

SEMI M12-0303

SPECIFICATION FOR SERIAL ALPHANUMERIC MARKING OF THE FRONT SURFACE OF WAFERS

This specification was technically approved by the Global Traceability Committee and is the direct responsibility of the North American Silicon Wafer Committee. Current edition approved by the North American Regional Standards Committee on November 22, 2002. Initially available at www.semi.org January 2003; to be published March 2003. Originally published in 1988; previously published September 1998.

1 Purpose

1.1 This specification provides a serial alphanumeric marking of silicon or other semiconductor wafers. The wafer serial number links the properties of the wafer stored in an appropriate database system to each individual wafer for purposes of tracking and control during wafer and device manufacture.

1.2 By defining the basic code used for the mark, this specification ensures the consistency of wafer marking performed by wafer manufacturers. Thus, it allows simplification of the performance requirements of automatic optical character reading (OCR) equipment, provides for unassisted and immediate human readability without wafer handling, and facilitates resolution of wafer level process variations.

1.3 The marking code is intended to be valid for a broad range of wafer products (i.e., epi, SOI, processed polished wafers, etc.).

2 Scope

2.1 This specification defines the geometric and spatial limits of the alphanumeric code, specifically for serial identification of flatted and notched silicon wafers.

2.2 This specification does NOT address the marking techniques that may be employed when complying with this standard.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards

3.1 SEMI Standards

SEMI AUX001 — List of Vendor Identification Codes

SEMI M13 — Specification for Alphanumeric Marking of Silicon Wafers

3.2 ANSI Standard¹

ANSI X 3.17 — Character Set and Print Quality for Optical Character Recognition (OCR-A).

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

4 Terminology

4.1 Definitions

4.1.1 *adjacent character misalignment* — the vertical distance, R , between the character baselines of two adjacent characters on the same line.

4.1.2 *character separation* — the horizontal distance between the adjacent boundaries of any two adjacent characters.

4.1.3 *character spacing* — the horizontal distance between the character centerlines of any two adjacent characters.

4.1.4 *character window* — the rectangular window within which all characters must be contained.

4.1.5 *front surface of the wafer* — the exposed surface upon which active semiconductor devices have been or will be fabricated.

4.1.6 *line character misalignment, R* — the vertical distance between the character baselines of two characters on the same line.

5 Shape and Size of Marking

5.1 Solid line or dot matrix method may be used to write characters. The minimum matrix shall be 5 dots horizontal and 9 dots vertical. More dots may be used, up to and including a solid line. Higher density is recommended to achieve improved read reliability (see Related Information 1).

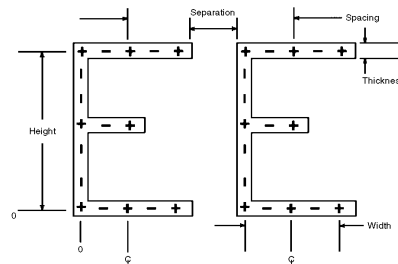
5.2 *Character Dimensions and Spacing* — (see Table 1 and Figure 1)

¹ American National Standards Institute, New York Office: 11 West 42nd Street, New York, NY 10036, USA. Telephone: 212.642.4900; Fax: 212.398.0023 Website: www.ansi.org

Table 1 Character Dimensions

Character	mm
Height	1.624 ± 0.025
Width	0.812 ± 0.025
Thickness (See NOTE 1)	0.200 + 0.050/-0.150
Spacing	1.420 ± 0.025

NOTE 1: The thickness of the diagonal in the letter "N" is 0.138 ± 0.05 mm for single density dot matrix.

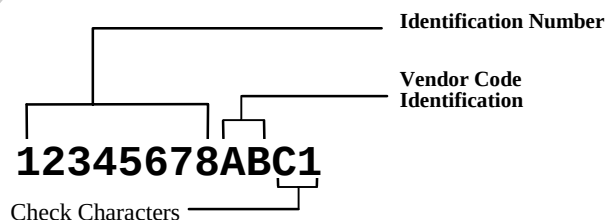

**Figure 1
Character Outline**
Table 2 Code

Character Location	CharacterStyle	Parameter	Code	Definition
1	Alpha/Numeric	IDENTIFICATION NUMBER	A through Z and 0 through 9	Vendor-Assigned (see Note 1)
2	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
3	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
4	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
5	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
6	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
7	Alpha/Numeric	IDENTIFICATION NUMBER		Vendor-Assigned (see Note 1)
8	Numeric Only	IDENTIFICATION NUMBER	0 through 9	Vendor-Assigned (see Note 1)
9	Alpha Only	VENDOR IDENTIFICATION CODE	A through Z	(see SEMI AUX001 and Note 1)
10	Alpha Only	VENDOR IDENTIFICATION CODE		(see SEMI AUX001 and Note 1)
11	Alpha Only	CHECK CHARACTERS	A through H	Error-Detecting Method (see Section 9.10)
12	Numeric Only	CHECK CHARACTERS	0 through 7	Error-Detecting Method (see Section 9.10)

NOTE 1: In the absence of information at any assigned location, a dash (–) must be used.

