Box and Moisture Sensitivity Level labels

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White Paper

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NORDIC® SEMICONDUCTOR

Contents

Revision history

Date	Version	Description
October 2020	1.0	First release

1 Introduction

This document is a guide to using and interpreting all features of Nordic Semiconductor labels for nRF5x Series, nRF91 Series, and newer products.

It also provides a summary of Nordic Semiconductor's lot combination rules for a combined reel or tray bundle.

2 Scope and definitions

This document applies to the labels listed in the following table.

Name	Description
Inner box label	The label attached to the immediate box (or the inner box) containing the product which could be packed either in a reel or a tray. This label contains lot-related information.
Outer box label	The primary label attached to the box containing the inner boxes. This label contains shipment-related information.
Second outer box label	A second label on the outer box added for the sole purpose of making lot-related information easily accessible. It bears a single 2D barcode that contains all the lot-related information usually available on the inner box 2D barcode.
Moisture sensitivity level (MSL) label	This label is attached to the moisture barrier bag (MBB) or aluminum bag (Al bag) and the reel or tray bundle. It shows the MSL of the product and surface mount process-related information such as reflow temperature, floor life, etc.

Table 1: Label descriptions

On some occasions, the subcontract manufacturer may attach additional labels based on their internal procedures or country-specific regulations. This document does not cover the labels that are not required by Nordic Semiconductor.

3 Label components

The following table describes the label components.

Number	Item	Reference/format	Remarks
1	Human-readable information	Standard English	
2	Data Identifier (DI)	ANSI MH10.8.2-1016	An alphabetic or alphanumeric code uniquely assigned to information on the label. It is used in parsing barcoded information.
3	Linear (1D) barcode	Code 128 or Code 39	Available on select information. It appears below the human-readable information it represents.
4	Two-dimensional (2D) barcode	Data matrix	Available on inner box, outer box, and second outer box labels. See 2D barcode on page 15 for more information.
5	Nordic Semiconductor logo	Nordic standard	
6	Lead-free symbol		If present on the label, it certifies that the product is Pb-free based on the J-STD-609 standard.
7	Second level interconnect terminal finish		An encircled symbol where X is variable, it is a numeric value assigned based on the J_STD-609 standard.
8	QA acceptance symbol	Can be a stamp or a printed symbol	This certifies that the product passed the manufacturer's QA controls.

Table 2: Inner box and outer box label components

4 Label fields and definitions

The following table describes the label fields.

Number	Field name	Data identifier	Definition	Where used
1	Part No.	1P	The ordering code assigned by Nordic Semiconductor. The part number displayed on the customer purchase order (PO).	Inner box label Outer box label
2	Trace code	1T	The lot traceability code assigned by Nordic Semiconductor. The format is: • YY - year of manufacture • WW - workweek of manufacture • LL - alphabetic, auto-generated lot code This is generally assigned per foundry lot number. The date code can be derived as the YYWW data of the trace code. Multiple trace codes displayed on this field are separated by the slash (/) symbol. This means the reel or bundled tray is composed of several trace codes. A maximum of four trace codes is allowed per inner box.	Inner box label
3	Trace Code Quantity	14Q 15Q	Shows the trace code quantity. For multiple trace codes, the trace code quantities are arranged following the same sequence as the trace code (1T) separated by a slash (/). The DI appears only on the 2D barcode of the inner box.	Inner box label
4	Total Quantity (inner box) Quantity (outer box)	Q	The number of pieces contained by the box. For the inner box, if the label only shows one trace code, the trace code quantity is equal to total quantity.	Inner box label Outer box label
5	Box ID	3S	The stock identifier, unique per inner box, assigned by Nordic Semiconductor.	Inner box label

