

## QA system certification

### RAQ1 in France

(equivalent to AQAP-1 for NATO)

With reference to the defense contracting obligations under ROFA (Règlement sur les obligations des fournisseurs de l'armement), our Quality Assurance system is certified to RAQ1 (which meets ISO 9001) by French Defense procurement supervisory agency SIAR (Surveillance Industrielle de l'Armement).

### AQF-2

In addition, the Saft QA system is certified to AQF-2 by 47 French Railways (SNCF) in accordance with the requirements of SNCF quality specification N° 900 title II.

### BS 5750 and NATO AQAP-1 in the UK

In the UK, Saft has been approved to BS 5750 parts 1 and 2 and registered by the British Ministry of Defense as operating quality control procedures in accordance with AQAP-1.

### US Military

Mil-Q-9858 A

Saft maintains a fully compliant system for all batteries.

### ISO 9001

To implement a highly efficient and internationally recognized Quality Assurance system, the Advanced Batteries Group has obtained ISO 9001 certification in mid-1995.

### Quality tools

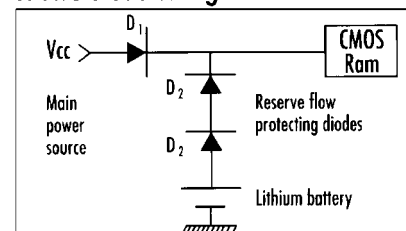
A quality manual is used as a reference system throughout the organization. Methodology tools are adapted to each phase of product development (see charts).

## Memory back-up configuration

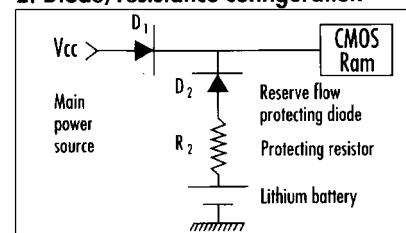
Lithium primary cells must be protected against accidental charging.

Two configurations are possible:

### 1. Two diode configuration



### 2. Diode/resistance configuration



Saft recommends the battery assembly illustrated above (maximum leakage current for diodes: 5 mA).

It is unadvisable to assemble cells of different chemistries and sizes, or featuring differing discharge states, into battery packs.

Cell	Size		Open circuit voltage volts	Nominal voltage volts	Nominal capacity Ah	Maximum recommended constant current mA	Operating temperature		Diameter (max.) or LxI		Height (max.)		Weight g oz	UL recognition <sup>(a)</sup>	Features <sup>(b)</sup>	
	IEC	ANSI					°C	°F	mm	in.	mm	in.				
<b>Small LS series</b>																
LS14250	30/3138÷30/3142	1/2R6 1/2AA	3.67	3.5	0.95	35	-55/+85*	-67/+185*	14.5	0.571	24.9	0.980	7.5	0.26	■	B,GTM
LS14500	30/3238÷30/3242	R6 AA	3.67	3.5	2.1	70	-55/+85*	-67/+185*	14.5	0.571	50.4	1.984	15.0	0.525	■	B,GTM

\* 100°C/212°F possible for short periods of time

Nominal capacity at C/700/20°C/68°F/2.0 V cut-off

Open circuit voltage (at 20°C/68°F)

Nominal voltage at C/700/20°C/68°F

Maximum recommended constant current (50% yield) at 20°C/68°F

### Large LS series

LS26500	30/3338÷30/3340	R14 C	3.67	3.5	7.2	170	-55/+85*	-67/+185*	26.1	1.03	50.0	1.969	50	1.76	■	B,GTM
LS33600	30/3360	R20 D	3.67	3.5	16.5	300	-55/+85*	-67/+185*	33.6	1.32	61.5	2.43	90	3.17	■	B,GTM

Nominal capacity at C/1500/20°C/68°F/2.0 V cut-off

Open circuit voltage (at 20°C/68°F)

Nominal voltage at C/700/20°C/68°F

Maximum recommended constant current (50% yield) at 20°C/68°F

On standard version these cells include a 2.5A fuse

# Saft 3.6 V low rate system: LS small size series

All-round production automation of the Saft LS small size series cells delivers a high-reliability, cost-effective solution. LS cells feature a high operating voltage (3.6 V), wide operating temperature range (-55°/+100 °C) and very high energy-density of up to 900 Wh/dm<sup>3</sup>. Their lack of toxic materials, low pressure system and reliable glass-to-metal feedthrough all guarantee safe operation. In fact, Saft LS cells offer designers not just a better power source, but often their only viable solution.

