

ENERGY SOLUTIONS

A Comprehensive Guide to Primary and Rechargeable Batteries



LITHIUM PRIMARY | LITHIUM ION | NICKEL METAL HYDRIDE

LITHIUM RECHARGEABLE | VRLA | ALKALINE

POWERED BY PANASONIC

ABOUT PANASONIC

Bringing strategic innovation and industrial technology expertise to our customers.

Many products sold by Fortune 500 companies are powered by Panasonic technology. We are proud to provide manufacturers with the performance, quality, and reliability that are synonymous with the Panasonic brand.

Panasonic began its existence by developing component and material technologies that still serve as the building blocks for the wide range of advanced products for which our company is best known today.

Panasonic is a leading supplier of batteries, offering advanced cell manufacturing and product technologies, superior quality, and one of the broadest lines of primary and rechargeable batteries in the industry.

Our batteries meet multiple market needs and are ideal for a variety of consumer, commercial and industrial portable power applications.

WHY CHOOSE PANASONIC BATTERIES?

- The largest and most extensive battery line in the industry
- Advanced cell manufacturing
- Superior quality
- Value added engineering support
- Our batteries meet multiple market needs and applications



Corporate Headquarters in Newark, New Jersey.

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Lithium Ion Batteries

High Energy Density, Safe Operation and Long-Life

Lithium Ion (Li-Ion) is a high energy density battery that is widely used in portable equipment. Lithium Ion uses lithium metallic oxide in its positive electrode (cathode) and carbon graphite material in its negative electrode (anode).

All Panasonic Lithium Ion batteries are covered by the Rechargeable Battery Recycling Corporation's (RBRC) recycling program.



FEATURES

- High energy density
- Higher voltage
- Light weight
- High power

APPLICATIONS

- Power tools
- Portable devices
- Medical equipment
- Automotive
- Energy storage



CYLINDRICAL TYPE						
Model Number	Nominal Voltage (v)	Typical Capacity (mAh)	Minimum Capacity (mAh)	Dimensions		Weight (g)
				Diameter (mm)	Height(mm)	
HIGH CAPACITY						
NCR18500A	3.60V	2040 mAh	1940 mAh	18.15 mm	49.36 mm	33.50g
NCR18650	3.60V	2900 mAh	2750 mAh	18.15 mm	65.10 mm	45.00g
NCR18650B	3.60V	3350 mAh	3250 mAh	18.5 mm	65.30 mm	48.50g
STANDARD						
UR14430P	3.70V	700 mAh	660 mAh	13.90 mm	42.90 mm	17.50g
UR14500Y*	3.70V	710 mAh	680 mAh	13.90 mm	49.20 mm	19.40g
UR14500P	3.70V	840 mAh	800 mAh	13.90 mm	49.20 mm	20.00g
UR14650P	3.70V	980 mAh	940 mAh	13.90 mm	64.70 mm	26.00g
UR18500Y*	3.70V	1400 mAh	1300 mAh	18.10 mm	49.30 mm	31.90g
UR18500F*	3.70V	1700 mAh	1620 mAh	18.10 mm	49.30 mm	33.50g
UR18650U*	3.60V	1200 mAh	1100 mAh	18.10 mm	64.80 mm	41.50g
UR18650A	3.60V	2250 mAh	2150 mAh	18.10 mm	64.80 mm	43.00g
UR18650Y*	3.70V	2000 mAh	1900 mAh	18.10 mm	64.80 mm	43.30g
UR18650ZY	3.70V	2600 mAh	2500 mAh	18.24 mm	64.80 mm	47.00g
COLD TEMP						
NCR18650F	3.60V	2900 mAh	2750 mAh	18.15 mm	65.10 mm	45.00g
NCR18650BF	3.60V	3350 mAh	3250 mAh	18.24 mm	65.10 mm	46.50g
NCR18650BJ	3.60V	3350 mAh	3250 mAh	18.25 mm	65.10 mm	47.50g
HIGH RATE						
UR14650R (10A)	3.60V	1050 mAh	1000 mAh	13.90 mm	64.80 mm	26.60g
UR18650SA (18A)*	3.70V	1300 mAh	1250 mAh	18.10 mm	64.80 mm	44.20g
UR18650RX (20A)*	3.60V	2050 mAh	1950 mAh	18.24 mm	65.10 mm	46.50g
UR18650E*	3.60V	2150 mAh	2050 mAh	18.10 mm	64.80 mm	44.50g
NCR18650E*	3.60V	2250 mAh	2150 mAh	18.15 mm	65.10 mm	44.50g
UR18650AA*	3.60V	2250 mAh	2150 mAh	18.10 mm	64.80 mm	42.10g
UR18650EA	3.60V	2350 mAh	2250 mAh	18.24 mm	65.10 mm	46.00g
UR18650NSX (20A)	3.60V	2600 mAh	2500 mAh	18.25 mm	65.07 mm	46.40g
NCR18650PF	3.60V	2900 mAh	2750 mAh	18.15 mm	65.10 mm	47.00g
NCR18650BD	3.60V	3180 Mah	3030 mAh	18.5 mm	65.30 mm	48.5g
NCR18650GA	3.60V	3450 mAh	3350 mAh	18.25 mm	65.10 mm	47.50g
HIGH VOLTAGE						
UR16650ZT*	3.70V	2200 mAh	2100 mAh	16.39 mm	64.90 mm	40.00g
UR16650ZTA	3.70V	2500 mAh	2380 mAh	16.39 mm	64.90 mm	39.60g
UR18650ZT*	3.70V	2800 mAh	2700 mAh	18.24 mm	65.10 mm	48.00g
UR18650ZTA	3.70V	3000 mAh	2900 mAh	18.24 mm	65.10 mm	48.00g

