

IPHONE PHOTO GLOSSARY

APERTURE: The size of the opening within the lens. The wider the aperture, the more light the lens allows through to the sensor. Apertures are usually expressed in f/stops. Wide apertures have lower f/stop numbers (1.2, 1.4, 1.8, 2.8 etc). As the aperture gets smaller (f/4, f/8/ f/16 etc.), the f/stop number increases, the shutter speed decreases, and the depth-of-field increases. iPhone cameras have fixed apertures that do not change.

ASPECT RATIO: This describes the width and height of an object (sensor or image) in units (millimeters, inches or pixels). When you divide the width by the height, you get a ratio (for example $4/3 = 1.33$, $16/9 = 1.78$). iPhone images by default are generated in the 4:3 aspect ratio. Access the Hidden Menu to utilize Square and 16:9 aspect ratios.

BOKEH: The quality of background blur. It's especially important for points of light in the background. An out of focus background is achieved on the iPhone using Portrait Mode.

BRACKETING: The process of taking multiple photos at different exposures. iPhones take from 9 to 15 shots with each shutter click. So every "shot" on an iPhone is bracketed.

CAMERA ORIENTATION: Camera orientation is the way in which an iPhone is oriented to take a photo. The two most common types of orientation are portrait and landscape.

- **PORTRAIT** Portrait orientation is vertical, where the height is greater than the width, typically used for reading or mobile browsing or taking photos of subjects that favor a vertical or "portrait" composition.
- **LANDSCAPE:** Landscape orientation is horizontal, with the width greater than the height, often preferred for multimedia consumption like videos or games or for taking photos of subjects that favor a horizontal "landscape" composition.

DEPTH OF FIELD: The space around the subject that is in focus. Depth-of-field (DOF) is affected by aperture, distance to subject, focal length, and sensor size. The small size of iPhone camera sensors generates great depth of field. The depth of field gets shallower as the focal length increases, for example from .5X to 1X to 3X to 5X. 5X will have the shallowest DOF and most Bokeh.

DEEP FUSION: Deep Fusion is an Apple computational photography process that blends together multiple exposures (9) at the pixel level in order to create a photograph with an even higher level of detail than standard HDR. Deep Fusion uses advanced machine learning to do pixel-by-pixel processing of photos, optimizing for texture, details and noise in every part of the photo.

DYNAMIC RANGE: The difference between the darkest part of a picture and the brightest part of a picture. Most cameras have a dynamic range of 8-12 stops, but the human eye has a dynamic range of about 20 stops.

EXPOSURE: The camera settings that determine the digital camera sensor's sensitivity and how much light it will capture. On iPhone cameras, exposure consists of the aperture (which is fixed for each camera), the shutter speed (which is variable), the ISO (which is variable). and if used, how much light was added by use of the flash.

EXPOSURE COMPENSATION: A camera setting that increases or decreases the default auto exposure set by the camera to produce a brighter or darker picture.

FIELD OF VIEW/ANGLE OF VIEW: Field of View (FOV) or Angle of View (AOV) refers to the amount of the scene visible in the camera viewfinder or rear display. Usually expressed in degrees. For example human vision has an average FOV of about 170-180 degrees. Switching between iPhone cameras changes the FOV. The .5 Ultra-Wide camera has the largest FOV (120 degrees) followed by the 1X Wide Camera (84 degrees), then the 3X (31 degrees) and finally the 5X Tele camera which has the narrowest/smallest FOV (15 degrees). FOV is determined by the Focal Length of the lens.

FOCAL LENGTH: Focal length is the distance from the center of the lens to the imaging point (focal plane) where the light is collected on the sensor usually expressed in millimeters (mm). The Wide 1X camera has a “short” focal length, 24mm, and shows you a great deal of the scene. Telephoto lenses have a “long” focal length, such as the 3X camera (77mm) or 5X (120mm), and show you a smaller portion of a scene. iPhone camera lens focal lengths are expressed in relationship to the AOV of a lens on a full frame digital sensor or 35mm film camera. Focal Length determines the angle of view or FOV and magnification of the lens. The higher or “longer” the focal length, the narrower/smaller the AOV and the higher or greater magnification.

FOCAL PLANE. A lens has two Focal Planes. The first is the two-dimensional plane at the lens’ focus point in a scene and the second is where the light collected by the lens is focused on the sensor. Anything in front of or behind either focal plane will be slightly out of focus

FOCUS: The point where a lens has imaged the subject in sharpest definition and contrast.

- **Minimum focusing distance:** The shortest distance that must be placed between the image sensor and the plane of focus on the subject for the lens to be able to focus. Longer focal length lenses usually involve a longer minimum focusing distance.

FORMAT: An Image format describes how the resulting image from an iPhone shot is processed by the camera. The iPhone Camera App can yield HEIC, JPEG (Most compatible), and ProRaw photo images and HEIC and ProRes video. The smallest file size is generated in HEIC followed by JPEG and finally ProRaw as the largest file size for an image.

- **HEIC/F:** HEIC stands for High Efficiency Image Container. The format is an updated variant of the High Efficiency Image Format (HEIF), traditionally used by Apple across its mobile devices. Think of it as a state-of-the-art JPEG. This format can display more colors than JPEG and is a smaller file size. HEIC improves image quality and uses less storage space.
- **HEIF MAX:** Introduced with IOS 17, HEIF files can now be generated in a 48MP resolution format yielding higher detail.
- **MOST COMPATIBLE:** This image format choice generates a JPEG/H.264 file.
- **JPEG:** a graphic image file compressed with lossy compression using the standard developed by the ISO/IEC Joint Photographic Experts Group.
- **PRORAW:** ProRaw is a 10 bit file that uses the Linear DNG format to retain more information and dynamic range in the file, providing additional flexibility when editing exposure and white

balance. Think of ProRaw as a traditional Raw file PLUS all the Smart HDR and Deep Fusion Data yielding a file of greater size than regular Raw file. **ProRaw 12MP** uses the entire Wide 1X Camera 48MP sensor in 12MP mode to improve low light photos. **ProRaw Max** uses the entire Wide 1X Camera sensor at 48MP.

