

Medical: radiography (CR)

Lossless, Phidelity: -13 % against JPEG 2000, -7 % against JPEG XL at maximum effort, -13 % against JPEG-LS.

Data

Medical imaging test set by R. Starosolski (University of Silesia): computed radiographs, 10 to 16 bits, up to 1,792 × 2,392. 12 items, 81 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	×3.16	5.061	4.201	3.603	2.916	8.4	14.6	22.2
Phidelity light	×3.05	5.244	4.258	3.662	2.978	64.4	82.4	62.9
JPEG XL e3	×2.80	5.711	—	—	—	23.1	27.7	119.6
JPEG XL e7	×2.95	5.425	4.573	4.047	3.177	3.1	19.3	120.3
JPEG XL e9	×2.95	5.433	—	—	—	0.6	18.4	121.2
JPEG-LS	×2.76	5.807	4.397	3.769	3.093	64.4	68.4	29.9
JPEG 2000 ref.	×2.75	5.820	5.843	5.875	5.916	13.0	14.5	94.1

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	4.447	1,297	887	618	78
Phidelity fast	4.578	825	601	82	58
Phidelity light	4.555	212	191	10,575	1,435
JPEG-LS (CharLS)	5.040	171	140	10	10
CCSDS 123.0-B-2	4.966	460	466	4	4

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	4.447	2,367	1,612	194	51
Phidelity fast	4.578	1,380	1,021	82	58
Phidelity light instructions and memory on a reduced sample	4.555	742	695	2,959	681
JPEG-LS (CharLS)	5.040	180	153	10	10
CCSDS 123.0-B-2	4.966	870	812	4	4

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: libjxl 0.12 (efforts 3, 7 and 9), CharLS (JPEG-LS), OpenJPEG (JPEG 2000), FFMpeg 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.