Embossed Tape, Reel, and Tray Packaging
nWP-024

White Paper

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Contents

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Revision history

Date	Description
04-14-2021	Added information for nRF53 Series
June 2020	• Updated Tray information on page 9 • Editorial changes
October 2019	• Added nRF9160 • Updated Tape components on page 6 • Added Tray information on page 9 • Updated Box dimensions on page 10
September 2018	• Updated Table 2: Carrier tape dimensions on page 7 • Added Box dimensions on page 10 • Editorial changes
December 2016	Specified cover tape pull angle
November 2016	Editorial changes
June 2016	Added CIAA variant
May 2016	First release

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1 Embossed tape, reel, and tray packaging

This document outlines the dimensions for the tape, reel, and tray packaging of components used for Nordic Semiconductor products.

This document applies to the following series:

- nRF24
- nRF51
- nRF52
- nRF53
- nRF8000
- nRF9160

Embossed tape, reel, and tray is used for transporting and storing electronic components. The packing is designed to feed components into automatic pick-and-place machines for surface mounting on PCBs. The complete configuration consists of a carrier tape with pockets holding the individual components that are sealed by a cover tape.

The tape, reel, and tray configurations of the nRF24, nRF51, nRF52, nRF53, nRF8000, and nRF9160 series products meet the current industry standards described in *EIA-481: 8 mm through 200 mm Embossed Carrier Taping and 8 mm through 200 mm Punched Carrier Taping of Surface Mount Components for Automatic Handling*. The loaded reels are shipped with a Humidity Indicator Card (HIC) and a bag of desiccant gel according to the JEDEC standard JSTD-033.

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2 Reel dimensions

Reels containing sealed carrier tape follow the dimension requirements described in EIA-481. For the detailed dimensions of the reel, refer to this standard. The reels are made of polystyrene and can be recycled.

Most products come in one of two different sizes of reels. The size of the reel is indicated by the ordering code that can be found in the product specification for each product.

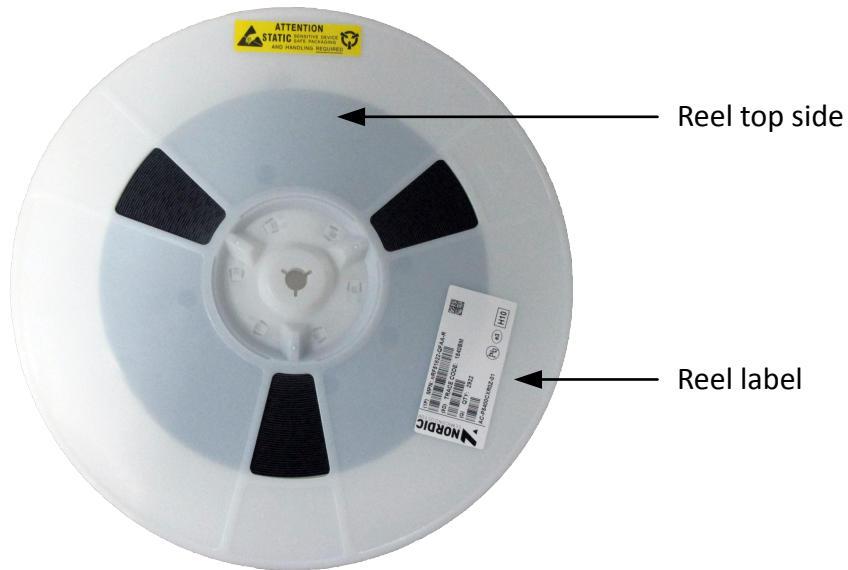The following figure shows the markings on a typical loaded reel.

Figure 1: Reel markings

The following table contains the reel dimensions.

Ordering code	Description	Reel diameter [mm]
-R7	7" reel	177.8
-R	13" reel	330.2

Table 1: Reel dimensions

3 Tape components

In the embossed tape-and-reel configuration, electronic components are placed in pockets embossed in the carrier tape. The cover tape is sealed to the carrier tape to encase the components in the pockets.

