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Status: IMPLEMENTED

Title:	Diodes Switching, based on types 1N5807 through 1N5811		
Number:	5101/013	Issue:	1

Other documents affected:

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Paragraph:

Page 5: Table 1(a) - Type Variants
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Page 7: Figure 1 - Parameter Derating Information
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Page 9: paragraph 4.2.2 Deviations from Final Productio

Original wording:

Proposed wording:

See attached document

Justification:

New variants 11 & 12 introduction with LCC2 B package (gold finish and hot solder dip).

Attachments:
DCR_1N5811.pdf, null
Modifications:
N/A
Approval signature:
Date signed:
2008-12-04

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
11	1N5811U	LCC2B	2(b)	150	150	2
12	1N5811U	LCC2B	2(b)	150	150	4

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

TABLE 1(a)- MAXIMUM RATINGS

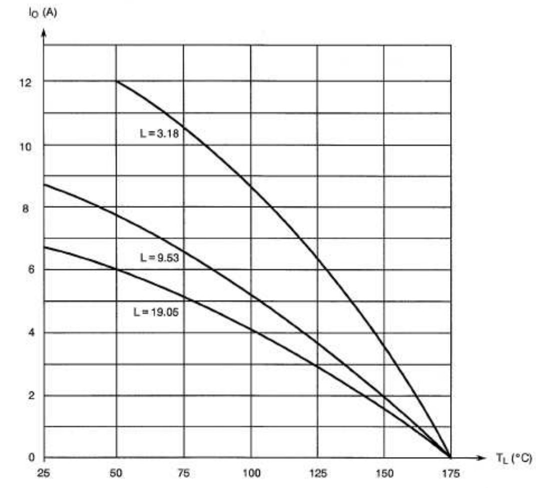
N°	Characteristics	Symbols	Maximum Ratings	Unit	Remarks
1	Forward Surge Current Variants 01 to 10 Variants 11 to 12	I_{FSM}	125 100	A(pk) A	Note 1 Note 5, Note 6
2	Working Peak Reverse Voltage Variants 01 to 10 Variants 11 to 12	V_{RWM}	See Note 2 150	V	Note 6
3	Average Output Rectified Current Variants 01 to 10 Variants 11 to 12	I_O	6 6	A A	~~50%Duty Cycle~~ Note 3 Note 7
4	Operating Temperature Range Variants 01 to 10 Variants 11 to 12 (Case Temperature)	Top Top	-55 to +175 -65 to +175	°C °C	Tamb Note 8
added	Junction Temperature Variants 11 to 12	Tj	+175	°C	
5	Storage Temperature Range Variants 01 to 10 Variants 11 to 12	Tstg	-65 to +200 -65 to +175	°C °C	Note 8
6	Soldering Temperature Variants 01 to 10 Variants 11 to 12	Tsol	+260 +245	°C °C	Note 4 Note 9
added	Thermal Resistance, Junction to Case Variants 11 to 12	$R_{th(j-c)}$	6.5	°C/W	Note 10

NOTES:

5. Sinusoidal pulse of 10ms duration.
6. At Tamb ≤ +25°C
7. At Tcase ≥ +136°C, derate linearly to 0A at +175°C.
8. For Variant 12 with hot solder dip terminal finish all testing performed at Tamb>+125°C shall be carried out in a 100% inert atmosphere.
9. Duration 5 seconds maximum and the same package shall not be resoldered until 3 minutes have elapsed.
10. Package mounted on infinite heatsink.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

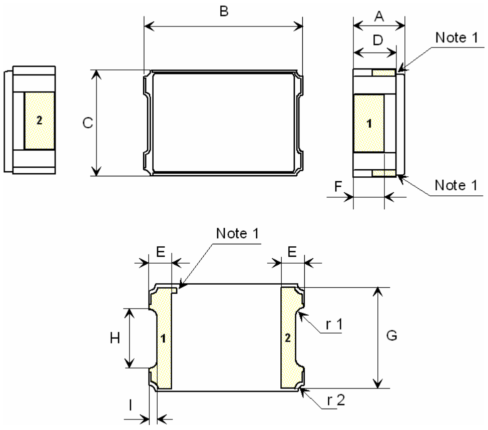
FIGURE 1 – PARAMETER DERATING INFORMATION (Not Applicable for the variants 11 to 12)



