JEDEC STANDARD

JEDEC® CML02 Memory Module Label Standard – for Compute Express Link® (CXL®)

JESD405-2

(Revision of JESD405-1B, June 2024)

November 2025

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

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JEDEC® CML02 Memory Module Label Standard – for Compute Express Link® (CXL®)

(From JEDEC Board Ballot number JCB-25-68, formulated under the cognizance of the JC-45 committee on DRAM Modules, item 2286.33).

1 Scope

The following labels shall be applied to all CXL memory modules in EDSFF form factors to fully describe the key attributes of the module. The label can be in the form of a stick-on label, silk screened onto the assembly, or marked using an alternate customer-readable format. A readable point size should be used, and the information can be printed in one or more rows on the label. Hyphens may be dropped when lines are split, or when font changes sufficiently separate fields. Unused letters or numbers in each field are to be omitted when not needed.

Each label shall include the following sections, which may share lines on the label or may occupy separate lines.

- Module type
- Serial number
- Part number
- Security identifier
- Machine readable

1.1 Section: Module Type

Format:

<media>~~b~~CXL<cxlrev>-PCIE<pcierev>-<iface>~~b~~<capacity>~~b~~<form>-<conn>-<portcfg>

Where:

Field	Description	Examples
<media>	Data media type	DDR4 (solder down) DDR5 (solder down) DDR4 RDIMM DDR5 RDIMM DDR5 MRDIMM
<cxlrev>	CXL base specification revision	2.0, 3.0, 3.1, 3.2
<pcierev>	PCIe revision	5.0, 6.0
<iface>	CXL interface type	MEM3 (CXL.mem type 3) MEM3NV (non-volatile, e.g., energy sourced)
<capacity>	Module capacity in GB or TB	128GB, 4TB

1.1 Section: Module Type (cont'd)

Field	Description	Examples
<form>	Module form factor and thickness	E3.S-1T E3.S-2T E3.L-1T E3.L-2T E1.L-9.5 (mm thickness) E1.L-18 E1.S-5.9 E1.S-8 E1.S-9.5 E1.S-15 E1.S-25
<conn>	Connector (slot) count	1C, 2C, 3C, 4C, 2x1C
<portcfg>	Port configuration and I/O width	1Px4, 2Px4, 1Px8, 2Px8, 1Px16
b	Space character	0x20
CXL	"CXL" text	0x43 0x58 0x4C
PCIE	"PCIE" text	0x50 0x58 0x49 0x45
-	Hyphen character	0x5F
NOTE All characters may be uppercase or lowercase		

<form> ::= <module type>-<module modifier>
Examples in the table above.

For SNIA EDSFF modules
<module type> ::= E3.S, E3.L, E1.S, E1.L
<module modifier> ::= 1T, 2T, <thickness in mm>

1.2 Section: Serial number

Format:

SN:<vid><mfgloc><mfgdate><serial>
%02x%02x%02x%02x%02x%02x%02x%02x%02x%02x

Where:

Field	Description	Examples
<vid>	Vendor identifier per JEP106, 4 hex characters %02x: Number of continuation codes with odd parity %02x: Module manufacturer code	8004 04A8
<mfgloc>	Vendor specific manufacturing location, 2 hex characters	01
<mfgdate>	Manufacturing date, yyww (year and week), 4 BCD characters	2509
<serial>	Unique serial number, 8 hex characters	12345678
SN:	"SN:" text	0x53 0x4E 0x3A

1.3 Section: Part number

Format:

PN:<mpn>

Where:

Field	Description	Examples
<mpn>	Manufacturer part number, 28 characters maximum	MTA12ASF2G72PA-4H4A0
PN:	“PN:” text	0x50 0x4E 0x3A

1.4 Section: Security Identifier

Format:

PSID:<psid>

Where:

Field	Description	Examples
<psid>	Physical security identifier, exactly 32 hex characters	1A2B3C4D09182736 00112233FFEEDDCC
PSID:	“PSID:” text	0x50 0x53 0x49 0x44 0x3A

1.5 Section: Machine Readable

Format:

2d_barcode

Where:

2d_barcode follows DataMatrix ECC 200; see ISO/IEC 16022 for details; characters coded per ISO 8859-1.

The size of the DataMatrix is not specified, but must contain sufficient data encoding space for at least the following textual information:

(L)<Module Type> **(S)**<Serial Number>**(P)**<Part Number>**(K)**<Security Identifier>**(C)**<Country of Origin>

where <Module Type>, <Serial Number>, <Part Number>, and <Security Identifier> are as defined in clauses 1.1 through 1.4 of this standard.

Field	Description	Examples
(L)	"(L)" text	0x28 0x4C 0x28
(S)	"(S)" text	0x28 0x53 0x28
(P)	"(P)" text	0x28 0x50 0x28
(K)	"(K)" text	0x28 0x4B 0x28
(C)	"(C)" text	0x28 0x43 0x28

The <Serial Number> field is exactly 21 ASCII characters long, including hyphens.

The <Part Number> field is supplier specific.

The <Security Identifier> field or Physical Presence Security ID (PSID) is exactly 32 ASCII characters as defined by the Trusted Computing Group Storage Opal SSC Feature Set: PSID specification; see trustedcomputinggroup.org for details. This field applies to CXL modules with data security features such as energy backup.

