Product packaging

For u-blox chips, modules, and antennas

Reference guide

Abstract

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

Document information

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Contents

1 Introduction

1.1 Purpose and scope

This document provides general information about how u-blox mass-production products, including GNSS and short-range modules, chips, and antennas, are packed for delivery to customers. This information supplements that provided in the data sheets and integration manuals, which include the specifications of the reel types used for the distribution of each specific product. The packaging information provided in this guide is not applicable to sample volumes.

1.2 Packing hierarchy

The packaging for each product depends on whether it is delivered on reels or trays. u-blox modules are delivered on either tape or tray, but u-blox chips are shipped exclusively on tape. See also Tape reels and Shipping parcels for trays or compartments.

The packing order for chips and modules delivered on tape reels is shown from left to right in Table 1.

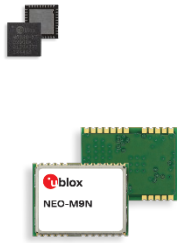
Module or chip	Tape and reel	Moisture barrier bag	Packing carton (also called “pizza box”)	Shipping parcel
				

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

The packing order for u-blox modules delivered on trays is shown from left to right in

Table 2.

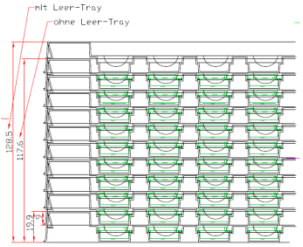
Module	Tray	Stacked trays	Shipping parcel
			

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

2 Shipping chips and modules

u-blox chips and modules are delivered as reeled tapes (see Figure 1) or on trays (Figure 2), which enables efficient production, production lot set-up and tear-down. Products with moisture sensitivity level (MSL) rating of 2 or above are shipped in a hermetically sealed package known as a “dry bag” (see Moisture sensitivity) to prevent moisture intake and to 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 also Packing reels in cartons.

Products that are normally delivered on a reel WILL NOT be delivered on a reel if the order volume is less than that specified in the specific data sheet or integration manual for the product. See also Packing hierarchy. Contact u-blox Sales Administration for any related questions prior to placing a partial order.

Figure 1: Tape reel

Figure 2: Tray

2.1 Tape reels

Most u-blox chips and modules that are delivered on tape come on reel type A, B, C or D. The reel type for each specific product is described in the respective data sheet.

☞ Product orders for volumes less than order quantities specified in the product data sheet or integration manual must be requested specifically in the purchase order. The number of pieces on a single reel of tape varies between products but is defined in the respective product data sheet. Contact u-blox Sales Administration with any related questions prior to placing your order. See also Shipping of non-standard quantities.

Figure 3 to Figure 10 show the various reel types on which u-blox chips and modules are shipped.

Figure 3: Type A reel for chipsets

Figure 4: Type A reel for modules

Figure 5: Type B reel

Figure 6: Type C reel

Figure 7: Type D reel

Figure 8: Type E reel

Figure 9: Type F reel

Figure 10: Type G reel

Figure 11 shows a typical reel and its various elements.

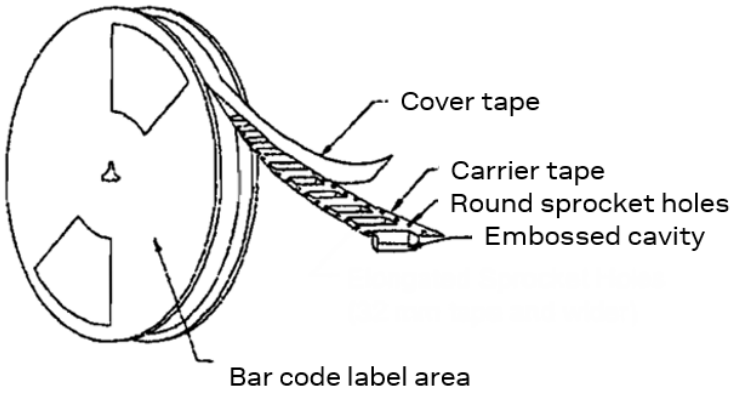


Figure 11: Elements of the reel

2.1.1 Reel type A

Type A reels are composed of two flanges, with the width between the flanges determined by the width of the hub that forms the winding surface for the tape.

Type A reels are used for standard UBX family chipsets and modules and come in different widths to accommodate the different chip sizes and subsequent tape width. Table 3 lists the possible variants and widths of the flange combinations.

Width variants	Tape width	Flange width 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
Type A5	44 mm	28 mm + 16 mm

Table 3: Reel composition of two halves

Figure 12 shows the component parts of a typical Type A reel for chipsets, and Figure 13 for modules, including one of the reel flanges.

