

# Default SECS-II Die Pick Interface

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# INTRODUCTION

This document describes the SECS-II communication via the ALPS LT/NT “Default” die picker interface (see [Note 1](#) at the end of the document).

A die picker interface, complying with this document, is included in ALPS to allow die picker manufacturers to develop a SECS-II host interface for their machines that supports ink-less die processing. This specification should be viewed as a (strong) recommendation. Provided that the interface complies with the SEMI standards mentioned, it is not necessary that it complies in all details with this document. On receipt of full documentation, KINESYS will provide a machine type-specific interface for ALPS.

Several ALPS functions require communication with this “Default” die picker:

- download of wafer maps
- upload of updated wafer maps
- real-time wafer map display

Of these three functions, wafer map download is essential. The other two functions are not absolutely required – although you may find in practice that end-users have a different opinion about this!

This document applies to both ALPS NT and ALPS LT.

## COMPLIANCE WITH STANDARDS

The die pick machine’s host interface must comply fully with the following SEMI standards:

- SECS-II standard (SEMI E5-1101)
- SECS-I standard (SEMI E4-0699)

or, alternatively:

- SECS-II standard (SEMI E5-1101)
- HSMS-SS standard (SEMI E37-0298 and SEMI E37.1-96<sup>E</sup>).

Furthermore, certain features are used of the GEM standard (details below):

- GEM standard (SEMI E30-1000)

# ESTABLISH/MAINTAIN COMMUNICATION

## S1F13/F14

S,H->E,reply / S,H<-E

The die picker should support the host-initiated S1F13/F14 Transaction.

When ALPS tries to establish communication with an attached die pick machine, it will send an S1F13 message, expecting an S1F14 reply message from the equipment. If no S1F14 reply message, or an equipment-initiated S1F13 message is received during the timeout period (value of SECS-I/HSMS Transaction Timeout, parameter T3), another S1F13 message is sent, etc.

S,H<-E,reply / S,H->E

Additionally ALPS supports the Equipment-initiated S1F13/F14 Transaction.

## S1F1/F2

S,H->E,reply / S,H<-E

The die picker should support the host-initiated S1F1/F2 Transaction

After communications has been established, ALPS sends regularly S1F1 messages, to check that communication is still operational. The time interval between successive S1F1 messages is fixed to 40 sec.

S,H<-E,reply / S,H->E

Additionally, ALPS supports the Equipment-initiated S1F1/F2 Transaction.

## Lost communication

Any failure of the die picker to send a reply message to any primary message from ALPS (described in this document) within the required transaction timeout period (see SECS-I and HSMS standards), will result in the ALPS equipment communication state NOT COMMUNICATING. Also a response with function code 0, SxF0, received in reply to an SxFy message sent by ALPS, will change the communication state to NOT COMMUNICATING.

The ALPS equipment communication state (COMMUNICATING or NOT COMMUNICATING) can be viewed on the ALPS GUI equipment status screen.

After ALPS has lost communication with the die picker, it will try to re-establish communication by periodically sending an S1F13. The time interval between successive S1F13 messages is equal to the Transaction Timeout (see the SECS-I resp. HSMS standard).

While NOT COMMUNICATING, any SECS-II message coming from the die picker, other than SxF0, will switch the ALPS communication state to COMMUNICATING. The SECS-II message, causing this state transition, will be processed normally.

# WAFER MAP DOWNLOAD

ALPS supports wafer map download in the SECS-II Type 2 format (array format). The die picker should implement the S12F3/F4, S12F15/F16 conversation, described in the SECS-II standard.

The following requirements apply to the data items in these messages:

## S12F3 Map Set-up Data Request

S,H<-E,reply

The format types to be used for the data items in this message are specified in the SECS-II standard. Any types allowed by the standard are acceptable for ALPS – unless specified differently per data item.

**MID** The format must be ASCII (Format 20). Maximum 32 characters (see however [Note 2](#) at the end of this document); otherwise no limitations for ALPS. All characters are significant; also non-printing characters. Trailing spaces are ignored, however. Names are case-sensitive (“Frame” and “frame” are not equal, but “Frame” and “Frame ” are).

