

SEMI E123.1-0703

SPECIFICATION FOR SECS-II PROTOCOL FOR HANDLER SPECIFIC EQUIPMENT MODEL (HSEM)

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1 Purpose

1.1 This document maps the services and data of SEMI E123 to SECS-II streams and functions, and data definitions.

2 Scope

2.1 This is a specification covering equipment supporting automated communication of the handler equipment.

2.2 This document applies to all implementations of SEMI E123 that use the SECS-II message protocol (SEMI E5). Compliance to this standard requires compliance to both SEMI E123 and SEMI E5.

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 specification applies to semiconductor equipment that also use SEMI E30 GEM standard.

4 Referenced Standards

4.1 SEMI Standards

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

SEMI E30 — Generic Model for Communications and Control of Manufacturing Equipment (GEM)

SEMI E37 — High-Speed SECS Message Services (HSMS) Generic Services

SEMI E123 — Standard for Handler Equipment Specific Equipment Model (HSEM)

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

5 Service Message Mapping

5.1 This section shows the specific SECS-II streams and functions that shall be used for SECS-II implementation of the services or remote commands defined in SEMI E123, as well as the parameter mapping for data attached to services.

5.2 Services Message Mapping

5.2.1 Table 1 defines the relationships between SEMI E123 services and SECS-II messages. Mapping of service parameters to the SECS-II data items is provided in a separate table. Conventions and definitions of table fields are as described below.

5.2.2 *Service Name* — Name of the service or remote command defined in SEMI E123.

5.2.3 *Stream, Function* — Specifies the SECS-II stream and function (SxFx) mapped to the service messages. Following convention of SECS-II, request and notification messages are mapped to the odd-numbered functions and response or acknowledgement messages are mapped to the corresponding even-numbered functions.

5.2.4 *SECS-II Message Name* — Name of the SECS-II message.

Table 1 Services Message Mapping Table

<i>Service Name</i>	<i>Stream, Function</i>	<i>SECS-II Message Name</i>
ABORT	S2,F41/F42	Host Command Send/Acknowledge
BIN-UNITS	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
BREAK-CONTACT	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
DISABLE-SITE	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
ENABLE-SITE	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
MAKE-CONTACT	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
PAUSE	S2,F41/F42	Host Command Send/Acknowledge

<i>Service Name</i>	<i>Stream, Function</i>	<i>SECS-II Message Name</i>
PP-SELECT	S2,F41/F42	Host Command Send/Acknowledge
PRELOAD-UNITS	S2,F41/F42	Host Command Send/Acknowledge
PURGE	S2,F41/F42	Host Command Send/Acknowledge
RECONTACT	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
RESET-TOOL-COUNTS	S2,F49/F50	Enhanced Remote Command Send/Acknowledge
RESUME	S2,F41/F42	Host Command Send/Acknowledge
START	S2,F41/F42	Host Command Send/Acknowledge
STOP	S2,F41/F42	Host Command Send/Acknowledge

5.3 Event Message Mapping

5.3.1 Table 2 defines the relationships between SEMI E123 collection events and SECS-II messages. Conventions and table field definitions similar to mapping table for the services, here Event Name specifies the event defined in SEMI E123.

Table 2 Event Message Mapping Table

<i>Event Name</i>	<i>Stream, Function</i>	<i>SECS-II Message Name</i>
All events defined in SEMI E123	S6F11/12	Event Report Send/Acknowledge

5.4 Service Parameter Mapping

5.4.1 Table 3 defines the relationships between SEMI E123 service parameters and SECS-II data definitions or parameter fields in the mapped streams and functions. Parameters for acknowledgements or responses will follow SECS-II specification for that stream and function, no service specific error codes are defined in this specification. Descriptions of each table column are described below.

5.4.2 *Service* — Specifies the service whose parameters are described.

