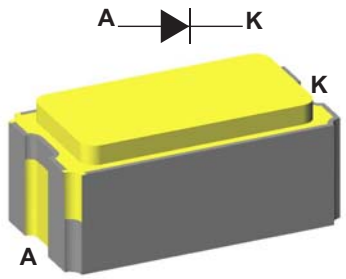
1N5806U

Aerospace 2.5 A fast recovery rectifier

Datasheet - production data



Leadless chip carrier 2 (LCC2A)

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 LCC2A package whose footprint is 100% compatible with industry standard solutions in D5A.

The 1N5806U 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: 0.12 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}	$T_{j(max)}$	$VF_{(max)}$
1N5806UA1		Engineering model	Gold		2.5	150	175	1
1N5806U01A	5101/014/13	ESCC flight	Gold	yes				
1N5806U02A	5101/014/14	ESCC flight	Solder dip					

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

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		6	A
$I_{F(AV)}$	Average forward rectified current	$T_c \geq 142$ °C, $\delta = 0.5$	2.5	A
I_{FSM}	Forward surge current	t_p = 8.3 ms sinusoidal	35	A
		t_p = 10 ms sinusoidal	33	
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
$R_{th\ (j\text{-}c)}$ (1)	Junction to case	13	°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 °C	V_R = 150 V	-	-	0.5	µA
		T_j = 125 °C		-	-	20	
		T_j = 25 °C	V_R = 160 V	-	-	10	
		T_j = -65 °C		-	-	10	
V_F (2)	Forward voltage	T_j = 25 °C	I_F = 1 A	-	-	880	mV
		T_j = 125 °C		-	-	800	
		T_j = -65 °C		-	-	1075	
		T_j = 25 °C	I_F = 2.5 A	-	-	1000	

1. Pulse test: t_p = 5 ms, δ < 2%
2. Pulse test: t_p = 680 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.70 \times I_{F(AV)} + 0.10 \times I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_{RR}	Reverse recovery time	$I_F = I_R = 0.5$ A, $I_{rr} = 0.05$ A, dI/dt = -65 A/µs (min.)	-	-	25	ns
		$I_F = 1$ A, $V_R = 30$ V, dI/dt = -50 A/µs,	-	-	30	
V_{FP}	Forward recovery voltage	$I_{FM} = 250$ mA	-	-	2.2	V
t_{FR}	Forward recovery time	$I_{FM} = 250$ mA, $V_{RF} = 1.1 \times V_F$	-	-	15	ns
C_j	Diode capacitance	$V_R = 10$ V, F = 1 MHz	-	-	25	pF

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

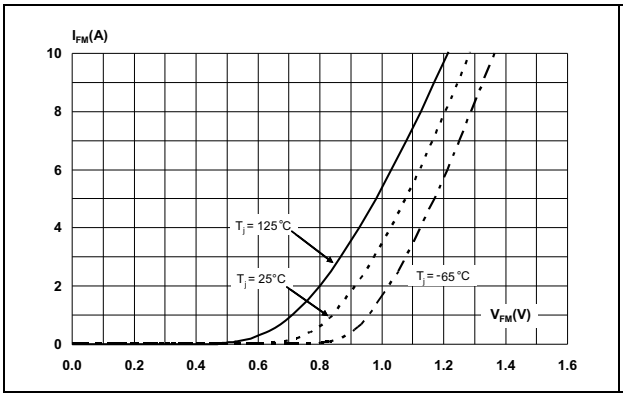


Figure 2. Forward voltage drop versus forward current (maximum values)