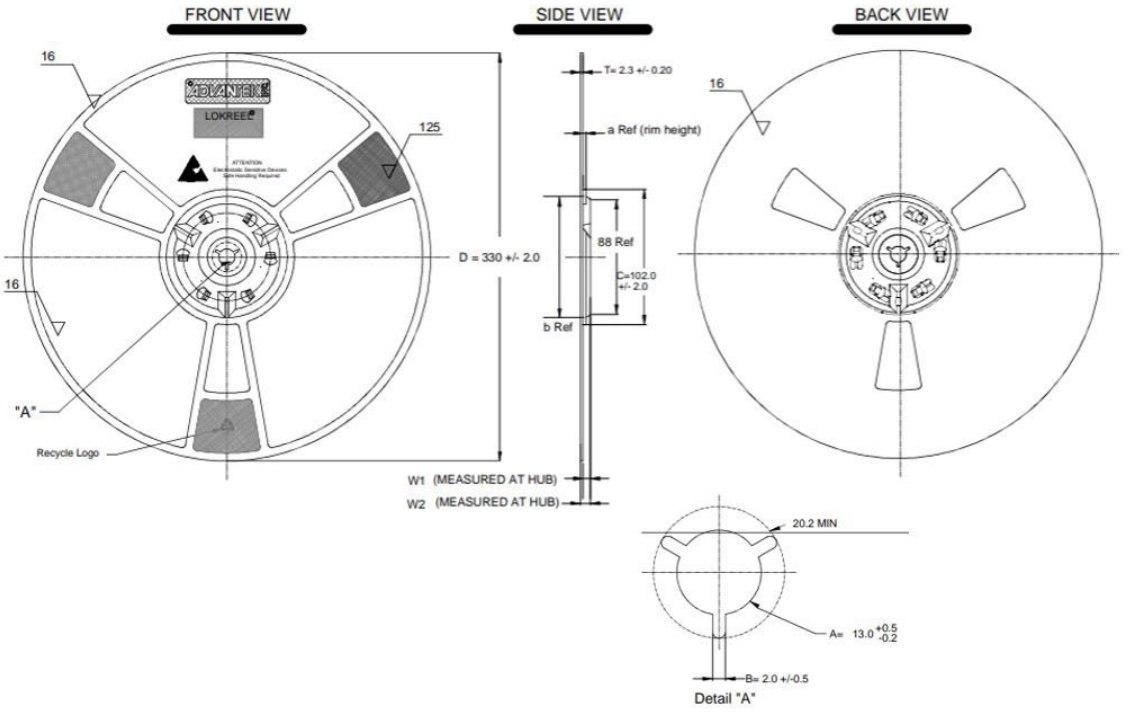


Figure 12: Type A for chipsets reel drawing

Nominal flange width	W1 [+0.3 mm / -0.2 mm]	W2 (max.)	A (rim height)	B (REF)
4	4.4 mm	7.1 mm	1.5 mm	96.5 mm
8	8.4 mm	11.1 mm	1.5 mm	96.5 mm

Table 4: Type A for chipsets reel dimensions

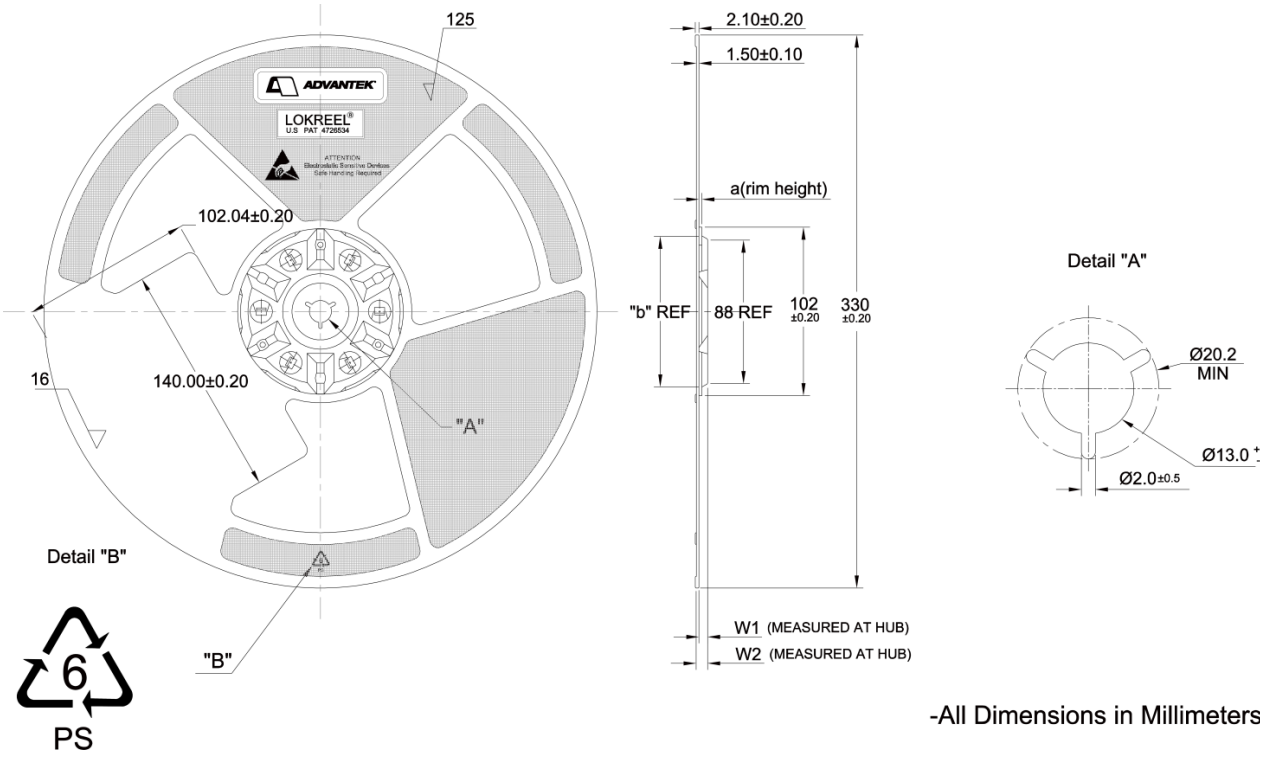


Figure 13: Type A for modules reel drawing

Nominal flange width	W1 [+0.3 mm / -0.2 mm]	W2 (max.)	A (rim height)	B (REF)
4	4.4 mm	7.1 mm	1.5 mm	95.0 mm
8	8.4 mm	11.1 mm	1.5 mm	97.3 mm
16	16.4 mm	19.1 mm	4.5 mm	97.3 mm

Table 5: Type A for modules reel dimensions

2.1.2 Reel type B

Type B reels are composed of two flanges, with the width between the flanges determined by the width of the hub that forms the winding surface for the tape.

Type B reels come in three widths to accommodate the different module sizes and subsequent tape width. Table 6 lists the possible variants and widths of the flange combinations.

Type B reels are used for several standard modules.

Width variants	Tape width	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 6: Type B reel dimensions

Figure 14 shows the component parts a typical Type B reel.

