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A-PM-90A / UF Series

Map Data File Manual

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Prober System Group

PREFACE

Description of this manual is limited to the range of map data file specifications for Prober A-PM-90A.

All data in the file is described in byte arrangements of Motorola (MSB-LSB). Therefore, it is necessary to notice that file data will be in Motorola's byte arrangements and it is not Intel's byte arrangements (LSB-MSB) when file is being written into floppy disc (FD), even FD itself is MS-DOS format.

This manual is the English edition of A-PM-90A / UF Series Map Data File Manual Japanese edition FT01000-R018-09.

This document shall be revised without prior notice.

This document shall not be copied to other materials without prior notice.

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1. OUTLINE

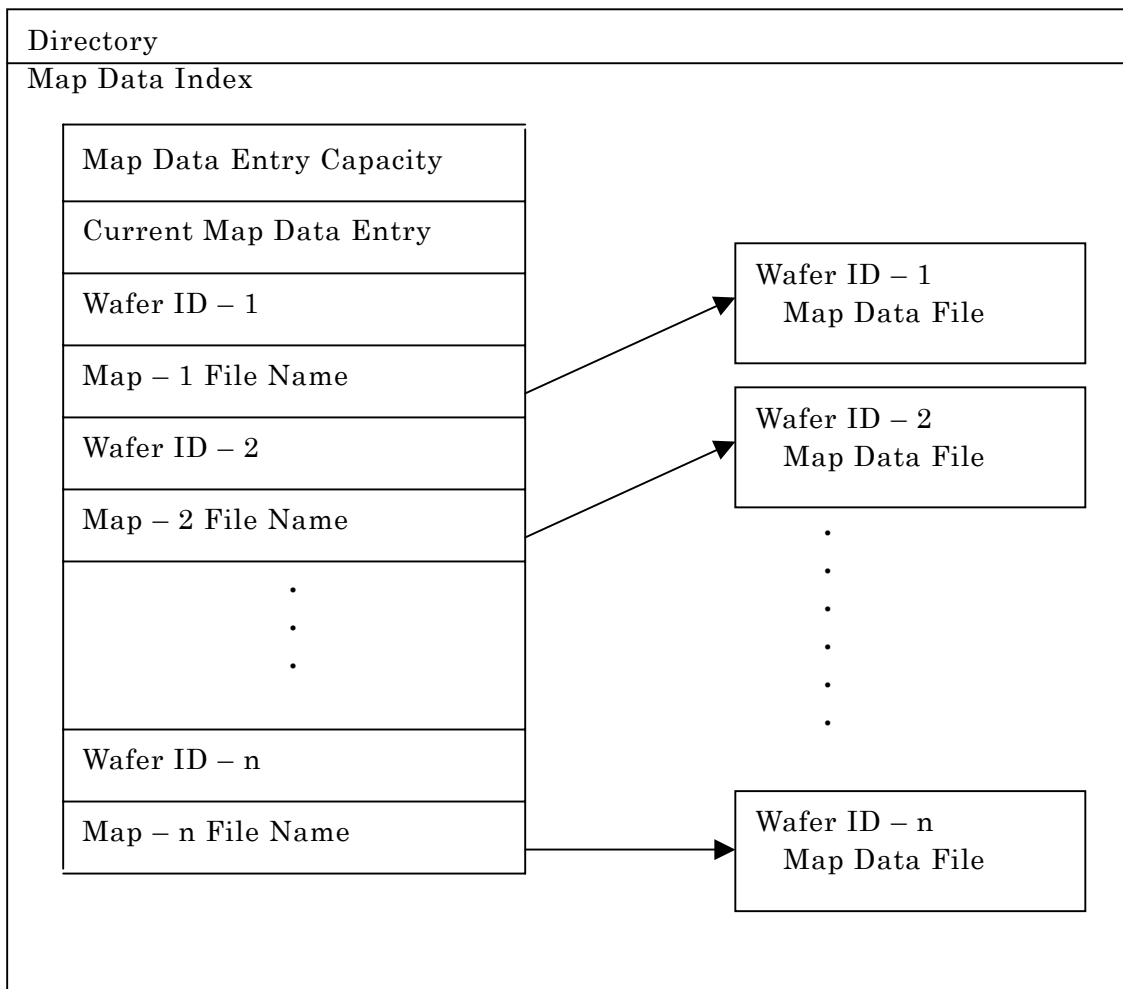
Map data of A-PM-90A and UF Series is made under directory (¥MAP) for map data of FDM.

