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CEA Standard

Product Package Bar Code Label Standard for Non-Retail Applications

CEA-624-A

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(From Project Number 4516, formulated under the cognizance of the CEA R9 Auto Data Capture Committee.)

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FOREWORD

This revision includes information previously contained in ANSI/EIA-621 Consumer Electronics Group Product and Packaging Bar Code standard.

Bar code marked product packaging labels are in widespread use in the global industries. A number of different standards exist, each designed to meet the requirements of the specific industry sector. For effective and economic use within and between industry sectors one common multi industry standard is a necessity.

A bar code marked product packaging label is designed to facilitate the automation of inventory, distribution, repair and point of purchase operations. The bar code information on the product packaging label may be used as a key to access the appropriate data base which contains detailed information about the product, including information transmitted via EDI. In addition a product packaging label may contain other information as agreed between the trading partners.

Two-dimensional symbols may be included to assist moving greater amounts of product data from sender to recipient.

This standard was developed under the auspices of the Consumer Electronics Association (CEA) R9 Automatic Data Capture Committee.

CONTENTS

LINEAR BAR CODE AND TWO-DIMENSIONAL SYMBOLS FOR THE LABELING OF PRODUCT PACKAGES

1 Scope

This standard applies to labels on the packaging of electronic products. This standard defines minimum requirements for identifying product packages that are distributed outside the originating location. These labels use linear bar code and two dimensional (2D) symbols. Labels required on the packaging of electronic products that are intended for the retail channel of distribution are excluded from this standard.

Intended applications include, but are not limited to, systems that automate the control of product packages during production, inventory, distribution, repair, transfer of ownership, and point of use.

Label dimensions or marking areas, and the location of the information, are not defined in this standard. Before implementing this standard, suppliers and manufacturers should review and mutually agree on these details with their trading partners.

In this document, the word "shall" indicates a requirement and the word "should" indicates a recommendation. Both printed labels and direct marking methods are referred to in this standard under the term "label".

2 Purpose

The purpose of this standard is to establish the machine readable (e.g. linear barcode and 2D symbologies) and human readable data content of labels applied to product packages.

3 References

3.1 Normative References

The following standards contain provisions that, through reference in this text, constitute normative provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Section 3.1.1.

3.1.1 Normative Reference List

IEC 60194, IEC Terms and Definitions

IEC 60286-1, Packaging of components for automatic handling - Part 1 : Tape packaging of components with axial leads on continuous tapes

IEC 60286-2, Packaging of components for automatic handling - Part 2 : Tape packaging of components with undirectional leads on continuous tapes

IEC 60286-3, Packaging of components for automatic handling - Part 3 : Packaging of surface mount components on continuous tapes

IEC 60286-4, Packaging of components for automatic handling - Part 4 : Stick magazines for dual in-line packages

IEC 60286-5, Packaging of components for automatic handling - Part 5 : Matrix trays

IEC 60286-6, Packaging of components for automatic handling - Part 6 : Bulk case packaging for surface mount components

ISO 8601, Data elements interchange formats-information interchange-Representation of date and time

ISO/IEC 2382, Information Technology — Vocabulary

ISO/IEC 15416, Bar Code Print Quality Test Specification - Linear symbols

ISO/IEC 15434, Transfer syntax for High Capacity ADC Media

ISO/IEC 15415, Bar Code Print Quality Test Specification - Two Dimensional Symbols

ISO/IEC 16388, Bar Code Symbology - Specification Code 39

ISO/IEC 15417, Bar Code Symbology - Specification Code 128

ISO/IEC 15418, Application Identifiers & Data Identifiers

ISO/IEC 15438, Bar Coding – Symbology Specification - PDF 417

ISO/IEC 16022, Bar Coding – Symbology Specification – Data Matrix

ISO/IEC 15459, Automatic Identification and Data Capture Techniques - International Specification - unique identifier for transport units

ISO 3166, Country Codes

3.1.2 Normative Reference Acquisition
IEC Standards:

- Global Engineering Documents, World Headquarters, 15 Inverness Way East, Englewood, CO USA 80112-5776; Phone 800-854-7179; Fax 303-397-2740; Internet http://global.ihs.com; Email global@ihs.com
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3.2 Informative References

- ANSI MH10.8.2, American National Standard for Material Handling - Data Application Identifier Standard, need acquisition information

4 Definitions

4.1 Main Definitions
For the purpose of this document the main definitions follow.

4.1.1 Component
Electronic or electrical parts (e.g., bare printed circuit boards, integrated circuits, capacitors, diodes, electronic modules, switches, heat sinks, resistors, electronic/electrical connector, etc.) of a first level assembly.

4.1.2 Component Packaging
A commercial unit of components defined by the supplier including, if applicable, their means for protection, structured alignment, and for transporting, storage, and/or assembly. Typical examples of a first level transport package for leaded components (such as Integrated Circuits) are:

- the single reel on which components are taped
- the single ammo box containing taped components
- the single (inner) transportable bag or box containing a reel, tube(s), stick(s), tray(s), or bulk packed components
- the single (intermediate) transportable bag or box containing multiple inner reels, bags, or boxes

4.1.3 Country of Origin.
The country of origin is defined as the manufacturing country wherein the product obtained its present identity (final form, fit, and function) as a part, subassembly, or finished product.

The definition of country of origin shall be in line with local regulations.

4.2 Glossary
A complete glossary of terms used in this document is given in Annex A.

5 Label Data Content and Requirements

5.1 Data Elements

5.1.1 General
The label format accommodates both required and optional data elements. See Table 1.

All data elements encoded in a machine-readable medium shall be presented with the correct semantics. In the case of the EAN.UCC symbologies, ITF-14, EAN-8, and EAN/U.P.C., the meaning of the data is implied by their structure. For further information, see the General EAN.UCC Specifications. All data elements encoded in other machine-readable media shall be preceded by the appropriate Data Identifier (DI) defined in ISO/IEC 15418 and ANSI MH10.8.2 Data Identifier or the appropriate Application Identifier (AI) defined in ISO/IEC 15418 and the General EAN.UCC Specifications.Several conventions exist to establish world-wide uniqueness of numbering. This numbering may be for license plates, product numbers, serial numbers, and/or lot/batch numbers.

One such method is described in the General EAN.UCC Specifications using an assigned company prefix followed by the remainder of the data structure.

Another method is the combined Issuing Agency Code, as defined in ISO/IEC 15459, followed by an IAC-assigned entity identification, hereinafter referred to as IAC/CIN, followed by the remainder of the data structure.

ISO/IEC 15459 IACs shall only be used by companies also using the IAC for their transport unit license plates.

In Tables 2 through 7, under “Data characteristics Type/length,” the characteristic of the Data Identifier or Application Identifier and their respective lengths are shown first.

5.1.2 Data Element Requirements
a) Item Identification code
b) Quantity without or Quantity with unit of measure
c) Traceability Identification
    i) Serial Number; or
    ii) Traceability Number

    NOTE—Certain Item Identification codes imply a quantity other than one.

Table 1 Data Element Usage

Data Element	Market Sector	Requirement
Item Identification Code	Industrial	Required
	Retail	Required
Quantity	Industrial	Required. Note that some manufacturers may change the product code to represent a change in quantity. Regardless, of whether the package contains one of an item or the package contains more than one, the quantity shall be encoded,
	Retail	Required. Note that in the case of encoding item identification in an EAN.UCC GTIN, the quantity is reflected by a change in the GTIN, either through the Packaging Indicator or through the item code portion of the GTIN.
Traceability Identification	Industrial	Required
	Retail	Optional

5.1.2.1 Item Identification

Item Identification may be assigned by either the Supplier or the Customer. Either the Customer Item Identification or the Supplier Item Identification or both may be shown on the label as agreed to between the trading partners. If both are shown on the label at least one of the two item identifiers shall be encoded in a machine readable symbol.

The supplier's part number shall be used for Item Identification in the absence of a different agreement between trading partners.

The maximum length of item identification data element shall be 25 alphanumeric characters, exclusive of identifiers and other overhead characters. When item identification is combined with supplier identification into a single data element, the maximum length of this field shall not exceed 32 alphanumeric characters.

The item identification data field should be in one of the formats Table 2 or Table 3. The complete list of possible item identification codes can be found in ANSI MH10.8.2 or the General EAN.UCC Specifications.

