 I_F = 1A; V_R =30V DI/dt=-50A/µS **(Note 4)**	-	-	30	nS
7	Forward Recovery Time	T_{FR}	4026	Variants 01 to 12 I_F = 250mA(pk) tr=8.0ns (Note 1 and 2)	-	-	15	nS
				Variants 13 to 14 I_{FM} = 250mA, V_{RF} = 1.1 x V_F **(Note 4)**	-	-	15	nS
8	Forward Recovery Voltage	V_{FR}	4026	Variants 01 to 12 I_{FM} = 250mA(pk) tr=8.0ns (Note 1 and 2)	-	-	2.2	V
				Variants 13 to 14 I_{FM} = 250mA **(Note 4)**	-	-	2.2	V

9	Thermal Impedance	$Z_{TH(J-C)}$	3101	Variants 01 to 12 I_H=5A; t_H=10ms I_M=1mA to 10mA t_{md}=100µs (Note 3)			4.5	°C/W
added	Thermal Impedance	$Z_{TH(J-C)}$	3101	Variants 13 to 14 I_H=1 to 10A; t_H=50ms I_M=50mA; t_{md}=100µs **(Note 5)**	Calculate ΔVF, **(see Note 6)**			°C/W

NOTES

1. Measurements shall be performed on a sample basic, LTPD = 7 or lower.

2. Forward Recovery Time (tfr) shall be measured as the interval between zero time and the point where the pulse has decreased to 110% of the steady value of VF when IF=250mA. The maximum rise time of the response detector shall be 1.0ns. The maximum Forward Recovery Voltage (Vfr) shall be measured during the forward recovery interval.

3. During Chart II only.

4. See appendix B [Agreed Deviations for STMicroelectronics (F)]

5. Performed only during Screening Tests after reliability test, go-no-go.

6. The limits for ΔVF shall be defined by the Manufacturer on every lot in accordance with MIL-STD-750 Method 3101 and shall guarantee the Rth(j-c) limits specified in Maximum Ratings, go no go.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

TABLE 3(a) - ELECTRICAL MEASUREMENTS AT HIGH TEMPERATURES

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits			Units
					Min	Typ	Max	
1	Forward Voltage	V_{F1}	4011	Pulse Method I_F=1A, Note 1 Variants 01 to12 **Tamb= +100°C**	-	-	0.8	V
				Variants 13 to 14 **(Note 3 & 4)** **Tamb=+125°C**	-	-	0.8	V
3	Reverse Current	I_{R1}	4016	Variant 01 to 12 DC Method V_R=V_{RWM}=Note2 Tamb=+100°C	-	-	50	µA
				Variant 13 to 14 **(Note 4)** DC Method V_R=V_{RWM}=150V **Tamb=+125°C**	-	-	20	µA

NOTES

1. Pulsed measurement: tp=8.3ms maximum.
2. See column 6 of Table 1(a)
3. Pulse Width≤ 680µs; Duty Cycle ≤ 2%
4. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.

Justification .

Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

TABLE 3(b) - ELECTRICAL MEASUREMENTS AT LOW TEMPERATURES

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits			Units
					Min	Typ	Max	
1	Forward Voltage	V_{F1}	4011	Pulse Method I_F=1A, Tamb=-65°C Variants 01 to 12 (Note 1)	-	-	1.075	V
				Pulse Method I_F=1A, Tamb=-65°C Variants 13 to 14 **(Note 3 & 4)**	-	-	1.075	V
4	Breakdown Voltage	$V_{(BR)}$	4021	I_R=-100µA Tamb=-65°C Variants 01 to 12	Note 3	-	-	V
				I_R=-100µA Tamb=-65°C Variant 13 to 14 **(Note 4)**	150	-	-	V

NOTES

1. Pulsed measurement: tp=8.3ms maximum.
2. See column 6 of Table 1(a)
3. Pulse Width≤ 680µs; Duty Cycle ≤ 2%
4. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.

FIGURE 4 – CIRCUITS FOR ELECTRICAL MEASUREMENTS (Not Applicable for the variants 13 to 14)

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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

N°	Characteristics	Symbols	Conditions	Units
3	Duration			
	Variants 01 to 12	t	72	Hours
	Variants 13 to 14	t	≥48	Hours

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

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

For the variants 13 to 14

N°	Characteristics	Symbols	Test Conditions	Units
1	Ambient Temperature	Tamb	+22 (+/-3)	°C
2	Junction Temperature	Tj	+175 (+0 -5)	°C
3	Average Output Rectified Current	IO	**Note 2**	A

NOTES:

2. The output current may be adjusted, within their given limit ranges, to attain the specified junction temperature.

Justification .

