<table>
<thead>
<tr>
<th>Instruction</th>
<th>Document</th>
<th>Version</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE/MFT2.2 Specific MAT-Label for Processed Wafer</td>
<td>1 279 944 031</td>
<td>1.0</td>
<td>1/12</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>From</th>
<th>Our Reference</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harold Ebeling</td>
<td></td>
<td>26.04.2022</td>
</tr>
</tbody>
</table>

Specific MAT-Label for Processed Wafer delivered to Bosch

based on

Bosch-AE Instruction MAT-Label
1 Prologue

1.1 Purpose

This instruction complements the specification Bosch-AE Instruction MAT-Label (2269921330) and specifies requirements for the MAT-Label for “Processed wafers delivered to Bosch”.

<table>
<thead>
<tr>
<th>Version</th>
<th>Alteration Number</th>
<th>Alteration</th>
<th>Date</th>
</tr>
</thead>
</table>

Acceptance

<table>
<thead>
<tr>
<th>Department</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>RtP1/LOI-SCO</td>
<td>26.04.2022</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature</th>
<th>Signed</th>
</tr>
</thead>
</table>
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 “Processed Wafer”. It is valid for unmeasured and measured (Wafer Level Test) wafer.

The MAT-Label for these products

- is based on the general specifications of the MAT-Label (see [www.bosch.com](http://www.bosch.com) > Company > Supply chain > Information for business partners > Logistics: Regulations and Standards > Marking of supplied parts: MAT-Label)
  - Standardized labeling of parts from suppliers with MAT-Label:
    - Requirements on Marking of Goods and Accompanying Information for Purchased Production Parts (MAT-Label)
  - Specification of MAT-Label for Automotive Electronics (AE):
    - Bosch-AE Instruction MAT-Label (2269921330)
    - includes additional Data Matrix Code (DMC) with wafer data

All specifics for Processed Wafer are listed in chapter “3.5 Differences to Bosch-AE Instruction MAT-Label”.

2.1 Motivation and Changes

The reasons for this new version are:

- Considering legal requirement “Country of Origin”
- alignment of fields 1. Batch and Shipping Note

All changes to the initial version are listed in chapter “3.6 Changes to initial version”.

3 MAT-Label for Processed Wafer

3.1 Definition of the MAT-Label content

The MAT-Label for Processed Wafer always consists of two DMCs:

- The MAT-Label DMC as required (see chapter 3.3)
- The Wafer Data DMC, which contains all Wafer-IDs and for measured wafer additionally good dies per wafer (see chapter 3.4)
  - The Wafer Data DMC has to be printed at the bottom.

The placement of the DMCs has to consider the printed size in case of maximum data.
3.2 Label samples with DMCs

3.2.1 MAT-Label for unmeasured Processed Wafer

![Fig. 1: Example of MAT-Label for unmeasured wafer](image)

**3.2.1.1 MAT-Label DMC**

For details see chapter “3.3 MAT-Label DMC”.

```
[@06 = prefix             @ = separator     nX = identifier        @@ = suffix]
```

**3.2.1.2 Wafer Data DMC**

For details see chapter “3.4 Wafer Data DMC”.

```
[@ = separator     nX = identifier     %L = sub identifier Lot-Id
%W = sub identifier Wafer String   @@ = suffix]
```
3.2.2 MAT-Label for measured Processed Wafer (with maximal data)

![Example of MAT-Label for measured wafer](image)

**Fig. 2: Example of MAT-Label for measured wafer**

### 3.2.2.1 MAT-Label DMC

For details see chapter “3.3 MAT-Label DMC”.

```
>@@@6 = prefix     @ = separator     nX = identifier     @@ = suffix
```

### 3.2.2.2 Wafer Data DMC

For details see chapter “3.4 Wafer Data DMC”.

```
@V777@S20210708AXBA@T%LMAX2021%W01@1234017,02@1234027,03@1234037,
04@1234047,05@1234057,06@1234067,07@1234077,08@1234087,09@1234097,10@1234107,
11@1234117,12@1234127,13@1234137,14@1234147,15@1234157,16@1234167,17@1234177,
18@1234187,19@1234197,20@1234207,21@1234217,22@1234227,23@1234237,24@1234247,
25@1234257@@
```

```
@ = separator     nX = identifier     %L = sub identifier Lot-ID
%W = sub identifier Wafer String     % = Delimiter for Quantity     @@ = suffix
```
### 3.3 Standard MAT-Label Data

This chapter explains the required data for
- 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 “Value is Standard(S) or ...” at the end to mark predefined and changed values:

- S (Standard) : value is according to Bosch-AE Instruction MAT-Label
- P (Processed Wafer) : value is predefined for Processed Wafer
- C (Changed) : added in case that the field value differs from previous version
- N (New) : 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 initial version”.