**IDTYP** The value should be 2 (Film frame ID)

**MAPFT** The value should be 1 (Array format)

**FNLOC** Should be either one of 0, 90, 180, 270. Should specify the orientation the wafer should have on the die picker, required to position the dies correctly on the leadframe or package. Is used by ALPS to rotate the wafer map before sending it to the die picker. Is also used by ALPS for (limited) checks on correct wafer orientation on the die picker.

**FFROT** Should be either one of 0, 90, 180, 270, or unspecified. Should specify the actual film frame orientation on the die picker.

If the die picker does not specify the FFROT, a zero-length item should be used, rather than a zero-value item. See also [Note 4](#) at the end of this document. In that case ALPS will assume a value for the film frame orientation on the machine, which is equipment-specific. Certain die pickers always process wafers with the same film frame orientation. In that case, if KINESYS Software is informed of this behavior, ALPS can work with that setting. Otherwise, ALPS can use a film frame rotation setting which has been defined in the Setup of the equipment connection in ALPS (see the Installation and Configuration Guide). The FFROT setting is used by ALPS, together with information received from other sources that the wafer orientation on the die picker is correct.

**ORLOC** Should be either one of the five permitted settings: 0, 1, 2, 3 or 4. (see SECS-II standard). Should specify the origin location of the coordinate system used by the die picker.

**PRAXI** ALPS accepts all SECS-II defined PRAXI values (0 to 7). If 0, the process axis is the x-direction, starting from the upper-left corner, left to right. For an explanation of this, and other PRAXI values, see the following example:

Example:

Suppose the bin list (BINLT) in a SECS-II message is "123456789ABCDEF", the number of rows (ROWCT) is 3, the number of columns (COLCT) is 5.

Then the actual wafer map is supposed to be:

PRAXI=0:  1 2 3 4 5 6 7 8 9 A B C D E F	PRAXI=1:  5 4 3 2 1 A 9 8 7 6 F E D C B
PRAXI=2:  B C D E F 6 7 8 9 A 1 2 3 4 5	PRAXI=3:  F E D C B A 9 8 7 6 5 4 3 2 1
PRAXI=4:  1 4 7 A D 2 5 8 B E 3 6 9 C F	PRAXI=5:  3 6 9 C F 2 5 8 B E 1 4 7 A D
PRAXI=6:  D A 7 4 1 E B 8 5 2 F C 9 6 3	PRAXI=7:  F C 9 6 3 E B 8 5 2 D A 7 4 1

This complies with the SECS-II standard. For more information about the PRAXI, see the standard.

- BCEQU Bin codes to be bonded. All SECS-II standard values allowed.
- NULBC Null bin code (no die). All SECS-II standard values allowed. Ignored by ALPS.

#### S12F4 Map Set-up Data

S,H->E

This is the information ALPS sends in response to the S12F3 message:

- MID Format 20. Value will be the same as in the corresponding S12F3 message.
- IDTYP Format 10. Same as in the corresponding S12F3 message.
- FNLOC Format 52. Same as in the corresponding S12F3 message. Specifies the wafer orientation of the wafer map sent in a subsequent S12F16 message.
- ORLOC Format 10. Same as in the corresponding S12F3 message.
- RPSEL Format 51. Number of reference points. Any reference point coordinates in the original wafer map format, or specified by the operator in the ALPS Product Setup, are included in this message.

If no reference points are present, the value is 0.

REFPxy	Format 32. Reference dies coordinate pairs, in the coordinate system as specified by ORLOC, and after rotation the wafer as in FNLOC.  If no reference points present, a zero-length list is specified.
DUTMS	Format 20. Included by ALPS when present in the original wafer map format; otherwise a zero-length item.
XDIES	Format 52. Supplied when present in original wafer map information, otherwise a zero-length item.
YDIES	Format 52. Supplied when present in original wafer map information, otherwise a zero-length item.
ROWCT	Format 52.
COLCT	Format 52.
PRDCT	Format 54. Contains the number of dies in the map sent by ALPS. The null bins found in the map are excluded (so, PRDCT is not equal to ROWCT * COLCT).
BCEQU	Format 20 or 51 (same format as in the corresponding S12F3 message). When ALPS finds a product setup for the requested map, ALPS will send the BCEQU, defined on the product setup screen. If ALPS does not have a product setup, ALPS will echo the BCEQU from the S12F3.
NULBC	Format 20 or 51. Format the same as the BCEQU parameter. Value as specified in the original wafer map format. The value of the NULBC parameter from the corresponding S12F3 message is ignored.
MLCL	Format 52. Not supplied by ALPS; always a zero-length item.

