

Samsung Rendering Engine for Clean Pages (ReCP)

Printer technology that delivers professional-quality prints for businesses



Contents

Introduction	3
Improve scan and copy quality with ReCP	3
Small text enhancement	3
Descreening	3
Fringe artifact removal	3
Text segmentation	4
Adaptive smoothing	4
Text sharpening	4
Adaptive halftoning	4
Produce superior prints with ReCP	5
Contents-based optimal color reproduction	5
Color trapping and composite color reduction	6
Adaptive sharpening and edge enhancement	6
Resolution enhancement	7
Line width control	7
Increase quality with multifunction enhancements	7
Auto color selection	7
Show-through removal	8
Book copy correction	8
Book copy correction	8
Compact PDF	9
Fax enhancement	9
Conclusion	9
Competitive comparison	10
ReCP specifications by model	11
About Samsung Electronics Co., Ltd.	12
For more information	12

ReCP technology delivers professional- quality images.

Introduction

Businesses need quality printing to enhance all documentation and visual presentations containing images and graphics.

Samsung's Rendering Engine for Clean Pages (ReCP) technology delivers professional quality images. Edges are smoothed to seem crisp, while solid objects are overlapped to eliminate white gaps. These enhancements make documents seem sharper and more vibrant. Negative sharpening on bright texts and lines against dark backgrounds ensures that text and lines are clearly legible, even at very small font sizes.

Samsung ReCP technology enables businesses to confidently use color to effectively communicate and promote ideas. ReCP operates automatically, eliminating the need for specialized knowledge to produce outstanding results.

Improve scan and copy quality

Copying and scanning are frequent tasks of business professionals. Therefore, quality from the start is essential to prevent the need to rescan or reprint. ReCP technology delivers the best prints for copying and scanning on the first attempt with features that enhance small text, graphics and images.

This white paper describes how ReCP enhances the quality of printed documents, scans, copies and faxes to deliver professional quality.

Small text enhancement

Small text can be difficult to scan or copy because of imperfect scanner optics, known as the integrated cavity effect (ICE). ReCP compensates for this effect and prevents cracking or breaking for a much improved reproduction of lines and small text.

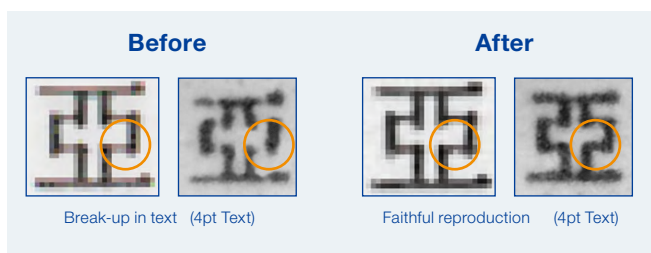


Figure 1. Small text enhancement

Desccreening

Scanning sometimes produces a Moire artifact, which is a grid-like or wavy pattern as shown in Figure 2. ReCP technology uses an adaptive filter to reduce the Moire artifact, resulting in better scan and copy quality. Compression rate (JPEG compression) is also improved, reducing the file size when sending over a network.

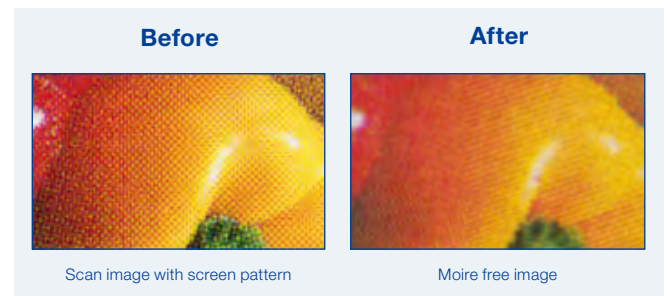


Figure 2. Desccreening

Fringe artifact removal

The vibration of internal parts of the scanner can cause what is referred to as a fringe artifact. This fringe artifact distorts the color on the edges of the scanned image. ReCP analyzes these edges and compensates for the fringe artifact, restoring neutral color regions.