<table>
<thead>
<tr>
<th>No.</th>
<th>Data Field</th>
<th>Proposals for field description</th>
<th>Definition / Description</th>
<th>Data Identifier</th>
<th>Length</th>
<th>Format</th>
<th>Example</th>
<th>Machine-Readable Code</th>
<th>Printed Text</th>
<th>Value is Standard(S) or specific for Proc. Wafer (P) or Changed (C) or New (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Label Version</td>
<td></td>
<td>The revision level (version) is a fixed entry and serves as recognition of the label or its version. The first digit “P” indicates that this label has two Data Matrix Codes.</td>
<td>12S</td>
<td>4</td>
<td>N (“P002”)</td>
<td>P002 (fixed data)</td>
<td>yes</td>
<td>no</td>
<td>PC</td>
</tr>
<tr>
<td>2.</td>
<td>Customer Part Number</td>
<td>Part No.</td>
<td>Part number of Bosch (10 digits without separators)</td>
<td>P</td>
<td>10</td>
<td>A/N</td>
<td>1223344556</td>
<td>yes</td>
<td>no</td>
<td>S</td>
</tr>
<tr>
<td>3.</td>
<td>Manufacturer Part Number</td>
<td>Man. Part No.</td>
<td>Internal manufacturer part number.</td>
<td>1P</td>
<td>Max. 35</td>
<td>A/N</td>
<td>PV20215556</td>
<td>yes</td>
<td>yes</td>
<td>S</td>
</tr>
<tr>
<td>4.</td>
<td>Ordering Code</td>
<td>Ord. Code</td>
<td>As Bosch does not use this field, it is utilized for the Country of Origin as ALPHAN ISO 2</td>
<td>31P</td>
<td>2</td>
<td>A/N</td>
<td>DE</td>
<td>yes</td>
<td>no</td>
<td>PC</td>
</tr>
<tr>
<td>5.</td>
<td>Part Description (Part Name)</td>
<td></td>
<td>Specified description of the ordered part (or part name).</td>
<td>-</td>
<td>Max. 30</td>
<td>A/N</td>
<td>ProWafer_2021</td>
<td>no</td>
<td>yes</td>
<td>(highlighted) S</td>
</tr>
<tr>
<td>6.</td>
<td>Manufacturer Number</td>
<td></td>
<td>Explicit identification for the manufacturer, e.g. DUNS-Mr.</td>
<td>12V</td>
<td>Max. 13</td>
<td>A/N</td>
<td>22446688</td>
<td>yes</td>
<td>no</td>
<td>S</td>
</tr>
<tr>
<td>7.</td>
<td>Manufacturer Location</td>
<td>Man. Loc.</td>
<td>Naming the manufacturing location/locations.</td>
<td>10V</td>
<td>Max. 20</td>
<td>A/N</td>
<td>DEU-DRESDEN</td>
<td>yes</td>
<td>no</td>
<td>S</td>
</tr>
<tr>
<td>8.</td>
<td>Revision Level/ Index</td>
<td>Index</td>
<td>Revision status of the part. The actual Bosch-Revision-Index must be filled in. If not existing the change number must be given here.</td>
<td>2P</td>
<td>Max. 14</td>
<td>A/N</td>
<td>AA</td>
<td>yes</td>
<td>yes</td>
<td>S</td>
</tr>
</tbody>
</table>
Table 1: Main Section Table
3.3.2 Additional Part Information (Field No. 9)

This field needs to be filled with the lasered Lot on the Wafer. This part of the lasermarking is unique for all wafers of a lot. Separated by a #-delimiter the kind of the processed Wafer has to be notified:

- U: Unmeasured Wafer
- M: Measured Wafer

3.3.3 Quantity (Field No. 19)

In case of unmeasured wafer this is the quantity of wafer, in case of measured wafer this is the sum of all good dies.

