IPERLITE Performance Fact Sheet

15 October 2026

Parameter	Performance / status
Mission Context	IPERLITE is an In-Orbit Demonstration (IOD) mission designed to demonstrate the CSIMBA compact hyperspectral imaging technology on a small-satellite platform. CSIMBA was originally developed with a focus on bio-agricultural and vegetation applications. The mission therefore serves both as a technology demonstration and as a platform for evaluating the scientific potential and limitations of the instrument in orbit.
Instrument	CSIMBA (Compact Smartspectral Imager for Monitoring Bio-agricultural Areas), a compact hyperspectral pushframe imager with thin-film interference filters directly deposited on a CMOS detector.
Operating principle	Pushframe imaging: narrow-band filters are arranged line-wise on a 2D CMOS focal plane (12 detector rows per spectral band). Successive frames acquired along the orbit reconstruct the hyperspectral cube. Nominal TDI12 sums 12 rows on-board to improve SNR.
Spectral coverage	465–900 nm (VNIR); Low-sensitivity/unreliable bands are excluded resulting in small spectral gaps between 598.7–608.1 nm and 615.6–629.4 nm
Detector / sampling	CMV12000 CMOS detector; up to 154 spectral bands of which 133 bands are included in the final products; 20 m ground sampling distance over an 80 km swath
Operational mode	TDI12
Dynamic range	10-bit (0–1023 DN)
SNR	Vicariously determined: ~100 in high-sensitivity green bands; ~60–70 in lower-sensitivity red/NIR bands
Absolute radiometric calibration	No on-board calibration source; absolute radiometric calibration is entirely vicarious, primarily based on PICS (Libya-4 and Niger-2) and independently assessed using RadCalNet and Sentinel-2 SNOs. Lunar calibration and EnMAP & PRISMA SNO activities are planned.
Absolute geolocation accuracy	CE95 ~40 m (~2 pixels) for a representative corrected scene; performance is scene-dependent
Inter-band co-registration	~0.5–0.67 pixels after correction
Known limitations	• Radiometric performance varies across the spectral range. Large band-to-band sensitivity differences (>20×), combined with a common TDI12 integration time, result in lower SNR in less-sensitive red/NIR bands and increased saturation risk in the most sensitive bands. • Offset/dark-current effects are significant relative to the 10-bit detector range. They vary with wavelength, field of view and detector temperature. Residual correction and read-out artefacts can particularly affect low-radiance targets. • Some spectral bands are excluded from the operational product because of low sensitivity or unreliable spectral characterization, resulting in gaps around 598.7–608.1 nm and 615.6–629.4 nm. • Low-radiance targets are more affected by radiometric uncertainty. Quantitative use of NIR bands over clear areas is currently not recommended. • Sequential acquisition makes inter-band co-registration sensitive to spacecraft attitude drift. Operational geometric processing reduces residual inter-band misregistration to approximately 0.5–0.67 pixels, but performance can vary between acquisitions. • Geolocation accuracy is scene-dependent and influenced by cloud cover and the availability and spatial distribution of suitable ground control points.