Table 2 Data Identifier

Data Identifier	Data Field	Data Characteristics Type/length	Description
P	Part Number	an1+an...25	Customer Assigned Part Number
1P	Part Number	an2+an...25	Supplier Assigned Part Number
8P	Part Number	an2+n14	UCC/EAN GTIN
11P	Part Number	an3+an10	CLEI Code for telecommunications equipment
25P	Part Number	an3 +an...32	Combined IAC/CIN and item code assigned by the supplier

Table 3 Application Identifier

Application Identifier	Data Field	Data Characteristics Type/Length	Description
N/A	Global Trade Identification Number (GTIN)	n14	Global Trade Item Number: Shorthand term for the EAN·UCC Global Trade Item Number. A GTIN may use the EAN/UCC-8, UCC-12, EAN/UCC-13 or EAN/UCC-14 standard numbering structure.
01	GTIN	n2+n14	GTIN Used primarily in EAN/UCC-128 symbology
241	Part Number	n3+an...25*	Customer Assigned Part Number
*UCC/EAN permits AI "241" to be a maximum of 30 characters. This standard recommends Customer Assigned Part Number to be limited to no more than 25 characters.			

5.1.2.2 Global Trade Item Number (GTIN)

The Information Technology supply chain has different ways of identifying a product: most suppliers use their own internal number, some use the customers' numbers, some use the distributor's number and still other use a Global Trade Item Number (GTIN) and some use all of these—all for the same product.

The EAN•UCC has adopted the GTIN (Global Trade Item Number) as the solution to uniquely identify products within the global supply chains. The EAN•UCC System is used in multiple industries and countries throughout the world—an important consideration given the global focus and rapid convergence of supply chains.

5.1.2.2.1 GTIN Database Requirement

Manufacturer/supplier databases should be designed to allow for 14 digits to accommodate all GTIN scenarios for product/service identification throughout the world. The GTIN number shall be right justified and zero-filled in the database.

It is important to understand that this does not mean that North American manufacturers/suppliers will begin replacing the UCC-12 (U.P.C.) GTIN with a 14-digit GTIN number structure. It means that any version of the GTIN (UCC-12, EAN/UCC-13 or UCC/EAN-14) should be capable of being stored in the same database field. In North America, the UPC-A GTIN will continue to appear on the products the way they have always appeared. See Figure 1.

14	13	12	11	10	9	8	7	6	5	4	3	2	1
				Company Prefix / Product ID									C
EAN/UCC-14													C
0	EAN/UCC-13												C
0	0	UCC-12											C

Key Number Structures

Structure	14	13	12	11	10	9	8	7	6	5	4	3	2	1
UCC-12			CP	CP	CP	CP	CP	CP	I	I	I	I	I	C
EAN/UCC-13		CP	CP	CP	CP	CP	CP	CP	I	I	I	I	I	C
EAN/UCC-14	PI	0	CP	CP	CP	CP	CP	CP	I	I	I	I	I	C

PI = Indicator digit
CP = EAN•UCC company prefix (length can vary)
I = Item Reference (length can vary)
(The sum of the number of digits of CP and I is 12 for the GTIN)
C = is the check digit

Figure 1 GTIN Structure

5.1.2.2.2 The Universal Product Code (UCC-12 – formerly U.P.C.)
The UCC-12 is 12 characters in length, is assigned by the manufacturer (or owner of the label), and contains: (1) a number unique to the manufacturer (company prefix), (2) the product number assigned by the manufacturer, and (3) a check character.

5.1.2.2.3 EAN/UCC-13
EAN/UCC-13 is 13-characters in length and contains (1) a number unique to the manufacturer (can be up to 11- characters) assigned by an EAN International organization outside of North America, (2) the product number assigned by the manufacturer or assigned by an EAN International organization outside of North America and (3) a check character, which is a calculated modulo 10 character based on the preceding characters.

5.1.2.2.4 The EAN/UCC-14
Like the UCC-12, the EAN/UCC-14 is a globally unique product identification. It contains the three basic components found in the UCC-12 and the EAN/UCC-13, but adds an additional component called the Indicator Digit “PI”.

The ‘**Indicator Digit**’ will always be zero (“0”) for the products marked per this guideline (position 14).

The **check character** found in position 1 is a calculated modulo 10 character just like the check character at the end of the UPC-A or EAN-13. See Figure .

(01) 0 0614141 00041 8

(01) = Application Identifier for EAN/UCC-14 number

Figure 2 EAN/UCC-14 Encoded in a UCC/EAN-128 Bar Code Symbol

For further detail and explanation, please refer to the Uniform Code Council's *Universal Product Code Industrial And Commercial Guidelines*.

> NOTE—Users should design inventory and product information databases to provide for a 14- character data field to fully describe a product. EAN•UCC future initiatives may utilize the Indicator Digit as an integral part of the product identification.

5.1.2.3 Quantity

If quantity is a discreet field, the Quantity shall be the quantity in the package or container to which the label is affixed. The default unit of measure for Data Identifier "Q" is EACH or "PIECES". The default unit of measure for Application Identifier "30" is EACH or "PIECES".

When the EAN.UCC 14-digit GTIN (Global Trade Identification Number) product identifier is used in the Product Identification data field, a separate Quantity field is not required to be included as part of the label.

When Data Identifiers are used and when a different unit of measure is required as agreed to between trading partners, the Data Identifier "7Q" shall be used with the quantity followed by two alphanumeric characters representing the ANSI X.12.3 unit of measurement code.

When Application Identifiers are used and when a different unit of measure is required as agreed to between trading partners, one of the Application Identifiers in the "3nn" series shall be used with a decimal point indicator and the quantity. ANSI MH10.8.2 and the General EAN.UCC Specifications list the specific Application Identifiers.

Certain Item Identification codes imply a quantity other than one. In such cases a discrete quantity identifier is not required.

The maximum length of this data element shall be 8 numeric characters, excluding identifiers and other overhead characters.

The quantity data field should be in the format in Table 4 and Table 5.

Table 4 Data Identifier

Data Identifier	Data field	Data characteristics Type/length	Description Examples show encoded characters. Spaces are shown for clarity but are not encoded.
DI "Q"	Quantity in package	an1+n...14	The number of products (pcs) in the shipment container. Example: Q2000
DI "2Q"	Actual Weight	an2+n...14	The actual weight of package (kilograms implied by convention) (This includes an encoded decimal point, if necessary) Example: 2Q200.1
DI "7Q"	Quantity with Unit of Measure	an2+n..14+an2	The Quantity with ANSI X12.3 Data Element Dictionary qualifier of products in the shipment container. (CR = Cubic Meter) Example: 7Q1CR (This includes an encoded decimal point, if necessary)

Table 5 Application Identifier

Application Identifier	Data Field	Data characteristics Type/length	Description
AI "30"	Quantity in package	n2 + n..8	The number of products (pcs) in the shipment container. Example: 302000
AI "3nn*" (*) Plus one digit for decimal point indication	Quantity with specific unit of measure (with decimal point indication)	n4 + n6	Defined quantity and unit measure of the package Example: 3101000025 equals 2.5 kilograms net weight

NOTE—Print only the significant digits for the human readable quantity. Do not print leading zeros.

5.1.3 Traceability Information

The Traceability Identification shall be assigned by the supplier. This category of identification includes serial numbers and lot/batch numbers.

When Data Identifiers are used, Traceability Identification should be either a Serial Number (using the Data Identifier “S”) or a Lot/Batch Number (using the Data Identifier “1T”).

When Application Identifiers are used Traceability Identification should be either a Serial Number (using the Application Identifier “21”) or a Lot/Batch Number (using the Application Identifier “10”).

In certain circumstances both the Serial Number and the Lot/Batch Number may be shown on the label. In this case at least one of the two should be encoded in a machine readable symbol.

The maximum length of the traceability data element shall be 18 alphanumeric characters, exclusive of identifiers and other overhead characters. When traceability identification is combined with supplier identification into a single data element, the maximum length of this field shall not exceed 32 alphanumeric characters.

The product traceability code field shall be in the formats in Table 6 and Table 7.

Table 6 Data Identifier

Data Identifier	Data Field	Data characteristics Type/length	Description
S	Serial No.	an1+an...18	Serial number or code assigned by the supplier to an entity for its lifetime
22S	Electronic Serial Number	an3+an...25	Electronic Serial Number for Cellular Mobile Telephones
25S	Serial Number	an3 +an...25	Combined IAC/CIN and the serial number assigned by the supplier
1T	Lot/Batch Number	an2+an...18	Lot/Batch Number defined by the manufacturer
25T	Lot/Batch Number	an3 +an...25	Combined IAC/CIN and entity identification and Lot/Batch Number assigned by the supplier

Table 7 Application Identifier

Application Identifier	Data Field	Data characteristics Type/length	Description
21	Serial No.	n2+an...20	Serial number or code assigned by the supplier to an entity for its lifetime
10	Traceability Code	n2+an...20	Traceability code defined by the manufacturer
11	Date Code[2]	n2+n6*	Production Date
8002	Electronic Serial Number[1]	n4+an...20	Electronic Serial Number for Cellular Mobile Telephones

[1] For “serial number," the format for the serial number is to be defined by the manufacturer

[2] Date code construction using UCC/EAN Application Identifiers use a two-digit designation for year. Users wishing more information on the UCC/EAN implementation of Year 2000 issues should contact the Uniform Code Council

5.1.3.1 Serial Number

A serial number is a unique code assigned by the supplier to an entity for its lifetime.