#### S12F4 with empty list

S,H-&gt;E

The S12F4 format definition in the SECS-II standard allows an alternative message contents to be sent, in the form of an empty list. ALPS sends such an empty list in either one of the following cases:

- At least one S12F3 parameter is in an incorrect format (e.g. ASCII instead of integer)
- Unknown MID (wafer not found in ALPS database, or current ALPS wafer state does not permit download to die picker)
- Incorrect IDTYP ( $\neq 2$ )
- Incorrect MAPFT ( $\neq 1$ )
- Incorrect FNLOC value
- Incorrect FFROT value
- Incorrect ORLOC value ( $\neq 0, 1, 2, 3$  or  $4$ )
- Incorrect PRAXI value ( $\neq 0, 1, 2, 3, 4, 5, 6$  or  $7$ )
- Internal error during the processing of the S12F3 message.

#### S12F15 Map Data Request Type 2

S,H&lt;-E,reply

After the S12F3/F4 Transaction, the die picker should request the actual wafer map with the S12F15 message.

MID Must be ASCII (type 20). Maximum 32 characters (see however [Note 2](#) at the end of this document); otherwise no limitations for ALPS. All characters are significant; also non-printing characters.

Trailing spaces are ignored, however. Names are case-sensitive ("Frame" and "frame" are not equal, but "Frame" and "Frame " are).

IDTYP Format must be Binary (10), value must be 2 (Film frame ID)

### S12F16 Map Data Type 2

M,H->E

MID Format 20. Value will be the same as in the corresponding S12F15 message.

IDTYP Format 10. Same as in the corresponding S12F15 message.

STRPxy Format 32. Defines the starting point of the wafer map, as requested with the PRAXI parameter in the corresponding S12F3 message, using the coordinate system as specified in ORLOC. The wafer map is rotated according to FNLOC.

BINLT Format 20 or 51 (same as the BCEQU parameter in the corresponding S12F4 message).

### S12F16 with empty list

S,H->E

The S12F16 format definition in the SECS-II standard allows an alternative message contents to be sent, in the form of an empty list. ALPS sends such an empty list in either one of the following cases:

- Unknown MID (wafer not found in ALPS database, or current ALPS wafer state does not permit download to die picker)
- S12F15 has not been immediately preceded by a successful S12F3 for the same wafer.

## WAFER MAP UPLOAD

It is strongly recommended (but not required) that the die picker host interface includes a feature to send an updated wafer map back to the host, after it has finished processing a wafer. If that feature is supported, ALPS expects that it is implemented with the S12F1/F2, S12F5/F6, S12F9/F10 Conversation.

Alternatively, ALPS will also accept the Inquire/Grant Transaction being left out. So the Conversation S12F1/F2, S12F9/F10 will also be accepted.

Please be aware that the messages sent by the die picker for the ALPS Real-time Display (if supported) are only used by ALPS to support the real-time wafer map display. These are **not** used to update the actual wafer map in the ALPS database. For data integrity reasons (the possibility of missing collection events from the die picker, resulting in incorrectly updated wafer maps), updating the wafer maps in the database is only done with the Wafer Map Upload function.

ALPS only accepts upload of *complete* wafer maps: starting at the starting point corresponding with the PRAXI setting.

For example, suppose that the top half of a wafer has completely been picked and dies only remain on the bottom half. Suppose that the die picker works with PRAXI = 0, meaning: start at the top left corner. Then the uploaded wafer map must also start at the top left corner, not somewhere in the middle. The first half of the uploaded wafer map in this example should then only contain null bin codes.

The following requirements apply to the data items in these messages:

### S12F1 Map Set-up Data Send

S,H<-E,reply

The format types to be used for the data items in this message are specified in the SECS-II standard. Any types allowed by the standard are acceptable for ALPS – unless specified differently per data item.

**MID** Must be ASCII (type 20). Maximum 32 characters (see however [Note 2](#) at the end of this document); otherwise no limitations for ALPS. All characters are significant; also non-printing characters. Trailing spaces are ignored, however. Names are case-sensitive (“Frame” and “frame” are not equal, but “Frame” and “Frame ” are).

