Panasonic Lithium Primary Battery

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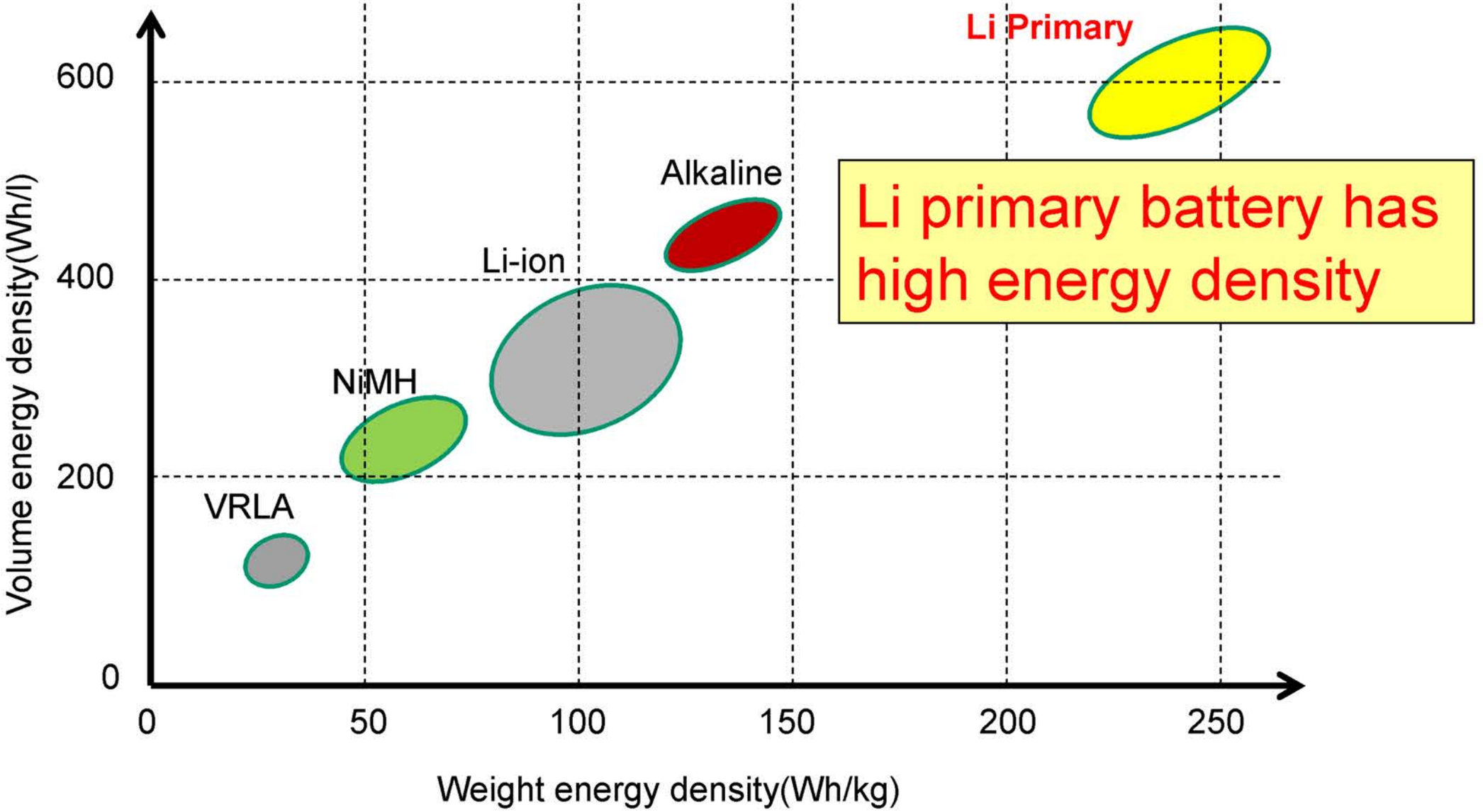
Panasonic Industry Europe GmbH
Battery Technical Center

Battery Energy Density Comparison



Micro Batteries Are Used …..



















