

# PRIMARY LITHIUM BATTERY SELECTOR GUIDE



**S A F T**

THE BATTERY COMPANY

## SAFT LITHIUM BATTERIES: EXCEEDING YOUR NEEDS

**For more than 30 years, Saft has pioneered, in Europe, North America and Asia/Pacific, the development and production of primary lithium cells and battery packs.**

**Autonomy, power, voltage, shape, weight, service life, price... Saft knows how to tailor battery solutions you can count on.**

With more than 4,700 employees, 2 R&D centers, 9 manufacturing facilities and 25 local sales organizations, a product range offer covering the 3 main primary lithium chemistries of today, Saft is a truly international player in the field of batteries and power supply systems for professional, industrial, space and military uses.

Among recognized characteristics of the Saft spirit worldwide are quality, performance, reliability, openness and an ability to meet the most demanding challenges. Take advantage of them for your applications!

### Lithium power at your service

Lithium is a light metal which exhibits an exceptional specific capacity (3.86 Ah/gram) and unique electrochemical characteristics.

Combining lithium with manganese dioxide ( $MnO_2$ ) powder or low-freezing point liquid cathode materials such as thionyl chloride ( $SOCl_2$ ) or sulfur dioxide ( $SO_2$ ), results in batteries with high energy, low weight, reduced self-discharge rate, and ability to operate under extreme conditions.

### Saft's lithium products

3 lithium chemistries are currently available:

- Lithium-thionyl chloride ( $Li-SOCl_2$ ) in LS/T/LSH 3.6 V cells,
- Lithium-sulfur dioxide ( $Li-SO_2$ ) in G/LO 3.0 V cells,
- Lithium-manganese dioxide ( $Li-MnO_2$ ) in LM 3.0 V cells.



# SAFT LITHIUM BATTERIES: EXCEEDING YOUR NEEDS

The LS and T cells are *cylindrical* and based on the high-energy concentric "bobbin" electrode configuration. They are available in *standard*, and *high capacity "C" versions*, both adapted to low current applications.

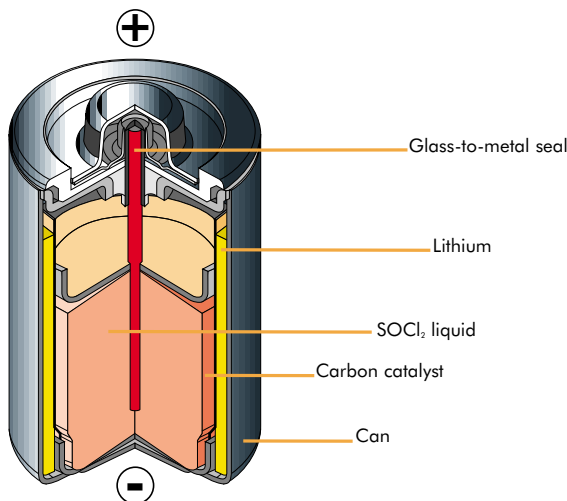
The LSH, G, LO and LM cells are also *cylindrical* but use the power-optimized "spiral" electrode construction. The cells are available in "SX" and "G" *standard versions* and in *high pulse capability "SHX" versions*.

The LM cell series is completed with 3 button cells aimed at memory back-up.

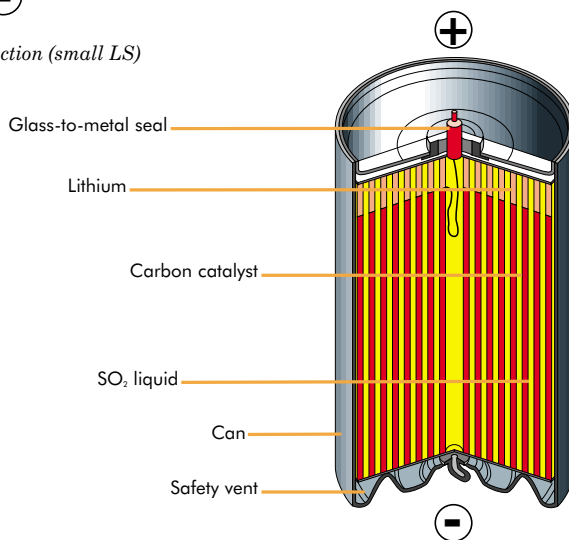
Corrosion-proof containers, hermetic sealing based on rugged glass-to-metal seals and TIG or laser welds, built-in safety vents and individual protection fuses are design features common to most of Saft's lithium cells.