Following files are made under directory for map data.

- (1) Index File of Map Data
- (2) Map Data File (1 wafer map/file)

To follow is the management methods of map data.

Media (FD)



1.1 Map Data File Name

Map data file names are as follows.

- (1) Map Data Index File : MAP.IDX
- (2) Map Data File : MAP_nnnn.DAT (nnnn = numeral)

Note) Map data index file is not used on VegaNet G/C Server.

2. MAP DATA INDEX FILE

Map data is managed by a name of maximum 21 characters, but MS-DOS file name is applicable only for 8 characters maximum. Owing to such reason, a table which is listing relations of map data name plus its data and corresponding MS-DOS file name is prepared as the map data index file.

Allowable number of map data group is limited by the capacity of map data index file. Map data index file size is as follows.

- Floppy Disc (3.5" 2HD type): Maximum 200 wafer maps

Map data index file is not used on VegaNet G/C Server.

2.1 Map Data Index File Configuration

Map data index file configuration is as follows.

Map data entry capacity (M), current map data entry (N), file name usage status data, followed by the information on the relations of map data names (Wafer IDs) and map data file names for N wafers.

Map Data Index File

	Version No.	2 bytes (integer)
	Map data entry capacity (M)	2 bytes (integer)
	Current map data entry (N)	2 bytes (integer)
	File name usage status data	250 bytes (integer)
1	Wafer ID – File name relation data – 1	26 bytes (character)
2	Wafer ID – File name relation data – 2	26 bytes (character)
	⋮	⋮
N	Wafer ID – File name relation data – N	26 bytes (character)
	⋮	⋮
M	Wafer ID – File name relation data – M	26 bytes (character)

(1) Version No.

Represents map data file format version.

2-byte integer (Binary)

(2) Map data entry capacity (M)

Represents the maximum number of map data groups permitted for the medium. Data form is 2-byte integer (Binary).

(3) Current map data entry (N)

Represents the numbers of map data those currently entered in media.

Data form is 2-byte integer (Binary).

(4) File name usage status data

Displays usage condition (occupied / free) of map data file figures (1 to 200) by 1 bit/data. It is occupied if data is “1” and is free if data is “0”. For a file having N in the numeral part of the file name, the corresponding bit position is determined as follows.

- Byte Position = $(N - 1) / 8$
- Bit Position = $(N - 1) - \text{byte position} \times 8$

(5) Wafer ID – File name relation data

It is the data that displays corresponding wafer ID and file name.

Composed as follows.

Wafer ID	21-byte character data
Map Data Form	1-byte character data
File Name	4-byte character data

(a) Wafer ID

21-byte character data represents wafer ID. If wafer ID is less than 21 characters, the remaining characters are replaced by space.

(b) Map Data Form

Represents map data format in 1 character.

- “0”: Tokyo Seimitsu Standard Format –II
- “1”: SEMI Format (Not used)

(c) File Name

From the map data file name “MAP_nnnn”, “nnnn” are taken and stored here for referencing the wafer ID and the file name.

3. MAP FILE FORM

There are 3 types of map data file form.

- Normal Map Data File
- Map Data File for 250,000 Chips
- Map Data File for 256 Multi-sites

Each map data file form can be confirmed by referring to map version in header information.

For the detail of header information, refer to the next page and after.

Data amount of “Map Data Area Row Size” × “Map Data Area Line Size” of Header Information is stored for the data per die.

3.1 NORMAL MAP DATA FORM

Normal map data file form consists of following blocks.

Header Information	Store the detailed information of map file. Refer to “Header Information List”.
Test Result per Die	Store the die information as 6-bytes data per die. Refer to “Test Result per Die”.
Line Category per Die	Store the line category information as 8-bytes data per die. Refer to “Line Category per Die”.

[NOTE]

Regarding “line category per die”, data is stored only when line category data store is selected as “Yes”.

