EaglePicher Technologies, LLC
Commercial **Power**
P.O. Box 47
Joplin, MO 64802
(417) 623-8000
inquiry.**keeper**@eaglepicher.com

Keeper® II Lithium Thionyl Chloride ($LiSOCl_2$)

MSDS

EaglePicher provides an outstanding line of Lithium Thionyl Chloride cells and batteries, which are capable of providing power to a wide variety of applications. The exceptional reliability of the original Keeper® II cell is a result of the unique electrochemistry of the system, along with a design concept that requires military ruggedness. Keeper® II batteries provide reliable performance under several environmental conditions.

Click on Part Number to view data sheet.

Keeper® II Cylindrical Cells ($LiSOCl_2$)

Voltage (V)	Capacity (mAh)	Length (in)	Width (in)	Thickness (in)	Part Number
3.5	950	0.985	0.540	8.6	LTC-9C (1/2 AA)
3.5	1700	1.980	0.540	15.5	LTC-17C (AA)
3.6	1800	1.95	0.58	17	PT-2100
3.6	1000	0.95	0.58	9	PT-2150
3.5	6000	1.95	1.03	52	PT-2200
3.5	12000	2.42	1.35	100	PT-2300
3.6	1000	0.266	1.295	16	HP-5134
3.6	1600	0.400	1.279	25	HP-5135

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard.
29 CFR 1910.1200 Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

Identity *(As Used on Label and List)*
KEEPER II/Lithium/Thionyl Chloride Battery

Note: *Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that*

Section I

Manufacturer's Name	Emergency Telephone Number
Eagle-Picher Technologies, LLC	417-776-2256 800-424-9300 (CHEMTREC)
Address (Number, Street, City State, and Zip Code)	Telephone Number for Information
P.O. Box 130	417-776-2256
14212 Bethel Road	Date Prepared
Seneca, MO 64865	1-Jul-98
	Signature of Preparer (optional)

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Lithium metal Cas #7439-93-2		N/A-reactive alkali metal		
Thionyl chloride ($SOCl_2$) Cas #007719-09-7	1/0 ppm	5/0 ppm		

Section III - Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O=1)	N/A
Vapor Pressure (mm Hg.)	N/A	Melting Point	N/A
Vapor Density (Air=1)	N/A	Evaporation Rate (Butyl Acetate=1)	N/A

Solubility in Water
N/A

Appearance in Odor
N/A

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A			

Extinguishing Media
Do not use water. Use dry chemical, soda ash, sand.

Special Fire Fighting Procedures
Use self contained breathing apparatus and full protective equipment.

Unusual Fire and Explosion Hazards
Do not recharge, disassemble, heat above 125°C (257°F), incinerate or expose contents to water.
Vent, rupture or explosion may result and cause severe burns.

Section V - Reactivity Data

Stability			
	Unstable		Conditions to Avoid:
	Stable	XX	Vent rupture or explosion will release thionyl chloride

Incompatibility (Materials to Avoid)

$SOC1_2$ Water, humid air, alkalies, and temperature above 140°C (284°F)

Hazardous Decomposition or Byproducts

$SOC1_2$ In presence of water or humid air, hydrochloric acid & sulfur oxide.

Hazardous Polymerization			
	May Occur		Conditions to Avoid
	Will Not Occur	XX	

Section VI - Health Hazard Data

Routes(s) of Entry	Inhalation?	Skin?	Ingestion?
Eyes	Yes	Yes	Yes

Health Hazards (Acute and Chronic)

$SOC1_2$ - Will burn and irritate eyes & skin. Upper respiratory irritant. Continuous inhalation of fumes may cause lung damage.

Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
N/A			

Signs and Symptoms of Exposure

$SOC1_2$ - Eye and skin irritation, pungent odor and respiratory irritation.

Medical Conditions Generally Aggravated by Exposure

N/A

Emergency and First Aid Procedures

If free($S0C1_2$) is present, evacuate areas and provide ventilation, wash exposed area with soda ash or sodium bicarbonate solution. Seek medical attention.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled

Avoid contact if vent rupture or explosion has occurred. Other wise protect from heat, short circuit of terminals, an accumulation of shorted batteries, which may cause dangerous elevated temperatures

Waste Disposal Method

Dispose of waste according to federal EPA, state and local regulations.