Variant 13: new ST variant introduction with LCC2A package

Variant 14: new ST variant introduction with LCC2A package

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

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS (Note1 and 2)	CHANGE LIMITS (Δ)	ABSOLUTE		UNIT
						MIN.	MAX.	
1	Forward Voltage Drop 1	V_{F1}	As per Table 2	As per Table 2 Variant 01 to 12 Variant 13 to 14	+/- 50mV -	- -	0.875 0.880	V V
2	Reverse Current	I_R	As per Table 2	As per Table 2 Variant 01 to 12 Variant 13 to 14	+/- 150nA -	- -	1.0	µA

NOTES

2. Changes limits is not applicable for the variants 13 to 14.

Justification .

Variant 13: new ST variant introduction with LCC2A package

Variant 14: new ST variant introduction with LCC2A package

APPENDIX 'B'

AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Deviations from Production Control-Chart F2	Internal Visual Inspection: Wedge bonds equal to 1.1 wire diameter are acceptable for bonding with a V-Groove tool.
Deviations from Production Control-Chart F2	Special In-process Control Internal Visual Inspection. For CCP packages the criteria specified for voids in the filet and minimum die mounting material around the visible die perimeter for die mounting defects may be omitted providing that a radiographic inspection to verify the die-attach process is performed on a sample basis in accordance with STMicroelectronics procedure 7050651.
Deviations from Room Temperature Electrical Measurements	All AC characteristic (Electrical Measurements at Room Temperature Note 4), may be considered guaranteed but not tested if successful pilot lot testing has been performed on the diffusion lot which includes AC characteristic measurements per the Detail Specification. A summary of the pilot lot testing shall be provided if required by the Purchase Order.

Justification .
Variant 13: new ST variant introduction with LCC2A package
Variant 14: new ST variant introduction with LCC2A package

DIODES, SILICON, SWITCHING

BASED ON TYPES 1N5802, 1N5804, 1N5806, 1N5802US, 1N5804US, 1N5806US AND 1N5806U

ESCC Detail Specification No. 5101/014

Issue 2 Draft E	March 2009

Document Custodian: European Space Agency - see https://escies.org

LEGAL DISCLAIMER AND COPYRIGHT

European Space Agency, Copyright © 2009. All rights reserved.

The European Space Agency disclaims any liability or responsibility, to any person or entity, with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the use and application of this ESCC publication.

This publication, without the prior permission of the European Space Agency and provided that it is not used for a commercial purpose, may be:

– copied in whole, in any medium, without alteration or modification.
– copied in part, in any medium, provided that the ESCC document identification, comprising the ESCC symbol, document number and document issue, is removed.

DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
315, 432, 454, 473, 474	Specification up issued to incorporate editorial and technical changes per DCR.

TABLE OF CONTENTS

1.	**GENERAL**	**5**
1.1	Scope	5
1.2	Applicable Documents	5
1.3	Terms, Definitions, Abbreviations, Symbols and Units	5
1.4	The ESCC Component Number and Component Type Variants	5
1.4.1	The ESCC Component Number	5
1.4.2	Component Type Variants	5
1.5	Maximum Ratings	6
1.6	Handling Precautions	7
1.7	Physical Dimensions and Terminal Identification	8
1.7.1	Axial Lead Package (UU)	8
1.7.2	Axial Lead Package (A)	9
1.7.3	Surface Mount Package (MELF)	9
1.7.4	Leadless Chip Carrier Package (LCC2A) - 2 Terminal	10
1.8	Functional Diagram	11
1.9	Materials and Finishes	11
2.	**REQUIREMENTS**	**11**
2.1	General	11
2.1.1	Deviations from the Generic Specification	11
2.1.1.1	Deviations from Special In-Process Controls (Chart F2)	11
2.1.1.2	Deviations from Screening Tests (Chart F3)	11
2.1.1.3	Deviations from Qualification and Periodic Tests (Chart F4)	12
2.2	Marking	12
2.3	Terminal Strength	12
2.4	Electrical Measurements at Room, High and Low Temperatures	12
2.4.1	Room Temperature Electrical Measurements	13
2.4.2	High and Low Temperatures Electrical Measurements	14
2.4.3	Notes to Electrical Measurement Tables	15
2.5	Parameter Drift Values	15
2.6	Intermediate and End-Point Electrical Measurements	15
2.7	High Temperature Reverse Bias Burn-in Conditions	16
2.8	Power Burn-in Conditions	16
2.9	Operating Life Conditions	17
APPENDIX ‘A’		18

