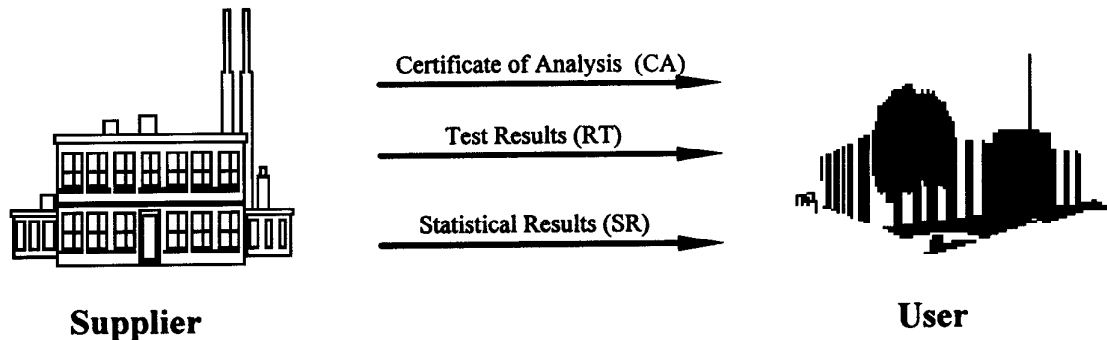


APPENDIX 1

EDI BUSINESS MODEL

NOTICE: The material in this appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A1-1 Any implementation model is agreed upon by trading partners. It is the intent of this document to make interpretation of the models used for transmitting electronic messages more consistent, so that implementations are based upon common practices.



A2-1 Attributes of EDI Messages

A2-1.1 *Certificate of Analysis (CA)* — One message containing measurement or statistical data for one shipment, from one supplier site to one user site, of one user part number against one user purchase order shipped. Multiple lot numbers may be included in the shipment.

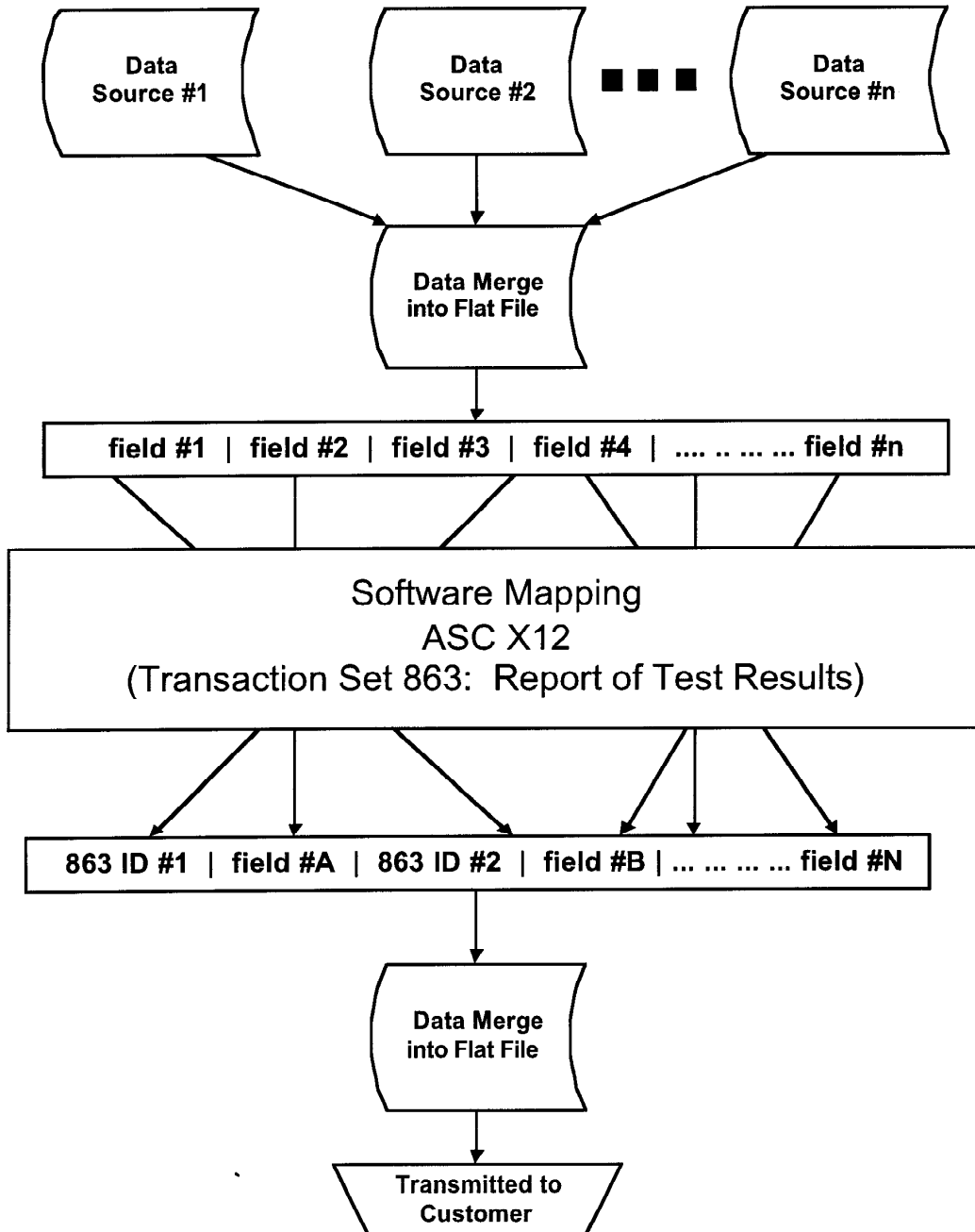
A2-1.2 *Test Results (RT)* — Used to designate data provided by special request (e.g., engineering, qualifications). This message contains specific measurement or statistical data for one request, from one trading partner to another trading partner, of one part number against one purchase order. Multiple lot numbers may be included.

A2-1.3 *Statistical Results (SR)* — One message containing measurement or statistical data for defined parameters for a period of time from one trading partner to another.

APPENDIX 2

EDI TRANSMISSION FLOWCHART

NOTICE: The material in this appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.



APPENDIX 3

NEW EDI STATISTICS (DEFINITIONS)

NOTICE: The material in this appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A3-1 Additions to ANSI's Statistical Codes to be Included within this Standard

A3-1.1 These new statistical codes are added to a predefined ANSI list of summary statistics found in Appendix 3 under the transaction segment STA. The codes are HS, HW, HC, GM, GS, PK, EC, OC, and PE and are submitted to ANSI for approval. The codes can be used in an EDI message as long as the trading partners agree to include them as part of their transmissions. Once the codes are approved, the ASC X12 convention will be updated to automatically accept these codes as standards.

A3-1.2 Histogram Information

A3-1.2.1 **HS** = Histogram Start (Left side of first class or bar)

A3-1.2.2 **HW** = Histogram Class Width (Width of class or bar)

A3-1.2.3 **HC** = Histogram Class Count (Count of classes or bars)

A3-1.3 Process Capability Information

A3-1.3.1 **GM = Geometric Mean (GMEAN)**. For the lognormal distribution, it's calculated as:

TMEAN = The mean of the natural log of the raw data values

$GMEAN = \exp(TMEAN + (TSIGMA^2)/2)$

A3-1.3.2 **GS = Geometric Sigma (GSIGMA)**. For the lognormal distribution, it's calculated as:

TSIGMA = The sigma of the natural log of the raw data values

$GSIGMA = \sqrt{(\exp((2 \cdot TMEAN) + (TSIGMA^2))) \cdot \exp((TSIGMA^2) - 1)}$

A3-1.3.3 **PK** = The **peak** of the fitted probability distribution function. It's calculated as the maximum Y value of the probability distribution function after it is fitted to the process histogram.

A3-1.3.4 **EC = The equivalent normal Cpk (ECPK)**. For the lognormal distribution, it's calculated as:

$$ECPK = \frac{((\ln(USL)) - \ln((GMEAN^2 / (\sqrt{GMEAN^2 + GSIGMA^2}))))}{(3 \cdot \sqrt{\ln(GMEAN^2 / GMEAN^2)})}$$

A3-1.4 Outlier Information

A3-1.4.1 **OC = Outlier Count**. It may be calculated as A minus B, where A = the count beyond a chosen sigma point using the histogram, and B = the count beyond the chosen sigma point using the statistical distribution.

A3-1.5 Percentile Information

A3-1.5.1 **PE = Percentile**. Like the HG, it can be repeated to give different elements. The user and supplier need to agree on the order for a particular application.

APPENDIX 4

EDI TRANSMISSION COMPONENTS (863 REPORT OF TEST RESULTS)

NOTICE: The material in this appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A4-1 Introduction

A4-1.1 The purpose of this section is to provide the necessary information to enable trading partners to use the ASC X12 standards for the exchange of electronic business documents within the electronics industry.

A4-1.2 The transmission, in the ASC X12 format, is comprised of an outer envelope (transmission envelope) which identifies the sender and receiver. Within the transmission envelope are one or more functional groups.

A4-1.3 The functional groups are analogous to batches of like documents (i.e., certificate of analysis, test results, statistical results). Each functional group contains one or more transaction sets (electronic documents). Each transaction set is an ordered collection of segments. Each segment is an ordered collection of data elements.

A4-1.4 Each segment has been assigned a two or three character identifier.

A4-1.5 This identifier marks the beginning of each segment. Each element within the segment is separated by a data element separator character. Electronic Industry Data Exchange (EDIX) recommends the use of the asterisk (*) character as a data element separator. A segment terminator character is used to mark the end of a segment.

A4-2 Format

A4-2.1 The ASC X12 segment hierarchy lists all segments, in order, available from the ASC X12 standard. The segment ID's that are shaded indicate the segments utilized by EDIX. Following the ASC X12 segment hierarchy is a detailed description of each segment in the order that they appear in the transaction set.

A4-2.2 Each segment is listed with the segment ID and name, level (header, detail, or summary), loop (if the segment is contained within a loop), loop repeat (for the first segment in the loop), requirement within the transaction set, maximum use, purpose (as defined by ASC X12), ASC X12 syntax notes, ASC X12 comments for segment usage, and notes that explain the EDIX convention for this segment within the transaction set. It is important to note all shaded text is either an EDIX convention or EDIX terminology.

Shaded coded lists refer to recommendations culled from the entire ASC X12 data element code list. The unshaded areas contain definitions and comments from the ASC X12 standard.

A4-2.3 The data element summary lists each data element, in order, for the segment; for each data element there is one line to identify reference designator, data element number, data element name, and attributes.

A4-2.4 Below the one line summary are usage notes and actual values identified for use.

A4-2.5 *Reference Designator* — This is the segment identifier with the data element sequence number within the segment.

A4-2.6 *Data Element Number* — This is the number assigned to the data element by ASC X12. This number may be used for direct reference into the ASC X12 Data Dictionary.

A4-2.7 *Data Element Name* — This is the name assigned to the data element by ASC X12, in the ASC X12 Data Dictionary.

A4-2.8 *Attributes* — Each data element has three ANSI attributes: element usage, element type, and Minimum/Maximum length.

A4-2.9 Element Usage

M Mandatory Designer

This is the segment identifier with the data element sequence number within the segment.

O Optional

The data element may be used if the segment is used.

X Conditional

The data element may be used only if other elements are used within the segment.

The particular condition/relation will be stated in the Data Element Summary for the segment when used.

A4-2.10 *Element Type*

ID Identifier

Values for the identifier-type data elements are taken from a predefined list in the ASC X12 data element dictionary.

AN String

Values for the string-type data elements are a sequence of any printable characters.

DT Date

Values for a date-type data element are in the format YYMMDD.

TM Time

Values for a time-type data element are in the format HHMM expressed in a 24-hour clock.

Nx Numeric

Values for a numeric data element are in an implied decimal format, where "X" indicates the number of places to the right of the decimal point.

i.e.,

N0 is a whole number (999.)

N2 is 999.99

R Decimal

This is a numeric field in character format, with a decimal point included. It is treated as alpha/numeric. The decimal point is not sent for whole numbers.

e.g.,

to send the number 0128.734, the field would contain "128.734".

to send the number 0789.00, the field would contain "789".

A4-2.11 *Minimum/Maximum*

This is the minimum and maximum length the field can be.

e.g.,

02/02 - fixed length of 2 characters.

04/09 - Minimum length of 4 characters and maximum length of 9 characters.

863 Report of Test Results - Overview

Heading: This section of information appears one time at the beginning of each transaction. The information is targeted at the identification of "Who is sending What to Whom, Where, and When."

SEMI USE:	Pos. No.	Seg. ID	Name	Req. Des.	Max. Use	Loop Repeat
M	010	ST	Transaction Set Header	M	1	
M	020	BTR	Beginning Segment for Test Results	M	1	
X	040	REF	Reference Numbers (Order & Material Ident.)	O	12	
O	060	PID	Product/Item Description (Commodity ID)	O	200	
LOOP ID - NI						>1
M	080	N1	Name (Buyer & Seller Company)	O	1	
O	090	N2	Additional Name Information	O	2	
O	100	N3	Address Information	O	2	
O	110	N4	Geographic Location (Buyer & Seller Site)	O	1	
LOOP ID - PER						>1
O	130	PER	Administrative Communications Contact	O	1	

Detail: This section of information appears as often as necessary during the transaction. The information deals directly with the data specific to the product or process of the supplier.

