SEMI E142.1-0921
SPECIFICATION FOR XML SCHEMA FOR SUBSTRATE MAPPING

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1 Purpose

1.1 The purpose of this Specification is to provide an XML schema that corresponds to the data model for equipment defined by SEMI E142, Specification for Substrate Mapping. This schema is available to equipment communication standards that want to use SEMI E142 defined information in XML formatted equipment communication.

2 Scope

2.1 The scope of this Specification is the representation of the SEMI E142 object model in an XML schema. It will not add new domain information or concepts to the model. The only additions made are those needed to render a useful XML schema.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 *SEMI Standards and Safety Guidelines*

SEMI E121 — Guide for Style and Usage of XML for Semiconductor Manufacturing Applications

SEMI E142 — Specification for Substrate Mapping

3.2 *OMG Specifications*[1]

Unified Modeling Language (UML) Specification, Version 1.4, OMG Specification 01-09-67, (http://www.omg.org/technology/documents/modeling_spec_catalog.htm)

3.3 *World Wide Web Consortium Documents*[2]

Extensible Markup Language (XML) 1.0 (Second Edition) — W3C, 6 October 2000 (http://www.w3.org/TR/2000/REC-xml-20001006/)

Namespaces in XML — W3C, 14 January 1999 (http://www.w3.org/TR/1999/REC-xml-names-19990114/)

XML Schema Part 0: Primer — W3C, 2 May 2001 (http://www/w3/org/TR/xmlschema-0/)

XML Schema Part 1: Structures — W3C, 2 May 2001 (http://www/w3/org/TR/xmlschema-1/)

XML Schema Part 2: Datatypes — W3C, 2 May 2001 (http://www/w3/org/TR/xmlschema-2/)

XML Path Language (Xpath) — W3C, 16 November 1999 (http://www/w3/org/TR/xpath/)

4 Terminology

4.1 *Abbreviations and Acronyms*

4.1.1 *UML* — Unified Modeling Language

4.1.2 *W3C* — World Wide Web Consortium

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[2] World Wide Web Consortium, 32 Vassar St. Room 32-G515, Cambridge, MA 02139, USA. Telephone: +1.617.253.2613; Fax: +1.617.258.5999, http://www.w3.org

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4.1.3 *XML* — eXtensible Markup Language

4.2 *Definitions*

4.2.1 *Unified Modeling Language (UML)* — a notation for representing object-oriented designs and views created by Booch, Rumbaugh, and Jacobson in order to merge their three popular notations plus aspects of other existing notations into a single object-oriented notation intended to be usable by all.

4.2.2 *eXtensible Markup Language (XML)* — a markup language used for representing data rich with context and content in documents and in communications. XML is an extension of SGML, a document-oriented markup language. It was created by W3C for use on the Internet. XML can represent object-oriented structures.

5 Conventions

5.1 This section discusses the conventions used in this Specification for translating UML to XML and for documenting the XML. These conventions are heavily influenced by the SEMI E121.

5.2 The reader is expected to have a working knowledge of the UML, XML, and Schema specifications (see ¶¶ 3.2 and 3.3). This Specification does not provide tutorial information on these subjects.

5.3 *Translating UML to XML*

5.3.1 This Specification follows the guidelines for XML as outlined in SEMI E121.

5.3.2 The translation of a UML class to XML is documented using a table format illustrated by Table 1.

5.4 *Translation Table Column Header Description*

5.4.1 *Attribute or Role Name* — If an attribute, the name of the attribute is placed here. If an association (including aggregation or composition), the role name from the UML diagram is placed here. Compositions are often not assigned role names. In that case 'none' is placed here.

5.4.2 *UML Name/Type* — If an attribute, the data type of the UML attribute is placed here. If an association, the type of association is placed here. The possible types are 'Composition', 'Aggregation', or the basic 'Association'. UML defines these three types of associations.

5.4.3 *XML Element or Attribute* — Lists the type of XML construct used to represent the UML attribute or association.

5.4.4 *XML Name/Type* — Provides the name and data type of the resulting XML construct. The type may be a built-in type (for example, xs:string), or a named type defined within the XML schema.