The LS/T/LSH/G/LO/LM cells are available as single units (with different optional finishes) or assembled within battery packs.

Whatever your application, you will probably find a Saft lithium battery able to meet your particular requirements. If not, custom-made solutions can be developed within your time-to-market constraints.



*Bobbin construction (small LS)*



*Spiral construction (LO)*

## SAFT PRIMARY LITHIUM BATTERIES: APPLICATIONS

	Memory back-up	Real time clocks	Utility metering + AMR	Security alarms	Electronic toll collection	Automotive electronics	Radio communication	Emergency location Buoys	Lighting Night vision	Medical defibrillators	Downhole logging	Meteorology + Space	Professional electronics
LM buttons	▼	▼		▽									▼
LS, T small bobbins (½AA, AA, ¾A, A)	▼	▼	▼	▼	▼	▼		▼	▼		▼		▼
LS large bobbins (C, D)	▼		▼	▼		▼		▼	▼		▽	▼	▼
LSH spirals			▽	▼		▼	▼	▼	▼		▼	▼	▼
G/LO spirals			▽	▼		▼	▼	▼	▼	▼		▼	▼
LM spirals			▽	▼		▼	▼	▼	▼			▼	▼

▼ recommended

▽ possible

## SAFT PRIMARY\* LITHIUM CELLS: KEY FEATURES

\* Primary batteries are not rechargeable.

- **High and stable operating voltage**
  - Above 3.0 V for LS/T/LSH cells.
  - Above 2.5 V for LO/G/LM cells.
- **Wide current capability range**

From a few microamperes base current for the LM buttons and small LS/T cells to more than 10 A pulses for some LO, G, and LM cells.
- **Wide operating temperature range**

From -60°C up to 85°C depending on cell type, current drain and environment conditions.
- **Long shelf life**

Capacity loss in storage at +20°C below 1% (LS, T, LM) and 3% (LSH, G, LO) per year.
- **Extended operating life**

Typically above 5 years, and up to 12 years for some applications.
- **High energy densities**

3-10 times greater than the other non-lithium systems.
- **Easy disposal**
- **Adequate safety**

Most of Saft's lithium cells are UL (Underwriters Laboratories) recognized and non-restricted for transport.  
Most battery packs comply with European and US Army specifications.
- **Storage**

The storage area should be clean, cool (not exceeding +30°C), dry and ventilated.

## SAFT PRIMARY LITHIUM CHEMISTRIES: SPECIFIC QUALITIES

- **Li-SOCl<sub>2</sub>** (LS, T, LSH cell series)
  - Operating voltage > 3 Volt
  - Ability to operate from -60 to 85°C
  - Non-flammable electrolyte
  - Cells non-pressurized at room temperature
  - Hermeticity guaranteed up to 110°C
  - Unrivalled nominal capacities (LS, T)
  - "C" cell versions yield longer service lives at low currents and higher transient minimum voltage during pulsing at temperature not exceeding 40°C.
- **Li-SO<sub>2</sub>** (G, LO cell series)
  - Non-flammable electrolyte
  - Superior pulse capability
  - Excellent capacity above 1 A
  - Superior power at -40°C
  - Hermeticity guaranteed up to 95°C
  - Wide military acceptance
  - "SHX" cell versions offer superior pulse capability for discharges not exceeding declared voltage cut-off.
- **Li-MnO<sub>2</sub>** (LM cell series)
  - Non-corrosive electrolyte
  - Cells non-pressurized at room temperature
  - Spiral cells with superior pulse capability and competitive capacity at high current
  - No voltage delay
  - Reduced self-discharge

## SAFT LITHIUM CELL SERIES: PERFORMANCE DATA

Data given on following pages relates to batteries aged up to 12 months and properly stored. Consult Saft regarding specific pulse conditions or usage following prolonged storage and/or exposure to extreme temperatures.

