

## EnFilm™ - rechargeable solid state lithium thin film battery

Datasheet – preliminary data

### Features

- All solid-state
- Ultra thin
- Fast recharge
- Long cycle life
- RoHS compliant
- UL file number: MH47669

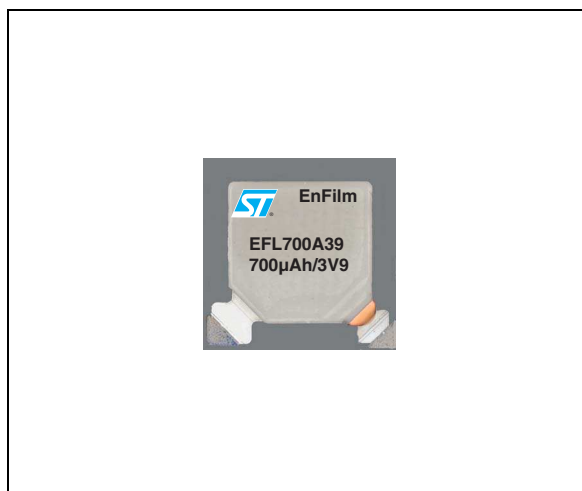
### Applications

Device is intended to be used in following applications:

- Sensors and sensor networks
- Smart card
- RF ID tags
- Energy storage for energy harvesting devices
- Non implantable medical applications
- Backup power

### Description

The EFL700A39 is a thin film rechargeable lithium battery. The battery has a  $\text{LiCoO}_2$  cathode, LiPON ceramic electrolyte and a lithium anode. This device has a footprint of 25.4 x 25.4 mm.



**Table 1. Device summary**

Symbol	Value
Capacity	0.7 mAh
$V_{\text{nominal}}$	3.9 V
$V_{\text{op}}$	3.6 to 4.2 V
$R_{\text{int}}$	100 ohm
$I_{\text{p}}$	10 mA
Dimension	25.4 x 25.4 mm
Thickness	200 $\mu\text{m}$

TM: EnFilm is a trademark of STMicroelectronics

# 1 Characteristics

**Table 2. Absolute ratings**

Symbol	Parameter	Value	Unit
V <sub>op</sub>	Operating voltage	3.6 – 4.2	V
I <sub>c</sub>	Maximum continuous discharge current	5	mA
I <sub>p</sub>	Maximum pulsed discharge current <sup>(1)</sup>	10	mA
T <sub>stg</sub>	Storage temperature range	- 40 to 60	°C
T <sub>op</sub>	Operating temperature range <sup>(2)</sup>	- 40 to 60	°C
C <sub>life</sub>	Cycle life (to minimum of 80% of initial capacity) <sup>(3)</sup>	1000	cycle

1. Pulsing conditions: 100 ms on, 0.9 s off
2. 1/100 C discharge at -40 °C: operating at 60 °C reduces the cycle life
3. 1C discharge rate: 50% depth of discharge, cycle at room temperature

**Table 3. Electrical characteristics**

Symbol	Parameter		Test conditions	Min	Typ	Max	Unit
C	Nominal capacity (minimum)		T = 30 °C Discharge @ 1 mA Cut-off voltage = 3.6 V	0.7	-	-	mAh
R <sub>int</sub>	Internal resistance		T= 30 °C	-	100	120	ohm
C <sub>t</sub>	Charge time to 80% of full capacity		Constant voltage= 4.2 V	-	-	20	mn
S <sub>Disch</sub>	Self discharge	total self discharge (recoverable and non-recoverable)	Room temperature	-	-	18	%/year
		non-recoverable	Room temperature	-	-	5	% first year
				-	-	15	% over 5 years

