

Primary Lithium Batteries





GP · Battery Experts for over 50 years

GP Batteries International Limited is a wholly-owned subsidiary of Gold Peak Group in Hong Kong. It is one of the world's major suppliers of primary and rechargeable batteries and Asia's No. 1 consumer battery manufacturer (excluding Japan). Apart from retailing under the "GP" brand, it also supplies electronic manufacturers and major battery companies with an extensive range of battery products. The volume sales of GP alkaline battery, rechargeable battery and charger have been ranked No.1 in Hong Kong for 13 consecutive years.



R&D

GP has dedicated significant amount of resources and efforts each year to the R&D center for its construction, development of new products and introduction of advanced equipment. Our R&D center prides itself on various facilities, namely the professional trial-production workshops, performance test rooms, chemical labs and material analysis rooms.



Automation

In order to meet the increasing market demand, we have equipped ourselves with the cost-effective automated systems that enhance productivity and quality control. Factors such as distribution, parts procurement, labor and risks are thoroughly assessed in areas of our in-house production of tools, materials and technologies.



Quality

As an established brand, we speak with strong data and make continuous improvement practicing the Six Sigma philosophy. Factors/parameters that could affect product quality are hence prevented by data automation. Not to mention we also possess world-class inspection equipment exclusive to the battery industry such as AAS (Atomic Absorption Spectroscopy), UV-VIS (UV-Visible Spectrometry) and EDXRF (Energy Dispersive X-Ray Fluorescence).





Product Compliance

As a major brand in consumer batteries, GP Batteries adheres to strict safety and complies with the highest international safety standards.





GP Batteries' IEC62133-certified **NiMH** batteries and Lithium-ion offer quick market penetration into **53** Certification Body scheme participating countries*.

GP Batteries manufactured ${\bf 4}$ out of ${\bf 8}$ brands worldwide of certified primary 9V brands against UL217 specifically for Smoke Alarm application.

GP Batteries is amongst the **First batch of Lithium-ion battery brands** that obtained voluntary CQC mark in China, as well as UR, BIS, and MC marks in the USA, India and Malaysia to respectively cater business needs more efficiently.

With UN38.3 certification, all GP Lithium-ion batteries are easily transported by air and sea to ${\bf 5}$ continents*.

* Subject to national deviation, additional tests may be needed.



Laboratory Services

China and Singapore

GP Batteries' quality assurance centers, located strategically in China, Singapore and Hong Kong, provide full range R&D facilities for quality and safety assurance.

Both China and Singapore laboratories are well-recognized by more than **90** international regions under International Laboratory Accreditation Cooperation-Mutual Recognition Agreement (ILAC-MRA).

China (Dongguan) - Chemical & Calibration Laboratory

 CNAS (China National Accreditation Service for Conformity Assessment) Accreditation



中国认可 国际互认 检测 / 校准 TESTING / CALIBRATION CNAS L2411

Testing scope

- 2002/95/EC (RoHS Directive)

- 2006/66/EC (Battery & Accumulator Directive)

Battery Performance Test in Singapore

- SAC-SINGLAS (Singapore Laboratory Accreditation Scheme) Accreditation
- Testing scope
 - IEC 60086-1
 - IEC 60086-2
 - IEC 60086-5



Hong Kong Science Park

The Hong Kong laboratory, the **first** in Hong Kong, is the only **1** out of **6** certified to UL WTDP (Witnessed Test Data Program); it is also the only **1** out of **5** CTF (Customers' Testing Facilities - Stage 1) approved facilities in the China and Hong Kong region*.

UL Data Acceptance Program

 WTDP (Witnessed Testing Data Program) UL1642 UL2054 UL62133 UN38.3



IEC Manufacturer's Testing Laboratory

 CTF (Customer's Testing Facilities (CTF) - Stage 1) IEC62133

Reliability Test for Benchmarking

· Test conditions to be agreed with clients



System Certification

In order to meet the increasing market demand, we make continuous improvement to ensure our Management System excellence for our stakeholders and clients. GP Batteries is certified against ISO9001, ISO14001, OHSAS18001, SA8000, as well as the highlighted below:

Global Security Verification (GSV)

Safety matters. Our GSV certified supply chain security excellence ensuring our trade with our clients are secure, protect against terrorist acts, and to combat illegal trafficking.