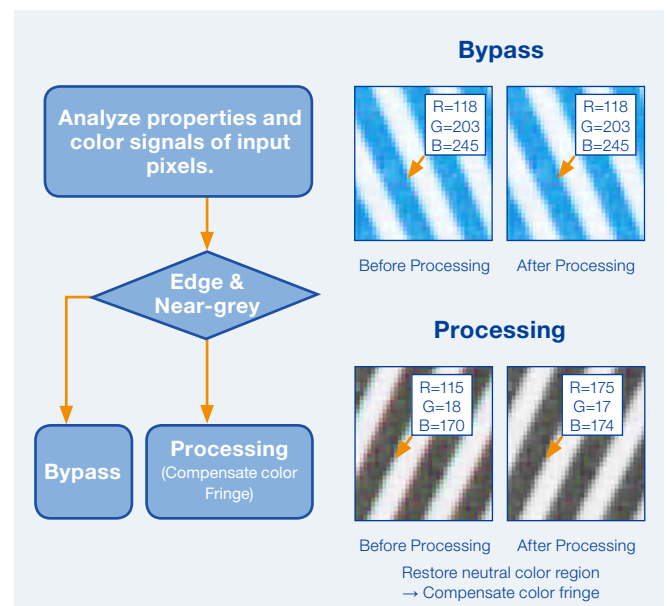


Figure 3. Fringe artifact removal

ReCP enhances the quality of text.

Text segmentation

Creating high-quality text often results in lower-quality images, which is why text and images must be enhanced separately. ReCP technology correctly separates the text region from the image region in a scanned image, producing sharp text and smooth images at the same time.

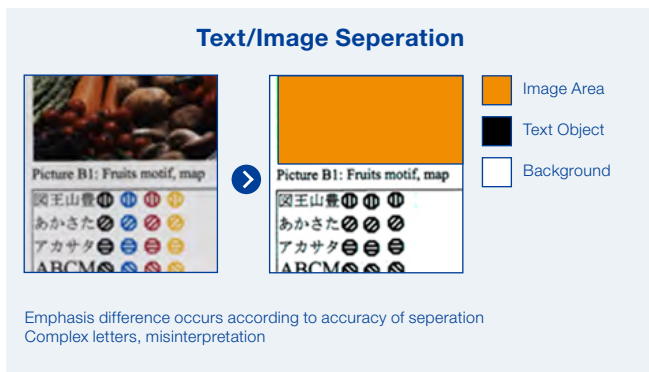


Figure 4. Text segmentation

Adaptive smoothing

The use of adaptive smoothing improves the look of copies or scans. ReCP technology uses filters to analyze images, smoothing inner regions and sharpening borders, resulting in higher-quality output.

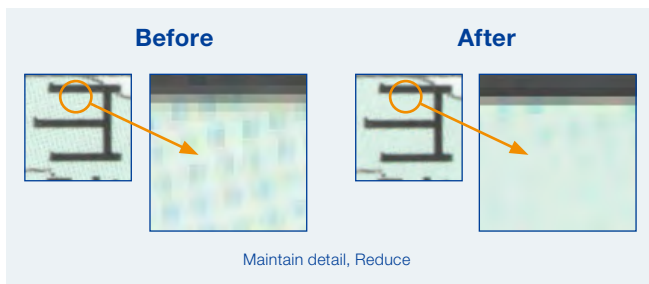


Figure 5. Adaptive smoothing

Text sharpening

ReCP prevents white gaps and color spread in text caused by misregistration because of mechanical inaccuracy. The resulting output is much sharper with pure black text clarity.