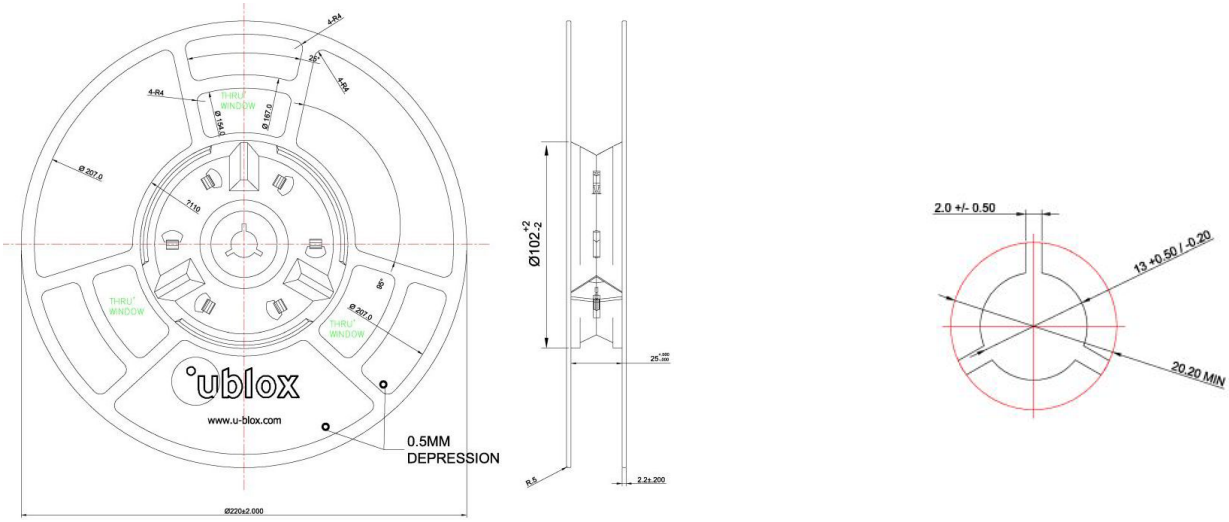


Figure 14: Type B reel dimensions

2.1.3 Reel type C

Type C reels have one set width. The tape width, reel diameter, and hub diameter of Type C reels are described in Table 7.

Width variants	Tape width	Reel diameter	Nominal hub width	Nominal hub diameter
Type C	50 mm	330 mm	56.5 mm	180 mm

Table 7: Type C reel dimensions

Type C reel dimensions are shown in Figure 15.

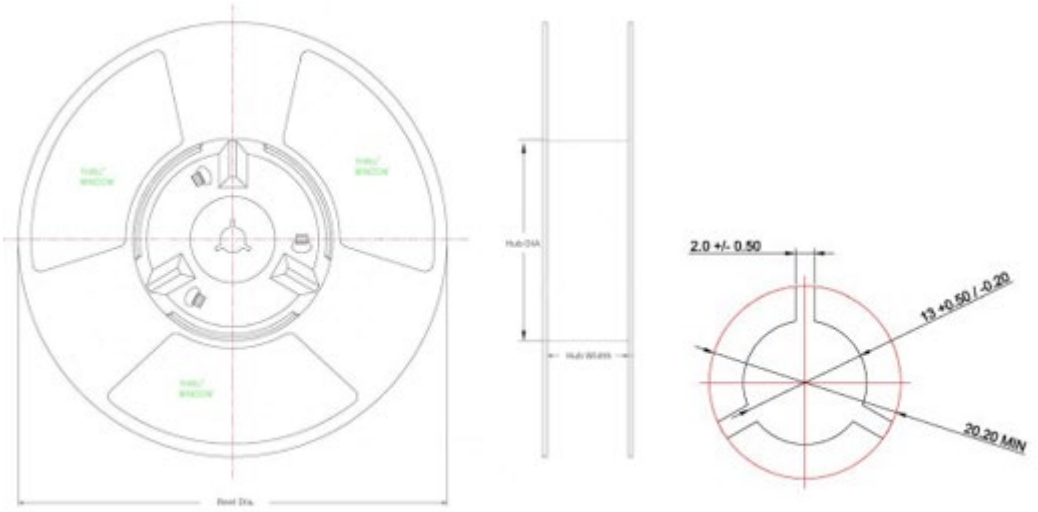


Figure 15: Type C reel dimensions

2.1.4 Reel type D

Type D reels have one set width and are used for chipsets. The tape width, reel diameter, and hub diameter of Type D reels are described in Table 8.

Width variants	Tape width	Reel diameter	Nominal hub diameter
Type D	16 mm	180 mm	62 mm

Table 8: Dimensions of type D reel

Type D reel dimensions are shown in Figure 16.

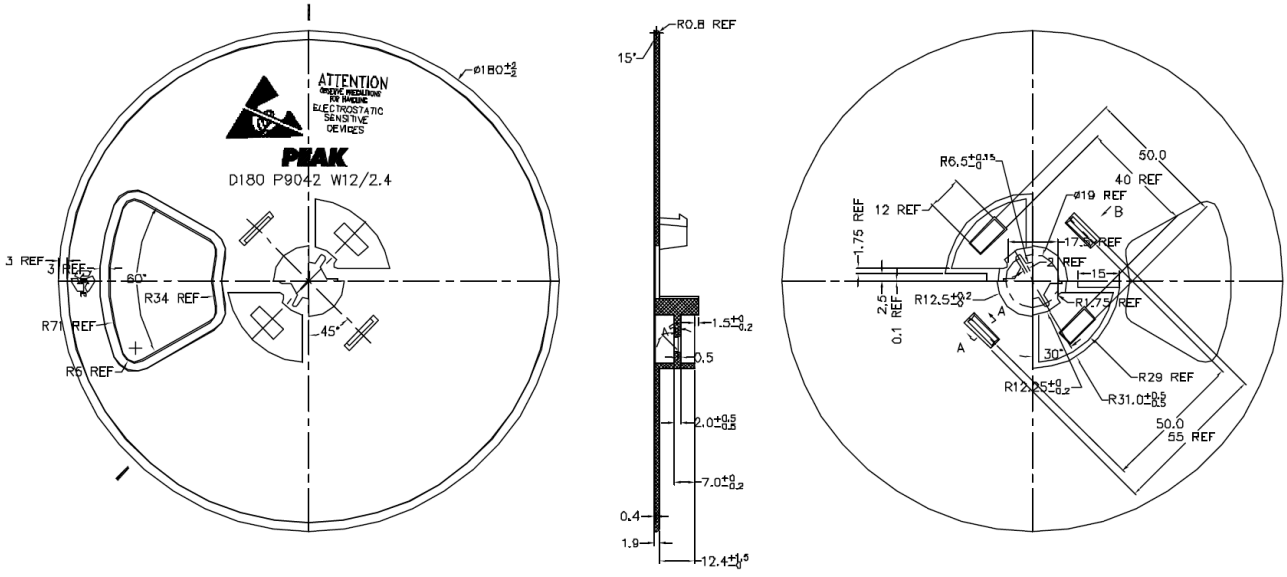


Figure 16: Type D reel dimensions

2.1.5 Reel type E

Type E reels have one set width. The reel size, reel diameter, and hub diameter of Type E reels are described in Table 9.