Table 1 Example Translation Table

Attribute or Role Name	*UML Name/Type*	*XML Element or Attribute*	*XML Name/Type*
friend	association	element	Friend: HumanReferenceArray
employees	aggregation	element	Employees: HumanArray
family	composition	element	Family: HumanArray
name	string	element	Name: xs:string

6 XML Schema

6.1 The actual XML schema defined by this Specification is contained in a separate document. The contents of the schema document constitute the core part of this Specification.

6.2 The target namespace for the schema is 'urn:semi-org:xsd.E142-1.V0211.SubstrateMap'.

6.3 Table 2 describes the complex types defined in the schema and how they relate to one another.

6.4 Table 3 describes the simple types defined in the schema.

6.5 Table 4 shows how the element and attribute names in the schema map to the attributes defined in SEMI E142 Substrate Mapping.

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Table 2 Complex Elements and Types Defined in Schema

Element/Type	*Description*
MapData	Top level MapDataType element.
MapDataType	Top level element that contains zero or one LayoutsType elements, zero or one SubstratesType elements and zero or one SubstrateMapsType elements.
LayoutsType	A collection of one or more LayoutType elements. The uniqueness of the LayoutId is enforced by the xs:key LayoutKey defined in MapData.
LayoutType	An element containing the attributes defined for the Layout object in SEMI E142.
LogicalCoordinatesType	An element containing the attributes defined for the LogicalCoordinates object in SEMI E142.
PhysicalCoordinatesType	An element containing the attributes defined for the PhysicalCoordinates object in SEMI E142.
ZDimensionsType	An element containing the attributes defined for the ZDimensions object in SEMI E142.
ChildLayoutsType	A collection one or more ChildLayoutType elements.
ChildLayoutType	An element containing a reference (LayoutId) of the child layout. This relationship is enforced by the xs:KeyRef ChildLayoutRef defined in MapData.
SubstratesType	A collection of one or more SubstrateType elements. The uniqueness of the combined SubstrateType and SubstrateId key is enforced by the xs:key SubstrateKey defined in MapData.
SubstrateType	An element containing the attributes defined for the Substrate object in SEMI E142.
AliasIdsType	A collection of one or more AliasIdType elements.
AliasIdType	An element containing the attributes defined for the AliasId object in SEMI E142.
SubstrateMapsType	A collection of one or more SubstrateMapType elements.
SubstrateMapType	An element containing the attributes defined for the SubstrateMap object in SEMI E142.
Overlay	An element containing the attributes defined for the Overlay object in SEMI E142. The uniqueness of the combined MapName and MapVersion key is enforced by the xs:key OverlayKey defined in SubstrateMapsType.
ReferenceDevicesType	A collection of one or more ReferenceDeviceType elements.
ReferenceDeviceType	An element containing the attributes defined for the ReferenceDevice object in SEMI E142.
BinCodeMapType	An element containing the attributes defined for the BinCodeMap object in SEMI E142.
BinCodeType	The content of this element corresponds to the Value attribute defined for the BinCode object in SEMI E142. The remaining attributes are represented as XML attributes.
BinDefinitionsType	A collection of one or more BinDefinitionType elements.
BinDefinitionType	An element containing the attributes defined for the BinDefinition object in SEMI E142.
DeviceIdMapType	An element containing the attributes defined for the DeviceIdMap object in SEMI E142.
DeviceIdType	An element containing the attributes defined for the DeviceId object in SEMI E142.
TransferMapType	An element containing the attributes defined for the TransferMap object in SEMI E142.
TransferType	An element containing the attributes defined for the Transfer object in SEMI E142.
DeviceDataMap	An element of type DeviceDataMapType containing the attributes defined for the DeviceDataMap object in SEMI E142.
DeviceDataMapType	A collection of ParameterType elements and DeviceDataType elements.
ParameterType	An element containing the attributes defined for the Parameter object in SEMI E142.
DeviceDataType	An element containing the attributes defined for the DeviceData object in SEMI E142.

Table 3 Simple Types Defined in Schema

Type	*Description*
MaterialIdType	String of 1–32 characters
BinCodeContentType	String of 1 or more characters
OrientationType	Integer from 0–359

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