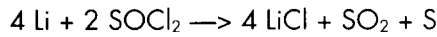
## Chemistry

Anode: lithium (Li)

Cathode: thionyl chloride (SOCl<sub>2</sub>)

Electrolyte: lithium tetrachloro aluminate in thionyl chloride

## Electrochemical reaction



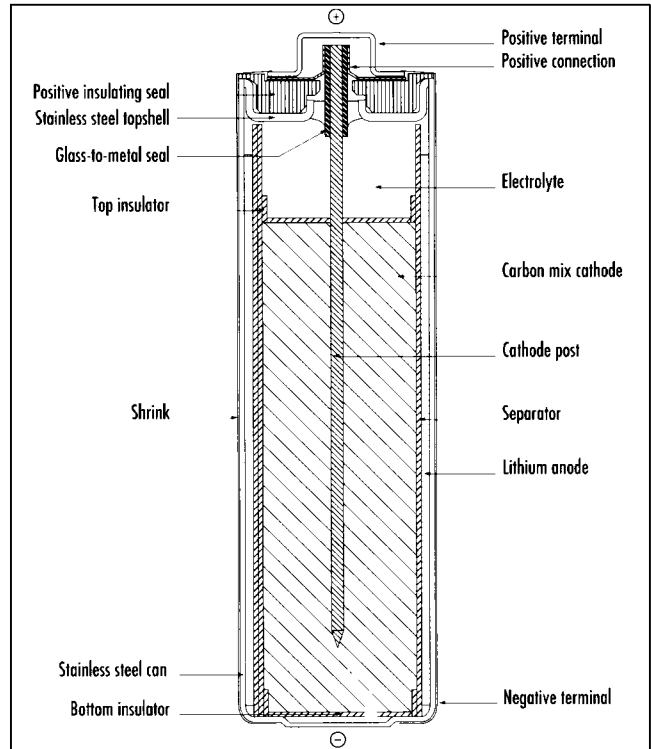
## Design

Cell electrode: bobbin construction

Container material: stainless steel

Sealing system: glass-to-metal feedthrough

Safety system: venting



		30/3138÷30/3142	30/3238÷30/3242	30/3380
<b>Cell</b>		<b>LS14250</b>	<b>LS14500</b>	<b>LS 9 V**</b>
Size	IEC	1/2R6	R6	-
	ANSI	1/2AA	AA	-
<b>Electrical features</b>		<b>LS14250</b>	<b>LS14500</b>	<b>LS 9 V</b>
Nominal capacity at C/700/20°C/68°F/2.0 V cut-off	Ah	0.95	2.1	0.95
Open circuit voltage (at 20°C/68°F)	volts	3.67	3.67	11.0
Nominal voltage at C/700/20°C/68°F	volts	3.5	3.5	10.6
Maximum recommended constant current (50% yield) at 20°C/68°F	mA	35	70	35
<b>Temperature</b>		<b>LS14250</b>	<b>LS14500</b>	<b>LS 9 V</b>
Operating*	°C	-55/+85*	-55/+85*	-40/+85
	°F	-67/+185*	-67/+185*	-40/+185
Storage	°C	-55/+85	-55/+85	-40/+85
	°F	-67/+185	-67/+185	-40/+185
<b>Physical features</b>		<b>LS14250</b>	<b>LS14500</b>	<b>LS 9 V</b>
Diameter (max) or L x l	mm	14.5	14.5	26.5 x 17.3
	in	0.571	0.571	1.043 x 0.68
Height (max)	mm	24.9	50.4	48.6
	in	0.980	1.984	1.913
Weight	g	7.5	15.0	33.5
	oz	0.26	0.525	1.172
<b>References</b>		<b>LS14250</b>	<b>LS14500</b>	<b>LS 9 V</b>
UL Recognition		•	•	•

\* 100 °C/212 °F possible for short periods of time \*\* LS 9 V D: version with diode

# Saft 3.6 V low rate system: LS large size series

The Saft LS large size series offers a cost-effective, high-reliability solution. LS cells feature a high operating voltage (3.6 V) and wide operating temperature range (-55°/+100°C). They also supply the highest energy density on the market – up to 1 050 Wh/dm<sup>3</sup> – a substantial energy reserve. The lack of toxic materials, low pressure system, safety vent and reliable glass-to-metal feedthrough all guarantee safe operation. In fact, Saft LS cells offer designers not just a better power source, but often their only viable solution.

