

3V Lithium Batteries

General Technical Information on Lithium Batteries

Lithium is one of the lightest alkaline metal elements and its standard potential and electrochemical equivalence are the highest of all metals (-3,045V).

When speaking about Lithium, this only refers to the anode material (negative pole). The electrolyte and cathode may consist of a wide variety of materials providing very different cell characteristics.

The Lithium/manganese dioxide chemistry provided by RENATA is the safest and most reliable Lithium battery system.

Contrary to other constructions they are:

- non polluting
- admitted as user-replaceable by Underwriter Laboratories (3V)
- short circuit proof

... and offer the following advantages:

- Ideal voltage level of 3V, approximately twice the voltage level from of alkaline button cells
- * Wide operating temperature range from -40°C to +85°C
- Low self discharge of less than 1 % to 1.5% (depending on type) per year at 23°C
- Best practical volume/capacity ratio
- Superior leakage resistance
- Excellent storage characteristics, up to 10 years storage with minimum deterioration possible
- UL-recognized products
- Safe product, does not contain toxic substances
- Available in a wide range of solder contact configurations or in combination with our battery holders

* CR2016.MFR / CR2025.MFR /CR2032.MFR = -30°C to +70°C

In Application where the battery is exposed to temperatures above 60°C, please contact Renata for consultancy.

3V Lithium Batteries

General Technical Information on Lithium Batteries (cont.)

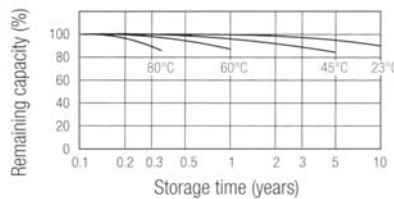
Self discharge - Storage

RENATA lithium batteries offer excellent storage characteristics. The loss of capacity due to self discharge is from less than 1% to 1.5% per year at room temperature (23°C). Thanks to the high stability of their chemical system, MnO₂/Li batteries have a shelf life of up to 10 years, at room temperature.

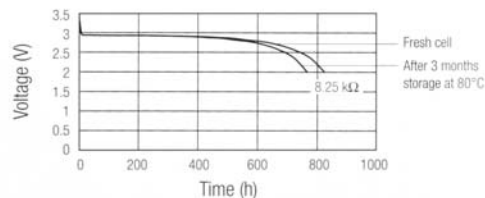
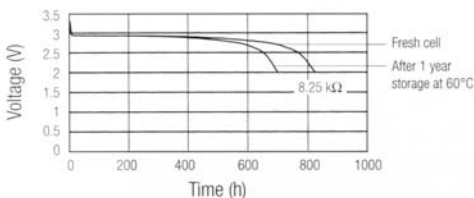
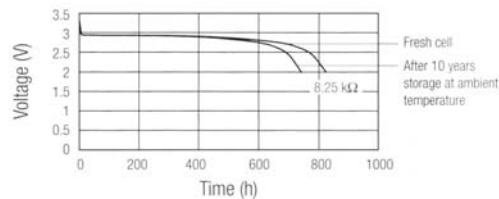
The internal chemical reactions of a battery are accelerated by high temperatures and slowed by low temperatures. In other words, the loss of capacity during storage depends largely on storage temperature. Higher temperatures result in increased self discharge rates, while lower temperatures reduce self discharge (as shown by graphs below). Storage at low temperatures bears the risk, however, that batteries are short circuited by moisture condensation when transferred into a warmer environment.

Characteristics

Shelf life (temperature / time)



Storage characteristics (CR2430)



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General Technical Information on Lithium Batteries (cont.)

Inverse Current

Lithium primary batteries are not rechargeable. Therefore, if there is a possibility of electric current flowing from the main power source to the battery, the circuit must include two suitable blocking diodes in series or one blocking diode and one protective resistor in series. Use a silicon diode of small inverse current to prevent charging. The total amount of re-charge energy due to leakage by the blocking diodes should not exceed 1% of the battery's nominal capacity during its total service life. A higher input of re-charge energy may harm the battery or reduce its performance.