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESCC Generic Specification No. 5000
(b) MIL-STD-750, Test Methods and Procedures for Semiconductor Devices

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 510101401

- Detail Specification Reference: 5101014
- Component Type Variant Number: 01(as required)

1.4.2 Component Type Variants

The component type variants applicable to this specification are as follows:

Variant Number	Based on Type	Case	Breakdown Voltage $V_{(BR)}$ (V)	Working Peak Reverse Voltage V_{RWM} (V)	Terminal Material and/or Finish	Weight max g
01	1N5806	UU	160	150	O1	0.25
02	1N5806	UU	160	150	A3 or A4	0.25
03	1N5804	UU	110	100	O1	0.25
04	1N5804	UU	110	100	A3 or A4	0.25
05	1N5802	UU	60	50	O1	0.25
06	1N5802	UU	60	50	A3 or A4	0.25
07	1N5806	A	160	150	A3 or A4	0.4

Variant Number	Based on Type	Case	Breakdown Voltage $V_{(BR)}$ (V)	Working Peak Reverse Voltage V_{RWM} (V)	Terminal Material and/or Finish	Weight max g
08	1N5804	A	110	100	A3 or A4	0.4
09	1N5802	A	60	50	A3 or A4	0.4
10	1N5806US	MELF	160	150	O4	0.3
11	1N5804US	MELF	110	100	O4	0.3
12	1N5802US	MELF	60	50	O4	0.3
13	1N5806U	LCC2A	160	150	2	0.12
14	1N5806U	LCC2A	160	150	4	0.12

The terminal material and/or finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Unit	Remarks
Forward Surge Current Variant 01 to 12 Variants 13, 14	I_{FSM}	 35 33	A	Notes 1, 2
Working Peak Reverse Voltage	V_{RWM}	Note 3	V	
Average Output Rectified Current	I_O	2.5	A	Note 4
Operating Temperature Range (Case Temperature)	T_{op}	-65 to +175	^oC	Note 5
Junction Temperature	T_j	+175	^oC	
Storage Temperature Range	T_{stg}	-65 to +175	^oC	Note 5
Soldering Temperature	T_{sol}	+245	^oC	Note 6
Thermal Resistance, Junction to Case Variants 01 to 09 Variants 10 to 12 Variants 13, 14	$R_{th(j-c)}$	 36 20 13	$^oC/W$	

NOTES:

1. Sinusoidal pulse of 8.3ms duration for Variants 01 to 12 and 10ms for Variants 13, 14.
2. At $T_{amb} \leq +25^{o}C$.
3. See Component Type Variants for V_{RWM} value.
4. For Variants 01 to 12: At $T_{case} \geq +75°C$, derate linearly to 0A at +175°C.
   For Variants 13, 14: At $T_{case} \geq +142°C$, derate linearly to 0A at +175°C.
5. For Variants 02, 04, 06, 07, 08, 09, 10, 11, 12, 14 with hot solder dip or tin-lead plating terminal finish all testing performed at $T_{amb} > +125°C$ shall be carried out in a 100% inert atmosphere.
6. For Variants 01 to 09: Duration 10s maximum at a distance of not less than 1.5mm from the device body and the same package shall not be resoldered until 3 minutes have elapsed.
   For Variants 10 to 12: Duration 10s maximum and the same package shall not be resoldered until 3 minutes have elapsed.
   For Variants 13, 14: Duration 5s maximum and the same package shall not be resoldered until 3 minutes have elapsed.