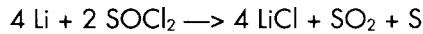
## Chemistry

Anode: lithium (Li)

Cathode: thionyl chloride (SOCl<sub>2</sub>)

Electrolyte: lithium tetrachloro aluminate in thionyl chloride

## Electrochemical reaction



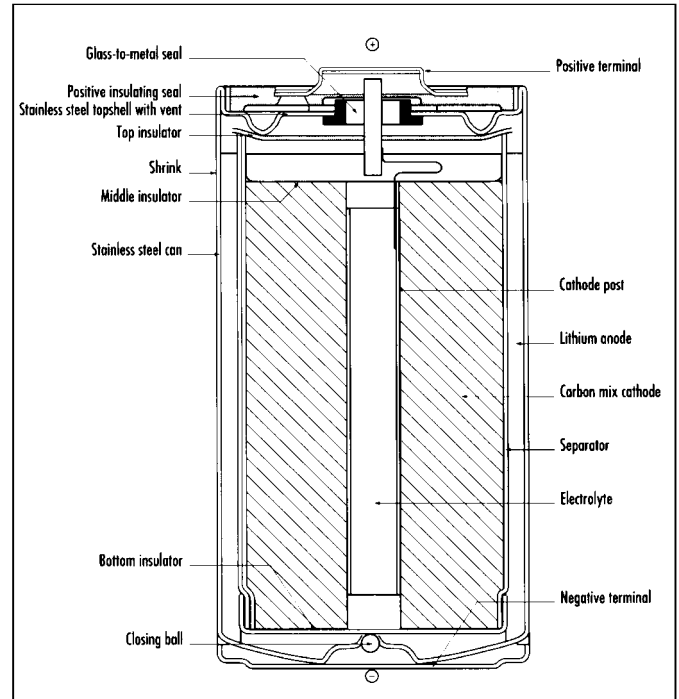
## Design

Cell electrode: bobbin construction

Container material: stainless steel

Sealing system: glass to metal feedthrough

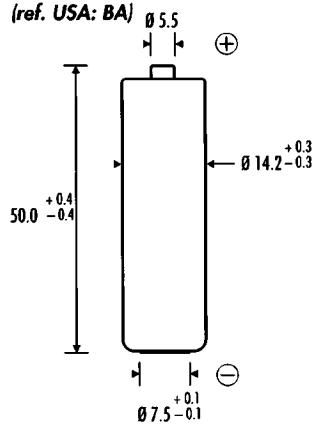
Safety system: rupture vent



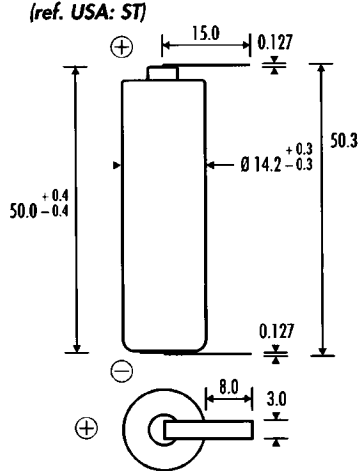
		30/3338+30/3340	30/3360
<b>Cell</b>		<b>LS26500</b>	<b>LS33600</b>
Size	IEC	R14	R20
	ANSI	C	D
<b>Electrical features</b>		<b>LS26500</b>	<b>LS33600</b>
Nominal capacity at C/1500/20 °C/68 °F	Ah	7.2	16.5
Open circuit voltage (at 20 °C)	volts	3.67	3.67
Nominal voltage at C/700/20 °C	volts	3.5	3.5
Maximum recommended constant current (50% yield) at 20 °C. On standard versions, these cells include a 2.5 A slow blow fuse.	mA	170	300
<b>Temperature</b>		<b>LS26500</b>	<b>LS33600</b>
Operating*	°C	-55/+85*	-55/+85*
	°F	-67/+185*	-67/+185*
Storage	°C	-55/+85	-55/+85
	°F	-67/+185	-67/+185
<b>Physical features</b>		<b>LS26500</b>	<b>LS33600</b>
Diameter (max)	mm	26.1	33.6
	in	1.03	1.32
Height (max)	mm	50.0	61.5
	in	1.969	2.43
Weight	g	50	90
	oz	1.76	3.17
<b>References</b>		<b>LS26500</b>	<b>LS33600</b>
UL Recognition		●	●

