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AE/MFT2.2		Harold Ebeling		Sept. 01. 2022

Specific MAT-Label
for Assembly Electronics Products
delivered to Bosch

based on

Bosch-AE Instruction MAT-Label

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1 Prologue

1.1 Purpose

This instruction complements the specification Bosch-AE Instruction MAT-Label (2269921330)
and specifies requirements for the MAT-Label of "assembled and not final tested parts containing one or more chips (ASIC, MEMS, ...)".

Version description

Version	Alteration Number	Alteration	Date
0.0	-	Draft	10.10.2021
1.0	-	Implementation	27.01.2022
1.1	3E10079291	Editorial Change (sequence-numbers in table6 corrected)	01.09.2022

Acceptance

Department		
RtP1/MFI		
Date		
Signature		
Signed		

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1.2 Table of contents

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2   Scope and Orientation

This instruction describes the contents of the MAT-Label for the product group
"assembled and not final tested parts containing one or more chips (ASIC, MEMS, ...)".

The MAT-Label for these products

- is based on the general specifications of the MAT-Label
   (see www.bosch.com > Company > Supply chain > Information for business partners >
        Logistics: Regulations and Standards > Marking of supplied parts: MAT-Label)

   o   Standardized labeling of parts from suppliers with MAT-Label:

        Requirements on Marking of Goods and Accompanying Information for Purchased
        Production Parts (MAT-Label); established in collaboration with Bosch, Siemens, Hella,
        Continental and Zollner

   o   Specification of MAT-Label for Automotive Electronics (AE):

        Bosch-AE Instruction MAT-Label (2269921330)

- includes additional information about assembled chips

   o   All specifics for assembled parts are listed in
        chapter "3.5 Differences to Bosch-AE Instruction MAT-Label".

For the product group of final tested parts delivered to Bosch please refer to the

- MAT-Label Bosch-AE Instruction for final tested parts V1.0

   (see www.bosch.com -> Company -> Information for business partners
   -> Logistics: Regulations and Standards-> Marking of supplied parts: MAT-Label
   - > Specification of MAT-Label for Final Tested Parts (AE))

2.1 Motivation and Changes

2.1.1 Motivation

The reasons for this version are:
- alignment to the structure of the Bosch-AE Instruction MAT-Label
- unique layout, always with two Data Matrix Codes (DMCs)
- identical field values as for final tested parts
- better identification of material for the logistic process

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2.1.2 Changes

All changes to the primary version

"Appendix to Bosch-AE-Instruction MAT-Label for Assembly Electronics"

as attachment of "Bosch-AE Instruction MAT-Label (2269921330)" are listed in chapter "3.6 Changes to previous version".

3 MAT-Label for Assembled Chips

3.1 Definition of the MAT-Label contents

The MAT-Label for Assembly Electronics always consists of two DMCs:
- The MAT-Label / Main Section DMC as required (see chapter 3.3.1)
- The Assembled Components DMC, which contains
  - Lot and Wafer IDs of all chips (ASIC, MEMS, ...) used for the assembly lot (see chapter "3.4.1 Assembled Components Section Table")
  - Lot IDs of other components if required by Bosch

The placement of the DMCs has to consider the printed size in case of maximum data.

The data of the Assembled Components section must be separated from standard MAT-Label contents by a dividing line.

