

# Enhanced Media Sensing with HP Auto Sense

HP Auto Sense technology with enhanced media sensing delivers fast photo printing and exceptional ease of use for brilliant photo prints—automatically



## Technology Summary

HP media sensing technologies deliver optimal print quality across a broad range of media—from plain paper and transparency films to HP photo papers—without user intervention. Enhanced HP Auto Sense technology delivers exceptionally fast, efficient photo printing. With HP automatic media sensing, getting brilliant photos and crisp text is as easy as a mouse click—just select “Print” and enjoy the results.

## What is it?

HP Auto Sense technology, available with select HP products, delivers enhanced media sensing capabilities with automatic detection of HP Advanced Photo Paper,<sup>1</sup> HP Premium Photo Paper, HP Premium Plus Photo Paper, and HP CD/DVD Tattoo media. An Auto Sense sensor in select HP inkjet printer and All-in-One products identifies the media by ‘reading’ special Auto Sense marks on the back of the media. The printer then selects the appropriate color profile and print settings for optimal print quality. Automatic detection of HP Auto Sense media allows HP Auto Sense-enabled printers to deliver fast, efficient printing—as fast as 10 seconds for a 4 x 6-inch (10 x 15 cm) photo when using select HP products. When printing directly from a memory card on HP Auto Sense media, the Auto Sense sensor also detects paper size—up to 8.5 x 11-inch—for additional convenience and efficiency.

## How do customers benefit?

HP Auto Sense technology allows HP Auto Sense-enabled printers to deliver brilliant, fast photo prints when using HP photo papers with Auto Sense—up to four times faster<sup>2</sup> than prints produced on other photo papers.

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<sup>1</sup> HP Photo Paper in European countries/regions.

<sup>2</sup> As fast as 10 seconds for a 4 x 6-inch (10 x 15 cm) photo in Fast Draft mode using HP Advanced Photo Paper.

Auto Sense technology offers customers additional ease of use and helps prevent wasted paper and ink. HP Auto Sense-enabled printers alert users if paper is loaded upside-down in the paper tray, eliminating the potential for printing on the wrong side. If the size of the paper in the main paper tray does not match the paper size the customer has selected from the printer software, the printer detects the inconsistency and notifies the user. This prevents the potential for getting a partial print on small-size media.

For multiple-page printing, the sensor enables the printer to implement a continuous, end-to-end method of picking and ejecting each sheet of paper as it advances through the paper path, providing extraordinary print speeds.

When using other photo papers, plain papers, and non-HP media, HP media sensing provides automatic detection for different paper types. With the growing number of specialty papers available to consumers, from photo and inkjet papers to transparency films and other papers, automatic media sensing saves customers the time and effort of having to select specific print settings, as well as the expense associated with making an inappropriate selection. If the user is unsure of the exact paper type they're using, there's no need to guess—the printer will automatically select the appropriate color profiles and print settings. HP media sensors support HP media, as well as a broad range of plain papers and non-HP media.

## How does media sensing work?

HP Auto Sense-enabled printers use two optical sensors to deliver automatic media sensing, as well as automatic printer calibration. One sensor is located in the printer carriage. A second sensor—the Auto Sense sensor—is located in the back of the printer near the paper 'clean out' area. Each sensor performs a specific set of media detection functions.



### HP Auto Sense technology

The Auto Sense sensor detects unique Auto Sensing marks on the back of select HP media and the printer automatically selects appropriate color profiles and print settings, including paper type and print quality. When printing directly from a memory card, the sensor also detects the paper size, up to 8.5 x 11-inch.



HP Advanced Photo Paper



Auto Sense mark

Auto Sense mark

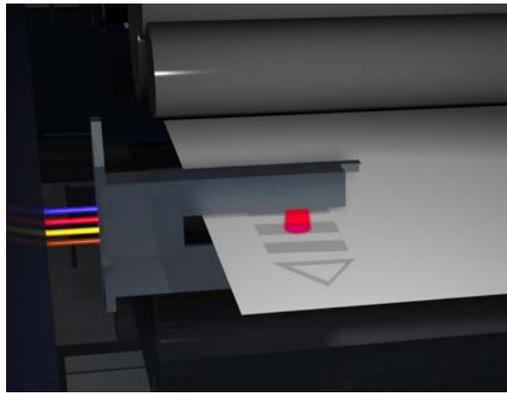
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## How does it work?

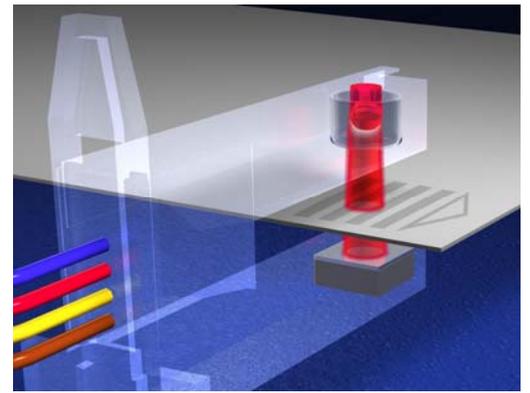
**Note:** The following illustrates media sensing with HP Advanced Photo Paper. HP's Auto Sense sensor also detects HP Premium Photo Paper, HP Premium Plus Photo Paper, and HP CD/DVD Tattoo media. Print speeds vary by paper type, document properties, and printing system.

HP Advanced Photo Paper is a glossy paper with a porous surface coating designed to dry almost immediately after printing. Porous-coated papers contain small, inorganic particles that create voids in the coating. The ink flows quickly through the spaces between the particles, depositing dye on particle surfaces, so prints dry quickly and can be handled right from the printer. HP Auto Sense-enabled printers identify the paper and deliver the optimal amount of ink. This allows the printer to deliver exceptionally fast speeds when printing on HP Advanced Photo Paper. Efficient ink usage offers customers the additional benefit of helping to conserve ink and thereby save money.

