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This technical brief provides detailed information on the following topics, related to all EPSON digital cameras:

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Image Quality—Megapixel CCD sensors

EPSON digital cameras include a one megapixel, two megapixel, or three megapixel CCD sensor, which determines the resolution of the images. Each megapixel contains one million pixels.

A CCD is made up of an array of photosensors (CCD elements or photosites) that are able to record a unique image detail. Each photosensor (or CCD element) creates an electrical charge proportional to the amount of light it receives and sends the charge to an A/D (Analog to Digital) converter inside the camera.

Because a higher resolution image contains more detail, you can:

- ▶ Enlarge an image without losing a significant amount of detail.
- ▶ Print an image to a high resolution output device (such as an EPSON Stylus ink jet printer or a printing press)—many industry analysts believe that the quality of images captured with two megapixel digital cameras is good enough to replace traditional film-based cameras.

Higher resolution produces greater detail



The key differences between a one megapixel, two megapixel, and three megapixel CCD sensor are:

Key Differences	One Megapixel CCD	Two Megapixel CCD	Three Megapixel CCD
Image resolution	1152 x 864 pixels (1.09 million pixels CCD) 1280 x 960 pixels (1.25 million pixels CCD)	1600 x 1200 pixels	2048 x 1536 pixels
Ideal use for images with low compression	Up to 5 x 7 inch enlargements	Up to 8 x 10 inch enlargements	Up to 11 x 14 inch enlargements

One, two, and three megapixel cameras produce excellent 4 x 6-inch and 5x7-inch prints. The key difference lies in the quality of the image enlargements.

▼ Image Quality—HyPict™ Image Enhancement Technology

Many digital cameras use an interpolation method to produce images with higher resolution than the camera's CCD can capture. EPSON HyPict image enhancement technology uses an exclusive interpolation method.

EPSON HyPict image enhancement technology produces more accurate results because it applies image enhancement before JPEG compression.

- ▶ The EPSON HyPict image enhancement technology uses an in-camera processing system to interpolate an image using full image data.
- ▶ After the image is interpolated, the camera then converts it to JPEG file format.
- ▶ Other image enhancement technologies convert to JPEG file format before enhancement. Since JPEG conversion removes image data, these technologies do not use full image data for the interpolation, resulting in less accurate images.



EPSON HyPict image enhancement technology performs all of these steps in the camera:

1. Captures image
2. Enhances and interpolates image
3. Applies JPEG compression

▼ Image quality—Resolution modes

EPSON digital cameras allows you to select different image quality settings. (Not all of these settings are available for each model.)

The following chart explains the differences between the image quality settings:

Key Differences	HyPict™	Super Fine	Fine	Standard
Compression level	Interpolated	Low compression	High compression	High compression
Description	Pictures include the most detail and are ideal for enlargements.	Pictures include great detail because less image detail is removed through compression.	Pictures include ample detail and are suitable for most applications, including 4 x 6-inch prints.	Pictures include less detail and fewer number of pixels. Suitable for on-screen display.
Enlargement sizes: One megapixel CCD camera	Up to 8 x 10 inches	Up to 5 x 7 inches	4 x 6 inches	None
Two megapixel CCD camera	Up to 11 x 14 inches	Up to 8 x 10 inches	5 x 7 inches	None
Three megapixel CCD camera	Up to 12 x 17 inches	Up to 11 x 14 inches	8 x 10 inches	None
Image file size	Largest file size	Large file size	Moderate file size	Smallest file size

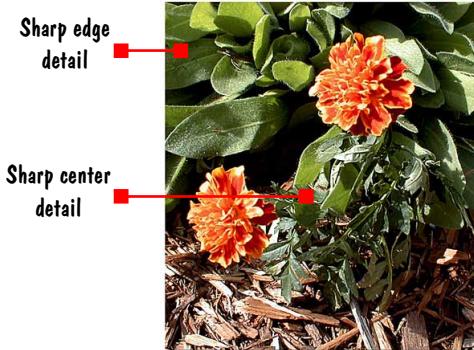
Additionally, some EPSON digital cameras include a TIFF Uncompressed image quality setting, which does not remove any image data through compression.

▼ Image Quality—EPSON ClearOptics™ glass lens

EPSON digital cameras all use an EPSON ClearOptics glass lens, but the specific type of lens differs by camera model. For example, the lens on the low-end model may include an aspherical glass lens with five elements in four groups, while the high-end model may include eight elements in seven group construction using two aspherical lenses. The greater number of elements and groups, the higher the quality of the lens.

EPSON ClearOptics glass lenses offer the following benefits:

- ▶ Overall sharper detail in the image
- ▶ Sharp center and edge detail; digital cameras with lesser quality lenses tend to capture images with good center detail, but with "fuzzy" edges.