3.2 Label sample with DMCs

3.2.1 MAT-Label for Assembly Electronics
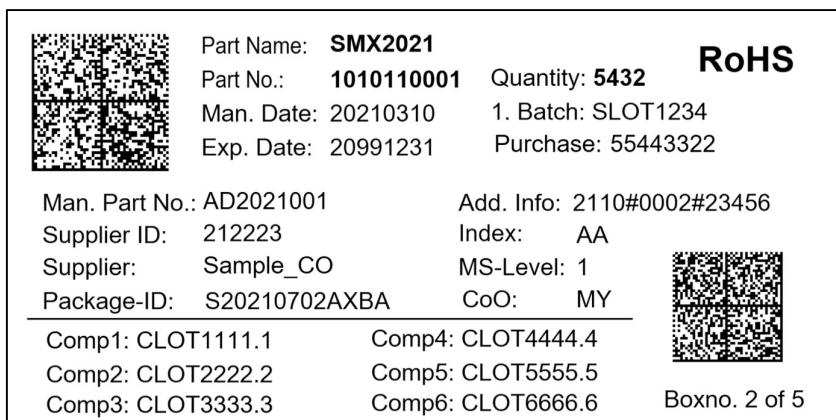
Fig. 1: Example of MAT-Label

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3.2.2 Data Matrix Codes

3.2.2.1 Main Section DMC

For details see chapter 3.3 Main Section.

```
[)>@06@12SA002@P1010110001@1PAD2021001@31PMY@12V333666999
@10VMYS-PENANG@2PAA@20P2110#0002#23456@6D20210311@14D20991231
@30PY@Z1@K55443322@16K412938/001@V212223@3SS20210702AXBA@Q5432NAR000
@20T1@1TSLOT1234@2T@1Z10001#X2110#0002@@
```

[)>@06 = prefix   @ = separator   nX = identifier   @@ =suffix

3.2.2.2 Assembled Components Section DMC

For details see chapter 3.4 Assembled Components Section.

```
@V212223@3SS20210702AXBA@31T%LCLOT1111.1%W01,11@32T%LCLOT2222.2%W02,12
@33T%LCLOT3333.3%W03,13@34T%LCLOT4444.4%W04,14@35T%LCLOT5555.5%W05,15
@36T%LCLOT6666.6%W06,16@@
```

@ = separator   nX = identifier   %Y = sub identifier   @@ =suffix

3.3 Main Section

The Main Section of the MAT-Label for Assembly Electronics contains
- MAT Label Data Matrix Code
- printed values
according to the Bosch-AE Instruction MAT-Label.

3.3.1 Main Section Table

This Main Section Table aligns with table "2.1.2 Definition of the MAT-Label content"
in Bosch-AE Instruction MAT-Label.

We added the column "Predefined / Changed Value" at the end to mark predefined and changed values:

- A: value is predefined for Assembly Electronics
- S: value is according to Bosch-AE Instruction MAT-Label
- C: added in case that the field value differs from previous version
- N: added in case it is a new field

All modified or new cells have yellow background and are described in detail in chapter "3.6 Changes to previous version".

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No.	Data Field	Proposals for field description	Definition / Description	Data Identifier	Length	Format N = Numerical, A/N = Alphanumerical, D =day, M = month, Y = year	Example	Machine-Readable Code 2D-Code Data Matrix Bosch	Printed Text Bosch	Predefined/ Changed value for Assembly Electr. (A) or Standard (S) /Changed (C) or New (N)
Label Information										
1.	Label Version		The revision level (version) is a fixed entry and serves as recognition of the label or its version. The first digit "A" indicates that this label has two Data Matrix Codes.	12S	4	A/N ("A002")	A002 (fixed data)	yes	no	AC
Part Information										
2.	Customer Part Number	Part No.	Part number of Bosch (10 digits without separators)	P	10	A/N	1010110001	yes	yes (highlighted)	S
3.	Manufacturer Part Number	Man. Part No.	Internal manufacturer part number.	1P	Max. 35	A/N	AD2021001	yes	yes	S
4.	Ordering Code	Ord. Code	As Bosch does not use this field, it is utilized for the Country of Origin as ALPHA ISO 2	31P	2	A	MY	yes	no	AC
5.	Part Description (Part Name)	Part Name	Specified description of the ordered part (or part name).	-	Max. 30	A/N	SMX2021	no	yes (highlighted)	S
6.	Manufacturer Number		Explicit identification for the manufacturer, e.g. **DUNS-Nr.**	12V	Max. 13	A/N	333666999	yes	no	S
7.	Manufacturer Location	Man. Loc.	Naming the manufacturing location/locations	10V	Max. 20	A/N	DEU-REUTLINGEN	yes	no	S
8.	Revision Level/ Index	Index	Revision status of the part. The actual Bosch- Revision-Index must be filled in. If not existing the change number must be given here.	2P	Max. 14	A/N	AA	yes	yes	S
9.	Additional Part Information	Add. Info	Date Code = week of manufacturing date (Format YYWW) Delimiter # Lot Counter (Trace code) = part of laser marking Delimiter # Total Quantity of assembled lot	20P	Max. 30	A/N	2110#0020#23456	yes	yes	AC
More Part Information										
10.	Date of Manufacturing	Man. Date	Date of manufacturing is related to the last manufacturing process	6D	8	YYYYMMDD	20210311	yes	yes	S
11.	Expiration Date	Exp. Date	The Expiration Date of the part. Fixed value "20991231" if not specified otherwise	14D	8	YYYYMMDD	20991231	yes	yes	S
12.	RoHS		Indicator for RoHS compliance N: no RoHS Y: RoHS 0: not applicable	30P	1	A/N (upper case)	Y	yes	Logo	S
13.	MS-Level	MSL or MS-Level	Moisture Sensitivity Level according to IPC/JEDEC J-STD-020.	Z	Max. 2	A/N, "N" if not applicable (text)	1	yes	yes	S