5.1.3.2 Traceability Number

A traceability number is a code assigned by the Supplier to identify or trace a unique group of entities (e.g., lot, batch).

5.1.4 Optional Data Elements

a) - Supplier Identification
b) - Country of origin
c) - Date code
d) - Others (not specified)

5.1.4.1 Supplier Identification

The Supplier Identification shall uniquely identify the supplier location to which the component is traceable. The Supplier Identification should be assigned by the supplier and, in mutual agreement between trading partners, it may be assigned by the customer.

It is recommended that the Supplier Identification shown on the label be the Supplier Identification assigned by the supplier.

It is further recommended that all Supplier Identification migrate to the following proposal:

The Supplier Identification shall use the issuing agency code as assigned by ISO 15459 followed by the company identification which is assigned by the issuing agency followed by an internally assigned location or entity identification.

For Example:

18V	UN	123456789	1234
Data Identifier	Issuing Agency Code	Company Identification	Internal Identification

The maximum length of this data element is 18 alphanumeric characters.

5.1.4.2 Country of Origin

When the country of origin is required to be included on the label it shall be shown in human readable information using the two letter designation as specified in ISO 3166 standard.

This may be in addition to the data being encoded in a machine readable symbol.

The maximum length of this data element is two characters.

5.1.4.3 Date Code
Date code shall be in accordance with ISO 15418.

The maximum length of this data element is 8 numeric characters.

5.1.4.4 Others Not Specified in This Standard.
Examples of this category of data elements are Product Description and Parametric values.

5.2 Data Representation

5.2.1 General Formatting
Data elements can be represented on the label as Human Readable Information or encoded in Machine Readable Symbols or both.

The label shall consist of Machine Readable data elements and Human Readable data elements.

It is important that the appropriate Data Identifiers, data separators and start and stop characters are utilized in accordance with their associated industry, country, or region and symbology standards For this standard the Data Identifiers for each data elements shall be selected from the options given in clause 5.1 (preferred) or ISO/IEC 15418.

5.2.2 General Formatting for Machine Readable Symbols
In this standard machine readable symbols can be linear bar code symbols or 2D symbols.

5.2.2.1 Linear Bar Code

5.2.2.1.1 Syntax
Generally it is recommended that each data element be encoded in a separate bar code symbol.

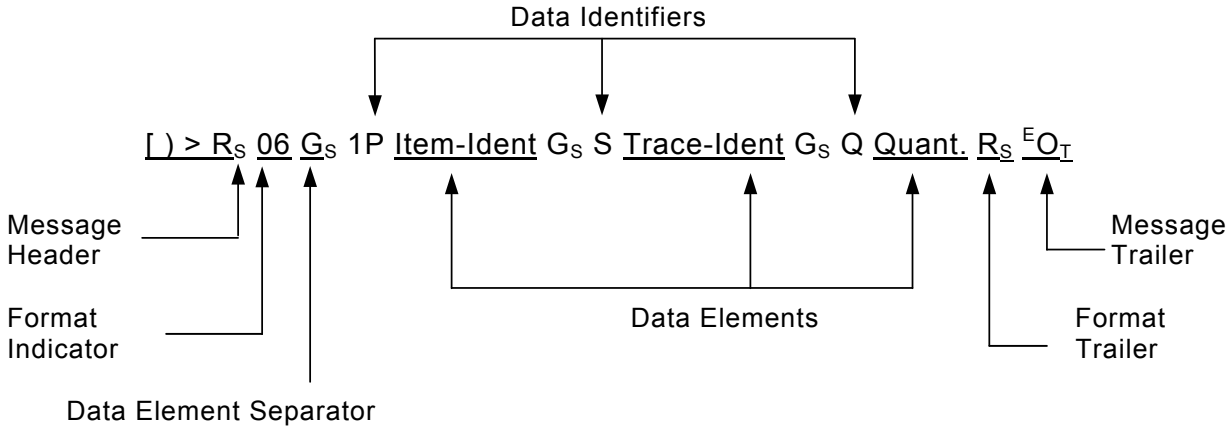
If mutually agreed between trading partners, data elements can be concatenated into one bar code symbol to facilitate capture of more than one data element with a single scanning operation. Concatenation shall be in accordance to ISO/IEC 15418.

5.2.2.1.2 Maximum Symbol Length
The maximum symbol length of a linear bar code symbol should be no more than 8 cm.

5.2.2.2 2D Symbols

5.2.2.2.1 Data Element Syntax for 2D Symbols
The encoding shall be as described in ISO/IEC 15434. When Data Identifiers are used, the first seven characters shall be “[)>$^{R}_{S}$06$^{G}_{S}$”. When Application Identifiers are used, the first seven characters shall be for Data Ior “[)>$^{R}_{S}$05$^{G}_{S}$”. For both Data Identifier and Application Identifier messages the last 2 characters, “$^{R}_{S}{}^{E}O_{T}$”, are fixed (Format Trailer) for this application. When data elements are combined within a two dimensional symbol, the "$^{G}_{S}$" (ASCII/ISO 646 Decimal “29", Hex “1D”) characterand the appropriate Data Identifier shall be used to identify each of the combined fields.

The example in Figure 3 is comprised of Data Identifiers, other overhead characters, and mandatory fields (an Item Identification, a Traceability Identification and the Quantity.)



Thus, the character string (without blank spaces) is represented as:

[ ) > R_S 06 G_S 1P Item-Ident G_S S Trace-Ident G_S Q Quant. R_S $^{E}O_T$

Figure 3 Example of Encoding in a 2D Symbol

5.2.3 General Formatting for Human Readable Information
Human Readable Information can be Human Interpretation, Human Translation, Data Titles or Free Text and Data.

5.2.3.1 Human Readable Interpretation
A human readable interpretation of each linear bar code symbol shall be provided adjacent to the bar code. Such human readable interpretation shall represent the encoded data. See Figure 2.

The Human Readable Interpretation shall represent the encoded data and is preceded by the Data Identifier in parentheses as part of the Data Area Title, e.g. (S) 123456.

The human readable interpretation of the linear bar code symbol shall be printed above the bar code.

5.2.3.2 Human Translation
In addition to the human readable interpretation, human translation of linear bar code information may be provided in a separate section of the label. See Figure 4.

Human Translation of 2D symbols may be provided in a separate section of the label.

5.2.3.3 Data Area Titles
Data areas comprise information in bar code or human readable form. Data areas shall be identified with the corresponding data area title in human-readable text. A data area title is not required when a data area contains:

a) A single linear bar code symbol concatenating multiple data elements, or
b) A data area containing multiple linear bar code symbols that are intended to be scanned in a single data capture operation.

Data area titles for linear bar code symbols may be presented with a full data element title, e.g. (S) Serial Number 123456, or an abbreviated data element title, e.g. (S) Ser. No. 123456. The data element title is placed directly after the Data Identifier.

If the real estate available for marking is insufficient to support the marking of the data element title and the Data Identifier, the data area title may be abbreviated to only include the Data Identifier enclosed in parentheses. e.g. (S) 123456