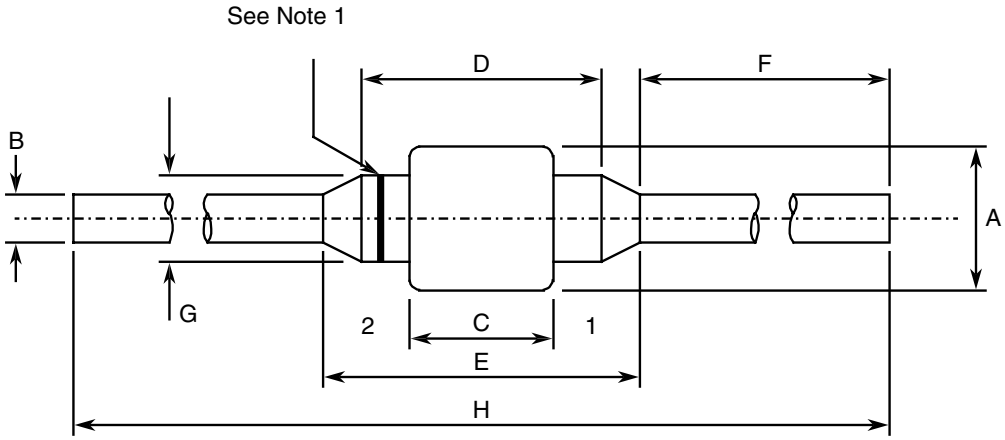
1.6 HANDLING PRECAUTIONS

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 Class 3 per ESCC Basic Specification No. 23800 with a Minimum Critical Path Failure Voltage of 15000 Volts.

1.7 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

1.7.1 Axial Lead Package (UU)

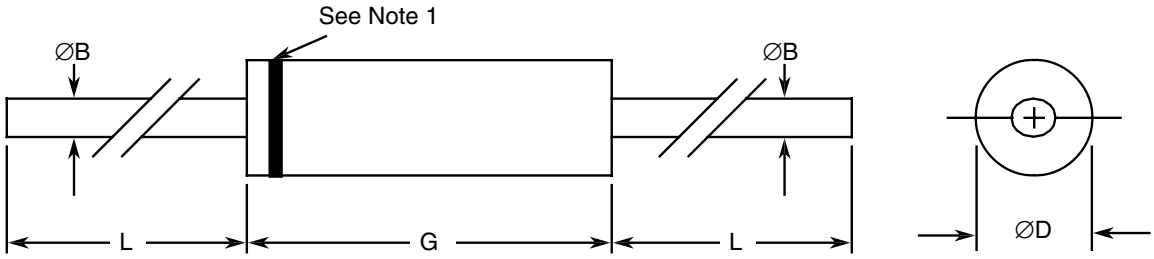


Symbols	Dimensions mm		Notes
	Min	Max	
A	-	2.2	
B	0.68	0.74	
C	-	2.3	
D	-	4	
E	-	6.35	
F	17.8	-	
G	-	1.5	
H	41.3	-	

NOTES:

1. Terminal identification: The cathode end shall be marked with a contrasting coloured band.

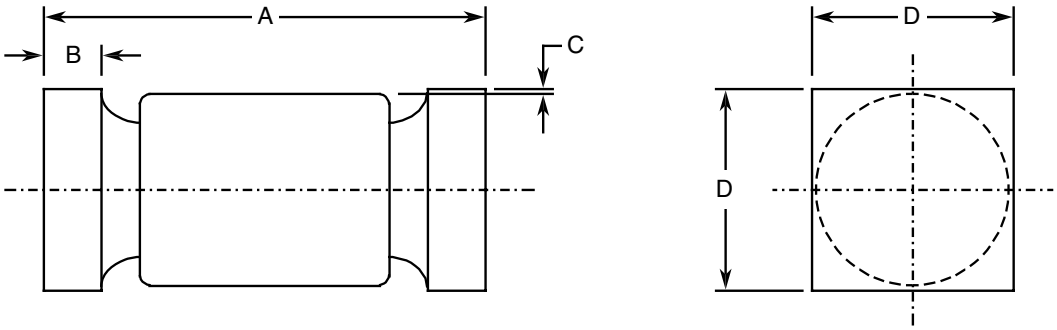
1.7.2 Axial Lead Package (A)



Symbols	Dimensions mm		Notes
	Min	Max	
ØB	0.66	0.84	
ØD	1.65	2.79	2
G	3.18	6.35	3
L	17.78	33.02	

NOTES:
1. Terminal identification: The cathode end shall be marked with a contrasting coloured band.
2. Dimension ØD shall be measured at the largest diameter.
3. Dimension G shall include the sections of the lead over which the diameter is uncontrolled. This uncontrolled area is defined as the zone between the edge of the diode body and extending 1.27mm onto the leads.