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No.	Data Field	Proposals for field description	Definition / Description	Data Identifier	Length	Format N = Numerical, A/N = Alphanumerical, D =day, M = month, Y = year	Example	Machine-Readable Code 2D-Code Data Matrix Bosch	Printed Text Bosch	Predefined/ Changed value for Assembly Electr. (A) or Standard (S) /Changed (C) or New (N)
						Logistic Information				
14.	Purchase Order Number	Purchase	Order number assigned by customer to identify a purchasing transaction.	K	Max. 18	A/N	55443322	yes	yes	S
15.	Shipping Note Number	Shipping Note	Shipping Note Number of the shipping note and MAT-Label must be the same. If supplier cannot provide the shipping-note, the field must be empty.	16K	Max. 12	A/N	412938/001	yes	no	AC
16.	Supplier Name (no real data field!)	Suppl.	The Supplier Name.	-	Max. 30		Sample_CO	no	yes	S
17.	Supplier-ID (Vendor Number)		The fixed vendor number (of the customer) for the supplier.	V	Max. 10	A/N	212223	yes	yes	S
18.	Package-ID		The explicit, unique number per single package. It has to be unique per supplier (vendor number) and package. It is always related to the smallest package unit. If possible, chronologically related to the production process (e.g. reel-ID).	3S	13	A/N	S20210702AXBA (first Byte reserved for specifying single)	yes	yes	S
19.	Quantity		Quantity of the smallest package unit.	Q	Max.18	12ISO3 to be aligned to the right, see example	5432NAR000 (in DMC) (printed: 5432)	yes	yes (highlighted)	S
						Traceability Information				
20.	Batch-Counter		Batch ID identifies the number of batches	20T	1	N	1 (fixed value)	yes	no	A
21.	Batch-No. #1	1. Batch No.	With this number the supplier has to be able to retroactively provide information about the batch (e.g. volume, production, delivery). The batch identification should be based on same manufacturing conditions. If a manufacturing condition changes batch number should be changed too.	1T	Max. 17	A/N	SLOT1234	yes	yes (highlighted)	SC
22.	Batch-No. #2	2. Batch No.	Batch number for the second batch – always empty because mixing of two batches is not allowed.	2T	Max. 17	A/N		yes	no	A
						Other				
23.	Supplier Data		Marking on device as defined, lines separated by "#" blanks noted as "_"	1Z	Max. 30	A/N	10001#X2110# 0002	yes	no	A
24.	Country of Origin	CoO	This printed field contains the value of field 4. Ordering Code as ALPHA ISO 2	-	2	A	MY	no	yes	AN
25.	Box Counter	Boxno.	Number of this Box (x) with total count of all boxes of the lot (y) as "x of y"	--	Max. 5	A	2 of 5	no	yes	AN

Table 1: Main Section Table

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3.3.2 Country of Origin

The field Ordering Code (Field No. 4, Identifier 31P) of the Main Section DMC is used to carry the information Country of Origin as Bosch does not use this field as originally defined. There the code must be filled as ALPHA ISO 2.