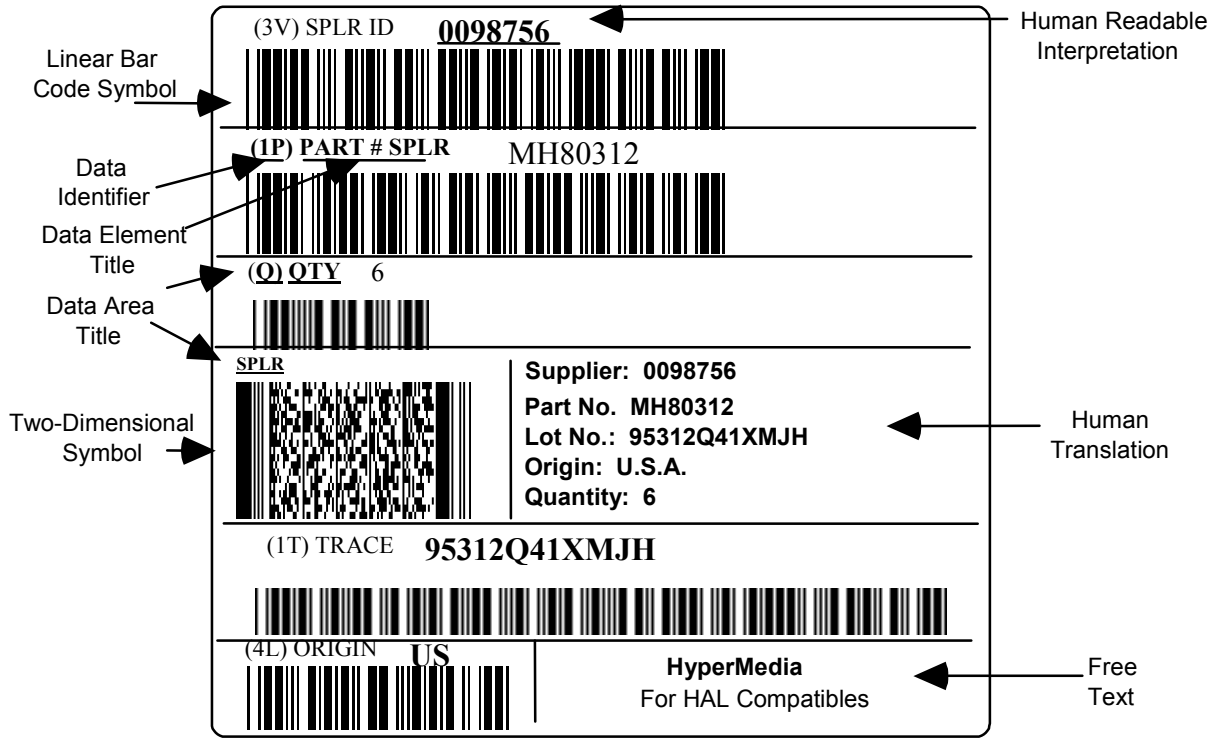


Figure 4 Examples of Terminology

When two-dimensional symbols are used, each 2D symbol should be identified by the following data area titles displayed above the 2D symbol:

A 2D symbol containing data meant for:

a) The Supplier only shall be identified by the title ‘SPLR’.
b) The Customer only shall be identified with the title ‘CUST’.
c) Both the Supplier and the Customer shall be identified with the title ‘SPLR/CUST’.

5.2.3.4 Free Text and Data
Human readable information that is not a translation of the bar code information may be provided according to the requirements of the trading partners.

5.3 Rules for Encoding of Mandatory and Optional Data Elements in Machine Readable Symbols and Human Readable Information.

5.3.1 General Rules
The choice to encode in linear bar code, 2D symbol or both is to be agreed between trading partners.

All machine readable Data Elements shall be preceded by the appropriate Data Identifier or Application Identifier. The Data or Appplication Identifier shall be selected from the options given in Section 5.1 and in accordance with ISO/IEC 15418.

5.3.2 Rules for Mandatory Data Elements

5.3.2.1 Encoding Mandatory Elements in Machine Readable Symbols

Mandatory data elements shall be encoded in a machine-readable symbol:

a) If only a linear bar code is used, the mandatory data shall be in the linear bar code.
b) If both a linear bar code and 2D symbol are used on the label, the mandatory data shall be in the linear bar code and the 2D symbol.
c) If only 2D symbols are to be used to encode mandatory data elements, agreement is needed between the trading partners.

5.3.2.2 Human Readable Information for Encoded Data Elements.

Human readable information for mandatory data elements shall be on the label in all cases.

a) For linear symbols the human readable shall be human readable interpretation.
b) For 2D symbols the human readable shall be human translation.

5.3.3 Rules for Optional Data Elements Specified in 5.1.3.1—5.1.3.3

5.3.3.1 Encoding in Machine Readable Symbols
Optional data elements should be encoded in a machine-readable symbol.

a) If only linear bar codes are used, the Optional data should be in a linear bar code.
b) If both linear bar codes and 2D symbol are used:
c) Optional Data should be in linear bar code and should be included in 2D.
d) If the data are included in the linear bar code the Optional data shall also be included in the 2D symbol.
e) If only a 2D symbol is used, the Optional data should also be in the 2D symbol.

5.3.3.2 Human Readable Information for Encoded Data Elements
Human Readable Information for Optional Data Elements encoded in a linear symbol shall be on the label in all cases. In this case Human Readable Interpretation shall be present and Human Translation may be added.

For Data Elements encoded in 2D symbols the Human Readable Information should be on the label and described in Human Translation with descriptive field titles.

5.3.3.3 Human Readable Information for Not Encoded Data Elements
Human Readable Information for Optional data elements that are not encoded in machine readable symbols may be shown in Human Readable Information only.

5.3.4 Rules for Optional Data Elements Not Specified in 5.1.3.1—5.1.3.3
For these other data elements following rules shall be applied.

5.3.4.1 Encoding Optional Data Elements in Machine Readable Symbols
a) If only linear bar codes are used, the data may be in the linear bar code.
b) If both linear bar codes and 2D symbol are used:
c) Data may be in linear bar code and should be included in 2D.
d) If the data are included in the linear bar code the data shall also be included in the 2D symbol.
e) If only a 2D symbol is used, the data should be in a 2D symbol.

5.3.4.2 Human Readable Information for Encoded Data Elements
For data elements encoded in a linear symbol, the Human Readable Information shall be on the label in all cases. In this case Human Readable Interpretation shall be present and Human Readable Translation may be added.

For data elements encoded in 2D symbols the Human Readable Information may be on the label and it shall be printed as Human Translation.

5.3.4.3 Human Readable Information for Not Encoded Data Elements
Other data elements may be shown in free text only. For example: Product Description and Parametric values.

5.3.4.4 Survey of Label Content, Rules for Encoding and Printing of Data Elements
In this section a summary of the Label Content and rules for encoding in Machine Readable Symbols and printing in Human Readable Information is given in Tables 8, 9, and 10. This summary is intended to facilitate the reading of this standard. In case of conflicts between Tables 8, 9. or 10 below and the text of Section 5.3.1 through 5.3.4, the text of Section 5.3.1 through 5.3.4 shall be used.

Table 8 Data Elements, Data Status, and Length of Fields for Product Package Labels Using Data Identifiers

Data Element	Maximum Number of Characters	Data Identifier	Data Status
Item Identification	25 an	P or 1P	Mandatory
Quantity	8 n	Q or 7Q	Mandatory
Traceability Identification	25 an	S or 1T	Mandatory
Supplier Identification	18 an	1V or 21V	Optional
Country of origin	2 a	4L	Optional
Date code	8 n	11D or 16D	Optional
Others	25 an	Use ISO/IEC 15418, ANSI MH 10.8.2	Optional

Table 9 Data Elements, Data Status, and Length of Fields for Product Package Labels Using Application Identifiers

Data Element	Maximum Number of Characters	Application Identifier	Data Status
Item Identification	14 n	01	Mandatory
Quantity	10 n	Various	Mandatory
Traceability Identification	30 an	21, 10, 8004	Mandatory
Supplier Identification	14 n	01 (included in “01” above)	Optional
Country of origin	3 n	422	Optional
Date code	6 n	11, 12, 13, 15, 17	Optional
Others	30 an	Use ISO/IEC 15418, ANSI MH 10.8.2	Optional

The number included in character count in Table 8 and Table 9 above are exclusive of overhead characters such as start and stop characters, Data or Application Identifiers and any other characters required by a standard symbology specification to properly encode data.

Table 10 Summary of Rules for Encoding in Machine Readable Symbols and Printing in Human Readable Information

Data Element Status	Machine Readable Symbols On Label	Requirement for Encoding		Requirement for Human Readable Information
		Bar	2D	
Mandatory	Bar	shall		shall
	Bar + 2D	shall	Shall	shall
	2D		Shall	shall
Optional Specified Note 1	Bar	should		shall if encoded
	Bar + 2D	should Note 2	Should	shall if encoded in Bar
	2D		Should	should if encoded
	No			may
Optional Not specified Note 1	Bar	may		shall if encoded
	Bar + 2D	may	May	shall if encoded in Bar
	2D		Should	may if encoded
	No			may
NOTE 1--"Specified Optional Data Elements" are in this standard Supplier Item Identification, Country of Origin and Date Code. All Others belong to the category "Optional data elements not specified".				
NOTE 2--If the data element is encoded in Linear Bar Code it shall also be included in the 2D symbol.				

5.4 Data Carriers

5.4.1 Data Carrier Selection

The choice of use of Linear Bar Code, or 2D symbols, or both as Data Carrier shall be agreed between trading partners.

5.4.2 General Symbology Requirements

Bar code and 2D symbologies used to meet the requirements of Section 5.4.2.1.1 and Section 5.4.2.2.1 shall be in accordance with the appropriate ISO/IEC JTC1 SC31 standard.