- Nominal capacity at +20°C and 2.0 V discharge cut-off (continuous current).
- Maximum recommended continuous current:
  - LS/T bobbin cells : the current providing 50% of the nominal capacity at +20°C and 2.0 V cut-off.
  - LSH/G/LO/LM spirals : the current that keeps the cells self-heating within safe limits.
- Maximum recommended pulse current : varies according to pulse characteristics (duration, frequency), temperature conditions, cell storage conditions prior to usage and the application's acceptable minimum voltage.

Production site	Size	Open circuit voltage	Nominal voltage	Nominal capacity (drain)	Maximum recommended continuous current	Operating temperature range	Outside diameter max.	Height max.	Weight	UL recognition	Transport
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**Small LS/T bobbin cells**

<b>LS 14250</b>	F	½ AA	3.67 V	3.6 V	1.00 Ah (1.5 mA)	40 mA	-60/+85°C*	14.5 mm	24.8 mm	8.5 g	yes	Non-restricted
<b>T 04</b>	UK	½ AA	3.67 V	3.6 V	1.00 Ah (1.5 mA)	40 mA	-60/+85°C*	14.4 mm	25.2 mm	10.0 g	yes	Non-restricted
<b>LS 14250 C</b>	F	½ AA	3.67 V	3.6 V	1.20 Ah (0.5 mA)	12 mA	-60/+40°C*	14.5 mm	24.8 mm	8.5 g	yes	Non-restricted
<b>LS 14500</b>	F	AA	3.67 V	3.6 V	2.25 Ah (3.0 mA)	120 mA	-60/+85°C*	14.5 mm	50.3 mm	16.0 g	yes	Non-restricted
<b>T 06</b>	UK	AA	3.67 V	3.6 V	2.20 Ah (3.0 mA)	120 mA	-60/+85°C*	14.4 mm	49.9 mm	18.0 g	yes	Non-restricted
<b>LS 14500 C</b>	F	AA	3.67 V	3.6 V	2.75 Ah (1.0 mA)	25 mA	-60/+40°C*	14.5 mm	50.3 mm	16.0 g	yes	Non-restricted
<b>T 32</b>	UK	¾ A	3.67 V	3.6 V	1.70 Ah (3 mA)	80 mA	-60/+85°C*	16.6 mm	34.1 mm	14.0 g	yes	Non-restricted
<b>LS 17500</b>	F	A	3.67 V	3.6 V	3.30 Ah (4 mA)	130 mA	-60/+85°C*	17.0 mm	50.5 mm	23.5 g	yes	Non-restricted

\* Cells leakproof up to 120°C

**Large LS bobbin cells**

<b>LS 26500</b>	F	C	3.67 V	3.6 V	7.3 Ah (5 mA)	170 mA	-60/+85°C*	26.0 mm	49.2 to 50.4 mm**	48 g	yes	Non-restricted
<b>LS 33600</b>	F	D	3.67 V	3.6 V	16.5 Ah (5 mA)	250 mA	-60/+85°C*	33.3 mm	60.1 to 61.6 mm**	90 g	yes	Non-restricted
<b>LS 33600 C</b>	F	D	3.67 V	3.6 V	18.5 Ah (1 mA)	80 mA	-60/+40°C*	33.3 mm	60.1 to 61.6 mm**	90 g	yes	Non-restricted

\* Cells leakproof up to 110°C

\*\* Depending on cell finish

**LSH spiral cells**

<b>LSH 26180</b>	F	⅓ C	3.67 V	3.6 V	1.15 Ah (10 mA)	400 mA	-60/+85°C*	26.2 mm	18.9 mm	24 g	---	Non-restricted
<b>LSH 14</b>	F	C	3.67 V	3.6 V	5.5 Ah (10 mA)	800 mA	-60/+85°C*	26.0 mm	50.4 mm	51 g	yes	Class 9
<b>LSH 20</b>	F	D	3.67 V	3.6 V	13.0 Ah (15 mA)	1800 mA	-60/+85°C*	33.3 mm	61.6 mm	100 g	yes	Class 9