**IDTYP** Should be 2 (Film frame ID)

**FNLOC** Should be either one of 0, 90, 180, 270. Should specify the orientation the wafer has in the subsequent S12F9 message.

**FFROT** Should be either one of 0, 90, 180, 270, or unspecified. Is ignored by ALPS.

**ORLOC** Should be either one of the five permitted settings (see SECS-II standard) or unspecified. Should specify the origin location of the coordinate system used by the die picker.

If the coordinate system of the die picker is fixed, ORLOC can remain unspecified (not recommended, though). In that case a zero-length item should be used. The current driver assumes that upper-left (ORLOC = 2) is being used. If the die picker manufacturer plans to use a different ORLOC, we would like to know.

**RPSEL** Number of reference points specified by the die picker.

If no reference points are present, the value should be 0.

**REFPxy** Reference dies coordinate pairs, in the coordinate system as specified by ORLOC, and after rotation the wafer as in FNLOC

If no reference points present, a zero-length list should be sent.

**DUTMS** When included by die picker, should be the same as in the corresponding, earlier S12F4 message.

**XDIES** When included by die picker, should be the same as in the corresponding, earlier S12F4 message.

**YDIES** When included by die picker, should be the same as in the corresponding, earlier S12F4 message.

**ROWCT** Should be the same as in the corresponding, earlier S12F4 message.

COLCT	Should be the same as in the corresponding, earlier S12F4 message.
NULBC	Should be the same as in the corresponding, earlier S12F4 message.
PRDCT	Not being used by ALPS.
PRAXI	ALPS accepts all SECS-II defined PRAXI values (0 to 7). If 0, the process axis is x, starting from the upper-left corner, left to right. For a further explanation of this and other PRAXI values, see the example with the description above of the S12F3 message.

**S12F2  
Map Set-up  
Data  
Acknowledge**

S,H->E	
SDACK	0 = Received data  1 = Setup error. This acknowledge code is sent in either one of the following cases: <ul style="list-style-type: none"> <li>• At least one S12F1 parameter is in an incorrect format (e.g. ASCII instead of integer)</li> <li>• Unknown MID (wafer not found in ALPS database, or current ALPS wafer state does not permit upload by die picker. Wafer state should be DOWNLOADED)</li> <li>• Incorrect IDTYP (<math>\neq 2</math>)</li> <li>• Incorrect FNLOC value</li> <li>• Incorrect FFROT value</li> <li>• Incorrect ORLOC value (<math>\neq 2</math>)</li> <li>• Number of reference points (REFPxy pairs) does not correspond with the REPSL value</li> <li>• REFPxy values are outside the wafer size (COLCT * ROWCT)</li> <li>• ROWCT, COLCT or NULBC value different from earlier sent S12F4 values</li> <li>• Incorrect PRAXI value (<math>\neq 0, 1, 2, 3, 4, 5, 6</math> or 7)</li> </ul>

**S12F5  
Map Transmit  
Inquire**

S,H<-E,reply	
MID	Should be the same as in S12F1 message
IDTYP	Should be the same as in S12F1 message
MAPFT	Should be 1 (Array format)
MLCL	Is ignored by ALPS (any size wafer map is accepted)

**S12F6  
Map Transmit  
Grant**

S,H->E	
GRNT1	Standard Grant codes

**S12F9  
Map Data Send  
Type 2**

M,H<-E,reply	
MID	Should be the same as in the S12F5 message (or in the S12F1 message, in case the Inquire/Grant Transaction is not used).
IDTYP	Should be the same as in the S12F5 message (or in the S12F1 message, in case the Inquire/Grant Transaction is not used).

- STRPxy Defines the starting point of the wafer map, as requested with the PRAXI parameter in the corresponding S12F1 message, using the coordinate system as specified in ORLOC. The wafer map is rotated according to FNLOC.
- BINLT The actual updated wafer map. Should have the same format as NULBC in the corresponding S12F1.

**S12F10**  
**Map Data**  
**Acknowledge**  
**Type 2**

S,H->E

MDACK 0 = Map received

- Map was received correctly and stored as a new version in the ALPS database.

