Production

u-blox Package Information

For Chips, Modules, and Antennas

Reference

Abstract

This document provides u-blox customers with general packaging information for positioning, short range and cellular products.

www.u-blox.com

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Contents

1 Introduction

1.1 Purpose

This user guide provides general package information for customers of u-blox GNSS and wireless products. It describes how u-blox mass production products are packed upon delivery to customers. The information is in addition to what is provided in the product data sheets.

The following symbols are used to highlight important information within the user guide:

☞ An index finger points out key information pertaining to product integration and performance.

⚠ **A warning symbol indicates actions that could negatively impact or damage the product.**

1.2 Scope

This user guide provides general packaging information for u-blox GNSS, cellular, and short range modules, and for GNSS chips and antennas. It should be used in combination with the applicable product data sheets, where the exact product specifications are found and reel types are listed.

☞ This document does not apply to sample volumes. The nominal order volume for each product is detailed in that product's specific data sheet. If a product is delivered on a reel, then any order volume less than a full reel is delivered on tape only, not mounted on a reel. Contact u-blox Sales Administration for any related questions prior to placing a partial order.

1.3 Packing hierarchy

The general packing hierarchy differs depending on whether the product is delivered on reels or trays.

Module or chip on tape	**Reel**	**Sealed bag**	**Packing carton** (also called "pizza carton")	**Shipping parcel**
				

Table 1: Packing hierarchy of u-blox chips and modules that are delivered on reels

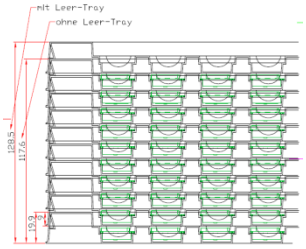
Module	**Tray**	**Stacked trays**	**Shipping parcel**
			

Table 2: Packing hierarchy of u-blox modules that are delivered on trays

2 Shipping information for chips and modules

u-blox chips and modules are delivered as reeled tapes (see Figure 1) or on trays (see Figure 2), which enables efficient production, production lot set-up and tear-down. Products with an MSL rating of 2 or above are shipped in a hermetically sealed package known as a "dry bag" (see section 3.1.1) to prevent moisture intake and protect against electrostatic discharge. Reels for products with an MSL rating of 1 are shipped in a special shielding bag. For protection from physical damage, the reels are individually packed in cartons (see section 2.2).

Products that are normally delivered on a reel WILL NOT be delivered on a reel if the order volume is less than is specified on the product's specific data sheet. See also section 1.2 Scope. Contact u-blox Sales Administration for any related questions prior to placing a partial order.

Figure 1: Reeled tape

Figure 2: Tray

2.1 Reels

Most u-blox chips and modules that are delivered on reels come on reel type A, B, C or D. All chips and very small LGA modules are delivered on reel type A or D, and most modules are delivered on reel type B or C. Type E reels are used for former connectBlue products as mentioned in section 2.1.5. The reel type is specified in the applicable product Data Sheet. See sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, and 2.1.5 for information about the different reel types.

Figure 3: Type A Reel

Figure 4: Type B Reel

Figure 5: Type C Reel

Figure 6: Type D Reel

Figure 7: Type E Reel

Figure 8 shows the reel and its various elements.

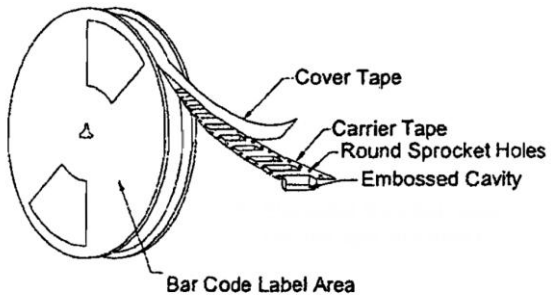


Figure 8: Elements of the reel

2.1.1 Reel: Type A

Reel dimensions are shown in Figure 9. Any reel is composed of two flanges, with the width of the flanges determined by the width of the tape. The exact composition and dimensions of the flanges are specified in the applicable data sheet. Table 3 lists the possible variants and widths of the flange combinations.

Width Variants	Tape Width	Flange Combination
Type A1	12 mm	4 mm + 8 mm
Type A2	16 mm	8 mm + 8 mm
Type A3	24 mm	8 mm + 16 mm
Type A4	32 mm	16 mm + 16 mm