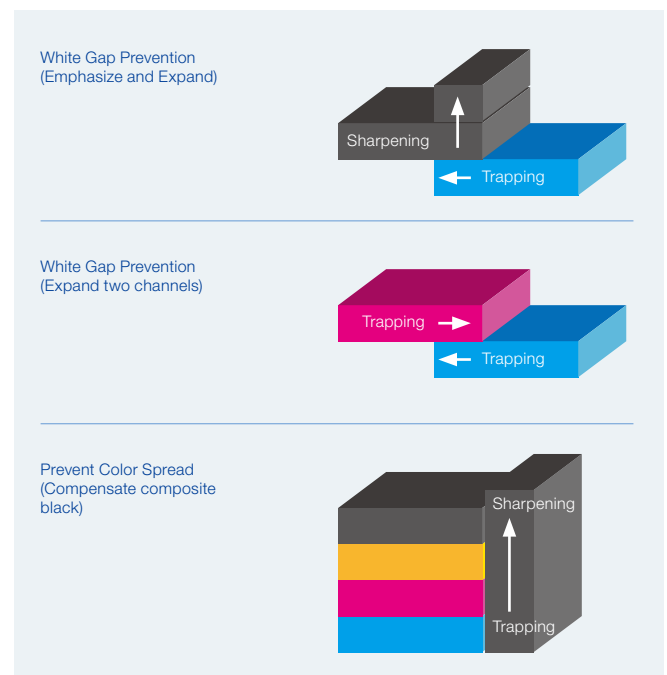


Figure 6. Text sharpening

Adaptive halftoning

Adaptive halftoning works based on the analysis of the edges of an image or graphic. The result is increased clarity and a reduction in unevenness and stronger uniformity of boundary edges.

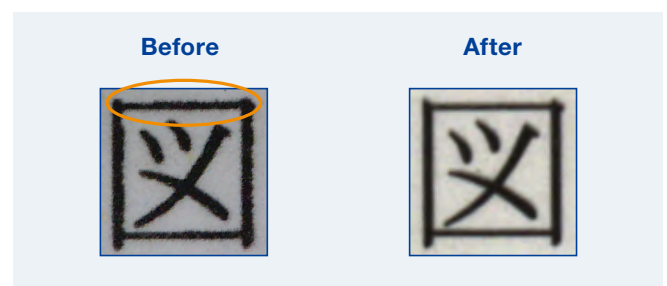





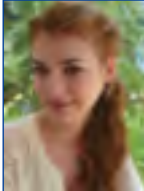
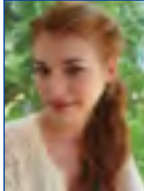



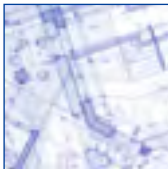


Figure 7. Adaptive halftoning

Produce superior prints with ReCP

ReCP technology delivers professional prints for businesses. Many built-in features, such as color trapping, adaptive sharpening, edge enhancement and resolution enhancement, ensure the quality of outputs with or without images. Edges of graphics, photos and text are precise and the results are stunning prints.

Contents-based optimal color reproduction

ReCP technology produces optimal color reproduction with the option to choose a specific content type from the printer menu interface. These content types include Standard, Photo, Biz Graphic, Computer Aided Design (CAD) and Web-Page. The following table describes each content type and displays examples.

Document type	Function description	Example		
Standard	Appropriate for general purpose with mixed text and photographs			
Photo	Appropriate for photographs or picture		Photo ➤	
Biz Graphic	Appropriate for business hand-outs, such as presentations		Biz Graphic ➤	
CAD	Appropriate for documents with fine lines and detail		CAD ➤	
Web-Page	Appropriate for webpage printing		Web-Page ➤	

ReCP provides color trapping and edge sharpening and enhancement.

Color trapping and composite color reduction

Misregistration between colors can be an issue when printing color contents, especially text. This issue occurs when the edge between colors does not match accurately. ReCP technology uses color trapping to compensate for this misregistration on colored backgrounds, filling in the white gap.

ReCP uses composite color reduction to compensate for misregistration of colored text on a white background. This process removes the minority colors along the edges of the colored text, resulting in sharper texts and graphics.