1 = Format error. This acknowledge code is sent in the following cases:

- The IDTYP parameter is incorrect ( $\neq 2$ )
- The starting point coordinates of the wafer map (STRPx, STRPy) are incorrect for the ORLOC and PRAXI specified in the corresponding S12F1 message.
- The length of the BINLT parameter does not correspond with the ROWCT and COLCT parameters specified in the corresponding S12F1 message (should be ROWCT \* COLCT).

2 = No ID match.

- IDTYP is specified correctly, but MID is incorrect (was not preceded by a corresponding S12F1/F2 Transaction)

3 = Abort, discard map

- This acknowledge code is sent in case any other error occurs.

## REAL-TIME WAFER MAP DISPLAY

This function is implemented via Collection Events:

- The die picker should send one or more event reports per die picked.
- Each report should include the row and column position of the die being processed
- This event reporting (events enabled, report definitions, reports linked to events) should either be "hard-coded" in the die picker host communication software, or that software should support the GEM Dynamic Event Report Configuration capability (SEMI E30-0600).

**Collection**  
**Events**

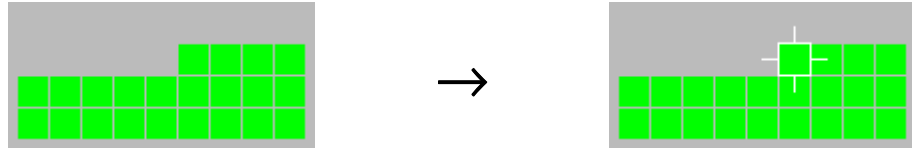
The collection events should be sent to ALPS with the S6F11/F12 Transaction. This is standard SECS-II and should need no further explanation.

For best visual effects it is recommended that all three collection events are implemented. To reduce the load on the die picker control system it is sometimes decided to implement only one collection event. In that case it is advised to implement the "Die Has Been Picked" event. This will remove the die from the ALPS screen, and show a white rectangle at its position, indicating where the last die has been picked.

**Next Die To Be Processed**

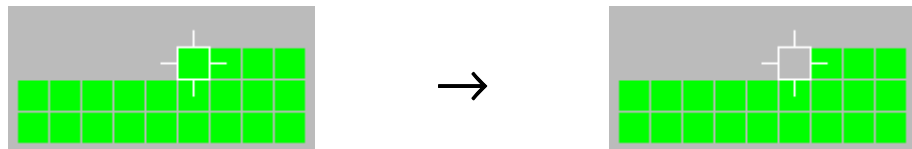
This event should be sent to ALPS when the die picker decides which will be the next die to be picked. The die is still on the wafer.

Visual effect on the ALPS real-time display: "marks" the die position on the real-time display by drawing a white rectangle around it:

**Die Has Been Picked**

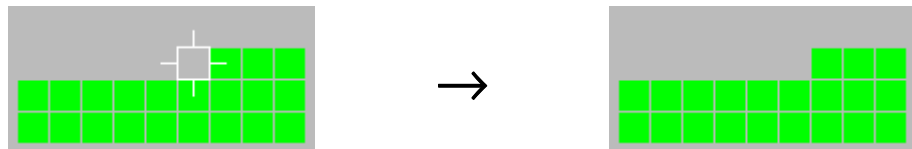
This event should be generated when the die picker has picked a die from the wafer. Dependent on the die picker this may or may not include that some test has been performed that the die is indeed on the picking mechanism.

Visual effect on the ALPS real-time display: leaves the white rectangle on the screen, but changes the die color to the background color (grey):

**Die Has Been Placed**

This event should be generated when the die has been placed (bonded, placed in tray, etc).

Visual effect on the ALPS real-time display: removes the white rectangle from the screen:

**Attached reports**

A report should be defined and linked to above three collection events, consisting of two Variable Items of the class "Data Value" (DVVAL), meaning that they are only valid upon the occurrence of a particular event. The format used should be 3( ): 1, 2, 4 or 8-byte signed integer.

**DieColumn**

X-coordinate of the next die to be processed, or has been picked or placed.

**DieRow**

Y-coordinate of the die to be processed, or has been picked or placed.

**Data items and formats**

Collection events and linked reports used for the Default die pick interface:

<i>Collection Event</i>	<i>CEID</i>	<i>RPTID</i>
Next Die To Be Processed	21	11
Die Has Been Picked	22	11
Die Has Been Placed	23	11

Contents of the report RPTID=11:

<i>Data variable</i>	<i>VID</i>
DieColumn	31
DieRow	32

For the S2F33, S2F35 and S2F37 messages sent by ALPS, the following formats and values are used for the data items:

DATAID    Format 52. Value sent by ALPS is always 0.

