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DEVELOPING AND IN-ORBIT TEST OF THE ULTRA-LIGHTWEIGHT & HIGH RESOLUTION  
MICROSATELLITE JILIN-1GF03A FOR COMMERCIAL SERVICE**Abstract**

By summing up key indexes of high resolution optical remote sensing satellite from application requirements, and finding out technical ways to significantly reduce the cost, weight, and volume, one kind of highly integrated design philosophy and performance-cost ratio based on payload-centered for commercial remote sensing satellite was proposed. Firstly, an ultra-lightweight and high-resolution optical camera could be achieved by designing an appropriate optical system, choosing higher MTF TDICMOS sensors, and using newly thermal-focusing. Secondly, traditional separated platform units, such as OBC, PDU, TCTM, Navigation, could be highly integrated in terms of electronic hardware, software and mechanical structure. And then microsatellite structure with enough stiffness, revolved around the camera primarily and integrated platform units, could be ultra-lightweight designed. Finally, due to the highly integrated design, new problems such as high stable thermal control, flywheel vibration, high precision attitude control, were brought and might deteriorate image quality. In response to these challenges, a lot of adopted methods, such as passive temperature isolation, high accuracy active thermal control, vibration isolation for camera and so on, were adopted. Theoretical analysis and experimental verification also have been carried on, and used to optimize the original design. Jilin-1gf03A, the newest third generation satellite of the Jilin-1 constellation using above philosophy, weighs only 39kg, and has a GSD of 0.983m and a swath of 17km in SSO orbit at altitude around 535km. Jilin-1gf03A which was launched in 2019 at altitude 571km actually, has completed in-orbit test and used for commercial services. The results show that all indexes can satisfy requirements and the design philosophy can be widely used.

Key words: highly integrated design philosophy, performance-cost ratio, payload-centered camera, ultra-lightweight design, high resolution, Jilin-1gf03A, in-orbit test