

SEMI T20.1-1109 (Reapproved 0322) SPECIFICATION FOR OBJECT LABELING TO AUTHENTICATE SEMICONDUCTORS AND RELATED PRODUCTS IN AN OPEN MARKET

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NOTICE: Paragraphs entitled ‘NOTE:’ are not an official part of this Standard or Safety Guideline and are not intended to modify or supersede the official Standard or Safety Guideline. These have been supplied by the global technical committee to enhance the usage of the Standard or Safety Guideline.

1 Purpose

1.1 *Assumed Commercial Environment*

1.1.1 Large quantities of semiconductor device products are distributed in the business world to be embedded into various electronics products such as television sets, computers, automobiles or their components, and so on. The electronic component supply network is frequently contaminated by counterfeit and tainted product. The risk of procuring contaminated goods increases when authorized (certified) distribution networks run out of product. This may occur with supply shortfalls or terminated products. Then, purchasing policy may also force procurement from noncertified distributors.

1.2 *Authentication of Distributed Products*

1.2.1 A product may be substituted by counterfeiting the item secretly anywhere in a chain of distribution. If the product has specific identification; for example, an unpredictable random code, on it issued by some authentication organization, it can be determined whether it is genuine or not anywhere in the distribution chain.

1.2.1.1 When authentication is practiced consistently at key points in the trade stream, and when it is left open for any party to participate, it drives unintended counterfeit purchases to a minimum in a way that can be deployed easily and relatively inexpensively in a wide variety of settings.

1.3 *Availability of Standards*

1.3.1 The semiconductor industry has lacked standardized methods to validate the integrity of goods from non-certified distributors or suppliers. The purpose of this Specification is to describe the object labeling aspect.

1.3.2 The approach that is covered by this Specification involves (1) labeling by trusted manufacturers of batches of authentic parts with Authentication Codes on the product package or device and (2) authentication service, available to anyone considering purchase of goods, using the Authentication Code for validation.

1.3.3 This Specification is intended to provide a common format, syntax, and content for printed, machine-readable codes on objects to facilitate communication of data essential for authentication. These labels differ from current commercial practice in that they provide no direct information about the product.

1.3.4 This Specification covers labels or package marking that contain a two-dimensional matrix bar code symbol (hereafter Data Matrix) and its associated human-readable interpretation. This symbol can accommodate substantially more information than can one-dimensional (linear) bar code symbols; it is included to provide for a smooth transition from existing traceability and labeling procedures to the comprehensive, unified system envisioned for the future in which common reading equipment can be used throughout the supply chain.

1.3.5 This Specification is a key element of a suite of Standards¹ aimed at enabling automated, reliable, and secure product authentication for the semiconductor industry, thereby reducing the presence of illegal counterfeit items in the marketplace.

¹ This suite of Standards is being developed in response to a request from the Anti-Counterfeiting Task Force of the Semiconductor Industry Association, 181 Metro Drive, Suite 450, San Jose, CA 95110.

NOTE 1: The other aspects of the process are covered in other Standards now under development within the Anti-Counterfeiting Task Force of the Traceability Committee. When approved, these Standards will also be appended to SEMI T20 as Subordinate Standards.

2 Scope

2.1 This Specification covers labels for objects used for packaging semiconductor and electronic components, including intermediate container, product package, or shipping pack, and for direct marking of the packaged device in the situation where such marking is desired and practical.

2.2 This Specification does not specify the location of the security label on the package or device. The location of package identification labels is covered in CEA-624-A. The location of device marking is covered in CEA-706-A.

2.3 This Specification covers the syntax and content of the code fields on the label.

2.4 This Specification includes descriptions of the characteristics of the code formats to be employed.

2.5 The materials of construction and the adhesives used to apply the label are beyond the scope of this Document.

2.6 The dimensions in this Specification are applicable to labels printed with printers which have nominal resolution of 203 dots per inch (dpi) or better. Printers with lower resolution may be used, but in such cases, it is necessary to ensure that the label is of a size that fits the package to be employed. Note that printing the codes with a cell size smaller than approximately 40 μm (0.016 in.) limits their readability by off-the-shelf barcode scanners.

