

# Lithium Ion Battery Packs

## NOTES AND PRECAUTIONS

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Lithium Ion battery packs (also referred as Li-ion, secondary, or rechargeable) are small, compact, with high energy concentration, and ideal for providing long lasting power to portable test equipment in demanding applications. Li-ion battery packs contain Li-ion cells and battery monitoring & protection circuitry, both sealed in a plastic container or wrap that shall not be disassembled. For safety reasons these batteries packs and products containing them MUST be used, charged, and handled properly, according to the manufacturer's recommendations. Improper use can result in product damage, electrolyte leaks, serious injury, and fire hazard.

Sunrise Telecom's Li-ion battery packs are tested and certified to UN38.3 and related safety regulations.

Performance and life expectancy of batteries depend heavily on how battery packs are used. In order to ensure safety, be sure to carefully read and understand this document and to keep it handy. If you have any questions or concerns, please contact Sunrise Telecom Incorporated immediately at 1-800-701-5208 / 1-408-360-2200, [support@sunrisetelecom.com](mailto:support@sunrisetelecom.com) or visit <http://www.sunrisetelecom.com/support>.

### Lithium-ion Advantages

- The biggest advantage Li-ion batteries have is the improvements in cell voltage and capacity over nickel cadmium (NiCd) or nickel metal hydride (NiMH) batteries. Li-ion batteries are therefore said to have a much higher energy density compared with NiCd or NiMH batteries.
- Unlike NiCd or NiMH batteries, Li-ion batteries have no 'memory' effect. This translates into more productive products or systems that can be used un-corded for longer periods in the field or handle higher-end applications, which are usually more energy demanding.
- Much lighter batteries, compared to the same capacity NiCd.
- No cadmium. As most people know, cadmium is highly toxic and is known to accumulate in biological systems, which is why NiCd batteries must be disposed of carefully and in the right places, following local regulations.

Although there are many other technical advantages that make Li-ion the current chemistry of choice for high-end portable equipment, much greater care is required for Li-ion batteries. Fortunately, more precise equipment and monitoring systems are built-into these battery packs for performance and safety reasons. A more rigorous approach, plus a profound awareness of Li-ion batteries, is vital to the wellbeing and SAFETY of users, bystanders, equipment, and premises. It's important to remember that, like other batteries, these batteries too may explode if abused!

### General Warnings

- Do not place the battery pack or cells on or near fires, heaters, other high temperature locations, or apply heat to the battery.
- Do not pierce the battery with any sharp objects, strike the battery with a hammer, tools, or heavy objects, step on the battery pack, or otherwise damage the outer casing.
- Do not subject the battery pack to strong impacts or shocks.
- Do not expose the battery to water or any other type of liquid, or allow the battery to get wet.
- Do not leave the battery in direct sunlight, and avoid storing spare battery packs inside cars in extreme hot weather. Doing so may cause the battery to generate heat, rupture, or ignite. Using the battery in this manner may also result in a loss of performance and a shortened life expectancy. When a battery becomes too hot, the built-in protection circuitry is activated,

preventing the battery from charging further. Heating the battery can destroy the safety devices, and can cause additional heating, rupture or ignition of the battery cells-

- Never short-circuit, reverse polarity, disassemble, damage or heat the battery pack over 100°C (212°F).
- If an exposed lithium-ion battery does start a fire, it may burn even more violently if it comes into contact with water or even the moisture in the air. DO NOT THROW WATER ON A BURNING LI-ION BATTERY! A class C fire extinguisher must be used.
- Although most battery packs have protected (recessed) connectors, do not carry individual battery packs in your pockets as they could short-circuit against other metal items.
- In the case of a high-impact event to the test system or the battery pack (e.g. car crash or drop > 0.75m/30 in) you must carefully inspect the battery for damage and properly discard it if damaged. Always observe the battery carefully for at least 20 minutes after an impact. The pack may look fine but a perforation or damaged wire means the pack must be disposed of according to local regulation. Contact Sunrise Telecom if in doubt.
- Do not disassemble or modify the battery pack. The battery contains safety and protection devices which, if damaged, may cause the battery to generate heat, rupture or ignite.
- Any modification may damage the battery pack or cells and will invalidate any warranty claim.
- If you happen to get any electrolyte from the cells on your skin, wash thoroughly with soap and water. If in your eyes, do not rub. Rinse thoroughly with water and seek medical assistance.
- Keep battery packs away from untrained personnel and children!