SEMI USE:	Pos. No.	Seg. ID	Name	Req. Des.	Max. Use	Loop Repeat
LOOP ID - LIN						>1
M	010	LIN	Item Identification (Primary Data Loop)	O	1	
O	034	QTY	Quantity	O	10	
X	040	DTM	Date/Time Reference	O	10	
LOOP ID - CID						>1
M	060	CID	Characteristic/Class ID	O	1	
O	100	SPS	Sampling Parameters for Summary Statistics	O	>1	
O	120	DTM	Date/Time Reference	O	10	
LOOP ID - MEA						>1
X	150	MEA	Measurements	O	1	
O	170	REF	Reference Numbers	O	10	
LOOP ID - STA						>1
X	180	STA	Statistics	O	1	
O	195	REF	Reference Numbers	O	10	
LOOP ID - TSP						>1
M	210	TSP	Test Period or Interval	O	1	
LOOP ID - LM						>1
M	242	LM	Code Source Information	O	1	
M	244	LQ	Industry Code	M	>1	

Summary: Transmission segments to mark the end of the transaction set.

SEMI USE:	Pos. No.	Seg. ID	Name	Req. Des.	Max. Use	Loop Repeat
O	005	CTT	Transaction Totals	O	1	
M	010	SE	Transaction Set Trailer	M	1	

Transmission Segments and Data Elements:

Segment:	ST Transaction Set Header
Level:	Heading
Loop:	_____
Usage:	Mandatory
Max Use:	1
Purpose:	To indicate the start of a transaction set and to assign a control number.
Semantic Notes:	1 The transaction set identifier (ST01) used by the translation routines of the interchange partners to select the appropriate transaction set definition (e.g., 810 selects the invoice transaction set).

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	ST01	143	Transaction Set Identifier Code	M	ID	3/3
			Code uniquely identifying a Transaction Set.			
			863 X12.41 Report of Test Results			
M	ST02	329	Transaction Set Control Number	M	AN	4/9
			Identifying control number that must be unique within the transaction set functional group assigned by the originator for a transaction set.			

Segment:	BTR Beginning Segment for Test Results
Level:	Heading
Loop:	_____
Usage:	Mandatory
Max Use:	1
Purpose:	To indicate the beginning of a test results transaction set.
Semantic Notes:	<ol style="list-style-type: none"> 1 If BTR01 equals 01, 02, 03, 04, 05, 18, or 19, then BTR06 is required to identify the original test report reference number transmitted. 2 BTR02 is the date that this transaction set was created by the sending party. 3 BTR03 is the time that this transaction set was created by the sending party. 4 BTR05 specifies test results report reference number created by the sending party.
Comments:	This segment is used to identify date and purpose of the data transmission.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
M	BTR01	353	Transaction Set Purpose Code Code identifying purpose of transaction set. 00 Original 18 Reissue	M ID 2/2
M	BTR02	373	Date Date (YYMMDD). Seller generated date representing the data collection date or other mutually agreeable date. Not associated with the lot/date code of the material.	M DT 6/6
O	BTR03	337	Time Time expressed in 24-hour clock time as follows: HHMM or HHMMSS, or HHMMSSD or HHMMSSDD, where H = hours (00-23), M = minutes (00-59), S = integer seconds (00-59) and DD = decimal seconds are expressed as follows: D = tenths (0-9) and DD = hundredths (00-99). Seller generated time representing the data collection time or other mutually agreeable time. Not associated with the lot/date code of the material.	O TM 4/8
M	BTR04	755	Report Type Code Code indicating the title or contents of a document, report, or supporting item. CA Certificate of Analysis RT Report of Tests and Analysis Report SR Statistical Report	O ID 2/2
X	BTR05	127	Reference Number Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier. Seller's unique shipment identification code visible on the shipping container and/or shipping paperwork that identifies the link to the data in a single Transaction Set. (Examples: Invoice No., Shipper No., Work Order No., etc.)NOTE: In the case of a re-transmittal (Purpose Code 18, reissue) of previous data due to correction or loss of data, this data element repeats the information from the prior transmission to be replaced.	O AN 1/30
O	BRT06	127	Reference Number Reference number of identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.	O AN 1/30

Segment:	REF	Reference Numbers (Order & Material Ident.)
Level:		Heading
Loop:		_____
Usage:		Optional
Max Use:		12
Purpose:		To specify identifying numbers.
Syntax Notes:	1	At least one of REF02 or REF03 is required.
Comments:	1	It is recommended for use and for report types CA and RT.
	2	BTR03 is the time that this transaction set was created by the sending party.
	3	It is not repeated once for each REF01 Qualifier determined by mutual consent between the Buyer and Seller as required.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	REF01	128	Reference Number Qualifier	M	ID	2/2
			Code qualifying the Reference Number.			
			BV Purchase Order Line Item Identifier (<i>Buyer</i>)			
			MF Manufacturer's Part Number (<i>Seller</i>)			
			PM Part Number (<i>Buyer</i>)			
			PO Purchase Order Number (<i>Buyer</i>)			
			PP Purchase Order Revision Number (<i>Buyer</i>)			
			RE Release Number (<i>Buyer</i>)			
			S3 Specification Number (<i>Buyer</i>)			
			SZ Specification Revision (<i>Buyer</i>)			
			YB Revision Number (<i>Buyer</i>)			
			ZZ Mutually Defined			
X	REF02	127	Reference Number	X	AN	1/30
			Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.			
O	REF03	352	Description	X	AN	1/80
			A free-form description to clarify the related data elements and their content.			

Segment:	PID Product/Item Description (Commodity ID)
Level:	Heading
Loop:	_____
Usage:	Optional
Max Use:	200
Purpose:	To describe a product or process in coded or free-form format.
Syntax Notes:	<ol style="list-style-type: none"> 1 If PID04 is present, then PID03 is required. 2 At least one of PID04 or PID05 is required. 3 If PID07 is present, then PID03 is required.
Semantic Notes:	<ol style="list-style-type: none"> 1 Use PID03 to indicate the organization that publishes the code list being referred to. 2 PID04 should be used for industry-specific product description codes.
Comments:	<ol style="list-style-type: none"> 1 If PID01 = "F", then PID05 is used. If PID01 = "S", then PID04 is used. If PID01 = "X", then both PID04 and PID05 are used. 2 PID07 specifies the individual code list of the agency specified in PID03.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	PID01	349	Item Description Type	M	ID	1/1
			Code indicating the format of a description.			
			F Free-form			
			Not recommended. To be used prior to adoption of SEMI codes into X.12.41 Standards.			
			S Structured (From Industry Code List)			
			Preferred use. The PID03 and PID04 codes shall be registered with the appropriate organization.			
			X Semi-structured (Code and Text)			
			Not recommended.			
M	PID03	559	Agency Qualifier Code	X	ID	2/2
			Code identifying the agency assigning the code values.			
			SM Semiconductor Equipment and Materials International			
			SEMI EDI Task Force shall register this code with ANSI.			
			ZZ Mutually Defined			
			To be used prior to adoption of SEMI codes into X.12.41 Std.			
M	PID04	751	Product Description Code	X	AN	1/12
			A code from an industry code list which provides specific data about a product characteristic.			
			For silicon wafers see SEMI Standard M18. Codes for other semiconductor products can be used as they are documented.			
O	PID05	352	Description	X	AN	1/80
			A free-form description to clarify the related data elements and their content.			
O	PID07	822	Source Subqualifier	O	AN	1/15
			A reference that indicates the table or text maintained by the Source Qualifier.			
			Identifies the SEMI Standard and applicable Table or Figure reference that defines the meaning of the codes used in PID04.			

Segment:	N1 Name (Buyer & Seller Company Ident.)
Level:	Heading
Loop:	N1
Usage:	Optional
Max Use:	1
Purpose:	To identify a party by type of organization, name, and code.
Syntax Notes:	1 At least one of N102 or N103 is required. 2 If either N103 or N104 is present, then the other is required.
Comments:	This N1 loop requires a minimum of two passes, one for Buyer (receiver) identification, and one for Seller (submitter) identification.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	N101	98	Entity Identifier Code	M	ID	2/2
			Code identifying an organizational entity, a physical location, or an individual.			
			1X Laboratory			
			28 Subcontractor			
			BY Buying Party (Purchaser)			
			PT Party to Receive Test Report [Buyer to the attention of]			
			SE Selling Party			
			YE Third Party			
X	N102	93	Name	X	AN	1/35
			Free-form name.			
			Use of N103 and N104 in lieu of this Element is recommended.			
X	N103	66	Identification Code Qualifier	X	ID	1/2
			Code designating the system/method of code structure used for Identification Code (67).			
			Preferred use is N103/N104 combination.			
			SM SEMI			
			ZZ Mutually Defined			
X	N104	67	Identification Code	X	AN	2/20
			Code identifying a party or other code.			
			Code from SEMI Standards Buyer/Seller code list (SEMI AUX1).			

Segment: N2 Additional Name Information
Level: Heading
Loop: N1
Usage: Optional
Max Use: 2
Purpose: To specify additional names or those longer than 35 characters in length.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	N201	93	Name Free-form name.	M	AN	1/35
O	N202	93	Name Free-form name.	O	AN	1/35

Segment: N3 Address Information
Level: Heading
Loop: N1
Usage: Optional
Max Use: 2
Purpose: To specify the location of the named party.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	N301	166	Address Information Address information	M	AN	1/35
O	N302	166	Address Information Address information	O	AN	1/35

Segment: N4 Geographic Location (Buyer & Seller Site Ident.)
Level: Heading
Loop: N1
Usage: Optional
Max Use: 1
Purpose: To specify the geographic place of the named party.
Syntax Notes: 1 If N406 is present, then N405 is required.
Comments: 1 A combination of either N401 through N404 or (N405 and N406) may be adequate to specify a location.
 2 N402 is required only if city name (N401) is in the USA or Canada.

Data Element Summary

SEMI USE:	Ref. Des.	Data Element	Name	Attributes
O	N401	19	City Name Free-form text for city name.	O AN 2/30
O	N402	156	State or Province Code Code (Standard State/Province) as defined by appropriate government agency.	O ID 2/2
O	N403	116	Postal Code Code defining international postal zone code excluding punctuation and blanks (zip code for United States).	O ID 3/11
O	N404	26	Country Code Code identifying the country.	O ID 2/3
X	N405	309	Location Qualifier Code identifying type of location. Preferred use if N405/406 combination. Additional codes are available for selection. FA Factory	X ID 1/2
O	N406	310	Location Identifier Code which identifies a specific location. Mutually defined identification strings shall be determined by trading partners and shall remain constant.	O AN 1/30

Segment:	PER Administrative Communications Contact
Level:	Heading
Loop:	PER
Usage:	Optional
Max Use:	1
Purpose:	To identify a person or office to whom administrative communications should be directed.
Syntax Notes:	1 If either PER03 or PER04 is present, then the other is required. 2 If either PER05 or PER06 is present, then the other is required. 3 If either PER07 or PER08 is present, then the other is required.
Comments:	Used to notify of change in EDI contact information at Seller, or to specify special attention name at Buyer, as required. Infrequent use anticipated.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	PER01	366	Contact Function Code	M	ID	2/2
			Code identifying the major duty or responsibility of the person or group named.			
		DC	Delivery Contact			
			[A Buyer attention flag.]			
		EA	EDI Coordinator			
			[Seller's EDI primary contact information.]			
		EG	Engineering			
			[A Buyer attention flag.]			
		QA	Quality Assurance Contact			
			[A Buyer attention flag.]			
		SU	Supplier Contact			
			[A Seller attention flag.]			
O	PER02	93	Name	O	AN	1/35
			Free-form name.			
X	PER03	365	Communication Number Qualifier	X	ID	2/2
			Code identifying the type of communication number.			
X	PER04	364	Communication Number	X	AN	1/80
			Complete communications number including country or area code when applicable.			
X	PER05	365	Communication Number Qualifier	X	ID	2/2
			Code Identifying the type of communication number.			
			Refer to 003050 Data Element Dictionary for acceptable code values.			
X	PER06	364	Communication Number	X	AN	1/80
			Complete communications number including country or area code when applicable.			
X	PER07	365	Communication Number Qualifier	X	ID	2/2
			Code identifying the type of communication number.			
			Refer to 003050 Data Element Dictionary for acceptable code values.			
X	PER08	364	Communication Number	X	AN	1/80
			Complete communications number including country or area code when applicable.			
O	PER09	443	Contact Inquiry Reference	O	AN	1/20
			Additional reference number or description to clarify a contact number.			