The field Manufacturing Location in parallel to CoO as printed text (Field No. 24) may be misleading. In this case it must be defined with Bosch, which field shall be used as printed text. Generally, for packaged devices, for "Country of Origin", the country of assembly must be used.

The legal requirements for CoO for the receiving countries for the printed text must be followed in any case,

e.g. CoO for Taiwan   when shipping to China: "Made in Taiwan"
                         when shipping to USA: "CoO / Made in TW"

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3.4 Assembled Components Section

The Assembled Components Section of the MAT-Label for Assembly Electronics includes
- Assembled Components Data Matrix Code
- printed values

containing the data of all relevant component lots.

3.4.1 Assembled Components Section Table

Cells with values changed towards the previous version are marked in yellow. All changes are described in detail in chapter "3.6 Changes to previous version".

No.	Data Field	Proposals for field description	Definition / Description	Data Identifier	Length	Format N = Numerical, A/N = Alphanumerical, D =day, M = month, Y = year	Example	Machine-Readable Code 2D-Code Data Matrix Bosch	Printed Text Bosch
			Logistic Information						
26	Supplier-ID		Supplier-ID of MAT-Label DMC	V	Max. 10	A/N	212223	yes	no
27	Package-ID		Package-ID of MAT-Label DMC	3S	13	A/N	S20210702AXBA	yes	no
			Traceability Information						
28	Comp. Lot-No#1	Comp1	First Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	31T	Max. 46	A/N	%LCLOT1111.1 %W01,11	yes	yes (Lot-ID)
29	Comp. Lot-No#2	Comp2	Second Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	32T	Max. 46	A/N	%LCLOT2222.2 %W02,12	yes	yes (Lot-ID)
30	Comp. Lot-No#3	Comp3	Third Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	33T	Max. 46	A/N	%LCLOT3333.3 %W03,13	yes	yes (Lot-ID)
31	Comp. Lot-No#4	Comp4	Fourth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	34T	Max. 46	A/N	%LCLOT4444.4 %W04,14	yes	yes (Lot-ID)
32	Comp. Lot-No#5	Comp5	Fifth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	35T	Max. 46	A/N	%LCLOT5555.5 %W05,15	yes	yes (Lot-ID)
33	Comp. Lot-No#6	Comp6	Sixth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	36T	Max. 46	A/N	%LCLOT6666.6 %W06,16	yes	yes (Lot-ID)
34	Comp. Lot-No#7		Seventh Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	37T	Max. 46	A/N	%LNC210702% Q0010864%TCE	yes	no
35	Comp. Lot-No#8		Eighth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	38T	Max. 46	A/N	%LAE202122 %TAE	yes	no
36	Comp. Lot-No#9		Nineth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	39T	Max. 46	A/N	%LXC4712 %TXC	yes	no
37	Comp. Lot-No#10		Tenth Component Lot- & Wafer-ID. If required: Quantity and Lot Type.	40T	Max. 46	A/N	%LAB8463 %TBA	yes	no

Table 2: Assembled Components Section Table

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3.4.1.1 Definition of the Component Lot Data

For each chip component lot the values of Lot-ID, Wafer-ID(s) - and if agreed for non-chip components the Lot Type - are required. If the amount of assembled devices is different to the quantity of the package unit, the used quantity of the component lot has to be written into the field Quantity.

Field Name	Identifier	Length	Format	Example	Remark
Lot ID	%L	max. 12	Alphanumerical	CLOT1111.1	
Wafer ID	%W	max. 17	NN,NN,NN,NN,NN	01,11	required for chip lots; Wafer IDs separated by commas; Wafer IDs 1 to 9 always with leading 0
Quantity (optional)	%Q	max. 7	NNNNNNN	10864	only needed if different to quantity of package unit (Field 19. Quantity); no leading 0
Lot Type (optional)	%T	2	Alphanumerical	CE	only needed if agreed for non-chip components

Table 3: Component Lot Table

3.4.2 Order and Printing of Component Lots

The Assembled Component DMC contains up to ten Component Lot-IDs. Ordering and printing of these Lot-IDs must follow these guidelines:

1) Specifications of Bosch for the sequence of the Component Lot-IDs must be adhered to.

