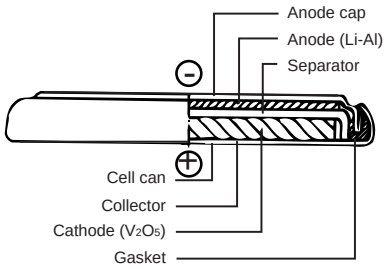
Rechargeable Lithium Coin Batteries

Vanadium Pentoxide Lithium Rechargeable Batteries (VL series)

Features

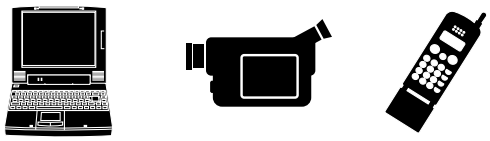
These coin-type lithium batteries feature vanadium oxide for the positive pole, lithium alloy for the negative pole and a non-aqueous solvent for the electrolyte.

Construction



Applications

- Memory backup power supplies for office automation equipment (personal computers, fax machines, etc.), audio-video equipment (VTRs, etc.), communications equipment (mobile phones, etc.), etc.
- Hybrid systems with solar batteries (solar remote controllers, etc.)



General Specifications

Model	Electrical Characteristics (20˚C)			Dimensions (mm)		Weight (g)	JIS	IEC
	Nominal Voltage (V)	*Nominal Capacity (mAh)	Continuous Drain (mA)	Diameter	Height			
VL621	3	1.5	0.01	6.8	2.1	0.3	-	-
VL1216	3	5.0	0.03	12.5	1.6	0.7	-	-
VL1220	3	7.0	0.03	12.5	2.0	0.8	-	-
VL2020	3	20.0	0.07	20.0	2.0	2.2	-	-
VL2320	3	30.0	0.10	23.0	2.0	2.8	-	-
VL2330	3	50.0	0.10	23.0	3.0	3.7	-	-
VL3032	3	100.0	0.20	30.0	3.2	6.3	-	-

* Nominal capacity shown above is based on standard drain and cut off voltage down to 2.5V at 20°C.

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Charging

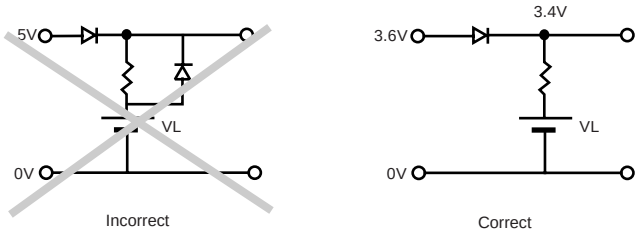
■ Charging circuits

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 trouble.

■ 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.
The guaranteed value over an operating temperature range from -20 to +60°C is 3.4V±0.15V. (Actual value: 3.4V±0.20V)

* 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 charge voltage” page 69.)
* It is not possible for the battery capacity to recover completely when the charging voltage is below the specification.

■ Recommended charging circuits

● Basic conditions
Charge voltage: 3.4V±0.15V
Charge current: For a battery voltage of 3V

VL621	Approx. 0.2 mA or below
VL1216, VL1220	Approx. 0.5 mA or below
VL2020	Approx. 1.5 mA or below
VL2320, VL2330	Approx. 2.0 mA or below
VL3032	Approx. 4.0 mA or below

(It is permissible for the current to increase beyond the above level when the battery voltage drops below 3V.)

■ 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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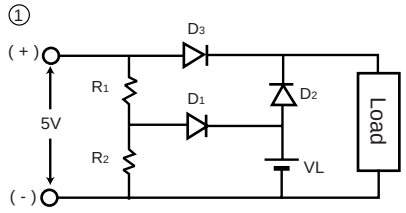
Charging

● Reference: Examples of 5-V charging circuits

①

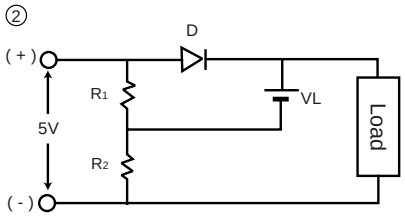


Standard circuits

For D2, select a diode of small inverse current (I_R = 1μA below / 5V)
D_1, D_2: MA716 (Diode type code)
D_3: MA704, MA700

	R_1	R_2
VL621	2.2k Ω	5.6k Ω
VL1220, VL1216	750 Ω	2000 Ω
VL2020	200 Ω	510 Ω
VL2320, VL2330	150 Ω	390 Ω
VL3032	68 Ω	160 Ω

②



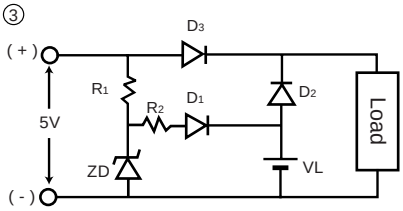
Pat No.JP284170

Simple economical circuits

D : MA700 : Very small inverse current

Load with 5V applied	100μA~10mA		100μA below	
D	0.2V~0.6V		0~0.2V	
	R_1	R_2	R_1	R_2
VL621	8.2k Ω	2.4k Ω	6.8k Ω	2.7k Ω
VL1220, VL1216	2000 Ω	510 Ω	1500 Ω	560 Ω
VL2020	1300 Ω	330 Ω	470 Ω	180 Ω
VL2320, VL2330	1100 Ω	270 Ω	390 Ω	150 Ω
VL3032	510 Ω	120 Ω	180 Ω	68 Ω