ISO26000 Social Responsibility

We speak as a global excellence brands, we value the relationship with our society and environment. Our social responsibility performance is certified against ISO 26000 which proved our promises to the welfare of society and environment.

ISO17025

Our China and Singapore laboratories are certified against ISO17025 – the general requirement for the competence of testing and calibration laboratories to offer the most reliable service to our clients.







Awards

GP stands for excellence, and its track record is impressive. GP's unwavering adherence to high standards has brought recognition from various entities.

Asia Quality Best Practice Award:

Handed out by the International Six Sigma Council, the gold award celebrates GP being top in quality improvement.

MAKE (Most Admired Knowledge Enterprise) Award:

The award names organizations which out-perform their peers by above average growth in intellectual capital and wealth creation.





GP Primary Lithium Manganese Batteries



GP Primary Lithium Manganese Dioxide (LiMnO₂) batteries offer numerous advantages over other conventional primary battery systems. The unique features include high energy density, stable discharge platform, outstanding performance at extremely low temperature, wide operating temperature range (-40°C to +60°C), superior safety design including built-in PTC, specific crimp design for leakage proof, and low self discharge rate of less than 1% per year.

Our complete product range offers ideal battery options for both user-replaceable, and maintenance-free devices, especially amid the growing demand of IoT, Home Security, and Tracking applications.

Security devices such as Smoke Detectors and Sensor Products do require highly reliable performance over an extended operation period under extreme ambient conditions. The state-of-art spiral cell construction design of GP Primary Lithium Cylindrical batteries meet the usage needs regardless applications demanding high drain or low drain discharge. GP is the unanimous solution for maintenance-free security products.

By adopting the advanced Japanese technology and fully automatic production processes, GP Primary Lithium Batteries are produced under highly consistent Japanese quality control and strict standard. Our manufacturing plant is ISO9001 and ISO14001 accredited. As an expert in battery technology and the world's leading battery manufacturer, GP ensures our high standard of performance and quality are committed to meet the demands of the large and diversified market.

Index

08	Cell Constructions
09	Lithium 9V
10	Lithium Cylindrical
11	Lithium CR2/3A
12	Lithium Coin
13	Lithium AA & AAA
14-17	Specifications

18 Precautions for Battery Handling

Cell Constructions



GP Primary Lithium Cylindrical Batteries

The spiral cell construction of GP Primary Lithium Cylindrical Batteries (e.g. GPCR-V9, GPCR123A etc.) enlarges the facing area of the positive and negative electrodes, providing high power for high discharge current applications.

PTC device: A PTC (Positive Temperature Coefficient) device is installed to protect the battery from external short circuit.

Positive cap with safety vent: The burst-proof safety vent prevents excessive internal pressure build-up under abusive conditions.





- 2. PTC device
- 3. Battery jacket
- 4. Steel can
- 5. Vent diaphragm
- 6. Negative pole7. Anode (Lithium)
- 8. Cathode (MnO2)
- 9. Separator

GP Primary Lithium 9V Batteries

GP Primary Lithium 9V Battery (GPCR-V9) is consisted of 3 pieces of GP Primary Lithium Cylindrical Batteries (GPCR14250)



GP Primary Lithium Coin Batteries

Cross sectional drawing of GP Primary Lithium Coin Batteries

1 1. Negative pole 2 2. Anode (Lithium) 3 3. Separator 5 4. Gasket

6

- 5. Positive pole (Cell can)
- 6. Cathode (Poly-Carbonmonofluoride)

GP Primary Lithium Manganese Dioxide (LiMnO₂) Lithium 9V



Major Features

- 10 years service life in smoke detectors
- **2** Up to 5 times longer lasting than ordinary alkaline batteries

Spiral construction results in

- Low internal impedance
- · High discharge current

Obsign for safety

- Built-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
- Burst-proof venting holes which allows safe release of the battery internal pressure

Eakage proof crimpint technique

- **(**) Wide operational temperature range of -40°C to +60°C with excellent discharge performance at extremely low temperatures
- Excellent storability with low self discharge rate at less than 1% per year
- Brvironmentally friendlier

 Electrolyte contains no lithium perchlorate
- Ocomply with UL and UN38.3 safety standards

Major Applications

General Applications

Smoke detectors, security devices, medical equipment, carbon monoxide alarms, explosion gas alarms, meters (gas/electric/ water), metal detectors, wireless transmitters, electronic toll collection system, etc.

