Digital multitoning is an extension of halftoning for rendering more than two tones at each pixel for higher image quality. Although a lot of effort has been put in generating dispersed dots previously, the blue-noise feature can hardly be achieved for those printers utilizing the electrophotography (EP) process to avoid the physically unstable isolated dots. To overcome this issue, Chandu et al. proposed a screening method for yielding green-noise dot clusters, yet noisy multitone texture was accompanied. This degrades the visual quality and the stability of tone rendering. In this paper, a significantly improved homogeneity of clustered dots can be achieved by the proposed screening method based upon the new inter-iterative clustered-dot direct multi-bit search algorithm. Compared with the former approaches, the inter-iteration design leads to less error by the updated initial multitone patterns. As demonstrated in the experimental results, both of the high homogenous multitone texture and less noisy perception at all absorptance levels are offered in contrast to the former Chandu et al.'s results. The high-quality output proves it as a very competitive candidate for EP printers, e.g., laser printers.