

CP.D2I Format Specification

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Association of Super-Advanced Electronics Technology (ASET)

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CP.D2I format specifications

1 Purpose

Mask D2I/ASET has been working to reduce mask writing TAT by utilizing CP (Character Projection) technology. This document defines the CP mask data format specifications for CP technology based on OASIS, namely “CP.D2I”.

2 Scope

CP.D2I specification applies to the input data format for CP mask drawing tools.

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

3 Limitations

This document will always be required to remain compliant with SEMI P39 OASIS, so that this document is always a formal subset of SEMI P39 OASIS.

4 Referenced Standards and Documents

4.1 SEMI Standards

SEMI P39—OASIS™ OPEN ARTWARK SYSTEM INTERCHANGE STANDARD

SEMI P44—SPECIFICATION FOR OPEN ARTWARK SYSTEM INTERCHANGE STANDARD (OASIS™) SPECIFIC TO MASK TOOLS

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

5 Terminology

5.1 Abbreviations and Acronyms

OASIS™—OPEN ARTWARK SYSTEM INTERCHANGE STANDARD

CP—Character Projection

5.2 Symbol

5.2.1 A — acceptable record

The records generated as needed in the input data for mask tools by the software. The mask tools perform processing according to the contents of the records.

5.2.2 I — ignore record

The records that may be generated in the input data for mask tools by the software, but will be ignored by the mask tools. The mask tools do not respond to the records.

5.2.3 M — mandatory record

The records that must be generated in the input data for EB mask tools by the software. If the records do not exist, the mask tools treat it as an error.

5.2.4 X — prohibited record

The records are prohibited to exist in the input data for mask tools. If the records exist, the mask tools treat it as an error.

6 Requirements

6.1 Concept of CP.D2I

The concept of CP.D2I is shown in Figure 1. CP.D2I is a format that defines restrictions to the OASIS format.

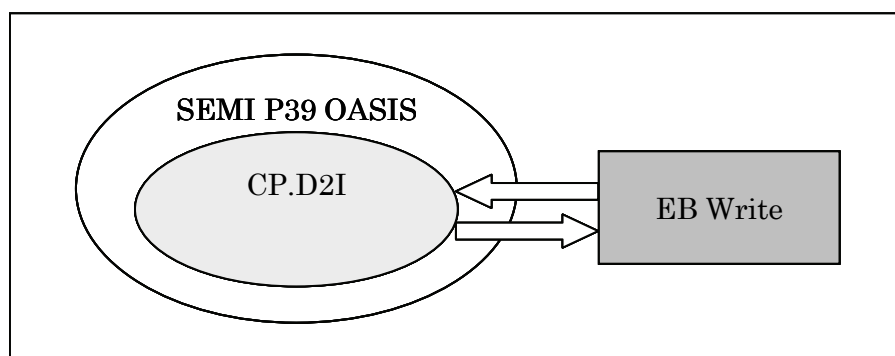


Figure 1. Concept of CP.D2I

6.2 OASIS Format Specification

See SEMI P39 for OASIS Format Specification.

6.3 Additional Records in CP.D2I

In CP.D2I, the following standard user properties are added to PROPERTY record. These properties are file-level standard properties and polygon-level standard properties.

6.3.1 file-level standard properties

6.3.1.1 S_CPD2I_VERSION

This property declares the version of CP.D2I specification. Its value consists of a single a-string record. With this specification, the value is “1”.

6.3.2 polygon-level standard propertie

6.3.2.1 S_CPCELL_ID

This property declares CELL ID for CP. Its value consists of a single unsigned integer record. It appears immediately after the CELLNAME record. The value must be uniquely defined.

6.3.2.2 S_CPCELL_AREA

This property declares the boundary box of a CP CELL area. Its value consists of a single unsigned-integer record.

6.4 Restrictions on CP.D2I

6.4.1 Concept

- (1) The specification reduces the load in the conversion process of mask tools as much as possible, and aims for the direct input to mask tools
- (2) The specification maintains the data compaction expression in OASIS as much as possible.

6.4.2 Restrictions on OASIS Record

The restrictions on the record of OASIS are shown in Table 1.

