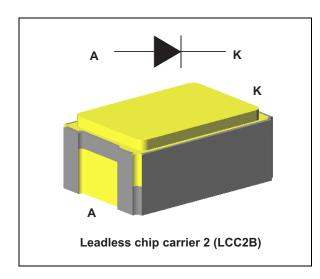


Aerospace 6 A fast recovery rectifier

Datasheet - production data



Description

This power ultrafast recovery rectifier is designed and packaged to comply with the ESCC5000 specification for aerospace products. It is housed in a surface mount hermetically sealed LCC2B package whose footprint is 100% compatible with industry standard solutions in D5B.

The 1N5811U is suitable for switching mode power supplies and high frequency DC to DC converters such as low voltage high frequency inverter, free wheeling or polarity protection.

Features

- Aerospace applications
- Surface mount hermetic package
- · High thermal conductivity materials
- · Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop
- Package mass: 0.18 g
- Target radiation qualification
 - 150 krad (Si) low dose rate
 - 3 Mrad (Si) high dose rate
- ESCC qualified

Table 1. Device summary⁽¹⁾

Order code	ESCC detailed specification	Quality level	Lead finish	EPPL	I _{F(AV)}	V _{RRM}	T _{j(max)}	VF _(max)
1N5811UB1		Engineering model	Gold					
1N5811U01B	5101/013/11	ESCC	Gold	yes	6	150	175	0.95
1N5811U02B	5101/013/12	ESCC	Solder dip	yes				

^{1.} Contact ST sales office for information about the specific conditions for products in die form.

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1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit	
V_{RRM}	Repetitive peak reverse voltage	150	V	
I _{F(RMS)}	Forward rms current	10	А	
I _{F(AV)}	Average forward rectified current $T_c \ge 136 ^{\circ}\text{C}, \delta = 0.5$		6	Α
1.	Forward surge current $ \frac{t_p = 8.3 \text{ ms sinusoidal}}{t_p = 10 \text{ ms sinusoidal}} $		105	А
I _{FSM}			100	^
T _{stg}	Storage temperature range	-65 to + 175	°C	
T _j	Maximum operating junction temperature	175	°C	
T _{sol}	Maximum soldering temperature (1)	245	°C	

^{1.} Maximum duration 5 s. The same package must not be re-soldered until 3 minutes have elapsed.

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
R _{th (j-c)} (1)	Junction to case	6.5	°C/W

^{1.} Package mounted on infinite heatsink

Table 4. Static electrical characteristics

Symbol	Parameter	Tests conditions		Min.	Тур.	Max.	Unit
	T _j = 25 °C		V = 150 V	-	-	2	
I _R ⁽¹⁾	l⊳ ⁽¹⁾ Reverse current	T _j = 125 °C	$V_R = 150 \text{ V}$	-	-	30	- μΑ
'R`	Neverse current	T _j = 25 °C	V 400 V	-	-	10	
		T _j = -65 °C	V _R = 160 V	-	-	10	
		T _j = 25 °C	I _F = 3 A	-	-	865	
	$V_F^{(2)}$ Forward voltage $T_j = 25 ^{\circ}C$ $T_j = 125 ^{\circ}C$ $T_j = -65 ^{\circ}C$		-	-	900		
V _F ⁽²⁾		T _j = 125 °C	I _F = 4 A	-	-	800	mV
		T _j = -65 °C		-	-	1075	
		T _j = 25 °C	I _F = 6 A	-	-	955	

^{1.} Pulse test: $t_p = 5 \text{ ms}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 0.68 \times I_{F(AV)} + 0.03 \times I_{F^{2}(RMS)}$$

^{2.} Pulse test: t_p = 680 μ s, δ < 2%

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Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
t	Reverse recovery time	$I_F = I_R = 0.5 \text{ A}, I_{rr} = 0.1 \text{ A}, dI/dt = -100 \text{ A/}\mu\text{s (min.)}$		-	30	ns
t _{RR} Reverse recovery time		$I_F = 1 \text{ A, V}_R = 30 \text{ V, dI/dt} = -50 \text{ A/}\mu\text{s,}$	-	-	35	113
V _{FP}	Forward recovery voltage	I _{FM} = 500 mA	-	-	2.2	٧
t _{FR}	Forward recovery time	$I_{FM} = 500 \text{ mA}, V_{RF} = 1.1 \text{ x V}_{F}$	-	-	15	ns
C _j	Diode capacitance	V _R = 10 V, F = 1 MHz	-	-	60	pF

Figure 1. Forward voltage drop versus forward current (typical values)

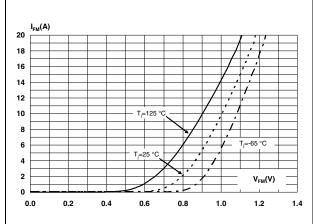


Figure 2. Forward voltage drop versus forward current (maximum values)

