



REDEFINING THE POWER LIMITS OF **FPV** **RACING DRONES**

Next-Gen Nanocomposite Materials & 3D Conductive
Network Technology Whitepaper.

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As the technology behind FPV (First-Person View) racing drones advances at a breakneck pace, the performance demands on power batteries have reached unprecedented heights. To meet the rigorous demands of top-tier pilots for extreme burst power, sustained endurance, and absolute reliability, we are proud to introduce the next-generation FPV racing battery—the R-line V6.0.

This white paper provides a deep dive into the three core technological innovations of the R-line V6.0: nanoparticle cathode materials with a porous electrode design, a point-line-plane 3D conductive network, and a new high-conductivity lithium salt combined with solid-state electrolyte technology. The fusion of these cutting-edge technologies enables the R-line V6.0 to achieve a quantum leap in energy density, internal resistance, and discharge performance, aiming to set a new performance benchmark for the FPV racing world.



Overview of Key Performance Upgrades

17%↑

Gravimetric Energy Density

Longer flight time with sustained power

26%↑

Volumetric Energy Density

More compact drone design

20%↑

Internal Resistance

Faster throttle response and reduced heat



The Power Bottleneck in FPV Racing

FPV racing is an extreme sport that demands the absolute peak of equipment performance. Drones must execute high-G maneuvers like accelerations, sharp turns, and flips within seconds. This places immense challenges on a battery's instantaneous high-current discharge capability (burst power), voltage stability (preventing sag), and overall weight management.

1 Voltage Sag

Rapid voltage drop under full throttle reduces motor output and may trigger low-voltage cut-off.

2 Insufficient Energy Density

Larger capacity batteries extend flight time but add weight, compromising agility and control.

3 High Internal Resistance

Elevated resistance limits peak discharge current and converts energy into heat, accelerating degradation and posing safety risks.

R-line V6.0 Core Technologies Breakdown

Traditional LiPo batteries often suffer from voltage sag, severe heat generation, and inadequate power output, making them unable to meet the extreme demands of high-intensity flight. These issues typically stem from poor conductivity in the anode and cathode materials, low thermal stability in the electrolyte, and structural designs that impede high-current flow and heat dissipation. The development goal of the R-line V6.0 was to tackle these core challenges head-on through comprehensive upgrades to its materials, structure, and electrolyte system, delivering a more reliable, agile, and safer power solution.

Nanoparticle Cathode Material

Utilizes nano-grade active materials to drastically shorten the lithium-ion diffusion path.



3D Conductive Network

A point-line-plane structure creates an electron superhighway, boosting electron transport efficiency.

New Electrolyte Technology

Combines a high-conductivity lithium salt with solid-state electrolyte to improve ionic conduction and overall safety.



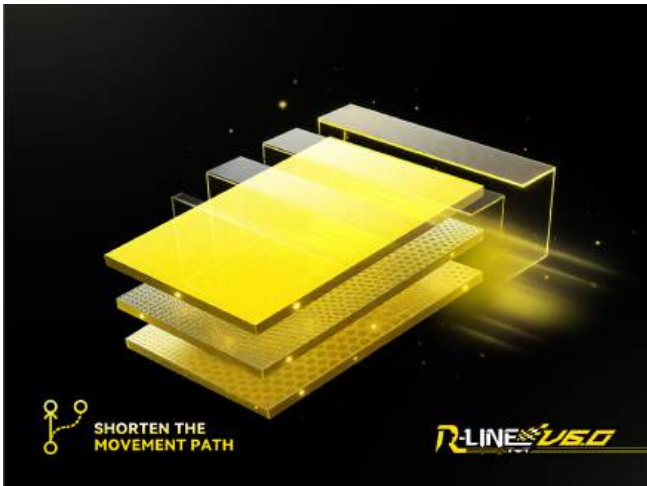
Cathode Revolution: Nanoparticle Materials & Porous Electrode Design

In traditional lithium batteries, cathode material particles are typically on the micron (µm) level. During charge and discharge cycles, lithium ions must migrate over relatively long distances within these solid particles. According to the principles of ion diffusion, the length of this path is a key factor limiting a battery's rate performance (high-current discharge capability).