No	Record name	Restriction item	Content of restriction					Propriety	
			Minimum	Maximum	Step	Unit	Comment		
14	RECTANGLE	x,y	Coordinate value			1	grid		A
		width height	Width and Height	1	$2^{32}-1$	1	grid	zero-area (width=0 or height=0) is prohibited	A
		layer-number	Layer number	0	255	1	-		A
		datatype-number	Data type number	0	255	1	-		A
		repetition	Repetition type	-	-	-	-	TYPE0-3	A
		x-dimension y-dimension	Repetition *2 (row, column)	0	$2^{32}-3$	1	-		A
		x-space y-space	Space	0		1	grid		A
15	POLYGON	x,y	Coordinate value	-2^{31}	$2^{31}-1$	1	grid		A
		point-list	Coordinate value list	-	-	-	-	TYPE0-5 zero-area (width=0 or height=0) is prohibited	A
		layer-number	Layer number	0	255	1	-		A
		datatype-number	Data type number	0	255	1	-		A
		repetition	Repetition type	-	-	-	-	TYPE0-3	A
		x-dimension y-dimension	Repetition *2 (row, column)	0	$2^{32}-3$	1	-		A
		x-space y-space	Space	0	$2^{32}-1$	1	grid		A
16	PATH	-	-	-	-	-	-	X	
17	TRAPEZOID	x, y delta-a delta-b	Coordinate value of bottom left	-2^{31}	$2^{31}-1$	1	grid	-	A
		width height	Width and Height	1	$2^{32}-1$	1	grid	zero-area (width=0 or height=0) is prohibited	A
		layer-number	Layer number	0	255	1	-		A
		datatype-number	Data type number	0	255	1	-		A
		repetition	Repetition type	-	-	-	-	TYPE0-3	A
		x-dimension y-dimension	Repetition *2 (row, column)	0	$2^{32}-3$	1	-		A
		x-space y-space	Space	0	$2^{32}-1$	1	grid		A
18	CTRAPEZOID	x, y delta-a delta-b	Coordinate value	-2^{31}	$2^{31}-1$	1	grid	-	A
		width height	Width and Height	1	$2^{32}-1$	1	grid		A
		layer-number	Layer number	0	255	1	-		A
		datatype-number	Data type number	0	255	1	-		A
		repetition	Repetition type	-	-	-	-	TYPE0-3	A
		x-dimension y-dimension	Repetition *2 (row, column)	0	$2^{32}-3$	1	-		A
		x-space y-space	Space	0	$2^{32}-1$	1	grid		A
19	CIRCLE	-	-	-	-	-	-	X	
20	PROPETY	prop-string	Property name length	1	256	1	-		A
		reference-number	Reference number	0	$2^{32}-1$	1	-		A
21	XNAME	-	-	-	-	-	-	X	
22	XELEMENT	-	-	-	-	-	-	X	
23	XGEOMETRY	-	-	-	-	-	-	X	
24	CBLOCK	-	-	-	-	-	-	X	

M: Mandatory, A: Acceptable, I: Ignore, X: Prohibited

The restrictions on the standard property of CP.D2I are shown in Table 2.

Table 2. Restrictions on Standard properties

No	Property name		Restriction item	Content of restriction					Propriety
				Minimum	Maximum	Step	Unit	Comment	
1	S_CPCELL_ID	int	CELL ID for CP	0	$2^{64}-1$	1	-		M
2	S_CPCELL_AREA	int	CPCELL area value	0	$2^{64}-1$	1	grid		M
3	S_CPD2I_VERSION	Flags	CP.D2I format version	-	-	-	-	Fixed to 1	M
4	P44_BOUNDDING_BOXES_AVAILABLE	-	Bounding boxes available	-	-	-	-	Fixed to 2	M
5	P44_BOUNDDING_BOX	flags	Flag	-	-	-	-	Fixed to 000	M
		lower-left-x lowerleft-y	Coordinate value of bottom left	-2^{31}	$2^{31}-1$	1	grid		M
		width height	Width and Height	-2^{31}	$2^{31}-1$	1	grid		M
6	P44_CELL_OFFSET	offset	Cell offset value	1	$2^{64}-1$	1	Byte		M
7	P44_TOP_CELL	cellname-string	Top cell name length	1	$2^{16}-1$	1	-		M
8	P44_MD_FORMAT	flags	Format type	-	-	-	-	Fixed to 1	M
9	P44_CHIP_WINDOW	x1,y1 x2,y2	Chip window size	-	-	-	-		M
10	P44_FILE_SIZE	size	File size	1	$2^{64}-1$	1	Byte	Fixed to 1	M
11	P44_TOP_CELL_NUMBER	number	Top cell number	-	-	-	-		I

M: Mandatory, A: Acceptable, I: Ignore, X: Prohibited

6.4.3 Restrictions on class for cell

CP.D2I has three classes as shown in Figure 2 and Figure 3. Polygon is permitted in CP cell. Table3 shows the mandatory property in CP cell.