Precautions to be taken in Handling and Storing

Do not short circuit, heat above 125°C (257°F), recharge, disassemble, incinerate or expose to water.

Other Precautions

Section VIII - Control Measures

Respiratory Protection *(Specific Type)*

Self-contained breathing apparatus

Ventilation	Local Exhaust	Specific
	Mechanical *(General)*	Other
N/A		

Protective Gloves	Eye Protection
Neoprene	Recommended

Other Protective Clothing or Equipment

N/A

Work/Hygienic Practices

N/A

EAGLE PICHER

KEEPER® II

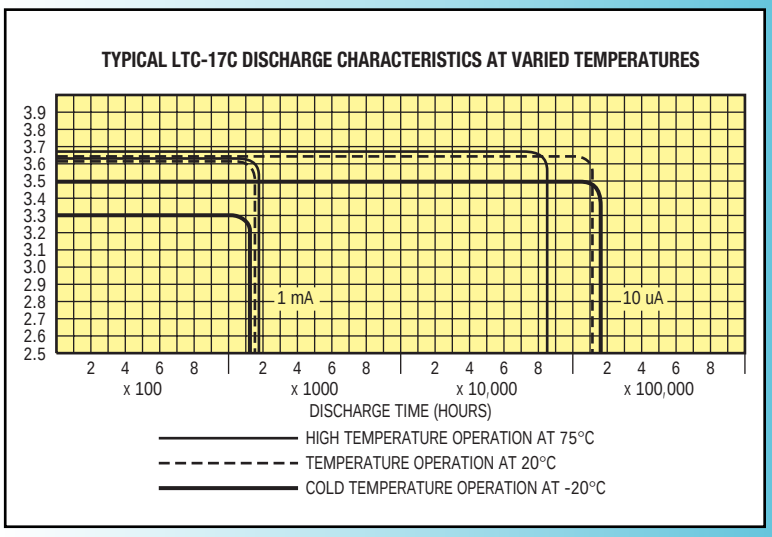
LTC-9C & 17C

Lithium-Thionyl Chloride Batteries

The 17C and 9C KEEPER cells are perfect for situations which require a AA or 1/2AA size battery. With the rugged design of a bobbin type configuration, these cells are a good match for military and industrial applications. Available with a variety of pin configurations, or with Molex connectors, these cells are an excellent fit for your cylindrical cell needs.

LTC-9C & 17C Product Features

- Manufactured in the USA.
- Stainless steel construction provides corrosion resistance, hermetic seal and structural integrity.
- Years of low rate continuous use.
- Stand-by use with 80% capacity retention after 15 years at room temperature.
- Wave solderable (limit solder bath exposure to a maximum of 5 seconds).
- High energy density compared to other chemistries.
- No charging circuits required.
- Higher cell voltage allows for fewer cells and high reliability.
- Flat discharge characteristics provide optimum voltage regulation.
- Non-pressurized system allow for high temperature usage.
- Ship unrestricted.
- Underwriters Laboratories recognized component.



Do you have questions concerning:

- What size battery you need?
- What is passivation and its effects?
- What is the maximum rate of this cell?
- Any other technical question?

If so, call our Engineers at (417) 659-9635 for detailed technical information.

EAGLE PICHER

KEEPER® II

LTC-9C & 17C

Lithium-Thionyl Chloride Batteries

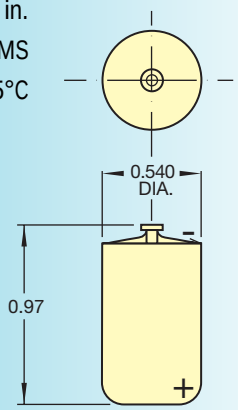
Part Number	Voltage	Capacity (mAh)	Length (in.)	Diameter (in.)	Weight (g)
* LTC-9C	3.5	950	0.97	0.54	8.5
LTC-9C/P	3.5	950	1.00	0.54	8.5
LTC-9C/PT	3.5	950	1.00	0.54	8.5
LTC-9C/T	3.5	950	1.00	0.54	8.5
LTC-17C	3.5	1700	1.96	0.54	16.6
LTC-17C/T	3.5	1700	1.96	0.54	16.6