High Drain Applications

Stun guns, military applications



Performance Characteristics



10-year Service Life in Smoke Detectors

Voltage characteristics remain stable even for a long period of discharge, greatly improving the reliability of the ionisation-type smoke detector that uses GP Lithium 9V battery (GPCR-V9). Such smoke detector is also maintenance free (battery replacement is seldom required).



Lightweight, High Voltage and High Energy Density

GP Lithium 9V battery (GPCR-V9) lasts 5 times longer than Alkaline batteries.

50mA 24hr/day to 5.4V at 23°C/ 15°C/ 5°C/ 0 °C/ -20°C





Excellent Temperature Characteristics

GP Lithium 9V battery (GPCR-V9) outperforms competition by demonstrating much longer operating time and stable performance over a wide temperature range of -40°C to +60°C.

Lithium Cylindrical



Major Features

O Spiral construction results in

- · Low internal impedance
- · High discharge current

2 Design for safety

- Build-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
- · Burst-proof venting holes which allows safe release of the battery internal pressure
- 8 Leakage proof crimping technique
- Wide operational temperature range of -40°C to + 60 °C with excellent discharge performance at extremely low temperatures
- Excellent storability with low self discharge rate at less than 1% per year

6 Environmentally friendlier

- · Electrolyte contains no lithium perchlorate
- O Comply with UL and UN38.3 safety standards

Major Applications

IoT, home security, asset tracking, cameras, flashlights, medical equipment, meters (gas/electric/water) and electronic guns, etc.

Performance Characteristics



Outstanding Low Drain Discharge Performance at Various Temperature CR123A shows superior low drain discharge performance especially at low temperature.

1200mA pulse discharge to 1.3V at 23°C / -20°C



Excellent Pulse Discharge Capacity at Room Temperature and -20°C The outstanding high pulse discharge capacity of GPCR123A remains strong at room temperature and extremely low temperature.







Lithium CR2/3A



Major Features

- **1** Wide operational temperature range of -40°C to +60°C
- **2** Build-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
- **8** Low discharge rate at less than 1% per year
- Ocomply with UL & UN38.3 safety standards

Major Applications

Smoke detector, sensors, home security products and measurement equipment, etc.

Performance Characteristics



Test Condition: 10mA Continuous Discharge to 2.0V

Test Condition: 1000Ω pluse discharge at 23°C



Test Condition: 2mA Continuous Discharge to 2.0V



Test Condition: 100Ω pulse discharge resistance at 23°C





Lithium Coin



Major Features

- High volumetric energy density
- Plat discharge voltage
- 8 Leakage proof crimping technique
- **3** Wide range of operating temperature from -10°C to +60°C
- S Excellent storability with low self discharge rate at less than 1% per year
- **6** Comply with UL and UN38.3 safety standards

Major Applications

Calculators, car key, FA instruments (measuring instruments, onboard microcomputers, sensors), electronic thermometer, IC cards, IC tags, memory back-up, greeting cards, time pieces, remote control, portable games, etc.

Performance Characteristics

GPCR2032 provides longer operating hours at different loading discharges.















GP Primary Lithium/Iron Disulfide (Li/FeS₂) Lithium AA & AAA



Major Features

- O Suitable for power hungry / medical / professional devices
- **2** 40% lighter than Alkaline Battery
- Seriorms well in extreme weather (-30°C to 60°C)
- **4** Built-in- short-circuit safety protection
- **5** Long shelf life of 10 years

Major Applications

Photo flash, digital camera, medical devices, electronic games, battery-operated toys, shaves, GPS devices, portable lighting, etc.