Table 3: Reel composition of two halves

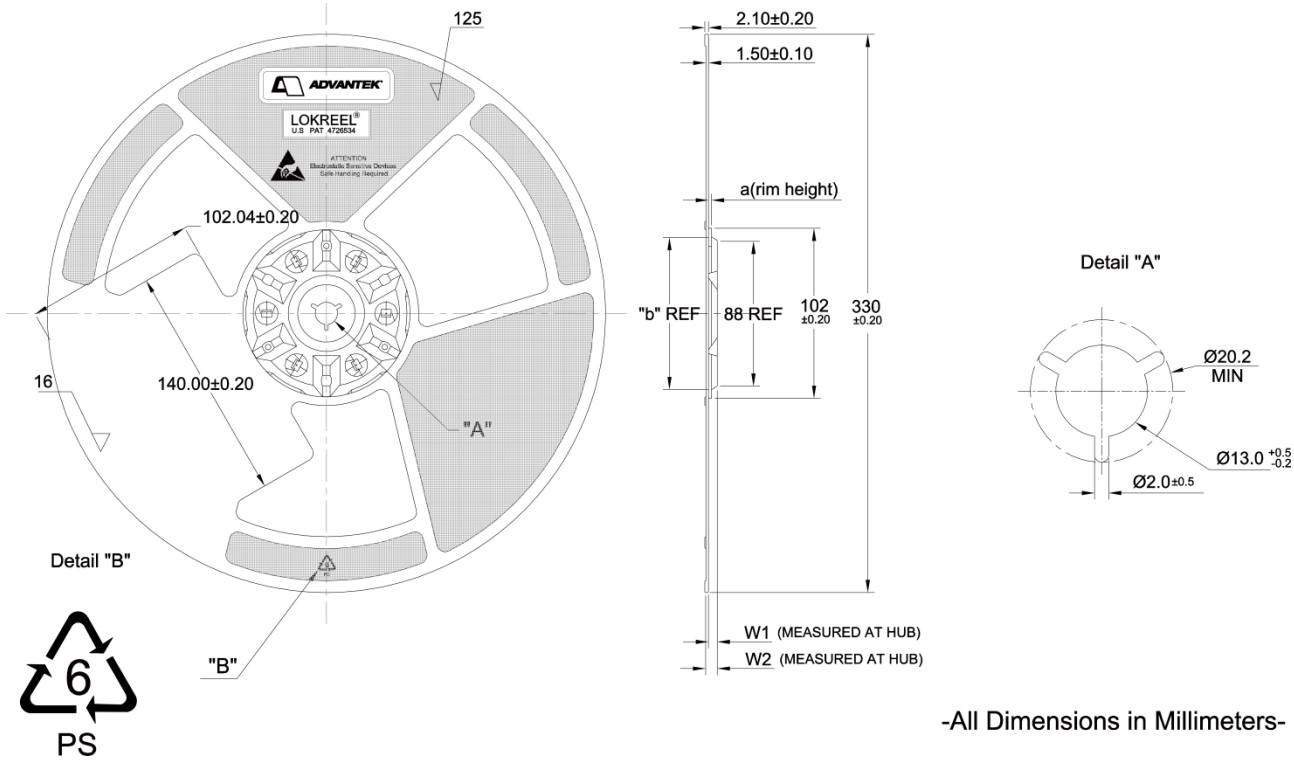


Figure 9: Reel Type A

Nominal Flange Width	W1 [+0.3 mm / -0.2 mm]	W2 MAX	a	b	Unit
4	4.4	7.1	1.5	95.0	mm
8	8.4	11.1	1.5	97.3	mm
16	16.4	19.1	4.5	97.3	mm

Table 4: Type A reel dimensions

2.1.2 Reel: Type B

Type B reel dimensions are shown in Table 5 and Figure 10. Type B reel comes in three widths, depending on the size of the module and the tape used.

Width variants	Tape size	Flange Combination	Nominal hub width	W1
Type B1	24 mm		25 mm	
Type B2	44 mm		45 mm	
Type B3	56 mm	C9F2+C9F2 (28.5 mm + 28.5 mm)	57 mm	57 + 0.5/-0-0 mm

Table 5: Dimensions of Type B reel

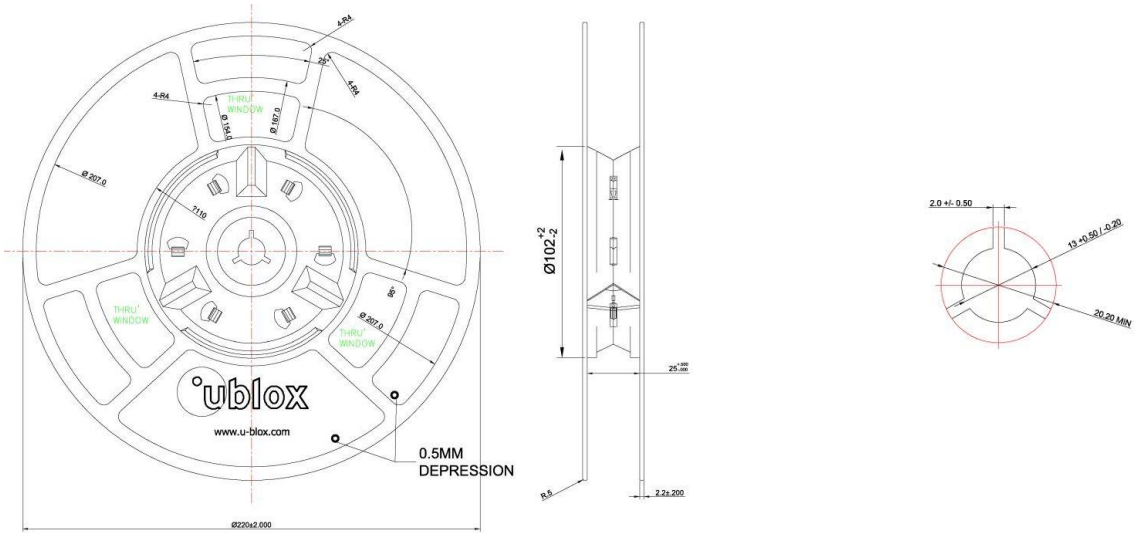


Figure 10: Type B reel dimensions

2.1.3 Reel: Type C

Type C reel dimensions are shown in Table 6 and Figure 11.

Width variants	Tape size	Reel Diameter	Nominal hub width	Nominal Hub Diameter
Type C	50 mm	330 mm	56.5 mm	180 mm

Table 6: Dimensions of Type C reel

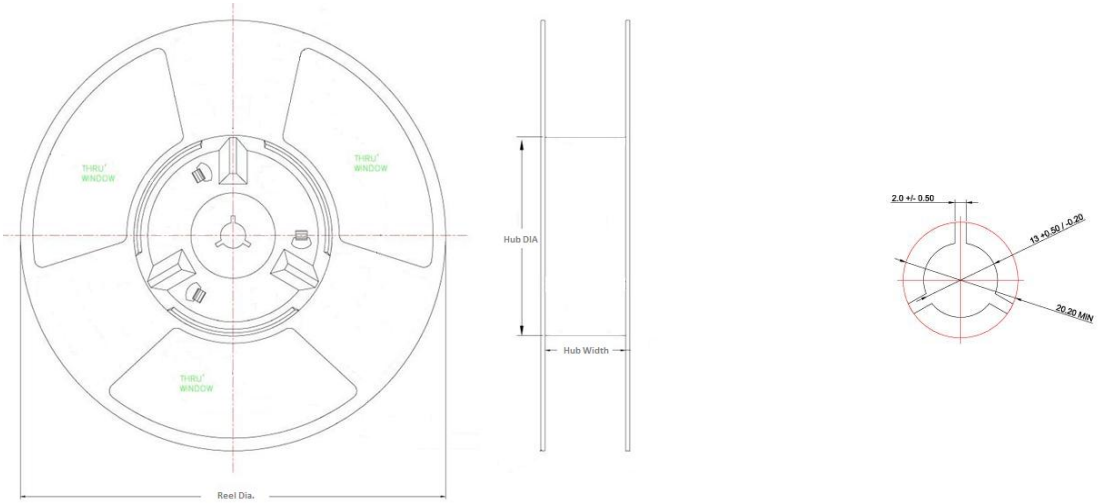


Figure 11: Type C reel dimensions

2.1.4 Reel: Type D

Type D reel dimensions are shown in Table 7 and Figure 12.