Width variants	Tape width	Reel diameter	Nominal hub diameter
Type E	56 mm	330 mm	100 mm

Table 9: Dimensions of type E reel

Type E reel dimensions are shown in Table 17.

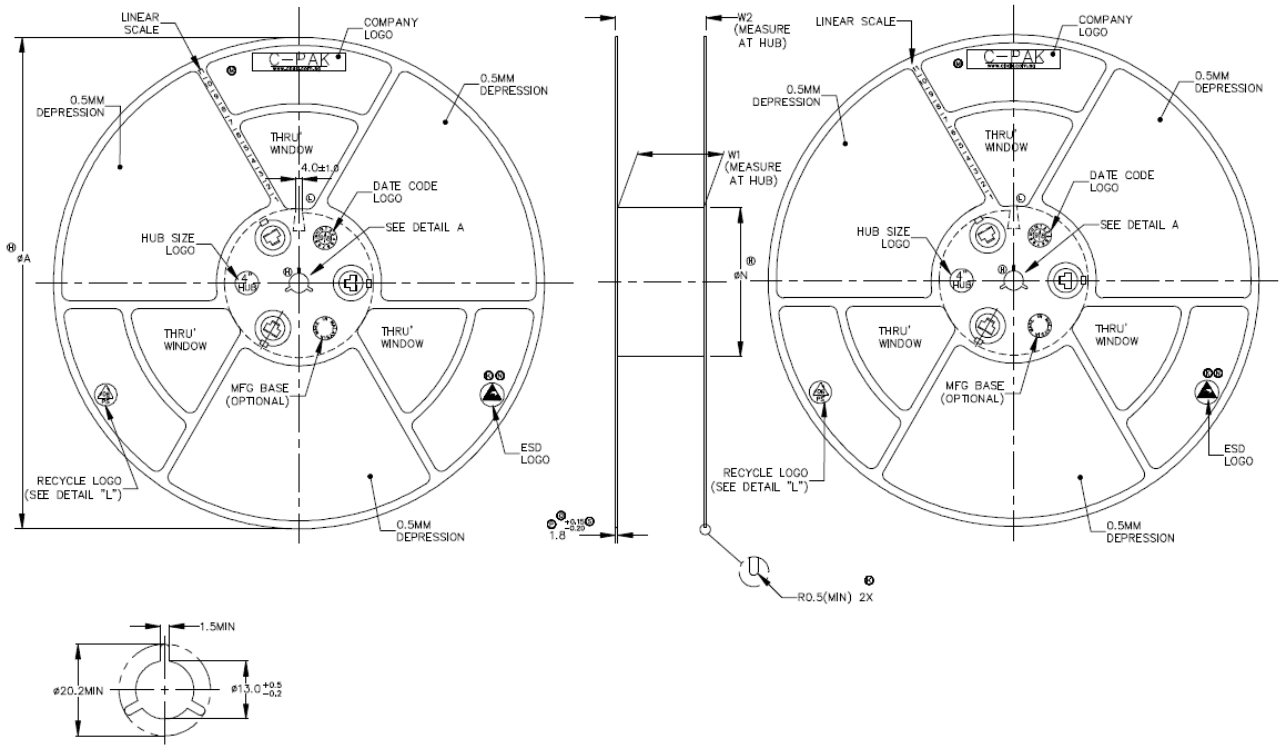


Figure 17: Type E reel dimensions

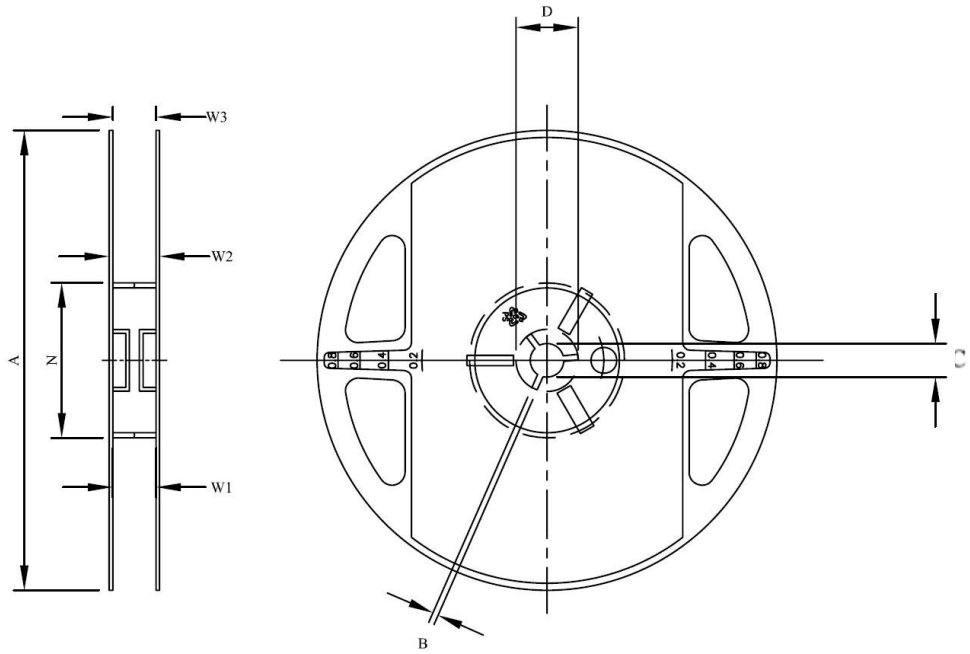
2.1.6 Reel type F

Type F reels have one set width. The tape width, reel diameter, and hub diameter of Type F reels are described in Table 10Table 10.

