

SEMI P6-88 (Reapproved 0707)

SPECIFICATION FOR REGISTRATION MARKS FOR PHOTOMASKS

This Standard was technically approved by the Micropatterning Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on April 25, 2007. It was available at www.semi.org in June 2007. Originally published in 1988.

NOTICE: This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

1 Purpose

1.1 This Specification covers a defined mark placed photolithographically on photomasks for the express purpose of determining the registration accuracy of one imaged photomask to another imaged photomask within the same set of photomasks.

2 Scope

2.1 This Specification defines the shape, range of sizes, and general placement of a registration mark for use on all photomasks. Methods of use will be stated in accompanying application notes (to be furnished at a later date).

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 None.

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Detail Specifications

4.1 Introduction

4.1.1 The complete specification for this registration mark is to be agreed upon by the circuit designer, mask maker, and the mask user.

4.2 Other

4.2.1 This mark is not intended to be used for the determination of overlay accuracy of an imaged layer of a photomask onto a maker to any subsequent imaged layers on the same wafer.

5 Guidelines for Shape and Sizes of Registration Mark

5.1 The shape of the mark shall be in the form of a cross (see Figure 1).

5.2 The area of intersection of the horizontal and vertical lines shall be “user-defined.” The designer, mask maker, or user may define any shape of geometry within this area. The “user-defined” geometry used shall not exceed the width or height of the area of intersection (see Figure 2).

5.3 The width of both the horizontal and vertical lines shall be equal.

5.4 The length of both the horizontal and vertical lines shall be equal.

5.5 The width and length of the horizontal and vertical lines may vary due to design rules, scaling, process bias, etc. Table 1 lists the design dimensions for each type of photomask. ¶¶ 3.3 and 3.4 are not superseded by this statement.

5.6 Any of the four quadrants created to the outside of the cross shall be defined as “No-Man’s Land” and shall not have any geometry or marks placed within them (see Figure 3).

5.7 A field or registration mark (i.e., dark or clear) is user-definable.

5.8 The mark shall be placed as per attached application notes (to be furnished at a later date).

Table 1 Dimensions of Registration Mark for All Mask Types (all dimensions are in micrometers [μm])

<i>Type of Photomask</i>	<i>Width</i>	<i>Length</i>	<i>User Defined Area</i>	<i>Total Pattern Window</i>
1× Masters	4–8	10–15	min. 4×4 max. 8×8	min. 24×24 max. 38×38
1× Stepper Reticles	4–8	10–15	min. 4×4 max. 8×8	min. 24×24 max. 38×38
5× Stepper Reticles	8–40	20–75	min. 8×8 max. 40×40	min. 48×48 max. 190×190
10× Stepper Reticles	16–80	40–150	min. 16×16 max. 80×80	min. 96×96 max. 380×380

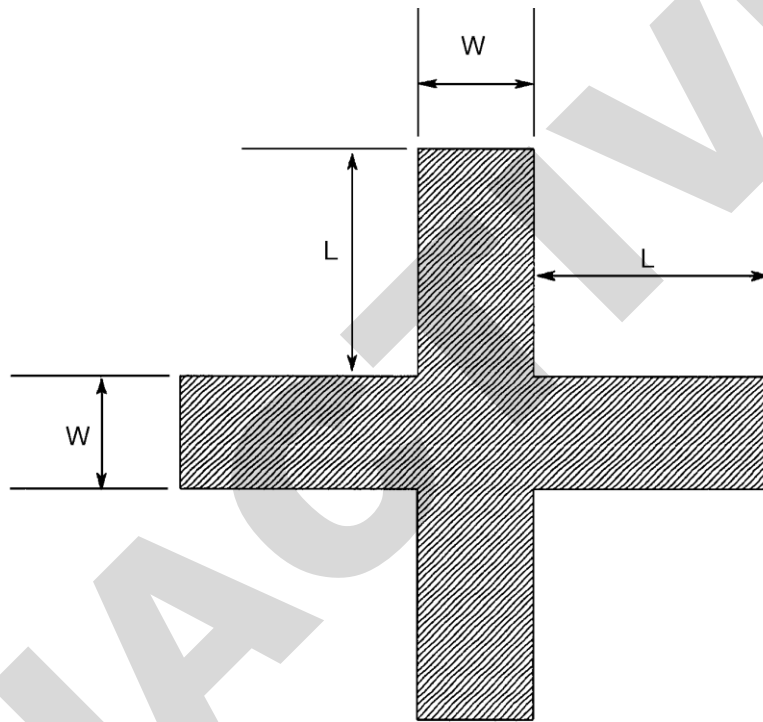


Figure 1
Shape of Registration Mark