Performance Characteristics



AAA

Application Tests (23±2°C)







Application Tests (23±2°C)





Specifications

Lithium Cylindrical

Madal Na	Dimer	Voltage	Weight	Cross Reference						
Woder No.	Diameter	Height	(V)	(g)	IEC	JIS	Energizer	Duracell	Panasonic	
CR14250	14.5	25.0	3.0	9	-	-	-	-	-	
CR2	15.6	27.0	3.0	12	-	CR15H270	-	DLCR2	CR-2	
CR123A	16.8	34.5	3.0	17	CR17345	-	EL123AP	DL123A	CR-123A	
CR2/3A	16.8	34.0	3.0	17	-	-	-	-	CR-2/3AZ	
CR-P2	34.8(L) x 19.5(W) x 35.8(H)		6.0	37	CR-P2	-	EL223AP	DL223A	CR-P2	
2CR5	34.0(L) x 1	6.0	40	2CR5	-	EL2CR5BP	DL245	2CR-5		

Operating temperature: -40°C to +60°C

Lithium 9V

	Ultralife
CR-V9 26.5(L) x 17.5(W) x 48.5(H) 9 34 1604LC	U9VL

Operating temperature: -40°C to +60°C

Lithium AA & AAA

Model No	Dimer	Voltage	Weight	Cross Reference						
Model No.	Diameter	Height	(V)	(g)	IEC	ANSI	Energizer	Duracell		
15LF	14.5	50.5	1.5	14.5	FR6	15-LF	L91	LF1500		
24LF	10.5	44.5	1.5	7.5	FR03	24-LF	L92	LF2400		

Operating temperature: -30°C to +60°C

Lithium Coin

Madal Na	Dime	Voltage	Weight	Cross Reference						
Model No.	Diameter	Height	(V)	(g)	IEC / JIS	Eveready	Varta	Duracell		
CR1/3N	11.6	10.8	3.0	2.3	CR1/3N	-	-	DL1/3N		
CR1216	12.5	1.6	3.0	0.6	CR1216	ECR1216	CR1216	-		
CR1220	12.5	2.0	3.0	0.8	CR1220	ECR1220	CR1220	-		
CR1616	16.0	1.6	3.0	1.1	CR1616	ECR1616	CR1616	-		
CR1620	16.0	2.0	3.0	1.2	CR1620	ECR1620	CR1620	-		
CR2016	20.0	1.6	3.0	1.7	CR2016	ECR2016	CR2016	DL2016		
CR2025	20.0	3.2	3.0	2.4	CR2025	ECR2025	CR2025	DL2025		
CR2032	20.0	3.2	3.0	3.2	CR2032	ECR2032	CR2032	DR2032		
CR2430	24.5	3.0	3.0	4.0	CR2430	ECR2430	CR2430	DR2430		
CR2450	24.5	5.0	3.0	6.6	CR2450	ECR2450	CR2450	-		

Operating temperature: -10°C to +60°C



Specifications

Lithium Battery with Tags/Connector



Tag/Connector	Medel	Connective(mAh)				Size	S ====				
Description	Model	Capacity(mAn)	Α	В	С	D	E	F	G	н	Spec
T2	CR2	800	15.6	27	29	7.2	-	28	-	-	T:0.15 STAINLESS STEEL
Т8	CR123A	1500	17	34	35	1.9	4	34.5	12.8	2.65	T:0.30 STAINLESS STEEL
T12	CR123A	1500	17	34	35	1.3	4	34.5	-	-	T:0.30 STAINLESS STEEL
CR2/3A-T4	CR2/3A	1650	17	34	35	5.2	4	34.5	7.5	-	T:0.30 STAINLESS STEEL
CR2/3A-B	CR2/3A	1650	17.5	20	37	29.5	-	-	-	-	J.S.T. PHR-2

Application Table for GP Primary Lithium Cylindrical

	Lithium Cylindrical								
GP Model Applications	CR-V9	CR123A	CR2/3A	CR2	CR14250	CR-P2	2CR5	15LF	24LF
Internet of Things (IoT)		•		•				•	•
Sensors		•	•	•				•	•
Home Security Systems	•	•	•	•				•	•
Access Control Systems	•	•		•				•	•
Asset Tag/Tracker		•		•				•	•
Data Logger (Wireless, Weather)	•	•		•				•	•
Military Application	•	•		•				•	•
Automatic Faucet						•	•	•	•
Marine		•		•	•			•	•
Flashlights		•		•				•	•
Sport Optics	•	•		•				•	•
Metal Detector	•							•	•
Carbon Monoxide Alarms	•	•	•	•					
Wireless Transmitters	•							•	•
Cameras (Conventional/Digital/Instant)		•		•				•	•
Medical Equipement & Application	•	•						•	•
Meters (Gas/Electric/Water)		•	•						
Photo Flash		•						•	•







