

SEMI P6-88

SPECIFICATION FOR REGISTRATION MARKS FOR PHOTOMASKS

1 General Specification

1.1 Scope

1.1.1 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).

1.2 Applicable Documents — None.

2 Detail Specifications

2.1 Introduction

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

2.2 Requirements

2.2.1 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.

2.3 Other

2.3.1 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.

3 Guidelines for Shape and Sizes of Registration Mark

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

3.2 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).

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

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

3.5 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. Sections 3.3 and 3.4 are not superseded by this statement.

3.6 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).

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

3.8 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])

Type of Photomask	Width	Length	User Defined Area	Total Pattern Window
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

Type of Photomask	Width	Length	User Defined Area	Total Pattern Window
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

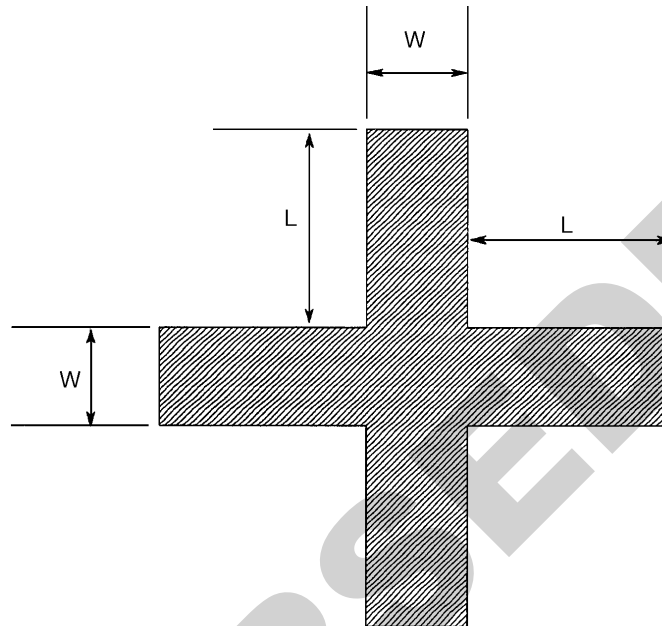


Figure 1
Shape of Registration Mark

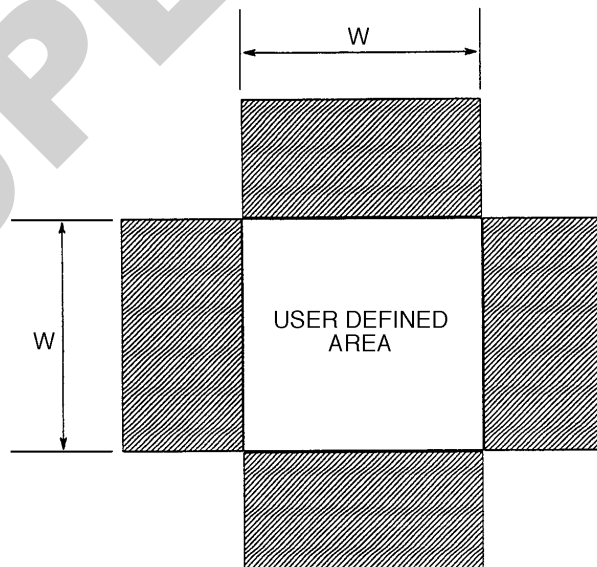


Figure 2
User-Defined Area