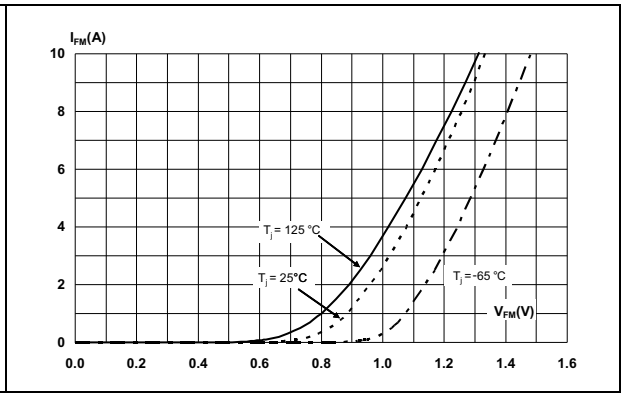


Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

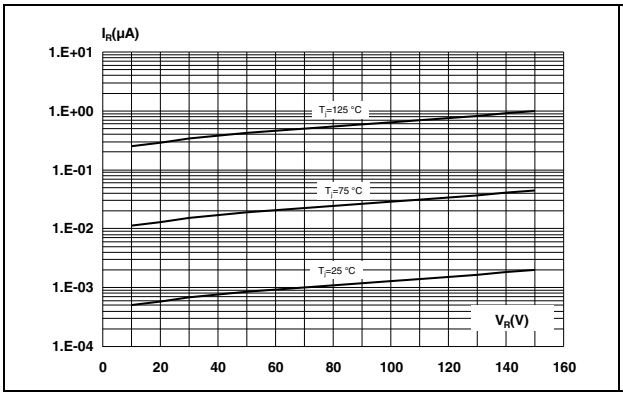


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

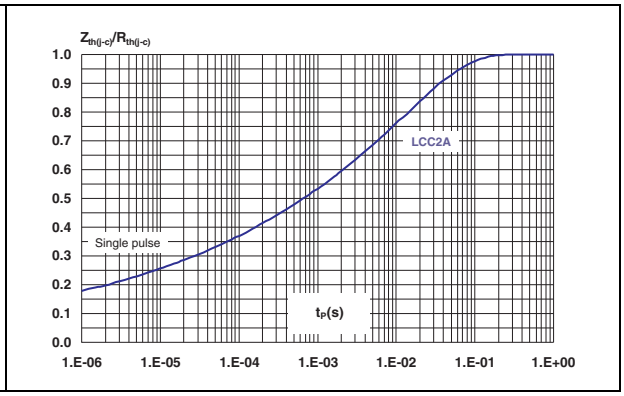


Figure 5. Reverse recovery time versus dI_F/dt

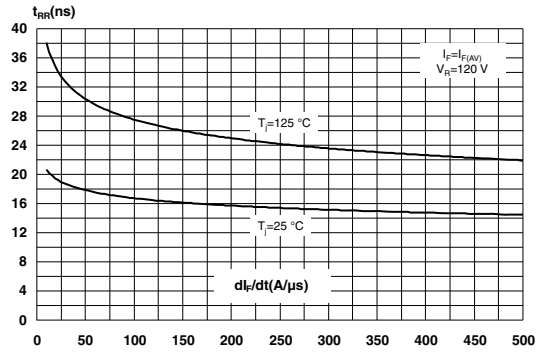
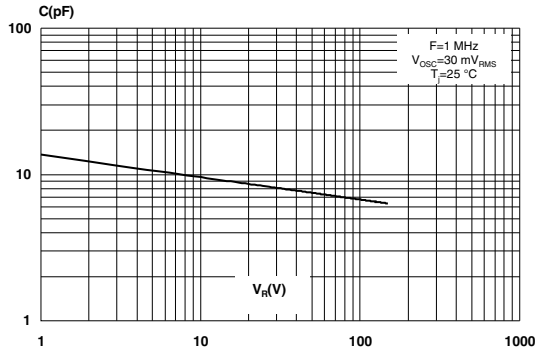


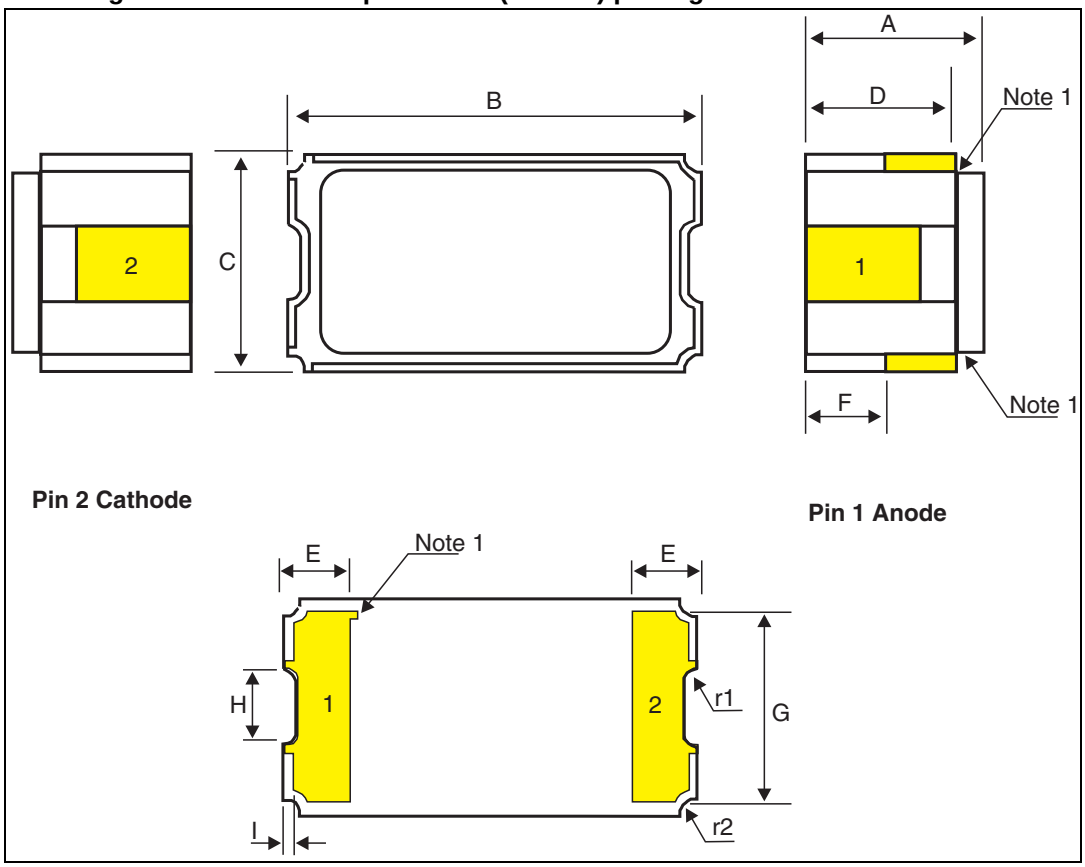
Figure 6. Junction capacitance versus reverse voltage applied (typical values)



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.

Figure 7. Leadless chip carrier 2 (LCC2A) package dimension definitions



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

Table 6. Leadless chip carrier 2 (LCC2A) package dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A(1)	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	0.92	0.97	0.102
D	1.53	1.70	1.87	0.060	0.067	0.074
E	0.48	-	0.71	0.019	-	0.028
F	-	1.3	-	-	0.051	-
G	-	2.16	-	-	0.085	-
H	-	0.86	-	-	00.34	-
I	-	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
1N5806UA1	-	LCC2A	Gold	5806	-	0.12 g	Waffle pack
1N5806U01A	5101/014/13		Gold	510101413	Y		
1N5806U02A	5101/014/14		Solder dip	510101414	-		

1. Contact ST sales office for information about the specific conditions for products in die form.
2. Specific marking only. The full marking includes in addition:

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

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 2*, *Table 5* and *Table 7* and inserted *Other information*.

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