* Supplied with Molex connector

Specifications LTC-9C

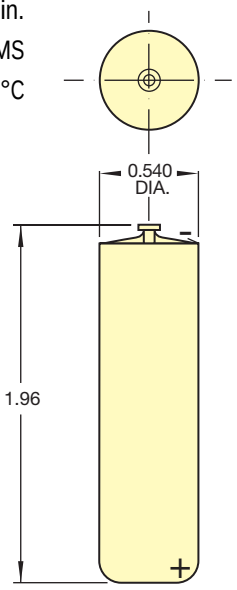
Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C ..... 950 mAH
Volume ..... .21 cu. in.
Weight .....8.5 GMS
Operating Temperature..... -40°C to +95°C
Case Material: 304 Stainless Steel, Hermetically Sealed (case negative polarity)
Terminal pin (positive) are 446 Stainless Steel

Termination of pins, tabs or pintabs available.



Specifications LTC-17C

Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C ..... 1700 mAH
Volume ..... .44 cu. in.
Weight..... 16.6 GMS
Operating Temperature..... -40°C to +95°C
Case Material: 304 Stainless Steel, Hermetically Sealed (case negative polarity)
Terminal pin (positive) are 446 Stainless Steel



WE CAN DESIGN TO FIT ANY APPLICATION.

Our team of engineers can design any pin configuration required to fit your specialized application. If you don't see a battery configuration you need here, call us and we will begin working on a EPT part number just for you.

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KEEPER® II

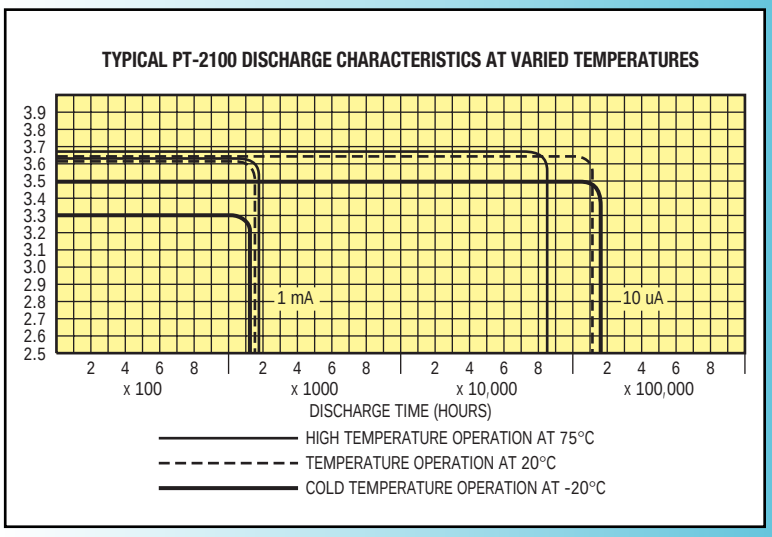
PT SERIES

Lithium-Thionyl Chloride Batteries

The Eagle-Picher PT Series of KEEPER cells, were developed as an economical, high power option for design experts who prefer the cylindrical design. With sizes and capacities ranging from the PT-2150 (1200 mAh) to the PT-2300 (19,000 mAh), this cylindrical design will provide the long life power needed for commercial applications.

PT Series Product Features

- Stainless steel construction provides corrosion resistance, hermetic seal and structural integrity.
- Years of low rate continuous use.
- Stand-by use with 80% capacity retention after 15 years at room temperature.
- Wave solderable (limit solder bath exposure to a maximum of 5 seconds).
- High energy density compared to other chemistries.
- No charging circuits required.
- Higher cell voltage allows for fewer cells and high reliability.
- Flat discharge characteristics provide optimum voltage regulation.
- Non-pressurized system allow for high temperature usage.
- Underwriters Laboratories recognized component.



