

SEMI G84-0303

SPECIFICATION FOR STRIP MAP PROTOCOL

This specification was technically approved by the Global Automated Test Equipment Committee and is the direct responsibility of the North American Automated Test Equipment Committee. Current edition approved by the North American Regional Standards Committee on October 25, 2002 and November 22, 2002. Initially available at www.semi.org January 2003; to be published March 2003. Originally published November 2001.

1 Purpose

1.1 The purpose of this specification is to provide definition that will enable the implementation of strip mapping throughout the assembly and test process. This document will enable standardization of the strip map format and execution method throughout the factory floor.

1.2 This document describes the format and methods in which strip map information shall be formatted and used to transfer information about a strip to and from equipment using the SECS/GEM interface standard (see SEMI E5).

2 Scope

2.1 This specification will identify the messages within the SECS/GEM message set used in the implementation of strip mapping.

2.2 This specification will identify the Map Data Items (MDI) that are required or optionally may be used in the implementation of strip mapping.

2.3 This document will provide basic application notes to aid in the proper implementation of strip mapping.

2.4 This document will not address application or implementation for wafer test process.

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 Limitations

3.1 This document does not address the transmission, file naming conventions, storage or archiving of strip maps.

4 Referenced Standards

4.1 SEMI Standards

SEMI E5 — SEMI Equipment Communications Standard 2 Message Content (SECS-II)

SEMI G81 — Specification for Map Data Items

SEMI T9 — Specification for Marking of Metal Lead-Frame Strips with a Two-Dimensional Data Matrix Symbol

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

5 Terminology

5.1 Definitions

5.1.1 *assembly site* — the sub-contractor, supplier's facility or department that will be responsible for the assembly of IC devices.

5.1.2 *bottom-side* — the bottom of the strip as defined by the customer based on the customer master manufacturing drawing.

5.1.3 *cell* — a term used to represent the mapping item on a strip—unit, package, device, multi-chip module, etc.

5.1.4 *strip* — a leadframe, board, panel or other container which hold locations for semiconductor devices to be manufactured upon.

5.1.5 *strip map* — a record of data in a file that contains quality and historical information about each individual strip in a manufacturers lot.

5.1.6 *substrate* — a board or panel containing locations for semiconductor devices to be manufactured upon. Also referred to as strip, board or PCB.

5.1.7 *supplier* — a supplier of inspected/tested substrates (strips) and strip maps to the assembly site.

5.1.8 *top-side* — the top of the strip as defined by the customer based on the customer master manufacturing drawing.

6 Ordering Information

None.

7 Convention

7.1 The following conventions are used to represent data format. Each format is represented by an alphabetic character and optional data size given by "byte" unit. Exceptions are "*" and "List of". Refer to SEMI E5 for details.

7.1.1 A — ASCII character(s), may not be required terminal character such as null (00₁₆)

7.1.2 B — Binary

7.1.3 I — Integer number

7.1.4 U — Unsigned Integer number

7.1.5 List of — Combined item format consisting of one or more items; array (items of the same type) or structure (items of different types)

7.1.6 * — Any format as above or those allowed in SEMI E5.

8 Object Definitions

8.1 The implementation of Strip Mapping defines one standard object, the Strip Map.

8.1.1 *Strip Map Object Definition* — The Strip Map is a dynamic object created and modified through the assembly and test process. Each Strip Map Object is a logical representation of a manufacturing lead frame or substrate and maintains the current processing state for the group of die attached to that physical leadframe or substrate. Each Strip Map Object uniquely identifies a manufacturing leadframe or substrate using the ObjID (StripID) object attribute. The object attribute notation used in Table 1 is described in Conventions, Section 7.

9 Requirements

9.1 Equipment Communication

9.1.1 Communication of strip maps between host and equipment shall use the SECS I or HSMS protocols. Otherwise, some other general protocols, which are widespread in the data communication field, could be used as an alternative. However, these are not covered in this specification.

9.2 Map Data Items

9.2.1 The Standard Map Data Items in Table 1 contain the standard data items that shall be used in all strip mapping implementations.

9.2.2 The Strip Map Data Items in Table 2 are the data items and object attributes that will be used in the implementation of strip mapping via the SECS/GEM interface as needed by each equipment type and process step.