Figure 1. Typical discharge curve

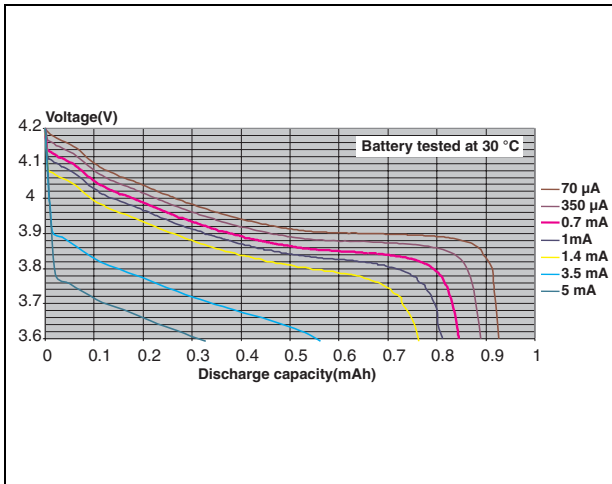


Figure 2. Typical pulsed discharge curve

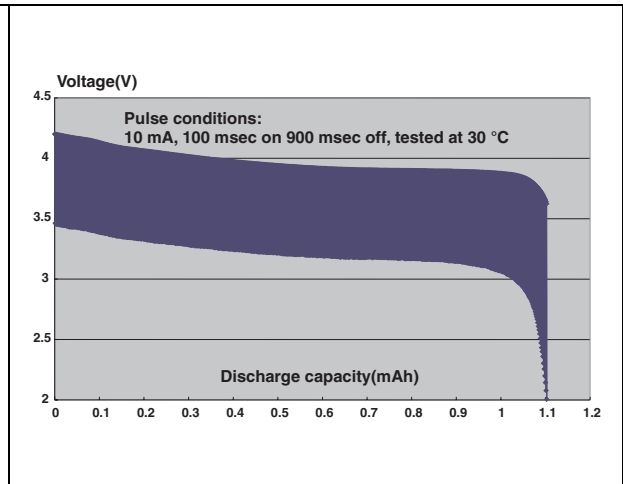
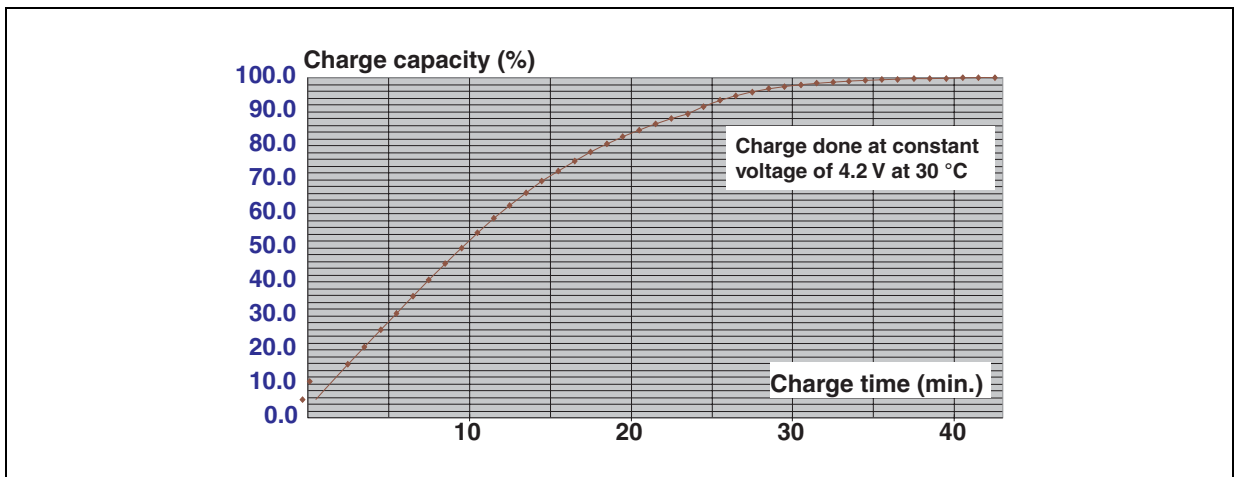


Figure 3. Typical charge curve



## 2 Application information

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## **3 Recommended charge and discharge processes**

### **3.1 Charge**

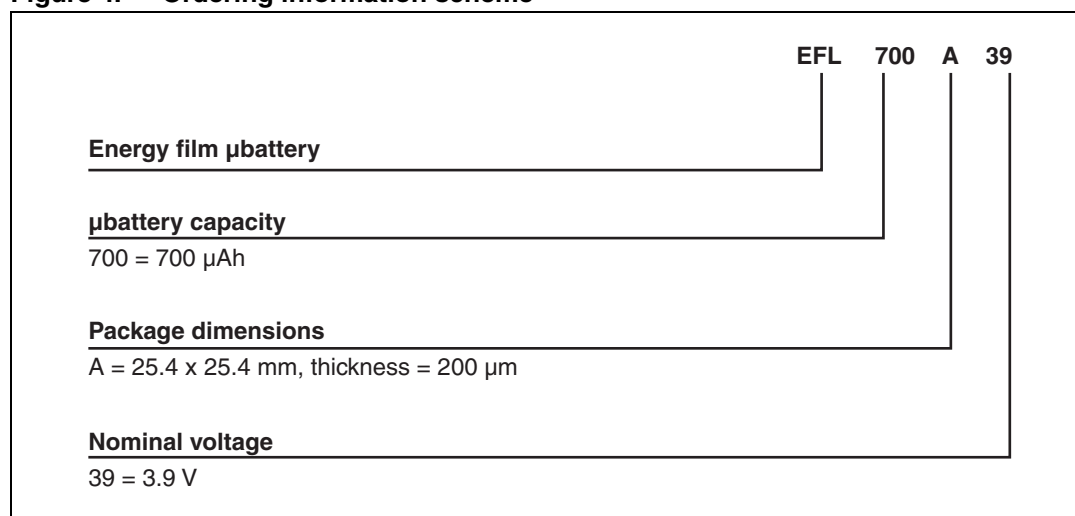
Battery can be charged from a  $4.2\text{ V} \pm 0.05\text{ V}$  constant voltage source with or without current limit. More than 90% of the total capacity is recharged when the charge current falls below 0.1 mA.