Number	Field name	Data identifier	Definition	Where used
6	Seal date	9D	Date of dry-packing. The format is YYYY-MM-DD.	Inner box label
7	Pb-free logo	None	The product is certified lead-free.	Inner box label Outer box label
8	2nd level interconnect terminal finish	None	The second level interconnect symbol determined based on J-STD-609.	Inner box label
9	Build code	2P	A code with 1–3 characters that represents the product version.	Inner box label Outer box label
10	From	None	The shipper which could be a subcontract manufacturer or a third-party logistics agent.	Outer box label
11	To	None	The destination of the shipment.	Outer box label
12	Customer PO. No.	K	The purchase order reference number from a Nordic Semiconductor customer.	Outer box label
13	Sales order No.	1K	The sales transaction reference assigned by Nordic Semiconductor. This field contains the concatenated data of the sales order number, sales order line number, and delivery line number.	Outer box label
14	Shipment ID	2K	The shipment reference number assigned by Nordic Semiconductor.	Outer box label Second outer box label
15	Country of origin	4L	COO, a 2-character ISO 3166 country code.	Outer box label
16	Carton No.	13Q	The carton number. It resets per Nordic sales order number.	Outer box label
17	Delivery No.	9K	The subcontractor's shipment reference number.	Outer box label Second outer box label
18	Gross weight	None	The total weight of the carton.	Outer box label
19	Quantity of inner box	None	The total number of loaded inner boxes in an outer box.	Second outer box label

Table 3: Inner box and outer box label fields and definitions

5 Inner box label

Nordic Semiconductor uses the same inner box label format for all inner box types.

There are two types of inner box. The type of inner box used depends on the container used for delivering the product:

- Pizza box – used for reeled products. One pizza box contains one reel.
- Shoe box – used for tray products. One shoe box may contain up to 10 trays with covers.

> **Note:** Nordic Semiconductor does not recommend the use of trays.

The inner box label can be found on the following locations:

- Inner box outside surface
- Moisture barrier bag (MBB) or aluminum bag (Al bag)
- Reel or bundled tray

The inner box label is printed in triplicates.

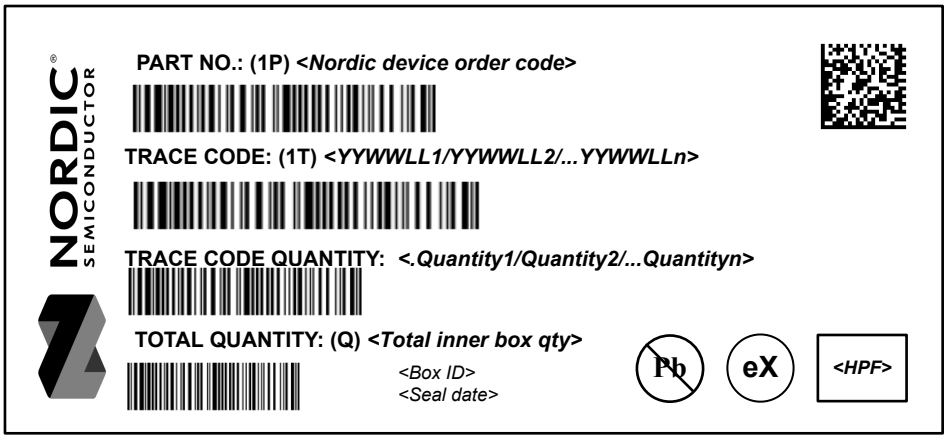

Figure 1: Inner box label template

See Inner box labels on page 18 for sample photos.

6 Outer box labels

The subcontract manufacturer may use different sizes of outer boxes depending on the inner box used and the quantity of shipment.

The following labels are used for the outer box:

- Outer box label
- Second outer box label

See Scope and definitions on page 5 for more information on these labels.