The R-line V6.0 employs advanced Nano-particle Cathode Materials. By reducing the particle size of the active material to the nanometer (nm) scale, the diffusion path for lithium ions is shortened by several orders of magnitude. This allows Li+ to intercalate and de-intercalate from the electrode material much more rapidly, dramatically increasing the electrochemical reaction rate.

$$t \approx \frac{L^2}{2D}$$

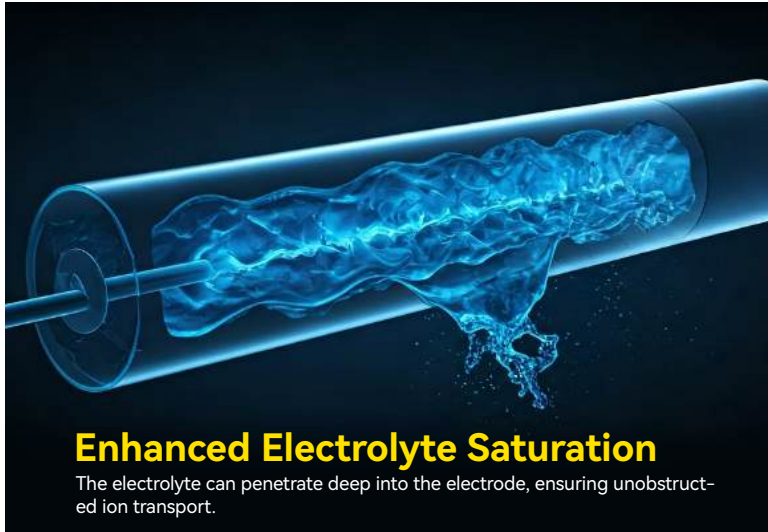
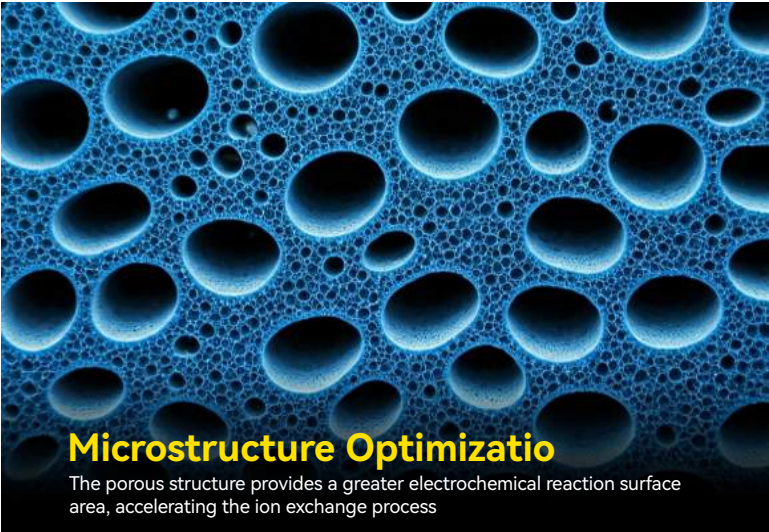
Where t is the ion diffusion time, L is the diffusion distance, and D is the diffusion coefficient. When L is significantly reduced, t decreases exponentially.



Advantages of the Porous Electrode Design

In tandem with nanoparticle materials, we have introduced a Porous Electrode Design. Through precise process control, we have engineered a vast network of micron and sub-micron-sized pores within the electrode sheet. This design not only provides a larger surface area for the nanoparticles to adhere to but, more importantly, it allows the electrolyte to fully saturate every corner of the electrode, creating highly efficient ion transport channels.

The core advantages of this design are ultimate burst power and reduced internal resistance. The extremely short ion diffusion paths and highly efficient transport channels mean the battery can instantly respond to full-throttle commands and unleash massive current, providing unparalleled thrust.



The 3D Conductive Network: Building an Electron Superhighway

A battery's performance depends not only on ion transport efficiency but also on the efficiency of electron transport within the electrode materials. Traditional conductive agents like carbon black form only point-to-point contacts, resulting in a single, inefficient conductive pathway. The R-line V6.0 creatively integrates a point-line-plane 3D Conductive Network within the anode material. This network is a composite of three different dimensional, high-conductivity carbon materials:

Point - Conductive Graphite

Serves as the foundational conductive nodes, filling the gaps between active material particles to build a base conductive network.