Specifications

Application Table for GP Primary Lithium Coin

	Lithium Coin											
GP Model Applications	CR1/3N	CR1216	CR1220	CR1616	CR1620	CR1632	CR2016	CR2025	CR2032	CR2430	CR2450	
Cameras (Conventional/Digital/Instant)	•											
Calculators		•	•	•	•		•	•	•	•	•	
Car Key		•	•	•	•		•	•	•	•	•	
Electronic Thermometers		•	•	•	•		•	•	•	•	•	
FA Instruments		•	•	•	•		•	•	•	•	•	
Greeting Cards		•	•	•	•		•	•	•	•	•	
IC Tags		•	•	•	•		•	•	•	•	•	
Memory Back Up	•	•	•	•	•		•	•	•	•	•	
Medical Equipement & Application	•	•	•	•	•	•	•	•	•	•	•	
Meters (Gas/Electic/Water)	•									•	•	
Photo Flash	•											
Portable Games		•	•	•	•		•	•	•	•	•	
Time Pieces		•	•	•	•		•	•	•	•	•	







Precautions for Battery Handling

1. Do not charge. When this battery is charged, gas is generated inside and raises internal pressure, resulting in fire, heat generation, leakage or bursting.

2. Do not dispose of in fire, disassemble or heat in any way. It will damage the insulation materials and the safety vent resulting in fire, heat generation, leakage or bursting.

3. Insert batteries properly. Keep polarities in the correct position aligning + and – correctly for ALL batteries to avoid leakage or bursting.

4. Do not short-circuit. If the + and – come into contact with metal objects, short circuiting occurs resulting in heat generation or bursting. When carrying or storing batteries, avoid direct contact with metal objects such as bracelets or key chains by putting them in a separate bag.

5. Keep away from children. Consult a doctor IMMEDIATELY if a battery or leaked liquid is swallowed.

6. If leakage or strange smell occurs, keep batteries well away from fire from fire to prevent ignition of leaked electrolyte.

7. Do not solder. It will damage the insulation materials resulting in fire, heat generation, leakage or bursting.

8. Do not force-discharge. When a battery is force-discharged by an external power source, the voltage drops to 0 or less (reversal voltage) and gas is generated inside the battery. This may cause fire, heat generation, leakage or bursting. 9. If leaked liquid gets into the eyes, wash IMMEDIATELY with plenty of clean water and consult a doctor.

10. Do not use different types of batteries nor new and used batteries together. Doing so can cause heaty generation, leakage or bursting.

11. Do not apply strong force or handle roughly to avoid heat generation, leakage or bursting.

12. Do not use nor keep batteries in direct sunlight nor high-temperature areas. Doing so may cause heat generation, leakage or bursting.

13. Do not wash nor place batteries in water as this may cause heat generation.

14. Read the instruction manual. Take note of all precautions carefully before use. Make sure these batteries are appropriate for your equipment.

15. Storage precautions. Keep batteries away from direct sunlight, excess humidity and high temperature areas as this can cause dangerous heat generation.

16. For proper disposal and transportation follow local authority guidelines and regulations.

17. Battery shall not be punctured, crushed, disassembled, or stored beyond the maximum temperature range specified on the data sheet. 18. Do not use if there is any sign of leakage or deformation. Read the Material Safety data Sheet (MSDS) for precautions and leakage handling directions.

19. Switch off the device immediately once the battery from the device after its temperature is cooled down to normal.

20. Only use the battery for the applications which it is designed for.

21. The warning labels must be read and all the safety precautions must be followed.

22. In case of battery fire incident refer to MSDS for control instructions.

23. While installing the battery pack in the device, ensure the pack is installed in the right position and away from the heat sources in the device, in order to avoid any damage caused to the battery pack.

24. Adopt a battery pack mechanism to prevent battery pack from being ejected, if the device is suffered from a drop of any physical impact.





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