*Please contact Panasonic for availability

Lithium Ion Batteries

PRISMATIC TYPE						
Model Number	Nominal Voltage (v)	Typical Capacity (mAh)	Dimensions			Weight (g)
			Thickness (mm)	Width (mm)	Length (mm)	
UF103450P*	3.7V	2000 mAh	10.50 mm	33.80 mm	48.80 mm	38.50g
NCA103450*	3.6V	2350 mAh	10.50 mm	33.80 mm	48.50 mm	38.30g
UF424866ST*	3.8V	1880 mAh	4.20 mm	47.90 mm	66.00 mm	31.00g
UF424873ST*	3.8V	2080 mAh	4.20 mm	47.90 mm	73.00 mm	35.10g
NCA463436A*	3.6V	720 mAh	4.60 mm	34.30 mm	35.50 mm	12.40g
UF495780SZ*	3.85V	3315 mAh	4.90 mm	56.90 mm	80.00 mm	52.30g
NCA496080SA*	3.6V	3490 mAh	4.95 mm	60.00 mm	80.00 mm	57.00g
UF515161SX*	3.8V	2160 mAh	5.05 mm	50.40 mm	60.60 mm	37.50g
UF515761ST*	3.8V	2720 mAh	5.10 mm	56.95 mm	60.50 mm	42.00g
UF544383SZ*	3.85V	2910 mAh	5.40 mm	42.25 mm	82.30 mm	44.00g
UF544759SX*	3.8V	2140 mAh	5.35 mm	46.90 mm	59.00 mm	35.60g
UF553450Z*	3.7V	1200 mAh	5.55 mm	33.85 mm	49.80 mm	22.30g
UF555172ST*	3.8V	3030 mAh	5.45 mm	50.90 mm	71.50 mm	47.30g
UF564296SZ*	3.85V	3350 mAh	5.50 mm	41.33 mm	95.80 mm	52.10g
UF593965ST*	3.8V	2080 mAh	5.85 mm	38.40 mm	65.00 mm	34.60g
UF653450S*	3.7V	1300 mAh	6.35 mm	33.85 mm	49.80 mm	25.10g
UF653864S*	3.7V	2100 mAh	6.50 mm	38.00 mm	64.40 mm	38.50g
UF663436SU*	3.7V	980 mAh	6.50 mm	33.80 mm	35.60 mm	18.20g
UF673438F*	3.7V	1100 mAh	6.70 mm	33.50 mm	38.00 mm	20.80g
UF703141FU*	3.7V	1090 mAh	7.05 mm	30.50 mm	40.70 mm	20.90g
NCA752836A*	3.6V	1010 mAh	7.80 mm	27.90 mm	35.70 mm	16.70g
NCA793540*	3.6V	1570 mAh	7.95 mm	35.10 mm	*40.5 mm	24.70g
NCA843436*	3.6V	1300 mAh	8.70 mm	33.90 mm	35.70 mm	23.00g

Thickness at time of shipment.

*Please contact Panasonic for availability.

POUCH						
Model Number	Nominal Voltage (v)	Typical Capacity (mAh)	Dimensions			Weight (g)
			Thickness (mm)	Width (mm)	Length (mm)	
UPF3259132TA*	3.75V	3350 mAh	3.15 mm	58.10 mm	132.00 mm	52.00g
UPF359191TA*	3.75V	3910 mAh	3.50 mm	91.00 mm	90.70 mm	65.30g
UPF394386TA*	3.75V	2030 mAh	3.79 mm	42.85 mm	85.40 mm	31.40g
UPF485569TA*	3.75V	2610 mAh	4.71 mm	68.50 mm	54.85 mm	39.10g
UPF516067TA*	3.75V	3090 mAh	5.08 mm	59.90 mm	66.80 mm	45.50g
UPF575677TA*	3.75V	3520 mAh	5.70 mm	55.65 mm	76.60 mm	53.90g
UPF575677Z*	3.80V	4040 mAh	5.67 mm	55.95 mm	76.60 mm	55.90g
UPF595490TA*	3.75V	4530 mAh	5.90 mm	54.00 mm	90.00 mm	66.10g

*Please contact Panasonic for availability.

Nickel Metal Hydride Batteries



GENERAL DESCRIPTION

Panasonic rechargeable NiMH batteries are designed to meet the requirement for increasingly higher levels of energy demanded by today's electronic products. Our Nickel Metal Hydride batteries offer up to three times the capacity of same size standard Nickel Cadmium batteries. Due to their increased capacity and energy density features, users can expect a longer run time between charges.

FEATURES

- High energy density
- Rapid charge
- Excellent cycle life
- Excellent discharge characteristics
- Reliability at high ambient temperatures and under demanding conditions

Applications where high-energy and small size are critical

APPLICATIONS

- Cameras
- Cellular mobile telecom products
- Notebook PC's
- Personal digital assistants (PDA)
- Portable VCRs, TVs, portable stereos and CD players
- Cordless vacuum cleaners
- Power tools
- R/C hobby



CYLINDRICAL TYPE

New Model Number	Old Model Number	Size	Nominal Voltage (V)	Discharge Capacity (Rated/Min) (mAh)	Discharge Capacity (Average) (mAh)	Diameter (with tube) (mm)	Height (with Tube) (mm)	Approx.Weight (g)
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HIGH TEMPERATURE & LONG LIFE TYPE

BK160AH	N/A	A	1.2 V	1,600 mAh	1,720 mAh	17.0+0/-0.7	43.0+0/-1.5	29 g
BK210AH	HHR210AH	A	1.2 V	1,900 mAh	2,050 mAh	17.0+0/-0.7	50.0+0/-2.0	36 g
BK370AH	HHR370AH	A	1.2 V	3,500 mAh	3,700 mAh	18.2+0/-0.7	67.5+0/-1.5	60 g
BK60AAAH	HHR60AAAH	AAA	1.2 V	500 mAh	550 mAh	10.5+0/-0.7	44.5+0/-1.5	13 g
BK70AAH	HHR70AAH	AA	1.2 V	700 mAh	750 mAh	14.5+0/-0.7	49.0+0/-1.5	18 g

HIGH RATE DISCHARGE & HIGH TEMPERATURE TYPE

BK250SCH	HHR250SCH	SC	1.2 V	2,500 mAh	2,650 mAh	23.0+0/-1.0	43.0+0/-1.5	55 g
BK310CH	N/A	C	1.2 V	3,100 mAh	3,300 mAh	25.8+0/-1.0	50.0+0/-2.0	80 g
BK330APH	HHR330APH	A	1.2 V	3,200 mAh	3,300 mAh	18.2+0/-0.7	67.5+0/-1.5	60 g

BUTTON TYPE TOP

BK110AAB	HHR110AAB	AA	1.2 V	1,000 mAh	1,050 mAh	14.5+0/-0.7	50.5+0/-1.0	20 g
BK200AAB	N/A	AA	1.2 V	1,900 mAh	2,000 mAh	14.5+0/-0.7	50.5+0/-1.0	29 g
BK65AAB	N/A	AAA	1.2 V	650 mAh	700 mAh	10.5+0/-0.7	44.5+0/-1.0	12 g
BK80AAB	HHR80AAB	AAA	1.2 V	750 mAh	780 mAh	10.5+0/-0.7	44.5+0/-1.0	13 g