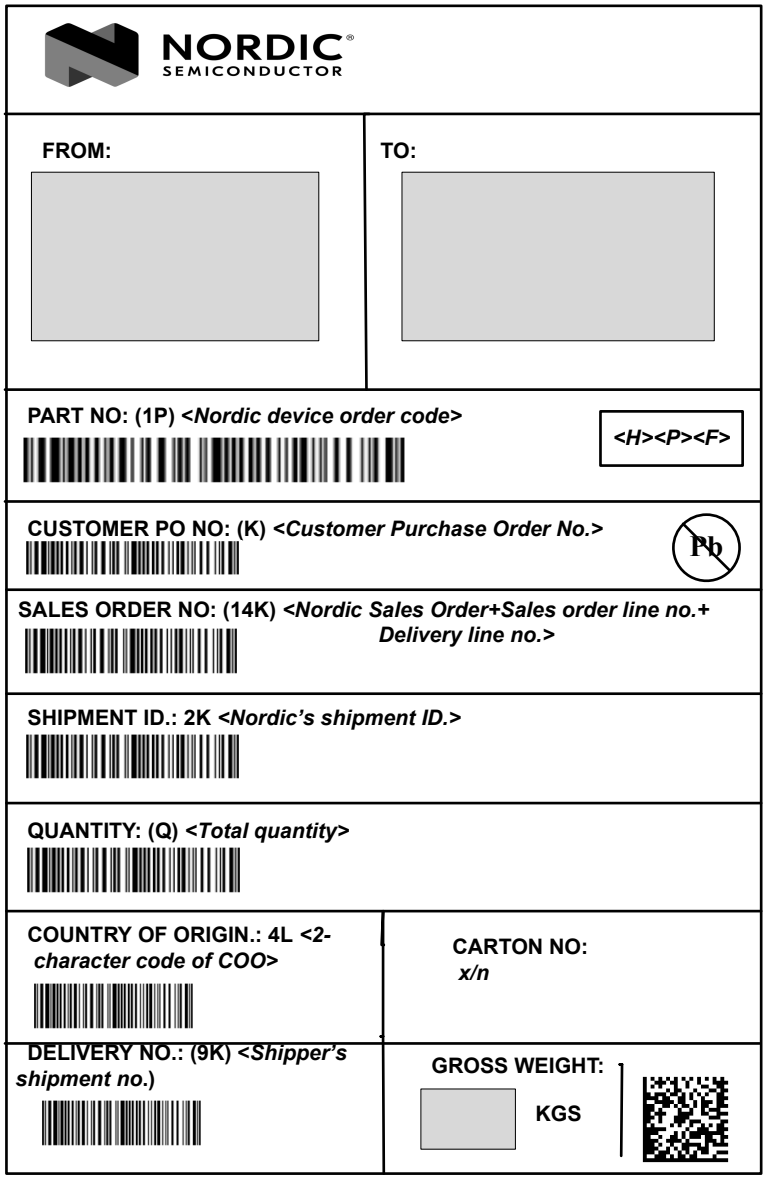

Figure 2: Outer box label template

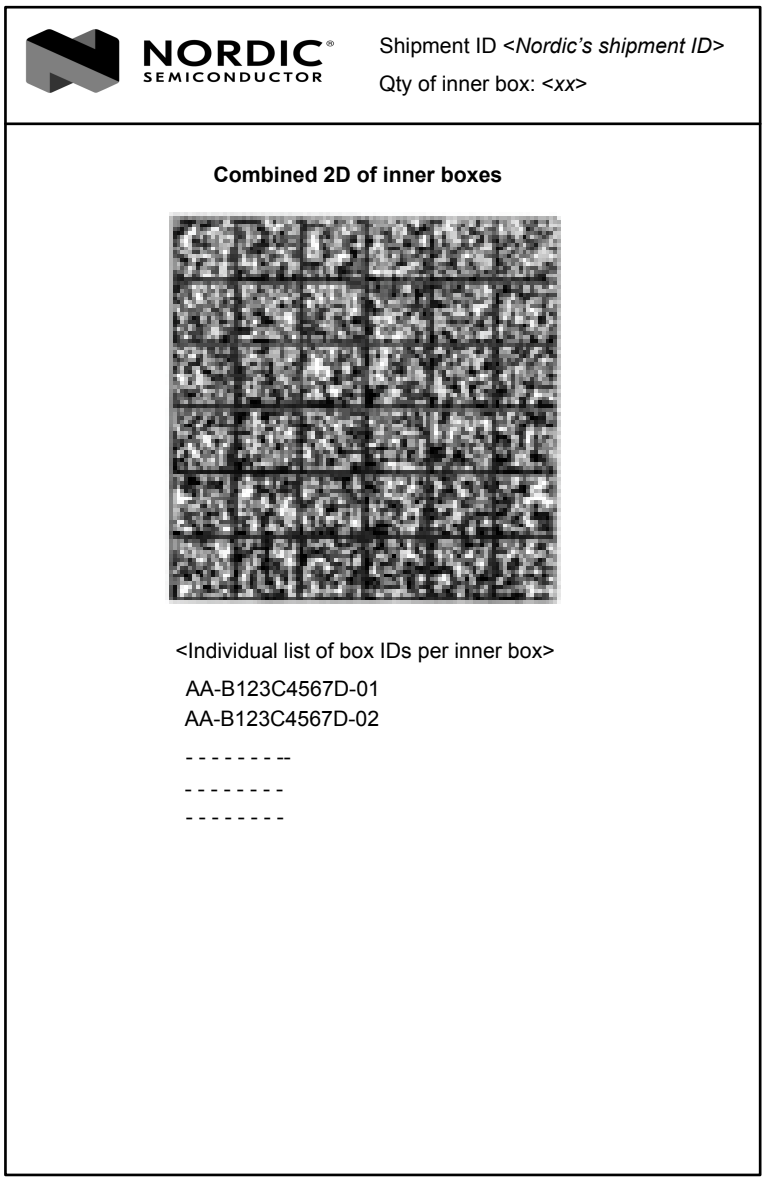

Figure 3: Second outer box label template

See Outer box labels on page 20 for sample photos.

7 Moisture sensitivity level (MSL) label

The MSL label serves as a reference when the product is used in the production floor.

The MSL label is found on the following:

- Moisture barrier bag (MBB) or Aluminum bag (Al bag)
- Reel or cover tray of a bundled tray

Number	Field name	Description
1	MSL classification	The MSL classification of the product based on IPC/Jedec J-STD-020. It is the numeric information usually found on the top right corner of the label.
2	Peak body temperature (PBT)	The product's maximum reflow temperature. See item 2 on Figure 5: Sample MSL label for MSL2 products on page 14.
3	Floor life	The maximum exposure time from unsealing the moisture barrier bag before the product requires baking. See item 3a on Figure 5: Sample MSL label for MSL2 products on page 14.
4	Storage conditions or requirements	The environmental conditions of the storage area where the product was kept per J-STD-033. See item 3b on Figure 5: Sample MSL label for MSL2 products on page 14
5	Bake application	The conditions when to perform baking. See item 4 on Figure 5: Sample MSL label for MSL2 products on page 14
6	Bake requirements	The procedures or specifications to be followed when baking is required. See item 5 on Figure 5: Sample MSL label for MSL2 products on page 14
7	Bag seal date	The dry pack date of the product.
8	Moisture-sensitive symbol 	The symbol indicates that the product is moisture-sensitive.
9	Moisture-sensitivity declaration	A caution warning if the product is moisture-sensitive or not. It is usually found on the top of the label.

