

Infrared video, fixed cameras

Lossless, Phidelity: -37 % against FFV1, -36 % against JPEG XL at maximum effort, -37 % against JPEG-LS.

Data

LTIR v1.0 (Linköping University, CC BY 4.0): 30-frame sequences from fixed thermal infrared cameras, raw 16-bit counts. 13 sequences, 178 MB raw.

On PC — one core

Codec	Lossless ratio	Bits per sample (lower = better)				Lossless speed (M samples/s)		Memory (MB)
		lossless	±1	±2	±4	encoding	decoding	
Phidelity compact	×3.88	4.119	2.648	2.029	1.417	9.7	11.2	39.7
Phidelity light	×3.77	4.246	2.789	2.188	1.599	67.2	80.0	50.0
JPEG XL e3	×2.48	6.441	—	—	—	25.7	27.5	18.9
JPEG XL e7	×2.48	6.448	4.849	4.130	3.336	2.2	16.7	39.2
JPEG XL e9	×2.50	6.408	—	—	—	0.6	18.1	39.4
JPEG-LS	×2.44	6.546	4.970	4.258	3.475	54.7	58.0	9.0
FFV1 ref.	×2.45	6.532	6.293	5.992	5.304	33.2	25.8	—

Embedded — instructions counted in emulation

ARM Cortex-A53, 64-bit

Codec	b/sample lossless	Instr./sample encoding	Instr./sample decoding	Encoding memory (KB)	Decoding memory (KB)
Phidelity compact	4.734	2,665	1,209	1,281	665
Phidelity fast	4.842	1,126	958	675	650
Phidelity light	4.850	209	197	2,857	1,337
JPEG-LS (CharLS)	6.756	177	149	9	9
CCSDS 123.0-B-2	4.818	522	528	1,200	1,200

Cortex-M7 (microcontroller)

Codec	b/sample lossless	Instr./sample encoding	Instr./sample decoding	Encoding memory (KB)	Decoding memory (KB)
Phidelity compact instructions and memory on a reduced sample	4.734	4,419	2,085	885	536
Phidelity fast	4.842	1,832	1,607	675	650
Phidelity light instructions and memory on a reduced sample	4.850	756	733	2,327	855
JPEG-LS (CharLS)	6.756	194	169	8	9
CCSDS 123.0-B-2	4.818	904	838	1,200	1,200

Good to know

- JPEG XL and JPEG-LS code each frame separately; FFV1 and Phidelity code the whole sequence.

Conditions

- PC: AMD Ryzen 7 8700F, a single core; every file decoded and compared with the original (zero error lossless, at most k in ±k).
- ±k: guaranteed maximum error of k on every sample. Phidelity and JPEG-LS (NEAR) hold it natively; for JPEG XL and the reference format, the image is first rounded to a 2k + 1 step, then coded losslessly.
- Codecs: libxl 0.12 (efforts 3, 7 and 9), CharLS (JPEG-LS), OpenJPEG (JPEG 2000), FFV1 through ffmpeg, LERC, CCSDS 123.0-B-2 (encoder written for the benchmark, byte-identical to the NTNU verification model).
- Memory: peak private memory during the call only, measured on the largest item of the set.
- Embedded: instruction counts in emulation (QEMU), not board timings; cropped samples, sizes comparable with each other only. Compact and light through the 1.7 kit, fast through its core; in both cases with a caller-provided output buffer. Byte-identical streams on PC and ARM. Code on Cortex-M7: fast 73 KB, compact 92 KB, CharLS 205 KB, CCSDS 123 6 KB.