③

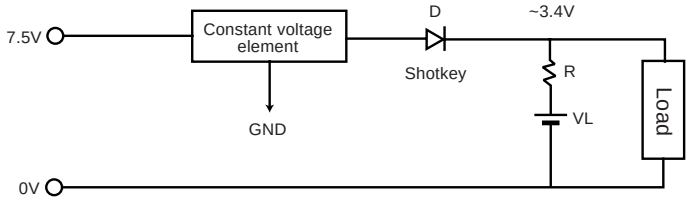


	ZD	D_1	R_1	
	MA3036L	MA704	300 Ω	Common to all types
	MA3036H	MA700	270 Ω	

Type		VL3032	VL2330	VL2320	VL2020	VL1220	VL1216	VL621
R_2	A	Not required				470 Ω		1.5k Ω
	B	Not required				560 Ω		1.6k Ω

For D2, select a diode of small inverse current (I_R=1μA below / 5V)

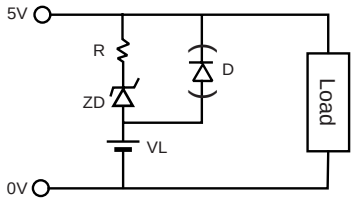
④ For minimizing current leakage due to resistance, etc., as when charging by another battery.



REG	D
3.7V	MA700

For details, refer to the constant voltage element specifications

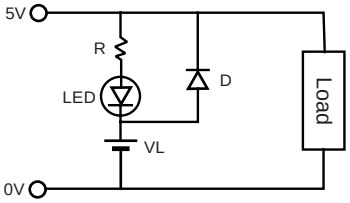
⑤ Zener control



ZD : HZ2ALL
R : 43Ω/VL2320
68Ω/VL2020
D : MA700 or MA704

Patent pending

⑥ LED control

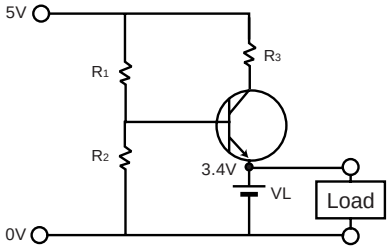


LED
R=51Ω for VL2320
] D : MA700 or MA704

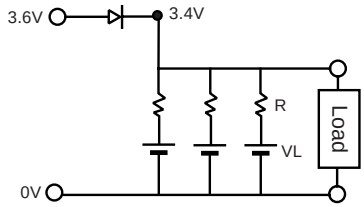
Select a diode having an inverse current as small as possible. (I_R = 1μA below / 5V)

⑦ Transistor contro (for VL2320)

R_1: 4.3kΩ R_2: 15.0kΩ R_3: 680Ω



⑧ Parallel circuit



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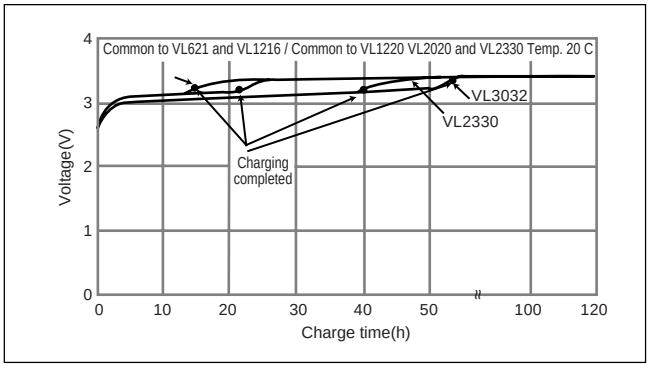
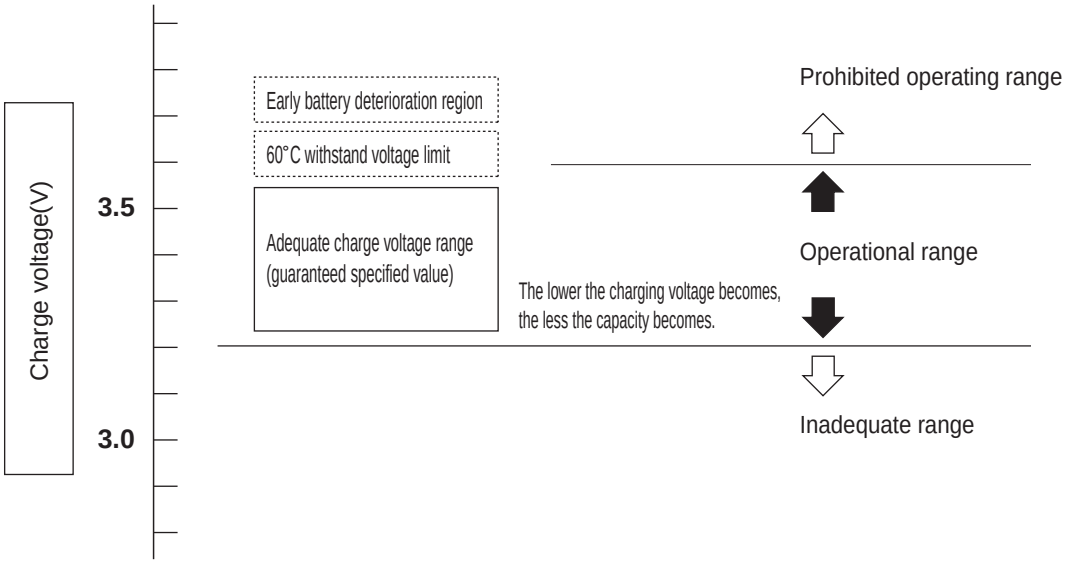
Charging

● Charging characteristics



● Influence of charge voltage on VL batteries

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



○ UL recognition conditions

When a protective component is shorted or opened, the maximum charge current is regulated to the following

Value : 300mA

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