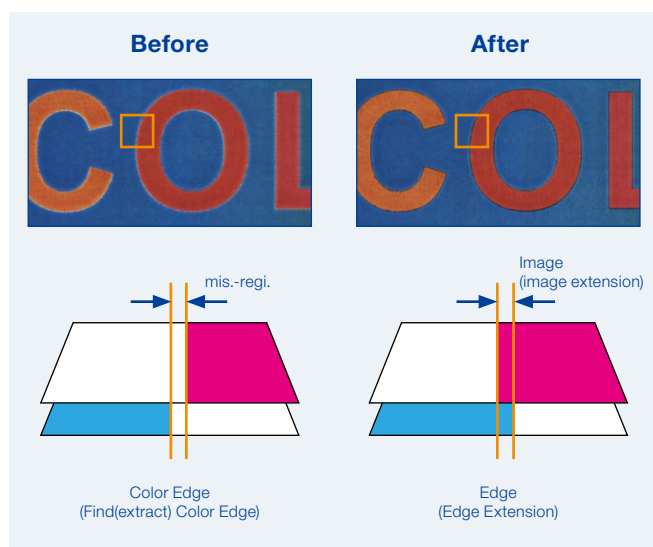


Figure 8. Color trapping

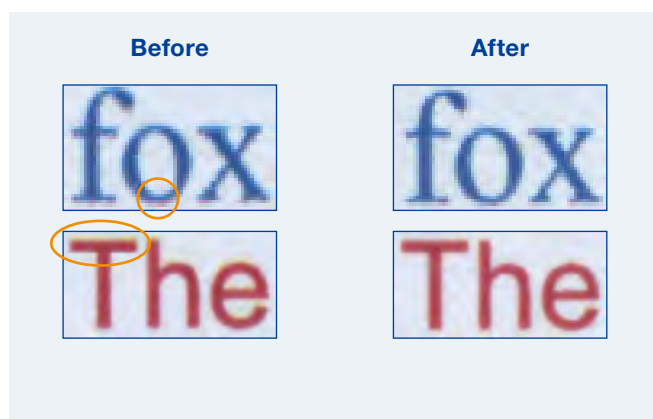


Figure 9. Composite color reduction

Adaptive sharpening and edge enhancement

Adaptive sharpening analyzes the edges and improves clarity by adjusting the edge levels. The adjustment is based on the analysis of the edge and whether it is a positive or negative edge.

Edge enhancement adds dots along the edges of an image or graphic to make them look sharper. The dots are added to the positions along the edge where there are voids. Lines that may have seemed jagged become crisp and straight.

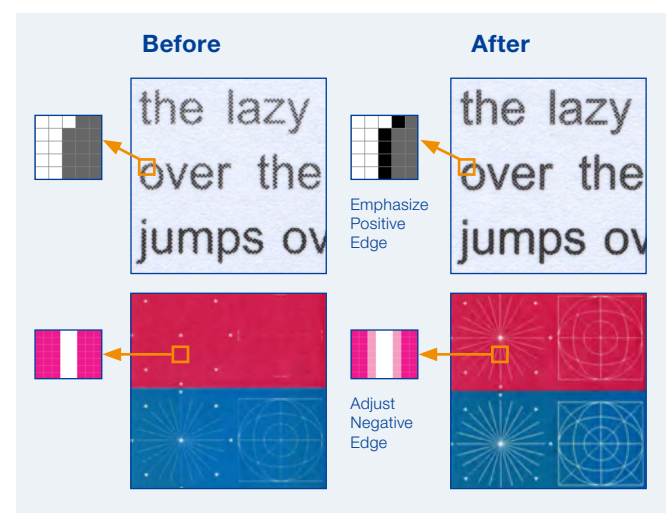


Figure 10. Adaptive sharpening

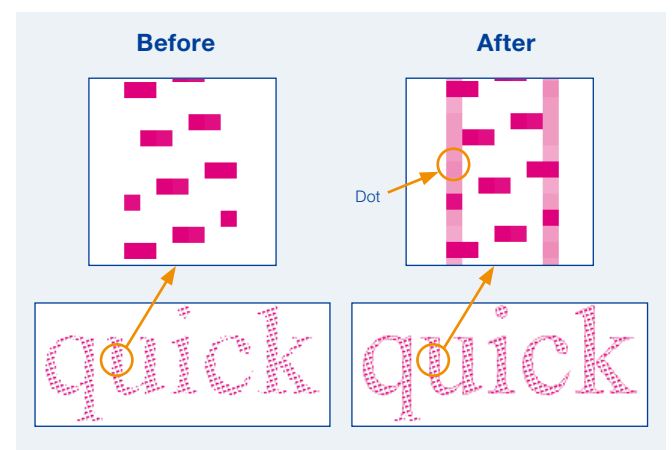


Figure 11. Edge enhancement

ReCP increases quality with multifunction enhancements.

Resolution enhancement

Resolution is based on how many dots per inch (dpi) the printer is capable of producing. ReCP technology enhances resolution, analyzing patterns in an image or graphic and decreasing jaggedness of slanted edges using anti-aliasing, which is a software process for removing or reducing the jagged distortions in curves and diagonal lines so that the lines seem smooth or smoother. The result is a more natural-looking edge.

