NEDA

PUBLICATION

NEDA Guidelines for Auto Identification
(1-Dimensional Bar Code & 2-Dimensional Matrix Code for Suppliers Product Package & Shipment Labeling)

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Industry Guidelines

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NEDA Supplier Guideline
Auto Identification
(1-Dimensional Bar Code & 2-Dimensional Matrix Code For Suppliers
Product Package & Shipment Labeling)

The purpose of this guideline is to provide current technical information that will help the Electronics Distribution Industry to know and choose appropriate symbology(s), materials, and equipment for their current and future application needs. This document is consistent with current industry standards (see EIA, CEA, ANSI, & ISO/IEC reference documents), and will make recommendations for symbology(s) and standardized set of data and data identifiers for each level of labeling applications used in the electronic manufacturing component supply chain (non-retail).

Index:

I. Defined Terms Related To This Document

A. 1-Dimensional (1D) Barcode – A bar code symbology in which the symbol is formed of a single row of symbol characters (made up of narrow & wide bars and spaces).

B. 2-Dimensional (2D) Matrix Code – Optically 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 barcode symbols. Two dimensional symbols have error detection and may include error correction features.

C. 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. A single part, item, or material purchased, manufactured, and/or distributed

D. Data Identifier (DI) - A specified character, or string of characters, that defines the intended use of the data element that follows.

E. Packing Slip – Also known as a pick list, pack/packing list or delivery note, this document contains the order specific information for the total ship quantity of 1 or more part numbers of a Purchase Order.

F. Product Package - 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 product 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

G. Shipping Container – The outer non-breakable container handled by a freight carrier in the transportation of an order from a shipper (supplier) to a receiver (customer or forwarder).

H. Unit Pack – The first tie, wrap, or container of a single part number (i.e.; tape, tube, tray, bag) — A unit pack may be an item packaged singly or a standardized quantity of items.

II. Reference Documents

JEP 130, NEDA Supplier Guideline, Packing and Handling

CEA-706, Component Marking Standard

JEDEC JEP 130, Guidelines for Packing and Labeling of Integrated Circuits in Unit Container Packing

CEA-624-A, Linear Bar Code and Two-Dimensional Symbols for the Labeling of Product Packages

ISO 22742 - Packaging – Linear Bar Code and Two-Dimensional Symbols for Product Packaging

CEA-556-C, Outer Shipping Container Label Standard

ISO 15434 - Packaging - Bar Code and Two-Dimensional Symbols for Shipping, Transport and Receiving Labels

ANS MH10.8.2 Data Application Identifier Standard

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

ISO/IEC 15416, Information Technology -- Automatic Identification and Data Capture Techniques -- Bar Code Print Quality Test Specification -- Linear Symbols

ISO/IEC 15417, Information Technology — International Symbology Specification - Code 128

ISO/IEC 16388, Information Technology — International Symbology Specification - Code 39

ISO/IEC 15438, Information Technology — International Symbology Specification - PDF417

ISO/IEC 16022, Information Technology — International Symbology Specification – Data Matrix

ISO/IEC 16023, Information Technology — International Symbology Specification — MaxiCode

ISO 3166-1, Codes for the Representation of Names of Countries and Their Subdivisions – Part 1: Country Codes

All documents should be available from:

Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112, Telephone: (800) 854-7179 or (303) 397-7956, Fax: (303) 397-2740, website: http://global.ihs.com (Outside the United States, check the above website for locations in other countries).

Many can also be obtained from:

ANSI, 25 West 43rd Street (between 5th and 6th Avenues), 4th floor, New York, NY 10036, Telephone: (212) 642-4900, Fax: (212) 398-0023, website: http://webstore.ansi.org/ansidocstore/default.asp.

III. Symbologies

A. 1D Linear Barcodes -

    1. Code 39

       a. Most commonly used barcode readable by all barcode scanners, approved for use in all major Industry Standards (ISO, ANSI, EIA/CEA, etc)

    2. Code 128

       a. Approved for use in all major Industry Standards.

       b. Recommended for Disty Specifications using 1D Barcode

       c. Advantages over Code 39 are:

          * space efficiency (data compression requires less real estate and faster scan rate when compared to Code 39, for most applications).

       d. Industry trend toward replacing Code 39 with Code 128

B. 2D Matrix Codes (see "Informative" in Section IV.)

   1. Data Matrix ECC-200

      a. Recommended for Disty Specifications using 2D Data Matrix on inner/intermediate product packages (bags, boxes, reels). Also recommended for any required 2D Contents List for outer containers, and/or as supplement to "Mixed Load" label.

      b. Data Matrix ECC 200 uses the automatic error correction to insure reliable performance of slightly damaged labels.