\* Cells leakproof up to 110°C

Cells fitted with individual 5 Amp fuse protection

**Li-SOCl<sub>2</sub> MILITARY LITHIUM BATTERY PACKS**

	Cell type construction	Open circuit voltage	Nominal voltage	Voltage cut-off	Rated capacity	Maximum dimensions	Weight	Safety features	NATO stock number	Typical applications
<b>PS 31 A</b>	1 LSH 26180	3.67 V	3.5 V	2.0 V	1.0 Ah	26.2 x 18.9 mm	25 g	5 A fuse	6135-14-376-4875	Night vision
<b>PS 38 A</b>	5 LSH 26180	18.0 V	17.5 V	10.0 V	1.0 Ah	110.7 x 37 mm	155 g	5 A fuse	6135-14-389-9050	Laser telemetry
<b>PS 40 A</b>	4 LSH 14	14.7 V	14.0 V	10.0 V	4.6 Ah	108 x 65 x 49 mm	285 g	PTC 1.1 A*	6135-14-420-1760	Radiocommunication (TRPP 11/13)
<b>PS 42 A</b>	2 LSH 20	7.3 V	7.0 V	5.0 V	9.0 Ah	69.9 x 67.2 x 34 mm	230 g	PTC 3.5 A*	6135-14-434-0766	Radiocommunication (TRPP 39)
<b>PS 48 B</b>	5 LSH 20-2	18.3 V	17.5 V	12.6 V	18.0 Ah	212.4 x 72.7 x 68.5 mm	1150 g	PTC 1.85 A*	6135-14-451-7198	Radiocommunication (TRC 350)
<b>PS 52 A</b>	2 LSH 20	7.3 V	7.2 V	5.0 V	12.5 Ah	77.5 x 63.5 x 34.6 mm	225 g	PTC 2.0 A*	6135-14-459-9265	Radiocommunication (Portable PR4G)
<b>PS 53 B</b>	6 LSH 20	22.0 V	21.0 V	15.0 V	12.5 Ah	210.5 x 68.5 x 37.5 mm	720 g	PTC 2.5 A*	6135-14-459-9266	Radiocommunication (Portable PR4G)

\*Maximum hold current

Production site	Size	Open circuit voltage	Nominal voltage	Nominal capacity (drain)	Maximum recommended continuous current	Operating temperature range	Outside diameter max.	Height max.	Weight	UL recognition	Transport
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**G/LO spiral cells**