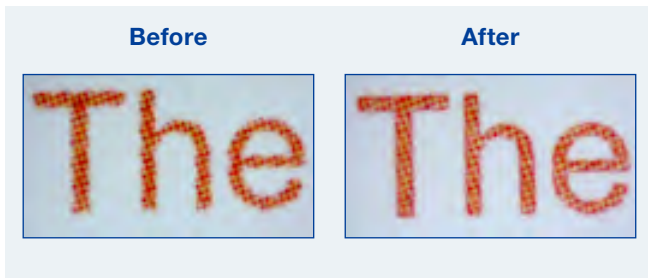


Figure 12. Resolution enhancement

Line width control

Line width control adjusts the thickness of thin lines based on whether the object has a positive or negative edge. This improves the visibility of lines.



Figure 13. Line width control

Increase quality and convenience with multifunction enhancements

Businesses rely heavily on multifunction printers in their day-to-day operations. ReCP technology improves the quality and efficiency of all multifunction tasks by reducing toner usage, by improving image quality, by reducing file size and by improving the quality of incoming faxes.

Auto color selection

Auto color selection automatically interprets if the original document was mono or color. This feature is essential for conserving toner usage when copying.

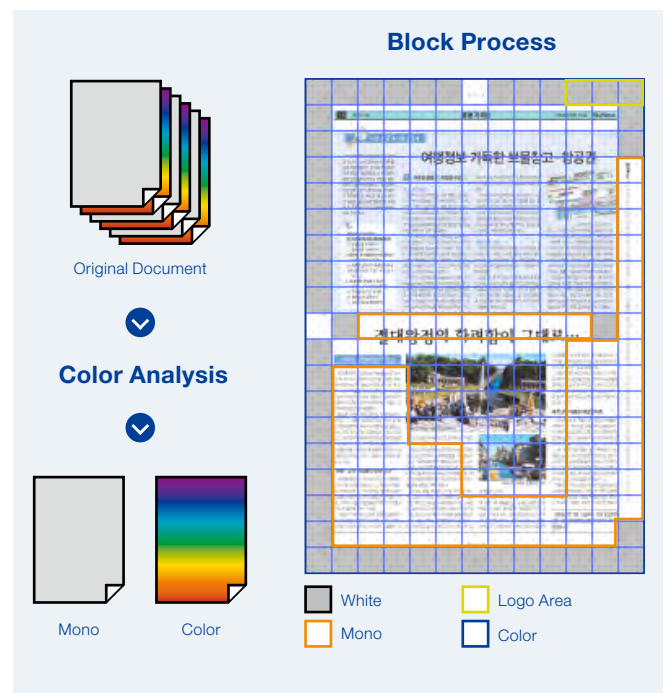


Figure 14. Auto color selection

ReCP technology eliminates show-through when copying documents with two sides.

Show-through removal

When scanning a document that has two sides, sometimes the content from one side shows through the other side. ReCP technology adjusts for this possibility and removes any show-through.

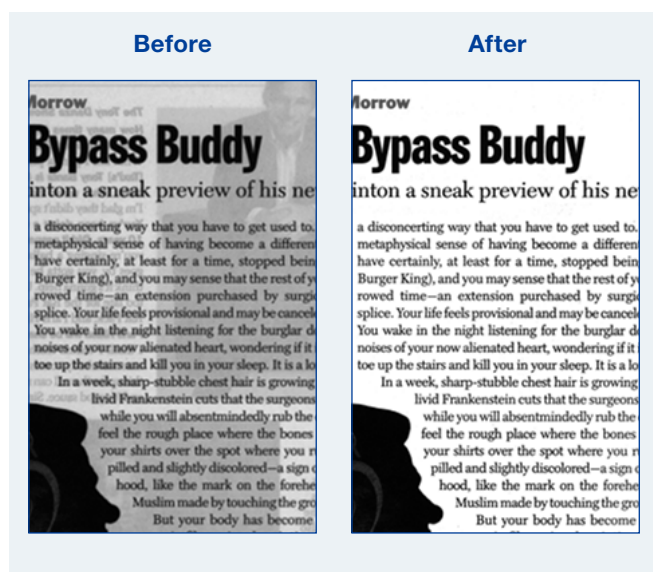


Figure 15. Show-through removal

Book copy correction

When copying a book, correcting copy distortions, such as shadows, can be difficult. ReCP technology reduces these distortions through the use of boundary cropping, perspective correction and shadow correction, resulting in a greatly improved copy.