## Charging and Storing Battery Packs

For safety reasons, rechargeable battery packs are not fully charged when they are shipped. Please read the following instructions carefully:

- New battery packs need to be fully charged and discharged up to five times before performing at full capacity.
- Always use the Sunrise Telecom's charger that came with the device. Do not attempt to charge the battery pack by any other means.
- The portable instrument, its external chargers, and the battery pack itself continuously monitor the conditions of the cells for safety and maximum performance.
- Do not use the Sunrise Telecom's charger with other lithium batteries or on any other type of battery – fire or explosion may occur.
- Never modify or repair the charger supplied.
- Never use a NiCd charger or any other charger to recharge the Li-ion battery pack as this is very dangerous.
- Never charge your Li-Ion battery pack near heat or flammable objects.
- The required charging time will depend upon the remaining charge level of the battery, and will vary from product to product. Charging the battery while the test set is being used will increase the charging time. Required charging time may also increase at lower temperatures.
- The temperature range over which the battery can be charged is typically 0°C to 45°C (32°F to 113°F). Therefore, charging efforts outside the prescribed temperature range may automatically be blocked by the protection circuitry of the battery pack.
- If a battery pack can not maintain charge for long periods, even when it is being charged correctly, this may indicate it is time to replace the battery.
- If the product or battery pack becomes too hot to the touch during charging, disconnect and switch off immediately. Contact Sunrise Telecom.
- Do not charge battery packs if the battery has expanded or swollen in size, or if the battery cells have been punctured, even if this is the first time the battery is going to be charged.
- Do not charge or use the battery if any mechanical damage has occurred.
- Do not continue charging the battery if it does not recharge within the specified charging time. Doing so may cause the battery to become hot, rupture, or ignite. Please consult the product's manual and datasheet.
- Because batteries utilize a chemical reaction, battery performance will naturally deteriorate over time, even if stored for a long period without being used. In addition, if the various conditions such as charge, discharge, ambient temperature, etc. are not maintained within

the specified ranges, the life expectancy of the battery may be shortened, or the device in which the battery is used may be damaged by electrolyte leakage.

- Storage: For long term storage, the battery pack should be stored at room temperature (around 20°C/68°F), charged at about 30 to 50% of its capacity. We recommend that spare battery packs are charged and used at least once per year to prevent over-discharge.
- If you have spare (extra) battery packs, rotate the packs regularly, so they all stay active and avoid over-discharge. It is recommended to charge and use battery packs at least every three months. Battery packs shall not go without reconditioning (recharging) for more than six months.
- After extended storage battery packs may reach deep discharge state and/or enter into sleep mode. For safety reasons, Li-ion batteries in deep discharge state may take up to 24 hours to pre-recharge, before starting the regular fast charging cycle. Charging indicators (e.g. LEDs) may not turn on during the pre-charging state.

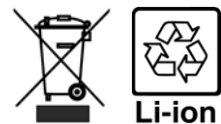
## Using Battery Packs

For the expected performance of each individual battery pack and test set, please refer to their specific manuals and datasheets.

- Sunrise Telecom battery packs shall only be used with the Sunrise Telecom product for which they were intended to be used. Follow the product's low battery indication and warnings. Do not over discharge a Li-ion battery pack. If the voltage does drop below specifications, and you can get your battery to take a charge, it may not give its full capacity and deterioration in performance will occur. This will invalidate all warranty claims.
- Do not discharge the battery pack using any device except for the specified test set it came with. The test set constantly monitors and controls the discharge rate to keep it within specifications. If used in devices aside from the specified devices, it may damage the performance of the battery pack, reduce its life expectancy, and if such device causes an abnormal current flow, it may cause the battery to become hot, rupture, or ignite, and could cause serious injuries.
- The temperature range over which the battery can be discharged is -10°C to 60°C (14°F to 140°F). Use of batteries at temperatures outside this range may damage the performance of the battery pack or may reduce its life expectancy.
- To avoid short circuits, make sure the battery pack's contacts are not exposed when transported outside the intended device (e.g. spares).
- Every deep discharge cycle decreases their capacity. Battery life will be extended by proper storage, and by charging the pack at least once per year to prevent over discharge.