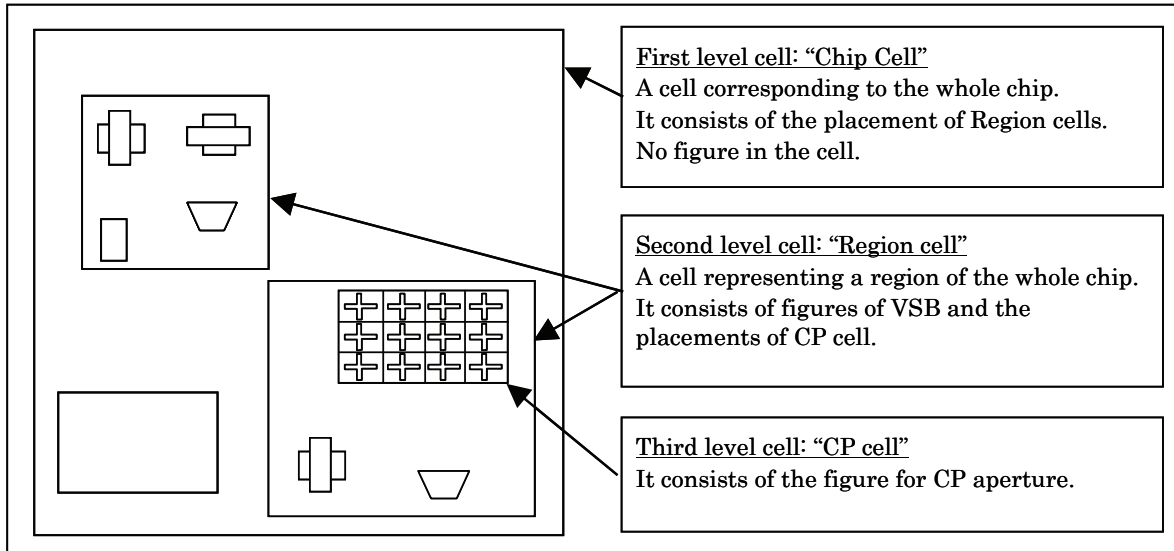


Figure 2. Class structure-I

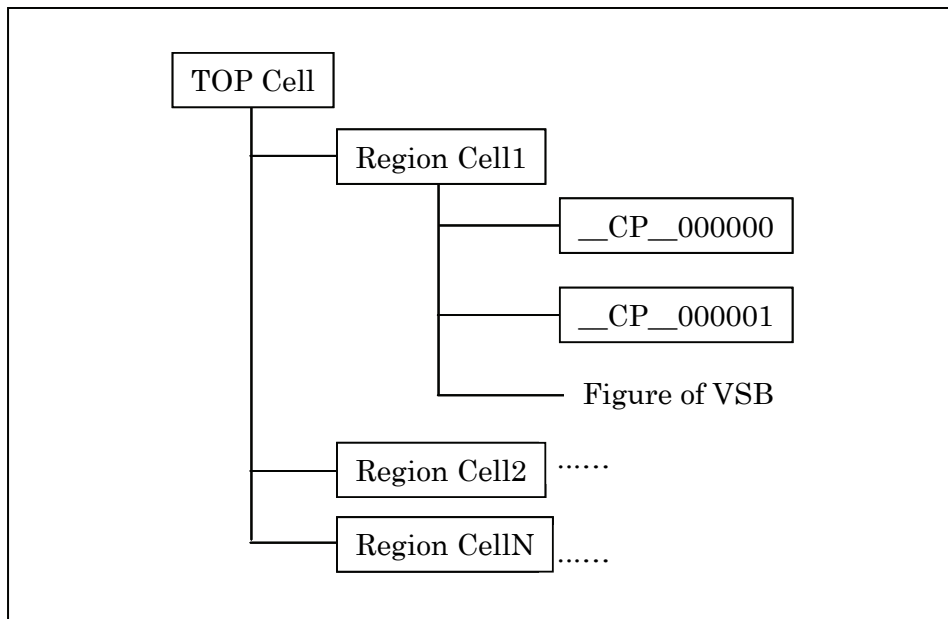


Figure 3. Class structure-II

Table 3. Property list for CP CELL

Record	Property
Cell	S_CPCELL_ID S_CPCELL_AREA
Placement	S_CPCELL_ID

6.4.4 Restrictions on CELL NAME

The first 6 characters of a CELL name must be “__CP__”.

6.4.5 Restrictions on CP CELL

- (a) There are no overlapping polygons in CP CELL
- (b) There is no class in CP CELL. If polygons are overlapping one another, it is not allowed.
- (c) Donut shaped figures are prohibited.
- (d) The data that stretches over more than one file is disabled.

6.4.6 Restriction for file name

The restrictions for file name are shown in Table 4.

Table 4. Restrictions for file name

No	Restriction item	Content of restriction
1	File name length	Minimum = 1 character, Maximum = 64 characters (Maximum of 256 characters, when directory path is included)
2	Character kind	64 kinds of characters: uppercase (A–Z), lowercase (a–z), numeric character (0–9), underline (_), and period (.)

CP.D2I Format Specification

Produced by Mask Design, Drawing, and Inspection Technology Research Department,
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