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Products Range of Panasonic Lithium Batteries

					Pa.	Re.	Du.	Saf	Ta.	To.	Ma.	Fd.	So.
Lithium Primary	Carbon Monofluoride Lithium Battery	BR	3V	Cyl.	●								
				Coin	●								
				Pin	●								
	Manganese Dioxide Lithium Battery	CR	3V	Cyl.	●		●	●		●	●	●	
				Coin	●	●				●	●		●
	Thionyl Chloride Lithium Battery	ER	3.6V	Cyl.				●	●	●	●		

Production Facilities

Production Facilities	Products	Certifications
Osaka, Japan (Energy device business division)	All BR cylindrical models	ISO/TS16949 ISO14001
Georgia, US (PECA-LD) 	Cylindrical CR (CR123A)	ISO14001
Jakarta, Indonesia (PECGI-LCD) 	All CR coin models All BR coin models All CR cylindrical models All rechargeable coin models	ISO/TS16949 ISO14001

Panasonic Lithium Primary Batteries

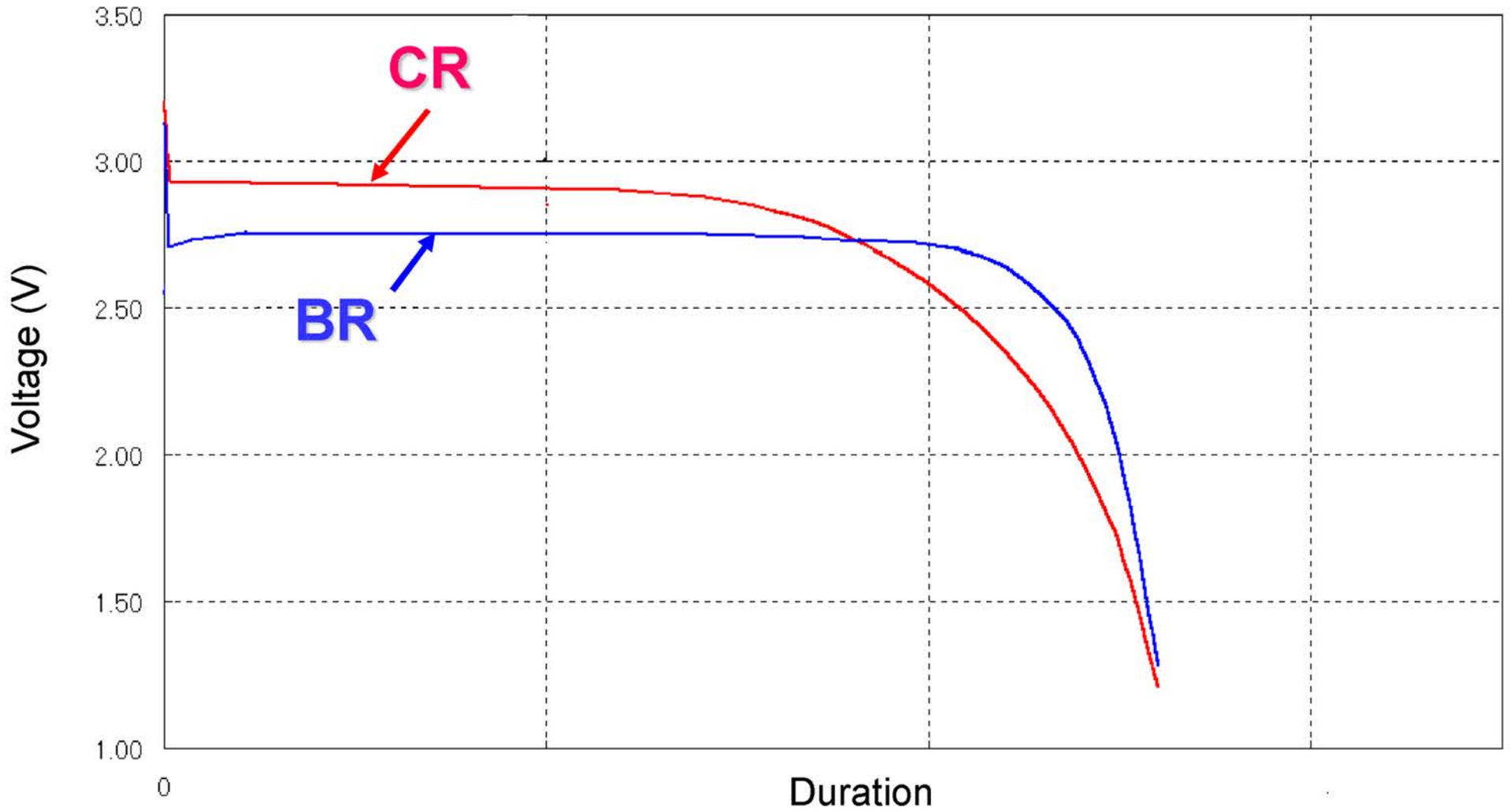
- ***Wide products range***

  (No.1 total battery manufacture in the world)
- ***High voltage (Nominal voltage 3V)***
- ***Excellent storability with minimal deterioration***
- ***Wide operating temperature range***