3.2 MAP DATA FILE FORM for 250,000 CHIPS

Map data file form for 250,000 chips consists of followings.

Header Information	Store detailed information of map file. Refer to “Header Information List”.
Extended Header Information	Store extended information of map file. Refer to “Extended Header Information List”.
Test Result per Die for 250,000	Store die information as 2-bytes data per die. Refer to “Test Result per Die for 250,000”.
Extended Test Result per Die for 250,000	Store extended test result as 1-byte data per die. However, it is stored only when line category storage is selected “Yes”. Refer to “Extended Test Result per Die for 250,000”.

3.3 MAP DATA FILE FORM for 256 MULTI

Map data file form for 256 multi chips consists as followings.

1. Header Information	Store detailed information of map file. Refer to "Header Information List".
2. Test Result per Die	Store die information as 6-bytes data per die. Refer to "Test Result per Die".
3. Line Category per Die	Store line category information as 8-bytes data per die. Refer to "Line Category per Die".
4. Extended Header Information	Store extended information of map file. Refer to "Extended Header Information List".
5. Extended Test Result per Die	Store extended die information as 4-bytes data per die. Refer to "Extended Test Result".
6. Extended Line Category per Die	Store extended line category information as 8-bytes data per die. Refer to "Extended Line Category per Die".

On account of prober settings, a block with any data will appear.

In such case, data length is "0" and the next data block will be added on top.

A setup of prober and the existence of each data block are shown below.

Prober Settings

9718: Max. # Of Die Tested

8111: Category Signal Setting

9708: Maximum Multi Sites

9715: Maximum Categories

1912: Line Category Data Store

0. Line / 1. Binary

64/128/196/256

64/128/256/512/1024

0. No / 1. Yes

ID:9718 Die Tested	ID:9708 Sites	ID:9715 Categories	ID:1912 Storage	ID: 8111 Signal	1	2	3	4	5	6	
less than 60000	64 or more	64	0	0	○	○	×	×	×	×	
				1	○	○	×	×	×	×	
			1	0	○	○	○	×	×	×	×
				1	○	○	×	×	×	×	
		128	0	0	○	○	×	○	○	×	
				1	○	○	○	○	○	○	
			1	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
		256 or more	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
			1	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
	over 64	64	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
			1	0	○	○	○	○	○	×	
				1	○	○	×	○	○	×	
		128	0	0	○	○	×	○	○	×	
				1	○	○	○	○	○	○	
			1	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
		256 or more	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
			1	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	

ID:9718 Die Tested	ID:9708 Sites	ID:9715 Categories	ID:1912 Storage	ID: 8111 Signal	1	2	3	4	5	6	
over 60000	64 or more	64	0	0	○	○	×	○	×	×	
				1	○	○	×	○	×	×	
			1	0	○	○	○	○	×	×	×
				1	○	○	×	○	×	×	
		128	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
			1	0	○	○	○	○	○	○	
				1	○	○	×	○	○	×	
		256 or more	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
			1	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
	over 64	64	0	0	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
				1	○	○	○	○	○	×	
			1	0	○	○	○	○	○	×	
				1	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
		128	0	0	○	○	×	○	○	×	
				1	○	○	○	○	○	○	
				1	○	○	×	○	○	×	
			1	0	○	○	○	○	○	○	
				1	○	○	×	○	○	×	
				1	○	○	×	○	○	×	
256 or more	0	0	○	○	×	○	○	×			
		1	○	○	×	○	○	×			
	1	0	○	○	×	○	○	×			
		1	○	○	×	○	○	×			

【NOTE】

- In a setup of a gray-scaled section, "3.1 Normal Map Data form" and block composition becomes the same.

4. MAP DATA FILE

There are 2 types of map data those are supported with A-PM-90A and UF series. In this manual, Tokyo Seimitsu standard format is described.

- (1) Tokyo Seimitsu Standard Format
- (2) SEMI Format (Not used)

Tokyo Seimitsu standard map data is listed as below. Each file contains only the data in order of listed items. Data size etc. is not included.

