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THE WORLD'S LIGHTEST OPERATIONAL IN-ORBIT 0.5M SATELLITE: GF04

Abstract

As the latest RD achievement put into actual use, GF04A is a VHR commercial satellite in the Jilin-1 constellation built by CGSTL. It was launched on April 30th, 2022, and started providing high-quality images to customers, with the highest GSD from space and 15km swath at 535km orbit height. Using the platform-less philosophy, the total weight of GF04A is only 92kg, which is the lightest in the world. The end-to-end optimization works of the GF04A satellite are introduced, including the image quality estimation, advanced payload design and manufacturing, the satellite's integrated design, and the AI on-board capabilities. The breakthrough of the advanced ultra-lightweight optical system for GF04 is highlighted. A new image quality evaluation method is also proposed, with its application for long-term in-orbit image quality monitoring. Using a series of innovative design and evaluation thoughts and methods, the GF04 successfully become an operational commercial satellite with state-of-art performance, among the satellites with similar weight and size. JL-1GF04B satellite with enhanced agility is scheduled to be launched in the middle of 2023.