5.4.3 *SECS-II Field* — Specifies the SECS-II data item or message parameter used by the service. In this specification, the DATAID and OBJSPEC fields are unspecified for services using the S2F49 SECS-II message. Their values are to be ignored or used for implementation specific purposes.

5.4.4 *Values* — Value or SECS II format for the specified field. Formats are specified using the SML notation as defined in appendices of SEMI E30 (GEM).

5.4.5 *Req.* — Indicates whether the specified field or parameter is required or not. If an optional CPNAME parameter is used, the corresponding CPVAL must also be given.

5.4.6 *Description* — Provides a brief description of the SECS-II field in relation to the service parameters defined in SEMI E123.

Table 3 Service Parameter to SECS-II Data Items Mapping

<i>Service</i>	<i>SECS-II Field</i>	<i>Values</i>	<i>Req.</i>	<i>Description</i>
ABORT	RCMD	"ABORT"	Y	
	CPNAME ₁	"PROCESSSITEID"	N	ProcessSiteID parameter.
	CPVAL ₁	U4	N	ProcessSiteID value. ID of handler process site.
	CPNAME ₂	"CLEANUP"	N	Cleanup parameter.
	CPVAL ₂	BOOLEAN	N	Cleanup value. If TRUE, remove all materials to outputs.

Service	SECS-II Field	Values	Req.	Description
BIN-UNITS	RCMD	"BIN-UNITS"	Y	
	CPNAME ₁	"BINS"	Y	Bins parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Bins value. List of bin results for current processed units, one bin value per process site beginning with site 1. Bin values for disabled or empty sites are to be ignored. L, n (n = total number of sites) 1. Site 1 Bin Value 2. Site 2 Bin Value 3. ... n. Site n Bin Value
BREAK-CONTACT	RCMD	"BREAK-CONTACT"	Y	
	CPNAME ₁	"SITES"	Y	Sites parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Sites value. List of sites to break contact. Zero-length list indicates all sites. Ex. L, n (n = number of sites selected) 1. ID of 1 st site 2. ID of 2 nd site 3. ... n. ID of nth site
DISABLE-SITE	RCMD	"DISABLE-SITE"	Y	
	CPNAME ₁	"SITES"	Y	Sites parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Sites value. List of sites to disable. Zero-length list indicates all sites.
ENABLE-SITE	RCMD	"ENABLE-SITE"	Y	
	CPNAME ₁	"SITES"	Y	Sites parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Sites value. List of sites to enable. Zero-length list indicates all sites.
MAKE-CONTACT	RCMD	"MAKE-CONTACT"	Y	
	CPNAME ₁	"SITES"	Y	Sites parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Sites value. List of sites to make contact after a break contact command. Zero-length list indicates all sites.
PAUSE	RCMD	"PAUSE"	Y	
	CPNAME ₁	"PROCESSSITEID"	N	ProcessSiteID parameter.
	CPVAL ₁	U4	N	ProcessSiteID value. ID of handler process site.