Example: A CR2450N battery with a nominal capacity of 540mAh is expected to supply power for 5 years. The amount of tolerable re-charge energy is 5.4mAh, corresponding to an inverse current of 0.1 μ A for the total service life. Consequently, a blocking diode with an inverse current not greater than 0.1 μ A should be selected. Please note that the inverse current of blocking diodes varies with temperature.

Short Circuits

When lithium batteries are short circuited, it takes time for the battery voltage to recover, even in case of slight short circuits. If electrical characteristics are measured while the battery is recovering, the battery may appear to be defective, but is not. Short circuiting leads to deterioration of the cell capacity. Short circuiting of batteries must therefore be avoided, except for wave or dip soldering. Use an instrument with a high input impedance (minimum 10 M Ω) for measuring open circuit voltage.

Superior Environmental Resistance

The combination of the sealing system and the use of organic electrolytes with low creeping tendency ensure the excellent leakage resistance of our batteries. Each production lot is subjected to a quality assurance program under difficult environmental conditions (high temperature storage, high temperature/high humidity storage, temperature cycling, etc.). RENATA batteries can be operated in any physical position.

Information and contents in this document sheet is for reference purpose only. They do not constitute any warranty or representation and are subject to change without notice. For most current information and further details, please contact your Renata representative.


For safety related information please consult the MSDS document related to that product or product family. The Products of Renata SA are neither designed nor authorized for use in certain areas of application of environment. For further details we refer to our webpage www.renata.com/downloads/restriction_of_use

Industry

renata
batteries

Scope of supply
Programme de livraison
Lieferprogramm

Batteries for watches, hearing aids and calculators
Piles pour montres, appareils auditifs et calculatrices
Batterien für Uhren, Hörgeräte und Taschenrechner