6 Alphanumeric Code

6.1 The code consists of one line of 12 characters. The first eight characters are an identification number which is unique to the wafer for a given vendor. These characters may be alphanumeric except character 8 which must be numeric (see Table 2). Characters 9 and 10 are the vendor identification codes (see SEMI AUX001). Characters 11 and 12 are check characters (see Section 9). These check characters are machine generated for code acceptance and reading verification.


**Figure 2
Example of Code**

6.2 In the absence of a character at any assigned location, a dash (–) must be used.

6.3 An example of the code is given in Figure 2.

6.4 SEMI-OCR Standard Character Set — This character set contains capital letters from A to Z, numerals from 0 to 9, a dash, and a period (see Appendix 1). The period is NOT used in the code symbols defined in this specification (see Tables 2 and 3), although it is required for use in the code symbols defined in SEMI M13.

Table 3 SEMI OCR Character Set Modified for Use in this Specification

A B C D E F G H I J K L M N O
 P Q R S T U V W X Y Z -
 0 1 2 3 4 5 6 7 8 9

7 Character Window

7.1 The character window must be located on the front surface of the wafers.

7.2 All characters must be contained within the character window dimensions specified in Figures 3 (for flatted wafers) or Figure 4 (for notched wafers).

7.3 The top of the characters is toward the side of the character window nearest to the flat or notch.

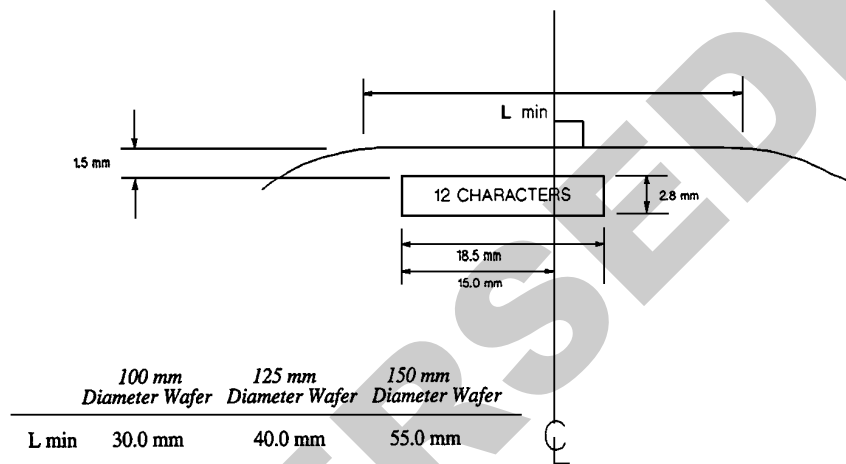


Figure 3
Character Window Location for Flatted Wafers

NOTE: The vertical center line referenced in Figure 3 is the bisector of the primary fiducial (flat).

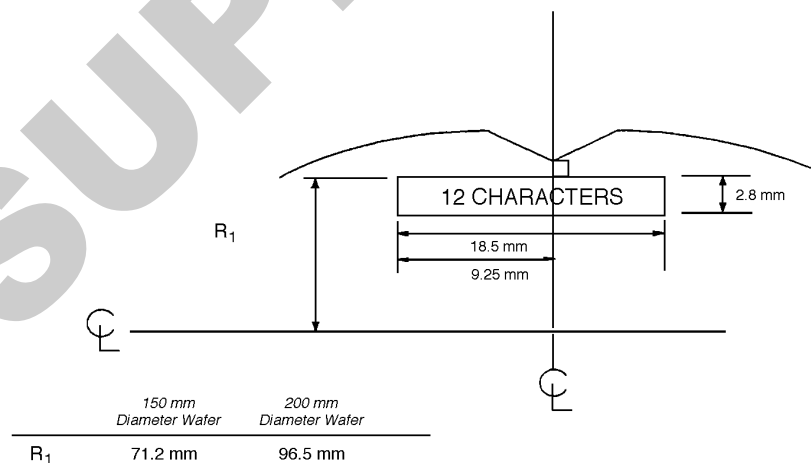


Figure 4
Character Window Location for Notched Wafers

NOTE: The vertical center line referenced in Figure 4 is the bisector of the primary fiducial (notch).