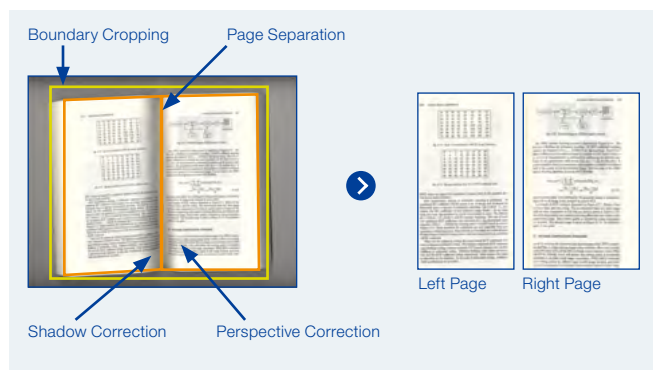


Figure 16. Book copy correction

Watermark blender

Security is critical when copying confidential documents. With ReCP technology, users can add up to eight watermark or stamp patterns to copies, such as page numbers, invisible security marks, logos and dates.

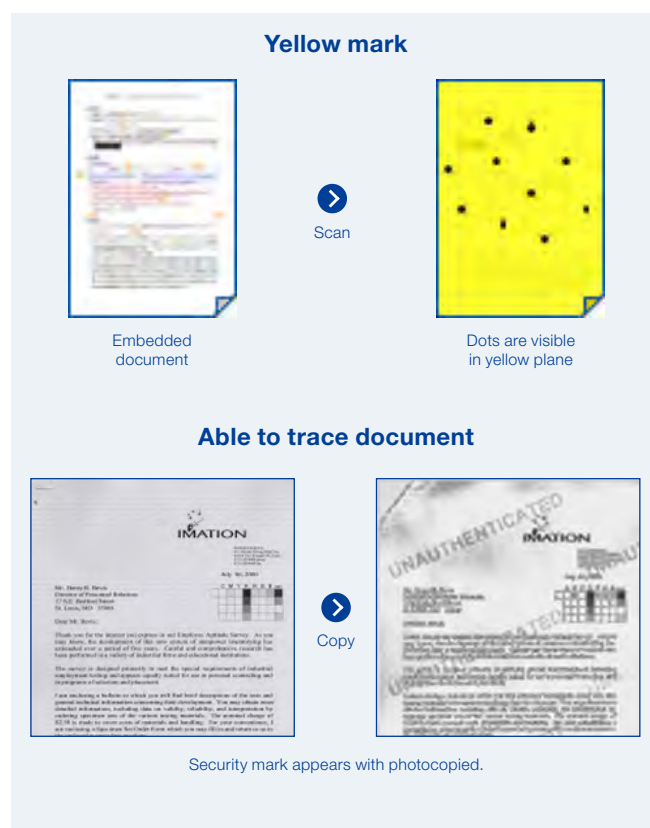


Figure 17. Watermark blender

Edges of graphics, photos and text are precise to produce stunning prints.

Compact PDF

When scanning documents, reducing the file size without sacrificing quality is important to businesses. With compact Adobe® Portable Document Format (PDF), documents with a combination of text and images are compressed 10 to 20 times more than JPEG compressions.