- **RAW:** A Raw file is all the uncompressed and unprocessed image data captured by a digital camera's sensor. Current Pro model iPhones generate ProRaw files using the Apple Camera app. Use another camera app like Camera+2 to get simple (smaller) Raw files.
- **PRORES:** ProRes is a professional video format intended for professional post production. Think of it as "ProRaw video". It is usually characterized as generating less sharp, less smart phone looking video. Requires over 256 GB of storage space to function. It is best to connect a external drive to record ProRes video. Only available on a Pro series iPhone with at least 256 GBs of storage installed.

HIGH DYNAMIC RANGE (HDR). A photographic process that combines multiple photos of a single subject taken at different exposures. HDR allows you to capture more detail in highlight and shadow areas than would be possible with a single exposure. **Smart HDR** on the iPhone describes how the iPhone with each shot takes multiple exposures (9 to 15) and then intelligently processes all the resulting images to yield the final image with a maximum dynamic range with more detail in the highlight and shadow areas than can be achieved with a single exposure.

IMAGE STABILIZATION: A camera or lens feature that compensates for camera shaking. Image stabilization is a family of techniques that reduce blurring associated with the motion of a camera or other imaging device during exposure. The iPhone uses sensor shift, optical and digital image stabilization.

ISO. ISO refers to the "International Organization for Standardization" which rated film speeds. A digital sensor's sensitivity range is defined by ISO values. The iPhone camera app sets the ISO for each camera shot automatically.

MAGNIFICATION RATIO: The ratio of the size of an object as projected onto the image plane (i.e., the camera's image sensor) versus the size of the object in the real world.

MEGAPIXEL: One Million pixels: A megapixel is used as a measure of resolution/the quality of the picture created by a digital camera. The iPhone 15 series main 1X cameras have 48 megapixel sensors. The other cameras have 12 MP sensors.

NOISE: Incorrectly colored pixels that make your picture look less clear and vibrant. Generally the higher the ISO used the more noise will be found in the image. iPhone computational image processing works to reduce digital noise.

PHOTOGRAPHIC STYLES: Photographic Styles customizes how the iPhone cameras capture photos. Choose from the preset styles—**Rich Contrast, Vibrant, Warm, or Cool**—then customize them further by adjusting the tone and warmth values. A photo taken with a "Style" cannot have the style removed in editing like Filters on the iPhone.

PIXEL: A pixel is also known as a picture element. Pixels are combined to form a complete image, video, text, or any visible thing on a computer display. It is a tiny square or dot that represents a single point of color.

PHOTONIC ENGINE: Photonic Engine enables a dramatic increase in quality by applying the computational benefits of Deep Fusion earlier in the imaging process to deliver extraordinary detail, and preserve subtle textures, provide better color, and maintain more information in a photo.

PRIME LENS: Also known as a fixed-focal length lens, prime lenses cannot zoom optically on the iPhone. All iPhone cameras are currently prime lenses.

RAW: A file format that captures every piece of information recorded by your digital camera's sensor. Raw files consume far more space than JPG files; however, they can produce higher quality images, especially if you need to adjust the white balance or exposure on your computer.

RESOLUTION: The level of detail contained within an image or sensor usually expressed in pixels or megapixels. The higher the resolution the more detail and definition achieved.

12MP = 4000X3000 pixels= 12 million pixels

48MP= 8064X6048 pixels = 48.8 million pixels

HD= 1920X1080 pixels= 2.1 million pixels = **1080P**

1280X720 pixels = .9 million pixels = **720P**

4K= 3840X2160 pixels = 8.3 million pixels

SHUTTER SPEED: The length of time the shutter stays open, exposing the camera's digital sensor to light through the lens. iPhone cameras use an "electronic shutter" not a mechanical shutter. The sensor itself acts as a Shutter.

STOP: A measurement of light levels. One stop doubles or halves the amount of light. An f-number is a measure of the light-gathering ability of an optical system such as a camera lens. It is calculated by dividing the system's focal length by the diameter of the entrance pupil.

ZOOM: Zoom lenses allow you to adjust the focal length of a lens within a specific range. In other words, you can change the angle of view and make it narrower (zoom in) or wider (zoom out).

- **OPTICAL ZOOM:** the iPhone does not have a zoom lens. It cannot zoom optically. Each camera on the iPhone has a fixed focal length lens. These focal lengths vary from 13mm ultra wide to 120mm telephoto. A true zoom lens uses optics within a single housing to move from one focal length to another, say from 24mm to 200mm, with the ability to use other focal lengths in between, such as 70mm or 135mm too — and often anything in between, like 36mm or 88mm.
- **DIGITAL ZOOM:** when you "zoom" on an iPhone, you are actually using what is described as digital zoom. In actuality, you are cropping in on the center of an image achieved by one of the prime, fixed, focal camera lens on the iPhone. The resulting cropped image has less resolution and may appear less sharp than the original image. The iPhone 15 Pro 3X (77mm) camera can digital zoom up to 15X (404mm). The ProMax 5X (120mm) camera can zoom up to 25X (600mm). The iPhone 15 1X camera can digital zoom up to 10X (260mm).