   2. PDF417

      a. Recommended for Disty Specifications using 2D PDF417 on outer shipping container, Shipping Content Summary, and Packlist labels (unless amount of auto-id data requires more efficient space utilization, in which case 2D Data Matrix Code is recommended)..

      b. Error Correction level of 3 is recommended to insure reliable performance of slightly damaged labels, when using PDF417 2D.

   3. MaxiCode

      a. Recommended only when required by Freight Carrier for Freight Tracking of outer shipping cartons.

IV. Materials & Equipment

A. Labels & Ribbon – When selecting ribbon &/or label suppliers it is important to qualify them (together) to insure that they meet 3 important criteria:

   1. Print Quality

   2. Smudge resistance

   3. Adhesive requirements (permanent and/or peel able)

B. Printer Recommendations

   1. For label printing only thermal transfer printers are recommend

   2. 400DPI minimum is recommended to support 1D & 2D symbologies

C. Scanners/Print Quality Verifiers – When selecting 1D and/or 2D symbology(s) for your supplier labeling specifications, it is necessary to also select a suitable scanner and print quality verifier for your application(s). New technological advances now permit some scanners to also double as an in-line or standalone print quality verifier (contact your full service 1D-2D solutions provider for more detailed updates). The following "Informative" section may be very helpful in determining the best symbology &/or scanner technology to meet your current and future needs.

Informative - Selection and Use of 2D Symbols & Equipment

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 through 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	LinearImager	Area Imager	Linear Laser	RasterLaser	Label Space Efficiency For Symbology Consideration (same "X" dimension)
PDF417	May be compatible (check with Manufacturer)	Compatible	May be compatible (check with manufacturer)	Compatible	More efficient than linear barcode
Data Matrix ECC 200	Not Compatible	Compatible	Not Compatible	Not Compatible	More efficient than linear barcode and PDF417
1D Code 39/ Code 128	Compatible	Compatible	Compatible	Compatible	Code 128 is more efficient than Code 39
2D Maxicode	May be compatible (check with Manufacturer)	Compatible	May be compatible (check with manufacturer)	Not Compatible	Efficient but dedicated use for "Freight Tracking" purposes.

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

- Printer capabilities (2D capabilities, DPI, Print Quality, Size/Footprint, etc.)

- Print Quality Verifier types and capabilities (application variables - handheld, fixed, in-line, etc.)

- Scanner types & capabilities (application variables - hand-held, fixed, field of view, depth of field, lighting, etc.)

V. Marking/Labeling Applications & Interface

A. Component Marking Application

1. At the time of this publication 2D part marking on individual components is limited to special (custom) parts not required for distribution.

2. Data Matrix ECC 200 is the industry standard symbology for 2D part marking

3. Typical 2D data for individual component tracking include

    a. Part Number

    b. Supplier Code

    c. Mfg Lot Trace Code

    d. Environmental category (Pb-Free/ROHS/Lead Finish type code).

4. See example of 2D direct part marking in examples section

B. Product Package Labeling Application

    1. For product packages (inner/intermediate bags, boxes, & reels) used for stocking and manufacturing POU (Point Of Use).

C. Shipping & Receiving Application

    1. Shipping Carton (Single Item/Single PO)

    2. Mixed Load

    3. Master (Packlist/Delivery with Single Part#)

    4. Content Summary Label (for contents of Mixed Load Container)

D. Unit Pack Label (See Product Package Labeling Application)

E. Interface

    1. 1-Dimensional Barcode – When scanning 1D barcode data into your application you may need an interface tool such as a simple hard wedge to emulate a keyboard entry. Other (middleware/software scripting) tools may also be necessary if parsing of data identifiers from actual data is not desired within the application.

    2. 2-Dimensional Matrix – A middleware/software scripting tool is recommended for parsing of data identifiers from actual data and for custom scripting (buffer) of desired data for each recognized application.

    Note: There are many solution options in the Auto-Id industry that will support your needs, whether it is within the scanner, individual workstations, or your local/global enterprise level system.