Codes indicated in the data form column represents:

- P: POINTER
- C: Character
- F: Single Precision Floating Point Decimal
- D: Double Precision Floating Point Decimal
- B: BINARY
- b: bit

4.1 HEADER INFORMATION LIST

Header information is used in common for each map data file form.

Details may change due to system version.

Data Name		Size (byte)	Data Form	Range of Value
Wafer Testing Setup Data	Operator Name	20	C	Alphanumeric
	Device Name	16	C	Alphanumeric, “—“
	Wafer Size	2	B	40, 45, 50, 60, 80 (Unit: 0.1 inch) 100, 115, 125, 150, 200 (Unit: mm)
	Machine No.	2	B	0 to 999 (<i>user special</i>)
	Index Size X	4	B	(Unit: 0.01um)
	Index Size Y	4	B	(Unit: 0.01um)
	Standard Orientation Flat Direction	2	B	0 to 359 (Unit: degree°)
	Final Editing Machine type	1	B	<i>User Special</i>

Data Name		Size (byte)	Data Form	Range of Value
Map Version		1	B	0: Normal 1: 250,000 Chips 2: 256 Multi-sites 3: 256 Multi-sites (without extended header information) 4: 1024 category
Map data area row size		2	B	
Map data area line size		2	B	
Map Data Form	(Group Management)	4	B	0:6 byte, 1:1 byte, 2:2 byte, 3:3 byte
Wafer Specific Data	Wafer ID	21	C	Alphanumeric. Last digit is space or null
	Number of Probing	1	B	1 or over (<i>user special</i>)
	Lot No.	18	C	Alphanumeric
	Cassette No.	2	B	1 to 4
	Slot No.	2	B	1 to 25
Wafer Probing Coordinate System Data	X coordinates increase direction	1	B	1: leftward 2: rightward
	Y coordinates increase direction	1	B	1: forward 2: backward
	Reference die setting procedures	1	B	1: Wafer center die 3: Target sense die 2: Teaching die
	(Reserved)	1	B	
	Target die position X	4	B	Reference die position X from wafer center (Unit: 0.01um) * Only when target sense die is selected for "Standard die setting procedure"
	Target die position Y	4	B	Reference die position Y from wafer center (Unit: 0.01um) * Only when target sense die is selected for "Standard die setting procedure"

Data Name		Size (byte)	Data Form	Range of Value
(Continued) Wafer Probing Coordinate System Data	Reference die coordinator X	2	B	
	Reference die coordinator Y	2	B	
	Probing start position	1	B	1: upper-left 2: upper-right 3: lower-left 4: lower-right
	Probing direction	1	B	1: leftward 2: rightward 3: upward 4: backward
	(Reserved)	2	B	
	Distance X to wafer center die origin	4	B	Distance X from wafer center to die center including wafer center (Unit = μm) (<i>user special</i>)
	Distance Y to wafer center die origin	4	B	Distance Y from wafer center to die center including wafer center (Unit = μm) (<i>user special</i>)
	Coordinator X of wafer center die	4	B	Coordinator X of die including wafer center (<i>user special</i>)
	Coordinator Y of wafer center die	4	B	Coordinator Y of die including wafer center (<i>user special</i>)
Information Per Die	First Die Coordinator X	4	B	Effective with map version 1 (250,000) and later.
	First Die Coordinator Y	4	B	Effective with map version 1 (250,000) and later
Wafer Testing Start Time Data	Year_____	2	C	00 to 99
	Month_____	2	C	1 to 12
	Day_____	2	C	1 to 31
	Hour_____	2	C	0 to 23
	Minute_____	2	C	0 to 59
	(Reserved)	2	B	00

Data Name		Size (byte)	Data Form	Range of Value
Wafer Testing End Time Data	Year_____	2	C	00 to 99
	Month_____	2	C	1 to 12
	Day_____	2	C	1 to 31
	Hour_____	2	C	0 to 23
	Minute_____	2	C	0 to 59
	(Reserved)	2	B	00
Wafer Loading Time Data	Load End Year_____	2	C	00 to 99
	Load End Month_____	2	C	1 to 12
	Load End Day_____	2	C	1 to 31
	Load End Hour_____	2	C	0 to 23
	Load End Minute_____	2	C	0 to 59
	(Reserved)	2	B	00
Wafer Unloading Time Data	Unload start Year__	2	C	00 to 99
	Unload start Month__	2	C	1 to 12
	Unload start Day__	2	C	1 to 31
	Unload start Hour__	2	C	0 to 23
	Unload start Minute__	2	C	0 to 59
	(Reserved)	2	B	
Machine No.		4	B	Used with Vega 98/11/28
Machine No.		4	B	Used with Vega 98/11/28
Special Characters		4	B	<i>(User Special)</i>