Conductive Network

Line - Carbon Nanotubes (CNTs)

Leveraging their excellent aspect ratio and extremely high conductivity, CNTs act like wires that weave between particles, establishing long-range conductive pathways.

Plane - Graphene

As a 2D atomic crystal with a massive specific surface area and ultra-high planar conductivity, graphene connects the "line" network into a cohesive "plane".

Performance Advantages of the 3D Conductive Network

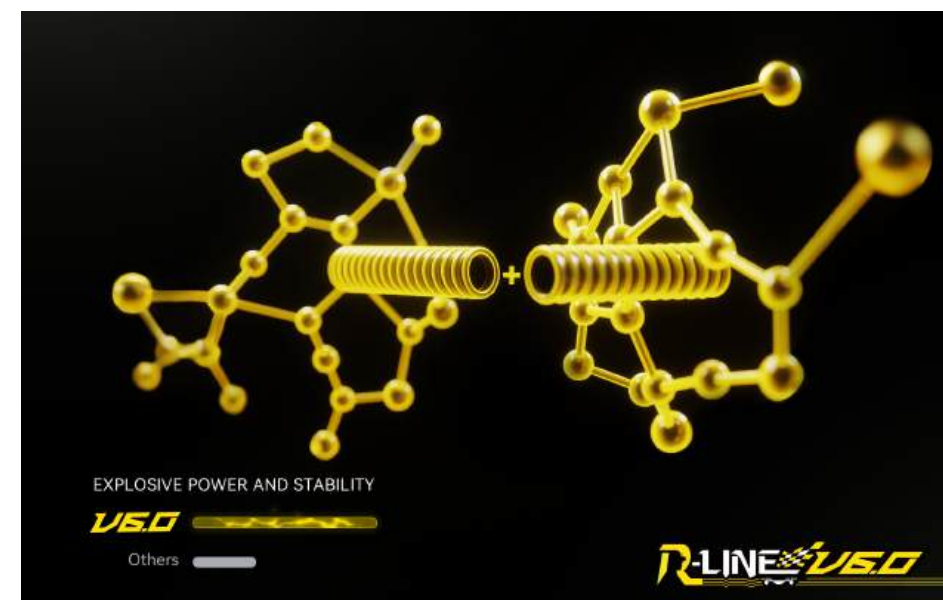
The R-line V6.0 features a creatively engineered point-line-plane 3D conductive network in its anode. This three-dimensional network functions like a highly efficient electron superhighway, ensuring that electrons can be rapidly transferred from the current collector to any part of the active material, allowing them to complete the electrochemical reaction in sync with the lithium ions.

1 Enhanced High-Rate Discharge Capability

With electron transport no longer a bottleneck, the battery can sustain an ultra-high C-rate discharge continuously and stably, meeting the most demanding racing requirements.

2 Improved Voltage Platform

During high-current discharge, Ohmic polarization is significantly reduced due to the extremely high electron transport efficiency. This results in a higher and more stable discharge voltage platform. Pilots will experience a much more linear power delivery and a consistent, locked-in feel from the beginning of a flight to the end.



Breakthroughs in Electrolyte and Safety

The electrolyte is the medium through which lithium ions travel between the anode and cathode, and its ionic conductivity directly impacts the battery's power performance. The R-line V6.0 incorporates two major innovations to significantly enhance both performance and safety.



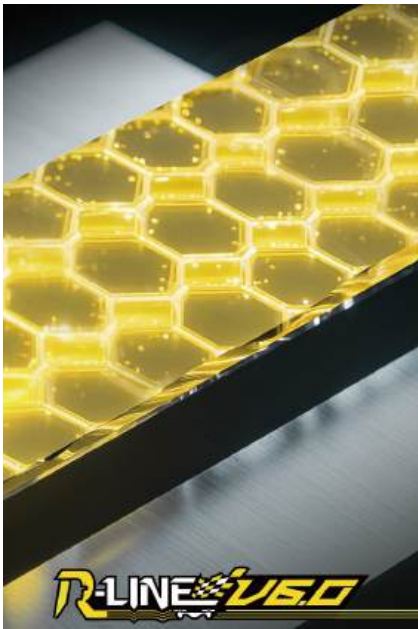
New Lithium Salt

In addition to the traditional Lithium Hexafluorophosphate (LiPF₆), we've introduced a novel lithium salt with a higher dissociation constant and a more optimal solvation structure. This new salt releases a greater number of free Li⁺ ions into the organic solvent, significantly boosting the overall ionic conductivity of the electrolyte.