\* 100 °C/212 °F possible for short periods of time

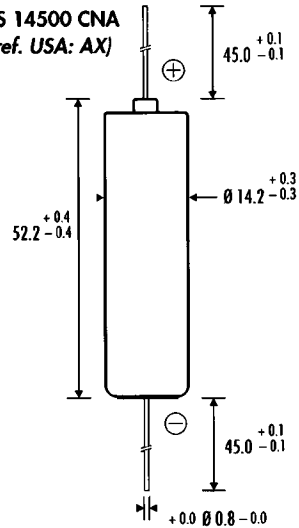
**LS 14500**  
(ref. USA: BA)



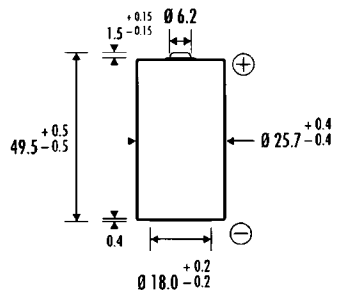
**LS 14500 CNR**  
(ref. USA: ST)



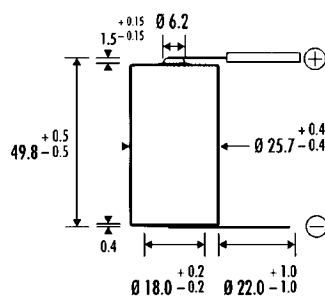
**LS 14500 CNA**  
(ref. USA: AX)



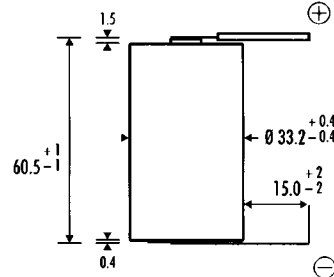
**LS 26500**  
(ref. USA: BA)



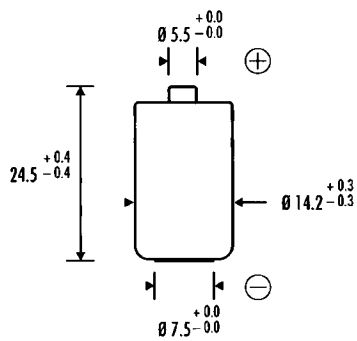
**LS 26500 CNR**  
(ref. USA: ST)



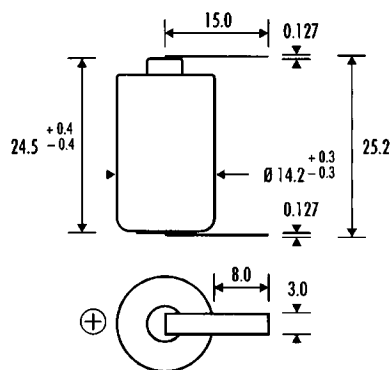
**LS 33600 CNR**  
(ref. USA: ST)



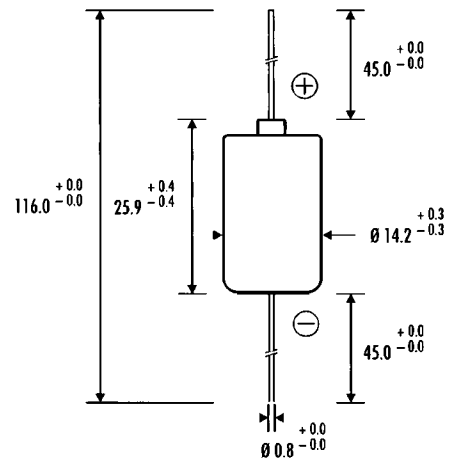
**LS 14250**  
(ref. USA: BA)