## Battery Pack Disposal

- Batteries must be recycled or disposed of properly.
- Follow local regulations and ordinances for the disposal batteries.
- Do not trash battery packs in the garbage can.
- Before disposing the battery pack or cells, insulate any exposed terminals with adhesive tape or similar material to prevent short circuits.



## Shipping and Transportation (Air)

- Air transportation of Li-ion batteries is regulated in several countries, and by United Nations through the International Air Transportation Association (IATA) Dangerous Goods Regulations, among others. Please check local regulations and with the common carrier before shipping Li-ion battery packs or products containing relatively large Li-ion battery packs.
- As of January 1, 2008, the US Department of Transportation (DOT) through the Pipeline and Hazardous Materials Safety Administration (PHMSA) no longer allows loose lithium batteries in checked baggage.
- Sunrise Telecom's Li-ion batteries are tested in accordance with specifications detailed in UN 3090 (UN manual of Tests and Criteria, Part III, subsection 38.3). This safety precaution safeguards against the shipment of defective battery packs.

- Do not ship or carry recalled or damaged batteries on an aircraft. Check battery information and instructions at Sunrise telecom's website or contact Customer Support at 1 (800) 701-5208 / +1 (408) 360-2200 or support@sunrisetelecom.com.
- If the original packaging is not available for shipping spare batteries, effectively insulate any exposed battery terminals by isolating the batteries from contact with other batteries and metal. Do not permit a loose battery to come in contact with any metal objects.

IATA Classification

Medium and large capacity Lithium-ion battery packs may be classified as Class 9 – Miscellaneous dangerous goods. Shipments of such products must be identified by a Class 9 label on the shipping package and may be considered restricted cargo in passenger aircrafts. Individual Li-ion battery packs must be declared as:

- UN 3480 for Lithium-ion batteries or battery packs being shipped alone.
- If they are contained inside a piece of equipment or packed along with a piece of equipment, they must be declared as:
- UN 3481 for Lithium-ion batteries contained in equipment
  - UN 3481 for Lithium-ion batteries packed with equipment.

Li-ion (Secondary) Battery Category Definition & Restrictions

Relative Capacity	Capacity Watt-hours	Equiv. Lithium Content (ELC)	UN38.3 Tested	Applicable Shipping Regulations
Small	<100 Wh	<8g	Yes	Ground: Non-restricted Air: Non-restricted
Medium	100 to 312 Wh	8g to 25g	Yes	Ground: Non-restricted Air: Fully-regulated Class 9 hazardous material
Large	>312 Wh	>25g	Yes	Ground: Fully-regulated Class 9 hazardous material Air: Fully-regulated Class 9 hazardous material

Note: Check with your carrier for any required forms, labels and local regulations. Li-ion battery pack capacity may be printed on the battery.

**Product Registration**

- Registration is a very important step in the ownership of your instrument.
- For warranty and safety purposes all Sunrise Telecom products must be registered by the owner and/or end user.
- Customers would not only benefit from service notes and safety notifications, but from access to a wide range of improvements (e.g. software updates, new features, new documentation, etc.). Please follow the registration instructions that came with your product.
- Registration is the sole responsibility of the end user and owner. Products must also be registered, and contact information must be updated, whenever the end user, responsible person, or contact information changes.
- Customer and end user shall follow any calibration, verification, and/or preventive maintenance cycles recommended by the manufacturer for each specific product, to keep it under warranty and assure safety. During these procedures the battery pack will be checked for any sign of degradation, leakage or any other possible defect that may affect safety.
- Refer to the specific manual and datasheet for the suggested maintenance period.
- Copy of this document shall be kept with the product at all times.

**Customer Service Contact Information**

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## **Limited Warranty**

SUNRISE TELECOM INCORPORATED WARRANTS ITS BATTERY PRODUCTS TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP, UNDER NORMAL USE AND IF PROPERLY INSTALLED, FOR A PERIOD OF ONE YEAR FROM DATE OF PURCHASE.

Notice: *The information presented in this document is generally descriptive only and it is not intended to make or imply any representation, guarantee or warranty with respect battery packs. Please refer to individual product manuals and datasheets for specific information. This document is subject to change without notice. Contact Sunrise Telecom for the latest information.*