Solid-State Electrolyte

The introduction of solid-state electrolyte technology serves two purposes. First, it reduces the amount of flammable liquid electrolyte, improving the battery's safety under abuse conditions such as overcharging or puncture. Second, this reduction in liquid electrolyte further increases the battery's energy density, thereby lowering its overall weight.



Performance Advantages of Electrolyte Innovation

1

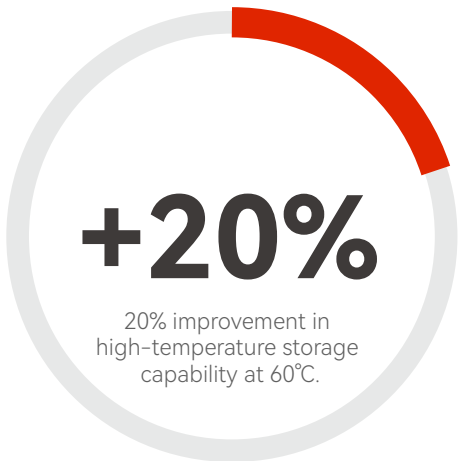
Increased Power Density and Safety

The combination of higher ionic conductivity and a more efficient electron transport network allows the battery to output greater power per unit of weight and volume. At the same time, the inclusion of a solid-state electrolyte gives pilots peace of mind while pushing the limits of performance.

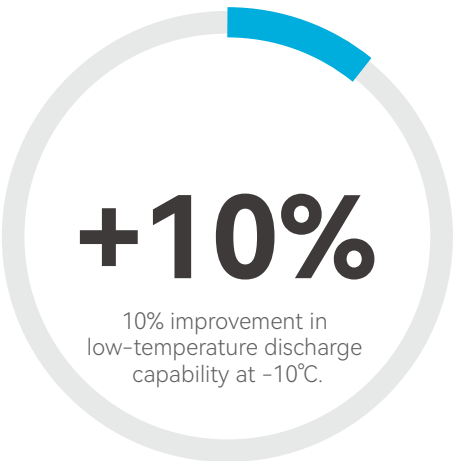
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Wider Operating Temperature Range

The new electrolyte system demonstrates better low-temperature performance and superior high-temperature stability. No matter the environment, the R-line V6.0 delivers reliable power, ensuring a consistent flight experience.