Service	SECS-II Field	Values	Req.	Description
PP-SELECT	RCMD	“PP-SELECT”	Y	
	CPNAME ₁	“PPID”	Y	ProcessProgramID parameter.
	CPVAL ₁	A[80]	Y	The ID of the program to be loaded.
	CPNAME ₂	“PROCESSSITEID”	N	ProcessSiteID parameter.
	CPVAL ₂	U4	N	ProcessSiteID value. ID of handler process site.
	CPNAME ₃	“LOTID”	N	LotID parameter.
	CPVAL ₃	A[1..40]	N	LotID value. ID of lot to be processed with this program. This is an optional parameter that has implementation specific meanings.
PRELOAD-UNITS	RCMD	“PRELOAD-UNITS”	Y	
PURGE	RCMD	“PURGE”	Y	
RECONTACT	RCMD	“RECONTACT”	Y	
	CPNAME ₁	“SITES”	Y	Sites parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	Sites value. List of sites to re-contact. Zero-length list indicates all sites.
RESET-TOOL-COUNTS	RCMD	“RESET-TOOL-COUNTS”	Y	
	CPNAME ₁	“SVIDLIST”	Y	StatusVariableList parameter.
	CPVAL ₁	L, n 1. U4 2. U4 : n. U4	Y	StatusVariableList value. List of status variables to reset, list by SVID.
	CPNAME ₂	“PROCESSSITEID”	N	ProcessSiteID parameter.
	CPVAL ₂	U4	N	ProcessSiteID value. ID of handler process site.
RESUME	RCMD	“RESUME”	Y	
	CPNAME ₁	“PROCESSSITEID”	N	ProcessSiteID parameter.
	CPVAL ₁	U4	N	ProcessSiteID value. ID of handler process site.
START	RCMD	“START”	Y	
	CPNAME ₁	“PROCESSSITEID”	N	ProcessSiteID parameter.
	CPVAL ₁	U4	N	ProcessSiteID value. ID of handler process site.
STOP	RCMD	“STOP”	Y	
	CPNAME ₁	“PROCESSSITEID”	N	ProcessSiteID parameter.
	CPVAL ₁	U4	N	ProcessSiteID value. ID of handler process site.
	CPNAME ₂	“CLOSELOT”	N	CloseLot parameter.
	CPVAL ₂	BOOLEAN	N	CloseLot value. This is an optional parameter that has implementation specific meanings.

6 Variable Data Item Mapping

The purpose of this section is to define the list of variable items required by the HSEM. Values of these variables will be available to the host through collection event reports and host status queries.

6.1 Requirements

6.1.1 Any supplier-defined variables shall be documented in the same format used by this document. The following minimum information is required:

<variable name> **Class:** <ECV, SV, or DVVAL> **Format:** <SML>

Description: <If class = DVVAL, description must contain statement of when data is valid.>

<If format = ASCII, then a length is required. It is assumed to be left-justified unless otherwise noted.>

6.2 Data Types

6.2.1 Equipment Constants (ECVs) can be changed by the host using S2,F15 (New Equipment Constant Send). The operator may be able to change some values, but the equipment does not change the values on its own. The value of an equipment constant may be queried by the host at any time, using the S2,F13/14 transaction. They reside in non-volatile memory of the equipment. Equipment constants remain in effect until they are overwritten either by manual entry or by a S2,F15.

6.2.2 Status Variables (SVs) are valid at all times. An SV may not be changed by the host but may be changed by the equipment or operator. The value of status variables may be queried by the host at anytime using the S1,F3/4 or S6,F19/20 transactions.

6.2.3 DVVALs are variables that are valid only upon the occurrence of specific collection events. An attempt to read a variable item at the wrong time does not generate an error, but the data reported may not have relevant meaning.

6.3 For multiple sites scenarios, if a variable is described as List by number of sites, then a list is expected, one value for each site.

Table 4 Variable Item Mapping Table

Variable Name	Description	Class	SECS-II Type
<i>Physical Handler Group</i>			
BufferID	Identifier of the buffer. This is implementation specific depending if handler supports any input, sort or output buffers.	DVVAL	A[1..16]
BufferType	Supplier defined buffer type. This is implementation specific, and may include input, output or sort buffers.	DVVAL	Enumerated value for each buffer type.
CategoryID	List of sort category IDs currently configured in handler.	ECV	L, n 1. A[1..16] 2. A[1..16] : n. A[1..16]
CategoryCount	Count of units in each sort category. List by number of categories. L,n # n=number of categories L, 2 1. CategoryID 2. Count of units in this category	SV	L, n L,2 1. A[1..16] 2. U4
EquipSerialID	Identification of Equipment.	SV	A[1..16]
KitID	ID of unique tooling unit.	SV	A[1..24]
LightPoleStatus	Color/status (i.e., Red/flash).	SV	A[1..16]