Width variants	Tape size	Reel Diameter	Nominal Hub Diameter
Type D	16 mm	180 mm	62 mm

Table 7: Dimensions of Type D reel

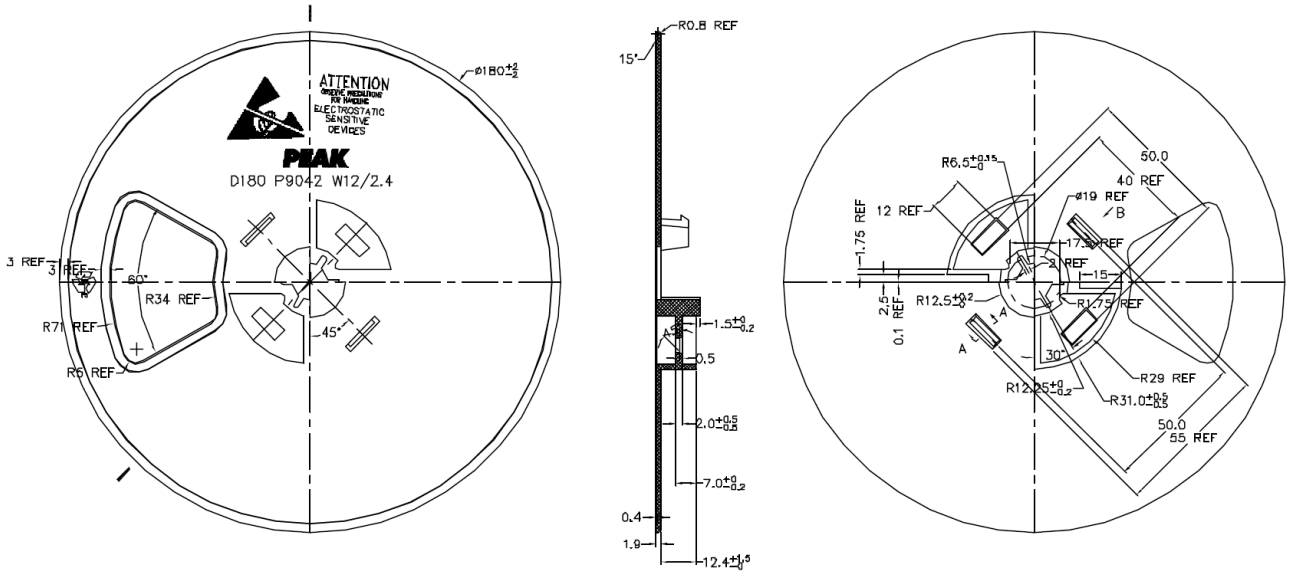


Figure 12: Type D reel dimensions

2.1.5 Reel: Type E

Type E reel dimensions are shown in Table 8 and Figure 13. The Type E reels are used for all versions of the following former connectBlue products that are listed below:

- CB-OBS418/419/421
- CB-OLS/OLP 425/426
- CB-OWL221/222
- CB-OWL253
- CB-OWS451

Width variants	Tape size	Reel Diameter	Nominal Hub Diameter
Type E	56 mm	330 mm	100 mm

Table 8: Dimensions of Type E reel

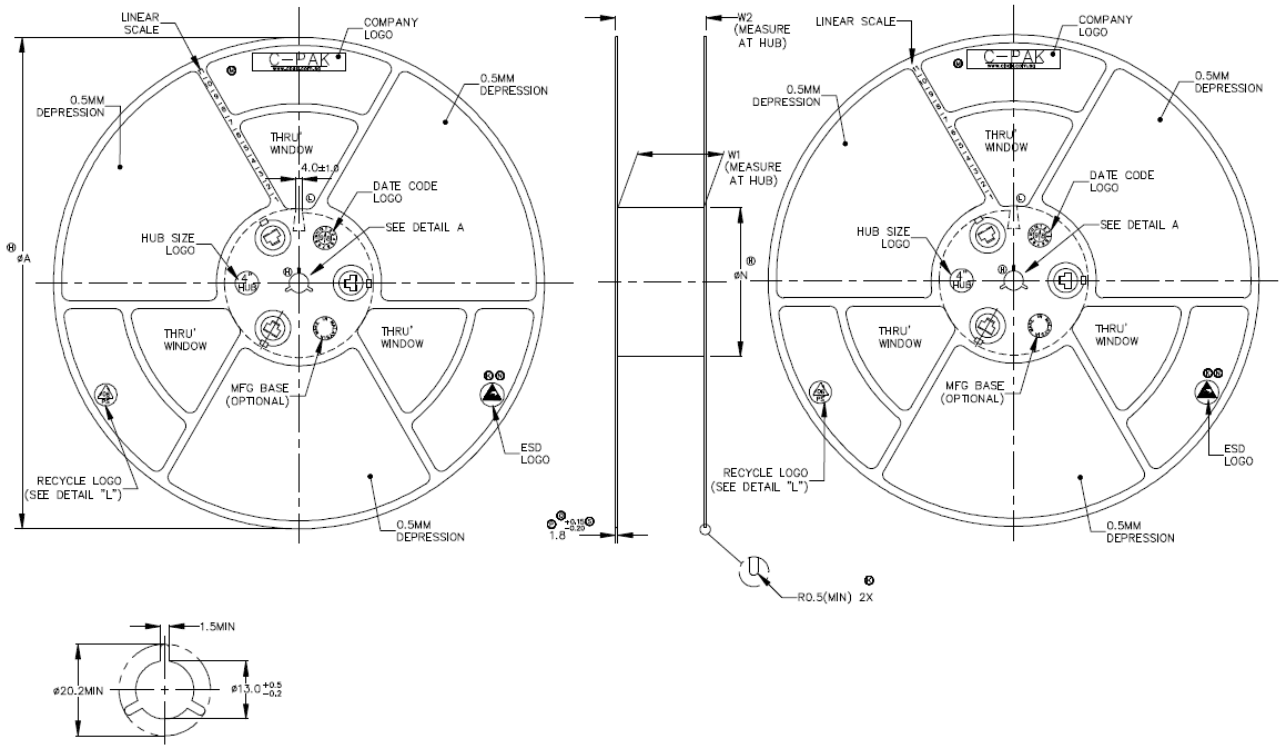


Figure 13: Type E reel dimensions

2.2 Packing cartons for reels

u-blox delivers reels of chips and modules in one of the following different packing carton types. The packing carton (the lowest shipping container) is determined by the type of the reel. A packing carton may also be referred to as a "pizza box".