High-Temperature Stability

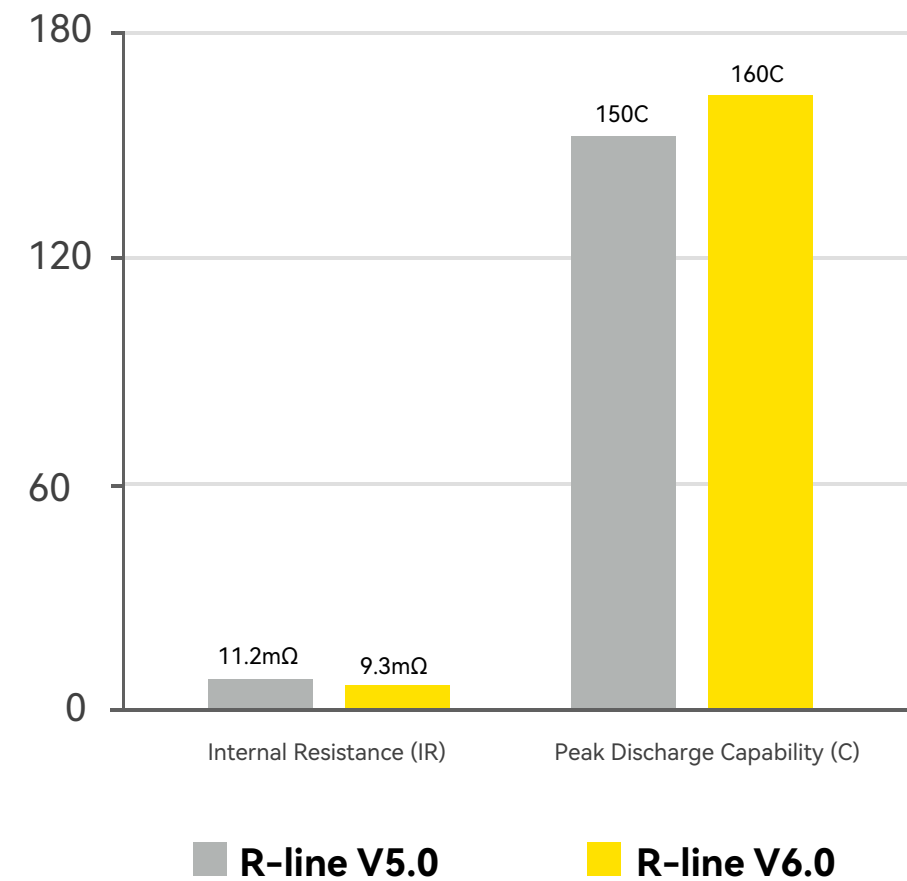
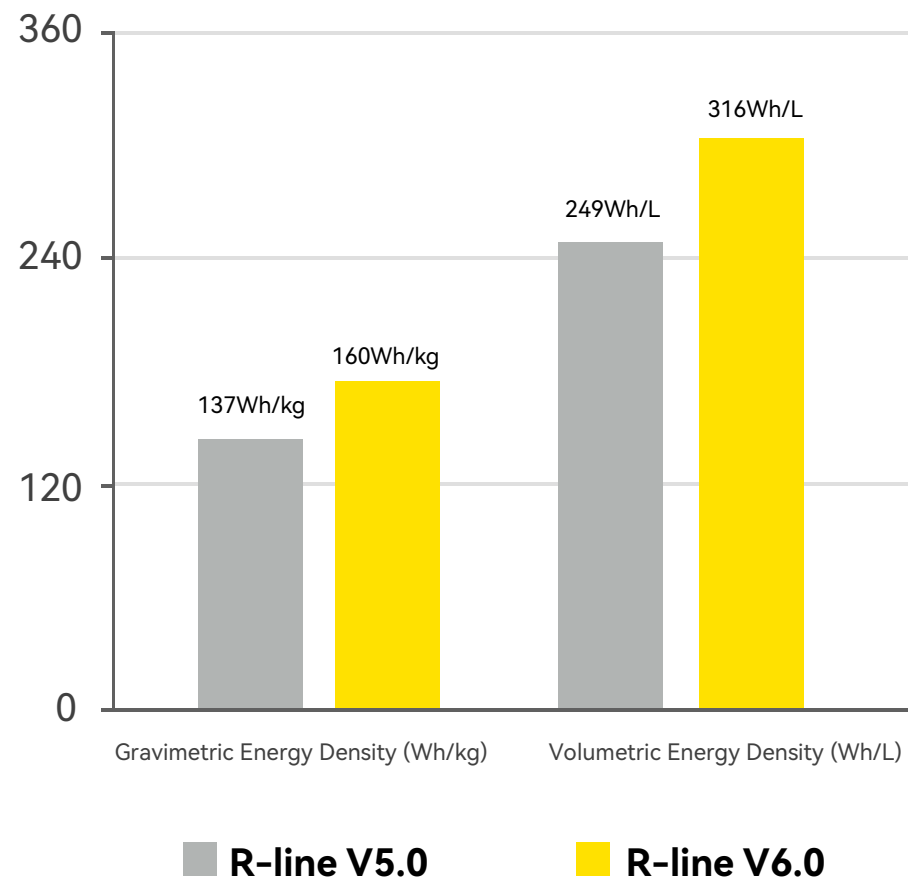


Low-Temperature Performance

R-line V6.0 Performance: A Practical Comparison

Performance Metric	R-line V5.0	R-line V6.0	Improvement	Core Value for FPV Racing
Gravimetric Energy Density	137Wh/kg	160Wh/kg	↑ 17%	Longer flight time / higher thrust
Volumetric Energy Density	249Wh/L	316Wh/L	↑ 26%	Compact airframe designs
Internal Resistance (IR)	11.2mΩ	9.3mΩ	↓ 20%	Reduced voltage sag, linear throttle response
Peak Discharge Capability	150C	160C	↑ 7%	Sustained power in high-G maneuvers