2) The first six Component Lot-IDs must be printed as text fields Comp1, …, Comp6.

3) The order of the Lot-IDs on the shipping note must be the same as in the MAT-Label.

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3.5 Differences to Bosch-AE Instruction MAT-Label

3.5.1 Standard fields

Field No.	Data Field	Identifier	contents	comment
1.	Label Version	12S	"A002"	indicating the specific MAT-Label version with two DMCs for Assembly Electronics
4.	Ordering Code	31P	Country of Origin	required Country of Origin according ISO 3166-1 ALPHA-2 in DMC
9.	Additional Part Information	20P	Date Code # Lot Counter # Total Quantiy	contents of this field may be used for additional data
15.	Shipping Note Number	16K	empty if not available at printing time	Empty field (instead of "0") to enable automated process
20.	Batch-Counter	1T	1	only one assembly lot allowed
22.	Batch-No. #2	2T	always empty	field is empty, because the mixing of two batches is not allowed
23.	Supplier Data	1Z	Marking on device	Use of this field is necessary to include this important value

Table 4: Differences of Standard fields

3.5.2 Additional fields

Field No.	Data Field	Identifier	contents	comment
24.	Country of Origin	-	Country of Origin	Two-digit value according to ISO 3166-1 ALPHA-2 only as printed value
25.	Box Counter	-	Number of this Box (x) with total count of all boxes of the lot (y) as "x of y"	Only printed field; To simplify sorting of all boxes of a lot

Table 5: Additional Fields for Assembly Electronics

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3.5.3 Second DMC for Assembled Components

Detailed description in chapter 3.4. Assembled Components Section

3.6 Changes to previous version

Field No.	Data Field	Identifier	new	old	comment
1.	Label Version	12S	"A002"	"0002"	necessary due to essential changes
4.	Ordering Code	31P	Country of Origin (two-digit value)	Ord. Code	required to include Country of Origin according ISO 3166-1 ALPHA-2
9.	Additional Part Information	20P	Date Code (Format YYWW) Delimiter # Lot Counter / Trace code Delimiter # lotquantity	Date Code (Format YYWW) Delimiter # Trace code Delimiter # additional Supplier Lot No. and Wafer IDs	Supplier Lot No. now shifted into Field 21. Batch-No. #1 and Wafer IDs are now included in Assembled Components DMC; added total quantity of assembly lot
15.	Shipping Note Number	16K	emtpy field if SNN is unknown	"0" if SNN is unknown	alignment with spec for final tested devices
21.	Batch-No. #1	1T	Supplier Lot No. (without prefix "*")	Bosch Lot ID w/o prefix "*", depending on second DMC	alignment with AE MAT-Label spec and spec for final tested devices
22.	Batch-No. #2	2T	no printed text	-	field is empty, because the mixing of two batches is not allowed
24.	CoO	-	printed (two-digit value)	-	required to include Country of Origin according ISO 3166-1 ALPHA-2

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Field No.	Data Field	Identifier	new	old	comment
25.	Box Counter	-	Boxno. x of y	-	x = Boxno.; y = total number of boxes of delivered lot
28. to 33.	Comp. Lot-No	3xT	printing of Bosch-Lot-IDs	-	new fields to be printed for up to six Bosch-Lot-IDs separated by a horizontal line
28. to 37.	Comp. Lot-No	3xT (also 40T in case of ten lots)	required for all Bosch-Lot-IDs incl. Wafer-IDs	Lot- and Wafer-IDs for second and further Bosch-Lot-ID(s)	now all Bosch-Lot-IDs and corresponding Wafer-IDs are included in Assembled Components DMC, also in case of only one Bosch-Lot-ID

Table 6: Changes to previous version

3.6.1 Renamings

Assembled Components DMC renamed from Component Batch DMC.

Trace Code is now denoted as Lot Counter (part of laser marking).