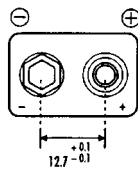
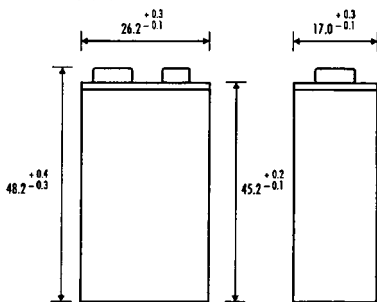
**LS 14250 CNR**  
(ref. USA: ST)



**LS 14250 CNA**  
(ref. USA: AX)

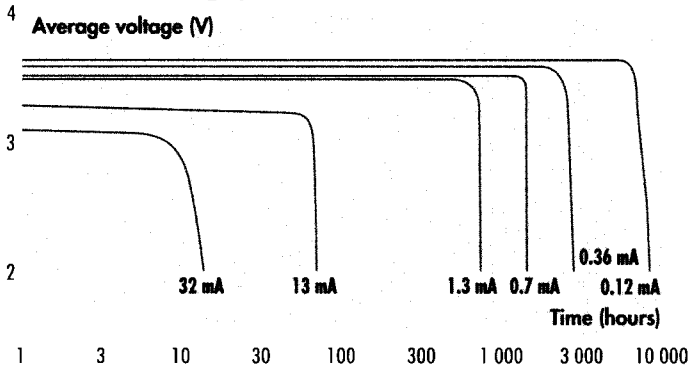


**LS 9 V** 30/3380

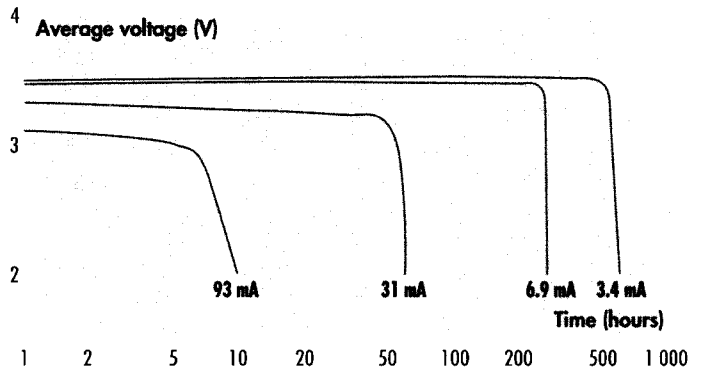


# Typical discharge curves of LS batteries

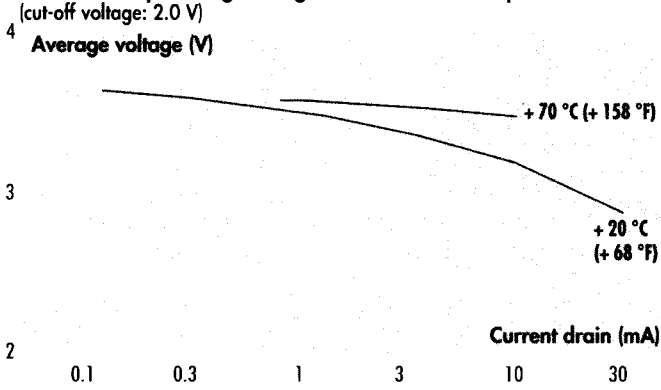
LS 14250 Discharge profiles at + 20 °C (68 °F)



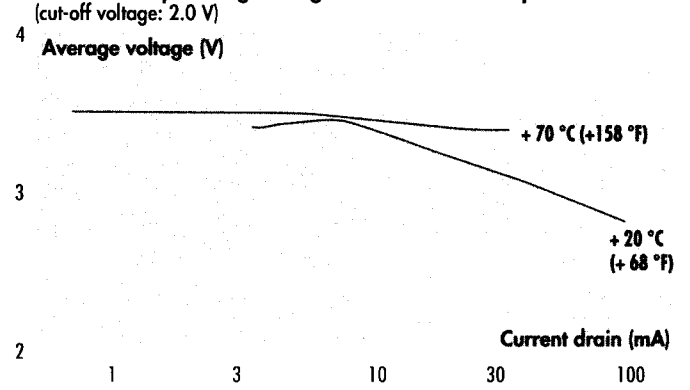
LS 14500 Discharge profiles at + 20 °C (68 °F)