5.4.2.1 Linear Symbologies Requirements

5.4.2.1.1 Selected Symbologies:

The linear bar code symbologies to be used in this standard are:

a) Code 39 (reference: ISO/IEC 16388)
b) Code 128 (reference: ISO/IEC 15417 excluding UCC/EAN 128)

5.4.2.1.2 Symbol Requirements for Linear Bar Code Symbols

Recommended symbol parameters of the bar code symbols are shown in Table 11 and Table 12. Deviations from the parameters recommended in this standard shall be mutually agreed between trading partners.

This standard recommends a minimum narrow element width of 0.17 mm. Regardless of the narrow element width the linear symbol shall meet the minimum print quality requirements of 1.5/05/660.

Table 11 Product Package Label Symbol Requirements Code 39

Code 39:		Recommended Minimum	Recommended Maximum
Dimensions(nominal)	Ratio of wide to narrow	2.5:1	3.0 :1
	Narrow element width "X"	0.25 mm	
	Wide element width	as ISO 16388	
	Intercharacter gap	1X to 5.3X	
Height of bar code	5 mm or greater		
Minimum Print quality	1.5 / 05 / 660		

Table 12 Product Package Label Symbol Requirements Code 128

Code 128:		Recommended Minimum
Dimensions(nominal)	Module/element width	0.25 mm
Height of bar code	5 mm or greater	
Minimum Print quality	1.5 / 05 / 660	

5.4.2.2 Two Dimensional (2D) Symbols

5.4.2.2.1 Selected Symbologies:

The 2D code symbologies to be used in this standard are:

PDF417
Data Matrix ECC 200

The symbology specification shall be in line with the symbology standards issued or drafted by JTC 1/SC 31 :ISO/IEC 15438 for PDF417, or ISO/IEC 16022 for Data Matrix ECC 200.

Information for choosing a suitable 2D symbology for product package labeling are provided in Annex B.

5.5 Label Size and Layout

5.5.1 Label Size

The dimension of the label should suit the dimensions of the package and may be dependent on the space needed for the required information.

5.5.2 Label Layout

Label layout refers to the positioning of the fields on a label. Layout of linear bar code or two dimensional symbols will depend on the available space on a label, packaging techniques and other factors.

When multiple bar code symbols or two-dimensional symbols are to be placed in line or in contiguous fields, care shall be taken to avoid layouts that inhibit scanning the individual data elements. The layout of the label should be designed to accommodate the package size and should facilitate scanning of the bar codes.

Examples of label layouts for patterns are shown in following pages.

5.5.3 Examples of Label and Label Layout

5.5.3.1 Label with Linear Bar Code and Human Readable Information

See Figure 5.

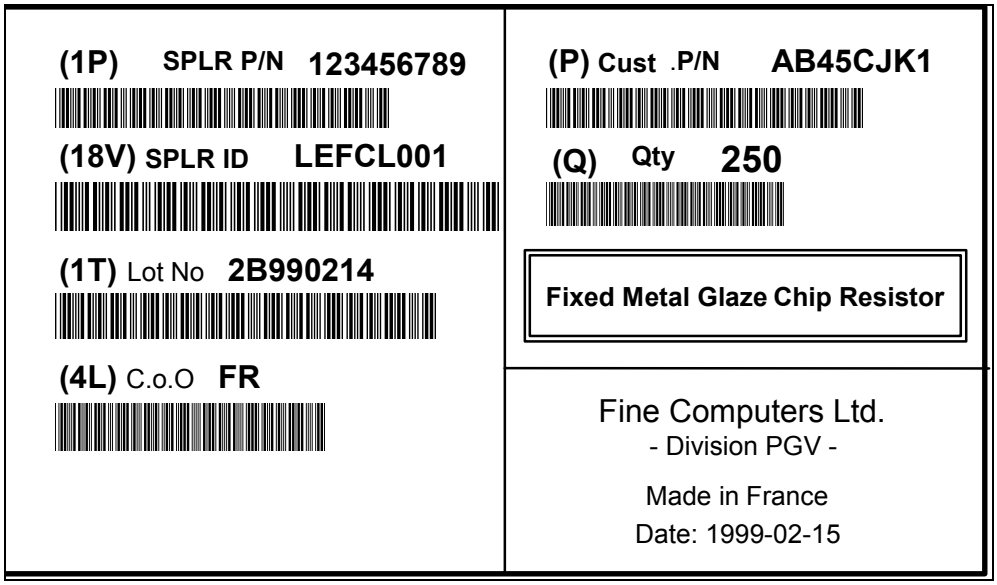


Figure 5 Label with Linear Bar Code and Human Readable Information

5.5.3.2 Label with 2D Symbol and Human Readable Information

See Figure 6.

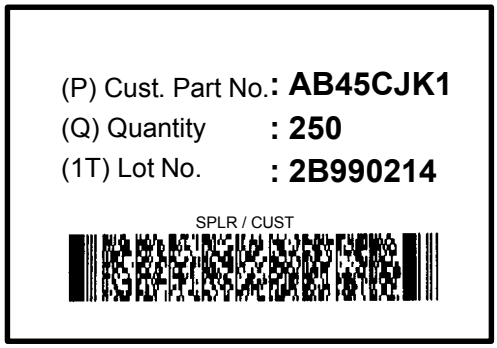
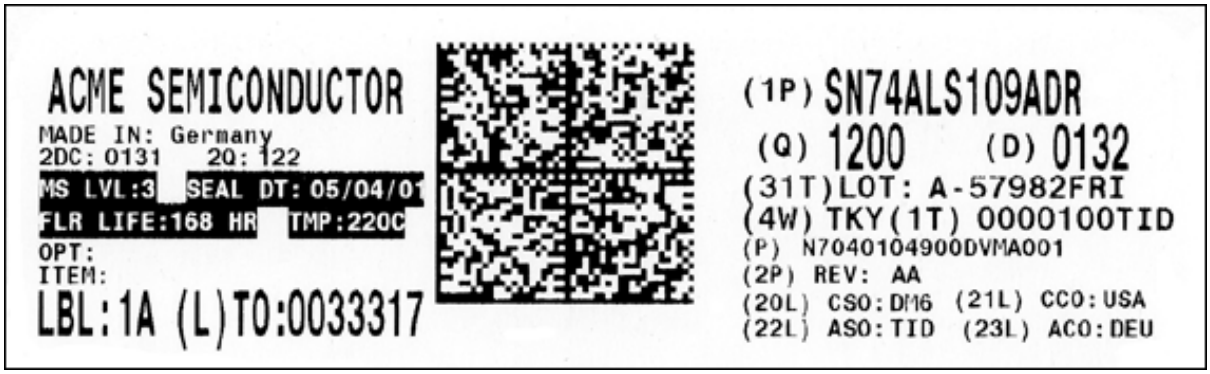


Figure 6 Label with 2D Symbol and Human Readable Information

DATA MATRIX SAMPLE



5.5.3.3 Label with Linear Bar Code, 2D Symbol and Human Readable Information (See Figure 7).

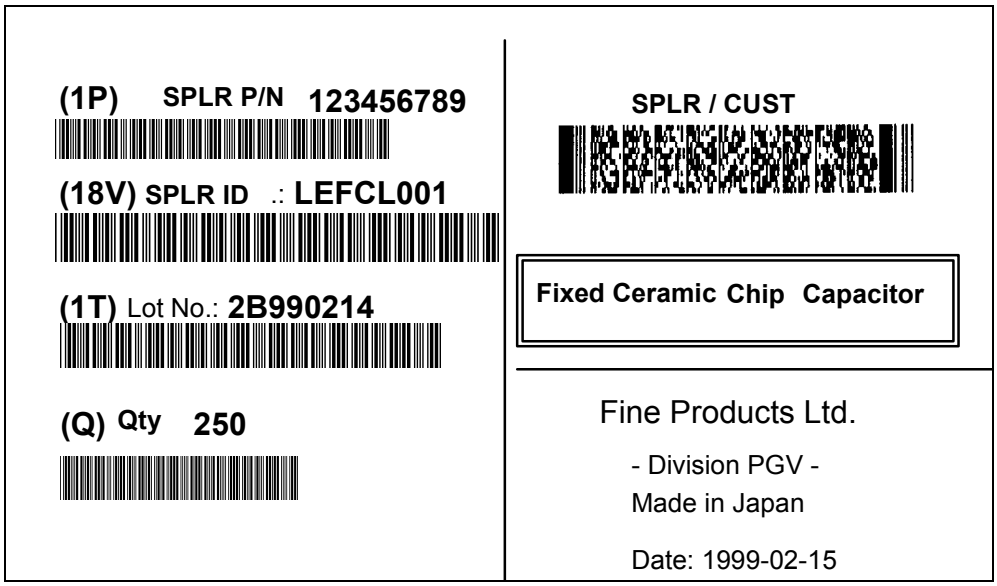


Figure 7 Label with Linear Bar Code, 2D Symbol and Human Readable Information

5.5.4 Label Location

Label location refers to the positioning of the label on the package.