Width variants	Tape width	Reel diameter	Nominal hub width	Nominal hub diameter
Type F	16 mm	178 mm	17 mm	60 mm

Table 10: Dimensions of type F reel

Type F reel dimensions are shown in Figure 18.



A	N	W1	W2	W3	D	B	C
178±1.0	60±0.5	17.0 $^{+0.5}_{-0.0}$	20.0±0.5	>16.0	21.3±0.2	2.3±0.2	13.5±0.2

Figure 18: Type F reel dimensions

2.1.7 Reel type G

Type G reels have one set width. The tape width, reel diameter, and hub diameter of Type G reels are described in Table 11.

Width variants	Tape width	Reel diameter	Nominal hub width	Nominal hub diameter
Type G	44 mm	330 mm	48 mm	178 mm

Table 11: Dimensions of type G reel

Type G reel dimensions are shown in Figure 19.

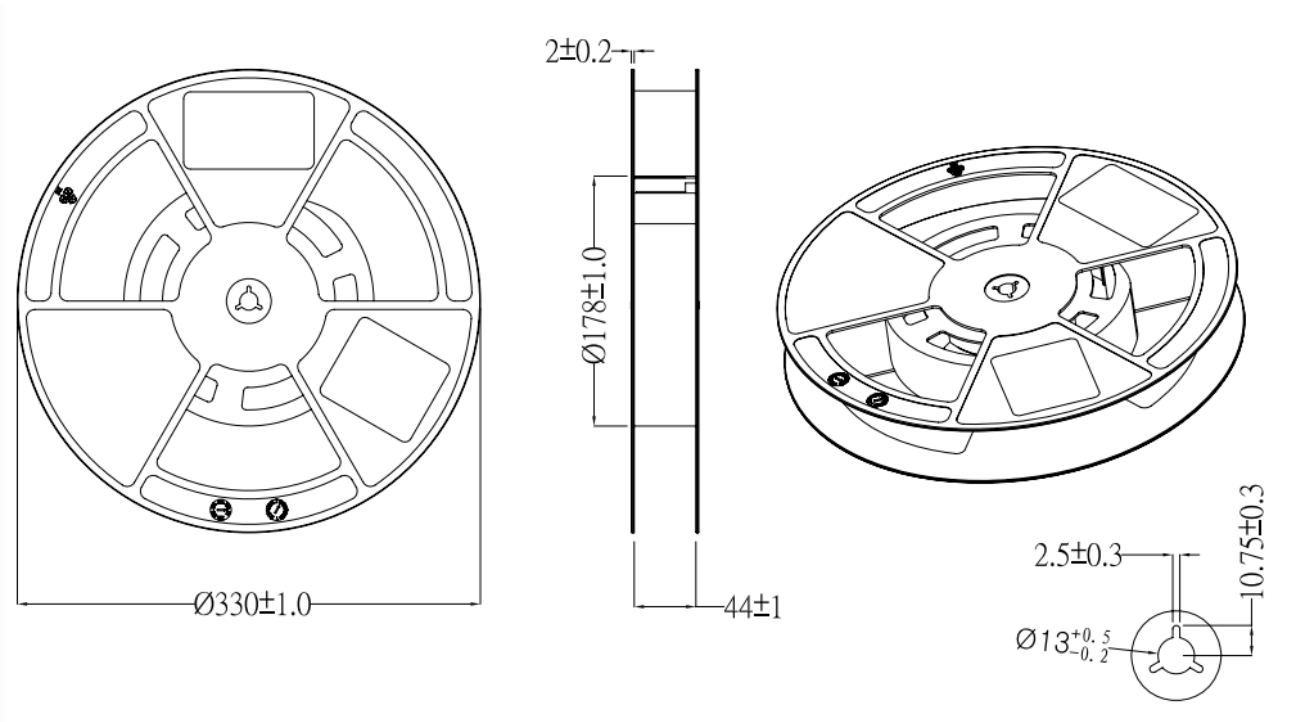


Figure 19: Type G reel dimensions

2.2 Packing reels in cartons

u-blox delivers the reels of chips and modules in several packing carton types (A-G), as described in the following sections. The physical dimensions of each carton type vary.

The type of packing carton used for shipping mass-production products is determined by the type of tape and reel on which the chip or module is delivered.

A packing carton is sometimes referred to as a “pizza box”.

Figure 20: Typical packing cartons

Reel Type	Packing carton dimensions (mm)
Type A1-A4	370 x 355 x 56
Type A5	370 x 355 x 63
Type B1	250 x 245 x 45
Type B2+B3	250 x 245 x 64
Type C	372 x 360 x 65
Type D	180 x 180 x 82
Type E	330 x 330 x 70
Type F	220 x 220 x 50
Type G	350 x 350 x 55

Table 12: Packing cartons sizes

2.3 Shipping reel cartons in parcels

Parcels are shipping boxes that contain one or more reel cartons. Although parcels generally include reels of the same type, some parcels can contain different reel types. See also Shipping parcels for split shipments.

2.3.1 Shipping parcels for type A reels for chipsets

Shipping parcels for Type A cartons are shipped in three different types of shipping parcels:

A smaller parcel with dimensions 388 x 386 x 143 mm is used for shipments of up to two reels.

Figure 21: Small shipping parcel for type A reels

A mid-size parcel with dimensions 395 x 395 x 232 mm is used for shipments of up to four reels.

Figure 22: mid-size shipping parcel for type A reels

A larger parcel with dimensions 388 x 353 x 414 mm is used for shipments of up to six reels.

Figure 23: Large shipping parcel for type A reels

2.3.2 Shipping parcels for type B, D, and F reels

Type B, D, and F packing cartons are shipped in three different types of shipping parcels:

A shipping parcel with dimensions 260 x 270 x 150 mm is used for shipments of one or two reels.