Segment:	LIN Item Identification (Primary Data Loop)
Level:	Detail
Loop:	LIN
Usage:	Optional
Max Use:	1
Purpose:	To specify basic item identification data.
Syntax Notes:	1 If either LIN04 or LIN05 is present, then the other is required.
Semantic Notes:	1 LIN01 is the line item identification.
Comments:	1 See the Data Dictionary for a complete list of ID's. 2 LIN02 through LIN31 provide for fifteen (15) different product/service ID's for each item. For example: Case, Color, Drawing No., UPC No., ISBN No., Model No., SKU.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
M	LIN01	350	Assigned Identification Alphanumeric characters assigned for differentiation within a transaction set. Use to clarify the type of information in Table 2.	O AN 1/11
			LOT Lot Dependent Data Report Type Codes CA and RT: Indicates that the LIN loop contains specific lot based data.	
			PER Lot Independent Periodic Data Report Type Code SR: Indicates that the LIN loop contains lot independent data.	
M	LIN02	235	Product/Service ID Qualifier Code identifying the type/source of the descriptive number used in Product/Service ID (234).	M ID 2/2
			KL Item Management Code Mandatory use for Assigned ID of PER: Primary scope identification number for data, assigned by Seller for the data set included. This Product/Service ID may identify periodic data sets by a single code, permanently defined by mutual consent of trading partners.	
			LT Lot Identifier Mandatory use for Assigned ID of LOT: Primary lot identification number for material. Example: Polished wafer final acceptance test lot number.	
M	LIN03	234	Product/Service ID Identifying number for a product or service.	M AN 1/40
X	LIN04	235	Product/Service ID Qualifier Code identifying the type/source of the descriptive number used in Product/Service ID (234). NOTE: The codes identified below are examples that may be used for each Product/Service ID Qualifier in this segment. Up to 14 Element pairs (LIN04/LIN05...through LIN30/LIN31) may be used.	X ID 2/2
			FE Feature Optional use for Assigned ID of PER: Secondary scope identification number for data assigned by mutual consent for the data set included. Example: Back Surface Finish No. 2 - Poly, LTO, etc.	

F1 Finish Number

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Back Surface Finish No. 1 - Poly, LTO, etc.

GC Grade Code

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Wafer Grade - Prime (Product), Test/Monitor (Non-product), SIMOX, BESOI, Silicon, Gallium Arsenide, etc.

KM Shelf-Life Code

KN Shelf-Life Action Code

LT Lot Number

Optional use for Assigned ID of LOT: Subordinate lot identification number for material. Example: EPI lot number.

MB Measurement Type Code

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Data is for before or after depositions.

PR Process Number

Optional use for Assigned ID of LOT: Additional processing lot identification number for material if required.

PW Part Drawing

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Specific part number.

RS Set Number

Optional use for Assigned ID of LOT: Superior lot identification number for data, assigned by mutual consent for the data set included. Example: Crystal or boule identification, etc.

SF Surface Finish

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Front Surface Finish - Etch, Polish, EPI, etc.

TP Product Type Code

Optional use for Assigned ID of PER: Secondary scope identification number for data, assigned by mutual consent for the data set included. Example: Diameter - 100 mm, 125 mm, 150 mm, 200 mm, 300 mm, etc.

LIN05 234 Product/Service ID X AN 1/40

Identifying number for a product or service.

The value identified by the preceding Product/Service ID Qualifier.

Segment: QTY Quantity
Level: Detail
Loop: LIN
Usage: Optional
Max Use: 10
Purpose: To specify quantity information.

Data Element Summary

SEMI USE:	Ref. Des.	Data Element	Name	Attributes		
M	QTY01	673	Quantity Qualifier Code specifying the type of quantity. 39 Shipped Quantity	M	ID	2/2
M	QTY02	380	Quantity Numeric value of quantity. Quantity of material represented by the most recent LIN Segment definition above; i.e., the material quantity represented by the data below. Not the combined total quantity of the shipment, unless it is a single lot.	M	R	1/15
O	QTY03	355	Unit or Basis for Measurement Code Code specifying the units in which a value is being expressed, or manner in which a measurement has been taken. Other codes may be used for other commodities/materials. EA Each	O	ID	2/2

Segment:	DTM Date/Time Reference
Level:	Detail
Loop:	LIN
Usage:	Optional
Max Use:	10
Purpose:	To specify pertinent dates and times.
Syntax Notes:	1 At lease one of DTM02, DTM03, or DTM06 is required. 2 If either DTM06 or DTM07 is present, then the other is required.
Comments:	1 Report Type Code SR (LIN01 Assigned ID = "PER"): Defines date range covered by summary data. 2 Report Type Codes CA and RT (LIN01 Assigned ID = "LOT"): May be used to specify a ship date or other date mutually agreed upon by Buyer and Seller. 3 If date range for all data entities is identical, the DTM Segment at Position Number 040 may be used to identify a single date.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	DTM01	374	Date/Time Qualifier	M	ID	3/3
			Code specifying type of date or time, or both date and time.			
			009 Process			
			011 Shipped			
			054 Sellers Local			
			119 Test Performed [Period Range]			
			157 Test Period Start			
			158 Test Period Ending			
X	DTM02	373	Date	X	DT	6/6
			Date (YYMMDD).			
			Used for start/stop combination.			
O	DTM03	337	Time	X	TM	4/4
			Time expressed in 24-hour clock time (HHMM).			
O	DTM05	624	Century	O	N0	2/2
			The first two characters in the designation of the year (CCYY).			
X	DTM06	1250	Date Time Period Format Qualifier	X	ID	2/3
			Code indicating the date format, time format, or date and time format.			
			RD6 Range of Dates Expressed in Format YYMMDD-YYMMDD.			
			RD8 Range of Dates Expressed in Format CCYYMMDD-CCYYMMDD.			
			A range of dates expressed in the format CCYYMMDD-CCYYMMDD, where CCYY is the numerical expression of the century CC and year YY, MM is the numerical expression of the month within the year, and DD is the numerical expression of the day within the year; the first occurrence of CCYYMMDD is the beginning date and the second occurrence is the ending date.			
			RDM Range of Dates Expressed in Format YYMMDD-MMDD.			
X	DTM07	1251	Date Time Period	X	AN	1/35
			Expression of a date, a time, or range of dates, times, or dates and times.			

Segment:	CID Characteristic/Class ID
Level:	Detail
Loop:	CID
Usage:	Optional
Max Use:	1
Purpose:	To specify the general class or specific characteristic upon which test results are being reported or are to be taken.
Syntax Notes:	<ol style="list-style-type: none"> 1 At least one of CID01, CID02, CID04, or CID05 is required. 2 If either CID03 or CID04 is present, then the other is required. 3 If CID06 is present, then both CID03 and CID04 are required. 4 If CID07 is present, then at least one of CID04 or CID05 is required.
Comments	<ol style="list-style-type: none"> 1 CID06 specifies the individual code list of the agency specified in CID03.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
X	CID01	738	Measurement Qualifier Code identifying a specific product or process characteristic to which a measurement applies.	X	ID	1/3
M	CID02	750	Product/Process Characteristic Code Code identifying the general class of a product or process characteristic. 13 Quality (Quality Level)	X	ID	2/3
X	CID03	559	Agency Qualifier Code Code identifying the agency assigning the code values. SM Semiconductor Equipment and Materials International New code required for SEMI: SM suggested. ZZ Mutually Defined May be required until incorporation of the SEMI code.	X	ID	2/2
X	CID04	751	Product Description Code A code from an industry code list which provides specific data about a productcharacteristic.	X	AN	1/12
X	CID05	352	Description A free-form description to clarify the related data elements and their content.	X	AN	1/80
O	CID06	822	Source Subqualifier A reference that indicates the table or text maintained by the Source Qualifier.	O	AN	1/15

Segment:	SPS Sampling Parameters for Summary Statistics		
Level:	Detail		
Loop:	CID		
Usage:	Optional		
Max Use:	>1		
Purpose:	To define the sampling parameters associated with summary statistics.		
Syntax Notes:	1 If either SPS05 or SPS06 is present, then the other is required.		
Semantic Notes:	1	SPS01 is the population size (count) of the class of objects or events to which the statistical generalizations refer.	
	2	SPS02 is the sample size, which is the number of observations on which the reported summary statistics were based.	
	3	SPS03 is the subgroup size, which is the number of observations in a subgroup of a sample.	

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
O	SPS01	609	Count Occurrence counter	O	N0	1/9
O	SPS02	609	Count Occurrence counter	O	N0	1/9
O	SPS03	609	Count Occurrence counter	O	N0	1/9
O	SPS04	949	Confidence Limit Percent value expressing the confidence that a true value falls within a certain confidence interval.	O	R	1/4
O	SPS05	C00101	Composite Unit of Measure To identify a composite unit of measure.	X		
	C00101	355	Unit or Basis for Measurement Code Code specifying the units in which a value is being expressed, or manner in which a measurement has been taken. Refer to 003051 Data Element Dictionary for acceptable code values.	M	ID	2/2
	C00102	1018	Exponent Power to which a unit is raised.	O	R	1/15
	C00103	649	Multiplier Value to be used as a multiplier to obtain a new value.	O	R	1/10
			C00101 through C00103 can be repeated five times using C00103 to C00115.			
O	SPS06	942	Sample Frequency Value per Unit of Measurement Code The number of samples collected.	X	N0	1/9

Segment:	DTM Date/Time Reference
Level:	Detail
Loop:	CID
Usage:	Optional
Max Use:	10
Purpose:	To specify pertinent dates and times.
Syntax Notes:	1 At lease one of DTM02, DTM03, or DTM06 is required. 2 If either DTM06 or DTM07 is present, then the other is required.
Comments:	1 Report Type Code SR (LIN01 Assigned ID = "PER"): Defines date range covered by summary data. 2 Report Type Codes CA and RT (LIN01 Assigned ID = "LOT"): May be used to specify a ship date or other date mutually agreed upon by Buyer and Seller. 3 If date range for all data entities is identical, the DTM Segment at Position Number 040 may be used to identify a single date.

Data Element Summary

SEMI USE:	Ref. Des.	Data Element	Name	Attributes
M	DTM01	374	Date/Time Qualifier	M ID 3/3
			Code specifying type of date or time, or both date and time.	
			009 Process	
			011 Shipped	
			054 Sellers Local	
			119 Test Performed [Period Range]	
			157 Test Period Start	
			158 Test Period Ending	
X	DTM02	373	Date	X DT 6/6
			Date (YYMMDD).	
O	DTM03	337	Time	X TM 4/4
			Time expressed in 24-hour clock time (HHMM).	
O	DTM05	624	Century	O N0 2/2
			The first two characters in the designation of the year (CCYY).	
X	DTM06	1250	Date Time Period Format Qualifier	X ID 2/3
			Code indicating the date format, time format, or date and time format.	
			RD6 Range of Dates Expressed in Format YYMMDD-YYMMDD.	
			RD8 Range of Dates Expressed in Format CCYYMMDD-CCYYMMDD.	
			A range of dates expressed in the format CCYYMMDD-CCYYMMDD where CCYY is the numerical expression of the century CC and year YY, MM is the numerical expression of the month within the year, and DD is the numerical expression of the day within the year; the first occurrence of CCYYMMDD is the beginning date and the second occurrence is the ending date.	
			RDM Range of Dates Expressed in Format YYMMDD-MMDD.	
X	DTM07	1251	Date Time Period	X AN 1/35
			Expression of a date, a time, or range of dates, times, or dates and times.	

Segment: **MEA Measurements**

Level: Detail

Loop: MEA

Usage: Optional

Max Use: 1

Purpose: To specify physical measurements or counts, including dimensions, tolerances, variances, and weights. (See figures in appendix for example of use of C001.)

- Syntax Notes:**
- 1 At least one of MEA03, MEA05, MEA06, or MEA08 is required.
 - 2 If MEA05 is present, then MEA04 is required.
 - 3 If MEA06 is present, then MEA04 is required.
 - 4 If MEA07 is present, then at least one of MEA03, MEA05, or MEA06 is required.
 - 5 Only one of MEA08 or MEA03 may be present.

Semantic Notes: 1 MEA04 defines the unit of measure for MEA03, MEA05, and MEA06.

Comments: 1 When citing dimensional tolerances, any measurement requiring a sign (+ or -), or any measurement where a positive (+) value cannot be assumed, use MEA05 as the negative (-) value and MEA06 as the positive (+) value.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
O	MEA01	737	Measurement Reference ID Code	O ID 2/2
Code identifying the broad category to which a measurement applies.				
Examples of possible values for wafers, if used, are indicated.				
			AV	Average Reading
			CT	Counts
			DE	Defects
			EL	Electrical Characteristics
			FD	Finished Dimensions
				Dimensions of the final or end-use product
			HR	Historical Result
			IR	Interpolated Result
				A test result value calculated by interpolation between two physical tests.
			LS	Lot Status
			LT	Lot Limits
				Limits set on test results from all product contained in a single shipment (which may involve any multiple or fraction of transportation carrier units) to one customer.
			PD	Physical Dimensions (Product Ordered)
			SF	Shelf Life
			TR	Test Results
				Indicates that the data to follow are the results test measurements.
O	MEA02	738	Measurement Qualifier	O ID 1/3
Code identifying a specific product or process characteristic to which a measurement applies.				
Use not recommended for wafers. Included as optional for use with other commodities/materials.				
Refer to 003050 Data Element Dictionary for acceptable code values.				