▼ Ease of Use—Image storage

EPSON digital cameras store all use CompactFlash cards for image storage, although some of EPSON's cameras also have internal memory for images.

1. The benefits of CompactFlash memory cards are:

- ▶ Small size and easy insertion and removal
- ▶ Low power consumption with the use of Flash technology
- ▶ High reliability with no moving parts and the ability to withstand a shock rating of 2,000 Gs (equivalent to a ten foot drop)
- ▶ Available in larger capacities than SmartMedia cards, which is important for the larger file size of high-resolution images.
- ▶ Currently CompactFlash cards are available in capacities ranging from 8MB to 192MB.



There are different types and sizes of CompactFlash cards. Be sure to check which type each EPSON camera requires.

2. Images can be copied to your computer directly from a CompactFlash card using one of the following methods:

- ▶ Optional PCMCIA adapter—Allows the card to be used in any PCMCIA Type II slot (the ideal transfer method for a notebook computer)
- ▶ Optional CompactFlash card reader—Allows your computer to access the CompactFlash card like a removable disk drive (Available from Lexar Media or San Disk in parallel and USB configurations)
- ▶ Optional IOMEGA Clik!™ digital camera drive—Allows you to download CompactFlash or SmartMedia cards to a Clik! disk, then transfer images from the Clik! disk to your PC using the desktop docking station.



▼ Ease of Use—Color LCD monitor

EPSON digital cameras allows you to take pictures using the viewfinder or the color LCD. Using the LCD gives you the following advantages:

- ▶ Fast real-time preview or playback of images
- ▶ Ability to change camera settings by using the LCD's menu options
- ▶ Ability to choose additional picture modes such as digital zoom, panoramic, and macro

Some EPSON digital cameras have a Solar Assist LCD which allows you to power the LCD by direct sunlight. This feature has two benefits:

- ▶ It allows you to view the LCD when using it in direct sunlight to take pictures outdoors
- ▶ It conserves battery power



▼ Versatility—Automatic to manual controls

Many EPSON digital cameras have three operating modes that allow you progressive control over the camera's advanced features.

- Full Auto mode: Ideal for novice users because the camera chooses most settings
- Program mode: Allows moderate control over camera functions and includes programmed subject settings
- Manual mode: Ideal for advanced users who wish to have full control over advanced features

The following features are available within each mode:

Full Auto	Program	Manual
<ul style="list-style-type: none"> ▼ Digital Zoom ▼ Picture Mode: Normal, Macro, or Panoramic * All other camera functions are controlled automatically 	<ul style="list-style-type: none"> ▼ Digital Zoom ▼ Picture Mode: Normal, Macro, or Panoramic ▼ Exposure Adjustment ▼ Sensitivity: Standard, High, or Super High ▼ Programmed Subject Settings—automatically assigns the optimum exposure, metering method, and sensitivity for your selected subject: <ul style="list-style-type: none"> ○ Normal—for most photos; auto exposure, matrix metering ○ Sports—for action photos; high shutter speed, automatic sensitivity, and matrix metering ○ Portrait—for portraits; spot metering, aperture field ○ Landscape—for scenery; matrix metering, aperture 	<ul style="list-style-type: none"> ▼ Digital Zoom ▼ Picture Mode: Normal, Macro, or Panoramic ▼ Exposure Adjustment ▼ Manual exposure ▼ Sensitivity: Standard, High, or Super High ▼ Metering: <ul style="list-style-type: none"> ○ Spot—Allows you to choose a point that the camera samples to determine exposure ○ Matrix—Camera automatically measures available light and determines correct exposure ▼ Manual focus

▼ Versatility—File upload and video output

Most EPSON digital cameras allow you to upload presentations, images, and programs to the camera and then connect the camera directly to a video output device, such as a television, VCR or multimedia projector.

1. **Upload**—Allows you to upload programs to the camera, as well as to convert an image or presentation to the EPSON Photo file format and upload it to the camera.
2. **Output**—The video output capability supports NTSC, allowing you to display images stored in the camera using the slide show feature. Using the software bundled with the camera, you can also:
 - Convert any JPEG or BMP image or presentation to EPSON Photo file format (includes a screen capture function)
 - Upload these files to the camera's CompactFlash card



▼ Versatility—Voice recording

Several EPSON digital cameras have built-in microphones which allow you to record a voice message for each image, right on the camera. Some cameras also have a built-in speaker so you can also listen to the message right on the camera.

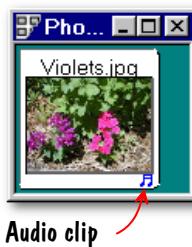
1. **To record a message**—You can record a message immediately after shooting a photo, or, in some cases, add it later while the image is still in the camera. Recordings are saved with the image in .WAV format.