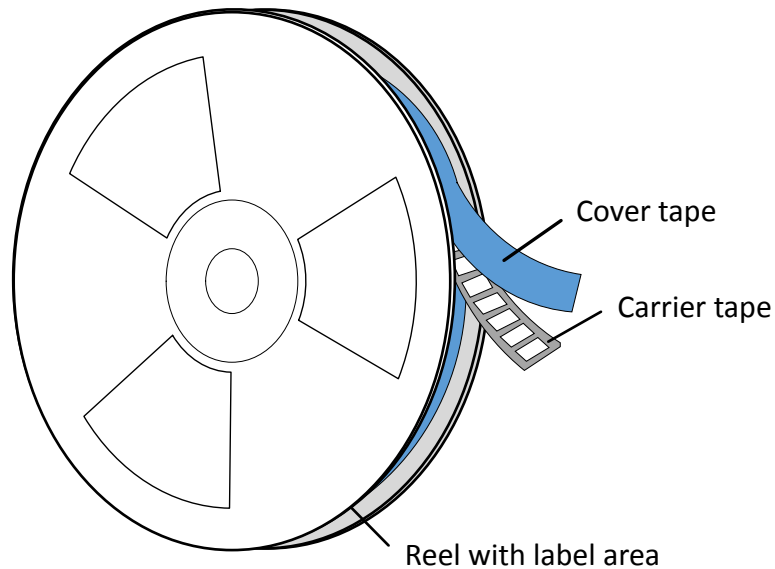The following figure shows the typical tape components.

Figure 2: Tape components

Cover tape

The cover tape is sealed by hot sealing. The pull strength limit for the cover tape is 20 to 120 grams when it is pulled at an angle of 175° to 180° with a peel-off speed of 300 ± 10 mm/min.

Carrier tape

The minimum leader part, or the length from the tape edge of the feeding side to the first component in the carrier tape, is 400 mm. The carrier tape material is conductive polystyrene.

The following dimensions are used in Figure 3: Carrier tape dimensions on page 7 and Table 2: Carrier tape dimensions on page 7.

    P = Pitch between cavity centers
    W = Width of carrier tape
    A = Dimension of cavity adjusted for component width
    B = Dimension of cavity adjusted for component length
    d = Distance between sprocket holes, 4 mm

The following figure illustrates the basic dimensions of the carrier tape. The center of the cavity is located in the middle between the sprocket holes.
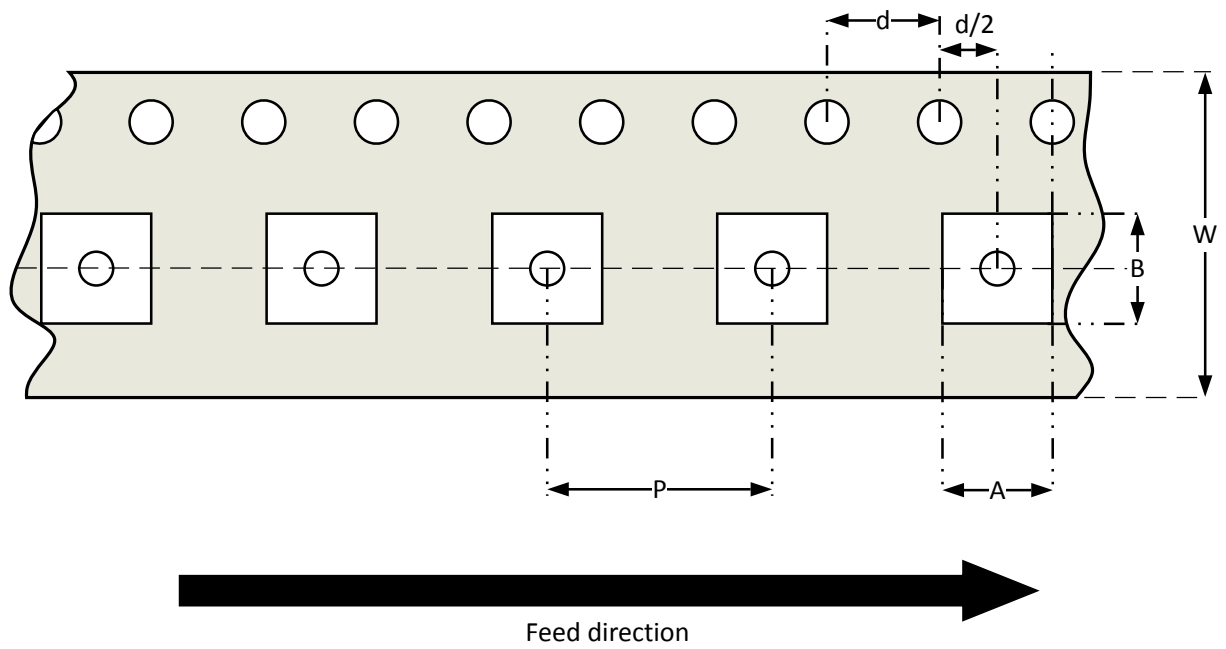
Figure 3: Carrier tape dimensions

The following table contains the product and package specific dimensions.