STANDARD TYPE

BK110AAO	HHR110AAO	AA	1.2 V	1,100 mAh	1,180 mAh	14.5+0/-0.7	50.5+0/-1.5	26 g
BK120AA	HHR120AA	AA	1.2 V	1,150 mAh	1,220 mAh	14.5+0/-0.7	43.0+0/-1.5	23 g
BK150AA	HHR150AA	AA	1.2 V	1,500 mAh	1,580 mAh	14.5+0/-0.7	50.5+0/-1.5	26 g
BK200A	HHR200A	A	1.2 V	2,000 mAh	2,040 mAh	17.0+0/-0.7	43.0+0/-1.5	32 g
BK210A	HHR210A	A	1.2 V	2,100 mAh	2,200 mAh	17.0+0/-0.7	50.0+0/-2.0	38 g
BK380A	HHR380A	A	1.2 V	3,700 mAh	3,800 mAh	17.0+0/-0.7	67.0+0/-2.0	53 g
BK450A	HHR450A	A	1.2 V	4,200 mAh	4,500 mAh	18.2+0/-0.7	67.5+0/-1.5	60 g
BK65AAAK	N/A	AAA	1.2 V	650 mAh	700 mAh	10.5+0/-0.7	44.5+0/-1.5	12 g
BK70AA	HHR70AA	AA	1.2 V	700 mAh	780 mAh	14.5+0/-0.7	49.0+0/-1.5	18 g
BK70AAAJ	HHR70AAAJ	AAA	1.2 V	700 mAh	730 mAh	10.5+0/-0.7	44.5+0/-1.5	12 g
BK90AAA	HHR90AAA	AAA	1.2 V	830 mAh	880 mAh	10.5+0/-0.7	50.5+0/-1.5	14 g

HIGH RATE DISCHARGE & RAPID CHARGE TYPE

BK200SCP	HHR200SCP	SC	1.2 V	1,900 mAh	2,100 mAh	23.0+0/-1.0	34.0+0/-1.5	42 g
BK260SCP	HHR260SCP	SC	1.2 V	2,450 mAh	2,700 mAh	23.0+0/-1.0	43.0+0/-1.5	55 g
BK300SCP	HHR300SCP	SC	1.2 V	2,800 mAh	3,050 mAh	23.0+0/-1.0	43.0+0/-1.5	57 g

LOW TEMPERATURE DISCHARGE TYPE

BK-10V1S	N/A	N/A	12	90000	95000	N/A	N/A	23000
BK-10V10T	N/A	V	1.2	90000	95000	62.6+0/-1.0	188.5+1.0/-1.0	1700

1. H Type: Improved low rate charge characteristics at higher temperatures. Ideal for back-up applications (with appropriate charge control circuitry).

2. Mainly for low drain, extended run time applications.

3. Mainly for high drain applications such as power tools.

4. For reference only.

5. After charging at 0.1It for 16 hours, discharging at 0.2It

Note: /B=extended positive terminal (button top).

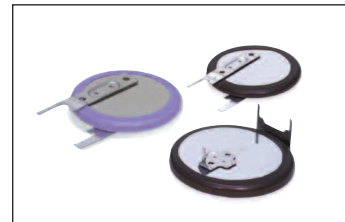
Lithium Rechargeable Coin Batteries

GENERAL DESCRIPTION

Panasonic Vanadium Pentoxide (VL Type) rechargeable lithium batteries are compact, high energy secondary batteries that have nearly twice the energy of conventional button-shaped Ni-Cd batteries.

FEATURES

- One high-voltage battery can serve your backup needs
- Can provide the voltage equivalent of two or three 1.2V Ni-Cd's or two capacitors
- Months of continuous use as a backup
- Self discharge rate less than 2% a year
- Superior reliability; withstands overcharging and discharging



VANADIUM RECHARGEABLE LITHIUM BATTERIES (VL COIN CELLS)

Model Number	Electrical Characteristics 20°C (68°F)		Recommended Drain	Dimensions (Max.)		
	Nominal Voltage (V)	*Nominal Capacity (mAh)		Diameter inch (mm)	Height inch (mm)	Weight oz. (g)
VL621	3.0	1.5	0.01	0.27(6.8)	0.08(2.1)	0.01(0.3)
VL1220	3.0	7.0	0.03	0.49(12.5)	0.08(2.0)	0.03(0.8)
VL2020	3.0	20.0	0.07	0.79(20.0)	0.08(2.0)	0.07(2.2)
VL2320	3.0	30.0	0.10	0.91(23.0)	0.08(2.0)	0.09(2.7)
VL2330	3.0	50.0	0.10	0.91(23.0)	0.12(3.0)	0.12(3.5)
VL3032	3.0	100.0	0.20	1.18(30.0)	0.13(3.2)	0.22(6.2)

* Nominal capacity is based on a standard drain and cut off voltage down to 2.5V at 20°C (68°F).

APPLICATIONS

- Memory cards
- Personal computers
- Sequencers
- Telephones
- Tuners
- Video cameras
- VTRs
- Memory back-up in facsimiles

GENERAL DESCRIPTION

These super compact lithium secondary batteries feature a new configuration in which a manganese compound oxide is used for the positive electrode, and a lithium/aluminum alloy for the electrode.

FEATURES

- Charge at voltage levels even under 3V
- Large capacity for hour-after-hour back-up
- Excellent withstand voltage, overcharge and overdischarge withstanding characteristics

MANGANESE RECHARGEABLE LITHIUM BATTERIES (ML COIN CELLS)

Model Number	Electrical Characteristics 20°C (68°F)		Recommended Drain	Dimensions (Max.)		
	Nominal Voltage (V)	*Nominal Capacity (mAh)		Diameter inch (mm)	Height inch (mm)	Weight oz. (g)
ML421	3.0	2.3	0.005	0.19(4.8)	0.08(2.1)	0.004(0.11)
ML614 ¹	3.0	3.4	0.01	0.27(6.8)	0.06(1.4)	0.006(0.16)
ML621 ¹	3.0	5.0	0.01	0.27(6.8)	0.08(2.1)	0.008(0.23)
ML920	3.0	11.0	0.03	0.37(9.5)	0.08(2.0)	0.014(0.40)
ML1220	3.0	17.0	0.03	0.49(12.5)	0.08(2.0)	0.03(0.80)
ML2020	3.0	45.0	0.12	0.79(20.0)	0.08(2.0)	0.078(2.2)

* Nominal capacity shown is based on standard drain and cut off voltage down to 2.0V at 20°C (68°F)

¹Available as a bare cell.