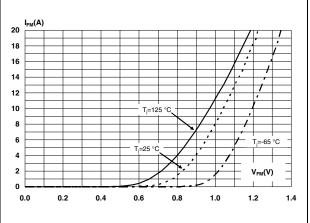


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

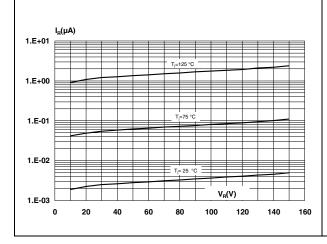
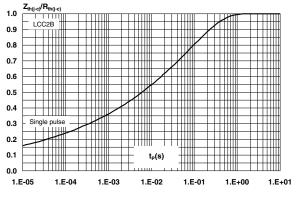
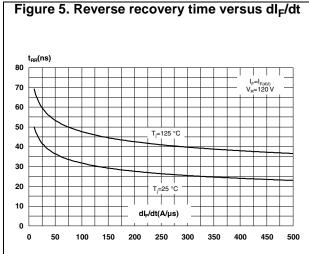


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration



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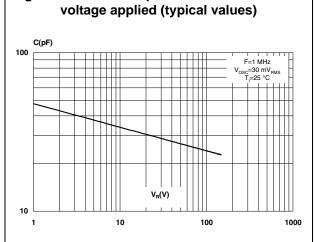


Figure 6. Junction capacitance versus reverse



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Package information 1N5811U

Package information 2

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Leadless chip carrier 2 (LCC2B) package information 2.1

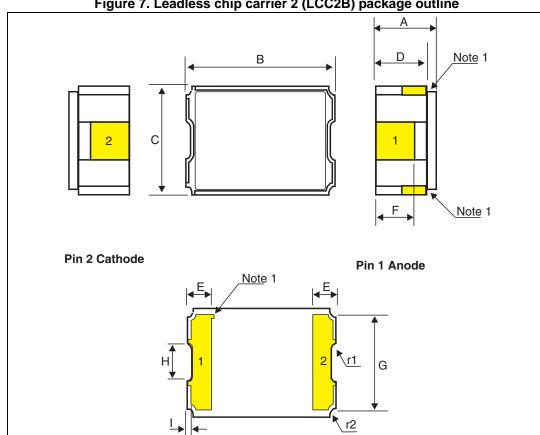


Figure 7. Leadless chip carrier 2 (LCC2B) package outline

1. The anode is identified by metalization in two top internal angles and the index mark.

Package information 1N5811U

Table 6. Leadless chip carrier 2 (LCC2B) package mechanical data

			Dimer	nsions		
Ref.		Millimeters				
	Min.	Тур.	Max.	Min.	Тур.	Max.
A ⁽¹⁾	2.04	2.23	2.42	0.080	0.088	0.095
В	5.27	5.4	5.6	0.207	0.213	0.220
С	3.49	3.62	3.76	0.137	0.143	0.148
D	1.71	1.90	2.09	0.067	0.075	0.082
Е	0.48	-	0.71	0.019	-	0.028
F	-	1.4	-	-	0.055	-
G	-	3.32	-	-	0.131	-
Н	-	1.82	-	-	0.072	-
ı	-	0.15	-	-	0.006	-
r1	-	0.15	-	-	0.006	-
r2	-	0.20	-	-	0.008	-

^{1.} Measurement prior to solder coating the mounting pads on bottom of package



3 Ordering information

Table 7. Ordering information⁽¹⁾

Order code	ESCC detailed specification	Package	Lead finish	Marking ⁽²⁾	EPPL	Mass	Packing
1N5811UB1	-		Gold	1N5811UB1	-		
1N5811U01B	5101/013/11	LCC2B	Gold	510101311	Υ	0.18 g	Waffle pack
1N5811U02B	5101/013/12		Solder dip	510101312	Υ		

^{1.} Contact ST sales office for information about the specific conditions for products in die form.

For the engineering models: ST logo, date code, country of origin (FR).

For ESCC flight parts: ST logo, date code, country of origin (FR), ESA logo, serial number of the part within the assembly lot.

4 Other information

4.1 Date code

Date code is structured as describe below:

- EM xyywwz
- ESCC flight yywwz

Where:

- x (EM only): 3, assembly location Rennes (France)
- yy: last two digits year
- ww: week digits
- z: lot index in the week

4.2 Documentation

In Table 8 is a summary of the documentation provided with each type of products.

Table 8. Documentation provided with each type of products

Quality level	Documentation
Engineering model	
ESCC flight	Certificate of conformance

^{2.} Specific marking only. The full marking includes in addition:

Revision history 1N5811U

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
27-Jul-2009	1	First issue.
25-Mar-2010	2	Updated ESCC status in Features and added footnote to Table 3.
8-Nov-2013	3	Updated Table 1, Table 5 and Table 7 and inserted Other information.
04-Dec-2015	4	Updated Table 7 and reformatted to current standard.

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