X	MEA03	739	Measurement Value	X	R	1/20
			The value of the measurement.			
X	MEA04	C001	Composite Unit of Measure	X		
			To identify a composite unit of measure (see figures in appendix for examples of use).			
M	C00101	355	Unit or Basis for Measurement Code	M	ID	2/2
			Code specifying the units in which a value is being expressed, or manner in which a measurement has been taken.			
			ZZ Mutually Defined			
			Standardized default unit of measure for each parameter to be published by SEMI as part of the procedure. Optionally, standard code set may be used.			
O	C00102	1018	Exponent	O	R	1/15
			Power to which a unit is raised.			
O	C00103	649	Multiplier	O	R	1/10
			Value to be used as a multiplier to obtain a new value.			
X	MEA05	740	Range Minimum	X	R	1/20
			The value specifying the minimum of the measurement range.			
X	MEA06	741	Range Maximum	X	R	1/20
			The value specifying the maximum of the measurement range.			
O	MEA07	935	Measurement Significance Code	O	ID	2/2
			Code used to benchmark, qualify, or further define a measurement value.			
			03 Approximately			
			04 Equal to			
			05 Greater than or equal to			
			06 Greater than			
			07 Less than			
			08 Less than or equal to			
			10 Not equal to			
			22 Actual			
			31 Calculated			
			39 Corrected			
			40 Uncorrected			
			43 Intermediate			
			44 Average [based on an average parameter or standard]			
X	MEA08	936	Measurement Attribute Code	X	ID	2/2
			Code used to express an attribute response when a numeric measurement value cannot be determined.			
			Other codes available.			
			05 Undetectable			
			09 Pass			
			12 OK			
			21 Checked			
			23 Absent			
			29 To Be Determined			
			44 Not Applicable			
			45 Not Determined			
			51 Conforming			

Segment:	REF Reference Numbers
Level:	Detail
Loop:	MEA
Usage:	Optional
Max Use:	10
Purpose:	To specify identifying numbers.
Syntax Notes:	1 At lease one of REF02 or REF03 is required.
Comments:	May be used when describing serialized or positional-dependent data.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	REF01	128	Reference Number Qualifier	M	ID	2/2
			Code qualifying the Reference Number.			
			55 Sequence Number			
			6K Zone			
			Wafer site or other measurement location identification.			
			BG Beginning Serial Number			
			EG Ending Serial Number			
			QQ Unit Number			
			Used to identify the parameter sample size.			
			SE Serial Number			
			Serialization reference number applicable to the measurement.			
			SJ Set Number			
			Reference to the laser mark on a wafer (verbatim).			
X	REF02	127	Reference Number	X	AN	1/30
			Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.			
X	REF03	352	Description	X	AN	1/80
			A free-form description to clarify the related data elements and their content.			

Segment: STA Statistics
Level: Detail
Loop: STA
Usage: Optional
Max Use: 1
Purpose: To provide summary statistics related to a specific collection of test result values.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>
M	STA01	950	Statistic Code	M ID 2/2
			A code specifying the specific statistic being reported.	
			Complete list from Standard is available. Typical parameters are indicated. Other parameters may be defined to accommodate proprietary statistical formats.	
			01	Cusum Delta
			02	Cusum - H
			03	Cusum - K
			04	Capability Ratio
			05	F - Test
			06	Control Limit Lower - Individual
			07	Control Limit Upper - Individual
			08	T - Test
			09	Grand Average (Double X-Bar)
			10	Kurtosis
			11	Mean Average
			12	Median
			13	Minimum Average
			14	Median Range
			15	Maximum Average
			16	Process Capability Upper
			17	Process Capability Lower
			18	Process Capability CPK
			19	Range Average (R-Bar)
			20	Control Limit Lower R-Bar
			21	Control Limit Upper R-Bar
			22	Range Value (Total Range)
			23	Standard Deviation
			24	Standard Error
			25	Skewness
			26	Control Limit Lower X-Bar
			27	Control Limit Upper X-Bar
			28	Failure Rate in Time (failures over time determined by the equation (failure rate*10^9))
			29	Mode
			30	Average

			31	Mean			
			32	Minimum Value			
				The least or smallest value; the allowed lower limit			
			33	Maximum Value			
				The largest value; the allowed upper limit			
			AD	Anderson Darling Test			
			CF	Cochran's Procedure			
			CS	Chi-Square Test			
	See Appendix 2		EC	Equivalent Cpk (Add definition)			
	See Appendix 2		PE	Percentile			
	See Appendix 2		GM	Geometric Mean			
	See Appendix 2		GS	Geometric Sigma			
			HG	Histogram			
	See Appendix 2		HC	Histogram Class Count (Count of classes or bars)			
	See Appendix 2		HS	Histogram Start (Left side of first class or bar)			
	See Appendix 2		HW	Histogram Width (Width of class or bar)			
			KS	Kolmogrov-Smirnov Test			
	See Appendix 2		OC	Outlier Count			
	See Appendix 2		PK	Peak Value of Distribution Curve			
			SK	Moment Tests, Skewness and Kurtosis (Weighted Average)			
			SW	Shapiro-Wilk Test			
			ZZ	Mutually Defined			
M	STA02	739	Measurement Value		M	R	1/20
			The value of the measurement.				
O	STA03	C001	Composite Unit of Measure		O		
			To identify a composite unit of measure (see figures in appendix for example of use).				
M	C00101	355	Unit or Basis for Measurement Code		M	ID	2/2
			Code specifying the units in which a value is being expressed, or manner in which a measurement has been taken.				
			Refer to 003050 Data Element Dictionary for acceptable code values.				
O	C00102	1018	Exponent		O	R	1/15
			Power to which a unit is raised.				
O	C00103	649	Multiplier		O	R	1/10
			Value to be used as a multiplier to obtain a new value.				
O	STA04	738	Measurement Qualifier		O	ID	1/3
			Code identifying a specific product or process characteristic to which a meas. applies.				
			Refer to 003050 Data Element Dictionary for acceptable code values.				
O	STA05	737	Measurement Reference ID Code		O	ID	2/2
			Code identifying the broad category to which a measurement applies.				
			HR	Historical Result			
			LS	Lot Status			
			LT	Lot Limits			
				Limits set on test results from all product contained in a single shipment (which may involve any multiple or fraction of transportation carrier units) to one customer.			
			TS	Single Test Limits			

Limits set on each measurement of the specified product characteristic or manufacturing process so that any single test whose value falls outside these limits causes the product or process to be declared out-of-specification.

O	STA06	740	Range Minimum	O	R	1/20
			The value specifying the minimum of the measurement range.			
O	STA07	741	Range Maximum	O	R	1/20
			The value specifying the maximum of the measurement range.			

Segment: **REF** Reference Numbers
Level: Detail
Loop: STA
Usage: Optional
Max Use: 10
Purpose: To specify identifying numbers.
Syntax Notes: **1** At lease one of REF02 or REF03 is required.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	REF01	128	Reference Number Qualifier Code qualifying the Reference Number. Refer to 003050 Data Element Dictionary for acceptable code values.	M	ID	2/2
X	REF02	127	Reference Number Reference number or identification number as defined for a particular Transaction Set, or as specified by the Reference Number Qualifier.	X	AN	1/30
X	REF03	352	Description A free-form description to clarify the related data elements and their content.	X	AN	1/80

Segment: TSP Test Period or Interval
Level: Detail
Loop: TSP
Usage: Optional
Max Use: 1
Purpose: To describe a specific period or interval at which tests are performed.
Syntax Notes: 1 If either TSP03 or TSP04 is present, then the other is required.
Comments: 1 TSP02 is used to further expand TSP01 as a qualifier.

Data Element Summary

SEMI USE:	Ref. Des.	Data Element	Name	Attributes		
M	TSP01	1312	Test Period or Interval Qualifier	M	ID	2/2
			Code indicating the type of period or interval as related to when a test event occurs.			
			TF	Final Test Measurement or Read-point (Cumulative).		
				This code marks the end of the experiment under a specific test.		
			TI	Intermediate Test Measurements or Read-point (Cumulative).		
				There may be a number of intermediate test points during an experiment; this code would likely be combined with DE 350 to indicate which intermediate test point it is.		
			TO	Initial Test Measurement or Read-point (Cumulative).		
				This is the first test interval that a product or item is subjected to.		
O	TSP02	350	Assigned Identification	O	AN	1/11
			Alphanumeric characters assigned for differentiation within a transaction set.			
X	TSP03	1313	Test Period or Interval Value	X	N0	1/6
			Numeric value of period or interval signifying when a test event occurs.			
X	TSP04	344	Unit of Time Period or Interval	X	ID	2/2
			Code indicating the time period or interval.			
			AD	Average Daily		
			AM	Average Monthly		
			AY	Average Year		
			CY	Calendar Year		
			DA	Calendar Days		
			F1	Fiscal Year Plus One Year		
			F2	Fiscal Year Plus Two Years		
			FY	Fiscal Year		
			MO	Month		
			PR	Preceding Six Months		
			Q1	First Quarter		
			Q2	Second Quarter		
			Q3	Third Quarter		
			Q4	Fourth Quarter		
			QY	Quarter of a Year		
			SA	Semiannual		
			WK	Weeks		
			WW	Work Week		

Segment: **LM** Code Source Information
Level: Detail
Loop: LM
Usage: Optional
Max Use: 1
Purpose: To transmit standard code list identification information.
Comments: 1 LM02 identifies the applicable industry code list source information.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	LM01	559	Agency Qualifier Code	M	ID	2/2
			Code identifying the agency assigning the code values.			
			SM Semiconductor Equipment and Materials International			
			ZZ Mutually Defined			
O	LM02	822	Source Subqualifier	O	AN	1/15
			A reference that indicates the table or text maintained by the Source Qualifier.			

Segment:	LQ Industry Code
Level:	Detail
Loop:	LM
Usage:	Mandatory
Max Use:	>1
Purpose:	Code to transmit standard industry codes.
Syntax Notes:	1 If LQ01 is present, then LQ02 is required.
Comments:	This section will allow for a breakdown of the measurement or parameter (e.g., Flatness, STIR, Font Ref, 90% PUA, ADE7700).

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
O	LQ01	1270	Code List Qualifier Code Code identifying a specific industry code list. Refer to 003050 Data Element Dictionary for acceptable code values.	O	ID	1/3
M	LQ02	1271	Industry Code Code indicating a code from a specific industry code list. Repeat as necessary to define a parameter in mutlitier fashion. May also be used after parameter definition to provide additional information such as test method orconditions coding.	X	AN	1/20



Segment: CTT Transaction Totals
Level: Summary
Loop: _____
Usage: Optional
Max Use: 1
Purpose: To transmit a hash total for a specific element in the transaction set.
Syntax Notes: 1 If either CTT03 or CTT04 is present, then the other is required.
 2 If either CTT05 or CTT06 is present, then the other is required.
Comments: 1 This segment is intended to provide hash totals to validate transaction completeness and correctness.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	CTT01	354	Number of Line Items	M	N0	1/6
			Total number of line items in the transaction set.			
M	CTT02	347	Hash Total	O	R	1/10
			Sum of values of the specified data element. All values in the data element will be summed without regard to decimal points (explicit or implicit) or signs. Truncation will occur on the left most digits if the sum is greater than the maximum size of the hash total of the data element.			
			Example:			
			-.0018 First occurrence of value being hashed. .18 Second occurrence of value being hashed. 1.8 Third occurrence of value being hashed. 18.01 Fourth occurrence of value being hashed. ----- 1855 Hash total prior to truncation. 855 Hash total after truncation to three-digit field.			

Segment: **SE Transaction Set Trailer**
Level: Summary
Loop: _____
Usage: Mandatory
Max Use: 1
Purpose: To indicate the end of the transaction set and provide the count of the transmitted segments (including the beginning (ST) and ending (SE) segments).
Comments: **1** SE is the last segment of each transaction set.

Data Element Summary

<i>SEMI USE:</i>	<i>Ref. Des.</i>	<i>Data Element</i>	<i>Name</i>	<i>Attributes</i>		
M	SE01	96	Number of Included Segments	M	N0	1/10
			Total number of segments included in a transaction set including ST and SE segments.			
M	SE02	329	Transaction Set Control Number	M	AN	4/9
			Identifying control number that must be unique within the transaction set functional group assigned by the originator for a transaction set.			

APPENDIX 5

EXAMPLES OF EDI TRANSMISSIONS

NOTICE: The material in this appendix is an official part of SEMI T6 and was approved by full letter ballot procedures.

A5-1 Certificate of Analysis Transmission

The "ISA" and "GS" segments indicated at the start of this example and the "GE" and "IEA" segments located at the end are generally handled by the Information System (IS) dept. in charge of managing the translation and routing of EDI messages through various VAN channels, and are not part of this document.

ISA*00* *00* *01*9012345720000 *01*908887732000*960130*2049*U*00200*120005424*0*T*:
GS*RT*901234572000*908887732000*960130*2049*4*T*003050

HEADING:

ST*863*7559
BTR*00*960130**CA*SHIP#102
REF*PO*PO_NO
REF*PP*PO_REV#
REF*BV*PO_LINE#
REF*S3*SPEC_NO
REF*SZ*REV-F
REF*PM*PART_NO
REF*YB*REV-C
PID*S**SM*WFR
N1*BY**SM*MT
N4*****FA*LATG/BP1
PER*QA*GEORGE WASHINGTON*TE*(602)555-1212
N1*SE**SM*MM
N4*****FA*SPTNBRG
PER*EA*BENEDICT ARNOLD*TE*(314)555-2121

NOTE for Application: For easy visualization and a show of flexibility, the example messages in this appendix were simplified by showing only a portion of what they can do. In practice, all of the transaction types (CA, RT, and SR) can use any combination of the statistical codes in Appendix 4, the new statistical codes in appendix 4, or raw measurement data.