Table 4: MSL label field definitions

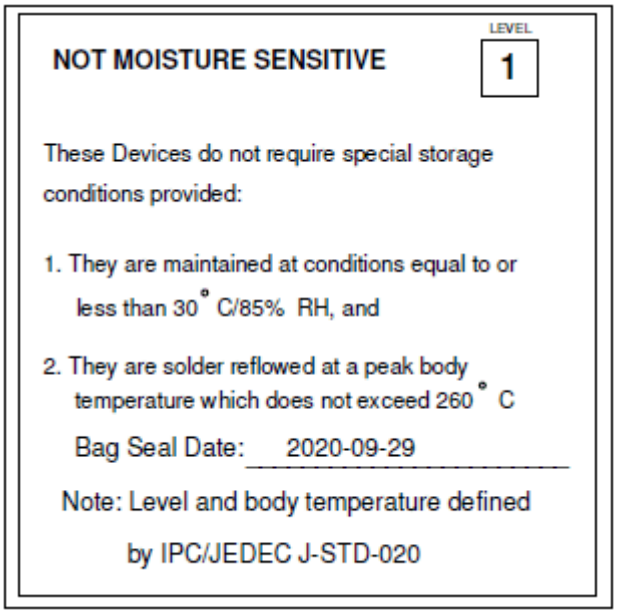

Figure 4: Sample MSL label for MSL1 products

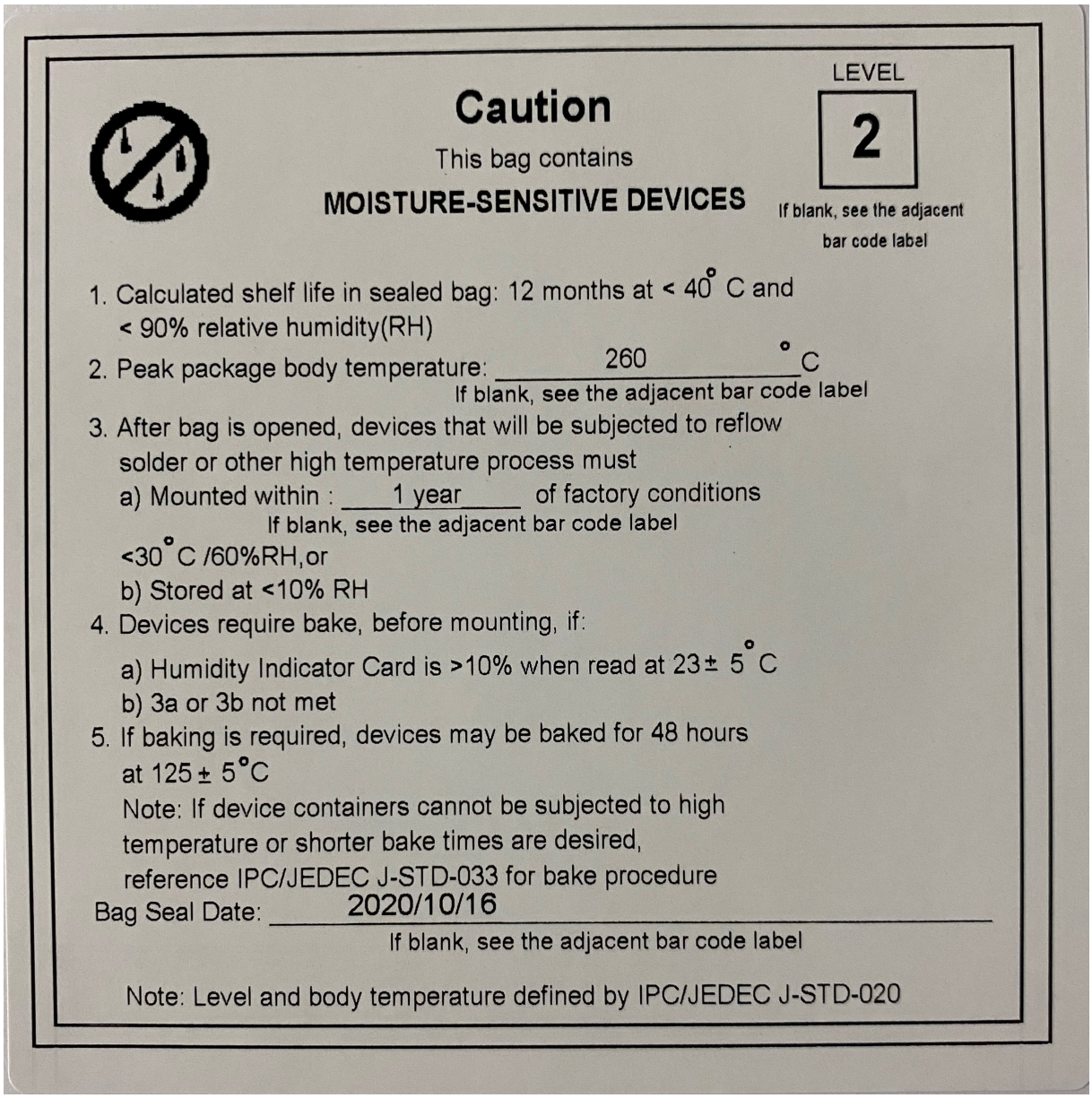

Figure 5: Sample MSL label for MSL2 products

8 2D barcode

A two-dimensional (2D) barcode is a set of small geometric shapes that stores more information than a linear barcode.

Using compatible scanners, 2D barcodes make data encoding faster and more accurate than the conventional method. Nordic Semiconductor applies the data matrix format on all 2D barcodes for all types of labels. Stored information varies depending on the label type.

The 2D barcode makes use of the data identifier (DI) for easier parsing of stored information. The DI precedes the value it represents. The pipe (|) character is used as an added delimeter to parse data. The basic format is `(DI)<stored data>|`.

The basic format repeats for all stored information. For trace code quantity which appears on the inner box label, the stored information is displayed between 2 DI's to distinguish the beginning and end of the series of information.

All human-readable information, except logos and symbols, are included on the 2D barcode. Nordic Semiconductor internal information is also included.

8.1 Inner box label

The following information is displayed on the 2D barcode of the inner box label.

