

SEMI M13-0706 (Reapproved 1011) SPECIFICATION FOR ALPHANUMERIC MARKING OF SILICON WAFERS

This Standard was technically approved by the Traceability Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on September 12, 2011. Available at www.semiviews.org and www.semi.org in October 2011; originally published in 1988; previously published July 2006.

NOTICE: This Document was reapproved with minor editorial changes.

1 Purpose

1.1 This Specification describes an alphanumeric marking system for silicon wafers. The marking code includes information on the origin, approximate resistivity, dopant species, and crystal growth orientation in addition to a wafer identification number. Use of this Specification ensures the consistency of all wafer marking performed by silicon manufacturers. This consistency allows simplification of the performance requirements of automatic Optical Character Reading (OCR) equipment.

1.2 By defining the basic code used to characterize the individual wafer, this Specification provides the information needed for practical operator interpretation.

2 Scope

2.1 This Specification defines the character set, location, and associated dimensions and tolerances of an alphanumeric code, specifically for 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: 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 SEMI Standards and Safety Guidelines

None.

3.2 Other Documents

SEMI AUX001 — List of Vendor Identification Codes

SEMI AUX015 — SEMI OCR Character Outlines

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

4 Terminology

4.1 Definitions

4.1.1 *adjacent character misalignment, R_{adj}* — the vertical distance 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 characters.

4.1.3 *character spacing* — the horizontal distance between the character spacing reference lines of the adjacent characters.

4.1.4 *line character misalignment, R_{line}* — the vertical distance between the character baselines of the highest and lowest 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 five dots horizontal and nine dots vertical as shown in Figure 1. More dots may be used, up to and including a solid line. Higher density is recommended, especially for use with the larger code size applicable to notched wafers, to achieve improved read reliability (see Related Information 1).

5.2 *Character Dimensions and Spacing* — See Table 1 and Figure 1.

5.3 *SEMI OCR Standard Character Set* — See Table 2 and SEMI AUX 015.

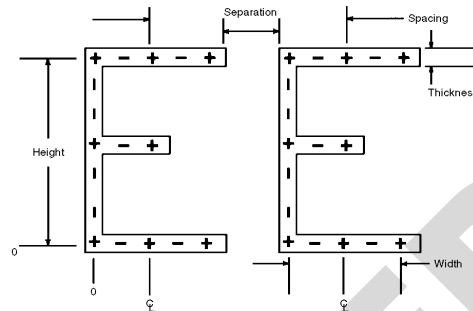


Figure 1
Character Outline

6 Alphanumeric Code

6.1 *Message Content* — The code consists of one line of 18 characters. The first eight characters are an identification number that is unique to the wafer for a given supplier. These characters may be alphanumeric except character 8, which must be numeric (see Table 3). Characters 9 and 10 are the supplier identification code (see SEMI AUX001) (see Figure 2 and Table 3).

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

6.2 *Code Field Location and Dimensions* — The alphanumeric code field shall be located on the front surface of the wafers (see Figures 3 and 4 for location and dimensions of the alphanumeric code field for flatted and notched wafers, respectively).

6.3 Character Alignment

6.3.1 *Character Skew* — the maximum allowable angle between the character baseline and a line parallel with the bottom of the character window shall be 3 degrees (see Figure 5).

6.3.2 *Maximum Character Misalignment* — the maximum adjacent character misalignment, R_{adj} , shall be 0.23 mm (see Figure 6), and the maximum line character misalignment, R_{line} , shall be 0.46 mm (see Figure 7).

Table 1 Character Dimensions

Character	100 mm, 125 mm, and 150 mm Flatted Wafers, mm	150 mm and 200 mm Notched Wafers, mm
Height	0.812 ± 0.025	1.624 ± 0.025
Width	0.406 ± 0.025	0.812 ± 0.025
Thickness	0.100 ± 0.050	$0.200 + 0.025$ or -0.150
Spacing	0.710 ± 0.025	1.420 ± 0.025
Minimum Separation	0.104	0.308

#1 The diagonal thickness of the letter 'N' is 0.138 ± 0.05 mm.

Table 2 Standard Character Set

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 .

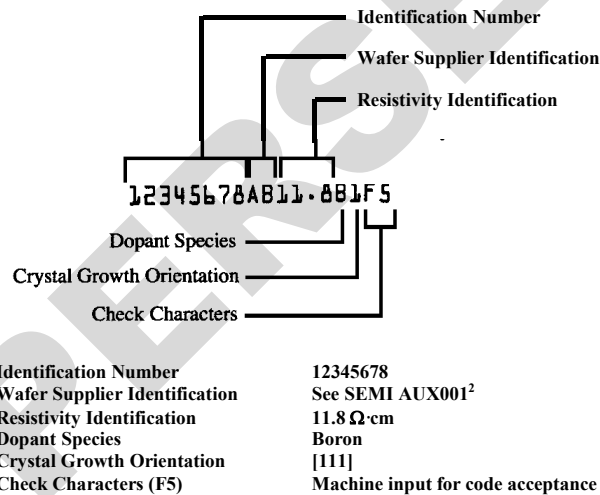


Figure 2
Example of Code

Table 3 Code

Character Location	Character Style	Parameter	Code	Definition
1	Alpha/Numeric	IDENTIFICATION NUMBER	A–Z and 0–9	Supplier-Assigned ^{#1}
2	Alpha/Numeric			
3	Alpha/Numeric			
4	Alpha/Numeric			
5	Alpha/Numeric			
6	Alpha/Numeric			
7	Alpha/Numeric			
8	Numeric Only		0–9	
9	Alpha Only	SUPPLIER IDENTIFICATION	A–Z	See SEMI AUX001 ^{#1}
10	Alpha Only	RESISTIVITY IDENTIFICATION	0–9 and . (period)	Resistivity ($\Omega \cdot \text{cm}$) identification is assigned by supplier, expressed as a whole number or as a mixed number with a decimal fraction. No accuracy is implied. ^{#1}
11	Numeric Only			
12	Numeric Only			
13	Numeric Only			
14	Numeric Only			
15	Alpha Only	DOPANT SPECIES	B	Boron
			F	Phosphorous
			A	Arsenic
			S	Antimony
			–	not identified
16	Numeric Only	CRYSTAL GROWTH ORIENTATION	0	[100]
			1	[111]
			2	[110]
			3	[011]
			5	[511]
			–	not identified
17	Alpha Only	CHECK CHARACTER A ₁₇	A–H	Error-Detecting Method (see § 7)
18	Numeric Only	CHECK CHARACTER A ₁₈	0–7	

^{#1} In the absence of information at any assigned location, a dash (–) must be used.