APPLICATIONS

- Mobile telephones
- Memory cards
- Pagers
- Other small-size communications devices

Lithium Rechargeable Coin Batteries

COIN CELL TAB CONFIGURATIONS

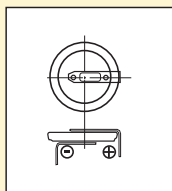
Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
VL TYPE			
VL621		/DN	F
VL1220	/HFN		H
VL1220	/VCN		V
VL1220	/FCN		F
VL2020	/VCN		V
VL2020	/HFN		H
VL2320	/VCN		V
VL2320	/HFN		H
VL2320	/F2N		F
VL2330	/1VC		V
VL2330	/VCN		H
VL2330	/F3N		F
VL3032	/GUFN		G
VL3032	/F2N		F

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
ML TYPE			
ML414 ¹		ML-414S/DN	F
ML421	Contact Panasonic for details on available tab configurations.		
ML614 ¹		ML-614S/FN	F
ML621 ¹		ML-621S/DN	F
ML920		ML-920S/DN	F
ML1220	F1AN		F
ML1220	V1AN		V
ML2020	G1AN		G
ML2020	H1CN		H
ML2020	V1AN		V

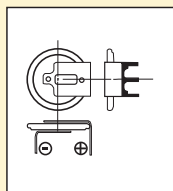
¹Also available as a bare cell.
Please refer to the Panasonic website for exact tab dimensions.

Minimum order requirements may apply.
Please refer to the Panasonic website for exact tab dimensions.

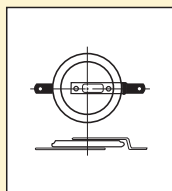
TYPICAL TAB CONFIGURATIONS



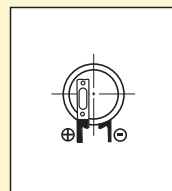
H Type



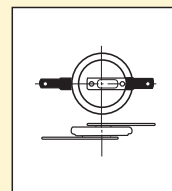
G Type



F Type



V Type



T Type

Lithium Primary Coin Batteries

GENERAL DESCRIPTION

Panasonic coin type lithium batteries are high energy, high reliability batteries for a variety of applications. The full 3 volts in these high energy batteries is about twice that of conventional dry batteries. Panasonic coin type lithium batteries are available in two types: poly-carbonmonofluoride lithium batteries (BR Series) for users requiring extended reliability and safety, and manganese dioxide lithium batteries (CR Series) for users requiring high voltage and strong load pulse characteristics.

FEATURES

- High voltage of 3 volts — twice that of conventional batteries
- Extremely small self-discharge for long service and shelf life
- Compact and lightweight, with extremely high energy density per unit weight
- Extremely safe (poly-carbon monofluoride lithium batteries)
- Extremely strong load pulse characteristics (manganese dioxide lithium)

APPLICATIONS

- Calculators
- Cameras
- Compact, low power consuming cordless appliances
- Electronic watches (digital and analog)
- Memory backup in all type of devices (with tab terminals)

Operating Temperature CR Type: -30°C ~ 60°C
Operating Temperature BR Type: -30°C ~ 80°C

COIN TYPE



POLY-CARBONMONOFLUORIDE LITHIUM BATTERY (BR COIN CELLS)

Model Number	Electrical Characteristics [20°C]				Recommended Drain Continuous (mA)	Dimensions (Max.)		
	JIS	IEC	Nominal Voltage (V)	Nominal Capacity (mAh)		Diameter inch (mm)	Height inch (mm)	Weight oz. (g)
BR1220	—	—	3	35	0.03	0.49 (12.5)	0.08 (2.00)	0.02 (0.7)
BR1225	—	BR1225	3	48	0.03	0.49 (12.5)	0.10 (2.50)	0.03 (0.8)
BR1632	—	—	3	120	0.03	0.63 (16.0)	0.13 (3.20)	0.05 (1.5)
BR2032	—	—	3	190	0.03	0.79 (20.0)	0.13 (3.20)	0.09 (2.5)
BR2325	—	BR2325	3	165	0.03	0.91 (23.0)	0.10 (2.50)	0.11 (3.2)
BR2330	—	—	3	255	0.03	0.91 (23.0)	0.12 (3.00)	0.11 (3.2)
BR3032	—	BR3032	3	500	0.03	1.18 (30.0)	0.13 (3.20)	0.19 (5.5)

*Nominal capacity shown is based on standard drain

BR COIN CELL TAB CONFIGURATIONS

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
BR1220	/HFN		H
BR1220	/VCN		V
BR1225	/HCN	/HBN	H
BR1225	/VCN		V
BR1632	/HFN		H
BR2032		/HGN	G
BR2032	/GUFN	/GUN	G
BR2032	/HFN	/HEN	H
BR2032		/VBN	V
BR2032	/GVFN	/GVN	V
BR2032	/F2N		F

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
BR2325	/HCN	/HBN	H
BR2325	/VCN		V
BR2325		/HGN	H
BR2325	/2HCN		H
BR2325		/VGN	V
BR2330	/HFN	/HEN	G
BR2330	/GUFN	/GUN	G
BR2330	/VCN	/VBN	V
BR2330	/GVFN	/GVN	V
BR2330	/F3N		F
BR3032	/VCN		V
BR3032	/F2N		F

Lithium Primary Coin Batteries

MANGANESE DIOXIDE LITHIUM BATTERIES (CR COIN)

Model Number	Electrical Characteristics (20°C)				Recommended Drain Continuous (mA)	Dimensions (Max.)		
	JIS	IEC	Nominal Voltage (V)	Nominal Capacity (mAh)		Diameter inch (mm)	Height inch (mm)	Weight oz (g)
CR1025	CR1025	CR1025	3	30	0.10	0.39 (10.0)	0.10 (2.5)	0.02 (0.7)
CR1216	CR1216	CR1216	3	25	0.10	0.49 (12.5)	0.06 (1.6)	0.02 (0.7)
CR1220	CR1220	CR1220	3	35	0.10	0.49 (12.5)	0.08 (2.0)	0.04 (1.2)
CR1612	—	—	3	40	0.10	0.63 (16.0)	0.05 (1.2)	0.03 (0.8)
CR1616	CR1616	CR1616	3	55	0.10	0.63 (16.0)	0.06 (1.6)	0.04 (1.2)
CR1620	CR1620	CR1620	3	75	0.10	0.63 (16.0)	0.08 (2.0)	0.05 (1.3)
CR1632	—	—	3	140	0.10	0.63 (16.0)	0.13 (3.2)	0.06 (1.8)
CR2012	CR2012	—	3	55	0.10	0.79 (20.0)	0.05 (1.2)	0.05 (1.4)
CR2016	CR2016	CR2016	3	90	0.10	0.79 (20.0)	0.06 (1.6)	0.06 (1.6)
CR2025	CR2025	CR2025	3	165	0.20	0.79 (20.0)	0.10 (2.5)	0.08 (2.3)
CR2032	CR2032	CR2032	3	225	0.20	0.79 (20.0)	0.13 (3.2)	0.10 (2.9)
CR2330	CR2330	CR2330	3	265	0.20	0.91 (23.0)	0.12 (3.0)	0.13 (3.8)
CR2354	CR2354	CR2354	3	560	0.20	0.91 (23.0)	0.21 (5.4)	0.20 (5.8)
CR2412	—	—	3	100	0.20	0.96 (24.5)	0.05 (1.2)	0.07 (2.0)
CR2477	—	—	3	1000	0.20	0.96 (24.5)	0.30 (7.7)	0.37 (10.5)
CR3032	CR3032	CR3032	3	500	0.20	1.18 (30.0)	0.13 (3.2)	0.24 (6.8)