VI. Examples of 1D & 2D Marking and Labeling

Figure 1 - Component Marking (not required for distribution at the time of this publication)
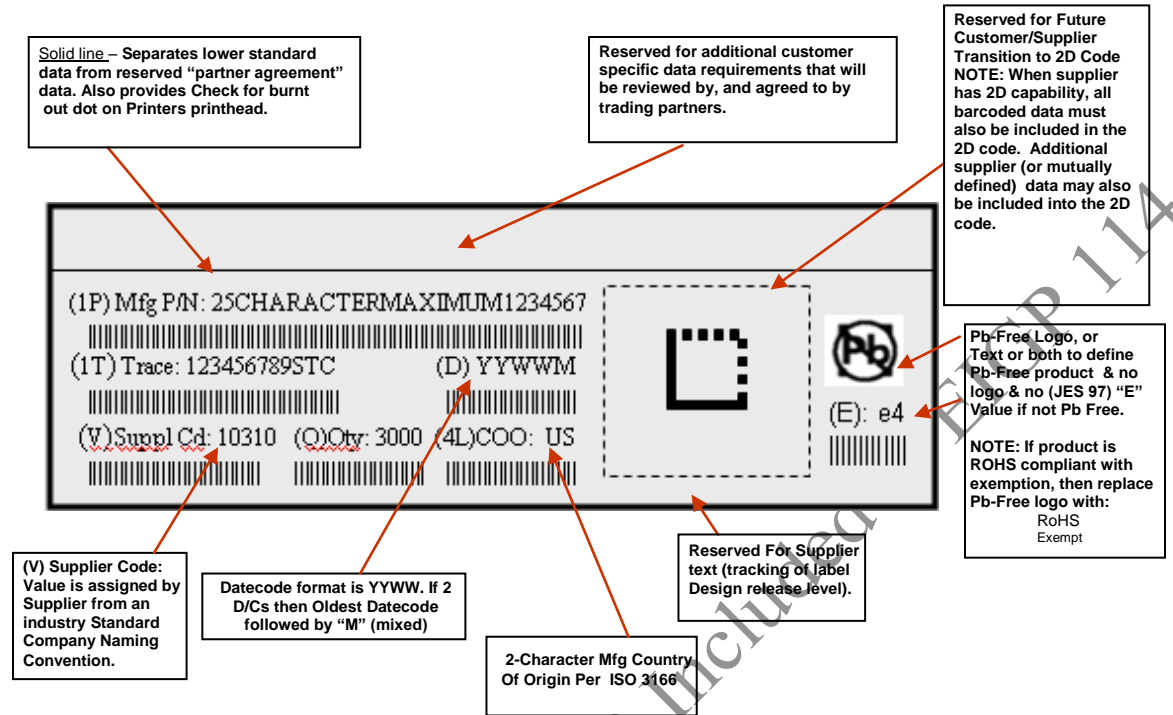

(P)1234567890^G_S(V)12345^G_S(1T)1234567
 **Note: Parentheses () are to illustrate
enclosed DIs (Data Identifiers) and
are not actual encoded data.**

**Note: For component marking where only
Data Matrix ECC 200 is used for 2D
marking, it is not necessary to encode the
full syntax structure of Header and Trailer
information if agreeable to trading partners.**

Figure 2 – NEDA Recommended **"Product Package Label"** (Code 128 barcode with reserved area for future 2D Data Matrix ECC200). Label size and data layout is defined by supplier.

Solid line – **Separates lower standard data from reserved "partner agreement" data. Also provides Check for burnt out dot on Printers printhead.**

Reserved for additional customer specific data requirements that will be reviewed by, and agreed to by trading partners.

Reserved for Future Customer/Supplier Transition to 2D Code NOTE: When supplier has 2D capability, all barcoded data must also be included in the 2D code. Additional supplier (or mutually defined) data may also be included into the 2D code.

Pb-Free Logo, or Text or both to define Pb-Free product & no logo & no (JES 97) "E" Value if not Pb Free.

NOTE: If product is ROHS compliant with exemption, then replace Pb-Free logo with:
RoHS
Exempt

(V) Supplier Code: Value is assigned by Supplier from an industry Standard Company Naming Convention.

Datecode format is YYWW. If 2 D/Cs then Oldest Datecode followed by "M" (mixed)

2-Character Mfg Country Of Origin Per ISO 3166

Reserved For Supplier text (tracking of label Design release level).

Label content:
(1P) Mfg P/N: 25CHARACTERMAXIMUM1234567
(1T) Trace: 123456789STC   (D) YYWWM
(V) Suppl Cd: 10310   (Q)Qty: 3000   (4L)COO: US
(E): e4

NOTE: Industry Standard Data Identifiers (in parentheses) are included in the barcode. The Data Field titles following the DI's are not included in the actual barcode data.