<b>G 04</b>	UK	½ AA	3.0 V	2.9 V	450 mAh (50 mA)	250 mA	-60/+70°C*	14.2 mm	27.9 mm	8 g	---	Non-restricted
<b>G 06</b>	UK	AA	3.0 V	2.9 V	950 mAh (100 mA)	1000 mA	-60/+70°C*	14.2 mm	50.3 mm	15 g	---	Non-restricted
<b>G 32</b>	UK	⅔ A	3.0 V	2.9 V	800 mAh (80 mA)	750 mA	-60/+70°C*	16.3 mm	34.5 mm	12 g	---	Non-restricted
<b>G 36</b>	UK	"long" A	3.0 V	2.9 V	1700 mAh (100 mA)	1500 mA	-60/+70°C*	16.3 mm	57.7 mm	18 g	---	Class 9
<b>LO 34 SX</b>	USA	⅓ C	3.0 V	2.9 V	860 mAh (80 mA)	1000 mA	-60/+70°C*	25.6 mm	20.3 mm	18 g	yes	Non-restricted
<b>LO 35 SX</b>	USA	⅔ C	3.0 V	2.9 V	2000 mAh (120 mA)	2000 mA	-60/+70°C*	25.6 mm	35.9 mm	30 g	yes	Class 9
<b>G 52</b>	UK	C	3.0 V	2.9 V	3750 mAh (150 mA)	2500 mA	-60/+70°C*	25.6 mm	49.5 mm	47 g	---	Class 9
<b>LO 29 SHX</b>	USA	C	3.0 V	2.9 V	3750 mAh (150 mA)	2500 mA	-60/+70°C*	25.6 mm	50.4 mm	40 g	yes	Class 9**
<b>G 54</b>	UK	¾ C	3.0 V	2.9 V	5000 mAh (200 mA)	2500 mA	-60/+70°C*	25.6 mm	60.2 mm	58 g	---	Class 9
<b>LO 43 SHX</b>	USA	¾ C	3.0 V	2.9 V	5000 mAh (200 mA)	2500 mA	-60/+70°C*	25.6 mm	59.3 mm	53 g	yes	Class 9
<b>LO 40 SHX</b>	USA	⅔"Thin"D	3.0 V	2.9 V	3500 mAh (120 mA)	2000 mA	-60/+70°C*	28.8 mm	41.6 mm	40 g	yes	Class 9
<b>LO 30 SHX</b>	USA	"Thin"D	3.0 V	2.9 V	5750 mAh (200 mA)	3000 mA	-60/+70°C*	29.1 mm	59.8 mm	63 g	yes	Class 9**
<b>G 20</b>	UK	D	3.0 V	2.9 V	7750 mAh (250 mA)	2500 mA	-60/+70°C*	33.3 mm	61.0 mm	88 g	---	Class 9
<b>LO 26 SX</b>	USA	D	3.0 V	2.9 V	7750 mAh (250 mA)	2500 mA	-60/+70°C*	33.8 mm	59.3 mm	85 g	yes	Class 9**
<b>LO 26 SHX</b>	USA	D	3.0 V	2.9 V	7500 mAh (1000 mA)	4000 mA	-60/+70°C*	34.2 mm	59.8 mm	85 g	yes	Class 9**
<b>LO 25 SX</b>	USA	"Fat"D	3.0 V	2.9 V	8000 mAh (270 mA)	2500 mA	-60/+70°C*	38.4 mm	50.3 mm	93 g	yes	Class 9
<b>LO 39 SHX</b>	USA	F	3.0 V	2.9 V	11000 mAh (300 mA)	3000 mA	-60/+70°C*	30.7 mm	99.4 mm	125 g	yes	Class 9
<b>G 22</b>	UK	DD	3.0 V	2.9 V	16500 mAh (500 mA)	3000 mA	-60/+70°C*	33.3 mm	120.6 mm	175 g	---	Class 9

\* Cells leakproof up to 95°C

\*\* 1A fused version non-restricted

**Li-SO<sub>2</sub> MILITARY LITHIUM BATTERY PACKS**

	Cell type construction	Open circuit voltage	Nominal voltage	Voltage cut-off	Rated capacity	Maximum dimensions	Weight	Safety features	NATO stock number	Typical applications
<b>BA 5112/U</b>	4 LO 35 SX	11.8 V	11.2 V	8.0 V	2.0 Ah	77.8 x 57.2 x 39.1 mm	180 g	0.8 A fuse	6135-01-235-4168	Radiocommunication (PRC 112)
<b>BA 5567/U</b>	1 LO 34 SX	2.95 V	2.9 V	2.0 V	0.86 Ah	25.9 x 19.9 mm	16 g	No fuse	6135-01-090-5363	Night vision
<b>BA 5588/U</b>	5 LO 40 SX	14.7 V	14.0 V	10.0 V	3.5 Ah	96 x 90 x 31 mm	295 g	1.0 A fuse	6135-00-088-2708	Radiocommunication (PRC 128)
<b>BA 5590/U</b> (2 sets of terminals)	5 LO 26 SX-2	14.7 V 29.5 V	14.0 V 28.0 V	10.0 V 20.0 V	7.5 V 15.0 Ah	127 x 111.8 x 62 mm	1020 g	2.25 A fuse	6135-01-036-3495	Radiocommunication (PRC 104/119)
<b>BA 5598/U</b>	5 LO 25 SX	14.7 V	14.0 V	14.0 V	8.0 Ah	120.7 x 92 x 54 mm	680 g	2.25 A fuse	6135-01-034-2239	Radiocommunication (PRC 25/74/77)
<b>BA 5599/U</b>	3 LO 26 SX	8.8 V	8.4 V	6.0 V	7.5 Ah	152 x 38 x 64 mm	450 g	2.25 A fuse	6135-01-034-2239	Radio tester
<b>BA 5600/U</b>	3 LO 26 SX	8.8 V	8.4 V	4.0 V	7.5 Ah	185.9 x 39.4 mm	360 g	2.25 A fuse	6135-01-168-2944	Communication terminal AN/PSC 2/cap
<b>BA 5800/U</b>	2 LO 26 SX	5.9 V	5.6 V	4.0 V	7.5 Ah	128.5 x 35.5 mm	220 g	2.25 A fuse	6135-99-798-9851	GPS
<b>BA 5847/U</b>	2 LO 26 SX	5.9 V	5.4 V	4.0 V	7.5 Ah	95 x 64.8 x 38 mm	240 g	3.0 A fuse	6135-01-090-5364	Radiocommunication Mine detector
<b>Li/3</b>	3 LO 26 SX	8.8 V	8.4 V	6.0 V	7.5 Ah	110 x 42 x 26.2 mm	450 g	10 A fuse	6135-14-383-9768	Missile