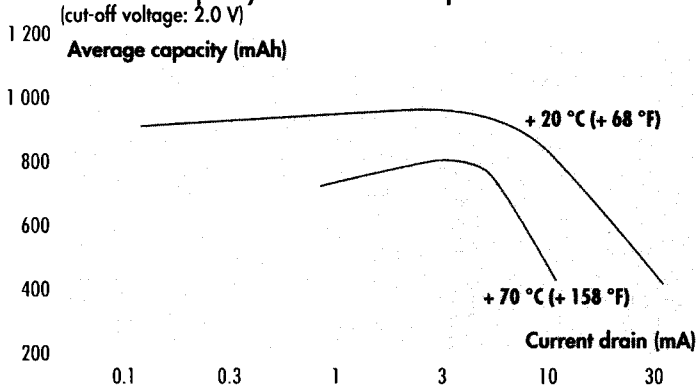
LS 14250 Operating voltage vs drain and temperature



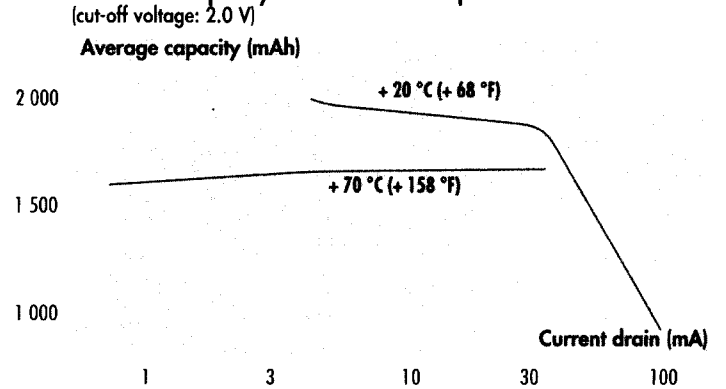
LS 14500 Operating voltage vs drain and temperature



LS 14250 Capacity vs drain and temperature

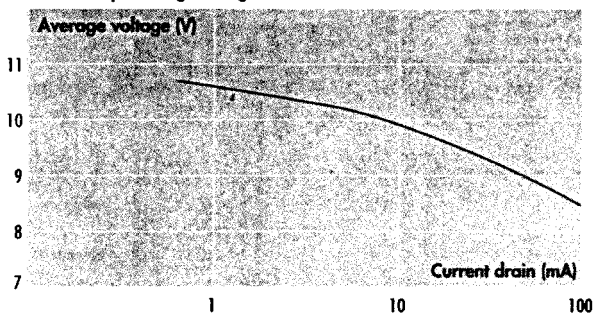


LS 14500 Capacity vs drain and temperature

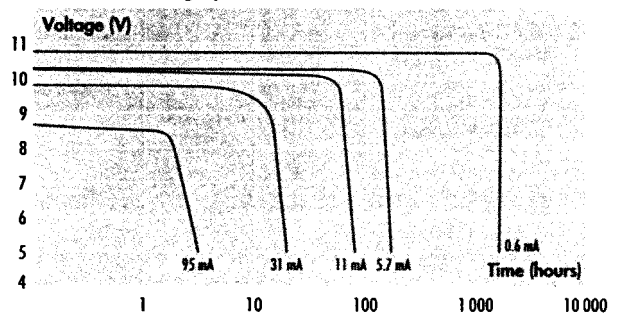


## 30/3380

LS 9 V Operating voltage vs drain at + 20 °C (68 °F)

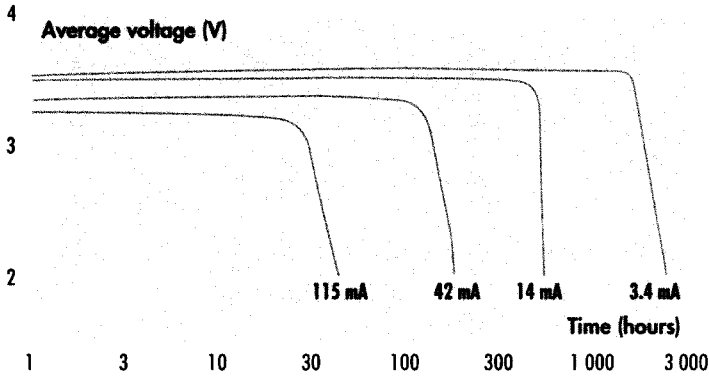


LS 9 V Discharge profiles at + 20 °C (68 °F)

