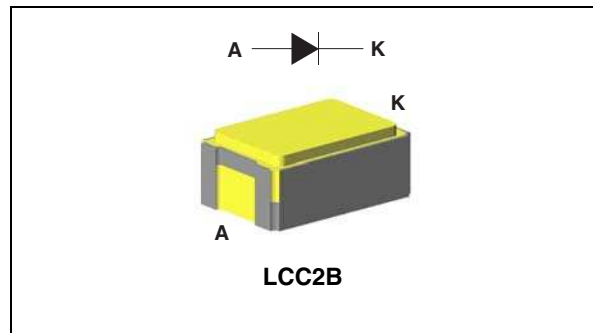


Aerospace 6 A fast recovery rectifier

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



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 .

Table 1. Device summary⁽¹⁾

Order code	ESCC detailed specification	Quality level	Lead finish	EPPL	$I_{F(AV)}$	V_{RRM}	$T_{j(max)}$	$V_F(max)$
1N5811UB1	-	Engineering model	Gold plated	-	6 A	150 V	175 °C	0.995 V
1N5811U01B	5101/013/11	Flight part	Gold plated	Y				
1N5811U02B	5101/013/12	Flight part	Solder dip	Y				

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

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	A
$I_{F(AV)}$	Average forward rectified current	$T_c = 135\text{ °C}, \delta = 0.5$	6	A
I_{FSM}	Forward surge current	$t_p = 8.3\text{ ms sinusoidal}$	105	A
		$t_p = 10\text{ ms sinusoidal}$	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 resoldered 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.	Typ.	Max.	Unit
I_R ⁽¹⁾	Reverse current	$T_j = 25\text{ °C}$	$V_R = 150\text{ V}$	-	-	2	μA
		$T_j = 125\text{ °C}$		-	-	30	
		$T_j = 25\text{ °C}$	$V_R = 160\text{ V}$	-	-	10	μA
		$T_j = -65\text{ °C}$		-	-	10	
V_F ⁽²⁾	Forward voltage	$T_j = 25\text{ °C}$	$I_F = 3\text{ A}$	-	-	865	mV
		$T_j = 25\text{ °C}$	$I_F = 4\text{ A}$	-	-	900	
		$T_j = 125\text{ °C}$		-	-	800	
		$T_j = -65\text{ °C}$		-	-	1075	
		$T_j = 25\text{ °C}$	$I_F = 6\text{ A}$	-	-	955	

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

2. Pulse test : $t_p = 680\text{ }\mu\text{s}, \delta < 2\%$

To evaluate the conduction losses use the following equation:

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

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
t_{RR}	Reverse recovery time	$I_F = I_R = 1 \text{ A}$, $I_{RR} = 0.1 \text{ A}$, $di/dt = -100 \text{ A}/\mu\text{s}$, (min)			30	ns
		$I_F = 1 \text{ A}$, $V_f = 30 \text{ V}$, $di/dt = -50 \text{ A}/\mu\text{s}$,			35	
V_{FP}	Forward recovery voltage	$I_{FM} = 500 \text{ mA}$			2.2	V
t_{FR}	Forward recovery time	$I_{FM} = 500 \text{ mA}$, $V_{FR} = 1.1 \times V_F$			15	ns
C_j	Diode capacitance	$V_R = 10 \text{ V}$, $F = 1 \text{ MHz}$			60	pF

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

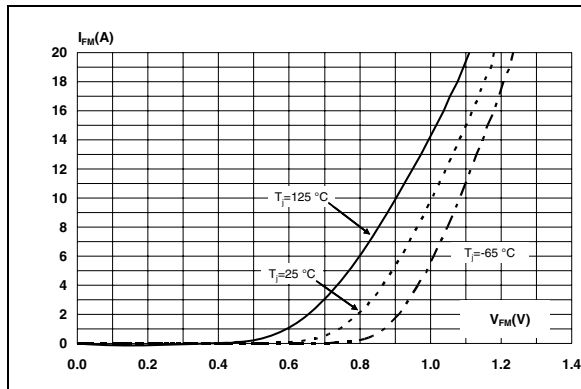


Figure 2. Forward voltage drop versus forward current (maximum values)

