

36 – 38 Arbitrary pattern fabrication with a LCD reticle-free exposure method

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We describe a newly developed technique that uses optical projection lithography with a liquid crystal display (LCD) in place of a conventional reticle, in order to minimize turn-around-time and production cost. Circuit pattern data, generated by a computer aided design (CAD) system, is transferred directly to a control computer. The control computer converts the data into an equivalent dot matrix representation of the design for use on a LCD. The LCD is placed in a conventional optical stepper. One feature of this system is the simplicity of the data management scheme which permits the data to be handled by a computer file directly; without any of the manual assistance normally needed in conventional reticle fabrication. It is a very convenient method to reverse reticle tone by changing the LCD mode: easy compared to a conventional reticle manufacturing process. The minimum resolution of this proposed system is very similar to conventional systems that use optical reticle. We have demonstrated that this LCD Reticle-Free Exposure Method has the potential of replacing conventional reticles in optical stepper lithography. This method is applicable for manufacturing devices with relatively large fabrication rules and low production quantities, such as System-in-Package application.

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