Do you have questions concerning:

- What size battery you need?
- What is passivation and its effects?
- What is the maximum rate of this cell?
- Any other technical question?

If so, call our Engineers at (417) 659-9635 for detailed technical information.

EAGLE PICHER

KEEPER® II

PT SERIES

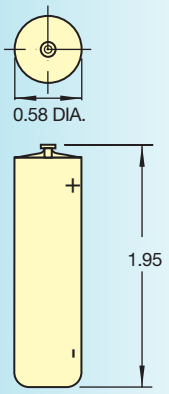
Lithium-Thionyl Chloride Batteries

Part Number	Voltage	Capacity (mAh)	Length (in.)	Diameter (in.)	Weight (g)
PT-2100 (AA)	3.5	2200	1.95	0.58	17.00
PT-2150 (1/2 AA)	3.5	1200	0.95	0.58	9.00
PT-2200 (C)	3.5	8500	1.95	1.02	52.00
PT-2300 (D)	3.5	19000	2.40	1.34	100.00

Available with tabs, pins, pintabs or axial leads upon request.

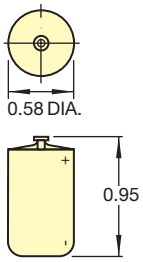
Specifications PT-2100

Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C ..... 2200 mAH
Volume..... .44 cu. in.
Weight ..... 17.0 GMS
Operating Temperature .....
..... -55°C to +85°C
Case Material:
304 Stainless Steel,
Hermetically Sealed
(case negative polarity)



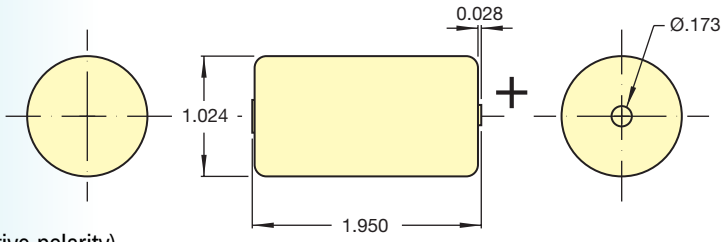
Specifications PT-2150

Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C ..... 1200 mAH
Volume ..... 21 cu. in.
Weight ..... 9.0 GMS
Operating Temperature .....
.....-55°C to +85°C
Case Material:
304 Stainless Steel,
Hermetically Sealed
(case negative polarity)



Specifications PT-2200

Nominal Open Circuit Voltage, 25°C ..... 3.65 volts
Nominal Working Voltage, 25°C..... 3.6 volts
Nominal Capacity (350 hr. rate), 25°C ..... 8500 mAH
Volume ..... 1.42 cu. in.
Weight ..... 52.0 GMS
Operating Temperature ..... -55°C to +85°C
Case Material: 304 Stainless Steel, Hermetically Sealed (case negative polarity)