- ***Strong leakage resistance***
- ***UL recognized product***
- ***Environmental friendly product***
- ***A lot of experiences for various applications since 1971***

Comparison by Each Chemistry

		BR	*CR*
Material	Cathode	(CF)n	MnO2
	Anode	Lithium	
	Electrolyte	Organic electrolyte	
	Separator, Gasket	Polypropylene	
Performance	Discharge capacity	BR = CR	
	Voltage during discharge	BR < CR (high)	
	Voltage stability	(flat) BR > CR	
	High current discharge	BR < CR (good)	
	Storage at <60 °C	(small self-discharge) BR ≧ CR	
	at >60 °C	(small self-discharge) BR > CR	

Discharge Curve Image



Product line up for Panasonic Li primary battery

- Coin type
  - CR type
  - BR type
    - Standard type (-30 to 80degC)
    - High temp. type (-40 to 125degC)

- Cylindrical type
  - CR type
    - Consumer type (high current discharge)
    - Industrial type (stable impedance)
  - BR type

Coin-type Lithium Primary Batteries

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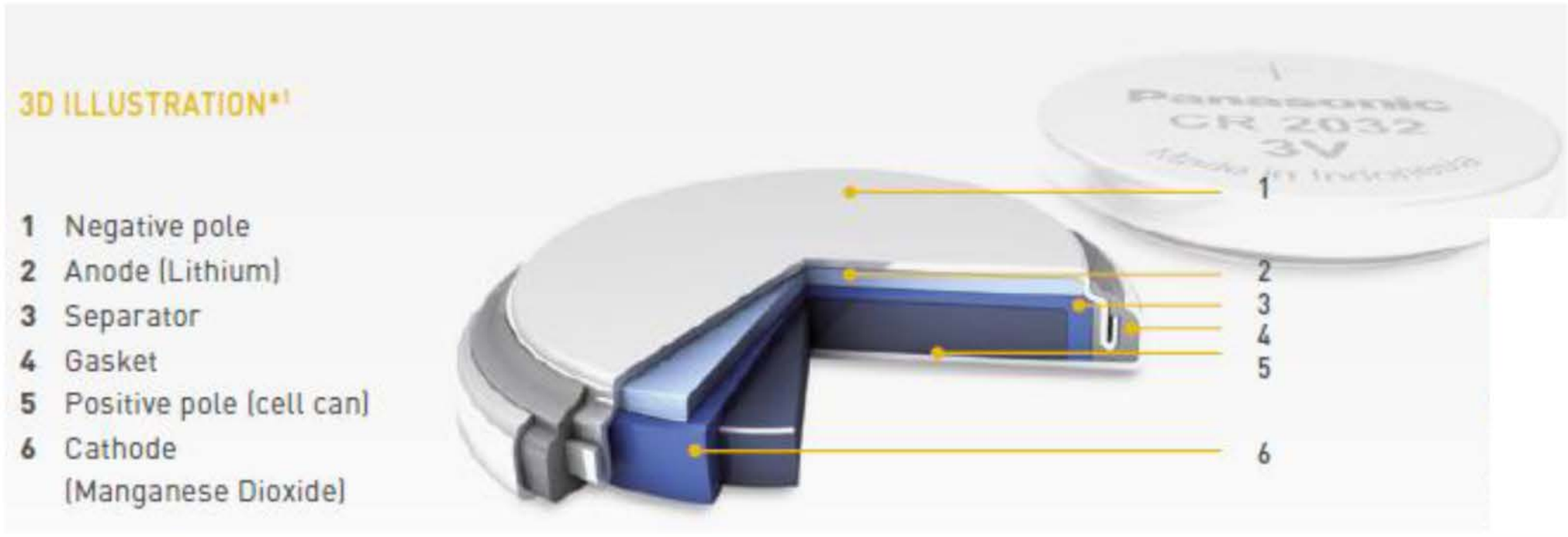
Cross section of coin battery