Product/package	P [mm]	W [mm]	A [mm]	B [mm]	Pin 1 orientation
QFN 4 x 4	8.0	12.0	4.3	4.3	Quadrant 1
QFN 5 x 5	8.0	12.0	5.3	5.3	Quadrant 1
QFN 6 x 6	12.0	16.0	6.3	6.3	Quadrant 1
QFN 7 x 7/aQFN	12.0	16.0	7.5	7.5	Quadrant 1
nRF51x22-CDAB	8.0	12.0	3.71	3.54	Quadrant 1
nRF51x22-CEAA	8.0	12.0	3.97	4.20	Quadrant 1
nRF51x22-CFAC	8.0	12.0	4.05	4.05	Quadrant 1
nRF51x22-CTAA	8.0	12.0	3.68	4.02	Quadrant 1
nRF51x22-CTAC	8.0	12.0	4.05	4.05	Quadrant 1
nRF52805-CAAA	8.0	12.0	2.67	2.69	Quadrant 1
nRF52810-CAAA	8.0	12.0	2.67	2.69	Quadrant 1
nRF52811-CAAA	8.0	12.0	2.67	2.69	Quadrant 1
nRF52832-CIAA	8.0	12.0	3.17	3.44	Quadrant 1
nRF52833-CJAA	8.0	12.0	3.38	3.38	Quadrant 1
nRF52840-CKAA	8.0	12.0	3.76	3.83	Quadrant 1
nRF9160 (SiP)	16.0	24.0	10.90	16.40	Quadrant 2

Table 2: Carrier tape dimensions

The following figure shows the pin 1 orientation and pin orientation options.
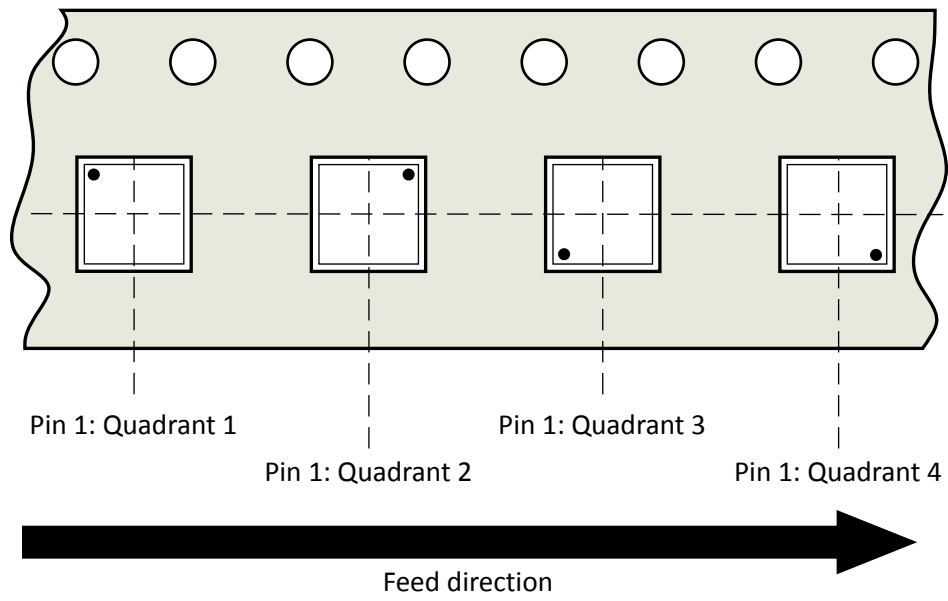
Pin 1: Quadrant 1

Pin 1: Quadrant 2

Pin 1: Quadrant 3

Pin 1: Quadrant 4

Feed direction

Figure 4: Pin 1 orientation

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4 Tray information

Some QFN products are also available in tray packaging. See the appropriate Product Specification for more information.