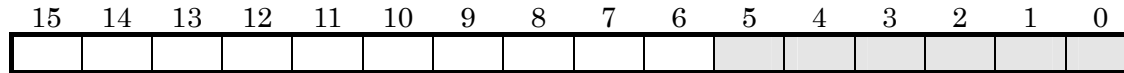
Data Name		Size (byte)	Data Form	Range of Value
Testing Result	Testing End Information	1	B	0: Normal End 1: Yield NG 2: Continuous FAIL NG
	(Reserved)	1	B	
	Total tested dice	2	B	1 to 16380
	Total pass dice	2	B	0 to 16380
	Total fail dice	2	B	0 to 16380
Test Die Information Address		4	P	Address of range where 6-byte data per die is stored. Range size = 6 × total tested die
Number of line category data		4	B	0,16,32,64,128, 256,512,1024
Line category address		4	B	
Extended Map Information	Map File Configuration	2	B	Extended Map Detailed Information (Bit) Refer to the following for the detail. Effective with map version 2 / 3 (256) and later.
	Max. Multi Site	2	B	Set maximum multi sites of testing. Effective with map version 2 / 3 (256) and later.
	Max. Categories	2	B	Set maximum categories of testing. Effective with map version 2 / 3 (256) and later.
	Do not use, reserved	2	B	

MAP FILE CONFIGURATION

Map file configuration is effective with map version 2 (256 multi) and later.

This area has the information of block availability of map file by bit unit.

To follow is detail of map file configuration.



- 0 bit Availability of Header Information (always ON)
- 1 bit Availability of Test Result Information per Die(always ON)
- 2 bits Availability of Line Category Information
- 3 bits Availability of Extension Header Information
- 4 bits Availability of Test Result Information per Extension Die
- 5 bits Availability of Extension Line Category Information
- 6 or more bits For Extension (Reserved)

4.2 EXTENSION HEADER INFORMATION LIST

Extension header information is used with 250,000-map data file and also with 256-multi map data file.

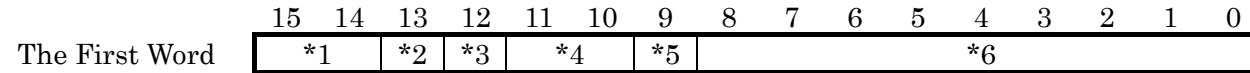
To follow is the extension header information.

Data Name	Size (Byte)	Data Form	Range of Value
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	1	B	
(Reserved)	2	B	
(Reserved)	2	B	
(Reserved)	2	B	
(Reserved)	2	B	
(Reserved)	2	B	
(Reserved)	2	B	
(Reserved)	2	B	

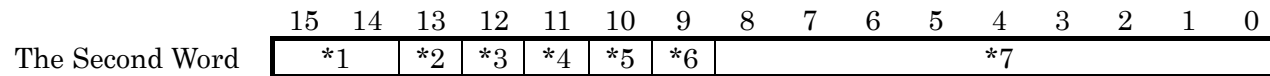
(Reserved)		2	B	
(Reserved)		2	B	
Data Name		Size (Byte)	Data Form	Range of Value
(Reserved)		2	B	
(Reserved)		2	B	
(Reserved)		2	B	
(Reserved)		2	B	
(Reserved)		2	B	
(Reserved)		2	B	
(Reserved)		2	B	
Wafer Test Result (250,000 Chips)	Tested dice	4	B	
	Tested pass dice	4	B	
	Tested fail dice	4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		4	B	
(Reserved)		64	C	

4.3 TEST RESULT per DIE

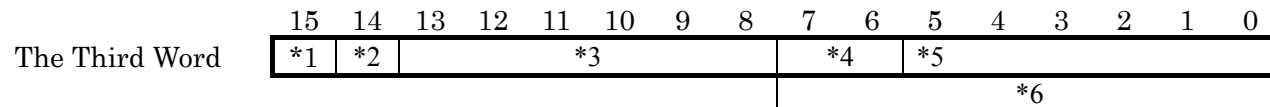
Test result per die is used with normal map data file and also map data file for 256 multi chips, and consists of three data, each Word of 2 bytes, thus total 6 bytes.