Although you can add and edit audio messages using the Image Expert software to any image, the advantages of being able to capture audio right on the camera are:

- ▶ You can capture not only voice but background noise or music at an event (that you would not be able to add later).
- ▶ You can add a message to a picture right after you take it, so that you won't have to try to remember later how you wanted to identify it.

2. **To playback a message**—You can play back audio messages attached to an image using the bundled Sierra Imaging Image Expert™ software.

- ▶ When you open an image that has audio attached to it (indicated by a musical note icon), the audio clip automatically plays.



- ▶ Sierra Imaging Image Expert software also includes audio controls that allow you to:



- Play the audio message
- Pause the audio message
- Stop play of the audio message
- Record a new message or additional audio
- Edit the audio message: Cut, copy, paste, or delete parts of the message (such as trimming unwanted audio from the beginning or end)

3. **To add an image and a message**—You can add an image and its attached audio file directly into a document, presentation, or web page. Some applications allow you to import the files together, while others require you to import them separately.
4. **To save an image and a message**—Using Sierra Imaging Image Expert software, Windows users can use the Save to Floppy command to create a diskette or ZIP disk containing the selected image files, their corresponding .WAV audio files, and the Image Expert slide show player. The slide show player will scroll through each image and play the attached audio message.

▼ Versatility—Picture modes

EPSON digital cameras offer a variety of pictures modes, and the supported modes vary by camera.

1. **Digital Zoom**—Many EPSON cameras have a 2X digital zoom setting that allows you to zoom in on objects from a distance.

The key differences between an optical zoom and a digital zoom are:

- ▶ Digital zoom crops and magnifies the image to "enlarge" it, so it is best to print these images in a smaller size to ensure image quality.
- ▶ Optical zoom uses a lens system to magnify image with no loss of image quality.

Normal mode



2x Digital Zoom



Many EPSON cameras have a 3X optical zoom lens that can be combined with the 2X digital zoom for a maximum 6X zoom.

2. **Quick shot**—This picture mode saves up to 10 standard, fine, or super fine images in temporary storage while you keep taking pictures. The camera then saves the images to the CompactFlash card when you're done. Using this picture mode, you can take pictures without waiting for the camera to process each one before allowing you to take another.

3. **Interval shooting**—This picture mode allows you to capture scenes that change over time, such as a sunset. With this time lapse feature, you can select time intervals from 10 seconds to 24 hours.



4. **Continuous shoot**—This picture mode captures several standard, fine, or super fine images per second, up to as many as 10 pictures per second. It is ideal for capturing progressive motion for web animation.



5. **Video clip recording**—This picture mode captures 25 second video clips with audio at 15 frames per second (320 x 240 resolution). Clips play back in QuickTime®.

6. **Stitching**—This picture mode captures a series of images that you can stitch together into a single, large panorama.



7. **Macro**—This picture mode captures close-up pictures without using an add-on lens. Many EPSON digital cameras support a close-up focus range of 8 inches, and some support a range of 2.36 inches.



▼ Versatility—PRINT Image Matching™ Technology

PRINT Image Matching is a revolutionary technology that ensures digital cameras and printers work together to produce photographs that print truer-to-life than ever before.

Several leading digital camera manufacturers* have partnered with Epson to incorporate PRINT Image Matching technology in their upcoming digital camera models. The EPSON Stylus Photo 785EPX is the first printer (future printers will have this feature, and many current models will have updated drivers available to support it) and the EPSON PhotoPC 3100Z is the first EPSON digital camera to incorporate this technology.

PRINT Image Matching offers a solution to several problems when printing digital images:

- ▶ Because software programs set their own unique print commands, it has been difficult to get accurate prints on a consistent basis when printing digital camera images.
- ▶ Although digital cameras can capture images in a wider color space, data files are optimized for the limited computer monitor space.

With PRINT Image Matching, precise print quality instructions and color space data is embedded in the digital camera file, resulting in a printed image that accurately reflects the image captured through the camera lens.

Additionally, PRINT Image Matching gives the photographer greater control over image consistency. The digital camera manufacturer can set critical image specific parameters for printing, such as:

- ▶ Gamma level
- ▶ Contrast
- ▶ Sharpness
- ▶ Brightness
- ▶ Saturation
- ▶ Shadow point
- ▶ Highlight point
- ▶ Color space
- ▶ Color balance



A PRINT Image Matching-compatible printer, such as the EPSON Stylus Photo 785EPX will use this information when printing the image to deliver new levels of image consistency and unsurpassed photo quality.

* Digital camera manufacturers who have teamed with Epson are: Casio Computer Co. Ltd., Konica Corporation, Kyocera Corporation, Minolta Co. Ltd., Olympus Optical Co. Ltd., Ricoh Company Ltd., Sony Corporation and Toshiba Corporation.