Figure 14: Carton Type A

Figure 15: Carton Type B

2.2.1 Carton: Type A

Type A cartons are used to pack Type A reels.

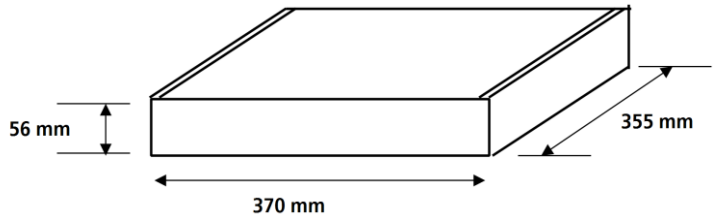


Figure 16: Dimensions of carton Type A

2.2.2 Carton: Type B

Type B cartons are used to pack Type B reels. Most modules are packed in the regular height carton, which is 6.5 cm high.

Very small modules, delivered on 24 mm wide tape on Type B3 reels, are packed in the 45 mm high carton.

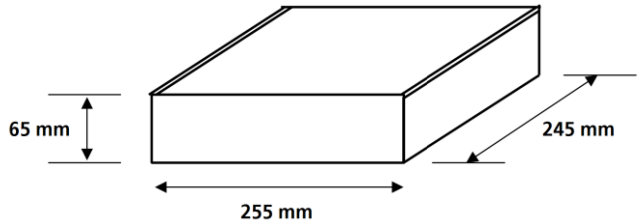


Figure 17: Dimensions of carton Type B (regular)

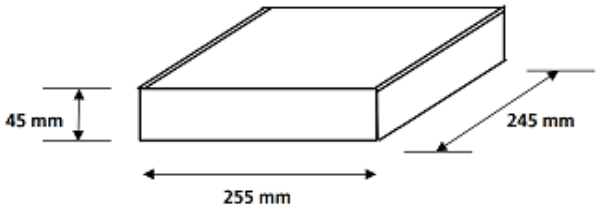


Figure 18: Dimensions of carton Type B (thin)

2.2.3 Carton: Type C

Type C cartons are used to pack Type C reels.

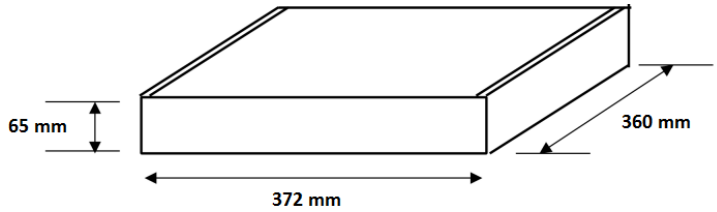


Figure 19: Dimensions of carton Type C

2.2.4 Carton: Type D

Type D cartons are used to pack Type D reels.

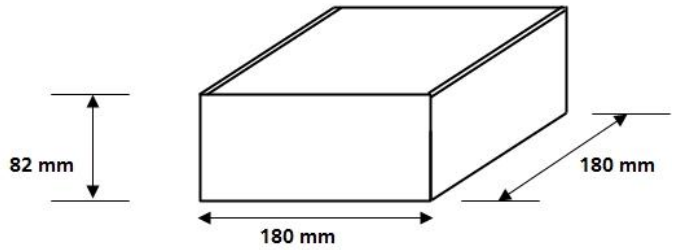


Figure 20: Dimensions of carton Type D

2.3 Shipping parcels for reels

☞ Split shipments use varying combinations of the parcels described in this section.

2.3.1 Shipping parcels for Type A reels

Type A cartons are shipped in two different types of shipping parcels:

- A smaller shipping parcel with dimensions 38 x 38 x 14 cm is used for shipments of up to 2 reels

Figure 21: Small shipping parcel for Type A reels

- A larger shipping parcel with dimensions 35 x 30 x 38 cm is used for shipments of up to 5 reels

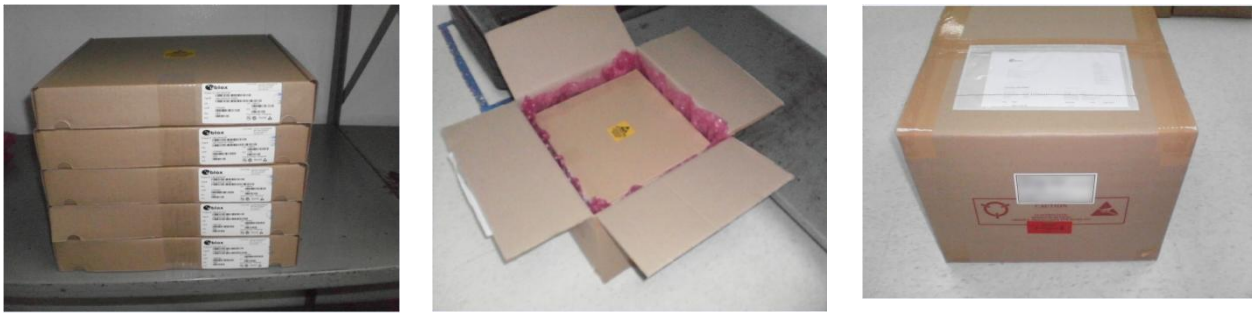


Figure 22: Large shipping parcel for Type A reels

2.3.2 Shipping parcels for Type B reels

Type B packing cartons are shipped in four different types of shipping parcels:

- A shipping parcel with dimensions 32 x 28 x 12 cm is used for shipments of one single reel

Figure 23: Shipping parcel for single Type B reel

- A shipping parcel with dimensions 32 x 28 x 27 cm is used for shipments of up to 4 reels

Figure 24: Shipping parcel for 2-4 units of Type B reels

- A shipping parcel with dimensions 52 x 35 x 27 cm is used for shipments of up to 10 reels

Figure 25: Shipping parcel for 5-10 units of Type B reels

- A shipping parcel with dimensions 60 x 40 x 27 cm is used for shipments of up to 13 reels

Figure 26: Shipping parcel for 10-13 units of Type B reels

2.3.3 Shipping parcels for Type C reels

Type C packing cartons are shipped in a shipping parcel with dimensions 32 X 28 X 27 cm. The parcel is used for shipments of up to 5 reels.