*Nominal capacity shown is based on standard drain

CR COIN CELL TAB CONFIGURATIONS

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
CR1220	/HFN		H
CR1220	/VCN		V
CR1616		/F2N	F
CR1632	/HFN		H
CR2016	/F2N		F
CR2032		/HU3N	H
CR2032		/HGN	G
CR2032	/HSN		H
CR2032	/GUFN	/GUN	G
CR2032	/HFN	/HEN	H
CR2032		/VBN	V
CR2032	/GVFN	/GVN	V
CR2032	/F4N		F
CR2032	/F2N		F

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
CR2330	/GUFN	/GUN	G
CR2330	/HFN		H
CR2330	/GVFN	/GVN	V
CR2330	/F3N		F
CR2354	/HFN	/HEN	H
CR2354	/GUFN	/GUN	G
CR2354	/VCN		V
CR2450	/H1AN		H
CR2450		/G1AN	G
CR2477	/VCN		V
CR2477	/HFN		H
CR3032	/VCN		V
CR3032	/F2N		F

GENERAL DESCRIPTION

High power, high reliability for a variety of applications.

APPLICATIONS

- Automotive TPMS
- RKE

HIGH TEMPERATURE COIN CELLS

Model Number	Electrical Characteristics			Operating Temp. Range (°C)	Dimensions		Approximate Weight (g)
	Nominal Voltage (V)	Nominal Capacity (mAh)	Standard Continuous Drain (mA)		Diameter (mm)	Height (mm)	
CR-2450A	3.0	560	0.2	-40 to +105	24.5	5.0	6.3

Lithium Primary Coin Batteries

HIGH OPERATING TEMPERATURE POLY-CARBONMONOFLUORIDE LITHIUM BATTERIES (BR“A” SERIES)

GENERAL DESCRIPTION

Panasonic's coin type high temperature batteries are high energy, high reliability batteries for applications that require a wider operating temperature range. The full 3 volts in these high energy batteries is about twice that of conventional dry batteries.

FEATURES

- Wide operational temperature range
- Good storage stability
- Constant operating voltage
- Available with Tab terminals for PCB mounting

APPLICATIONS

- Automotive electronic systems
- Tollway transponders
- RFID



HIGH TEMPERATURE BR COIN CELL

Model Number	Nominal Voltage (V)	Nominal Capacity (mAh)	Dimensions (max)		Weight oz (g)	Temp. Range °C
			Diameter inch (mm)	Height inch (mm)		
BR1225A	3	48	0.49 (12.5)	0.10 (2.5)	0.03 (0.8)	-40° C~125° C
BR1632A	3	120	0.63 (16.0)	0.13 (3.2)	0.05 (1.5)	-40° C~125° C
BR2330A	3	255	0.91 (23.0)	0.12 (3.0)	0.11 (3.2)	-40° C~125° C
BR2450A ¹	3	550	0.96 (24.5)	0.20 (5.0)	0.21 (5.0)	-40° C~125° C
BR2477A	3	1000	0.96 (24.5)	0.30 (7.7)	0.28 (8.0)	-40° C~125° C

HIGH TEMPERATURE BR COIN CELL TAB CONFIGURATIONS

See page 5 for diagrams

Model Number	Tab Type		Configuration Type
	With Insulation Wrap	Without Insulation Wrap	
BR1225A	/FAN		F
BR1225A	/HBN	/HAN	H
BR1632A	/FAN		F
BR1632A		/GAN	G
BR1632A	/HAN	/HBN	H
BR1632A	/VAN		V
BR2330A	/FAN		F
BR2330A		/GAN	G
BR2330A	/HDN		H
BR2330A	/VAN		V
BR2450A ¹	/FAN		F
BR2450A ¹	/GAN		G
BR2477A	/FBN		F
BR2477A	/GAN		G
BR2477A	/HBN	/HCN	H
BR2477A	/VAN		V

Please refer to the Panasonic website for exact tab dimensions.

Lithium Primary Cylindrical Batteries

(CF)N/Li POLY-CARBON MONOFLUORIDE



GENERAL DESCRIPTION

Panasonic cylindrical lithium batteries are known for their high voltage, energy density, durability, and stable operation.

FEATURES

- High energy density
- Long shelf life
- Stable operation
- High rate discharge
- Strong leakage resistance
- Excellent durability