Table 1 Standard Data Item/Object Description and Settings

Data Item	Description / Settings	Format
SMORLOC	0 = Error 1 = Upper right 2 = Upper left 3 = Lower left 4 = Lower right > 4 = Error 5-63 Reserved	U1
ERRCODE	Code identifying an error	U2
ERRTEXT	Text string describing the error noted in the corresponding ERRCODE. Limited to 80 characters maximum.	A
OBJACK	Acknowledge Code	U1
ATTRID	Object attribute ID	A
ATTRDATA	Object attribute data	*
ACKC6	Strip map acknowledge 0 = successful 1 = failed	B

<i>Data Item</i>	<i>Description / Settings</i>	<i>Format</i>
OBJSPEC	A text string that has an internal format and that is used to point to a specific object instance. The string is formed out of a sequence of formatted substrings, each specifying an object's type and identifier. The substring format has the following four fields: object type, colon character ":", object identifier, greater than symbol ">", where the ":" is used to terminate an object type and the ">" is used to terminate an identifier field. The object type may be omitted where it may be otherwise determined. The final ">" is optional. The OBJSPEC for the StripMap Object is a zero-length item. No specifier required.	A
OBJTYPE	Identifier for a group or class of objects. All objects of this type must have the same set of attributes. Available object types: "StripMap"	A
OBJID	Object Identifier	A

Table 2 Strip Map Data Item/Object Description and Settings

<i>Attribute Name</i>	<i>Definition</i>	<i>Access</i>	<i>Required</i>	<i>Format</i>
ObjType	The object type, "StripMap"	RO	Y	A = "StripMap"
ObjID	The object. This is the StripID, FrameID or equivalent.	RO	Y	A
CellStatus	Cell Status is an array of values indicating the value of each unit/package/device on a strip. 0 = Functional Good Cell; Good die placed on Good cell. 1 = Unknown Cell Status. 2 = Defect/Non-functional Cell; the cell is marked as defect by previous steps. CellStatus shall be sent in an array of size Rows × Columns in row major format with respect to the OriginLocation. CellStatus may be provided by the host to the equipment as well as from the equipment to the host. Used in: Strip Map Upload and Strip Map Download	RW	Y' Either CellStatus or CellGrade or both are required if mapping is to be used.	U1
CellGrade	CellGrade is an array of values indicating the classification of each unit/package/device/cell on a strip. The process and equipment using a 'grading' scheme determine this classification and the associated values. Examples of a CellGrade are test bins, sort grades, package grade, marking grades etc. CellGrade shall be sent in an array of size Rows × Columns in row major format with respect to the OriginLocation.	RW	Y' Either CellStatus or CellGrade or both are required if mapping is to be used.	U1
Columns	The number of columns of (measured) device matrix on substrate, that is the number of devices on the X-axis of the map data. It is required if the type of the map data is simple array structure.	RO	Y	U4

Attribute Name	Definition	Access	Required	Format
OriginLocation	Coordinate system on substrate to address devices. Location of the datum point or the origin of the coordinates shall be one of the following: 0 = Not currently supported 1 = Upper right – top side 2 = Upper left – top side 3 = Lower left – top side* 4 = Lower right – top side 5 = Not currently supported 6 = Upper right – bottom side 7 = Upper left – bottom side 8 = Lower left – bottom side 9 = Lower right – bottom side * Default value is 3 (=Lower left – top side) if this item is not present. Typically Used in: Strip Map Upload and Strip Map Download	RO	Y	U1
Rows	The number of rows of (measured) device matrix on substrate, that is the number of devices on the Y-axis of the map data. It is required if the type of the map data is simple array structure.	RO	Y	U4
SubstrateID	A character code that may be printed or encoded on the substrate, which uniquely identifies the substrate, and can be used to correlate the map with physical substrate. SubstrateID is either StripID or FrameID.	RW	Y	A
BinGrade	A BinCode (see SEMI G81) is a value describing the grading of a die. BinGrade is an array of bin codes used to describe each die on the wafer. BinCodeList shall be sent in an array size Rows x Columns in row major format with respect to the OriginLocation. Typically used in: Strip Map Upload	RW	N	U1
DefectCode	DefectCodes are a set of codes representing defects that are detected at each process step by equipment or a human. DefectCodes shall be sent in an array of size Rows x Columns in row major format with respect to the OriginLocation. If there is no defect, the DefectCode is 0 (Zero) Typically Used in: Strip Map Upload and Strip Map Download	RW	N	U1 or A
LotID	Production lot identifier for this data.	RW	N	A