CEID        Format 52. Values are 21, 22 and 23.

RPTID      Format 52. Value is 11, for the report linked to the collection events with CEIDs 21, 22 and 23.

VID         Format 52. Values: 31 and 32 (for report RPTID=11), 33 and 34 (for report RPTID=12), 35 and 36 (for report RPTID=13).

### Setting up the event reports

Either:

- The above mentioned three events should automatically and always be enabled
- The linked report should automatically be defined and linked to the event

Or:

- The die picker host interface should support the GEM capability Dynamic Event Report Configuration. In that case ALPS can setup the reporting.

By default, ALPS assumes that Dynamic Event Reporting is supported.

When reporting is setup by ALPS, it will do so with the following SECS-II Conversation:

1. S2F37/F38 with CEED = FALSE and an empty list, to disable all collection events
2. S2F33/F34 with an empty list of reports, to delete all reports and associated links to events
3. S2F33/F34 defining one report
4. S2F35/F36 linking the report to three events
5. S2F37/F38 enabling the three events

This 5-step Conversation is executed each time communication with the die picker is re-established.

### Event Setup program

The ID settings (CEIDs, RPTID and VIDs) used by ALPS, can be changed with the Event Setup program, included with the ALPS installation. Changes will become affective the next time you start the driver, e.g. by restarting the computer.

With this program you can also enable/disable Dynamic Event Reporting Setup (default setting is "enabled").

**Note:** The Event Setup program allows to define different sets of variables for three reports, to be linked to the three events. This will, in general, not be necessary, though. Different reports can be used in case the implementer of the host communication on an equipment control system would expect any conflicts in the use of the same variables for different, possibly simultaneously occurring collection events

# OTHER SECS-II TRANSACTIONS

Additionally to the SECS-II communication described above, the following should be taken into account, with respect to support of transactions by ALPS:

## SxFO

S,H->E

ALPS does *not* send function code 0 replies in response to primary messages received from the die picker.

S,H<-E

When ALPS receives a function code 0 reply in response to a primary message sent, it will switch its communication state to NOT COMMUNICATING. The failed transaction is cancelled.

Subsequently, ALPS will re-establish communication as described above.

## S2F25/F26

S,H<-E,reply / S,H->E

ALPS also supports the equipment-initiated "Loopback Diagnostic" transaction. ALPS never sends an S2F25, but any such messages it receives from the die picker are responded to by appropriate S2F26 replies.

Specifications of this transaction comply with the SECS-II standard.

## S9Fx

S,H<-E

ALPS accepts the standard SECS-I and SECS-II protocol error messages from the die picker: S9F1, S9F3, S9F5, S9F7, S9F9, S9F11 and S9F13. See the SECS-II standard for details about these messages.

The error responses are shown on the ALPS computer user interface and are logged.

## S12F19

S,H<-E

The "Map Error Report" transaction, initiated by the equipment (die picker) is not supported by ALPS. Any S12F19 message received by ALPS is logged and no further action is taken..

## Map Type 1 or 3

As explained in the above sections, ALPS only supports wafer maps in "Array format" (Type 2). The other two formats, "Row or column format" (Type 1) and "Cartesian coordinate format" (Type 3), are not supported. Consequently, the SECS-II transactions defined to up- and download Type 1 and 3 wafer maps are also not supported. If such messages are received by ALPS, they are logged and no further action is taken.

## Other messages

No other SECS-II messages, then the ones mentioned above, are supported by ALPS. On receipt of other messages from the equipment, such messages are logged but no further action is taken.

# COMMUNICATION LOGS

## Logging by ALPS

ALPS includes a feature to log communication with attached equipment. This logging feature can be useful to find the causes of any behavior in the communication that is not understood.

How you can use this facility, is explained in the ALPS documentation. Please check the Installation & Configuration Guide, the chapter on Troubleshooting.

## Example logs

Below you will find examples of the communication between ALPS and a die picker with the "Default" SECS-II interface. These logs show the complete message details, and may be very helpful for the development of a new host interface that should be compatible with ALPS.

