

Medical: MRI

Lossless, Phidelity: -54 % against JPEG 2000, +4 % against JPEG XL at maximum effort, -54 % against JPEG-LS.

Data

Medical imaging test set by R. Starosolski (University of Silesia): 16-bit MRI slices. 12 items, 4 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	×3.72	4.302	4.305	4.305	4.304	6.5	15.6	1.2
Phidelity light	×3.59	4.456	4.456	4.456	4.456	53.7	73.7	4.4
JPEG XL e3	×3.70	4.319	—	—	—	24.8	27.7	9.1
JPEG XL e7	×3.80	4.212	4.212	4.211	4.212	2.9	20.1	10.1
JPEG XL e9	×3.88	4.125	—	—	—	0.8	19.3	14.1
JPEG-LS	×1.72	9.323	8.021	7.407	6.706	54.4	54.9	1.7
JPEG 2000 ref.	×1.71	9.338	9.369	9.369	9.389	8.7	9.9	5.5

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	4.873	1,382	900	209	50
Phidelity fast	5.087	845	622	64	37
Phidelity light	5.140	219	192	2,959	694
JPEG-LS (CharLS)	11.337	207	192	8	8
CCSDS 123.0-B-2	11.745	472	482	2	2

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	4.873	2,466	1,622	209	50
Phidelity fast	5.087	1,408	1,046	64	37
Phidelity light instructions and memory on a reduced sample	5.140	744	696	2,959	694
JPEG-LS (CharLS)	11.337	244	228	8	8
CCSDS 123.0-B-2	11.745	887	832	2	2

Good to know

- JPEG XL at maximum effort stays about 4 % ahead.
- Format 1.5: the light mode is within 4 % of the compact mode here, at JPEG-LS speed.

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), 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.