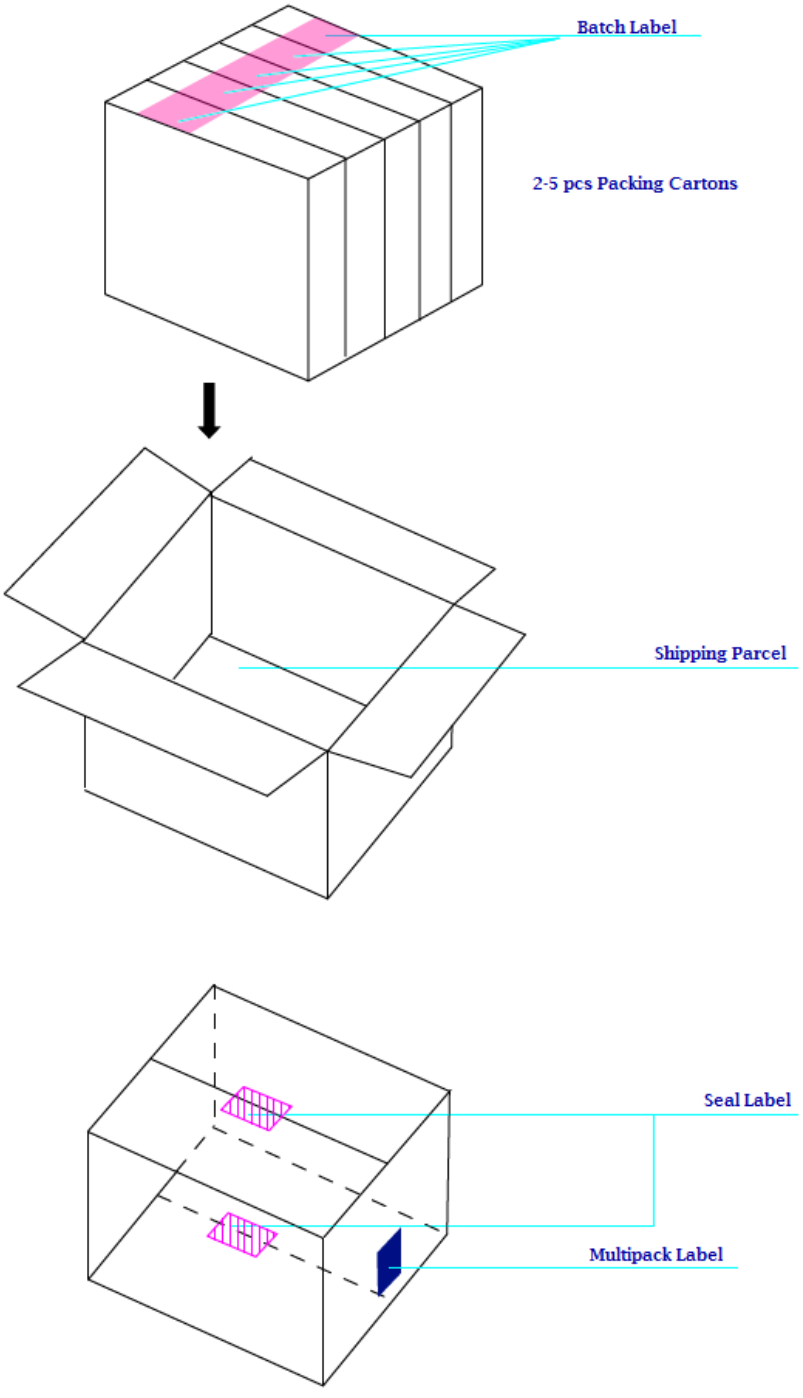


Figure 27: Shipping parcel for 2-5 units of Type C reels

2.3.4 Shipping parcels for Type D reels

Type D packing cartons are shipped in four different types of shipping parcels:

- A shipping parcel with dimensions 38 x 20 x 9 cm is used for 1-2 reels

Figure 28: Shipping parcel for 1-2 units of Type D reel

- A shipping parcel with dimensions 38 x 38 x 13 cm is used for 3-4 reels

Figure 29: Shipping parcel for 3-4 units of Type D reel

- A shipping parcel with dimensions 39 x 39 x 23 cm is used for 5-8 reels

Figure 30: Shipping parcel for 5-8 units of Type D reel

- A shipping parcel with dimensions 38 x 35 x 37 cm is used for 9-16 reels

Figure 31: Shipping parcel for 9-16 units of Type D reel

2.4 Shipping parcels for Trays

Trays are used for shipping products that due to their size or their connectors do not fit well on tapes. The trays provide protection so that they can be packed directly in the shipping parcels. The tray specifications are given in the data sheet of the product.

2.4.1 Shipping parcel for PAM-7Q

A shipping parcel with dimensions 333 x 203 x 144 mm is used to pack PAM-7Q trays.

Each tray holds 50 modules. The shipping parcel holds ten full trays plus one empty tray (to protect the top layer of modules), for a total of 500 pieces.

Figure 32: Shipping parcel for trays of PAM-7Q modules

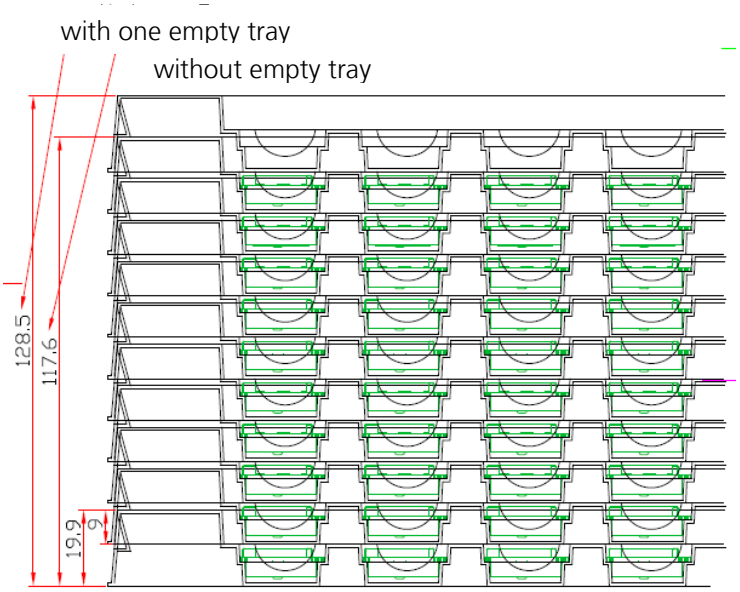


Figure 33: Dimensions stacked trays of PAM-7Q modules

2.4.2 Shipping Parcel for MPCI modules

MPCI modules are delivered as trays of 32 pieces, 5 trays in 1 package (160 units in total).