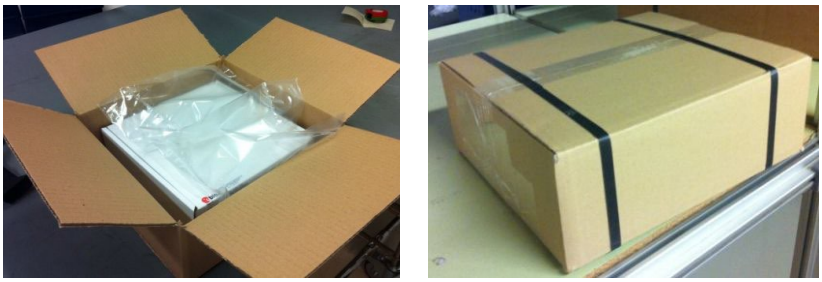


Figure 24: Shipping parcel for single type B reel

A shipping parcel with dimensions 260 x 270 x 350 mm is used for shipments of up to five reels.

Figure 25: Shipping parcel for up to 5 type F packing cartons

A shipping parcel with dimensions 520 x 270 x 350 mm is used for shipments of up to 10 reels.

Figure 26: Shipping parcel for up to 10 type F packing cartons

2.3.3 Shipping parcels for type C and E reels (and some A reels)

Type C and E packing cartons are shipped in a shipping parcel with dimensions 380 x 360 x 220 mm. This parcel is used for shipments of up to four reels, each in its own packing carton.

The shipping parcel for five to ten reels in type C and E packing cartons is 590 x 390 x 390 mm. This parcel size also applies to large shipments of A reels.

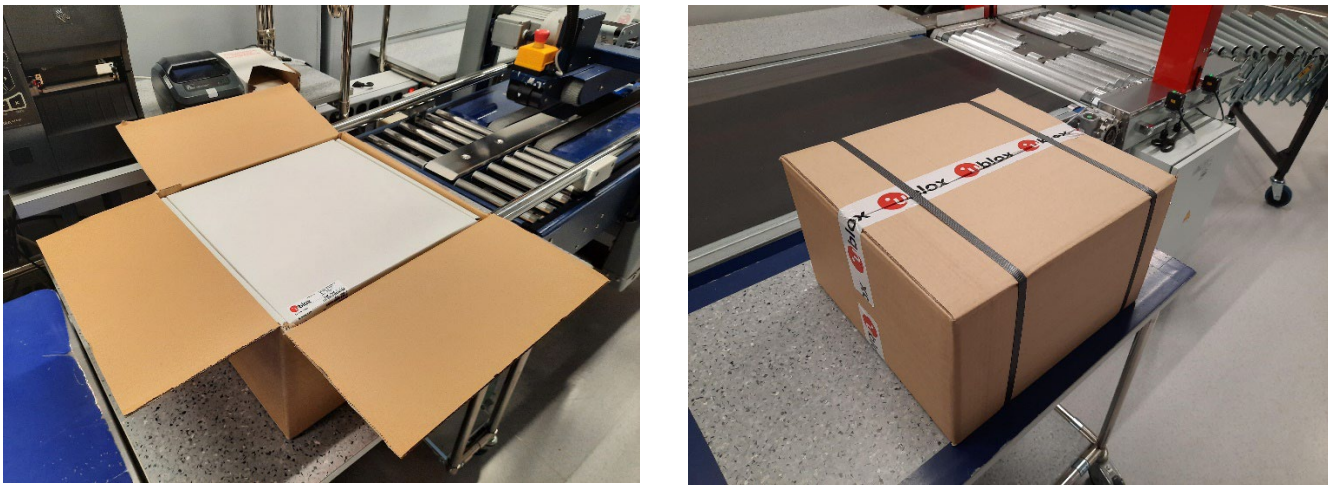


Figure 27: Shipping parcel for four type C reels

Figure 28: Shipping parcel for ten type C reels

2.3.4 Shipping parcels for type G reels

Type G packing cartons are shipped in a shipping parcel with dimensions 740 x 250 x 365 mm. This parcel is used for shipments of up to four reels. Four empty packing cartons are added to the parcel to fill the shipping parcel.

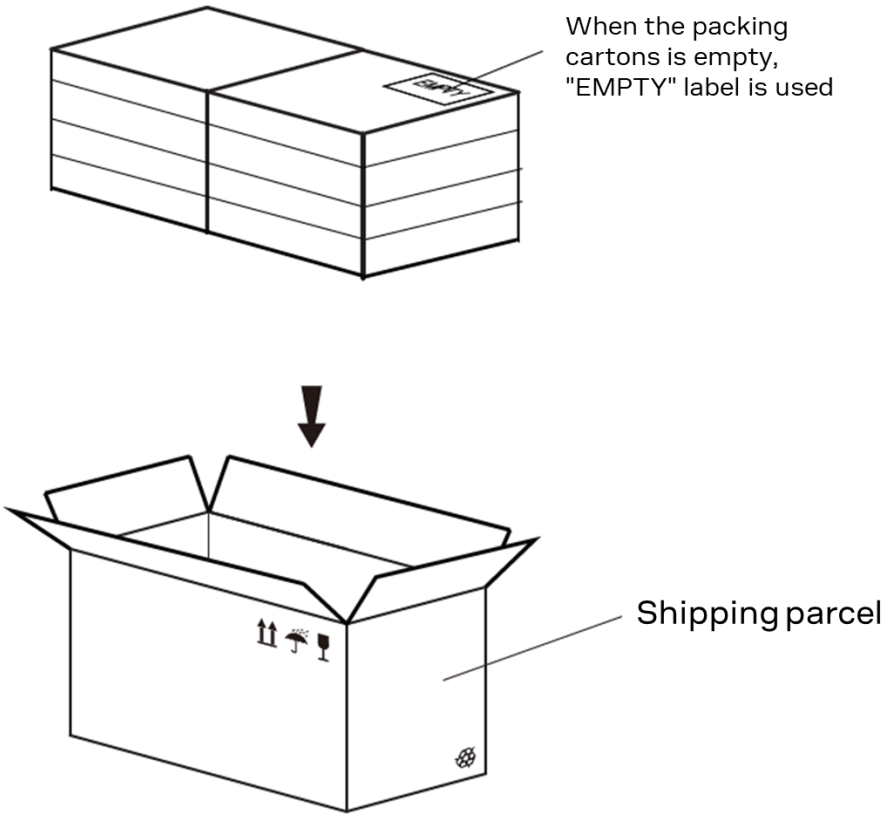


Figure 29: Shipping parcel for type G reels

2.4 Shipping parcels for split shipments

Although parcels generally include reels of the same type, parcels in “split shipments” can contain different reel types. Table 13 describes the possible reel types and maximum number of cartons for different sized parcels in split shipments.