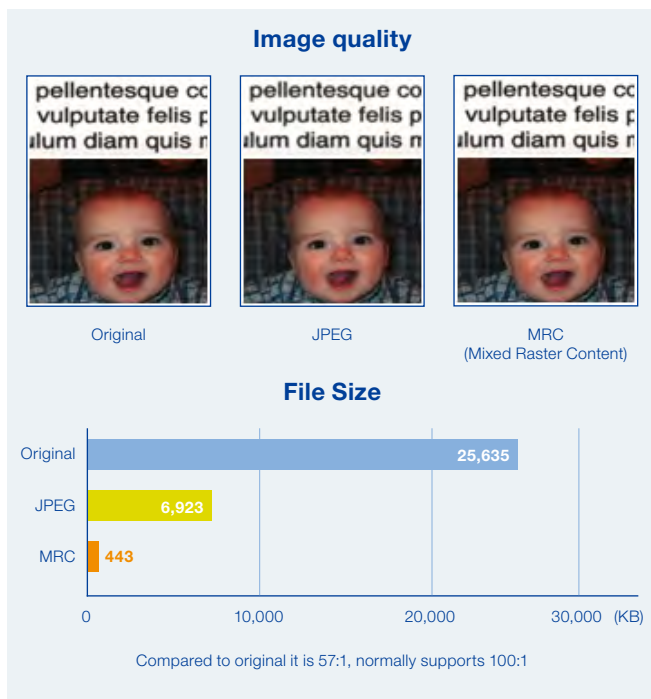


Figure 18. Compact PDF

Fax enhancement

The Fax enhancement feature in ReCP technology smoothes the edges of received fax text and removes binary noise from the transmission, resulting in improved image quality.

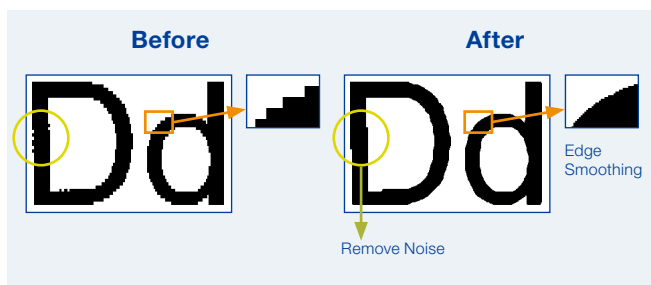


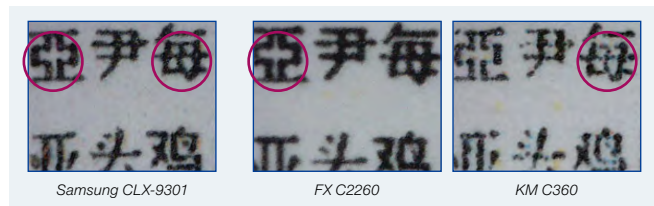
Figure 19. Fax enhancement

Conclusion

Samsung ReCP technology enables businesses to produce professional-grade documents, including scans, copies and high-resolution prints. ReCP adjusts images to ensure that edges are sharp and colors are vibrant; it also sharpens text to increase legibility. This advanced technology improves multifunction jobs by reducing toner usage, reducing file size and enhancing the quality of incoming faxes. With the many features of ReCP, organizations of all types can convey their business content with clarity and vibrancy, every time.

ReCP technology has distinct advantages in comparison to the competition.