DETAILS:
LIN*LOT*WL*WFR_LOT_NO*PR*XTAL_NO*LT*EPI_LOT_1*LT*EPI_LOT_2*LT*EPI_LOT_3
QTY*39*125*EA

CID**13 MEA*****ZZ*9.34*16.67 STA*31*13.261 STA*23*1.455 REF*QQ*125**QQ* INDICATES PARAMETER SAMPLE SIZE TSP*TF LM*SM LQ**RES LQ**CNTR	CID**13 MEA*****ZZ*516*535 STA*31*525.076 STA*23*2.614 REF*QQ*125 TSP*TF LM*SM LQ**THICK	CID**13 MEA*****ZZ**4.5 STA*31*1.893 STA*23*1.093 REF*QQ*25 TSP*TF LM*SM LQ**TTV	CID**13 MEA*****ZZ**19.44 STA*31*14.918 STA*23*5.902 REF*QQ*25 TSP*TF LM*SM LQ**BOW
CID**13 MEA*****ZZ**21.48 STA*31*2.665 STA*23*5.050 REF*QQ*25 TSP*TF LM*SM LQ**WARP	CID**13 MEA*****ZZ**2.30 STA*31*1.002 STA*23*0.282 REF*QQ*125 TSP*TF LM*SM LQ**FLAT LQ**GLOBAL LQ**TIR	CID**13 MEA*****ZZ*27.22*34.12 STA*31*30.8 STA*23*2.926 REF*QQ*5 TSP*TF LM*SM LQ**OXYGEN LQ**OLD ASTM	CID**13 MEA*****ZZ**0.07 REF*QQ*5 TSP*TF LM*SM LQ**CARBON
CID**13 MEA*****ZZ**4 REF*QQ*25 TSP*TF LM*SM LQ**LPD LQ**FRONT LQ**>0.3	CID**13 MEA*****5 REF*QQ*1 TSP*TF LM*SM LQ**OISF	CID**13 MEA*****ZZ**76 REF*QQ*125 TSP*TF LM*SM LQ**RRG	CID**13 MEA*****51 REF*QQ*125 TSP*TF LM*SM LQ**VISUAL LQ**FRONTSIDE

SUMMARY:

CTT*10*855
SE*134*7559
GE*1*4
IEA*1*120005424

A5-2 Test Results Transmission

The "ISA" and "GS" segments indicated at the start of this example and the "GE" and "IEA" segments located at the end are generally handled by the Information System (IS) dept. in charge of managing the translation and routing of EDI messages through various VAN channels, and are not part of this document.

ISA*00* *00* *01*9012345720000 *01*908887732000 *960130*2049*U*00200*000045789*0*T*:
GS*RT*901234572000*908887732000*960130*2049*4*T*003050

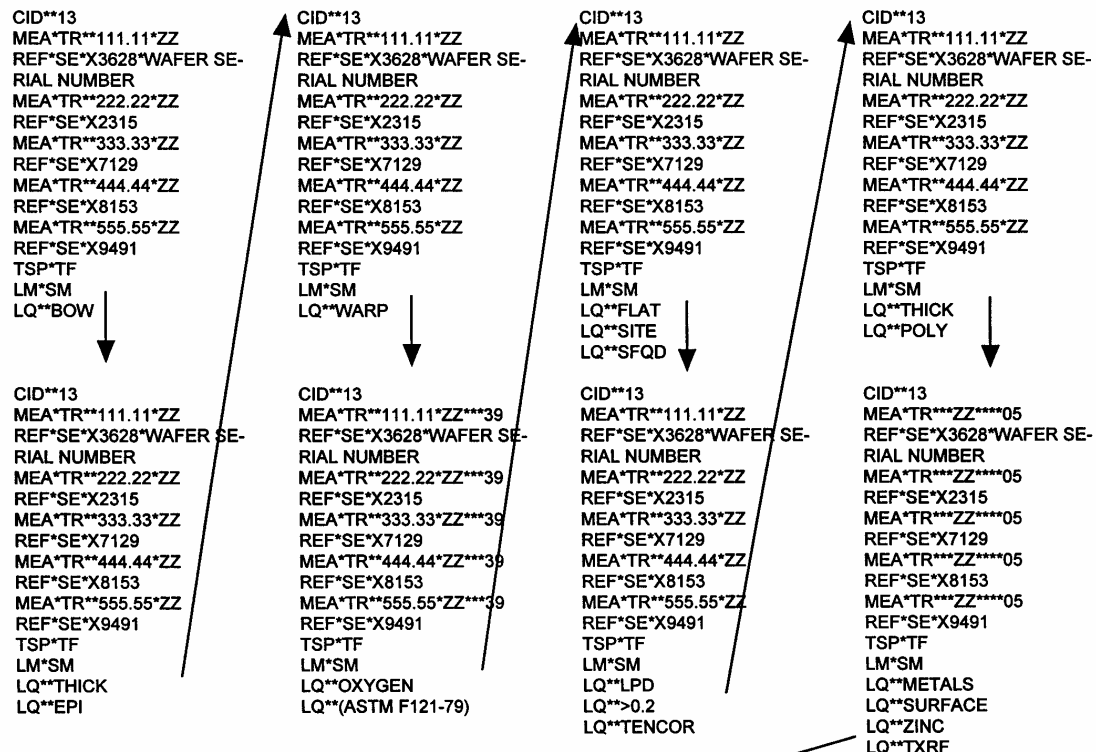
HEADING:

ST*863*1132
BTR*00*960130**RT*SHIP#102
REF*PM*PART_NO
REF*YB*REV-C
REF*ZZ**THE ENCLOSED DATA IS FOR THE QUAL LOT DELIVERED 12/14/95.
REF*ZZ**SAMPLE DATA FOR 5 SERIALIZED WAFERS FOR CORRELATION
PID*S**SM*WFR
N1*BY**SM*MT
N4*****FA*LATG/BP1
PER*DC*WILLY WAFERMAN*TE*(602)555-1212
N1*SE**SM*MM
N4*****FA*SPTNBRG

NOTE for Application: For easy visualization and a show of flexibility, the example messages in this appendix were simplified by showing only a portion of what they can do. In practice, all of the transaction types (CA, RT, and SR) can use any combination of the statistical codes in Appendix 4, the new statistical codes in appendix 4, or raw measurement data.

DETAILS:

LIN*LOT*WL*WFR_LOT_NO



SUMMARY :

CTT*10*855
SE*151*1132
GE*1*4
IEA*1*000045789

A5-3 Statistical Results Transmission

The "ISA" and "GS" segments indicated at the start of this example and the "GE" and "IEA" segments located at the end are generally handled by the Information System (IS) dept. in charge of managing the translation and routing of EDI messages through various VAN channels, and are not part of this document.

ISA*00* *00* *01*9012345720000 *01*908887732000 *960130*2049*U*00200*004113004*0*T*:
GS*RT*901234572000*908887732000*960130*2049*4*T*003050

HEADING:

ST*863*9681
BTR*18*960130**SR
PID*S**SM*WFR
N1*BY**SM*MT
N4*****FA*LATG/MOS21
N1*SE**SM*MM
N4*****FA*STPTRS

NOTE for Application: For easy visualization and a show of flexibility, the example messages in this appendix were simplified by showing only a portion of what they can do. In practice, all of the transaction types (CA, RT, and SR) can use any combination of the statistical codes in Appendix 4, the new statistical codes in appendix 4, or raw measurement data.

DETAILS:

LIN*PER*KL*RPT_DEF_200*SF*POLISH*TP*150MM*GC*PRIME
DTM*119*****RD6*950701-951231

CID**13	CID**13	CID**13	CID**13
SPS*20113	SPS*326	SPS*151	SPS*3345
STA*31*1.618	STA*31*11.15	STA*31*-0.847	STA*31*0.514
STA*23*0.811	STA*23*3.98	STA*23*2.373	STA*23*2.099
STA*33*5.2	STA*33*27.8	STA*32*-7.7	STA*32*-6.1
STA*18*1.8	STA*18*2.42	STA*33*6.5	STA*33*7.5
STA*GM*1.616	STA*GM*11.17	STA*18*1.8	STA*18*1.51
STA*GS*0.816	STA*GS*4.2	STA*OC*0.59	STA*OC*0
STA*EC*1.01	STA*EC*1.23	STA*PK*35	STA*PK*347.615
STA*OC*0	STA*OC*0	STA*HS*-8.296	STA*HS*-6.342
STA*PK*3967.04	STA*PK*51	STA*HW*1.28	STA*HW*0.543
STA*HS*0.0	STA*HS*3.2	STA*HC*12	STA*HC*25
STA*HW*0.2039	STA*HW*1.4	STA*HG*	STA*HG*1
STA*HC*25	STA*HC*15	STA*HG*1	STA*HG*8
STA*HG*1	STA*HG*1	STA*HG*2	STA*HG*12
STA*HG*152	STA*HG*15	STA*HG*6	STA*HG*31
STA*HG*1411	STA*HG*39	STA*HG*15	STA*HG*36
STA*HG*2753	STA*HG*50	STA*HG*28	STA*HG*69
STA*HG*3345	STA*HG*51	STA*HG*35	STA*HG*70
STA*HG*3894	STA*HG*42	STA*HG*31	STA*HG*147
STA*HG*3652	STA*HG*35	STA*HG*18	STA*HG*194
STA*HG*3242	STA*HG*29	STA*HG*9	STA*HG*272
STA*HG*2528	STA*HG*17	STA*HG*3	STA*HG*303
STA*HG*1958	STA*HG*14	STA*HG*2	STA*HG*312
STA*HG*1604	STA*HG*9	STA*HG*1	STA*HG*330
STA*HG*1173	STA*HG*6	TSP*TF	STA*HG*351
STA*HG*1000	STA*HG*5	LM*SM	STA*HG*310
STA*HG*697	STA*HG*2	LQ**BOW	STA*HG*250
STA*HG*533	STA*HG*2		STA*HG*217
STA*HG*404	STA*HG*1		STA*HG*160
STA*HG*315	STA*HG*0		STA*HG*96
STA*HG*225	STA*HG*1		STA*HG*85
STA*HG*181	STA*PE*10.46****50		STA*HG*40
STA*HG*134	STA*PE*14.20****80		STA*HG*31
STA*HG*111	STA*PE*16.66****90		STA*HG*11
STA*HG*95	STA*PE*19.02****95		STA*HG*4
STA*HG*72	STA*PE*24.36****99		STA*HG*2
STA*HG*41	TSP*TF		TSP*TF
STA*HG*3	LM*SM		LM*SM
STA*PE*2.14****80	LQ**WARP		LQ**THK
STA*PE*4.37****99			
TSP*TF			
LM*SM			
LQ**TTV			

SUMMARY:

CTT*10*855
SE*214*9681
GE*1*4
IEA*1*004113004



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SEMI T7-0303

SPECIFICATION FOR BACK SURFACE MARKING OF DOUBLE-SIDE POLISHED WAFERS WITH A TWO-DIMENSIONAL MATRIX CODE SYMBOL

This specification was technically approved by the Global Traceability Committee and is the direct responsibility of the North American Traceability Committee. Current edition approved by the North American Traceability Committee on November 22, 2002. Initially available at www.semi.org January 2003; to be published March 2003. Originally published in 1997; previously published November 2002.

1 Purpose

1.1 This specification is intended to provide a marking symbology that can be used to mark silicon wafers with no intrusion into the fixed quality area of the wafer.

2 Scope

2.1 This specification defines the geometric and spatial relationships and content (including the error checking and correcting code) of a rectangular two-dimensional (2-D), machine-readable, binary data matrix code symbol for back surface marking of notched, double-side polished wafers of silicon which comply with SEMI M1.15, and other materials with diameters of 300 mm and larger.

2.2 Although this specification does not specify the marking techniques that may be employed when complying with its requirements, it is assumed that the symbol will be obtained by laser scribing individual dots.

2.3 The matrix code is applicable to a broad range of wafer products including epitaxial wafers, SOI wafers, and unpatterned or patterned polished wafers. The format and algorithms of this code are based on two-dimensional symbology specified in ISO/IEC 16022.

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

3 Referenced Standards

3.1 SEMI Standards

SEMI AUX001 — List of Vendor Identification Codes

SEMI M1.15 — Standard for 300 mm Polished Monocrystalline Silicon Wafers (Notched)

SEMI M12 — Specification for Serial Alphanumeric Marking of Silicon Wafers

3.2 ISO/IEC Standard¹

ISO/IEC 16022 — International Symbology Specification – Data Matrix

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

4 Terminology

4.1 Definitions

4.1.1 *alignment bar, of a data matrix code symbol* — a solid line of contiguous filled cells abutting a line of alternately filled and empty cells [ISO/IEC 16022].

4.1.2 *binary values* — a dot in the wafer surface indicates the binary value 1. The absence of a dot, or a smooth surface surrounding a cell center point indicates the binary value 0.

4.1.3 *border column* — the outermost column of a data matrix code symbol. This column is a portion of the finder pattern.

4.1.4 *border row* — the outermost row of a data matrix code symbol. This row is a portion of the finder pattern.

4.1.5 *cell, of a data matrix code symbol* — the area within which a dot may be placed to indicate a binary value.

4.1.6 *cell center point, of an array* — the point at which the centerline of a row intersects the centerline of a column.

4.1.7 *cell spacing, of an array* — the (equal) vertical or horizontal distance between the cell center points of contiguous cells.

4.1.8 *center line, of a row or column* — the line positioned parallel to, and spaced equally between, the boundary lines of the row or column.

4.1.9 *central area, of a cell* — the area enclosed by a circle centered at the cell center point; used by code readers to sense the binary value of the cell.