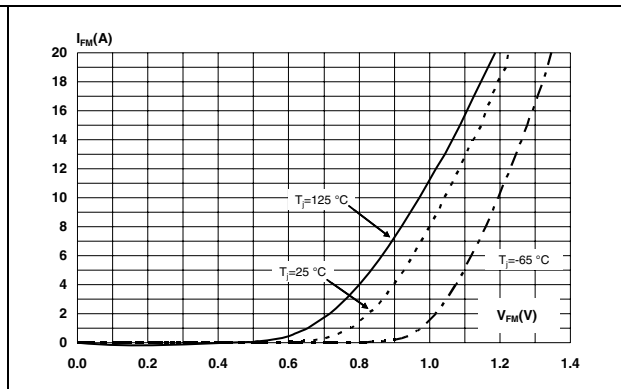


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

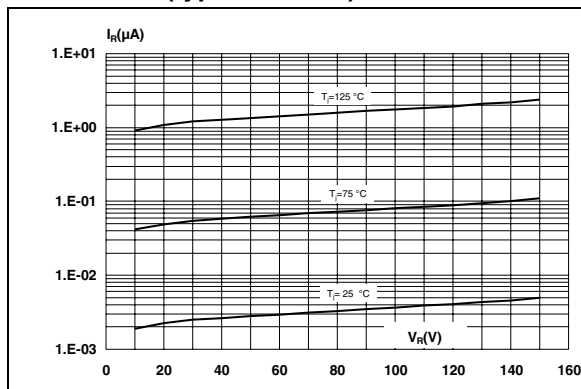


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

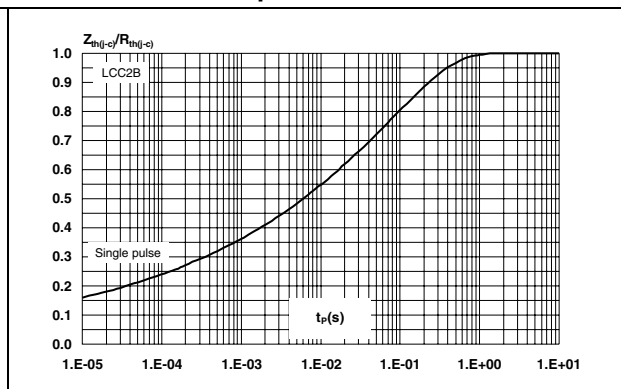
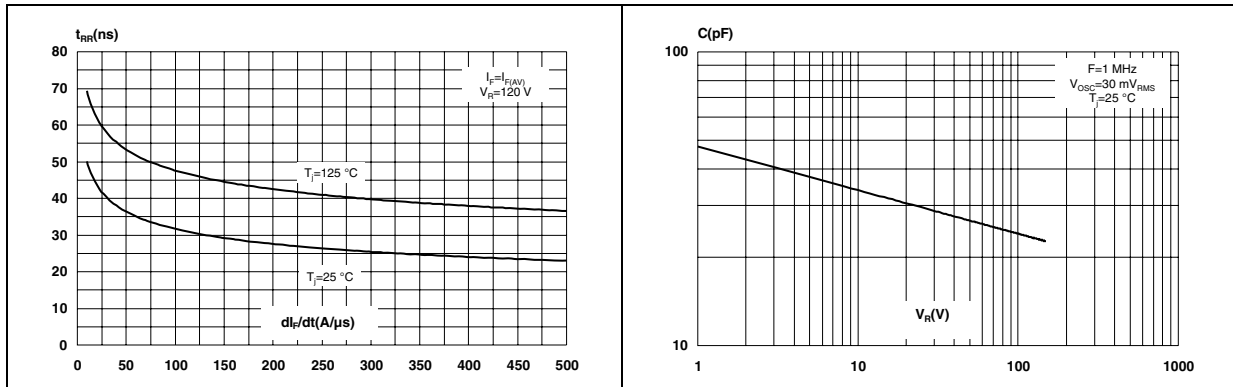


Figure 5. Reverse recovery time versus di_F/dt Figure 6. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

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.

Table 6. Leadless chip carrier 2 (LCC2B) package dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A ⁽¹⁾	2.04	2.23	2.42	0.080	0.088	0.095
B	5.27	5.4	5.6	0.207	0.213	0.220
C	3.49	3.62	3.82	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	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	-

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

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	EPPL	Mass	Packing
1N5811UB1	-	LCC2B	Gold plated	11UB1	-	0.18 g	Waffle pack
1N5811U01B	5101/013/11		Gold plated	11U01B	Y	0.18 g	
1N5811U02B	5101/013/12		Solder dip	11U02B	Y		

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
27-Jul-2009	1	First issue.
25-Mar-2010	2	Updated ESCC status in Features . Added footnote to Table 3 .

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