General Comparison of Panasonic Coin-type Batteries

Chemistry	BR (normal type) [CF/Li]	BR (High Temp.) [CF/Li]	CR [MnO2/Li]
Capacity Range	35mAh to 500mAh	48mAh to 1,000mAh	25mAh to 1,000mAh
Std. Discharge Current Range	0.03mA (Continuous)	0.03mA (Continuous)	0.1mA to 0.2mA (Continuous)
Temp. Range	-30ºC to +80ºC (Operation)	**-40ºC to +125ºC** (Operation)	-30ºC to +60ºC (Operation)
Self Discharge	1.0%/year (at Room Temp.)	1.0%/year (at Room Temp.)	1.0%/year (at Room Temp.)
Features	Superior long term reliability	Wide operational temp. range Superior long term reliability	Superior discharge performance
Product Line-up	BR1220 (35mAh) BR1225 (48mAh) BR1632 (120mAh) BR2032 (190mAh) BR2325 (165mAh) BR2330 (255mAh) BR3032 (500mAh)	BR1225A (48mAh) BR1632A (120mAh) BR2330A (255mAh) BR2450A (550mAh) BR2477A (1,000mAh) *Only tab models are available.	CR1025 (30mAh) CR1216 (25mAh), CR1220 (35mAh) CR1612 (40mAh), CR1616 (55mAh) CR1620 (75mAh), CR1632 (140mAh) CR2012 (55mAh), CR2016 (90mAh) CR2025 (165mAh), CR2032 (220mAh) CR2330 (265mAh), CR2354 (560mAh) CR2412 (100mAh), CR2450 (620mAh) CR2477 (1,000mAh) CR3032 (500mAh)
Application Example	Memory back up Meter Factory Automation Devices	Memory Back up, ETC (Automotive, Meters,...)	Power source (Watch, Calculator,...) RKE IC tag, RF-ID tag, Price tag