1.7.3 Surface Mount Package (MELF)

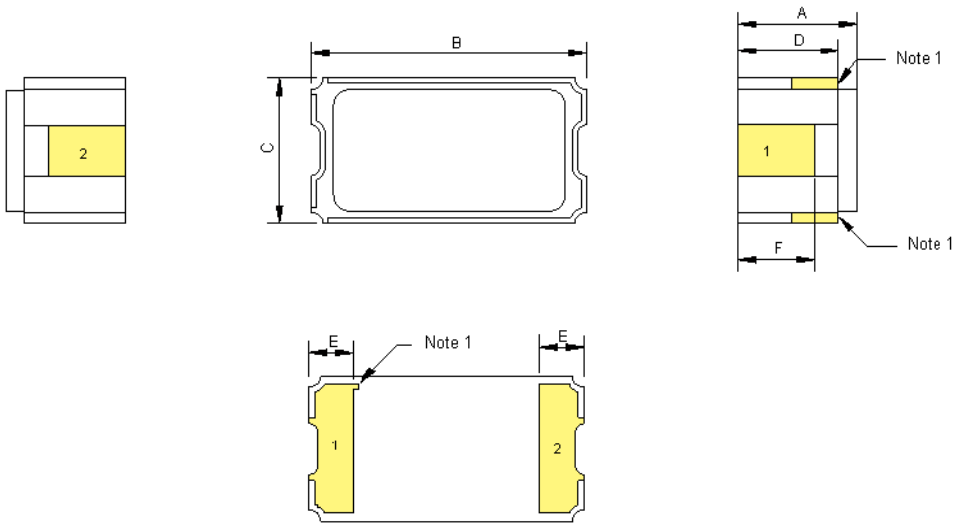


Symbols	Dimensions mm		Notes
	Min	Max	
A	4.27	5.08	
B	0.48	0.71	
C	0.08	-	
D	2.31	2.62	

NOTES:
1. Terminal identification: The cathode end shall be marked with a minimum of 3 contrasting coloured

dots or a black band.

1.7.4 Leadless Chip Carrier Package (LCC2A) - 2 Terminal



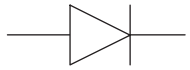
Symbols	Dimensions mm		Notes
	Min	Max	
A	1.86	2.2	2
B	4.54	4.87	
C	2.33	2.59	
D	1.53	1.87	
E	0.48	0.71	

NOTES:

1. Terminal identification: The anode is identified by metallisation in the two castellations and by the index mark on the bottom metallisation.
2. For Variant 14 dimension limits apply prior to solder coating of terminals.

1.8 FUNCTIONAL DIAGRAM

Terminal 1: Anode
Terminal 2: Cathode



NOTES:
1. For LCC2A, the lid is not connected to any terminal.

1.9 MATERIALS AND FINISHES

Materials and finishes shall be as follows:

a) Case
For Variants 01 to 12 the case shall be hermetically sealed and have a glass body.
For Variants 13, 14 the case shall be hermetically sealed and have an Aluminium Nitride body with a Kovar lid.

b) Terminal Finish
As specified in Component Type Variants.

2. REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 Deviations from the Generic Specification

2.1.1.1 Deviations from Special In-Process Controls (Chart F2)

(a) Bond Strength: Not applicable for Variants 01 to 12.
(b) Die Shear: Not applicable for Variants 01 to 12.

2.1.1.2 Deviations from Screening Tests (Chart F3)

(a) For Variants 01 to 12 only, following Temperature Cycling, Room Temperature Electrical Measurements shall be performed as specified herein.
Immediately following Room Temperature Electrical Measurements a Surge Current test shall be performed on a sample of 32 components with 0 failures allowed. The Surge Current test shall be

as follows:
MIL-STD-750, Test Method 4066, condition A
– I_{FSM} = 35A (pk)
– I_O = 1.0A
– V_{RWM} = See Component Type Variants for value.
– 10 surges at a rate of 1 per minute maximum and of duration 8.3ms or 10ms.

After the Surge Current test, Parameter Drift Values shall be performed as specified herein referred to the measurements prior to the test.

Immediately following the Surge Current test components shall be subjected to Scope Display analysis of the reverse breakdown characteristic as follows:
MIL-STD-750, Test Method 4023
– Display calibration: 50μA to 100μA and 20 V to 50V per division
– Reverse current over the knee: 500μA minimum.