Figure 3 – Minimum Requirements for NEDA Recommended "**Shipping & Receiving Labels"**

Shipping Carton, Single Item (Part Number) Load (industry standard size of 4" wide by 6.5" long (height)

Fr: Ship From Address W/B: Carrier W/B# ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖	To: Ship To Address
(3S) Pkg Id: Supplier Code + Unique Package Id ‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖	

(K) PO# 14CharMax.	(14K) Line Item:
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖	‖‖‖‖‖‖‖‖‖‖‖

(P) Cust P/N: 25CHARACTERMAX0000
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

(Q) Qty: 100000
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

(1P) Supplier P/N: 25 Char Maximum
‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

Desc: Integrated Circuit	
Package Count Package Wt. Box 1 of 5 XX Lbs. YY Kgs.	Supplier Reserved Space

Figure 4 – Minimum Requirements for NEDA Recommended **"Shipping & Receiving Labels"** for **"MIXED LOADs** (industry standard size of 4" wide by 6.5" long (height)

Fr: Ship From Address	To: Ship To Address

W/B: Carrier W/B#

|||||||||||||||||||||||||||||||||||||

(3S) Pkg Id: Supplier Code + Unique Package Id

||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

MIXED

LOAD

(Q) Qty: 800000

|||||||||||||||||||||||||||||||||||

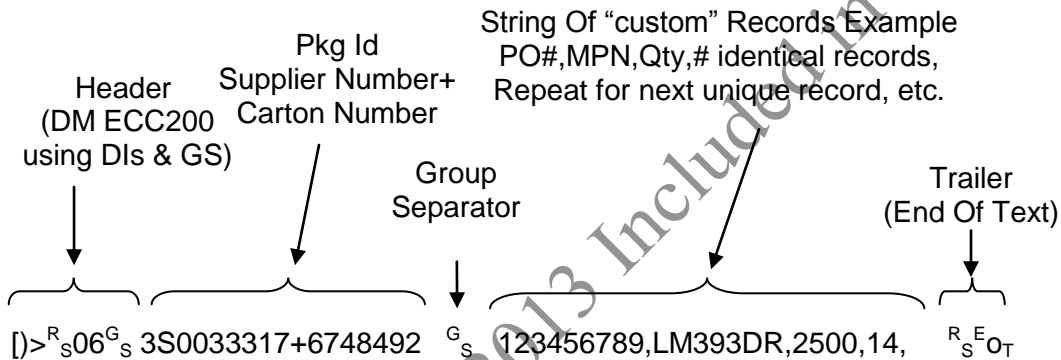| Package Count	Pkg Weight	
X of Y	XX Lbs. YY Kgs	Supplier Reserved Space

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Figure 5 – Minimum Requirements for NEDA Recommended "Shipping & Receiving Labels"
2D Content Label for "MIXED LOADs (industry standard size of 4" wide by 6.5" long (height)
NOTE: For Distributors & Suppliers who are 2D capable

Data Element Syntax for 2D Symbols

The encoding shall be as described in ISO/IEC 15434, using "Format 06", using Data Identifiers. The first seven characters shall be "[)>^R_S06^G_S". For Data 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") character and the appropriate Data Identifier shall be used to identify each of the combined fields.

Data Format example/concatenation of 2D codes:

Header
(DM ECC200
using DIs & GS)

Pkg Id
Supplier Number+
Carton Number

Group
Separator

String Of "custom" Records Example
PO#,MPN,Qty,# identical records,
Repeat for next unique record, etc.

Trailer
(End Of Text)

[)>^R_S06^G_S 3S0033317+6748492 ^G_S 123456789,LM393DR,2500,14, ^R_S^{E}o$_T$

(Z) Content List For Pkg Id: Supply Code + Box#

2D

2D

(Additional labels/2D codes if needed)

Figure 6 (**Delivery Note/Packlist Label)** – Minimum Requirements for NEDA Recommended Single Item/Single Purchase Order **Delivery Note/Packlist Label** (Backside labeling of document when all required Auto Identification is not printed directly on document at time of printing, using industry standard label size of 4" wide by 6.5" long (height)

Fr: Ship From Address

To: Ship To Address

W/B: Carrier W/B#

(11K) Packlist No.:

(K) PO# 14CharMax.   (14K) Line Item:

(P) Cust P/N: 25CHARACTERMAX0000

(Q) Qty: 100000

(1P) Supplier P/N: 25 Char Maximum

Desc: Integrated Circuit

Package Count
5

Supplier Reserved Space

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