BEF Format –
The ultimate image quality at JPEG file size

unified COLOR™

Designed to be an ideal image archiving solution, BEF image format offers the following unique and exclusive capabilities:

- Beyond RGB™ Color Platform's human vision imaging – free of typical CRT-based shortcomings.
  - High Dynamic Range – will accommodate any natural scene.
  - Full Human Color Range – no gamut clipping.
  - Objective Quality control – the only image compression solution to control the trade-off between quality and file size with an objective JND (Just Noticeable Difference) metric.
  - Unprecedented HDR compression ratio – the only solution available that offers full visual quality images at JPEG file size, providing 3x lead in compression ratio over any competition.

Overview

The BEF file format is an extremely efficient HDR image compression solution that offers very compact files, and a precise and capable method for image storage and archival while retaining full image qualities. BEF format saves image data using the full color range of human vision (full gamut). The 32-bit floating point architecture implementation has a dynamic range of up to 1076, which can represent any dynamic range within an image of a natural scene. BEF format compression ratios are comparable to those produced by JPEG compression; however, BEF files store visual information preserving full qualities of dynamic range, color and precision. Because BEF data design is tied to human vision (and not a particular display device like the CRT), it allows you to store images in a form suitable for any display hardware, even displays that have not yet been invented.

Users can rest easy knowing that BEF image data is saved in a format that ensures their picture quality will only improve as better display technology emerges.

Objective Quality Control

BEF uses a novel approach to control compression-quality trade-off of images — it is the first solution to use an objective quality metric, which is directly based on the JND (Just Noticeable Difference) property.
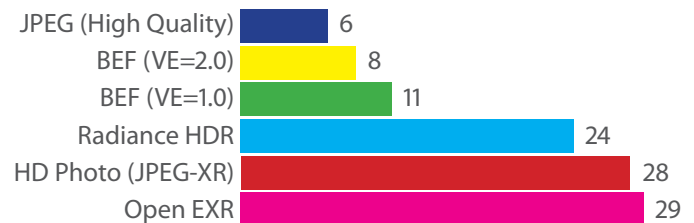
A Visual Error value of 1.0 designates the threshold of visual difference — meaning that perceptual color difference between a compressed image and the original will be at or not exceed the human eye's ability to notice this difference. A value greater than 1.0 specifies the factor of the eye's discrimination ability, while a value below 1.0 is the reciprocal to this factor.

With BEF's Visual Error technique, the quality of compressed images can be estimated quantitatively (objectively), in contrast with the traditional color technology that can only use a subjective metric of quality with a scale of abstract values.

Best image format for an HDR camera

BEF is flexible to use either floating point or integer arithmetic architecture. BEF offers optimal choices for embedded or integrated circuit designs. BEF offers options to be customized to the chosen camera solution.

Compare the Choices

Format	Value
JPEG (High Quality)	6
BEF (VE=2.0)	8
BEF (VE=1.0)	11
Radiance HDR	24
HD Photo (JPEG-XR)	28
Open EXR	29

Format	Foundation	Uncompressed Data Size (bit per pixel)	Compressed Data Size (bit per pixel)	Limitations
32-bit Floating	General Computing	96	-	None
HD Photo (JPEG-XR)	JPEG	96	28	Poor Accuracy
Open EXR	Open GL	48	29	Dynamic Range
Radiance HDR (RGBE)	Backlit LCD	32	24	Color Range
Unified Color BEF	Human Vision	96 (fp) or 32 (int)	8	None

More info

www.unifiedcolor.com/bef