- Part No.
- Trace code
- Trace code quantity
- Total quantity
- Box ID
- Seal date
- Build code
- Wafer lot No.[1] - Foundry wafer lot number used for traceability
- nILN[1] - Nordic assigned lot number used for the Nordic Semiconductor inventory tracking system

Figure 6: 2D barcode sequence for inner box label

1P*<Part no.>*|Q*<Total Quantity>*|1T*<Trace code1/…Trace code4>*|14Q*<Trace code qty1/…Trace code qty4>*15Q|2P*<Build code>*|30T*<Wafer lot1/…Wafer lotn>*|9D*<Seal date>*|3S*<Box ID>*|31T*<nILN>*

Figure 7: 2D barcode format for inner box label

8.2 Outer box label

The following information is displayed on the 2D barcode of the outer box label.

[1] Available on the 2D barcode only.

- Part No.
- Customer purchase order No.
- Sales order No.
- Shipment ID
- Quantity
- Country of origin
- Carton No.

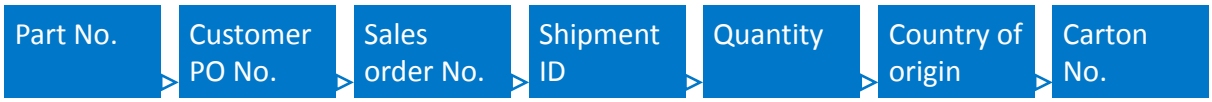

Figure 8: 2D sequence for outer box label

1P*<Part no.>*|K*<Customer PO no.>*|1K*<Sales order no.>*|2K*<Shipment ID>*|Q*<Quantity>*|4L*<Country of origin>*|13*<Carton no.>*

Figure 9: 2D format for outer box label

8.3 Second outer box label

The second outer box label makes the stored information of the inner box 2D barcode available from the outer box.

The second outer box label is an aggregation of individual 2D barcodes of all inner boxes contained by the outer box. The format follows the inner box 2D barcode and uses the ampersand (&) symbol as a delimiter between inner box 2D barcodes.

The basic format for the label is `Inner box 2D`$_1$`&Inner box 2D`$_2$`&Inner box 2D`$_3$ and so on.

Depending on the size of the outer box label, there could be up to ten inner boxes in one outer box. Thus, the aggregated inner box 2D barcode will also have up to ten inner box 2D barcodes.

1P*<Part no.>*|Q*<Total Quantity>*|1T*<Trace code1/…Trace code4>*|14Q*<Trace code qty1/…Trace code qty4>*15Q|2P*<Build code>*|30T*<Wafer lot1/…Wafer lotn>*|9D*<Seal date>*|3S*<Box ID>*|31T*<nILN>*&
1P*<Part no.>*|Q*<Total Quantity>*|1T*<Trace code1/…Trace code4>*|14Q*<Trace code qty1/…Trace code qty4>*15Q|2P*<Build code>*|30T*<Wafer lot1/…Wafer lotn>*|9D*<Seal date>*|3S*<Box ID>*|31T*<nILN>*&…

Figure 10: Full format for combined inner box 2D barcodes

Note: The ampersand (&) symbol is placed between the 2D barcode of each inner box.

9 Lot combination

To deliver a full reel or a full bundled tray, Nordic Semiconductor allows the subcontract manufacturer to combine units for the same product coming from different production lots.

A reel or bundled tray composed of more than one lot is called a combined reel or tray.

To combine several lots in one reel or bundled tray, the following rules must be satisfied:

- Has the same product and build code
- Tested using the same test program and revision
- Has a maximum of four different trace codes
- Has a date code with a maximum of 52 weeks apart

Nordic Semiconductor and the subcontract manufacturer retain lot combination information for a given combined reel or bundled tray. Given the box ID (3S), Nordic Semiconductor and the subcontract manufacturer can retrieve the individual lot information of a combined reel.

10 Sample photos

The following sections provide sample photos of labels for inner and outer boxes.

10.1 Inner box labels

The following photos show actual inner box labels.