Each label should be located in a position, which facilitates scanning.

Label placement shall be in accordance with relevant IEC packaging standards.

Examples of label locations for reel, bulk case, ammo box and bag are shown in Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, and Figure 13

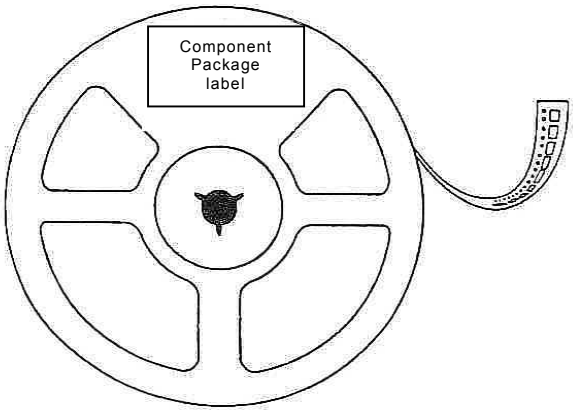


Figure 8 Example—Label Location, Reel (Component Package)

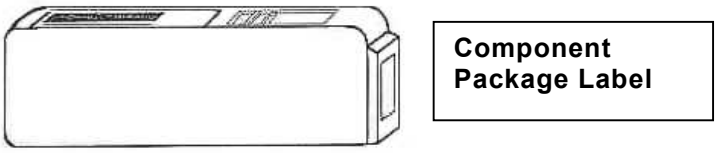


Figure 9 Example, Label Location, Bulk Case

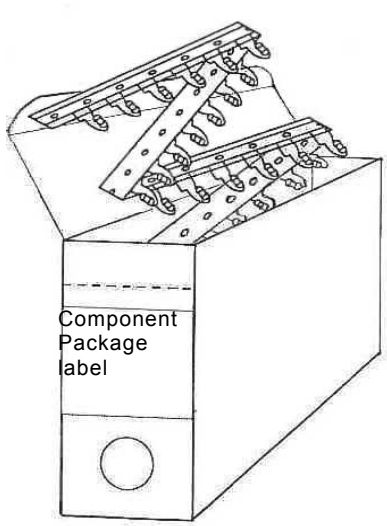


Figure 10 Example, Ammo Box, Component Package

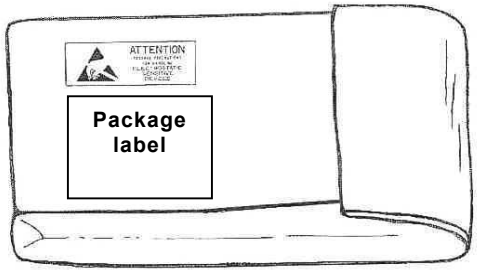


Figure 11 Example, Bag

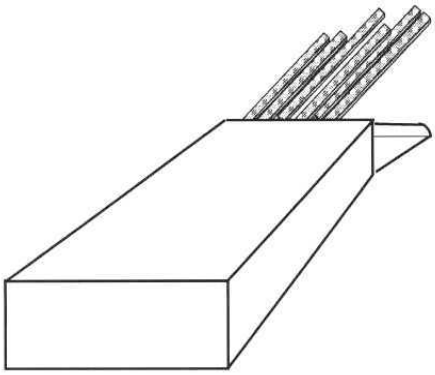


Figure 12 Example, Stick Magazine, Component Package

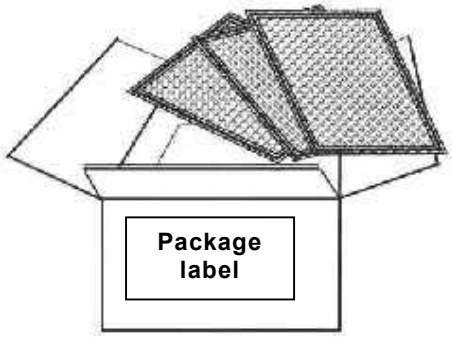


Figure 13 Example, Matrix Tray, Component Package

Annex A Glossary (Informative)

1. 2D symbol
See “two-dimensional symbol.”

2. alphanumeric
Alphabetic and numeric including punctuation marks.

3. ANSI
American National Standards Institute

4. area imager
An area imager scanner uses an area CCD or CMOS sensor and fixed illumination to capture a digital image, for omni-directional reading of linear bar codes, multi-row codes, and matrix codes (e.g., Data Matrix). Some area imagers are capable of reading Optical Character Recognition (OCR) fonts.

5. ASCII
American Standard Code for Information Interchange: a computer code, as described in ISO 646, consisting of 128 alphanumeric and control characters, each encoded with 7 bits (8 including parity check), used for the exchange of information between computerized systems.

6. bar
A dark element corresponding to a region of a scan reflectance profile below the global threshold

7. bar code
An array of parallel rectangular bars and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine readable form.

8. bar code density (symbol density)
The number of characters that can be represented in a bar code symbol per unit of measure, usually expressed as characters per inch (cpi) or per centimeter for linear bar codes and per square inch or per square centimeter for multi-row symbologies. The width of the narrowest bar or space, the wide to narrow ratio, the number of bars and spaces per character and the width of the intercharacter gap, if any, are the controlling factors.

9. bar code symbol
The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, which together form a complete scannable entity.

10. character
See Character Set, Data Character, Symbol Character, Human Readable Character.

11. character set
The total range of letters, numbers, and symbols that can be encoded in a particular symbology. See Code Page, Code Set.

12. check digit/character
A digit or character calculated from other characters in a code by means of a defined algorithm and used to check that the code is correctly composed. See Symbol Check Character, Data Check Character/Digit.

13. Code 39; 3 of 9 Code
A discrete, variable length, bar code symbology encoding the characters 0 to 9, A to Z, and the additional characters “-” (dash), “.” (period), Space, “$” (dollar sign), “/” (slash), “+” (plus sign), and “%” (per cent sign), as well as a special symbology character to denote the start

and stop character, conventionally represented as an "*" (asterisk). Each Code 39 symbol consists of a leading quiet zone, a start symbol pattern, symbol characters representing data, a stop pattern, and a trailing quiet zone. Each Code 39 character has three wide elements out of a total of nine elements. Each symbol consists of a series of symbol characters, each represented by five bars and four intervening spaces. Characters are separated by an intercharacter gap. Each element (bar or space) is one of two widths. The values of the "X dimension" and "N" remain constant throughout the symbol. The particular pattern of wide and narrow elements determines the character being encoded. The intercharacter gaps are spaces with a minimum nominal width of 1X. See ISO/IEC 16388.

14. Code 128
A continuous, variable length, bar code symbology capable of encoding the full ASCII 128 character set, the 128 extended ASCII character set, and four non-data function characters. Code 128 allows numeric data to be represented in a compact double-density mode, two data digits for every symbol character. Each Code 128 symbol uses two independent self-checking features, character self-checking via parity and a modulo 103 check character. Each Code 128 symbol consists of a leading quiet zone, a start pattern, characters representing data, a check character, a stop pattern, and a trailing quiet zone. Each Code 128 character consists of eleven 1X wide modules. Each symbol character is comprised of three bars alternating with three spaces, starting with a bar. Each element (bar or space) may consist of one to four modules. Code 128 has three unique character sets designated as Code Set A, B, and C. Code set A includes all of the standard upper case alphanumeric keyboard characters, the ASCII control characters having an ASCII value of 0 to 95, and seven special characters. Code set B includes all of the standard upper case alphanumeric keyboard characters, lower case alphabetic characters (specifically ASCII character values 32 to 127), and seven special characters. Code set C includes the set of 100 digit pairs from 00 through 99, inclusive, as well as three special characters. The FNC1 character in the first character position after the start code of Code 128 designates that the data the follows complies with the UCC/EAN-128 standards. See ISO/IEC 15417.

15. code page
A table showing the character allocated to each byte value in a coded character set.

16. code set
A subset of the character set of a particular symbology. See Character Set.

17. codeword
A symbol character value. An intermediate level of coding between source data and the graphical encodation in a symbol.

18. customer
In a transaction, the party that receives, buys, or consumes an item or service.

19. coded character set
A set of unambiguous rules establishing a character set and the relationship between the characters of the set and their byte values.

