FR210 Safety Information



Geneva by design.

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Understanding Lithium-ion batteries

Lithium-ion batteries have revolutionized the landscape of portable electronics, electric vehicles, and energy storage systems, becoming the cornerstone of modern power solutions. Their popularity stems from a unique combination of high energy density, light weight, and rechargeability. In lithium-ion batteries, lithium ions shuttle between the anode and cathode during charge and discharge cycles, allowing for efficient energy storage and release.

This versatile technology has enabled the development of sleek and powerful devices, ranging from smartphones and laptops to electric cars. Despite their widespread use, challenges such as safety concerns and limited lifespan persist, prompting ongoing research and innovation. As society continues to transition towards cleaner energy sources, lithium-ion batteries remain at the forefront of the drive for more sustainable and efficient power solutions.

Risks of Lithium-ion batteries

While lithium-ion batteries have become common place in various applications, they are not without risks. One area of significant concern is the potential for thermal runaway, a phenomenon where the battery's temperature rapidly increases, leading to overheating and, in extreme cases, ignition of the cell. This risk is especially relevant in cases of overcharging, physical damage, or manufacturing defects. Additionally, the formation of dendrites—tiny conductive filaments—inside the battery can cause short circuits, leading to internal fires. Lithium-ion batteries are also susceptible to aging, which can result in reduced capacity and increased internal resistance, further increasing the risks of thermal runaway. Addressing and mitigating these risks remains crucial for ensuring the safe and sustainable use of lithium-ion batteries.



Unsafe Charging

The use of non-suitable battery chargers may result in overcharging, supplying incorrect voltage or current due to improper battery management system



External &/or Environmental Factors

Risks may occur when lithium-ion battery is exposed to high temperatures, high humidity, liquids or damage.

- Exposing lithium-ion to high temperatures carries the risk of causing the cell(s) to thermally run away resulting in ignition of the cell(s). This can occur if the battery is left exposed to high heat such as sitting in direct sunlight for extended periods of time or other external heat sources.

- Liquid or a high humidity environment may result in short circuit on internal components due to the buildup of liquid.

- Large external forces applied to the cell, resulting in the cell being crushed can case the cell to fail and ignite as well as the leaking of toxic chemicals.



Modifications or Self-Repair
Modifications or repurposing the cell(s) in other devices is hazardous.



Manufacturing Defects
The quality of the lithium-ion cell is a key factor when it comes to the safe operation of the cell. Poorly manufactured cells pose a safety risk to the safe operations of the cells. This can also increase the risk of thermal runaway and other issues due to contaminants within the cell construction. Other manufacturing factors include:

- Low quality components used in the battery management system.
- subpar design of the battery management system and/or using low quality components or PCB design.

How FR210 Manages these risks

FR210 manages the risks posed by Lithium-ion batteries in several ways to deliver a robust battery solution. These include but are not limited to:

Robust Build

FR210 housing is made from an aluminum extrusion with tough polycarbonate end caps. The cells are secured inside of the housing in a secondary smaller housing that holds them in place. This design helps to keep the cells safe from external forces and punctures. Flame resistant materials are also used for the construction of the product as well as high grade components. Furthermore, only lithium-ion cells from Panasonic are used in FR210. Security screws are also used in the build to prevent access to the internals of the product.

Battery Management System

The lithium-ion cells in FR210PB are managed by a battery management system (BMS) that protects the cells from over-charging, over temperature, cell imbalance and short circuit. The BMS ensures that the cells don't operate outside of their manufactured operational range, lowering the risks of thermal runaway. The FR210PB has been tested to UL2056 safety standard and is UL listed. FR210PB also employs

a unique charging pin design, preventing the charging of the product with third party devices. This ensures that only a CMS approved charger is used that has been specifically designed to safely charge the lithium-ion cells.

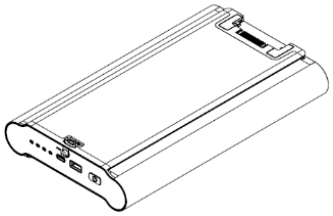
Visual Warnings

FR210PB contains both text and visual warnings on printed on the underside of the unit that bring to attention the safe operation of the unit, warning the user of the dangers if misusing the product.



Certifications

FR210PB

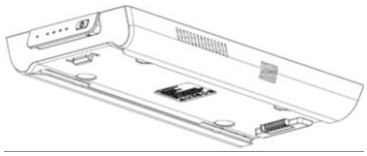


IEC62133 & IEC62368
UL2056
CE-EMC (EN 55032, EN 55035)
RoHS
UN38.3
USB-IF(PD)

Li-ion 20

LISTED E534552

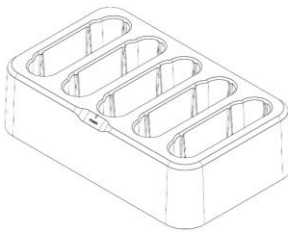
FR210DS



RCM (AS/NZS CISPR32)
CE-EMC (EN 55032, EN 55035)
ETL

Intertek
5028051
CONFORMS TO UL STD,62368-1
CERTIFIED TO CSA Std. C22.2
No.623468-1

FR210CS



RCM (AS/NZD CISPR32)
CE-EMS (EN 55032, EN 55035)
ETL

Intertek
5028051
CONFORMS TO UL STD,62368-1
CERTIFIED TO CSA Std. C22.2
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