Chemical System Système chimique Chemisches System	Dimensions Dimensions Dimensionen	RENATA No.		Capacity Capacité Kapazität
Silver oxide (low drain) 1.55 V Oxyde d'argent (low drain) 1.55 V Silberoxyd (low drain) 1.55 V   +  +  0% MERCURY	4.8×1.6 mm	337	SR416SW	8 mAh
	5.8×1.2 mm	335	SR512SW	6 mAh
	5.8×1.6 mm	317	SR516SW	10.5 mAh
	5.8×2.1 mm	379	SR521SW	16 mAh
	5.8×2.7 mm	319	SR527SW	21 mAh
	6.8×1.4 mm	339	SR614SW	11 mAh
	6.8×1.6 mm	321	SR616SW	14.5 mAh
	6.8×2.1 mm	364	SR621SW	20 mAh
	6.8×2.6 mm	377	SR626SW	28 mAh
	7.9×1.2 mm	346	SR712SW	9.5 mAh
	7.9×1.4 mm	341	SR714SW	15 mAh
	7.9×1.6 mm	315	SR716SW	23 mAh
	7.9×2.1 mm	362	SR721SW	24 mAh
	7.9×2.6 mm	397	SR726SW	32 mAh
	7.9×3.1 mm	329	SR731SW	37 mAh
	7.9×3.6 mm	384	SR41SW	45 mAh
	7.9×5.4 mm	309	SR754SW	80 mAh
	9.5×1.6 mm	373	SR916SW	29 mAh
	9.5×2.0 mm	371	SR920SW	40 mAh
	9.5×2.7 mm	395	SR927SW	55 mAh
9.5×3.6 mm	394	SR936SW	84 mAh	
11.6×1.6 mm	366	SR1116SW	47 mAh	
11.6×2.1 mm	381	SR1120SW	50 mAh	
11.6×3.1 mm	390	SR1130SW	60 mAh	
11.6×3.6 mm	344	SR1136SW	105 mAh	
11.6×4.2 mm	301	SR43SW	130 mAh	
11.6×5.4 mm	303	SR44SW	175 mAh	
Silver oxide (high drain) 1.55 V Oxyde d'argent (high drain) 1.55 V Silberoxyd (high drain) 1.55 V    0% MERCURY	6.8×2.6 mm	376	SR626W	27 mAh
	7.9×2.1 mm	361	SR721W	24 mAh
	7.9×2.6 mm	396	SR726W	32 mAh
	7.9×3.6 mm	392	SR41W	45 mAh
	7.9×5.4 mm	393	SR754W	80 mAh
	9.5×2.0 mm	370	SR920W	40 mAh
	9.5×2.7 mm	399	SR927W	55 mAh
	9.5×3.6 mm	380	SR936W	82 mAh
	11.6×1.6 mm	365	SR1116W	47 mAh
	11.6×2.1 mm	391	SR1120W	50 mAh
	11.6×3.1 mm	389	SR1130W	80 mAh
	11.6×3.6 mm	350		105 mAh
	11.6×4.2 mm	386	SR43W	130 mAh
11.6×5.4 mm	357	SR44W	190 mAh	
Alkaline 1.5 V	11.6×5.4 mm	LR44		110 mAh
Lithium 3 V   	10.0×2.5 mm	CR1025		30 mAh
	12.5×1.6 mm	CR1216		25 mAh
	12.5×2.0 mm	CR1220		35 mAh
	12.5×2.5 mm	CR1225		48 mAh
	16.0×1.6 mm	CR1616		50 mAh
	16.0×2.0 mm	CR1620		68 mAh
	16.0×3.2 mm	CR1632		137 mAh
	20.0×1.6 mm	CR2016		90 mAh
	20.0×2.5 mm	CR2025		165 mAh
	20.0×3.2 mm	CR2032		225 mAh
	23.0×2.0 mm	CR2320		150 mAh
	23.0×2.5 mm	CR2325		190 mAh
	24.5×3.0 mm	CR2430		285 mAh
	24.5×5.0 mm	CR2450N		540 mAh
	24.5×7.7 mm	CR2477N		950 mAh
Lithium 3 V Rechargeable	20.0×1.6 mm	LMR2016		25 mAh
Zinc air, 1.45 V Zinc air, 1.45 V Zink-Luft, 1.45 V   0% MERCURY	5.8×3.6 mm	10	PR70	105 mAh
	7.9×3.6 mm	312	PR41	165 mAh
	7.9×5.4 mm	13	PR48	305 mAh
	11.6×5.4 mm	675	PR44	660 mAh