20. component
Electronic or electrical parts (e.g., bare printed circuit boards, integrated circuits, capacitors, diodes, electronic modules, switches, heat sinks, resistors, electronic/electrical connector, etc.) of a first level assembly.

21. component packaging
A commercial unit of components defined by the supplier including, if applicable, their means for protection, structured alignment, and for transporting, storage, and/or assembly. Typical examples of a first level transport package for leaded components (such as Integrated Circuits) are:

- the single reel on which components are taped

- the single ammo box containing taped components
- the single (inner) transportable bag or box containing a reel, tube(s), stick(s), tray(s), or bulk packed components
- the single (intermediate) transportable bag or box containing multiple inner reels, bags, or boxes

22. Country of Origin.
The country of origin is defined as the manufacturing country wherein the product obtained its present identity as a part, subassembly, or finished product. The definition of country of origin shall be in line with local jurisdictions.

23. data area title
A descriptor contained within a portion of a label that indicates the purpose of the data within that portion of the label. For linear symbols, the data area title includes the Data Identifier and the Data Element Title, e.g., (S) SERIAL NUMBER, (S) SERIAL #, OR (S) SN. For two-dimensional symbols, the data area title signifies the intended user of the 2D symbol, e.g., SPLR, CUST, CARR. See “human readable information.”

24. data character
A single numeric digit, alphabetic character or punctuation mark, or control character, which represents information. Compare Symbol Character.

25. data check character/digit
A digit or character calculated from data and appended as part of the data string to ensure that the data is correctly composed and transmitted. Compare Symbol Check Character.

26. data codeword
A codeword which encodes data according to one of the compaction schemes of a symbology.

27. data element separator
A specified character used to delimit discrete fields of data.

28. data element title
A part of the data area title for linear code that gives a brief description of the data element e.g. Partnumber, Customer nr. The data element may contain abbreviations.

29. Data Identifier (DI)
A specified character string which 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, Data Application Identifier Standard. 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. See ISO/IEC 15418.

30. Data Matrix
An error correcting two-dimensional matrix symbology, developed in 1989 with finalized design in 1995 by International Data Matrix, capable of encoding various character sets including strictly numeric data, alphanumeric data, and all ISO 646 (ASCII) characters, as well as special character sets. The symbology has error detection and error correction features. Each Data Matrix symbol consists of data regions that contain nominally square modules set out in a regular array. A dark module is a binary 1 and a light module is a binary 0. There is no specified minimum or maximum for the X or Y dimension. The data region is surrounded by a finder pattern that is surrounded by a quiet zone on all four sides of the symbol. The finder pattern is a perimeter to the data region and is one module wide. Two adjacent sides are solid dark lines used primarily to define physical size, orientation, and symbol distortion. The two opposite sides are made up of alternating dark and light modules.

These are used primarily to define the cell structure but can also assist in determining physical size and distortion. There are two types of Data Matrix symbologies: ECC 000 - 140 with several available levels of convolutional error correction, and ECC 200 which uses Reed-Solomon error correction. For ISO/IEC JTC 1/SC 31 purposes, only ECC 200 is recommended. The intellectual property rights associated with Data Matrix have been committed to the public domain. See ISO/IEC 16022.

31. decoder
An electronic assembly that translates the proportional electrical signals from a scanner into recognizable or computer-compatible data.

32. Dot
A localized region with a reflectance that differs from that of the surrounding surface.

33. dot misalignment within a cell
The distance between the physical center point of a dot and the cell center point.

34. Electronic Data Interchange (EDI)
For the purposes of this document, EDI shall mean the computer to computer communication of data which permits the receiver to perform the function of a standard business transaction and is in a standard data format. The exchange of routine business transactions (documents) in a computer-processible format, covering such traditional applications as inquiries, planning, purchasing, acknowledgements, pricing, order status, scheduling, test results, shipping and receiving, invoices, payments, and financial reporting.

35. element
A single bar or space in a bar code symbol. The width of individual elements may be expressed in modules, or in multiples of the X dimension.

36. element width
The thickness of an element measured from the leading edge of an element to the trailing edge of the same element. See "X" Dimension.

37. erasure
A type of error represented by a physically missing character, or a symbol character which has failed to be decoded, as opposed to a substitution error or misdecode.

38. erasure correction
The use of the error correction characters to correct data errors that have known locations (these locations may have insufficient contrast in the image, may fall outside of the image field, or may have incorrect parity for symbologies with symbol character parity.) Only one error correction character is required to correct each erasure.

39. error correction
A mathematical procedure which allows the detection and rectification of errors to take place.

40. error correction codeword
A codeword in a symbol which encodes a value derived from the error correction codeword algorithm to enable decode errors to be detected and, depending on the error correction level, to be corrected.

41. error correction level
The degree of error correction capability in a symbology, where this is not fixed but subject to some user choice.

42. error detection
The use of the error correction characters to detect that the number of errors in the symbol exceeds the error correction capacity. Error detection will keep the symbol from being decoded as erroneous data. The error correction algorithm can also provide error detection by detecting invalid error correction calculation results.

43. European Norm (EN)
A standard of the European Union.

44. finder pattern
A unique pattern in a symbology used to locate symbols conforming with the symbology rules within a field of view.

45. first level assembly
For the purposes of this document, a manufactured electronic item or a mechanical assembly of an electronic item (e.g., populated printed circuit board, plug-in or PCMCIA card) made up of components.

46. format (high-capacity ADC media)
Formats comprise one or more “segments.” A format contains one “format type.”

47. format envelope
The format envelope, consisting of a “format header” and a “format trailer”, delimits the start and end of data in a given “format.”

48. format header
The string of characters, including the “format indicator,” used to identify the start of a “format envelope.”

49. format indicator
A two-digit numeric code used to identify the specific “format type” of the application data.

50. format trailer
A character used to identify the end of a “format envelope.”

51. format type
The rules under which a specific “format” is encoded.

52. free text
Letters, digits or other characters contained on the label that are not represented in a machine-readable symbol, e.g., product description, compatibility. See “human readable information.”

53. human readable character
The representation of a bar code data character or data check character in a standard eye-readable alphabet or numerals, as distinct from its machine-readable representation.

54. human readable information
Information contained on a label along with machine-readable information. Types of human readable information include human readable interpretation (HRI), human translation, data area titles, and free text.

55. human-readable interpretation (HRI)
The letters, digits or other characters associated with the encoded message and printed adjacent to the bar code or two-dimensional symbol. See “human readable information.”

56. human translation
The representation of machine-readable data in a standard eye-readable alphabet or numerals, located in a separate part of a label from the associated machine-readable data. Human translation provides for more human understandable representation of the data encoded in the machine-readable symbol(s), e.g., SUPPLIER PART #: MH80312 instead of (P) PART # SPLR: MH80312 or (P) MH80312. Human translation is also used to represent in a human friendly manner, some or all of the data encoded in a two-dimensional symbol. See “human readable information.”

57. Japanese Article Number (JAN)
The Japanese equivalent of a U.P.C. A or EAN-13 code. JAN company identification codes are assigned by Distribution Code Center (DCC), 3F Place Canada, 7-3-37 Akasaka, Minato-ku, Tokyo 107, Japan, Voice: +81 3 5414 8505, Telefax: +81-3-5414-8514.

58. Japanese Industrial Standard
A Japanese standards body responsible for the development of specific Japanese standards, such as those providing a technical specification for a bar code symbology. Japanese Industrial Standards Council (JISC), Japanese Standards Association. 1-24, Akasaka 4, Minato-Ku, Tokyo 107 JAPAN

59. linear imager
A linear imager scanner uses a high-resolution linear CCD sensor and a beam of LED illumination to scan along the X-axis (a line) for reading linear bar codes. Some linear imagers are also capable of reading multi-row codes (e.g., PDF417) when the operator manually swipes the beam over the height of the code.

60. linear laser
A linear laser scanner uses a mirror assembly to sweep a laser beam along the X-axis (a line) for reading linear bar codes. Some linear lasers are also capable of reading multi-row codes (e.g., PDF417) by manually swiping the beam over the height of the code.

61. linear symbology
A bar code symbology in which the symbol is formed of a single row of symbol characters. Compare Multi-Row Symbology.

62. matrix symbology
A collection of polygonal or circular elements in a regular pattern to represent data for retrieval by a vision scanning system.

63. message (high-capacity ADC media)
The data stream that is contained within the “message envelope.”

64. message envelope
Consisting of a “message header” data, and a “message trailer,” the message envelope delimits the start and end of a “data stream” in a given message.

65. message header
The string of characters used to identify the start of a “message envelope.”