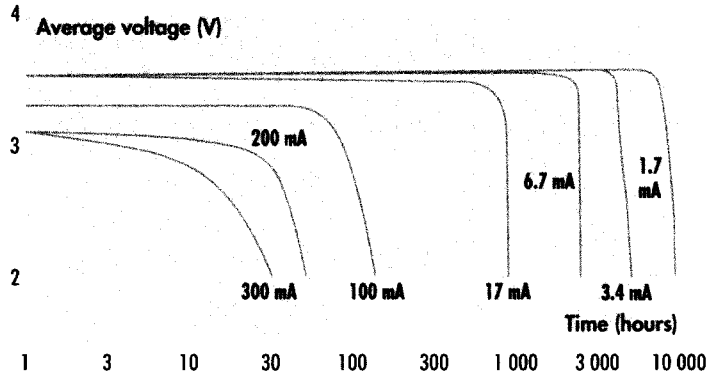


# Typical discharge curves of LS batteries

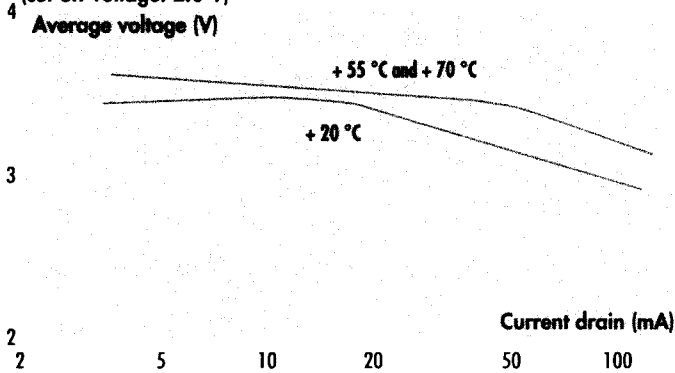
LS 26500 Discharge profiles at + 20 °C (68°F)



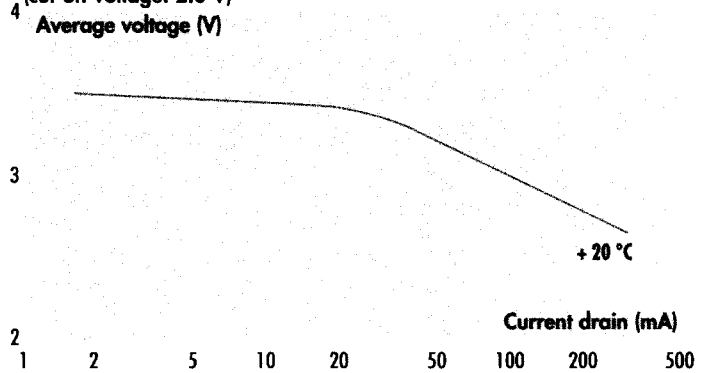
LS 33600 Discharge profiles at + 20 °C (68°F)



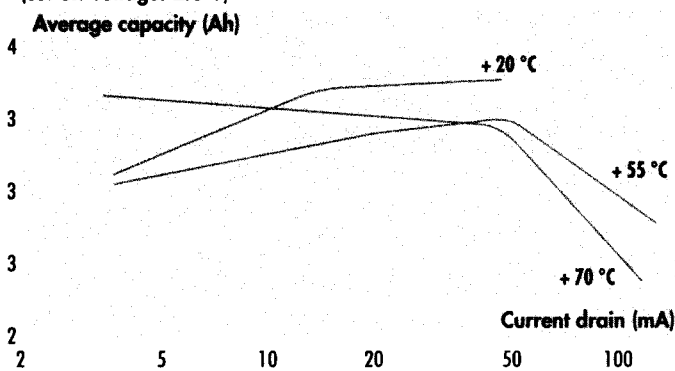
LS 26500 Operating voltage vs drain and temperature  
(cut-off voltage: 2.0 V)



LS 33600 Operating voltage vs drain and temperature  
(cut-off voltage: 2.0 V)



LS 26500 Capacity vs drain and temperature  
(cut-off voltage: 2.0 V)



LS 33600 Capacity vs drain at + 20 °C (68 °F)  
(cut-off voltage: 2.0 V)