Parcel dimensions mm	Reel types	Maximum number of reel cartons
260 x 270 x 150	B, D, F	2
380 x 360 x 220	A, C, E	4
380 x 380 x 300	A, C E	5
260 x 270 x 350	B, D, F	5
520 x 350 x 270	B, D, F	10
590 x 390 x 390	A, C, E	10

Table 13: Parcel dimensions and reel types in split shipments

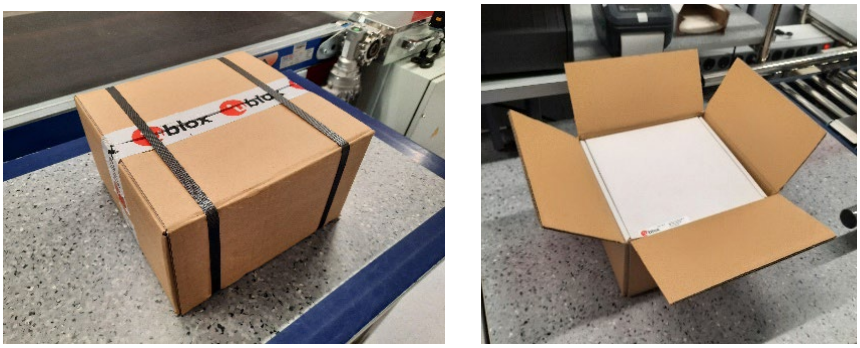


Figure 30: Shipping parcel size 260 x 270 x 150 for type B, D or F reels for split shipments

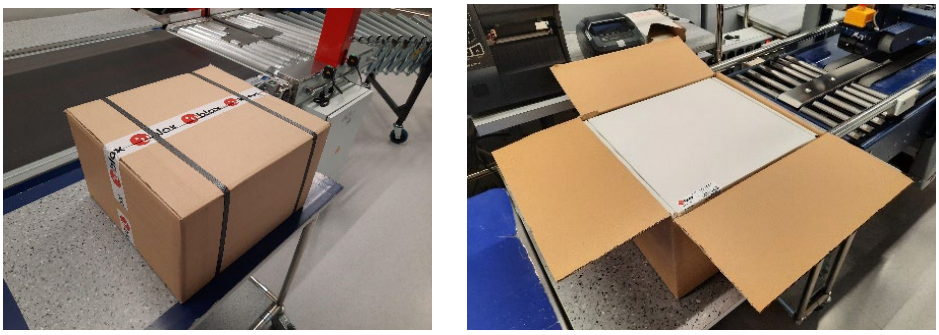


Figure 31: Shipping parcel size 380 x 360 x 220 for type A, C or E reels for split shipments

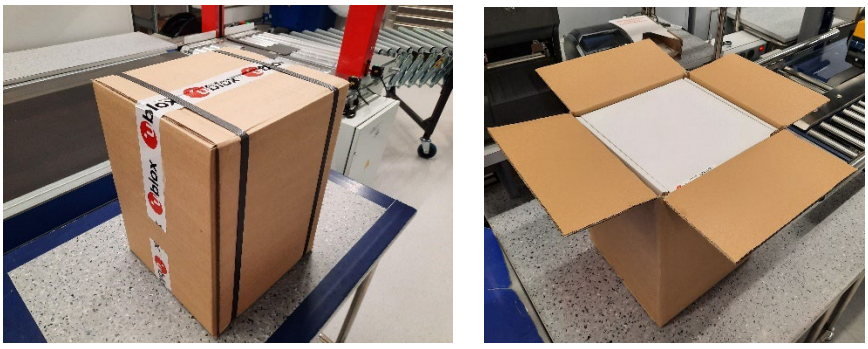


Figure 32: Shipping parcel size 260 x 270 x 350 for type B, D or F reels for split shipments

Figure 33: Shipping parcel size 520 x 350 x 270 for type B, D or F reels for split shipments

Figure 34: Shipping parcel size 590 x 390 x 390 for type A, C or E reels for split shipments

2.5 Shipping parcels for trays or compartments

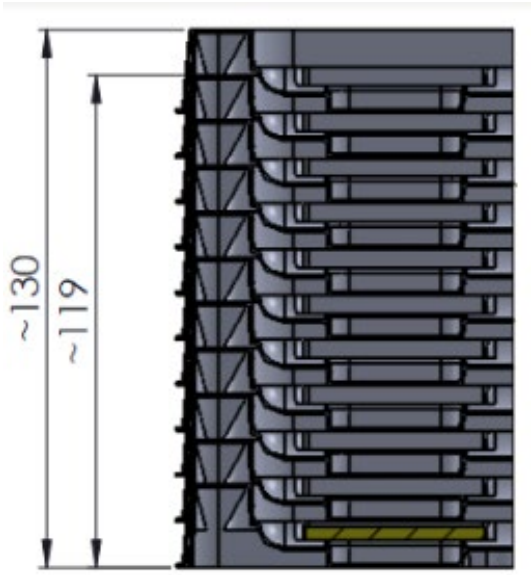
Trays are normally used for shipping products that, due to their size or their connectors, do not fit well on tapes. The trays come in various sizes and provide the necessary protection for the products to be packed directly in the shipping parcels. Tray specifications are given in the product documentation.

2.5.1 Shipping parcel 333 x 203 x 144 mm

A shipping parcel with dimensions 333 x 203 x 144 mm is used to pack products in trays of 330 x 200 mm, where each tray holds 20 cards. The parcel holds ten full trays plus one empty tray (to protect the top layer of products), for a total of 200 pieces. This is typically used for M2-cards for Positioning.

Figure 35: 333 x 203 x 144 mm shipping parcel with each tray holding 20 cards

Figure 36 shows the dimensions of stacked trays – with and without an extra tray that is included as an extra cushion against potential physical damage during shipment.