# SAFT Li-MnO<sub>2</sub>

Production site	Size	Open circuit voltage	Nominal voltage	Nominal capacity (drain)	Maximum recommended continuous current	Operating temperature range	Outside diameter max.	Height max.	Weight	UL recognition	Transport
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## LM button cells

<b>LM 2032</b>	F	20 x 3.2 mm	3.3 V	2.9 V	200 mAh (0.2 mA)	3 mA	-20/+60°C	20.0 mm	3.2 mm	2.9 g	yes	Non-restricted
<b>LM 2430</b>	F	24.5 x 3 mm	3.3 V	2.9 V	285 mAh (0.2 mA)	3 mA	-20/+60°C*	24.5 mm	3.0 mm	4.0 g	yes	Non-restricted
<b>LM 2450</b>	F	24.5 x 5 mm	3.3 V	2.9 V	540 mAh (0.2 mA)	3 mA	-20/+60°C	24.5 mm	5.0 mm	6.0 g	yes	Non-restricted

## LM spiral cells

\* Operating temperature range extended to -20/+70°C for the resin-encapsulated Memoguard 40 LH or LF 220 versions

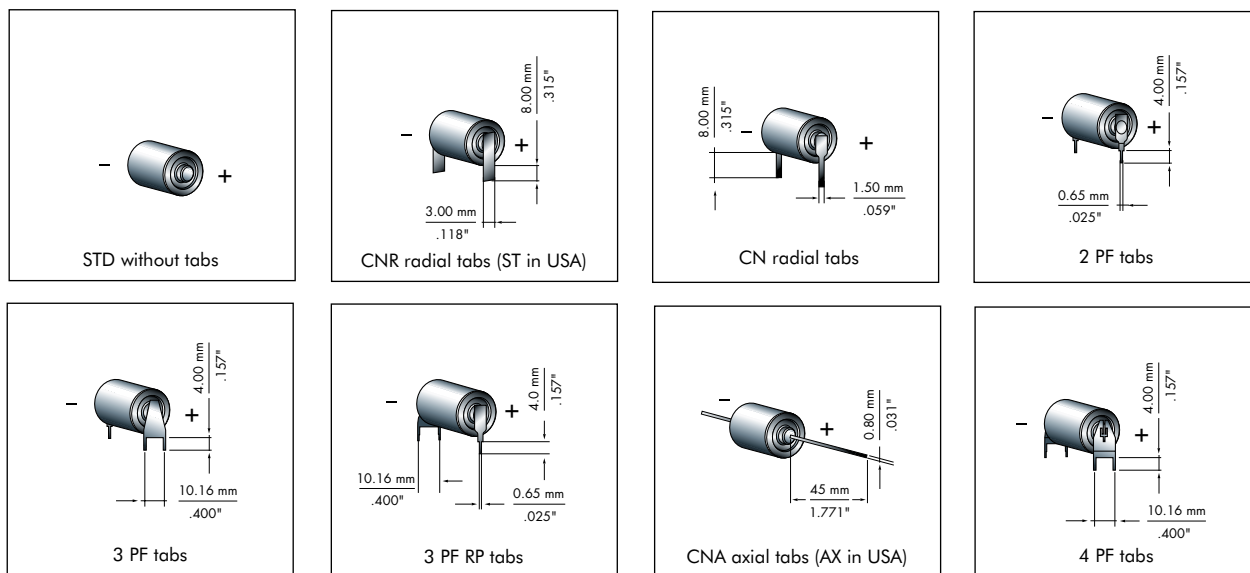
<b>LM 14250 (ex-M 04)</b>	USA	½ AA	3.3 V	2.9 V	350 mAh (41 mA to 2.4 V)	-	-40/-70°C*	24.8 mm	3.2 mm	8.5 g	---	Non-restricted
<b>LM 17130 (ex-M 31)</b>	USA	⅓ A	3.3 V	2.9 V	450 mAh (4.5 mA to 2 V)	-	-40/+70°C*	25.2 mm	3.0 mm	10 g	---	Non-restricted
<b>LM 22150 (ex-M 38)</b>	USA	⅓ sub-C	3.3 V	2.9 V	950 mAh (40 mA to 2.25 V)	-	-40/+70°C*	24.8 mm	5.0 mm	8.5 g	---	Non-restricted