¹ International Organization for Standardization, ISO Central Secretariat, 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30
Website: <http://www.iso.ch>

4.1.10 *data matrix code symbol* — a two-dimensional array of square cells arranged in contiguous rows and columns. In certain ECC200 symbols, data regions are separated by alignment patterns. The data region is surrounded by a finder pattern [ISO/IEC 16022].

4.1.11 *dot* — a localized region with a reflectance which differs from that of the surrounding surface.

NOTE 1: To assure reading efficiency, a minimum contrast of 30% is required between the reflectance value of a dot and the surrounding wafer surface. Various densitometers can provide such measurements nondestructively.

4.1.12 *dot misalignment, within a cell* — the distance between the physical center point of a dot and the cell center point.

4.1.13 *finder pattern, of a data matrix code symbol* — a perimeter to the data region. Two adjacent sides contain dots in every cell; these are used primarily to define physical size, orientation and symbol distortion. The two opposite sides are made up of cells containing dots in alternate cells [ISO/IEC 16022].

4.1.14 *reference point, of a data matrix code symbol* — the physical center point of a corner cell common to the primary border row and the solid line of the alignment bar, used to identify the physical location of the symbol on the object being marked with the symbol.

NOTE 2: The reference point is at a fixed location on the object. Different cells may be chosen as the reference point depending on the desired orientation of the symbol on the object and the size variability of the symbol. The particular cell to be used as the reference point must be specified for each application.

5 Requirements

5.1 Shape and Size of the Data Matrix Code Symbol

5.1.1 Data Matrix Code Symbol Dimensions

5.1.1.1 Each rectangular matrix code symbol shall be composed of an array of 8 rows and 32 columns with an alignment bar as defined in ISO/IEC ISS 16022.

5.1.1.2 Cell spacing shall be 125 μm , center to center.

5.1.2 *Dot Size* — The nominal shape of the dot produced in the matrix may be circular or square. Its diameter or edge length (after polishing) shall be $100\ \mu\text{m} + 10\ \mu\text{m} - 20\ \mu\text{m}$.

5.1.3 Border Rows and Columns

5.1.3.1 One border row and one border column shall contain a dot in each cell. These are identified as the

primary border row and the primary border column. These are used by the code reader to determine the orientation of the matrix.

5.1.3.2 The opposing (secondary) border row and column shall contain dots in alternating cells.

5.1.3.3 For these rectangular matrix code symbols, the reference point of the symbol shall be the physical centerpoint of the cell common to the primary border row and the center alignment bar.

5.1.4 The maximum dot misalignment within a cell is 15 μm . This ensures that a minimum size dot covers a cell central area of radius 25 μm .

5.1.5 Adjacent dots shall not touch.

5.2 Content of the Data Matrix Code Symbol

5.2.1 Each rectangular matrix code symbol shall contain 10 message characters, together with the error checking and correcting (ECC200) code characters, encoded in accordance with ISO/IEC ISS 16022.

5.2.2 The message characters may include the following: A–Z, 0–9, and dash (–). These characters constitute the SEMI OCR Character Set except for the period (.); this is the same character set specified in SEMI M12. These characters are also included in the set designated as “primarily upper case alphanumeric” in ISO/IEC 16022, in Table 5 and Annexe J. The ten message characters shall contain two elements:

- a. a vendor-assigned 8-character wafer identification code, followed by
- b. a 2-character vendor identification code (see SEMI AUX001).

5.3 Location of the Data Matrix Code Symbol

5.3.1 With the wafer positioned back surface up and with the primary fiducial (notch) toward the operator, the origin of the data matrix code symbol shall be located as specified below.

5.3.1.1 The 8 row \times 32 column rectangular 2-D matrix code symbol shall be placed entirely outside a fixed quality area (FQA) with a nominal edge exclusion of 3 mm. The reference point shall be located 148.95 ± 0.15 mm from the center of the wafer, along a radius $5.0 \pm 0.1^\circ$ counterclockwise from the axis of the notch fiducial bisector.

5.3.2 The primary row of the matrix code symbol shall be placed toward the periphery of the wafer.

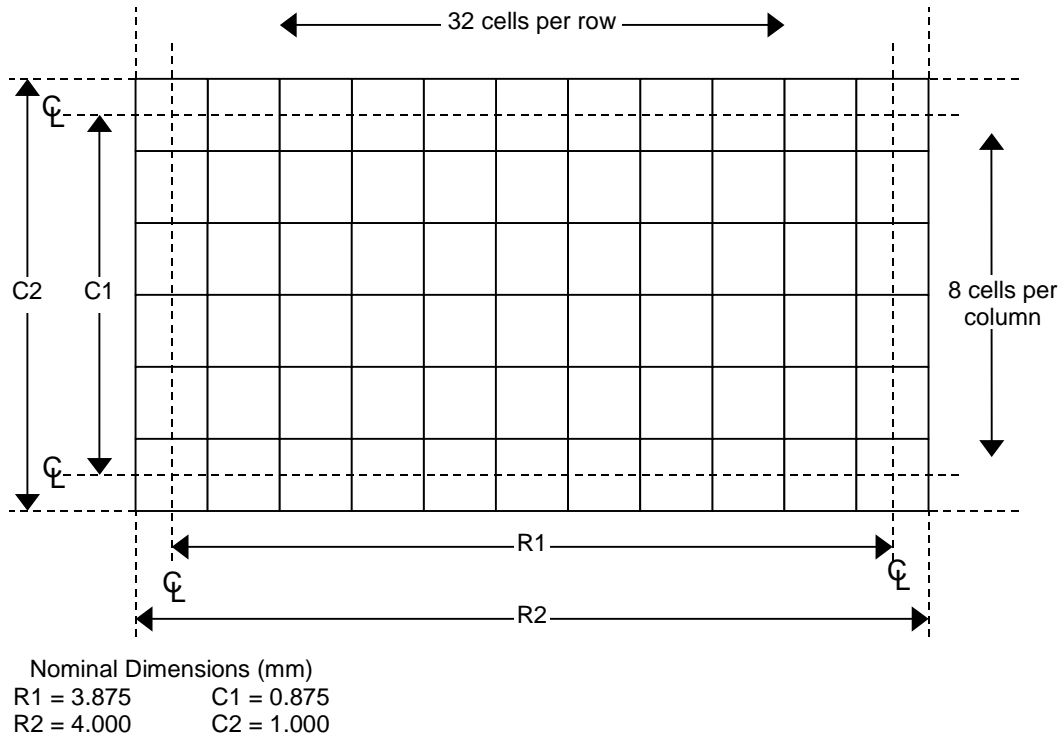


Figure 2
Data Matrix Field Dimensions
ECC200 - 8 rows x 32 columns

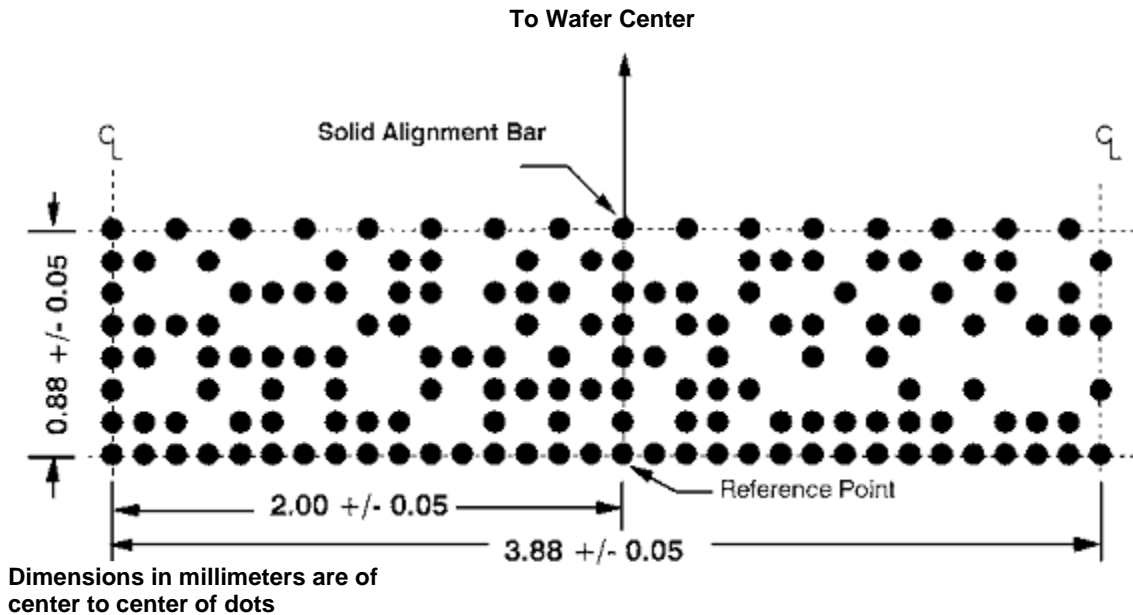


Figure 3
Data Matrix Code Fields
ECC200 - 8 rows x 32 columns

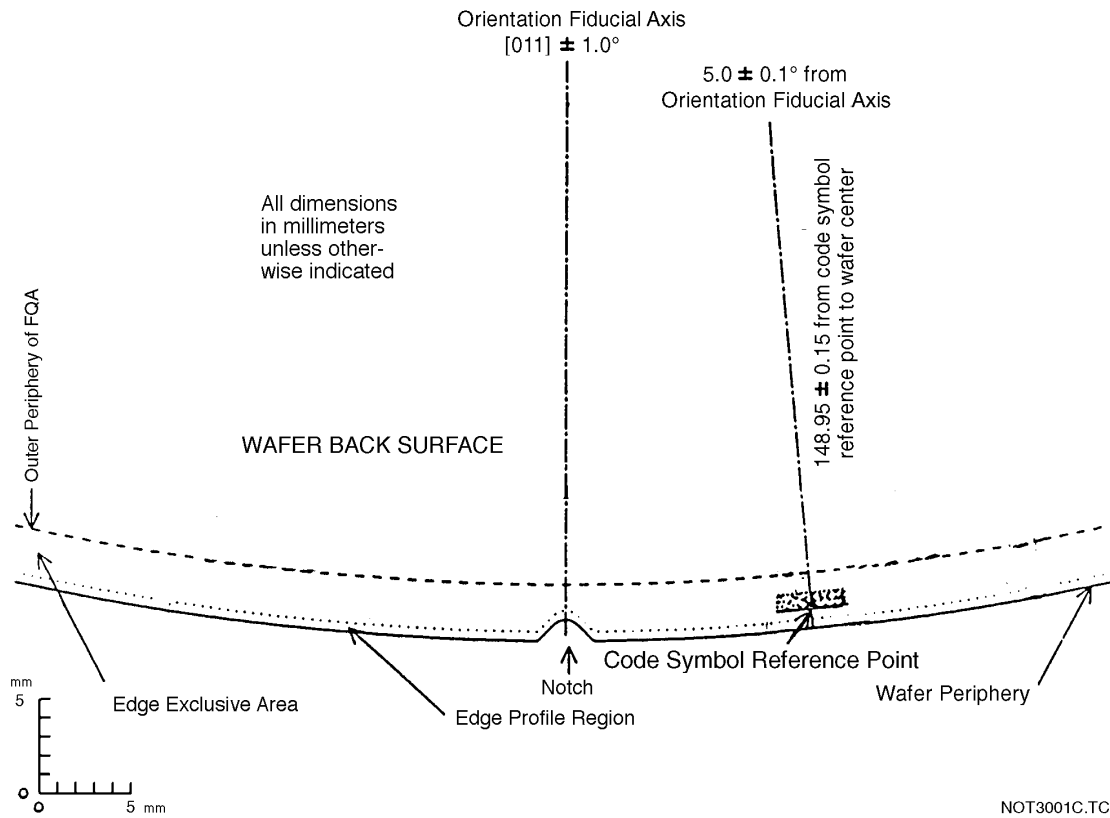


Figure 4
Data Matrix Code Symbol Location on Back Surface of Notched 300 mm Diameter Wafer

NOTE 1: The peripheries are of wafers of nominal diameter with nominal notch dimensions. The dots of the finder pattern are shown for an 8 row x 32 column data matrix code symbol with 125 μ m spacing.

NOTICE: These standards do not purport to address safety issues, if any, associated with their use. It is the responsibility of the user of these standards to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. SEMI makes no warranties or representations as to the suitability of the standards set forth herein for any particular application. The determination of the suitability of the standard is solely the responsibility of the user. Users are cautioned to refer to manufacturer's instructions, product labels, product data sheets, and other relevant literature respecting any materials mentioned herein. These standards are subject to change without notice.

The user's attention is called to the possibility that compliance with this standard may require the use of copyrighted material or of an invention covered by patent rights. RVSI Acuity CiMatrix has filed a statement with SEMI asserting that the patented or copyrighted item can be used by the public for the purpose of implementing this standard without specific license and without payment of royalty or other charge. Attention is also drawn to the possibility that some elements of this standard may be subject to patented technology or copyrighted items other than those identified above. Semiconductor Equipment and Materials International (SEMI) shall not be held responsible for identifying any or all such patented technology or copyrighted items. By publication of this standard, SEMI takes no position respecting the validity of any patent rights or copyrights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of any such patent rights or copyrights and the risk of infringement of such rights are entirely their own responsibility.