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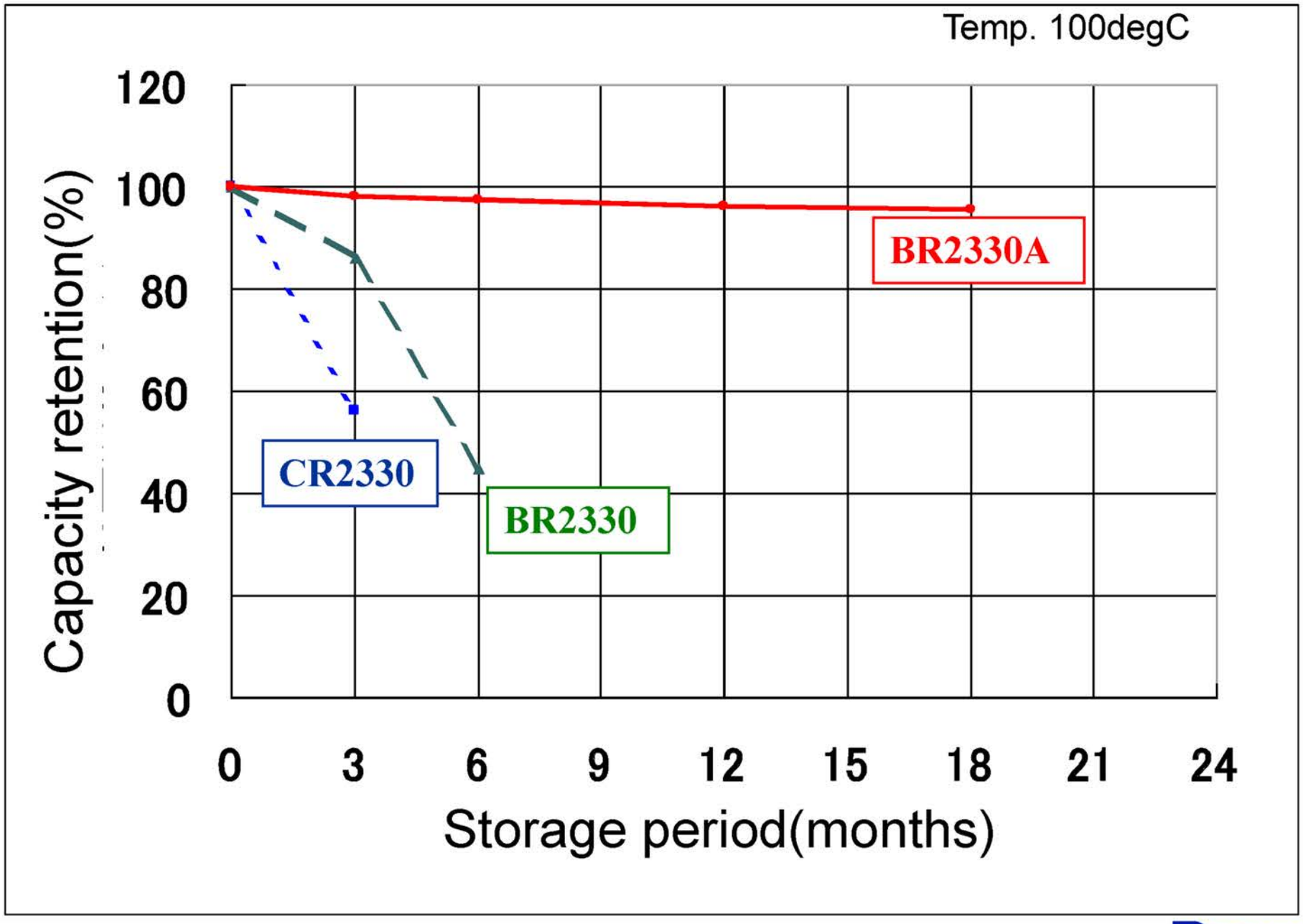
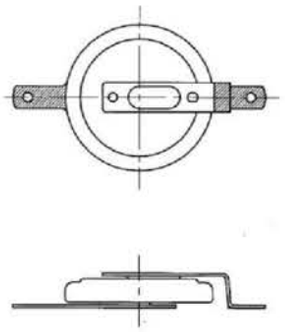
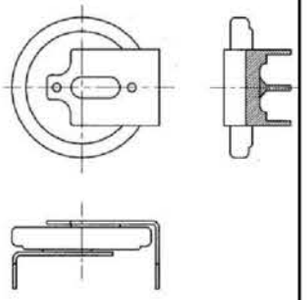
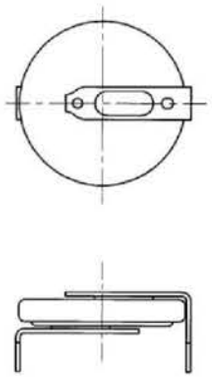
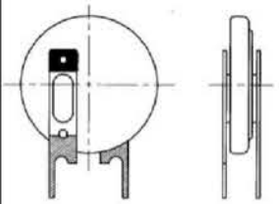
BR High Temp. type (BR-A series)