66. message trailer character
The End of Transmission character, "E_{OT}", (ASCII/ISO646 Decimal “04”) (ASCII/ISO646 Hex "04") serves to define the end of a message.

67. multi-row symbology. (also stacked symbology)
A bar code symbology in which the symbol consists of two or more vertically adjacent rows of symbol characters. Compare Linear Symbology.

68. PDF417
An error correcting two-dimensional multi-row symbol developed in 1992 by Symbol Technologies, PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules. The symbol size is from 3 to 90 rows. There is no specified minimum or maximum for X or Y dimension. With at least the recommended minimum level of error correction, the recommended Y dimension is 3X. With less than the minimum recommended level of error correction, the recommended Y dimension is 4X. A quiet zone of 2X is specified on each side of a symbol. Because of delta decode techniques the symbology is immune from uniform bar width growth. PDF417 supports cross-row scanning. The intellectual property rights associated with PDF417 have been committed to the public domain. See ISO 15438.

69. print quality
The degree to which a printed optical symbol complies with the requirements which are specified for it, such as dimensions, reflectance, edge roughness, spots, voids, etc., which will affect the performance of the scanner. See Verification.

70. product
A first level or higher assembly that is sold in a complete end-usable configuration.

71. product package
The first tie, wrap or container to a single item or quantity thereof that constitutes a complete identifiable pack. A product package may be an item packaged singularly, multiple quantities of the same item packaged together or a group of parts packaged together. For the purposes of this document the term “product package” includes component packages and packaging intended for storage and transport. See definition of component and component package.

For the purposes of this document a "Component Package" is synonymous with "Product Package" (a supplier packs and sells their product in a "Product Package", which when used by the next level manufacturing step becomes the customer's "Component Package".

72. quiet zone
The area free from interfering markings which surrounds a bar code symbol and, in particular, precedes the start character and follows the stop character. Also referred to as light margin or clear area.

73. raster laser
Raster laser scanners use two mirror assemblies, one mounted perpendicular to the other, to sweep the laser beam over both the X-axis and the Y-axis for reading linear bar codes and multi-row codes.

74. reader
A device used to capture the data encoded in a machine-readable symbol or other automatic data capture media. Machine-readable symbol readers consist of two parts: the transducer that sends signals proportional to the reflectivity of each successive element of the symbol to the decoder, that examines the signals from the scanner and translates them into recognizable or computer-compatible data. The decoder itself is sometimes called a reader.

75. resolution
Measure of the fineness of detail of an image which a piece of equipment can produce or distinguish. The width of the narrowest element capable of being read by the equipment under test.

76. scanner
An electronic device that converts optical information (eg a printed bar code) into electrical signals for subsequent decoding and transmission to a computer. See also Bar Code Reader, Decoder.

77. segment
A logical group of “data elements”, specifically, a logical portion of an EDI message.

78. segment terminator
The single character used to separate “segments.”

79. semantics
The means by which the purpose of a field of data is identified, semantic examples used in automatic data capture include ISO 15418/ANSI MH10.8.2 Data Identifiers, EAN/UCC Application Identifiers, EDI (X12/EDIFACT/CII) Data Element Qualifiers, DoD Data Element Identifiers (DEIs) - Structured Free Text

80. serial number
A code assigned by the Supplier to an entity for its lifetime, (e.g., computer serial number, traceability number, contract tool identification)

81. space
A light element corresponding to a region of a scan reflectance profile above the global threshold

82. speck
See Spot.

83. spot
An ink or dirt mark or other area of low reflectance in an area of a symbol which is intended to be of high reflectance. Compare Void.

84. structure
The order of data elements in a message.

85. Supplier
In a transaction, the party that produces, provides, or furnishes an item or service.

86. symbol
See Bar Code Symbol.

87. symbol character
The physical representation of the codeword as a pattern of dark and light elements. There may be no direct one-to-one mapping between symbol character and data character or auxiliary character. Decoding through the compaction rules is necessary to identify the data.

88. symbol check character
A symbol character calculated from the other symbol characters in a bar code symbol in accordance with an algorithm defined in the symbology specification and used to check that the bar code has been correctly composed and read. The symbol check character does not form part of the data encoded in the symbol.

89. symbology
A standard means of representing data in bar code form. Each symbology specification sets out its particular rules of composition or symbol architecture.

90. symbology identifier
A sequence of characters, generated by the decoder and prefixed to the decoded data transmitted by the decoder, that identifies the symbology from which the data has been decoded. See ISO/IEC 15424, *International Specification - Data Carrier/Symbology Identifiers.*

91. syntax
The way in which data is put together to form messages. Syntax also includes rules governing the use of appropriate identifiers, delimiters, separator character(s), and other non-data characters within the message. Syntax is the equivalent to grammar in spoken language. The syntactic example used in automatic data capture include ISO 15434/ANSI MH10.8.3 - *Transfer Syntax for High Capacity ADC Media*

92. traceability identification
A code assigned to identify or trace a unique group of entities (e.g., lot, batch, item, revision/version or serial number).

93. traceability number
A code assigned by the Supplier to identify/trace a unique group of entities, (e.g., lot, batch,).

94. two-dimensional (2D) symbols
Machine-readable symbols that must be examined both vertically and horizontally to read the entire message. Two dimensional symbols may be one of two types: matrix symbols and multi-row symbols. Two dimensional symbols have error detection and may include error correction features.

95. U.P.C. (Universal Product Code):
A fixed length, numeric 13-digit bar code symbol adopted by the U.S. grocery industry (and subsequently by other retail industries), composed of a six-digit manufacturer number assigned by the UCC, a five-digit product code assigned by the manufacturer, and a modulo 10 check digit as the twelfth digit. For international compatibility with EAN-13 the 13th digit is a derived 0 in the left most position.

96. verification
The technical process by which a bar code symbol is measured to determine its conformance with the specification for that symbol.

97. void
An area of high reflectance in an area of a bar code symbol which is intended to be of low reflectance. Compare Speck, Spot.

98. X dimension
1. The specified width of the narrow elements in a bar code symbol. See Z Dimension. 2. The specified width of a single element in a matrix symbol.

99. Z dimension
The average achieved width of the narrow elements in a bar code symbol. It is equal to half the sum of the average narrow bar width and the average narrow space width, in two-width symbologies, or to the quotient of the average overall character width divided by the number of modules per character in modular symbologies.

Annex B Selection and Use of 2D Symbols (Informative)

B.1 2D Symbol Selections

PDF 417and Data Matrix ECC 200 are approved to be used for product package labels.

Before choosing a 2D symbology or equipment for your application(s), consideration needs to be made concerning all supply chain materials passing thru your application(s) for scan automation and for label space efficiency. The following table illustrates the major differences to be considered when making these decisions.

Symbology	Linear Imager	Area Imager	Linear Laser	Raster Laser	Label Space Efficiency (for same "X" dimension)
PDF417	May be compatible (check with manufacturer)	Compatible	May be compatible (check with manufacturer)	Compatible	Greater than linear bar code
Data Matrix ECC 200	Not Compatible	Compatible	Not compatible	Not compatible	Greater than linear bar code and PDF417

NOTE:

When evaluating printers and scanners, other special considerations should include:

- Printer capabilities (2D capabilities, DPI, Print Quality, etc.)
- Print Quality Verifier types and capabilities (handheld, fixed, in-line, etc.)
- Scanner types & capabilities (hand-held, fixed, field of view, depth of field, lighting, etc.)

B.2 Format and Syntax Recommendations for 2D Symbols

B.2.1 Symbol Requirements for 2-D Symbols

B.2.1.1 "X" Dimension

The minimum narrow element dimension X should be 0,254 mm (cell size for Data Matrix / narrow element dimension for PDF417) as determined by the printing capability of the supplier/printer of the label.

B.2.1.2 Print Quality

Print quality should be tested in accordance with ISO/IEC NP 15415 Bar code print quality test specification - 2-D symbols.

For Data Matrix ECC 200 symbols, a minimum overall symbol grade of 3.0 (B) is recommended.

B.2.1.3 Error Correction Level

The PDF417 symbol error correction level depends on the number of data codeword. A minimum error correction level of 3 is recommended.

The Data Matrix ECC 200 uses the automatic error correction as specified in ISO/IEC 16022.

B.2.2 Syntax and Semantic Recommendations

Symbols compliant to this standard should use the Data Identifier semantics specified in ISO 15418/ANSI MH10.8.2 and the syntax specified in ISO 15434/ANSI MH10.8.3, Transfer syntax for high capacity ADC media.

CEA Document Improvement Proposal

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Consumer Electronics Association
Technology & Standards Department
2500 Wilson Blvd.
Arlington, VA 22201
FAX: 703 907-7693
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