R-Line V6.0 Performance Comparison

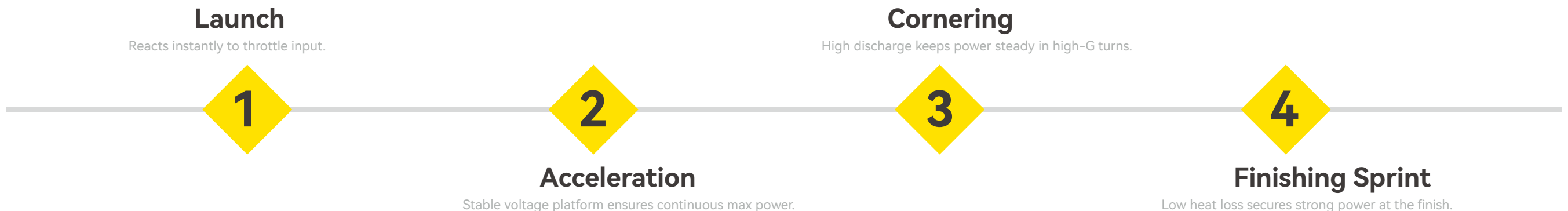




Real-World Application Value

Instantaneous Response, Win from the Start

The low-resistance design ensures the battery responds instantly. The moment you punch the throttle, power is delivered directly to the motors, giving pilots that critical 0.1-second advantage.



Lighter Flight, More Precise Control

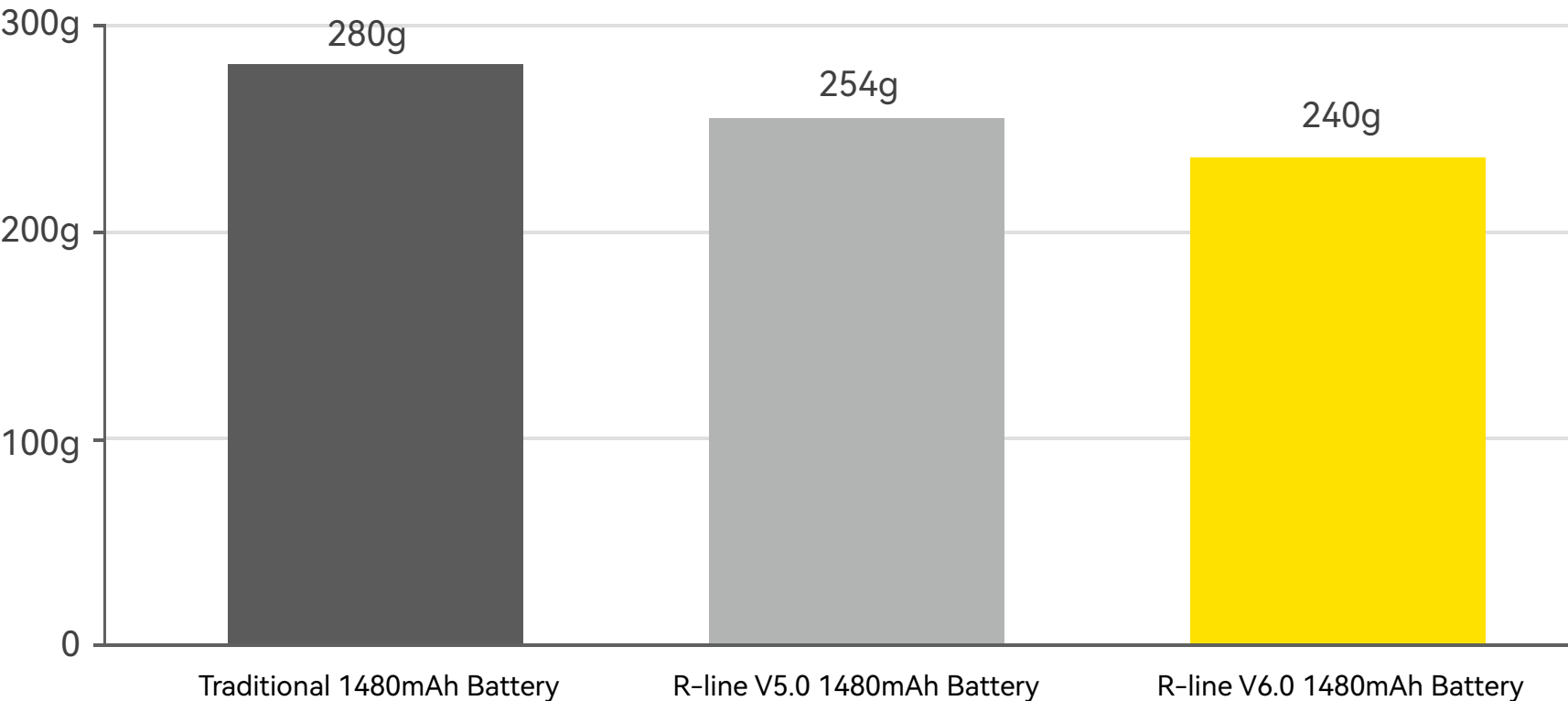
With a major boost in energy density, the R-line V6.0 is almost 15% lighter than traditional packs of the same capacity—translating to quicker handling and more precise maneuvers in flight.