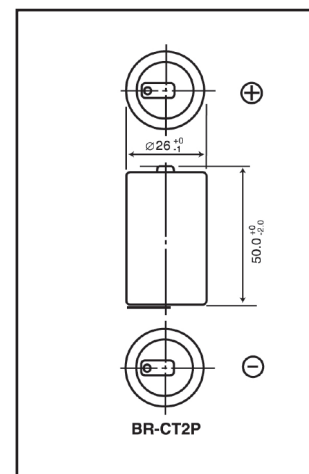
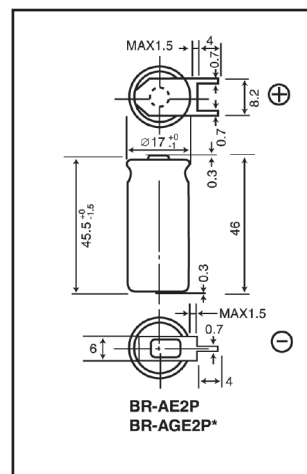
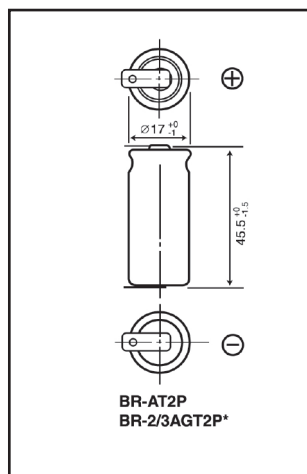
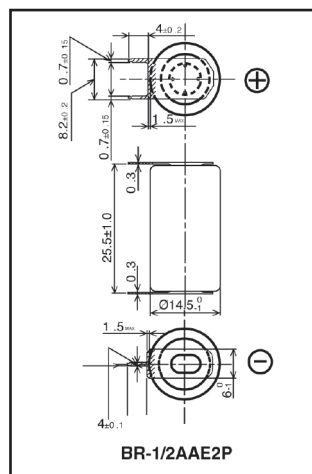
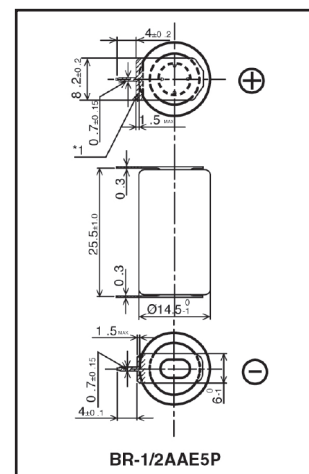
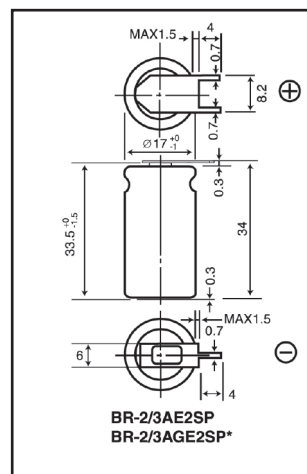
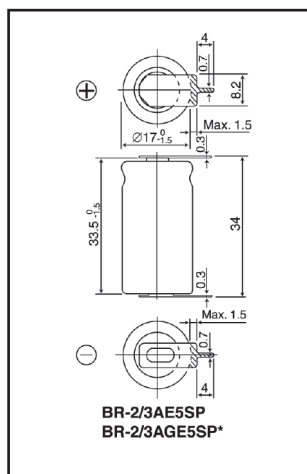
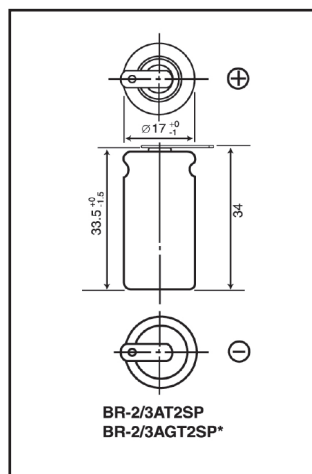
APPLICATIONS

- Cameras
- Memory back-up
- Utility meters
- Emergency signal light
- Electric locks
- Electronic measurement equipment

POLY-CARBONMONOFLUORIDE LITHIUM BATTERIES (BR SERIES) BR CYLINDRICAL CELLS

Model Number	Electrical Characteristics			Dimensions		Approximate Weight oz. (g)	Operating Temperature (°C)
	Nominal Voltage (V)	**Nominal Capacity (mAh)	Standard Drain (mA)	Diameter inch (mm)	Height inch (mm)		
BR-C	3	5,000	5.0	1.02 [26.0]	1.99 [50.5]	1.48 [42.0]	- 40 to +85
BR-A	3	1,800	2.5	0.67 [17.0]	1.79 [45.5]	0.63 [18.0]	- 40 to +85
BR-AG*	3	2,200	2.5	0.67 [17.0]	1.79 [45.5]	0.63 [18.0]	- 40 to +85
BR-2/3A	3	1,200	2.5	0.67 [17.0]	1.32 [33.5]	0.48 [13.5]	- 40 to +85
BR-2/3AG*	3	1,450	2.5	0.67 [17.0]	1.32 [33.5]	0.48 [13.5]	- 40 to +85
BR-1/2AA	3	1,000	2.5	0.57 [14.5]	1.00 [25.5]	0.28 [8.0]	- 40 to +100

Note: * G Versions are higher capacity. ** Nominal capacity is based on standard drain & cutoff voltage down to 2.0V at 20 degrees C..



Lithium Primary Cylindrical Batteries



GENERAL DESCRIPTION

Developed by Panasonic, packaged user replaceable lithium batteries offer high voltage and high energy density. Ideal for designs requiring batteries with retail availability to allow for convenient end user replacement.

FEATURES

- High safety and reliability
- High current pulse discharge capability
- Rapid discharge for strobes is possible at 6V
- Superior shelf life/minimal self-discharge
- Operating temperature (-40°C~70°C)
- High energy density

APPLICATIONS

- Cameras
- Memory back-up over a wide range of applications
- Flashlights
- Medical Apps.
- Remote Monitoring Systems
- Other applications where ease of replacement is required

USER REPLACEABLE MANGANESE DIOXIDE LITHIUM BATTERIES (CR CYLINDRICAL CELLS)

Model Number	Voltage [V]	Nominal Capacity [mAh]	Dimensions inch (mm)	Weight oz. (g)
CR123A	3	1,550*	0.67 x 1.36 (17.0 x 34.5)	0.60 (17)
CR2	3	850*	0.61 x 1.56 (15.6 x 27.0)	0.39 (11)
2CR5	6	1,400**	0.67 x 1.34 x 1.79 (17 x 34 x 45)	1.34 (38)
CR-P2	6	1,400**	0.77 x 1.38 x 1.42 (19.5 x 35 x 36)	1.31 (37)
CR-V3P	3	3,300*	1.03 x 0.51 x 1.84 (29 x 14.5 x 52)	1.38 (39)

* Based on standard drain and cut off voltage down to 2.0 V at 20°C

** Based on standard drain and cut off voltage down to 4.0 V at 20°C



GENERAL DESCRIPTION

The industrial Appliance CR Series featuring superior high-rate and extended-use performance. Internal resistance remains low during long term discharge such as memory-back-up. "Wake-up-pulse discharge" not required for high current pulse discharge.