3.3.4 Country of Origin (Fields No. 4 and No. 24)

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”
3.4 **Wafer Data DMC**

Processed Wafer need an additional Data Matrix Code to include wafer data. This DMC contains the following informations:

- Supplier-ID & Package-ID (same values as in the MAT-Label DMC)
- Wafer Data

### 3.4.1 Wafer Data Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Data Field</th>
<th>Proposals for field description</th>
<th>Definition / Description</th>
<th>Machine-Readable Code</th>
<th>Printed Text</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2D-Code Data Matrix</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bosch</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bosch</td>
<td></td>
</tr>
</tbody>
</table>

#### Logistic Information

<table>
<thead>
<tr>
<th></th>
<th>Supplier-ID</th>
<th>Supplier-ID, same value as Field No. 17 in MAT-Label DMC</th>
<th>V</th>
<th>Max. 10</th>
<th>A/N</th>
<th>777</th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Package-ID</td>
<td>Package-ID, same value as Field No. 18 in MAT-Label DMC</td>
<td>3S</td>
<td>13</td>
<td>A/N</td>
<td>S20210708AXBA</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

#### Wafer Information

<table>
<thead>
<tr>
<th></th>
<th>Wafer Data</th>
<th>Lot-ID (same as in Field No. 21 in MAT-Label DMC)</th>
<th>%L as Lot-identifier Wafer-IDs w/o quantity of good dies, separated by commas</th>
<th>Quantity by wafer assigned with #-sign</th>
<th>Max. 297</th>
<th>AN</th>
<th>31T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%W as Wafer-Identifier Unmeasured wafer: %LSLOT2021</td>
<td>%W01,02,03,04,05,06,07,08 Measured wafer: %MAX2021 %W01#1234017, 02#1234027</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Wafer Data Table**
3.5 Differences to Bosch-AE Instruction MAT-Label

3.5.1 Standard fields

<table>
<thead>
<tr>
<th>Field No.</th>
<th>Data Field</th>
<th>Identifier</th>
<th>contents</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Label Version</td>
<td>12S</td>
<td>“P002”</td>
<td>first sign “P” indicates additional DMC</td>
</tr>
<tr>
<td>9.</td>
<td>Additional Part Information</td>
<td>20P</td>
<td>Lasered Lot Delimiter # mark for measure: U: Unmeasured Wafer M: Measured Wafer</td>
<td>contents of this field may be used for additional data depending on product groups</td>
</tr>
<tr>
<td>15.</td>
<td>Shipping Note Number</td>
<td>16K</td>
<td>empty if not available at printing time</td>
<td>necessary for automatic booking</td>
</tr>
</tbody>
</table>

Table 3: Differences of Standard fields

3.5.2 Additional field

<table>
<thead>
<tr>
<th>Field No.</th>
<th>Data Field</th>
<th>Identifier</th>
<th>contents</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.</td>
<td>Country of Origin</td>
<td>-</td>
<td>Country of Origin</td>
<td>Two-digit value according to ISO 3166-1 ALPHAN-2 only as printed value</td>
</tr>
</tbody>
</table>

Table 4: Additional Field for Processed Wafer

3.5.3 Second DMC for Wafer Data

Detailed description in chapter “3.4. Wafer Data DMC”. 
### 3.6 Changes to initial version

The initial version was part of the MAT-Label-Specification as addendum "MAT-Label for Processed Wafer Appendix to Bosch-AE Instruction" from 15.Oct.2019

<table>
<thead>
<tr>
<th>Field No.</th>
<th>Data Field</th>
<th>Identifier</th>
<th>new</th>
<th>old</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Label Version</td>
<td>12S</td>
<td>&quot;P002&quot;</td>
<td>&quot;0002&quot;</td>
<td>necessary due to essential changes; first sign &quot;P&quot; indicates additional DMC</td>
</tr>
<tr>
<td>15.</td>
<td>Shipping Note Number</td>
<td>16K</td>
<td>empty field if SNN is unknown</td>
<td>&quot;0&quot; if SNN is unknown</td>
<td>alignment with spec for final tested devices</td>
</tr>
<tr>
<td>1.</td>
<td>Batch-No. #1</td>
<td>1T</td>
<td>Supplier Lot No. (without prefix &quot;***&quot;)</td>
<td>prefix &quot;***&quot; to indicate second DMC</td>
<td>alignment with AE MAT-Label spec and spec for final tested devices</td>
</tr>
<tr>
<td>1.</td>
<td>CoO</td>
<td>-</td>
<td>printed (two-digit value)</td>
<td>-</td>
<td>required to include Country of Origin according ISO 3166-1 ALPHA-2</td>
</tr>
</tbody>
</table>

**Table 5: Changes to initial version**