2.7 The recommended 2D barcode is a Data Matrix. The format of the Data Matrix is specified in ISO/IEC 16022.

2.7.1 While alternative standard methods for encoding ANSI MH10.8.2 data, such as Code 39, PDF417, QR Code, or RFID tags, can accommodate the necessary syntax and nonprinting characters required for encoding ANSI MH10.8.2 concatenated data fields, they are not within the scope of this Specification.

2.7.2 The purpose of defining standardized labeling practices is to enable interoperability between trading partners. Therefore, nonstandard and proprietary barcode symbology's cannot be used within the context of 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

SEMI G83 — Specification for Bar Code Marking of Product Packages

SEMI M59 — Terminology for Silicon Technology

SEMI T3 — Specification for Wafer Box Labels

3.2 ANSI Standards²

ANSI MH10.8.2 — Data Identifier and Application Identifier Standard

ANSI MH10.8.3 — Transfer Data Syntax for High Capacity ADC Media

3.3 ISO Standards³

ISO/IEC 646 — Information Technology – ISO 7-Bit Coded Character Set for Information Interchange

ISO/IEC 15415 — Information Technology – Automatic Identification and Data Capture Techniques – Bar Code Symbol Print Quality Test Specification – Two-Dimensional Symbols

ISO/IEC 15418 — Information Technology – Automatic Identification and Data Capture Techniques – GS1 Application Identifiers and ASC MH10 Data Identifiers and Maintenance

² American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: +1.212.642.4900, Fax: +1.212.398.0023, <http://www.ansi.org>

³ International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.749.01.11, Fax: +41.22.733.34.30, <http://www.iso.org>

ISO/IEC 15434 — Information Technology – Automatic Identification and Data Capture Techniques – Syntax for High-Capacity ADC Media

ISO/IEC 16022 — Information Technology – Automatic Identification and Data Capture Techniques – Data Matrix Bar Code Symbolology Specification

3.4 MHI Standards⁴

CEA-556-A — Outer Shipping Container Bar Code Label Standard

CEA-624-A — Product Package Bar Code Label for Non-Retail Applications

CEA-706-A — Component Marking Standard

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

4 Terminology

4.1 General terms, acronyms, and symbols associated with silicon technology and used in this Standard are listed and defined in SEMI M59.

4.2 Abbreviations and Acronyms

4.2.1 *AIM* — Association for Automatic Identification and Mobility

4.2.2 *ANSI* — American National Standards Institute

4.2.3 *ASB* — Authentication Service Body

4.2.4 *DI* — Data Identifier

4.2.5 *IAQG* — International Aerospace Quality Group

4.2.6 *IEC* — International Electrotechnical Commission

4.2.7 *ISO* — International Standards Organization

4.2.8 *SIA* — Semiconductor Industry Association⁵

4.3 Definitions

4.3.1 *Data Identifier (DI)* — a specified character string that defines the specific intended use of the data that immediately follows. The identifier shall be an alphabetic character or an alphabetic character preceded by up to three numeric characters as defined by ANSI MH10.8.2 and ISO/IEC 15418. A character (or set of characters) within a machine-readable symbol that defines the general category or specific use of the data that is encoded in the same machine-readable symbol.

4.4 Other Terminology

4.4.1 The following definitions of package levels are taken with minor modification from SEMI G83, see Figure 1:

4.4.1.1 *intermediate container* — container that holds one or more product packages for product/order separation in a shipping pack.

4.4.1.2 *packaged device* — the component.

4.4.1.3 *product package* — the smallest package format, made by a single material. Also called *unit pack*.

4.4.1.4 *shipping pack* — package or shipping container/final container that is strong enough for industrial use for product packaging, storage, and shipping.

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⁵ Semiconductor Industry Association, 181 Metro Drive, Suite 450, San Jose, CA 95110, USA; <http://www.sia-online.org>