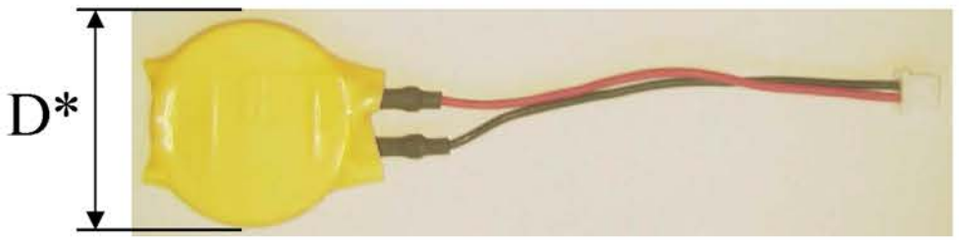
Battery Tab or Pack Configurations

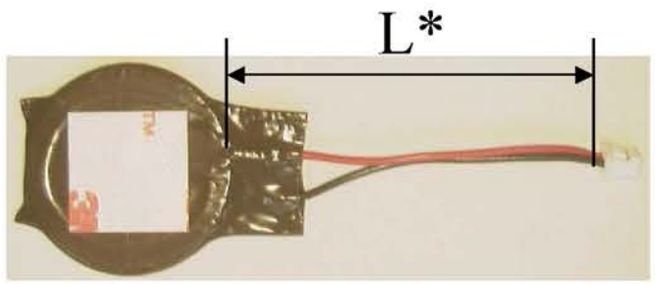
1. Coin Type

F type	G type	H type	V type
			

Terminal material : Stainless Steel

Terminal plating : 2-4 μm Tin over 0.5-3 μm Nickel





○Insulating Tube :

Material: Pet-Nylon Polymer Alloy (Inflammable)

Color: BR&CR = Yellow, BR**A=Light Green, VL= Brown, ML=Lavender (*D>ϕ12)

○Lead Wire :

Material:UL3302(Polyolefin) (un-flammable: UL VW-1)

Size: AWG26-28-30 Length: *L>40mm

Cylindrical Lithium Primary Batteries

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Cross section of cylindrical battery

3D ILLUSTRATION*2

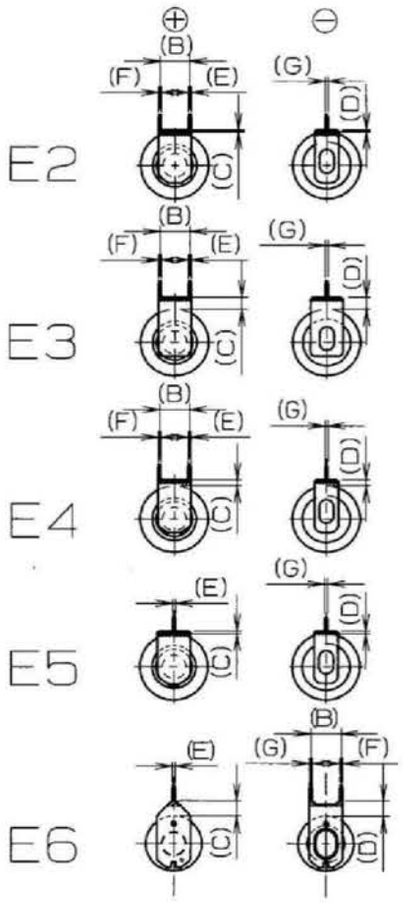
1 Positive pole
2 Vent diaphragm
3 Tube
4 Anode (Lithium)
5 Separator
6 Cathode (Manganese Dioxide)
7 Insulator
8 PTC (Positive Temperature Coefficient Device)
9 Collector
10 Cell can
11 Negative pole