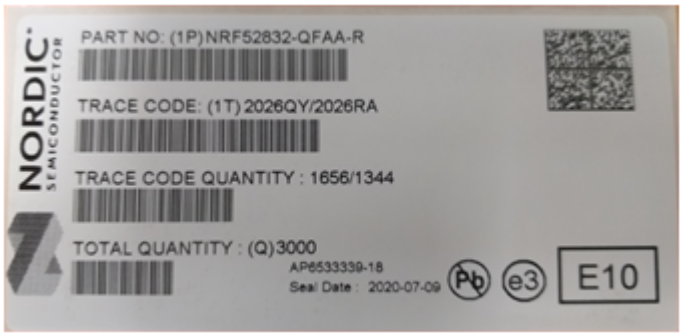

Figure 11: Inner box label

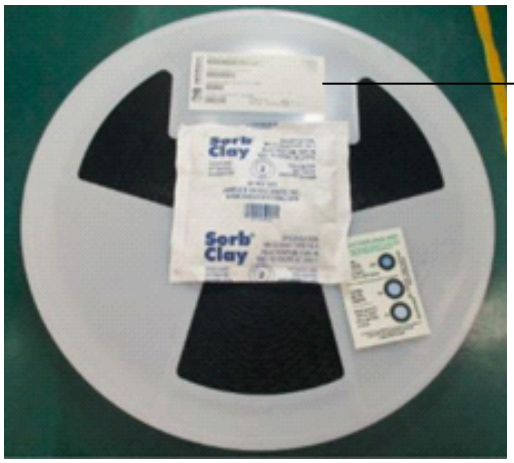

Figure 12: 13" reel with label, dessicant, and humidity card

Figure 13: Dry-packed 13" reel

Figure 14: Dry-packed 13" reel in an inner box

Figure 15: Tray bundle (5 loaded trays + 1 cover) with desiccant and humidity card

Figure 16: Dry-packed tray bundle (5 + 1)

Figure 17: Dry-packed tray bundle (5 + 1) in an inner box

10.2 Outer box labels

The following photos show actual outer box labels.

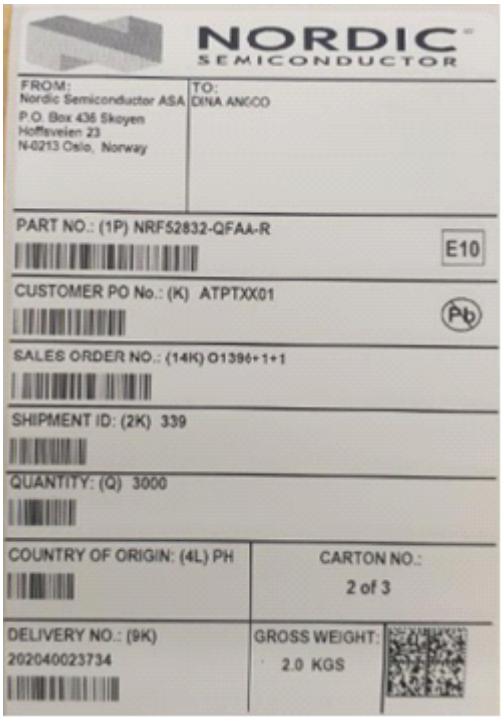

Figure 18: Outer box label

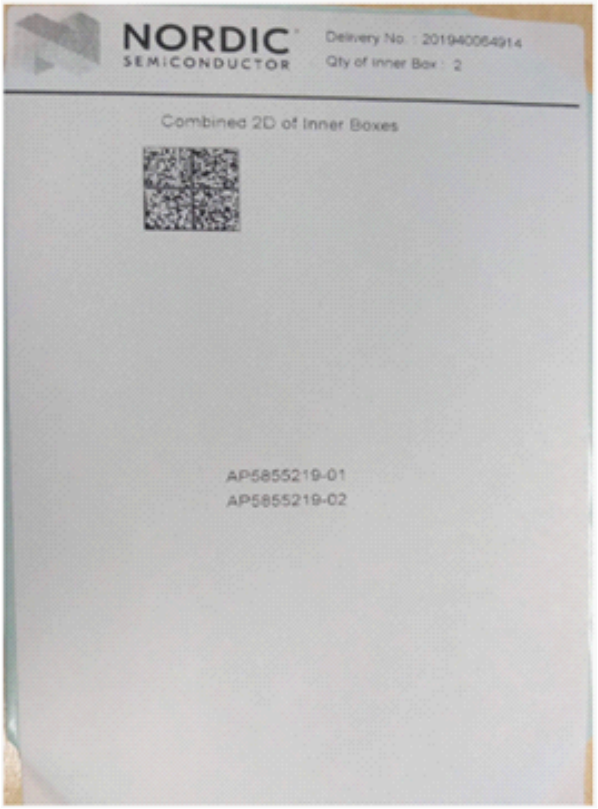

Figure 19: Second outer box label

Figure 20: Outer box - reel

Figure 21: Outer box - tray

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