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KEEPER® II

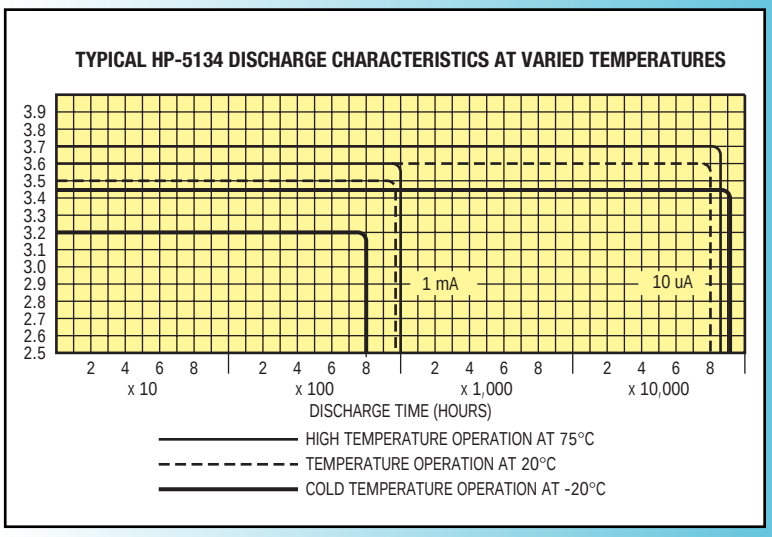
HP SERIES

Lithium-Thionyl Chloride Batteries

Eagle-Picher is breaking from tradition with the HIGH POWER (HP) Series. Designed to compliment the KEEPER II line, the HP Series offers capacities from 200mAh to 1700mAh, giving additional options to the electronics design engineer. Component material compatibility ensures high quality hermetic designs, which offer a shelf life in excess of 15 years. When a wafer cell design is preferred, the Eagle-Picher HP Series will have a cell to match your requirements.

HP Series Product Features

- Stainless steel construction provides corrosion resistance, hermetic seal and structural integrity.
- Years of low rate continuous use.
- Stand-by use with 80% capacity retention after 15 years at room temperature.
- Highly efficient utilization of valuable board space.
- Wave solderable (limit solder bath exposure to a maximum of 5 seconds).
- High energy density compared to other chemistries.
- No charging circuits required.
- Higher cell voltage allows for fewer cells and high reliability.
- Flat discharge characteristics provide optimum voltage regulation.
- Non-pressurized system allow for high temperature usage.
- Ship unrestricted.
- Underwriters Laboratories recognized component.



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- Any other technical question?

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EAGLE PICHER

KEEPER II

HP SERIES

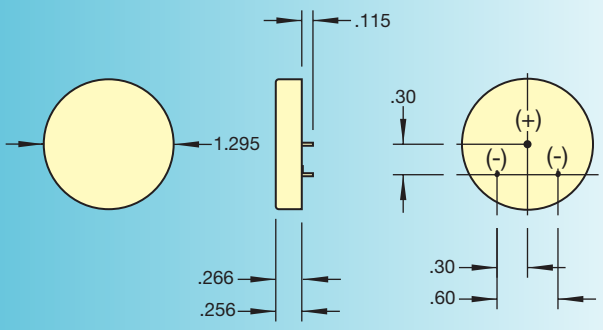
Lithium-Thionyl Chloride Batteries

Part Number	Voltage	Capacity (mAh)	Length (in.)	Diameter (in.)	Weight (g)
HP-4986	3.5	400	0.279	0.708	4.95
HP-5134	3.5	1000	0.256	1.295	16.0
HP-5135	3.5	1600	0.400	1.279	25.00
HP-6135	3.5	1600	0.400	1.279	25.00

Insulator available upon request.

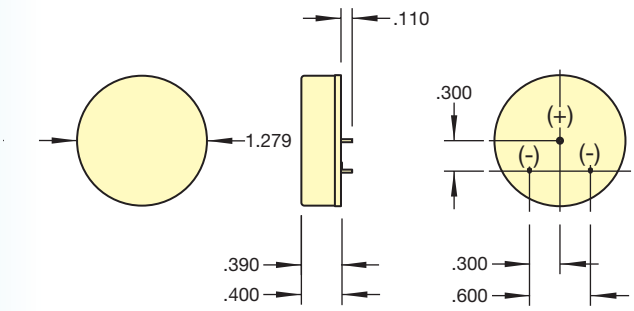
Specifications HP-5134

Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C 1000mAH
Volume ..... .31 cu. in.
Weight ..... 16 GMS
Operating Temperature ..... -40°C to +85°C
Case Material: 304 Stainless Steel, Hermetically Sealed (case negative polarity)
Terminal and Support Pins are .030" dia. (solder tinned)



Specifications HP-6135

Nominal Open Circuit Voltage, 25°C ..... 3.67 volts
Nominal Working Voltage, 25°C..... 3.5 volts
Nominal Capacity (350 hr. rate), 25°C 1600mAH
Volume ..... .50 cu. in.
Weight ..... 25.0 GMS
Operating Temperature ..... -40°C to +85°C
Case Material: 304 Stainless Steel, Hermetically Sealed (case negative polarity)
Terminal and Support Pins are .030" dia. (solder tinned)



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