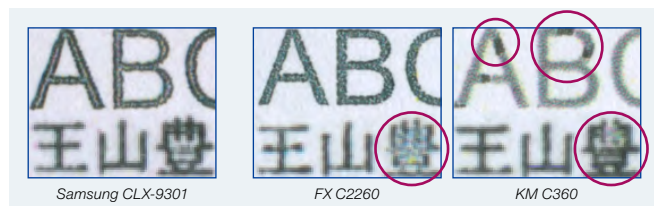
Small text enhancement



Desccreening



Text segmentation



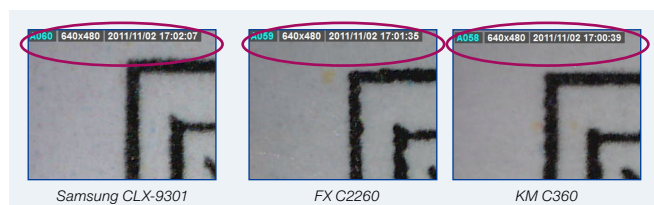
Adaptive smoothing



Text sharpening



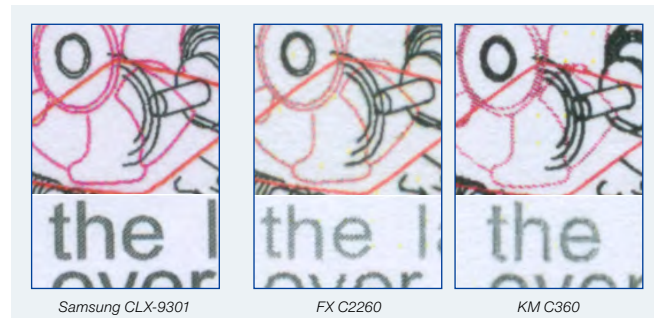
Adaptive halftoning



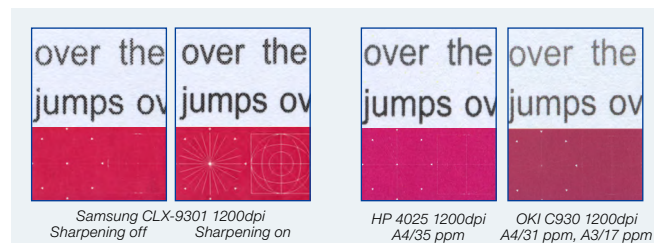
Small text enhancement



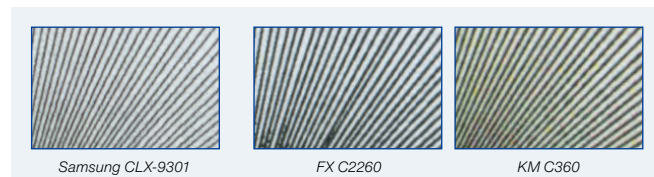
Edge enhancement



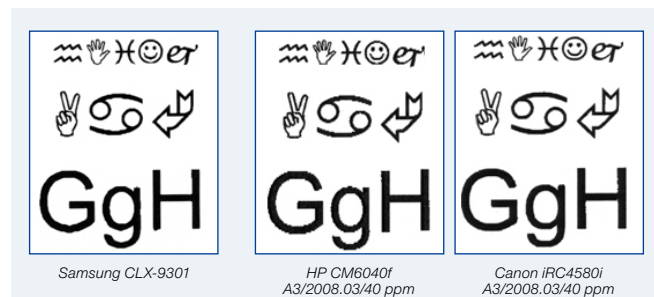
Adaptive sharpening



Resolution enhancement



Fax enhancement



ReCP model comparison

ReCP specifications by model

Category	ReCP technology	CLP-365/ CLX-3305	CLP-415/ CLX-4195	CLP-680/ CLX-6260	CLX-8650	CLX-9301
Copy	Small text enhancement	No	No	No	Yes	Yes
	Descreening	Yes	Yes	Yes	Yes	Yes
	Fringe artifact removal	Yes	Yes	Yes	Yes	Yes
	Text segmentation	Yes	Yes	Yes	Yes	Yes
	Adaptive smoothing	Yes	Yes	Yes	Yes	Yes
	Text sharpening	Limited	Limited	Limited	Yes	Yes
	Adaptive halftoning	No	No	No	Yes	Yes
Print	Color trapping and composite color reduction	Yes	Yes	Yes	Yes	Yes
	Adaptive sharpening and edge enhancement	Yes	Yes	Yes	Yes	Yes
	Resolution enhancement	No	No	No	Yes	Yes
	Line width control	No	No	No	Yes	Yes
Multifunction	Auto color selection	Yes	Yes	Yes	Yes	Yes
	Show-through removal	No	No	No	Yes	Yes
	Book copy correction	No	No	No	Yes	Yes
	Watermark blender	No	No	No	Yes	Yes
	Compact PDF	Bundled	Bundled	Bundled	Yes	Yes
	Fax enhancement	Yes	Yes	Yes	Yes	Yes

Yes = Printer has ReCP technology.

No = Printer does not have ReCP technology.

Bundled = Printer has ReCP technology that is provided as bundled software.

Limited = Printer has ReCP technology on black text only.

Legal and additional information

About Samsung Electronics Co., Ltd.

Samsung Electronics Co., Ltd. is a global leader in semiconductor, telecommunication, digital media and digital convergence technologies with 2011 consolidated sales of US\$143.1 billion. Employing approximately 222,000 people in 205 offices across 71 countries, the company operates two separate organizations to coordinate its nine independent business units: Digital Media & Communications, comprising Visual Display, Mobile Communications, Telecommunication Systems, Digital Appliances, IT Solutions, and Digital Imaging; and Device Solutions, consisting of Memory, System LSI and LCD. Recognized for its industry-leading performance across a range of economic, environmental and social criteria, Samsung Electronics was named the world's most sustainable technology company in the 2011 Dow Jones Sustainability Index. For more information, please visit www.samsung.com.



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