<Country of Origin> is exactly two ASCII alphabetic characters as defined in ISO 3166. Some example country codes:

Country	Code
China	CN
Japan	JP
Korea	KR
Taiwan	TW
United States of America	US

Other fields are permitted in the machine readable 2D barcode, and each section must start with (x), where x is a single section delineation character. Upper case characters (A-Z) in section delineation are reserved for JEDEC definition; lower case characters (a-z) may be used for supplier specific information. Delineated sections of the barcode may be in any order.

2 ASCII Table

Character	Hex	Decimal	Character	Hex	Decimal	Character	Hex	Decimal
<space>	20	32	@	40	64	`	60	96
!	21	33	A	41	65	a	61	97
"	22	34	B	42	66	b	62	98
#	23	35	C	43	67	c	63	99
$	24	36	D	44	68	d	64	100
%	25	37	E	45	69	e	65	101
&	26	38	F	46	70	f	66	102
'	27	39	G	47	71	g	67	103
(	28	40	H	48	72	h	68	104
)	29	41	I	49	73	i	69	105
*	2A	42	J	4A	74	j	6A	106
+	2B	43	K	4B	75	k	6B	107
,	2C	44	L	4C	76	l	6C	108
_	2D	45	M	4D	77	m	6D	109
.	2E	46	N	4E	78	n	6E	110
/	2F	47	O	4F	79	o	6F	111
0	30	48	P	50	80	p	70	112
1	31	49	Q	51	81	q	71	113
2	32	50	R	52	82	r	72	114
3	33	51	S	53	83	s	73	115
4	34	52	T	54	84	t	74	116
5	35	53	U	55	85	u	75	117
6	36	54	V	56	86	v	76	118
7	37	55	W	57	87	w	77	119
8	38	56	X	58	88	x	78	120
9	39	57	Y	59	89	y	79	121
:	3A	58	Z	5A	90	z	7A	122
;	3B	59	[	5B	91	{	7B	123
<	3C	60	\	5C	92	|	7C	124
=	3D	61	]	5D	93	}	7D	125
>	3E	62	^	5E	94	~	7E	126
?	3F	63	-	5F	95	Delete	7F	127

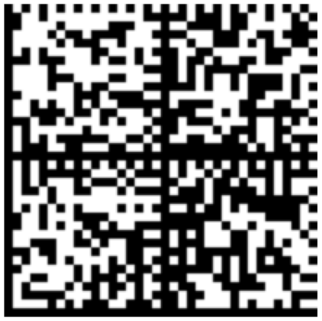
3 Examples

DDR5 CXL20-PCIE50-MEM3NV
256GB E3.S-2T-2C-1Px8
SN:802C26230112345678
PN:MTA12ASF2G72PA-4H4A0
PSID:1A2B3C4D0918273600112233FFEEDDCC

DDR5 SDRAM media type, soldered down
CXL 2.0, PCIe 5.0 operating at 32Gbps per lane
Type 3 controller supporting CXL.MEM protocol with energy backup source for non-volatility
256GB total capacity
E3.S-2T form factor with 2 connectors supported as one port of x8
Serial Number = 802C26230112345678
Part number = MTA12ASF2G72PA-4H4A0
Physical Security Identifier = 1A2B3C4D0918273600112233FFEEDDCC
Country of Origin: Japan

2D Barcode: (L)DDR5 CXL20-PCIE50-MEM3NV 256GB E3.S-2T-2C-1Px8
(S)802C26230112345678(P)MTA12ASF2G72PA-
4H4A0(K)1A2B3C4D0918273600112233FFEEDDCC(C)JP

3 Examples (cont'd)



DDR5 MRDIMM CXL32-PCIE60-MEM3
512GB E3.L-2T-2C-1Px16
SN:1FAA26230187654321
PN:SKH55BCCX112PA-4H4A0

DDR5 MRDIMM media type, module in connector
CXL 3.2, PCIe 6.0 operating at 64Gbps per lane
Type 3 controller supporting CXL.MEM protocol
512GB total capacity
E3.L-2T form factor with 2 connectors supported as one port of x16
Serial Number = 1FAA26230187654321
Part number = SKH55BCCX112PA-4H4A0
Country of Origin: Japan

2D Barcode: (L)DDR5 MRDIMM CXL32-PCIE60-MEM3 512GB E3.L-2T-2C-1Px16
(S)1FAA26230187654321(P)SKH55BCCX112PA-4H4A0(C)JP

4 External References

- DataMatrix ECC 200; ISO/IEC 16022
  https://www.iso.org/standard/44230.html

- Character codes ISO 8859-1
  https://www.iso.org/standard/28245.html

- Physical Presence Security ID (PSID)
  Trusted Computing Group Storage Opal SSC Feature Set: PSID specification
  https://trustedcomputinggroup.org/

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The purpose of this form is to provide the Technical Committees of JEDEC with input from the industry regarding usage of the subject standard. Individuals or companies are invited to submit comments to JEDEC. All comments will be collected and dispersed to the appropriate committee(s).

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1. I recommend changes to the following:

☐ Requirement, clause _____

☐ Test method number _____ Clause number _____

The referenced clause number has proven to be:

☐ Unclear ☐ Too Rigid ☐ In Error

☐ Other _____

2. Recommendations for correction:

_____

_____

_____

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3. Other suggestions for document improvement:

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