The Auto Sense sensor has a transmissive sensor that allows it to read all the way through to the back of the paper. If paper is inserted in the paper tray upside-down the printer ejects the paper and instructs the user to reinsert it correctly. The sensor's unique ability to detect incorrectly loaded media eliminates the potential for printing on the wrong side and prevents wasted ink and paper.



The Auto Sense sensor detects Auto Sense marks on the back of HP Advanced Photo Paper.

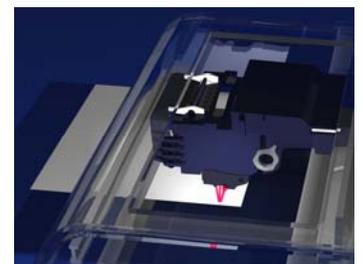


A transmissive sensor allows the Auto Sense sensor to detect the back of the media.

The Auto Sense sensor works with the HP optical sensor to detect transparency films and automatically adjust ink levels for optimal quality and performance. Customers can produce quick, impressive results for presentations without selecting a transparency film from the printer software. With appropriate print settings automatically selected, HP Auto Sense-enabled printers deliver fast, efficient photo printing, optimal print quality, and exceptional ease of use.

## Media sensing with the HP optical sensor

The HP optical sensor, located in the printer carriage, uses a red LED (light emitting diode) and two photo transistors—a diffuse photo transistor and a specular transistor—to rapidly scan the paper in the print region of the printer. The sensor detects plain and photo papers (glossy and matte) and the printer automatically adjusts ink levels for the appropriate amount of ink for the paper. In addition to distinguishing between plain and photo papers, the optical sensor also performs edge detection—the left and right sides of the page, or for small media, the right side of the page.

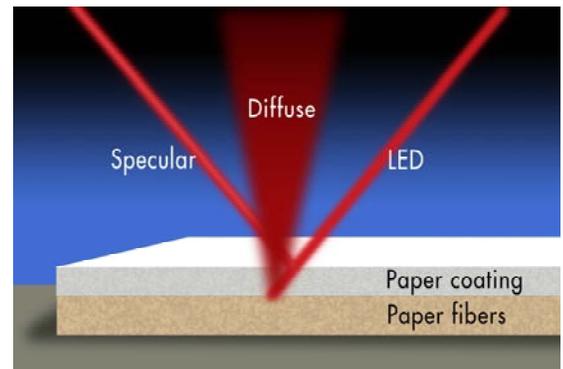
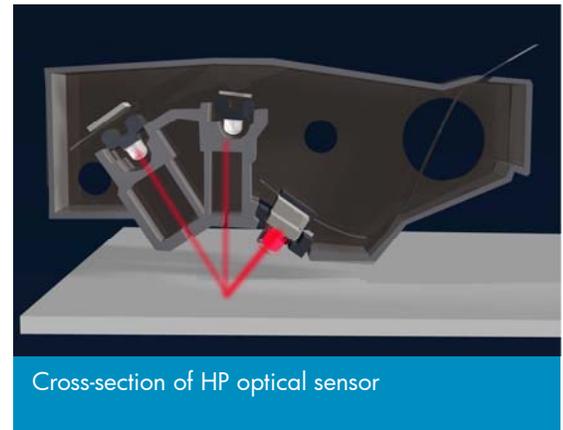


The optical sensor calibrates the printer to the specific ink cartridges and print heads, which eliminates the need for customers to manually calibrate the printer. The sensor also ensures the printer is properly calibrated to the print head nozzles to deliver optimal print quality.

### How does the HP optical sensor work?

The optical sensor has a red light-emitting diode (LED) and two phototransistors. When a customer initiates a print job, the paper is picked from the printer input tray and advanced to the print zone. As the paper reaches the top of the print zone, the LED shines light on the surface and creates an illuminating beam. The light from the LED reflects off the selected surface area of the paper, and the two phototransistors capture the signals that reflect back. The signals have two components, specular reflectance and diffuse reflectance:

- Specular reflectance reveals characteristics of the coating or IRL (Ink Retention Layer) on the paper, such as the coatings on photo papers. Similar to the reflection that is projected off of a mirror, specular reflectance has the same angle as the incidence light.
- Diffuse reflectance, which is scattered by the media surface at a 90-degree angle, captures the characteristics of the composition of the paper, such as the paper fibers, e.g., smooth or rough.



Each type of paper has a distinct set of characteristics. For example, photo papers typically are shiny, smooth, bright white and uniform in appearance, while plain papers have a rougher surface and generally are not shiny. All of these characteristics are exhibited in the reflective properties of the paper. As the sensor scans across the paper, the reflections change according to the orientation and composition of the fibers and any coating present on the surface of the paper. One phototransistor (PTR) measures the diffuse reflectance properties of the paper, while the second PTR measures the specular reflectance properties. The reflectance values are recorded at each 600<sup>th</sup> of an inch, as the sensor moves across the page.

The optical sensor reads the unique media 'signature' of the paper by measuring inherent optical properties and comparing them with the signatures of other papers. Once the paper is identified, the printer optimizes printing for the particular paper type.

### How does the HP optical sensor support competitive brand or new papers and films?

The optical sensor supports competitive brand papers and new papers by selecting color profiles, halftoning methods and the number of print passes for the paper, based on the paper's inherent optical properties. For example, a new photo paper that has specular and diffuse properties similar to HP Premium Plus Photo paper would be associated with the HP Premium Plus Photo paper color profile, print pass, and halftoning methods.