<b>LM 26500 (ex-M 52)</b>	UK	C	3.3 V	2.9 V	4500 mAh (500 mA)	1000 mA	-40/+70°C*	25.6 mm	51.0 mm	60 g	---	Class 9
<b>LM 26600 (ex-M 54)</b>	UK	¾ C	3.3 V	2.9 V	5500 mAh (500 mA)	1200 mA	-40/+70°C*	25.6 mm	61.5 mm	72 g	---	Class 9
<b>LM 33600 (ex-M 20)</b>	UK	D	3.3 V	2.9 V	10500 mAh (1000 mA)	2500 mA	-40/+70°C*	33.7 mm	61.5 mm	116 g	---	Class 9

\* Cells leakproof up to 80°C

## Li-MnO<sub>2</sub> MILITARY LITHIUM BATTERY PACKS

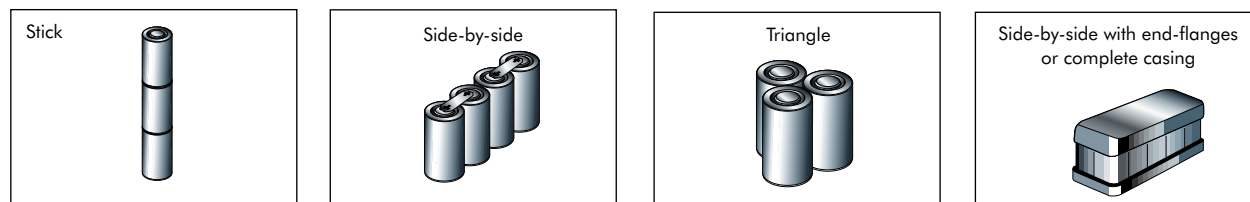
	Cell type construction	Open circuit voltage	Nominal voltage	Voltage cut-off	Rated capacity	Maximum dimensions	Weight	Safety features	NATO stock number	Typical applications
<b>BA 5368/U</b>	4 LM 22150	13.2 V	12.0 V	9.0 V	1.0 Ah	76.2 x 26.9 mm	145 g max	-	6135-01-455-7947	Radiocommunication (PRC-90-103-106-195)
<b>BA 5372/U</b>	2 LM 17130	6.6 V	6.0 V	4.0 V	0.5 Ah	16.5 x 33.0 mm	20 g	-	6135-01-214-6441	Radiocommunication (SINCGARS)

## EXAMPLES OF STANDARD INDIVIDUAL CELL TABBING ARRANGEMENTS\*



\* Other cell finishes are available upon request

## EXAMPLES OF STANDARD BATTERY PACK CONFIGURATIONS



# SERVING YOUR NEEDS AROUND THE WORLD

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