Any discontinuity or dynamic instability of the trace shall be cause for lot rejection.

(b) Particle Impact Noise Detection: Not applicable for Variants 01 to 12.
(c) Seal, Fine Leak: Not applicable for Variants 01 to 12.
(d) Radiographic Inspection: Not applicable for Variants 01 to 12.

2.1.1.3 Deviations from Qualification and Periodic Tests (Chart F4)

(a) Bond Strength: Not applicable for Variants 01 to 12.
(b) Die Shear: Not applicbale for Variants 01 to 12.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

(a) Terminal Identification.
(b) The ESCC qualified components symbol (for ESCC qualified components only).
(c) The ESCC Component Number.
(d) Traceability information.

2.3 TERMINAL STRENGTH

The test conditions for Terminal Strength, tested as specified in the ESCC Generic Specification, shall be as follows:

– For Variants 01 to 09, Test Condition A with applied force 17.8N and duration 15s.
– For Variants 10 to 14, as specified in the ESCC Generic Specification.

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures. Consolidated notes are given after the tables.

2.4.1 Room Temperature Electrical Measurements

The measurements shall be performed at T_{amb}=+22 ±3°C.

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Forward Voltage	V_{F1}	4011	Pulse Method I_F=1A, Note 1 Variants 01 to 12 Variants 13, 14	 - -	 0.875 0.88	V
	V_{F2}	4011	Pulse Method I_F=2.5A, Note 1 Variants 01 to 12 Variants 13, 14	 - -	 0.975 1	V
Reverse Current 1	I_{R1}	4016	DC Method V_R= V_{RWM}, Note 2 Variants 01 to 12 Variants 13, 14	 - -	 1 0.5	µA
Reverse Current 2 (Breakdown Voltage)	I_{R2}	4021	Variants 13, 14 only DC Method V_R=$V_{(BR)}$, Note 2	-	10	µA
Breakdown Voltage	$V_{(BR)}$	4021	Variants 01 to 12 only Pulse Method I_R=100µA, Note 1	Note 2	-	V
Capacitance	C	4001	V_R =10V V_{sig}=50mV (p-p)max f = 1MHz	-	25	pF
Reverse Recovery Time	t_{rr}	4031	Variants 01 to 12 Test Condition A I_F= I_R= 500mA I_{rr}=50mA(pk) di/dt=65A/µs (min) Note 3	-	25	ns
			Variants 13, 14 Test Condition A I_F=1A V_R=30V dI_F/dt=-50A/µs	-	30	ns
Forward Recovery Time	t_{fr}	4026	Variants 01 to 12 I_F=250mA t_r=8.0ns V_{fr}=1.1V_F Note 3	-	15	ns
			Variants 13, 14 I_F=250mA V_{fr}=1.1V_F	-	15	ns

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Forward Recovery Voltage	V_{fr}	4026	Variants 01 to 12 I_F=250mA t_r=8.0ns V_{fr}=1.1V_F Note 3	-	2.2	V
			Variants 13, 14 I_F=250mA V_{fr}=1.1V_F	-	2.2	V
Thermal Impedance, Junction to Case	$Z_{th(j-c)}$	3101	Variants 01 to 12 I_H = 5.0A t_H = 10ms I_M = 1mA to 10mA t_{md} = 100µs (max) Note 4	-	4.5	°C/W
			Variants 13, 14 I_H = 1 to 10A t_H = 50ms I_M = 50mA t_{md} = 100µs Note 4	(Calculate ΔV_F, see Note 5)		°C/W

2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions Note 3	Limits		Units
				Min	Max	
Forward Voltage 1	V_{F1}	4011	T_{amb}=+125(+0 -5)°C Pulse Method I_F=1A, Note 1	-	0.8	V
			T_{amb}=-65(+5 -0)°C Pulse Method I_F=1A, Note 1	-	1.075	V
Reverse Current 1	I_{R1}	4016	T_{amb}=+125(+0 -5)°C DC Method V_R = V_{RWM}, Note 2 Variants 01 to 12 Variants 13, 14	 - -	 50 20	µA
Reverse Current 2 (Breakdown Voltage)	I_{R2}	4021	Variants 13, 14 only T_{amb}= -65(+5 -0)°C DC Method V_R=$V_{(BR)}$, Note 2	-	10	µA
Breakdown Voltage	$V_{(BR)}$	4021	Variants 01 to 12 only T_{amb}= -65(+5 -0)°C Pulse Method I_R=100µA, Note 1	Note 2	-	V