1 Racing Advantage

Lighter weight means faster turn-in and shorter braking distances, allowing pilots to take more aggressive lines through gates.

2 Freestyle Advantage

Reduced weight lowers the drone's inertia, making rolls, flips, and other tricks smoother. This enables pilots to execute more complex and continuous combos.



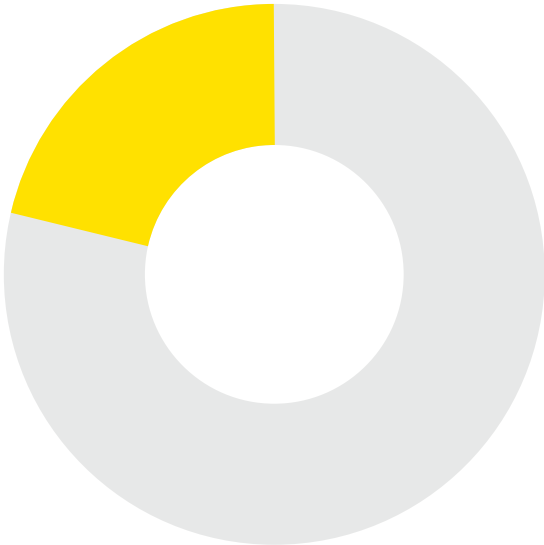
At the same capacity, the R-line V6.0 is 40g lighter than a traditional battery. This difference is especially noticeable during high-speed flight and sharp turns, providing pilots with more direct feedback and greater precision.

Lower Heat, Longer Lifespan

A 20% reduction in internal resistance significantly cuts down on thermal loss, preventing the battery from "puffing" and extending its overall service life, which saves long-term costs for professional pilots. During high-intensity racing, battery heat has always been a key factor limiting performance.

Increase in Cycle Life **20%↑**

Lower operating temperatures slow material aging, noticeably boosting the effective lifespan of the Tattu R-line V6.0.



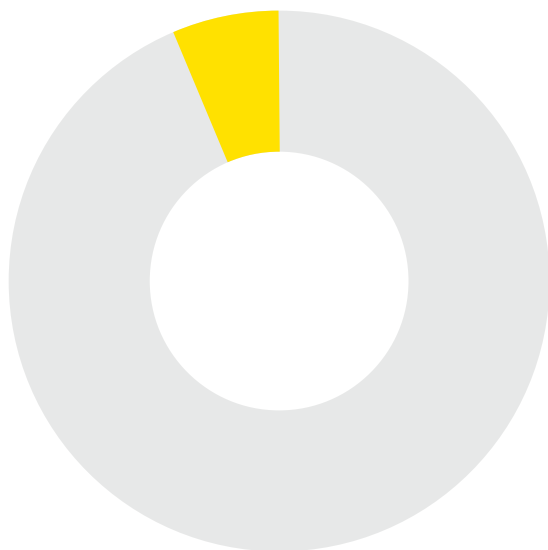
For pro pilots, the low-heat design of R-line V6.0 means:

- ◆ Consistent performance across multiple back-to-back race heats.
- ◆ Prevents batteries from puffing or deforming due to overheating.
- ◆ Reduces voltage instability caused by high temperatures.
- ◆ Extends battery cycle life, lowering long-term equipment costs.