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

The tray size is 322.60x135.90 mm. The following tables provide more information on tray capacities.

Products (QFN) ASE	Pieces / tray	Trays / inner box
nRF24 series	490	1-10
nRF51 series	490	1-10
nRF52 series (except nRF52840)	490	1-10
nRF52840	260	1-10

Table 3: ASE trays

> **Note:** The inner box size is 351x185x103 mm. You can have 1-10 trays and 1 top tray in one inner box.

Products (QFN) AMKOR	Pieces / tray	Trays / inner box
nRF24 series	490	1-5
nRF51 series	490	1-5
nRF52 series (except nRF52840)	490	1-5

Table 4: AMKOR trays

> **Note:** The inner box size is 375x185x103 mm. You can have 1-5 trays and 1 top tray in one inner box.

5 Box dimensions

Each reel is packed in an inner box that is also known as a *pizza box*.

Several inner boxes can be packed in one outer box for shipment. The following figures show a typical inner box and an outer box containing several inner boxes.
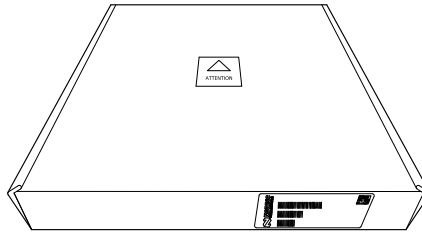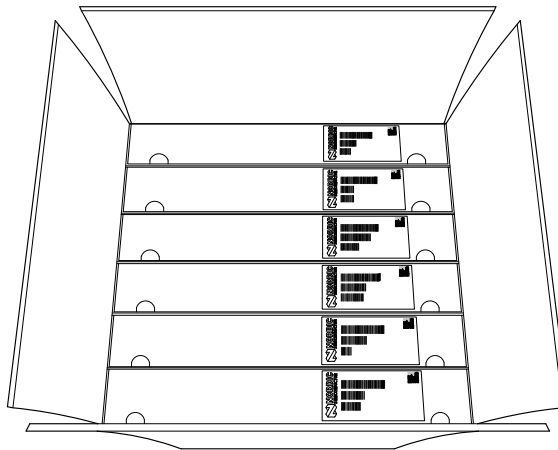

Figure 5: Inner box

Figure 6: Outer box containing inner boxes

The following tables show the capacities of the boxes according to the manufacturers.

Outer box	Inner box size (mm)	Outer box options (mm)	Composition
R7	180x180x79	400x210x100	2 inner boxes in 1 outer box
		381x381x127	4 inner boxes in 1 outer box
		410x340x205	8 inner boxes in 1 outer box
R	348x357x54	380x129x374	2 inner boxes in 1 outer box
		388x388x218	4 inner boxes in 1 outer box
		380x353x374	6 inner boxes in 1 outer box

Table 5: AMKOR outer box capacities for QFN

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Outer box	Inner box size (mm)	Outer box options (mm)	Composition
R7	193x192x70	212x154x210	2 inner boxes in 1 outer box
		311x212x210	4 inner boxes in 1 outer box
R	356x338x48	371x346x113	2 inner boxes in 1 outer box
		370x260x360	5 inner boxes in 1 outer box
		510x370x360	10 inner boxes in 1 outer box

Table 6: ASE outer box capacities for QFN

Outer box	Inner box size (mm)	Outer box options (mm)	Composition
R7	220x220x38	235x235x110	2 inner boxes in 1 outer box
		235x235x245	5 inner boxes in 1 outer box
		377x267x387	10 inner boxes in 1 outer box
R	356x338x48	370x260x360	5 inner boxes in 1 outer box
		371x346x113	2 inner boxes in 1 outer box

Table 7: ASE outer box capacities for CSP

Reel	Inner box size (mm)
R7	219x197x51
R	372x353x59

Table 8: QORVO inner box

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6 Green Program statement

In order to support our customers who wish to comply with environmental requirements, Nordic Semiconductor has introduced *green* package technology in its products. *Green* means that our products are halogen free in addition to RoHS/REACH compliant (free of Bromine, Chlorine, and Antimony based flame retardants).

The Green Program statement can be found on our website under Environment.

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