2.4.3 Notes to Electrical Measurement Tables

1. For Variants 01 to 12 Pulse Width ≤8.3ms, Duty Cycle ≤2%. For Variants 13, 14 Pulse Width ≤ 680µs, Duty Cycle ≤ 2%.
2. See Component Type Variants for V_{RWM} and $V_{(BR)}$ values.
3. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.
4. Performed only during Screening Tests Parameter Drift Values (Initial Measurements), go-no-go.
5. The limits for ΔV_F shall be defined by the Manufacturer on every lot in accordance with MIL-STD-750 Method 3101 and shall guarantee the $R_{th(j-c)}$ limits specified in Maximum Ratings.

2.5 PARAMETER DRIFT VALUES

Unless otherwise specified, the measurements shall be performed at T_{amb}=+22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values (Δ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits			Units
		Drift Value Δ	Absolute		
			Min	Max	
Forward Voltage 1 Variants 01 to 12 Variants 13, 14	V_{F1}	±0.05	 - -	 0.875 0.88	V
Reverse Current 1 Variants 01 to 12 Variants 13, 14	I_{R1}	±0.15 or (1) ±100%	 - -	 1 0.5	µA

NOTES:

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

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at T_{amb}=+22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements .

The drift values (Δ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits			Units
		Drift Value Δ Note 2	Absolute		
			Min	Max	
Forward Voltage 1 Variants 01 to 12 Variants 13, 14	V_{F1}	±0.05	 - -	 0.875 0.88	V
Reverse Current 1 Variants 01 to 12 Variants 13, 14	I_{R1}	±0.15 or (1) ±100%	 - -	 1 0.5	µA

NOTES:
1. Whichever is the greater referred to the initial value.
2. Drift values only apply to Variants 01 to 12.

2.7 HIGH TEMPERATURE REVERSE BIAS BURN-IN CONDITIONS

Characteristics	Symbols	Limits	Units
Ambient Temperature	T_{amb}	+150 (+0 -5)	°C
Reverse Voltage	V_R	0.8 x V_{RWM} (Note 1)	V
Duration	t	72 (Variants 01 to 12) ≥48 (Variants 13, 14)	hours

NOTES:
1. See Component Type Variants for V_{RWM} value.

2.8 POWER BURN-IN CONDITIONS

For Variants 01 to 12

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+22 ± 3	°C
Working Peak Reverse Voltage	V_{RWM}	Note 1	V
Average Output Rectified Current	I_O	1.0 f=50 to 60 Hz	A

For Variants 13, 14

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+22 ± 3	°C
Junction Temperature	T_j	+175 (+0 -5)	°C
Average Output Rectified Current	I_O	Note 2	A

NOTES:

1. See Component Type Variants for V_{RWM} value.
2. The output current may be adjusted, within the given limit range, to attain the specified junction temperature.

2.9 OPERATING LIFE CONDITIONS

The conditions shall be as specified for Power Burn-in.

APPENDIX 'A'

AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Deviations from Production Control-Chart F2	Special In-process Control Internal Visual Inspection. Wedge bonds equal to 1.1 wire diameters are acceptable for bonding with a V-Groove tool.
	Special In-process Control Internal Visual Inspection. For CCP packages the criteria specified for voids in the fillet and minimum die mounting material around the visible die perimeter for die mounting defects may be omitted providing that a radiographic inspection to verify the die-attach process is performed on a sample basis in accordance with STMicroelectronics procedure 7050651.
Room Temperature Electrical Measurements	All AC characteristics (C, t_{rr}, t_{fr}, V_{fr}) may be considered guaranteed but not tested if successful pilot lot testing has been performed in accordance with STMicroelectronics procedure 7188211 on the wafer lot, which includes AC characteristic measurements per the Detail Specification. A summary of the pilot lot testing shall be provided if required by the Purchase Order.
High and Low Temperatures Electrical Measurements	Low temperature characteristic I_{R2} may be considered guaranteed but not tested if successful pilot lot testing has been performed in accordance with STMicroelectronics procedure 7188211 on the wafer lot, which includes low temperature characteristic measurements per the Detail Specification. A summary of the pilot lot testing shall be provided if required by the Purchase Order.