FEATURES

- Superior long term reliability
- High current pulse discharge capability
- Operating temperature (-40 -70)
- High safety and energy density

APPLICATIONS

- Meter, AMR (Automatic Meter Reading)
- Fire alarm (smoke detector)
- Home security device
- ETC (Electric Toll Collection)

LITHIUM PRIMARY CYLINDRICAL

Model Number	Voltage [V]	Nominal Capacity [mAh]	Dimensions inch (mm)	Weight oz. (g)
CR-2/3AZ	3	1,600	0.67 x 1.32 (17.0 x 33.5)	0.60 (17)
CR-AG	3	2400	0.67 x 1.79 (17.0 x 45.5)	0.78

GENERAL DESCRIPTION

Panasonic carbon monofluoride pin type lithium batteries are slim and lightweight through the use of an aluminum case. This unique design, developed first by Panasonic, combines the best of battery technologies.

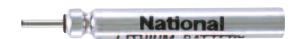
FEATURES

- Compact and lightweight
- 2x the voltage of conventional dry batteries
- Operating temperature (-30°C~+60°C)
- Pin terminal for easy connection

APPLICATIONS

- Fishing pole tip lights
- LED illumination
- LED night fishing floats
- Microphones

POLY-CARBONMONOFLUORIDE LITHIUM BATTERIES (BR PIN CELLS)



Model Number	Electrical Characteristics				Dimensions		Weight oz (g)
	Nominal Voltage	Nominal Capacity (mAh)	Recommended Drain		Diameter Inch (mm)	Height Inch (mm)	
			Pulse (mA)	Standard (mA)			
BR425	3	25	4	0.5	0.17 [4.2]	1.02 [25.9]	0.02 [0.55]
BR435	3	50	6	1.0	0.17 [4.2]	1.41 [35.9]	0.03 [0.85]

Valve Regulated Lead Acid Batteries*



GENERAL DESCRIPTION

Panasonic's tough Valve Regulated Lead Acid rechargeable batteries are designed to provide outstanding performance in withstanding over-charge, over-discharge, and resisting vibration and shock. Compact, these batteries save installation space, while providing full and reliable power. The use of special sealing epoxies, tongue and groove case and cover construction, and long-sealing paths for posts and connectors, assures that the Valve Regulated Lead Acid battery will offer exceptional leak resistance, and allows them to be used in any position.

Panasonic Valve Regulated Lead Acid batteries (weighing less than 2 lbs) are covered by the Rechargeable Battery Recycling Corporation's (RBRC) recycling program. For larger batteries, call 1-800-SAV-LEAD.

FEATURES

- State-of-the-art Absorbed Glass Mat (AGM) technology
- Superior design and low voltage spread gives excellent performance
- Enhanced lifespan due to low and stable charge current
- 100% inspection after final assembly and before shipment
- High quality and reliability
- Selected batteries with flame retardant battery containers according to UL94 V-0
- High power density
- Long service life
- Maintenance free operation

APPLICATIONS

- Electric lawn mowers
- Medical equipment
- Emergency Lighting
- UPS systems
- Alarm systems
- Wind turbines
- Vending machines
- Mobile floor sweepers
- Solar or wind powered street lighting and advertising displays etc.
- Wheelchairs
- Energy storage



*Previously referred to as "Sealed Lead Acid" batteries.

BACK-UP AND MAIN POWER SUPPLIES (CYCLE AND TRICKLE USE)

Model Number*	Nominal Voltage (V)	Rated capacity 20 hours rate (Ah)	Outline dimensions inch (mm)				Wt. (Approx.) lbs (kg)	Terminal Types	Battery-case resin	
			Length	Width	Height	Total height			UL94HB	UL94V-0
LC-R061R3P	6	1.3	3.82 [97]	0.95 [24]	1.97 [50]	2.17 [55]	0.66 [0.30]	B	○	
LC-R063R4P	6	3.4	5.28 [134]	1.34 [34]	2.36 [60]	2.6 [66]	1.37 [0.62]	B	○	
LC-R064R5P	6	4.5	2.76 [70]	1.89 [48]	4.02 [102]	4.26 [108]	1.72 [0.78]	B	○	
LC-R067R2P(a)	6	7.2	5.95 [151]	1.34 [34]	3.70 [94]	3.94 [100]	2.78 [1.26]	B/C	○	
LC-R0612P(a)	6	12.0	5.95 [151]	1.97 [50]	3.70 [94]	3.94 [100]	4.30 [1.95]	B/C	○	
LC-R121R3P	12	1.3	3.82 [97]	1.87 [48]	1.97 [50]	2.17 [55]	1.30 [0.59]	B	○	
LC-R122R2P	12	2.2	6.97 [177]	1.34 [34]	2.36 [60]	2.6 [66]	1.76 [0.80]	B	○	
LC-R123R4P	12	3.4	5.28 [134]	2.64 [67]	2.36 [60]	2.6 [66]	2.65 [1.20]	B	○	
LC-R127R2P(a)	12	7.2	5.95 [151]	2.54 [64.5]	3.70 [94]	3.94 [100]	5.45 [2.47]	B/C	○	
LC-RA1212P(a)	12	12.0	5.95 [151]	3.86 [98]	3.70 [94]	3.94 [100]	8.36 [3.80]	B/C	○	
LC-RD1217P	12	17.0	7.13 [181]	2.99 [76]	6.58 [167]	6.58 [167]	14.34 [6.50]	D	○	
LC-R1233P	12	33.0	7.70 [195.6]	5.12 [130]	6.10 [155]	7.09 [180]	26.50 [12.0]	E	○	●

* Previous model number is given in parentheses

(a) Add applicable codes for terminal type: P = faston 187, P1 = faston 250

Note: Battery cases marked with a (○) are the normal product using the standard resin.

Those marked with a solid circle (●) indicate specifications as per special order.

Valve Regulated Lead Acid Batteries

MAIN POWER SUPPLIES (CYCLE USE)

Model Number	Nominal Voltage (V)	Rated capacity 20 hours rate (Ah)	Outline dimensions inch (mm)				Wt. (Approx.) lbs (kg)	Terminal Types	Battery-case resin	
			Length	Width	Height	Total height			UL94HB	UL94V-0
LC-XC1228AP	12	28.0	6.50 (165)	4.92 (125)	6.89 (175)	7.07 (179.5)	24.34 (11)	G	○	

Note: Battery cases marked with a (○) are the normal product using the standard resin.
Those marked with a solid circle (●) indicate specifications as per special order.