### **3.2 Discharge**

When discharging under constant current or constant load, the cut-off voltage should be no less than 3.6 V. Cut-off voltage can be lowered to 2.0 V for pulsed discharge.

## 4 Ordering information scheme

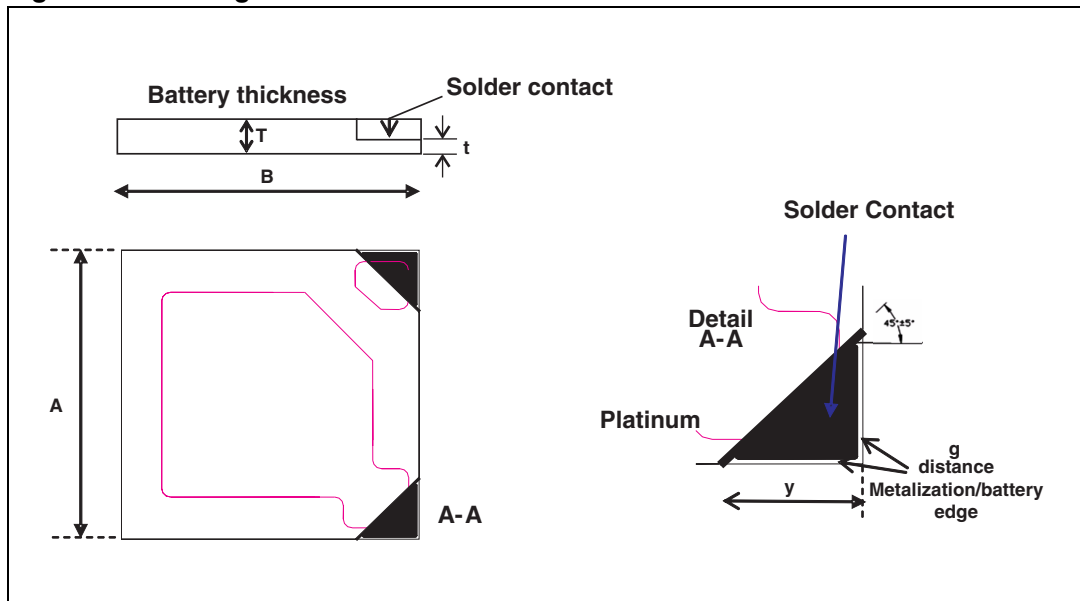
Figure 4. Ordering information scheme



## 5 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](http://www.st.com). ECOPACK® is an ST trademark.

**Figure 5. Package dimensions**



**Table 4. Package dimensions**

Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	25.2	25.4	25.7	0.992	1.000	1.012
B	25.4	25.4	25.7	1.000	1.000	1.012
T	-	0.16	0.2	-	0.006	0.008
t	-	0.07	-	-	0.003	-
y	5.3	-	5.9	0.209	-	0.232
g	-	0.3	-	-	0.012	-

## 6 Recommendations for the soldering process

Refer to the STMicroelectronics Application note AN4046, “EnFilm™ micro battery EFL700A39, recommendations for manual assembly on PCB”.



## 7 Ordering information

Table 5. Ordering information

Order code	Marking	Weight	Base qty	Delivery mode
EFL700A39	EFL700A39	0.2 g	1	Individual packing

## 8 Revision history

Table 6. Document revision history

Date	Revision	Changes
08-Apr-2010	1	Initial release.
23-Apr-2012	2	Insert AN4046 reference for recommendations for the soldering process and update <a href="#">Figure 5</a> .

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