

8-bit colour photos

Lossless, Phidelity: -2 % against WebP, -0 % against JPEG XL at maximum effort, -7 % against JPEG-LS.

Data

14 camera photos, public domain (CC0), 8-bit RGB, up to 2,048 × 1,368. 14 items, 115 MB raw.

On PC — one core

Codec	Lossless ratio	Bits per sample (lower = better)			Lossless speed (M samples/s)		Memory (MB)
		lossless	±1	±2	encoding	decoding	
Phidelity compact	×1.99	4.028	2.710	2.081	6.1	30.5	96.8
JPEG XL e3	×1.93	4.152	—	—	28.9	30.8	149.5
JPEG XL e7	×1.98	4.043	2.628	2.089	3.0	21.4	151.4
JPEG XL e9	×1.98	4.044	—	—	0.6	19.7	154.9
JPEG-LS	×1.85	4.316	2.879	2.253	61.5	74.4	40.2
WebP ref.	×1.95	4.097	2.884	2.268	0.8	144.0	163.6

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	4.678	1,901	988	15,724	582
Phidelity fast	8.765	53	19	24	4
JPEG-LS (CharLS)	4.807	181	153	18	18

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	4.678	3,531	1,728	4,296	404
Phidelity fast	8.765	68	22	24	4
JPEG-LS (CharLS)	4.807	187	143	18	18

Good to know

- The light mode handles grey only; on colour photos Phidelity is on par with JPEG XL e9.

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.