NOTES
1. L = Lead length from body in millimetres.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

Figure 2(b)- Variant 11 to 12 - Leadless Chip Carrier 2 (LCC2B) – 2 Terminal



Ref	Dimensions					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A[(2)]	2.04	2.23	2.42	0.080	0.088	0.095
B	5.27	5.40	5.60	0.207	0.213	0.220
C	3.49	3.62	3.76	0.137	0.143	0.150
D	1.71	1.90	2.09	0.067	0.075	0.082
E	0.48		0.71	0.019		0.028
F	1.4			0.055		
G	3.32			0.131		
H	1.82			0.072		
I	0.15			0.006		
r1	0.15			0.006		
r2	0.20			0.008		

Notes:

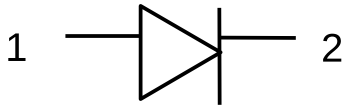
1. The anode is identified by metallization in two top castellation and by the index mark on the bottom metallization n°1.
2. Measurement prior to solder coating the mounting pads on bottom of package.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

FIGURE 3 - FUNCTIONAL DIAGRAM

Variants 11 to 12

Terminal 1: Anode
Terminal 2: Cathode



Notes:

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

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B 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 11 to 12 (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 11 to 12 (Applicable in the Chart F2 of the ESCC N°5000 Issue 3).

(c) Para. 9.8.1, Seal Test Fine Leak: Not applicable excepted for the variants 11 to 12 (Applicable in the Chart F3 of the ESCC N°5000 Issue 3).

(d) Surge current ………..Excepted for the variants 11 to 12: N/A.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

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

(a) H.T.R.B Test: Not applicable excepted for the variants 11 to 12

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B 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).

Justification .

Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

4.3.2 Weight

The maximum weight of the diodes specified herein shall be 0.25 grams for the variants 01 to 10, 0.18 grams for the variants 11 to 12.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

4.3.3 Terminal Strength

For the variants 11 to 12: 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 11 to 12.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

4.4.2 Lead Material and Finish

For the variants 11 to 12 leads/terminals as specified in the Table 1a.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

4.5.1 General

For the variants 11 to 12 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 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B 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.
For the variants 01 to 10, the measured shall be performed at Tamb = +100 (+0-5).
For the variants 11 to 12, the measured shall be performed at Tamb = +125 (+0-5) and tamb = -65 (+5-0) °C respectively.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

4.6.3 Circuits for Electrical Measurements

For the variants 11 to 12: Not Applicable.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B 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 10 the conditions for power burn-in are specified in Table 5(a) of this specification.

For the variants 11 to 12 the conditions for power burn-in are specified in Table 5(b) of this specification.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

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

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
					Min	Max	
added	Forward Voltage	V_{F1}	4011	Pulse Method I_F=3A, Variants 11 to 12 (Note 2)	-	0.865	V
1	Forward Voltage	V_{F2}	4011	Pulse Method I_F=4A, Variants 01 to 10 Variants 11 to 12 (Note 2)	- -	0.875 0.9	V V
added	Forward Voltage	V_{F3}	4011	Pulse Method I_F=6A, Variants 11 to 12 (Note 2)	-	0.955	V
2	Reverse Current	I_R	4016	DC Method V_R: see Note 1Variant 01 to 10 V_R=150V Variants 11 to 12	- -	5 5	µA µA

Notes

1. See Column (3) of Table1 (a)
2. Pulse test: tp ≤ 680µs; Duty Cycle ≤ 2%

Justification .

Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

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

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
					Min	Max	
3	Junction Capacitance	C_J	4001	Variant 01 to 10 V_R=10Vdc; f=1MHz	-	50	pF
				Variant 11 to 12 V_R=10Vdc; f=1MHz Vsig=50mV(p-p)max **(Note 1)**	-	60	pF
4	Reverse Recovery Time	t_{rr}	4031	Variants 01 to 10 I_F=I_R=1A; I_{RR}=100mA(pk) **D**I_F/dt=-65A/µS	-	30	ns
		t_{rr}	4031 Cond. ‘B’	Variants 11 to 12 I_F = 1A; V_R =30V **D**I_F/dt=-50A/µS **(Note 1)**	-	35	ns
added	Forward Recovery Time	t_{fr}	4026	Variants 11 to 12 I_{FM} = 500mA, V_{fr} = 1.1 x V_F **(Note 1)**	-	15	ns
added	Forward Recovery Voltage	V_{fr}	4026	Variants 11 to 12 I_{FM} = 500mA **(Note 1)**	-	2.2	V
added	Thermal Impedance Junction to Case	$Z_{th(j-c)}$	3101	Variants 11 to 12 I_H=1 to 10A; t_H=50ms I_M=50mA; t_{md}=100µs (Note 2)	Calculate ΔV_F, see Note 3)		°C/W

NOTES

1. See appendix A [Agreed Deviations for STMicroelectronics (F)]

2. Performed only during Screening Tests Parameter Drift Values (Initial Measurements), go-no-go.

3. 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 $R_{th(j-c)}$ limits specified in Maximum Ratings, go no go.

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

TABLE 3- ELECTRICAL MEASUREMENTS AT HIGH TEMPERATURES

N°	Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions (Note 4)	Limits		Units
					Min	Max	
added	Forward Voltage	V_{F2}	4011	**Tamb= +125°C (+0 -5)** Pulse Method I_F=4A, Note 5 Variants 11 to 12	-	0.8	V
				Tamb= -65°C (+5 -0) Pulse Method I_F=4A, Note 5 Variants 11 to 12	-	1.075	V
2	Reverse Current	I_R	4016	Variant 01 to 10 Tamb=+100°C(+0 -5) V_R: see Note 3	-	150	µA
				Variant 11 to 12 **Tamb= +125°C (+0 -5)** DC Method V_R= 150V	-	30	µA

NOTES

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.
5. Pulse Width≤ 680µs; Duty Cycle ≤ 2%

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

TABLE 4 – PARAMETER DRIFT VALUES

Characteristics	Symbols	Limits			Units
		Drift Value (Δ)	Absolute		
			Min	Max	
Forward Voltage 2	V_{F2}	Variants 01 to 10 ± 100mV	-	875	mV
		Variants 11 to 12 ± 50mV	-	900	mV
Reverse Current	I_R	Variants 01 to 10 ± 1µA	-	5	µA
		Variants 11 to 12 ± 0.5µA or (1) ± 100%	-	5	µA

NOTES

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

FIGURE 4 – CIRCUITS FOR ELECTRICAL MEASUREMENTS (Not Applicable for the variants 11 to 12)

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

TABLE 5(a) HIGH TEMPERATURE REVERSE BIAS BURN-IN CONDITIONS (Applicable for the variants 11 to 12)

Characteristics	Symbols	Test Conditions	Units
Ambiant Temperature	Tamb	+150 (+0 -5)	°C
Reverse Voltage	V_R	120	V
Duration	t	≥ 48	Hours

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

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

FOR VARIANTS 11 TO 12

Characteristics	Symbols	Test Conditions	Units
Ambiant Temperature	Tamb	+22 (±3)	°C
Junction Temperature	Tj	+175 (+0 -5)	°C
Average Output Rectified Current	I_O	Note 1	A

NOTES:

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

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

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

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Forward Voltage Drop 2	V_{F2}	As per Table 2	As per Table 2 Variant 01 to 10	-	0.875	V
added	Forward Voltage Drop 1	V_{F1}	As per Table 2	As per Table 2 Variant 11 to 12	-	0.865	V
added	Forward Voltage Drop 3	V_{F3}	As per Table 2	As per Table 2 Variant 11 to 12	-	0.955	V
2	Reverse Current	I_R	As per Table 2	As per Table 2 Variant 01 to 10 Variant 11 to 12	- -	5.0 5.0	µA µA

Justification .
Variant 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package

APPENDIX ‘A’

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 (Room Electrical Temperature Electrical Measurements Characteristics: C, t_{rr}, t_{fr}, V_{fr}), 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 11: new ST variant introduction with LCC2B package
Variant 12: new ST variant introduction with LCC2B package