Figure 34: Shipping tray and parcel for MPCI modules

2.4.3 Shipping parcel for ELIN-W1

A shipping parcel with dimensions 395 x 265 x 75 mm is used to pack ELIN-W1 trays.

Each tray holds 24 modules and is rotated 180 degrees. The shipping parcel holds four full trays plus one empty tray (to protect the top layer of modules), for a total of 96 pieces.

Figure 35: Shipping tray and parcel for ELIN-W1 modules

2.4.4 Shipping parcel for NANO-S100

A shipping parcel with dimensions 566 x 486 x 202 mm is used to pack NANO trays.

Figure 36: Shipping tray and parcel for NANO-S100 modules

2.5 Shipping labels

For shipping, u-blox provides batch and multipack labels for packages containing larger volumes of products, as well as Moisture Sensitive Device (MSD) labeling where necessary (for more information, see section 3.1). Batch labels are affixed to reels, sealed bags, and individual packing cartons. MSD labels are affixed to sealed bags, and multipack labels are affixed to shipping parcels.

Table 9 shows the hierarchy of u-blox shipping labels and where they are affixed. For individual product labeling information see the applicable Data Sheet.

	Batch Label	MSD Label	Multipack Label
Reel	X		
Sealed Bag	X	X	
Packing Carton	X		
Shipping Parcel			X

Table 9: Label hierarchy

☞ Batch label contains 2nd Level Interconnect Declaration.

Figure 37 shows an example the location of the batch label on a sealed reel and the packing carton; the MSD label is also shown (exact size and location depends on the reel and packing carton type).

Figure 37: Location of batch label on sealed reel and packing carton, MSD label also shown

For large quantities, products are shipped in a shipping parcel and labeled with a multipack label.

2.5.1 Labeling for CVBGA, LGA, MLF/QFN packages

Figure 38 shows a batch label for CVBGA, LGA, and MLF/QFN packages with a 2D bar code.

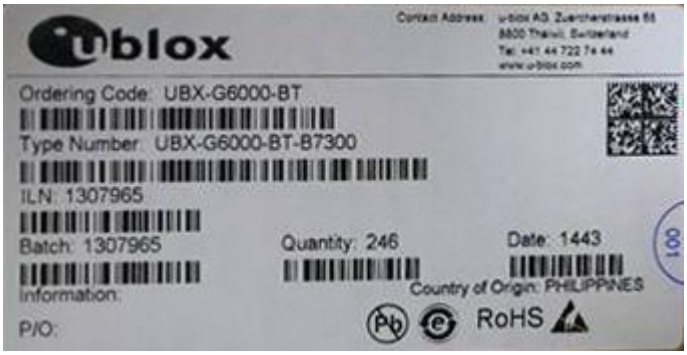


Figure 38: Batch label for CVBGA, LGA, MLF/QFN packages

☞ 2D bar codes have been applied to the existing u-blox package label system.

Figure 39 shows a multipack label for CVBGA, LGA, and MLF/QFN packages.

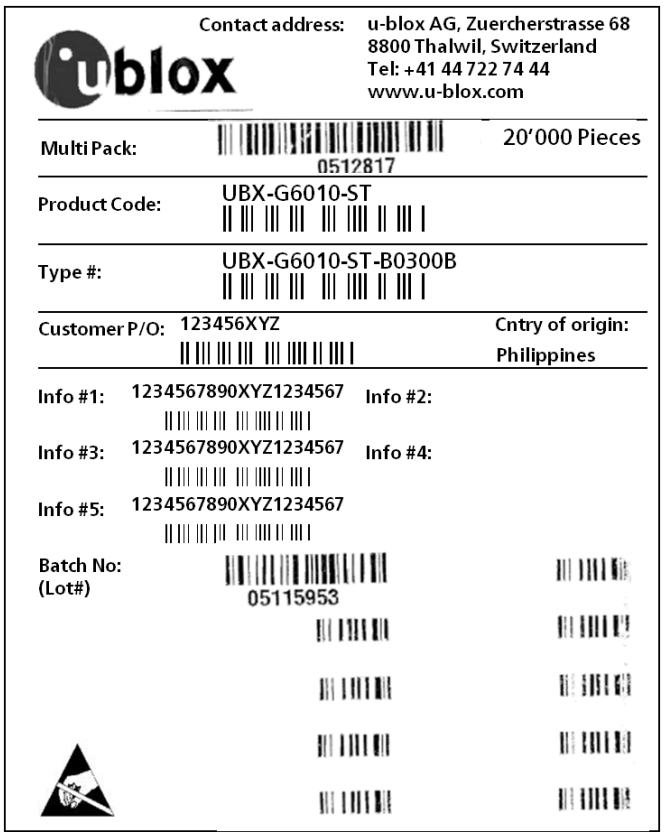


Figure 39: Multipack label: for CVBGA, LGA, and MLF/QFN packages

2.5.2 Labeling for LCC or LGA packages (modules)

Figure 40 and Figure 41 show a batch label for LCC packages (automotive & non-automotive modules).

Figure 40: Batch label for LCC automotive modules

Figure 41: Batch label for LCC non-automotive modules

Figure 42 shows a multipack label for LCC packages (modules).

Figure 42: Multipack label: for LCC packages

Figure 43 shows a batch label for LGA packages (modules) with CE marking.

Figure 43: Batch label for LGA modules

☞ The CE marking is printed on patch, MSD, and multipack labels for GNSS modules that have obtained CE certification.

2.5.3 Labeling for MPCI modules

Figure 44 shows a batch label for LGA packages (modules).

Figure 44: Batch label for MPCI modules

2.5.4 Labeling for NANO modules

NANO Modules are delivered in parcels with 10 trays of 24 modules.