SEMI T8-0698^E (Reapproved 1104) SPECIFICATION FOR MARKING OF GLASS FLAT PANEL DISPLAY SUBSTRATES WITH A TWO-DIMENSIONAL MATRIX CODE SYMBOL

This specification was technically reapproved by the Global Traceability Committee and is the direct responsibility of the North American Traceability Committee. Current edition approved by the North American Regional Standards Committee on August 16, 2004. Initially available at www.semi.org September 2004; to be published November 2004. Originally published June 1998.

1 Purpose

1.1 This specification is intended to provide a marking symbology that can be used to mark glass flat panel display (FPD) substrates within the fixed quality area of the edge exclusion area of the substrate.

2 Scope

2.1 This specification defines the geometric and spatial relationships and content (including the error checking and correcting code) of rectangular two-dimensional (2-D), machine-readable, binary Data Matrix symbology for front-surface or back-surface marking of glass FPD substrates (sometimes called “motherglass” substrates) which comply with the edge specifications of SEMI D12. It may be used in conjunction with the alphanumeric marking codes specified in SEMI M12 and SEMI M13 or the bar code specified in SEMI T1.

2.2 Although this specification does not specify the marking techniques that may be employed when complying with its requirements, it is assumed that the symbol will be obtained by laser scribing individual dots. A survivability experiment executed by the United States Display Consortium found such marks suitable.

NOTE 1: Other techniques could include resist exposure and grit blasting.

2.3 Data Matrix symbology is applicable to a broad range of FPD products including virgin substrates, processed and patterned substrates, panel assemblies, and displays. An application note describes the application of Data Matrix symbology to individual panel sections contained within a multi-panel motherglass substrate. The format and algorithms of this code are based on two-dimensional symbology specified in AIM International Symbology Specification - Data Matrix.

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

3 Referenced Standards

3.1 SEMI Standards

SEMI D12 — Specification for Edge Condition of Flat Panel Display (FPD) Substrates

SEMI M12 — Specification for Serial Alphanumeric Marking of the Front Surface of Wafers

SEMI M13 — Specification for Alphanumeric Marking of Silicon Wafers

SEMI T1 — Specification for Back Surface Bar Code Marking of Silicon Wafers

3.2 AIM International Technical Specifications¹

AIM International Symbology Specification - Data Matrix

3.3 ANSI Standard²

ANSI MH10.8.2 — Data Application Identifier Standard

3.4 Uniform Commercial Council Standard³

Manufacturer Identification Codes

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

4 Terminology

4.1 Definitions

4.1.1 *alignment bar, of a data matrix code symbol* — a solid line of contiguous filled cells abutting a line of alternatively filled and empty cells (AIM International Symbology Specification - Data Matrix).

1 AIM International, Inc., 634 Alpha Drive, Pittsburgh, PA 15238-2802, tel 412.963.8588, fax 412.938.8753

2 American National Standards Institute, Headquarters: 1819 L Street, NW, Washington, DC 20036, USA. Telephone: 202.293.8020; Fax: 202.293.9287, New York Office: 11 West 42nd Street, New York, NY 10036, USA. Telephone: 212.642.4900; Fax: 212.398.0023, Website: www.ansi.org

3 Uniform Code Council, 7887 Washington Village Drive, Suite 300 Dayton, OH 45459 Telephone: 937.435.3870, Fax: 937.435.7317, Website: info@uc-council.org

4.1.2 *binary values* — a dot in the substrate surface indicates the binary value 1. The absence of a dot, or a smooth surface surrounding a cell center point, indicates the binary value 0.

4.1.3 *border column* — the outermost column of a data matrix code symbol. This column is a portion of the finder pattern.

4.1.4 *border row* — the outermost row of a data matrix code symbol. This row is a portion of the finder pattern.

4.1.5 *cell, of a data matrix code symbol* — the area within which a dot may be placed to indicate a binary value.

4.1.6 *cell center point, of an array* — the point at which the centerline of a row intersects the centerline of a column.

4.1.7 *cell spacing, of an array* — the (equal) vertical or horizontal distance between the cell center points of contiguous cells.

4.1.8 *center line, of a row or column* — the line positioned parallel to, and spaced equally between, the boundary lines of the row or column.

4.1.9 *central area, of a cell* — the area enclosed by a circle centered at the cell center point; used by code readers to sense the binary value of the cell.

4.1.10 *data matrix code symbol* — a two-dimensional array of square cells arranged in contiguous rows and columns. In certain ECC200 symbols, data regions are separated by alignment patterns. The data region is surrounded by a finder pattern (AIM International Symbolology Specification - Data Matrix).

4.1.11 *dot* — a localized region with a reflectance which differs from that of the surrounding surface.

NOTE 2: To assure reading efficiency, a minimum contrast of 30% is required between the reflectance value of a dot and the surrounding substrate surface. Various densitometers can provide such measurements non-destructively.

4.1.12 *dot misalignment, within a cell* — the distance between the physical center point of a dot and the cell center point.

4.1.13 *finder pattern, of a data matrix code symbol* — a perimeter to the data region. Two adjacent sides contain dots in every cell; these are used primarily to define physical size, orientation, and symbol distortion. The two opposite sides are made up of cells containing dots in alternate cells (AIM International Symbolology Specification - Data Matrix).

4.1.14 *reference point, of a data matrix code symbol* — the physical center point of a cell common to a designated row and column, used to identify the

physical location of the symbol on the object being marked with the symbol.

NOTE 3: The reference point is at a fixed location on the object. Different cells may be chosen as the reference point, depending on the desired orientation of the symbol on the object and on the size variability of the symbol. The particular cell to be used as the reference point must be specified for each application.

5 Ordering Information

5.1 Purchase orders for substrates furnished to this specification shall include the following items:

5.1.1 Message Characters

5.1.1.1 Quantity (15 to *nn*, where *nn* is 16–46, and depends on the character set to be encoded [see Table 2]).

5.1.1.2 Content of Message Characters 16 and up, if present.

6 Requirements

6.1 Shape and Size of the Data Matrix Code Symbol

6.1.1 Data Matrix Code Symbol Dimensions

6.1.1.1 Each rectangular matrix code symbol shall be composed of an array of 8 to 16 rows and 32 to 46 columns (see Table 1 and Figure 1) as defined in AIM International Symbolology Specification - Data Matrix. It may contain an alignment bar.

6.1.1.2 Cell spacing shall be 125 μm , center to center.

6.1.2 *Dot Size* — the nominal shape of the dot produced in the matrix may be circular or square. Its diameter or edge length shall be $100 \pm 10 \mu\text{m}$.

6.1.3 Border Rows and Columns (see Figure 3)

6.1.3.1 One border row and one border column shall contain a dot in each cell. These are identified as the primary border row and the primary border column. These are used by the code reader to determine the orientation of the matrix.

6.1.3.2 The opposing (secondary) border row and column shall contain dots in alternating cells.

6.1.3.3 For these rectangular matrix code symbols, the reference point of the symbol shall be the physical centerpoint of the cell common to the primary border row and the primary border column.

6.1.4 The maximum allowable dot misalignment within a cell is 20 μm . This ensures that a minimum size dot covers a cell central area of radius 25 μm .

6.2 Content of the Data Matrix Code Symbol

6.2.1 Each rectangular matrix code symbol shall contain between 15 and 46 message characters, together with the error checking and correcting (ECC) 200 code characters, encoded in accordance with AIM International Symbology Specification - Data Marix.

6.2.2 The message characters may include any of those designated as “mostly upper case” in Table 5 and Annex K of AIM International Symbology Specification - Data Marix. 8-bit characters may also be encoded with reduced field capacity (see Table 3). The first 15 message characters shall contain two elements:

- a. a vendor-assigned 8-character substrate identification code, followed by
- b. a 7-character vendor identification code as defined by UCC. These are a six-digit company identification, preceded by a zero (0).

6.2.2.1 The remaining message characters, if any, shall contain information as agreed between the vendor and user. This may require field identifiers and field concatenators (see ANSI MH10.8.2).

6.3 Location of the Data Matrix Code Symbol

6.3.1 With the substrate positioned front surface up and with the orientation corner toward the operator and to the operator's left, the reference point of the data matrix code symbol shall be placed toward the orientation corner as specified in Table 3.

6.3.2 The 12 row \times 26 column rectangular 2-D matrix code symbol shall be placed entirely outside the fixed quality area (FQA) and within a nominal edge exclusion area of 10 mm. Large symbols will extend toward the substrate center and perpendicular to the substrate edges. (See Table 1 for field dimensions.)

6.3.3 The primary row of the symbol shall be parallel to the adjacent edge of the substrate $\pm 10.0^\circ$. The primary column of the symbol shall be nominally perpendicular to the same edge. The symbol shall lie between these two edges and the FQA (see Figures 4 and 5). The reference point of the symbol shall be located 4.0 ± 1.0 mm from the adjacent edge of the substrate.

Table 1 2-D Data Matrix Code Symbol Dimensions

<i>Rectangular Array Spacing</i>	<i># of Cells in Row</i>	<i># of Cells in Column</i>	<i>C₁ (mm)</i>	<i>R₁ (mm)</i>	<i>C₂ (mm)</i>	<i>R₂ (mm)</i>
125 μ m	12	26	1.375	3.125	1.500	3.250
	12	32	1.375	4.375	1.500	4.500
	16	36	1.875	4.375	2.000	4.500

Table 2 Message Character Count in Rectangular Arrays for Use on FPD Substrates

<i># of Cells in Row and Column</i>		<i>12 Rows \times 26 Columns</i>	<i>12 Rows \times 36 Columns</i>	<i>16 Rows \times 36 Columns</i>
Maximum # of Message Characters	8-bit	N/A	20	30
	Mostly upper-case	22	31	46

Table 3 Location of 2-D Matrix Code Symbol Substrate Back Surface Up, Orientation Corner Toward the Operator and Toward the Operator's Left

<i>Type of Array</i>	<i>Reference Point</i>	<i>Location of Reference Point</i>
Rectangular	Common cell of primary border row and column	^{#1} 4.0 ± 1.0 mm from the nominal edge of the substrate and toward the substrate orientation corner.

^{#1} The rows of the rectangular 2-D matrix code symbol are parallel to the X-edge of a substrate whose orientation corner is in the $1,1,1$ orientation or the $2,-1,0$ orientation.