- *1 Die Test Result
0: Not Tested / 1: Pass Die / 2: Fail 1 Die / 3: Fail 2 Die
- *2 Marking
0: No / Yes (After Marking: 1)
- *3 Fail Mark Inspection
0: Yes / 1: No
- *4 Re-Probing Result
0: Not Re-Probed
1: Passed at re-probing
2: Failed at re-probing
3: Reserved(for further extension)
- *5 Needle Mark Inspection Result(added Jan/23/96)(Not handled)
0: OK / 1: NG
- *6 Die Coordinator Values × (0 to 511)



- *1 Die Property
0: Skip Die / 1: Probing Die / 2: Compulsory Marking Die
- *2 Needle Marking Inspection Execution Die Selection
0: No / 1: Yes
- *3 Sampling Die
- *4 Code Bit of Coordinator Value X
0: + data / 1: - data
- *5 Code Bit of Coordinator Value Y
0: + data / 1: - data
- *6 Dummy Data (except wafer)
- *7 Die Coordinator Value Y

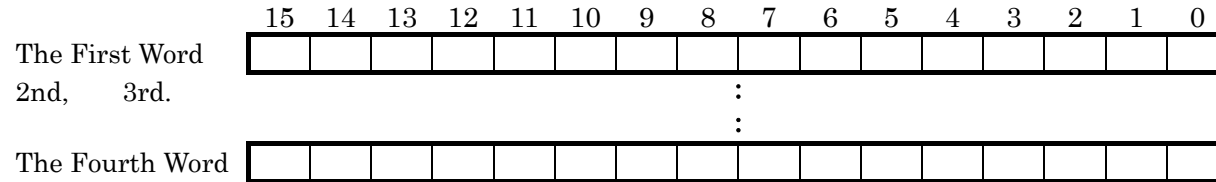


- *1 Measurement Finish Flag at "No-Over-Travel" Probing
0: Not Tested 1: Tested
 - *2 Reject Chip Flag (User Special)
Peripheral Probing Die (Standard specification)
Ink Die (User Special)
Partial P/W (User Special)
 - *3 Test Execution Site No. (0 to 63)
 - *4 Block Area Judgement Function
1: Block 1
2: Block 2
3: Block 3
 - *5 Category Data (0 to 63)
 - *6 According to user special, 8-bit area may be used.
- [NOTE] Add 1 to each of above to calculate actual site number and category data.

4.4 LINE CATEGORY per DIE

Line category per die is used with normal map data file and map data file for 256 multi chips, and consists of four data, each Word of 2 bytes, thus total 8 bytes.

As for line category, 1 to 64 of information is stored.



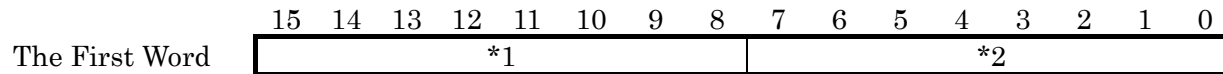
Take “0” bit of the first Word as category 1 and control category information in upward direction at 64 bits (8-bytes).

4.5 EXTENDED TEST RESULT per DIE

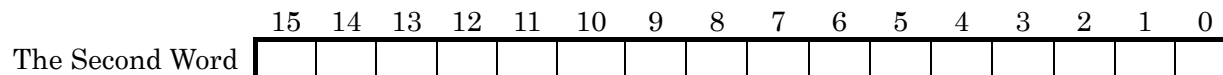
Extended test result per die is used with map data file for 256 multi chips, and consists of two data, each Word of 2 bytes, thus total 8 bytes.

However this area is used differently from map data up to 128 category (map version: 2,3) and category data over 128(map version :4).