Figure 45 shows a tray & vacuum label for NANO Modules

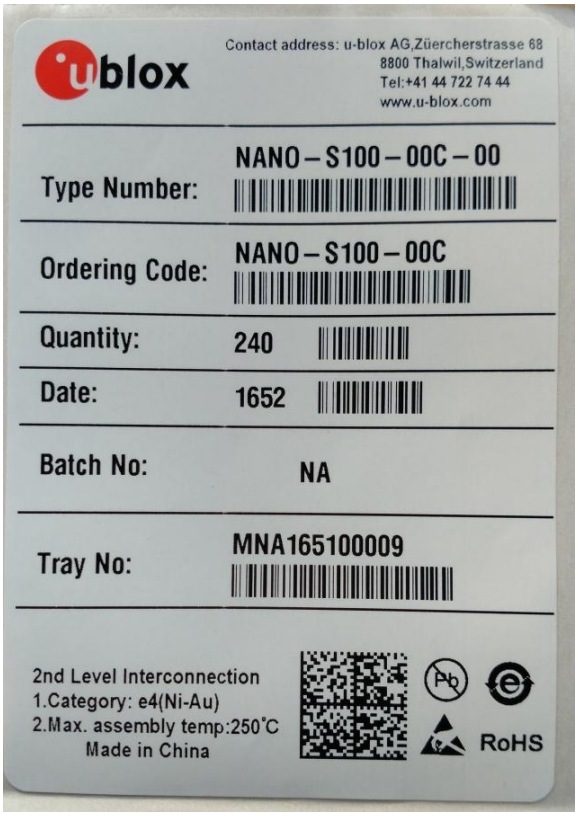


Figure 45: Tray & vacuum label for NANO Modules

2.5.5 Customer specific Labeling

For key customers, u-blox offers customer specific labeling on the primary packaging level.
This can be provided for modules dispatched from Althofen/AT and chips dispatched from Biñan/PH.

The scope of this covers:

- Individually designed labels as per customer requirement
- Three labels per packing carton (1 on carton, 1 loose in carton, 1 on vacuum bag)
- Label size is standardized at 14 x 9 cm

Figure 46, Figure 47, and Figure 48 show examples of customer specific labeled shipments.

Figure 46: Customer-specific label on a packing carton

Figure 47: Customer-specific label on a vacuum bag

Figure 48: Customer-specific label loose in a carton

3 Storage and handling for chips and modules

3.1 Storage

u-blox chips and modules are Moisture Sensitive Devices (MSD) according to the IPC/JEDEC specification. Appropriate MSD handling instructions and precautions are summarized in Sections 3.1.1 to 3.1.3. Read them carefully to prevent damage due to moisture intake.

3.1.1 Moisture Sensitivity Levels

The Moisture Sensitivity Level (MSL) relates to the required packaging and handling precautions. The MSL standard is available in IPC/JEDEC J-STD-020, which can be downloaded from www.jedec.org.

For the specified MSL levels of u-blox chips and modules see the applicable product Data Sheet.

Table 10 summarizes the dry pack requirements for different MSL levels in the IPC/JEDEC specification.

MSL Level	Dry Pack Requirement
1	Optional
2	Required
2a	Required
3	Required
4	Required

Table 10: JEDEC specification of dry pack requirements

According to IPC/JEDEC specification J-STD-020, if a device passes MSL level 1, it is classified as not moisture sensitive and does not require dry pack. If a device fails level 1 but passes a higher numerical level, it is classified as moisture sensitive and must be dry packed in accordance with J-STD-033.

3.1.2 Dry Bag

u-blox ships products with an MSL level of 2 or above dry packed in a Moisture Barrier Bag (MBB). Carrier materials such as trays, tubes, reels, etc., that are placed in the MBB can affect the moisture level within the dry bag. The effect of these materials is compensated by adding additional desiccant in the MBB to ensure the shelf life of the SMT packages.

IPC/JEDEC specifications require that MSD sensitive devices be packaged together with a Humidity Indicator Card (HIC) and desiccant to absorb humidity. If no moisture has been absorbed, the three fields in the HIC indicate blue color.

The MLF/QFN package is rated MSL=1 and is therefore not dry packed.

3.1.2.1 Humidity Indicator Card and desiccant bag (Type A & C & D reels)

Figure 49 and Figure 50 show the HIC and desiccant bag for Type A & C & D reels

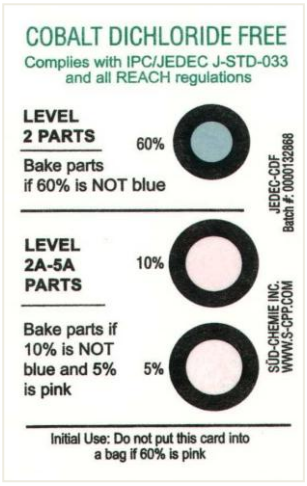


Figure 49: HIC for Type A reels

Figure 50: Desiccant bag for Type A reels

☞ u-blox uses Humidity Indicator Cards that are cobalt dichloride free.

3.1.2.2 Humidity Indicator Card and desiccant bag (Type B reels)

Figure 51 and Figure 52 show the HIC and desiccant bag for Type B reels.

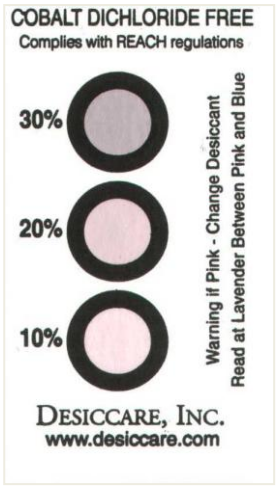


Figure 51: HIC for Type B reels

Figure 52: Desiccant bag for Type B reels

☞ u-blox uses Humidity Indicator Cards that are cobalt dichloride free.

3.1.2.3 MSD label

The dry bag provides an IPC/JEDEC compliant MSD label describing the handling requirements to prevent humidity intake. Figure 53 shows an example of an MSD label affixed to a dry bag along with a detailed enlargement.

Figure 53: Reel in hermetically sealed "dry bag" showing MSD label

3.1.3 Storage and floor life

The calculated shelf life for dry packed SMT packages is a minimum of 12 months from the bag seal date, when stored in a non-condensing atmospheric environment of <+40 °C/90% RH.

Table 11 lists floor life for different MSL levels in the IPC/JDEC specification.

MSL level	Floor life (out of bag) at factory ambient ≤30°C/60% RH or as stated
1	Unlimited at ≤30°C/85% RH
2	1 year
2a	4 weeks
3	168 hours
4	72 hours

Table 11: JEDEC specification of floor life

The parts must be processed and soldered within the time specified for the MSL level. If this time is exceeded, or the humidity indicator card in the sealed package indicates that they have been exposed to moisture, the devices need to be pre-baked before the reflow solder process.

