

Rechargeable Lithium Coin Batteries

Manganese Lithium Rechargeable Batteries (ML series)



Features

These super compact lithium rechargeable batteries feature a manganese compound oxide for the positive electrode, a lithium/aluminum alloy for the negative electrode and a special non-aqueous solvent for the electrolyte. They can easily be incorporated into circuits where 3V ICs are used to save space.

Applications

- Memory backup power supplies for mobile phones, memory cards, pagers and other compact communications equipment, data terminals and office automation equipment



General Specifications

Model	Electrical Characteristics (20°C)			Dimensions (mm)		Weight (g)	JIS	IEC
	Nominal Voltage (V)	*Nominal Capacity (mAh)	Continuous Drain (mA)	Diameter	Height			
ML414	3	1.2	0.005	4.8	1.4	0.09	-	-
ML421	3	2.3	0.003	4.8	2.1	0.11	-	-
ML614	3	3.4	0.01	6.8	1.4	0.16	-	-
ML621	3	5.0	0.01	6.8	2.1	0.23	-	-
ML920	3	11.0	0.03	9.5	2.0	0.4	-	-
ML1220	3	17.0	0.03	12.5	2.0	0.8	-	-
ML2020	3	45.0	0.12	20.0	2.0	2.2	-	-

*Nominal capacity shown above is based on standard drain and cut off voltage down to 2.0V at 20°C.

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Charging

□ Charging circuits

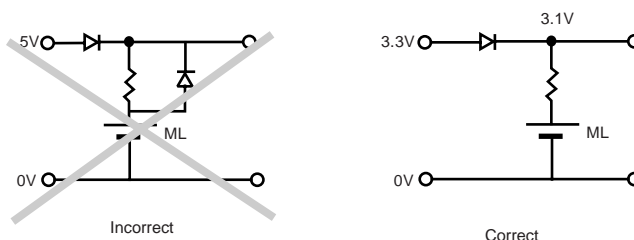
Charging/discharging cycle	Approx. 1,000 times at 10% discharge depth to nominal capacity
Charging system*	Constant-voltage charging. (Please strictly adhere to the specified charge voltage)
Operating temperature	-20°C ~ +60°C

* Consult with Panasonic concerning constant-current charging systems.

The charging circuit is crucial in terms of ensuring that full justice will be done to the battery characteristics. Consider it carefully as the wrong charging circuit can cause problems.

□ Precautions regarding the charge voltage setting

Under no circumstances should trickle charging, which is used for nickel-cadmium batteries, be used. Ignoring this precaution will cause the battery voltage to rise to about 5V, resulting in a deterioration of performance.



□ Charge voltage range

If a fixed-charging method is applied, please adhere to the specified charging voltage.

Guaranteed voltage is 2.8V ~ 3.2V at the temperature of -20°C~60°C.

* If the charging voltage exceeds the specifications, the internal resistance of the battery will rise and may cause battery deterioration. Also, with a charge voltage around 4V, corrosion of the (+)terminal (case) may occur, causing leakage. ("Influence of the charge voltage" in this section.)

* It is not possible for the battery capacity to recover completely when the charging voltage is below the specification.

□ Recommended charging circuits

□ Basic conditions

Fixed-voltage charge

Charge voltage: 2.8~3.2V (Standard voltage: 3.1V)

Charge current: For a battery voltage of 2.5V

ML414 Approx. 0.2 mA or below

ML421 Approx. 0.15 mA or below

ML614 Approx. 0.3 mA or below

ML621 Approx. 0.6 mA or below

ML920 Approx. 1.2 mA or below

ML1220 Approx. 1.2 mA or below

ML2020 Approx. 3.0 mA or below

□ Mixed usage of batteries

Do not use these batteries and lithium primary batteries or other rechargeable batteries together, and do not use new batteries and old batteries together even if they are of the same type.

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Charging

□ Reference: Examples of charging circuits

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ML414		
REG	D	R
3.2V	MA2J728	4.7K Ω
3.1V	MA2J728	3.9K Ω
ML421		
REG	D	R
3.2V	MA2J728	6.2K Ω
3.1V	MA2J728	5.1K Ω
ML614		
REG	D	R
3.2V	MA700	1.8K Ω
3.1V	MA700	1.5K Ω
ML621		
REG	D	R
3.2V	MA700	910 Ω
3.1V	MA700	750 Ω
ML920		
REG	D	R
3.2V	MA2J728	470 Ω
3.1V	MA2J728	390 Ω
ML1220		
REG	D	R
3.2V	MA2J728	470 Ω
3.1V	MA2J728	390 Ω
ML2020		
REG	D	R
3.2V	MA700	180 Ω
3.1V	MA700	150 Ω

②

Standard circuits
 For D2, select a diode of small inverse current
 D1, D2: MA3X716(Diode type code) (I_R=1μA/5V)
 D3: MA3X704, MA2J728

	R1	R2
ML414	5.1k Ω	9.1k Ω
ML421	5.1k Ω	9.1k Ω
ML614	2.7k Ω	5.1k Ω
ML621	1.1k Ω	2.0k Ω
ML2020	180 Ω	330 Ω

③

Simple economical circuits

Load	100μ A below 0-0.2V	
	R1	R2
ML414	9.1k Ω	5.6k Ω
ML421	10k Ω	5.1k Ω
ML614	5.1k Ω	2.7k Ω
ML621	2.4k Ω	1.3k Ω
ML2020	330 Ω	180 Ω

□ Influence of charge voltage on ML batteries

If the charge voltage goes beyond its adequate range, battery performance may deteriorate early. Be sure to observe the recommended charge voltage.

The lower the charging voltage becomes, the less the capacity becomes.

□ □ UL recognition conditions

When a protective component is shorted or opened, the maximum charge current is regulated to the following Value : ML414, ML421, ML614, ML621, ML920, ML1220, ML2020 — 300mA

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