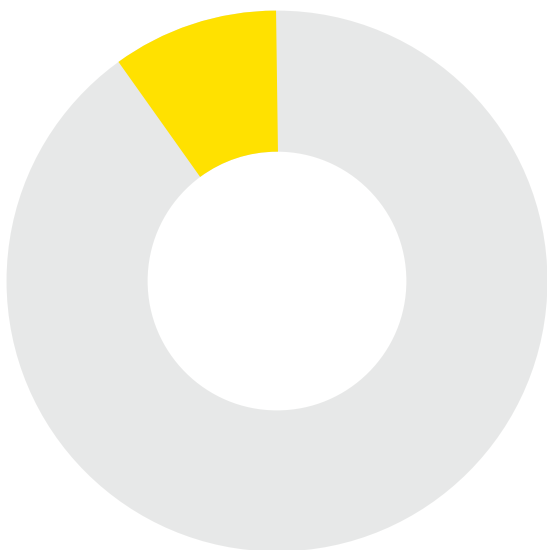
Safety, Upgraded

The solid-liquid hybrid electrolyte system dramatically improves thermal stability and puncture resistance, making the battery safer even during crashes or in high-temperature environments. FPV racing is a high-risk sport where crashes and falls are inevitable. While traditional LiPo batteries pose a safety risk upon physical impact, the solid-state electrolyte technology introduced in the R-line V6.0 significantly enhances the battery's safety profile.



Improvement in Puncture Resistance **10% ↑**

Enhanced durability against physical impact compared to traditional batteries.



Improvement in Thermal Stability **15% ↑**

Improved safe operating capability in high-temperature conditions.

This improved safety translates to:

- Enhanced puncture resistance, reducing the risk of battery damage from crashes.
- Higher thermal stability, ensuring safe operation even in extreme heat.



A Power Solution Validated by Champions

The R-line V6.0 series battery provides the core power for high-performance FPV racing drones by optimizing high-rate continuous discharge, maintaining a stable voltage platform, and achieving precise weight control. Its design goal is to meet the stringent demands of professional competition for power consistency and reliability.

The performance of this series has been proven in real-world racing environments. At the 2025 MULTIGP WORLD CUP—widely recognized as the premier international FPV racing event—Tattu-sponsored pilot YUKI used the R-line V6.0 exclusively and became the World Champion. This achievement directly reflects the battery's stability and consistent output under the most intense competition imaginable.

Competition-Proven Results

Since its release, the R-line V6.0 battery has demonstrated its competitive edge at numerous major events:

- 1** — MULTIGP WORLD CUP
World Champion (YUKI)
- 2** — DAR2025 China Drone Racing League
Open Class Champion (MINJAE)
Huangshan, Guiyang, Langfang, Suzhou, and Ordos Stations
- 3** — Aircrasher FAI World Cup Series - Germany
Champion (YUKI)
- 4** — FAI Drone World Cup - Italy Station
Open Class Champion (YUKI)



The success of the R-line V6.0 series in high-caliber competitions, including the MULTIGP WORLD CUP, provides empirical evidence of its performance in the professional FPV racing scene, making it the proven technical choice for those pursuing the pinnacle of competitive achievement.

A Historic Moment at The World Games 2025



The Tattu R-line V6.0 battery proved its superior performance and reliability at The World Games 2025. Sponsored pilot YUKI, powered by the R-line V6.0, soared to victory. In a testament to the battery's dominance, all top seven pilots at the event chose the R-line V6.0 to power their competitive flights.

Conclusion

Tattu R-line V6.0 is not just a simple product update; it is a significant evolution in FPV battery technology. Through synergistic innovations across the cathode material, conductive structure, and electrolyte system, we have successfully transformed cutting-edge laboratory research into tangible, superior performance that FPV pilots can feel.

The comprehensive improvements in energy density, power density, and safety achieved by the R-line V6.0 will give FPV racers a decisive competitive edge: faster lap times, longer pursuits, more extreme maneuvers, and a more reliable flight experience.

We are confident that the R-line V6.0 will become the ultimate choice for every FPV pilot dedicated to excellence, empowering them to continuously push the boundaries and set new records on the race track.

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