3.1.4 Drying

Both encapsulate and substrate materials absorb moisture. IPC/JEDEC specification J-STD-020 must be observed to prevent cracking and delamination associated with the "popcorn" effect during reflow soldering. The popcorn effect can be described as miniature explosions of evaporating moisture. Baking before processing is required in the following cases:

- Humidity indicator card: At least one circular indicator is no longer blue
- Floor life or environmental requirements after opening the seal have been exceeded, e.g. exposure to excessive seasonal humidity.

Refer to Section 4 of IPC/JEDEC J-STD-033 for recommended baking procedures. Table 4-1 of the specification lists required bake times and conditions for drying. Table 12 provides a summary of specified recommendations. For example, an SMD package with a thickness between 2.0 and 4.5 mm that has exceeded its floor life by >72 hours shall be baked at +125 °C for 48 hours. (Floor life begins counting at time = 0 after bake).

Consult Section 4 of IPC/JEDEC J-STD-033 for recommendations and specification. Package thicknesses and MSL values are specified in the product Data Sheet.

Package Thickness[1]	MSL Level [1]	Bake Time @ +125 ° C (hours)
≤1.4 mm	2	5
	2a	7
	3	9
	4	11
	5	12
	5a	16
>1.4 mm ≤2.0 mm	2	18
	2a	21
	3	27
	4	34
	5	40
	5a	48
>2.0 mm ≤4.5 mm	2	48
	2a	48
	3	48
	4	48
	5	48
	5a	48

Table 12: Bake times for SMD packages exceeding Floor Life by > 72 hours (See section 4 of IPC/JEDEC J-STD-033)

Do not attempt to bake u-blox products while contained in tape and rolled up in reels. For baking, place parts individually onto the oven tray.

Oxidation Risk: Baking SMT packages may cause oxidation and/or intermetallic growth of the terminations, which if excessive can result in solderability problems during board assembly. The temperature and time for baking SMT packages are therefore limited by solderability considerations. The cumulative bake time at a temperature greater than +90 °C and up to +125 °C shall not exceed 96 hours. If the bake temperature is not greater than +90 °C, there is no limit on bake time. Bake temperatures higher than +125 °C are not allowed.

3.2 Handling

u-blox chips and modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling without proper ESD protection may destroy or damage them permanently.

3.2.1 ESD handling precautions

u-blox chips and modules are Electrostatic Sensitive Devices (ESD) and require special ESD precautions when handling. Proper ESD handling and packaging procedures must be applied throughout the processing, handling and operation of any application that incorporates these products. Particular care must be used when handling patch antennas, due to the risk of electrostatic charges.

Maximum ESD ratings are specified in the applicable Data Sheet. For recommended ESD precautions during design and implementation, see the product Hardware/System Integration Manual.

Failure to observe these precautions can result in severe damage to the device!

[1] See product Data Sheet for specification.

4 GNSS antennas

4.1 Packaging and shipment

u-blox ANN-MS GNSS antennas are delivered in individual carton boxes (see Figure 54). The box dimensions are given in Figure 55.

Figure 54: ANN-MS GPS antenna in a shipping box

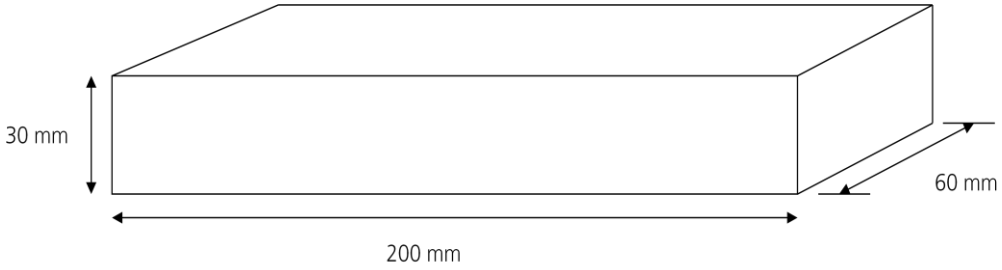


Figure 55: Dimensions of the ANN-MS shipping box

Figure 56: Package labeling variants of the ANN-MS GPS antenna

X	This box is checked for **all ANN-MS** antenna products	
X	**ANN-MS-0-005-0**	(SMA Connector)
X	**ANN-MS-1-005-0**	(SMB Connector)
X	**ANN-MS-2-005-0**	(MCX Connector)
X	**ANN-MS-3-005-0**	(Fakra Connector)

Figure 57: Explanation of package codes

Revision history

Revision	Date	Name	Status / Comments
-	19-Sep-2011	tgri	Initial release
1	10-Oct-2011	tgri	Added Table 12 to section 3.1.4 Last revision with old document number GPS-X-11004
R03	19-May-2014	smos	u-blox CI revisions. Added packing information for trays (for PAM-7Q patch antenna module).
R04	30-May-2014	rdow	Added packing information for Reel type C and FW2770/ FW75-C200 trays.
R05	18-Dec-2014	julu, smos	Added packing information for Reel type D, added 2D bar code information to section 2.5.1, added CE marking information to section 2.5.2.
R06	12-Jun-2015	julu, kgom	Updated Table 3 with new combination variant 3. Updated Table 4 with new flange variant with nominal width of 16 mm. Updated section 4 (package information for GPS antenna carton box). Added MPCI tray related information.
R07	30-Nov-2015	kgom, smos	Added reel type A4 in Table 3, section 2.1.1 – Reel type A. Removed Shipping Parcel for FW2770 & FW75-C200 section.
R08	3-Feb-2016	kgom	Updated Table 1. Added shipping parcel information for ELIN-W1 modules in section 2.4.3.
R09	24-Mar-2016	kgom, smos	Added MPCI tray, carton and label information. Simplified introduction chapter by removing the overview table, which did not provide more information than the table of contents does.
R10	27-May-2016	kgom	Added packing information for Reel type E for former connectBlue products in section 2.1 and section 2.1.5.
R11	09-Jan-2017	gbor	Updated batch label for LCC packages in section 2.5.2. Updated NANO Modules & customer specific labeling in section 2.5.4 & 2.5.5
R12	25-Apr-2017	gbor	Deleted option for small additional label under section 2.5.2
R13	27-Nov-2017	mbab	Added information about partial reels in sections 1.2 and 2

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