[Map Version: 2/3]

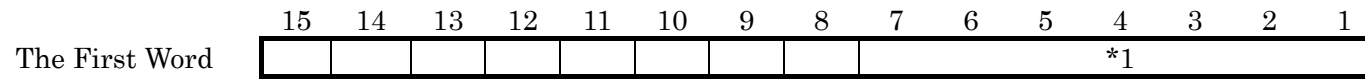


- *1 Extended Test Execution Site
0 to 255 (add 1 for actual test execution site.)
- *2 Extended Binary Category
0 to 127 (add 1 for actual category information.)

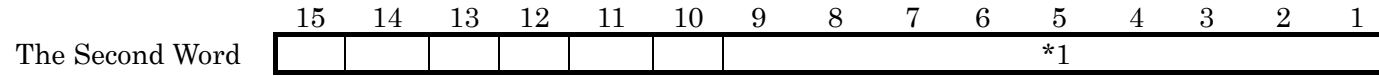


Reserved area: used for future function extension.

[Map Version: 4]



*1 Extended Test Execution Site
 0 to 255 (add 1 for actual test execution site)

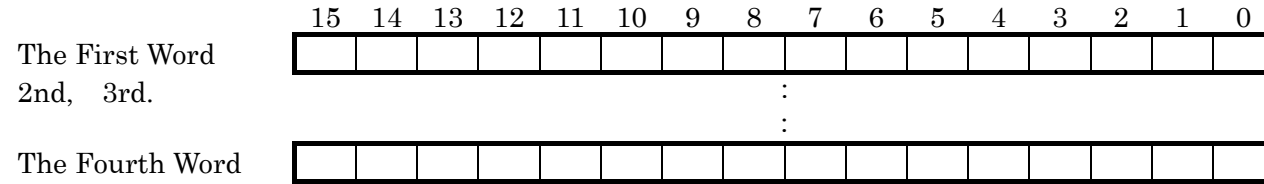


*1 Extended Binary Category
 0 to 1023 (add 1 for actual category information)

4.6 EXTENDED LINE CATEGORY per DIE

Extended line category per die is used with map data file for 256 multi chips, and consists of four data, each Word of 2 bytes per die, thus total 8 bytes.

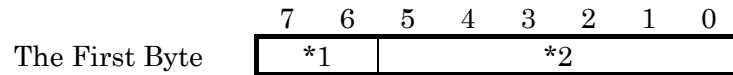
As for line category, 65 – 128 information are stored.



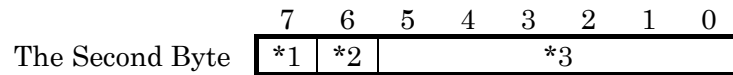
Take "0" bit of the first Word as category 65 and control category information in upward direction with 64 bits (8-bytes).

4.7 TEST RESULT per DIE for 250,000 CHIPS

Test result per die for 250,000 is used with map data file for 250,000 chips, and consists of two data, each Byte of 1 byte, thus total 2 bytes.



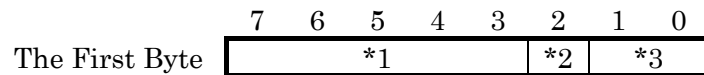
- *1 Die Test Result
0: Not Tested / 1: Passed Die / 2: Failed 1 Die / 3: Failed 2 Die
- *2 Category Data (0 to 63) add 1 for actual data value



- *1 Marking
0: No / 1: Yes (After marking: 1)
- *2 Spare
- *3 Test Execution Site Number (0 to 63) add 1 for actual data value

4.8 EXTENDED TEST RESULT per DIE for 250,000 CHIPS

Extended test result per die for 250,000 are used with map data file for 250,000 chips, and consists of one data, each Byte of 1 byte, thus total 1 byte.



- *1 Spare
- *2 Used for System Work
- *3 Re-Probing Result
0: Not Re-Probed
1: Passed at Re-Probing
2: Failed at Re-Probing
3: Reserved for Further Extension

CAUTION

The format of this file is in accordance with MS-DOS, however High Byte and Low Byte of each data will be in opposite orders. This is the only point that is different from MS-DOS.

- MS-DOS little-endian
- 90A/UF Series big-endian