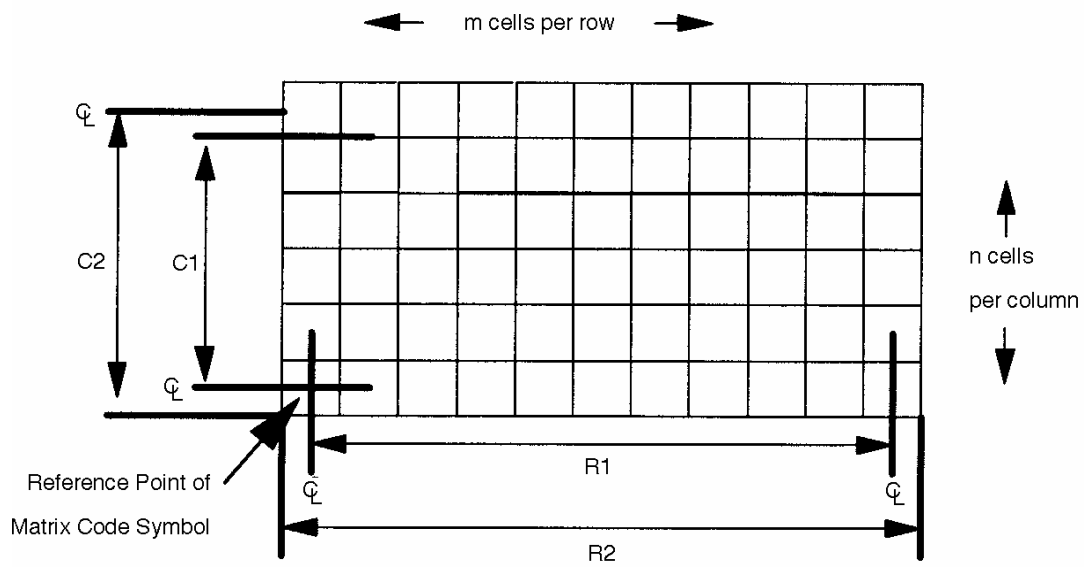


Figure 1
Data Matrix Field

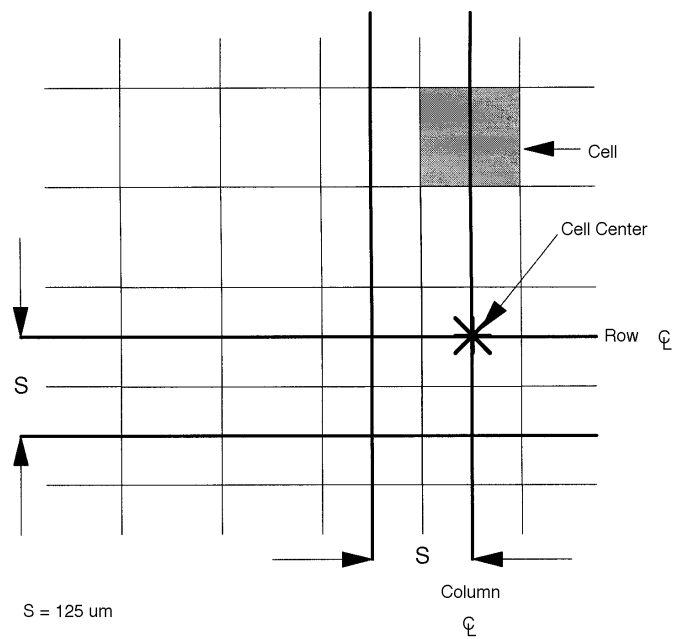


Figure 2
Data Matrix Cell Dimensions

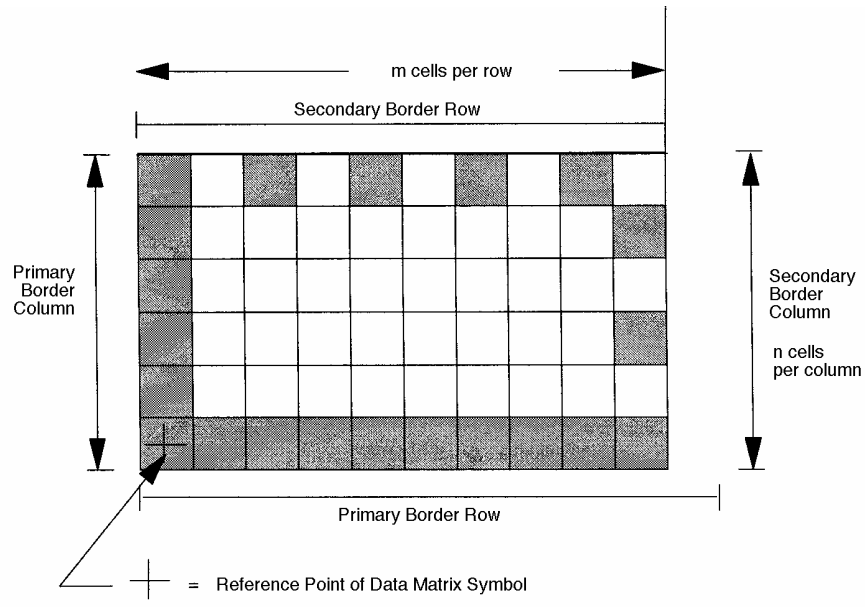


Figure 3
Border Rows and Columns

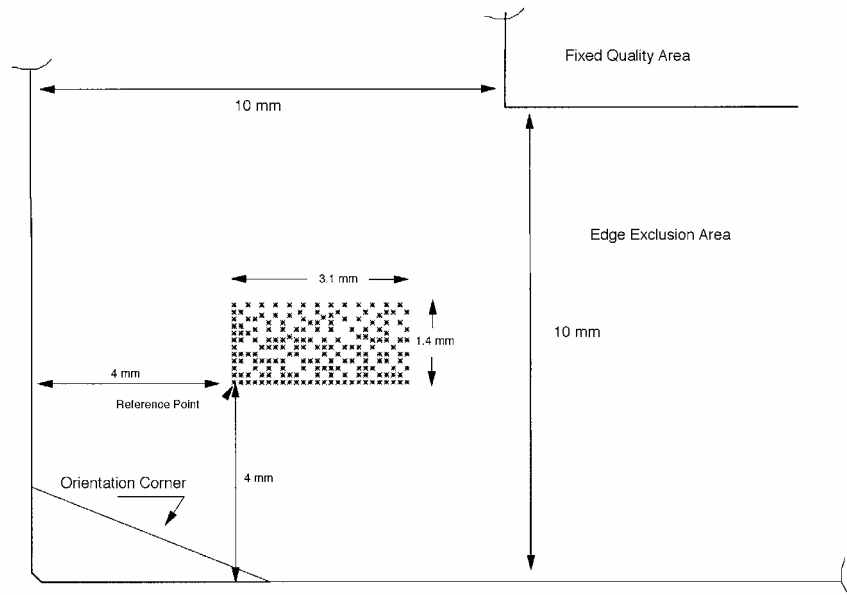


Figure 4|
Data Matrix Code Field in Edge Exclusion Area

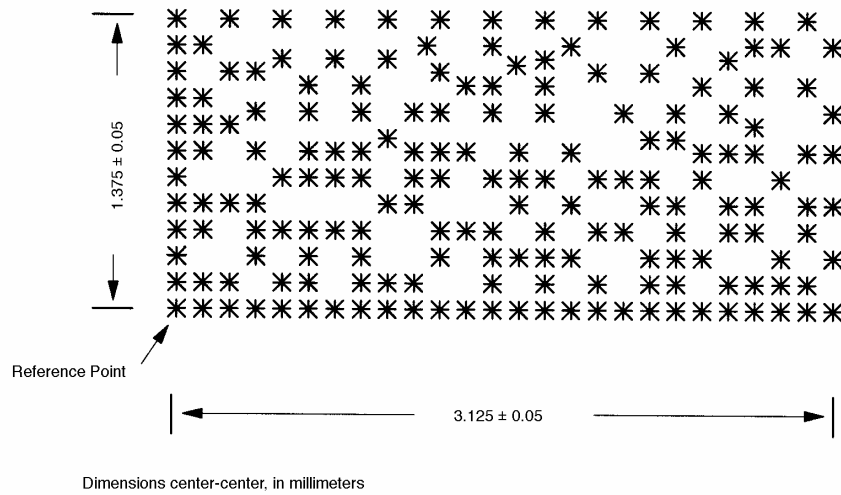


Figure 5
Data Matrix Code Field

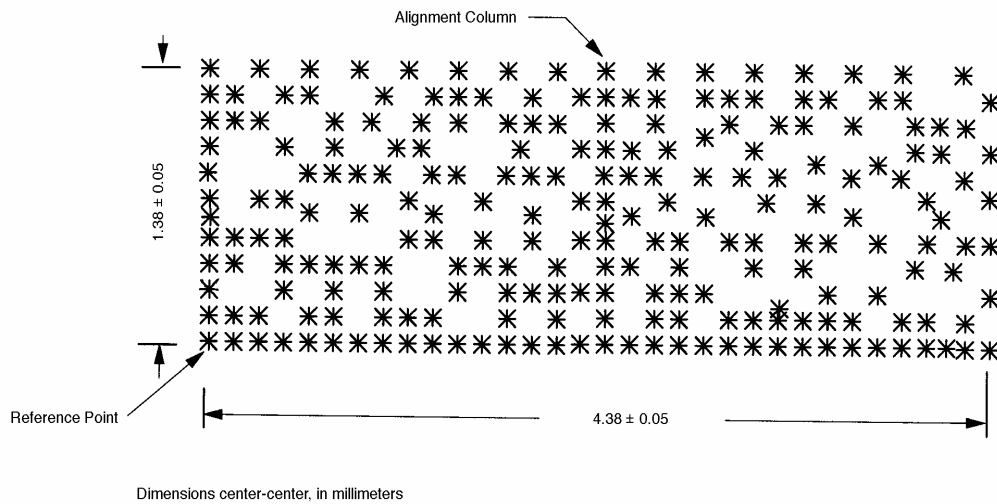


Figure 6
Data Matrix Code Field

APPENDIX 1

PLACEMENT OF DATA MATRIX CODES ON DISPLAY SECTIONS OF FLAT PANEL DISPLAY SUBSTRATES

NOTICE: This appendix was approved as an official part of SEMI T8, but the recommendations in this appendix are optional and are not required to conform to this standard.

A1-1 The following suggests one way in which individual display sections could be marked while still a part of the motherglass substrate. Figure A1-1 illustrates a six-up display layout on a 550 × 650 mm substrate.

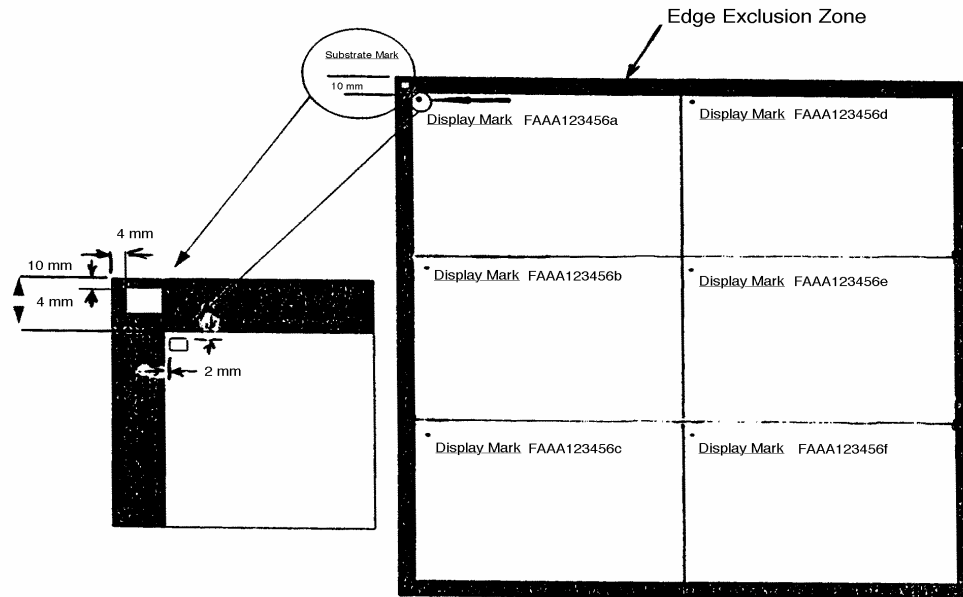


Figure A1-1
An Example of Mark Field Locations in Individual Display Sections within a “Motherglass” Substrate

A1-2 The Substrate ID location falls within the edge exclusion area as detailed in Figure 4. In this example, all ID fields are located on the back (non-pattern) surface. Placing them on the same surface as the substrate mark can simplify ID reading during fabrication. Their location on the non-pattern surface could allow ID reading of the outside surface of a display after assembly.

A1-3 The axes of the individual display IDs are parallel to the substrate ID axes. Each display ID is located adjacent to a display corner. The locations of each ID field are given.

NOTE A1-1: This example does not constitute a recommended usage, but is intended to assist users in developing ID locations suitable for their operations.



NOTICE: SEMI makes no warranties or representations as to the suitability of the standards set forth herein for any particular application. The determination of the suitability of the standard is solely the responsibility of the user. Users are cautioned to refer to manufacturer's instructions, product labels, product data sheets, and other relevant literature, respecting any materials or equipment mentioned herein. These standards are subject to change without notice.

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SEMI T9-0200 (Reapproved 1104) SPECIFICATION FOR MARKING OF METAL LEAD-FRAME STRIPS WITH A TWO-DIMENSIONAL DATA MATRIX CODE SYMBOL

This specification was technically approved by the Global Traceability Committee and is the direct responsibility of the North American Traceability Committee. Current edition approved by the North American Regional Standards Committee on July 11, 2004. Initially available at www.semi.org September 2004; to be published November 2004. Originally published in 1998; previously published April 2000.

1 Purpose

1.1 This specification provides a marking symbology that can be used to mark metal lead-frame strips.

2 Scope

2.1 This specification defines the geometric and spatial relationships and content (including the error checking and correcting code) of rectangular two-dimensional (2-D), machine-readable, binary Data Matrix symbology for front-surface marking of metal lead-frame strips (also called “strips”). It may be used in conjunction with the alphanumeric marking codes specified in SEMI M12 and SEMI M13 or the bar code specified in SEMI T1.

2.2 This specification defines a 22-character default message that is included in all marks, and option for up to 50 additional characters, for a total of 72 message characters. An optional shorter message contains 12 to 16 message characters; the resulting square field is narrower but taller than the 22-character rectangular one.

2.3 This specification provides a suggested location for the code symbol. It also provides guidelines for specifying other code locations when the suggested location is not suitable for an application.

2.4 Although this specification does not specify the marking techniques that may be employed when complying with its requirements, it is assumed that the symbol will be obtained by laser scribing individual dots.

NOTE 1: A mark survivability experiment is being conducted by the SEMI North American Traceability committee. A report is available from SEMI: request “Leadframe Mark Survivability Report” dated February, 1999.

2.5 Data Matrix symbology is applicable to a broad range of lead-frame materials including copper and Alloy 42 in both bare and plated conditions. The format and algorithms of this code are based on two-dimensional symbology specified in AIM International Symbology Specification - Data Matrix.

2.6 This specification supports EIA Package Marking Specification by enabling individual die tracking in the manufacturing steps between die attach and device packaging marking.

NOTE 2: Marking of each die, while in wafer form, prior to dicing, could also accomplish this end.

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

3 Referenced Standards

3.1 SEMI Standards

SEMI M12 — Specification for Serial Alphanumeric Marking of the Front Surface of Wafers

SEMI M13 — Specification for Alphanumeric Marking of Silicon Wafers

SEMI T1 — Specification for Back Surface Bar Code Marking of Silicon Wafers

3.2 AIM International Technical Specifications¹

AIM International Symbology Specification — Data Matrix

3.3 ANSI Standards²

ANSI/FACT-1 — Data Application Identifier Standard

ANSI X3.4 — American Standard Code for Information Interchange (ASCII)

NOTE 3: This standard is equivalent to ISO 646, Information Processing - ISO 7-bit Coded Character Set for Information Exchange³.

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2 American National Standards Institute, Headquarters: 1819 L Street, NW, Washington, DC 20036, USA. Telephone: 202.293.8020; Fax: 202.293.9287, New York Office: 11 West 42nd Street, New York, NY 10036, USA. Telephone: 212.642.4900; Fax: 212.398.0023, Website: www.ansi.org