Included are:

- Startup of the communication between die picker and ALPS
- Wafer map download
- Die picking reporting
- Wafer map upload
- Failed Map Setup Data Request (S12F4 with empty list)

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*To be supplied*

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# NOTES

## Die Pickers

### Note 1:

To avoid any confusion in terminology between die bonders, die sorters etc., the generic term "die picker" is used throughout this document.

## MID data item length

### Note 2:

ALPS accepts MID parameters in SECS-II messages of maximum 32 characters. This is in-line with the standard "Specification for Map Data Format" (SEMI G85-1101) and the matching standard "Specification for Map Dat Items" (SEMI G81-1101).

Please be aware however that the SECS-II standard only allows MID parameter up to 16 characters. If you want your host interface to be used also by other, third party wafer mapping software, you are recommended to adhere to this 16-character limitation.

## Format codes

### Note 3:

The format codes used in this document (e.g. Format 20 for ASCII) are octal numbers, as defined in the SECS-II standard.

## Zero Length Items

### Note 4:

Anywhere in this document, where it is specified that zero length data items are allowed (indicating that the data item is not specified), the item should either be of the data item format specified, or it can be a zero length "List" item, as specified in the SECS-II standard.

Zero length items sent by ALPS are always in the specified format, with length zero.

## REVISION RECORD

<i>Version</i>	<i>Date</i>	<i>Description</i>
2.0	May 25, 1999	Initial version for external distribution.
2.1	June 1, 1999	Cleaned up and extended the information on Data Items.
2.2	April 25, 2000	<p>Improved the explanation of the document's purpose in the "Introduction".</p> <p>Removed all ALPS PC references.</p> <p>Added information, when the communications state changes to NOT COMMUNICATING.</p> <p>Corrected descriptions of FNLOC, FFROT, PRAXI, ORLOC to represent new ALPS features.</p> <p>Added descriptions of error reply messages (S12F4 with empty list, etc.).</p> <p>Removed the section "General Recommendations" (using GEM, HSMS, etc.)</p> <p>Added detailed description of CEIDs, RPTIDs and VIDs to be used.</p> <p>Added section on "Protocol Errors".</p>
2.3	July 20, 2000	<p>Changed the document title from "SECS-II Requirements" to "SECS-II Die Pick Interface".</p> <p>Changed section title "General Requirements" into "Compliance with Standards".</p> <p>Added information on ALPS' use of the SECS-I/HSMS Transaction Timeout.</p> <p>Changed MID maximum size from 16 to 32, with warning regarding non-compliance with SECS-II.</p> <p>Adapted the ORLOC value range supported, and added PRAXI examples.</p> <p>Corrected descriptions of BCEQU and NULBC for S12F4, and BINLT for S12F16.</p> <p>Redefined the S12F5/F6 Enquire/Grant as being optional.</p> <p>Added pictures, explaining ALPS GUI effects of Die Picked etc. events.</p> <p>Updated and extended the information on CEIDs, RPTIDs and VIDs used, and added format descriptions of data items used in the Dynamic Event Report Setup conversation.</p> <p>Extended the section "Protocol Errors" and renamed it to "Other SECS-II Transactions".</p> <p>Added sections "Communication Logs" (actual logs still t.b.s.) and "Notes", containing all earlier footnotes.</p>
2.4	August 22, 2000	Corrected PRAXI values supported: 0 and 2, instead of 0 and 1.

<i>Version</i>	<i>Date</i>	<i>Description</i>
2.5	September 18, 2000	Added remark of required and recommended features in "Introduction". Added that trailing spaces in MIDs are ignored. Added information about handling fixed and variable FFROT values. Extended supported PRAXI values from 0 and 2 to 0, 1, 2 and 3.
2.6	March 26, 2001	Extended list of supported PRAXI values from 0, 1, 2, 3 to the full range. Added list of errors, causing MDACK=1 in the S12F10 reply.
2.7	January 28, 2002	Corrected KINESYS company address in Utrecht. Updated document version numbers of referred SEMI standards. Added message directions for S12 messages (H<-E, etc.), to avoid future misunderstandings about SECS-II allowing host-initiated wafer map downloads etc. Changed the specifications of variables used in the attached reports to the ALPS real-time display collection events: only one pair of die coordinates is now used, instead of a separate pair per event. Added "Revision Record".