BACK-UP POWER SUPPLIES (LONG LIFE TRICKLE USE*)

Model Number	Nominal Voltage (V)	Rated capacity 20 hours rate (Ah)	Outline dimensions inch (mm)				Wt. (Approx.) lbs (kg)	Terminal Types	Battery-case resin	
			Length	Width	Height	Total height			UL94HB	UL94V-0
LC-P067R2P(a)	6	7.2	5.95 (151)	1.34 (34)	3.70 (94)	3.94 (100)	2.87 (1.3)	B/C		
LC-P0612P(a)	6	12.0	5.95 (151)	1.97 (50)	3.70 (94)	3.94 (100)	4.41 (2.0)	B/C		
LC-P127R2P(a)	12	7.2	5.95 (151)	2.54 (64.5)	3.70 (94)	3.94 (100)	5.52 (2.5)	B/C		○
LC-PD1217P	12	17.0	7.13 (181)	2.99 (76)	6.58 (167)	6.58 (167)	14.34 (6.5)	D	●	
LC-P1220P	12	20.0	7.13 (181)	2.99 (76)	6.58 (167)	6.58 (167)	14.6 (6.6)	D	○	
LC-P1220AP	12	20.0	7.13 (181)	2.99 (76)	6.58 (167)	6.58 (167)	14.6 (6.6)	G	●	
LC-P1228P	12	28.0	6.50 (165)	4.92 (125)	6.89 (175)	7.07 (179.5)	24.3 (11)	D	○	
LC-P1228AP	12	28.0	6.50 (165)	4.92 (125)	6.89 (175)	6.89 (175)	24.3 (11)	G	○	●

(a) Add applicable codes for terminal type: P = faston 187, P1 = faston 250, P2 = 187/250

Note: Battery cases marked with an ○ are the normal product using the standard resin.

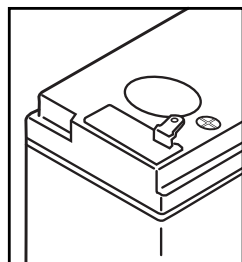
Those marked with a solid circle ● indicate specifications as per special order.

*Expected trickle life approximately 6 years

BACK-UP POWER (HIGH POWER SERIES)

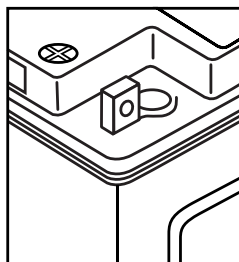
Model Number	Nominal Voltage (V)	Rated capacity Watts/Cell at 10 Minute Rate	Outline dimensions inch (mm)				Wt. (Approx.) lbs (kg)	Terminal Types	Battery-case resin	
			Length	Width	Height	Total height			UL94HB	UL94V-0
UP-VW1220P1	12	20	5.51 (140)	1.52 (38.5)	3.70 (94)	4.00 (101.5)	2.98 (1.35)	C	○	●
UP-VW1245P1	12	45	5.95 (151)	2.54 (64.5)	3.70 (94)	4.00 (101.5)	5.74 (2.6)	C	○	
UP-VW1228P1	12	28	5.95 (151)	2.54 (64.5)	3.70 (94)	4.00 (101.5)	4.07 (1.85)	C		
UP-VW1236P1	12	36	5.95 (151)	2.54 (64.5)	3.70 (94)	4.00 (101.5)	4.51 (2.05)	C		

TERMINAL TYPES:



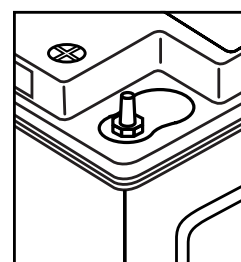
(B) Faston type 187
(C) Faston type 250

Indicated by model # suffix:
P=187
P1=250
P2=250(+)/187(-)



(D) M5 bolt and nut type
(E) M6 bolt and nut type

Indicated by model # suffix: P



(G) M5 threaded post type
(H) M6 threaded post type

Indicated by model # suffix: AP

Alkaline Batteries

GENERAL DESCRIPTION

Long lasting. Designed to support industrial applications.

Panasonic's alkaline batteries are designed with a power density that enables them to last longer while still supporting industrial strength applications. Standardized with high-current and large capacity, the Alkaline series provides customers with high performance results.

FEATURES

- Heavy current and continuous drain
- Operates reliably in wide temperature ranges
- EU compliant dustbin
- Easier cross-referencing with IEC battery codes



INDUSTRIAL ALKALINE BATTERIES					
Model Number	Size	V	Diameter Inch (mm)	Height Inch (mm)	Avg. Wt. oz (g)
LR20XWA	D	1.5	1.312 [33.3]	2.407 [60.5]	4.97 [141.0]
LR14XWA	C	1.5	1.004 [25.5]	1.969 [49.5]	2.47 [70.0]
LR6XWA	AA	1.5	.571 [14.50]	1.988 [50.0]	0.80 [23.0]
LR03XWA	AAA	1.5	.413 [10.20]	1.752 [44.10]	0.38 [11.0]

Also available in contractor boxes.

Model Number	V	L Inch (mm)	W Inch (mm)	D Inch (mm)	Avg. Wt. oz (g)
6LF22XWA [9V]	9	1.0 [47.5]	1.0 [25.50]	0.649 [17.50]	1.60 [45]

Also available in contractor boxes.

APPLICATIONS

- Toys and cordless products
- Security
- Medical devices
- Flashlights
- Electric shavers
- HVAC systems

Lithium Ion Pin Batteries

GENERAL DESCRIPTION

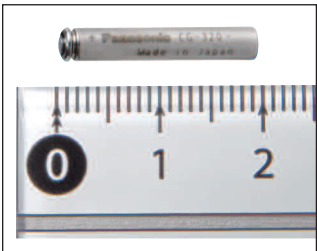
The industry's smallest cylindrical shaped rechargeable Lithium Ion battery which features high reliability and high output and is ideal for powering small devices such as wearable devices.

FEATURES

- High reliability
- High output
- Metallic can which prevents battery swelling
- Pin shaped, 3.5mm diameter lithium ion battery, industry's smallest

APPLICATIONS

- Wearable devices
- Electronic pens
- Hearing aids and measuring devices
- Near field communications (NFC)



LITHIUM ION PIN						
Model Number	Nominal Voltage (V)	Typical Capacity (mAh)	Charge Voltage (v)	Dimensions (max)		Approx. Weight (g)
				Diameter mm	Height mm	
CG-320	3.75	13	4.20	3.60 mm	20 mm	0.06

Panasonic

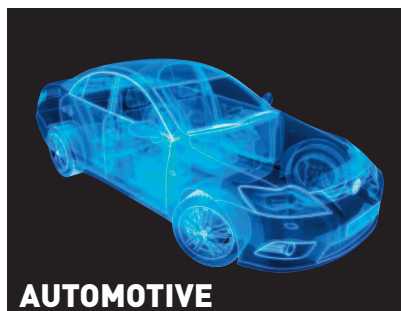
For more information on how Panasonic can assist you with your battery power solution needs contact us.

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