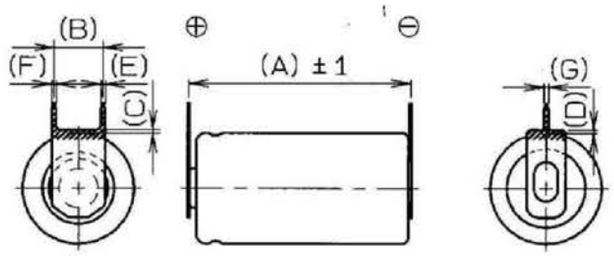
General Features of Panasonic Cylindrical Batteries

Chemistry	BR [CF/Li]	CR (for Industry) [MnO2/Li]	CR (for Consumer) [MnO2/Li]
Capacity Range	1,000mAh to 5,000mAh	1,000mAh to 2,400mAh	850mAh to 3,300mAh
Std. Discharge Current Range	0.03mA (Continuous)	0.1mA to 0.2mA (Continuous)	0.1mA to 0.2mA (Continuous)
Temp. Range	-40°C to +85°C (Operation)	-40°C to +70°C (Operation)	-40°C to +70°C (Operation)
Self Discharge	0.5%/year (at Room Temp.)	1.0%/year (at Room Temp.)	1.0%/year (at Room Temp.)
Features	Superior long term reliability Superior safety Expected life over 10years	Superior discharge performance Long term reliability Expected life below 10years	Superior discharge performance] Expected life below 3years (User replaceable)
Product Line-up	BR-1/2AA (1,000mAh) BR-2/3A (1,200mAh) BR-2/3AG (1,450mAh) BR-A (1,800mAh) BR-AG (2,200mAh) BR-C (5,000mAh) *Only tab or connector models are available.	CR-2Z (1,000mAh) CR-2/3AZ (1,600mAh) CR-AAZ (1,650mAh) CR-AG (2,400mAh) *Only tab or connector models are available.	CR-2 (850mAh) CR123A (1,400mAh) Pack model CR-P2 (6V 1,400mAh) 2CR5 (6V 1,400mAh) CR-V3 (3V 3,300mAh)
Application Example	Memory back up Utility Meter Electricity meter	ETC transponder RF-ID tag Security devices(ex. Smoke Detector) Gas meter	Camera (Digital Camera) Flash light

Battery Tab or Pack Configurations

2. Cylindrical





(A)	1/2AA	25.5
	AA	50.5
	2/3A	34
	A	46
(B)	E2~E4, E6	7.5
	E5	—
(C)	E2	≤1.5
	E3	$3.5^{+0.2}_{-0.5}$
	E4	2±0.4
	E5	≤1.5
	E6	≥3.2

(D)	E2	≤1.5
	E3	$3.5^{+0.2}_{-0.5}$
	E4	2±0.4
	E5	≤1.5
	E6	≥3.2
(E)	E2~E5	0.7
	E6	0.8
(F)	E2~E4	0.7
	E5	—
	E6	0.8
(G)	E2~E5	0.7
	E6	0.8

○Insulating Tube Material: Pet-Nylon Polymer Alloy (Inflammable)

○Lead Wire Material:
UL3385(Polyolefin) (un-flammable: UL VW-1)
Size: AWG 22-24-26

○Connector:

	Maker	Housing	Contact
	JST	SMP-02V-BC	SHF-001T-0.8SS
	Molex	5051-02	2759G

Panasonic Technical Support

EACH CHEMISTRY HAS EACH CHARACTERISTICS!

Panasonic would like to check usage conditions of each application in order to prevent mismatching the characteristics.

Important information for recommendation of battery.

1) Discharge current (base and pulse load condition)
2) Cut off voltage
3) Temperature range
4) Expected life
5) Limitation battery size and tab configuration

Panasonic propose the battery which suitable for your application

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