Cross Reference Guide

Interchangeabilit 
Austauschbarkeit

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batteries

renata	ENERGIZER EVEREADY	MAXELL PANASONIC SONY TOSHIBA	VARTA	RAYOVAC	DURACELL	TIMEX	CITIZEN	SEIKO	I.E.C. 60086-3 (60086-2)
301	301	SR43SW	V301	301	D 301/386	D	280-01	SB-A8	SR1142 (SR43)
303	303	SR44SW	V303	303	D 303/357	A	280-08	SB-A9	SR1154 (SR44)
309	309	SR754SW	V309	309	D 309/393				SR754 (SR48)
315	315	SR716SW	V315	315		HA	280-56	SB-AT	SR716 (SR67)
317	317	SR516SW	V317	317		CA	280-58	SB-AR	SR516 (SR62)
319	319	SR527SW	V319	319	D 319		280-60	SB-AE/DE	SR527 (SR64)
321	321	SR616SW	V321	321		DA	280-73	SB-AF/DF	SR616 (SR65)
329	329	SR731SW	V329	329					SR731
335	335	SR512SW	V335	335			280-68	SB-AB	SR512
337	337	SR416SW		337					SR416
339	339	SR614SW	V339						SR614
341	341	SR714SW	V341	341					SR714
344	344	SR1136SW	V344	344					SR1136 (SR42)
346	346	SR712SW	V346	346			280-66	SB-DH	SR712
350	350		V350						SR1136 (SR42)
357	357	SR44W	V357	357	D 303/357	J	280-62	SB-B9	SR1154 (SR44)
361	361	SR721W	V361	361	D 361/362	X	280-53	SB-BK/EK	SR721 (SR58)
362	362	SR721SW	V362	362	D 361/362	S	280-29	SB-AK/DK	SR721 (SR58)
364	364	SR621SW	V364	364	D 364	T	280-34	SB-AG/DG	SR621 (SR60)
365	365	SR1116W							SR1116
366	366	SR1116SW	V366	366			280-46		SR1116
370	370	SR920W	V370	370	D 370/371	Z	280-51	SB-BN	SR921 (SR69)
371	371	SR920SW	V371	371	D 370/371		280-31	SB-AN	SR921 (SR69)
373	373	SR916SW	V373	373		WA	280-45	SB-AJ/DJ	SR916 (SR68)
376	376	SR626W		376	D 376		MA		SR626 (SR66)
377	377	SR626SW	V377	377	D 377	BA	280-39	SB-AW	SR626 (SR66)
379	379	SR521SW	V379	379	D 379	JA	280-59	SB-AC/DC	SR521 (SR63)
380		SR936W							SR936
381	381	SR1120SW	V381	381	D 381/391		280-27	SB-AS/DS	SR1121 (SR55)
384	384	SR41SW	V384	384	D 384/392		280-18	SB-A1/D1	SR736 (SR41)
386	386	SR43W	V386	386	D 301/386	H	280-41	SB-B8	SR1142 (SR43)
389	389	SR1130W	V389	389	D 389/390	M	280-15	SB-BU	SR1130 (SR54)
390	390	SR1130SW	V390	390	D 389/390		280-24	SB-AU	SR1130 (SR54)
391	391	SR1120W	V391	391	D 381/391	L	280-30	SB-BS/ES	SR1121 (SR55)
392	392	SR41W	V392	392	D 384/392	K	280-13	SB-B1	SR736 (SR41)
393	393	SR754W	V393	393	D 309/393	F		SB-B3	SR754 (SR48)
394	394	SR936SW	V394	394	D 394		280-17	SB-A4	SR936
395	395	SR927SW	V395	395	D 395/399	LA	280-48	SB-AP/DP	SR927 (SR57)
396	396	SR726W	V396	396	D 396/397	V	280-52	SB-BL	SR726 (SR59)
397	397	SR726SW	V397	397	D 396/397	N	280-28	SB-AL	SR726 (SR59)
399	399	SR927W	V399	399	D 395/399	W	280-44	SB-BP/EP	SR927 (SR57)
LR44	A76	LR44	V13GA	RW82	LR44	KA	280-904	SB-F9	LR1154 (LR44)
CR1025	CR1025	CR1025							CR1025
CR1216	CR/BR1216	CR/BR1216	CR1216	BR1216					CR1216
CR1220	CR1220	CR/BR1220	CR1220	CR1220	DL1220	PA		SB-T13	CR1220
CR1225	CR/BR1225	BR1225		BR1225					BR1225
CR1616	CR/BR1616	CR/BR1616	CR1616	BR1616	DL1616	YA	280-209		CR1616
CR1620	CR1620	CR1620	CR1620	CR1620	DL1620	EA	280-208		CR1620
CR1632		CR1632							CR1632
CR2016	CR/BR2016	CR/BR2016	CR2016	CR/BR2016	DL2016	FA	280-202/4/6	SB-T11	CR/BR2016
CR2025	CR2025	CR2025	CR2025	CR2025	DL2025	NA	280-205	SB-T14	CR2025
CR2032	CR/BR2032	CR/BR2032	CR2032	CR2032	DL2032			SB-T15	CR2032
CR2320	BR2320	CR/BR2320	CR2320	BR2320			280-201		CR/BR2320
CR2325	BR2325	BR2325		BR2325				SB-T12	BR2325
CR2430	CR2430	CR2430	CR2430	CR2430	DL2430				CR2430
CR2450N	CR2450	CR2450	CR2450		DL2450				CR2450
CR2477N	CR2477	CR2477			DL2477				CR2477

renata	RAYOVAC	DURACELL ACTIVAIR	ENERGIZER	ENERGIZER AMPLIFIER	POWER ONE	PANASONIC	TOSHIBA	I.E.C
10	10A	DA 10	AC230E/EZ	AC230	P10	PR230H	ZA10	PR70
312	312A	DA 312	AC312E/EZ	AC312	P312	PR312H	ZA312	PR41
13	13A	DA 13	AC13E/EZ	AC13	P13	PR13H	ZA13	PR48
675	675A	DA 675	AC675E/EZ	AC675	P675	PR675H	ZA675	PR44