1 Empty tray on the top

Figure 36: Dimensions for stacked trays

2.5.2 Shipping parcel 360 x 220 x 380 mm

360 x 220 x 380 mm shipping parcels typically pack modules in trays of 16 pieces, with 10 trays in a 220 x 180 x 340 mm package (160 units in total).

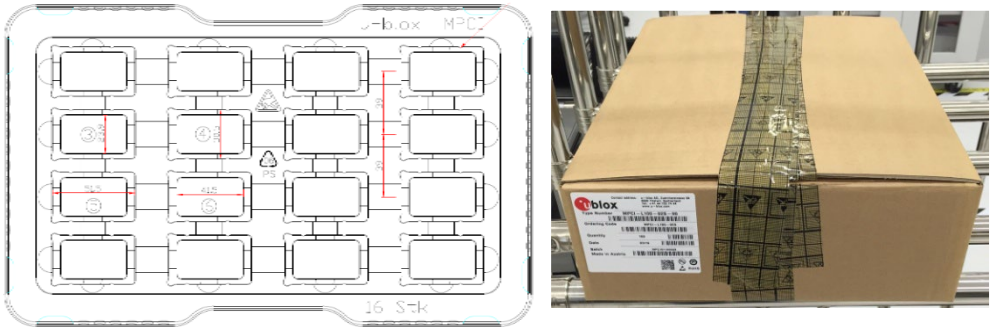


Figure 37: 360 x 220 x 380 mm shipping parcel with 16-piece trays for 160 units

2.5.3 Shipping parcel 390 x 270 x 100 mm

Some boards, like the RCB-F9T, are delivered in a special 390 x 270 x 100 mm parcel with 72 (8 x 9) individual compartments. Boards packed in these parcels are each in their own antistatic, plastic bag.

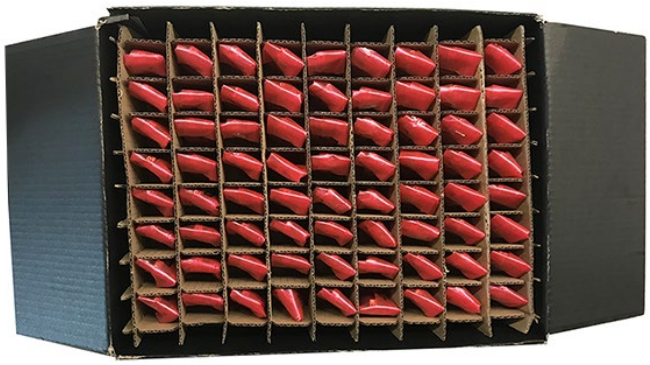


Figure 38: Special 390 x 270 x 100 shipping parcel with individual compartments

2.5.4 Shipping parcel 229 x 324 x 60 mm

M2 cards for short range products, like M2-JODY-W263, which use trays of 28 pieces each are delivered in 229 x 324 x 60 mm inner boxes. One inner box contains five stacked trays of 140 pieces in total. The trays are sealed in vacuum bags including desiccant bags and humidity indicators. Outer box size may vary depending on volume shipped.

Figure 39: Packed tray, sealed tray and closed inner box for M2 cards

2.5.5 Shipping parcel 345 x 345 x 70 mm

ANT-B10-00C antenna boards are delivered in 345 x 345 x 70 mm inner boxes. Boxes include trays of 4 pieces each. One inner box contains 3 stacked trays, totaling 12 pieces. An empty tray is used on top as a cover. The trays are sealed in vacuum bags including a desiccant bag.

Figure 40: Packed tray and closed inner box of ANT-B10-00C

2.5.6 Shipping parcel 160 x 110 x 30 mm

ANT-B11-00C antenna boards are delivered in 160 x 110 x 30 mm inner boxes. Boxes include trays of 4 pieces each. One inner box contains 2 stacked trays, totaling 8 pieces. The trays are sealed in vacuum bags including a desiccant bag.

Figure 41: Packed tray and closed inner box of ANT-B11-00C

2.6 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. See also Storage. 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 14 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 14: Label hierarchy

Figure 42 shows an example of the location of the batch label on a sealed reel and the packing carton; the MSD label is also shown. The exact size and location depend on the reel and packing carton type.

Figure 42: 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.

2.6.1 Labeling for chipset packages

Depending on the place of production, some chipset packages are shipped with labels that include 2D bar codes, as shown in Figure 43.

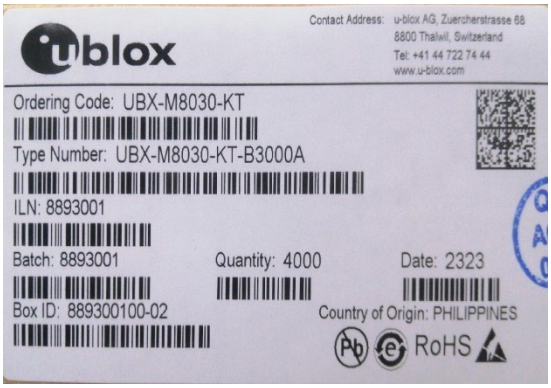


Figure 43: Batch label with 2D bar cards

Chipset batch labels include a 2D QR-code with a comma separator and the following fields: ordering code, type number, quantity, internal lot number (ILN), batch number, date code, box identification number, and country of origin, as shown in Table 15.

Label field	Example content
Ordering code	UBX- M8030-KT
Type number	UBX- M8030-KT-B30000A
Quantity	4000
ILN	8893001
Batch	8893001
Date code	2323
Box ID	889300100_02
Country of origin	PHILIPPINES

Table 15: Example of information in 2D barcodes for CVBGA, LGA, MLF/QFN chipsets packages

Table 16 shows example content of a multipack shipping label for chipset packages that are without 2D bar codes.

Label field	Example content
Ship to Code	244-27-A
From	u-blox
Shipping address	Company Name Inc. 1234 Main Street 99999 Big City COUNTRY
Shipment number	202300009999
Invoice number	DIV202300000
Carton	1 of 1, weight (kg): 1.5

Table 16: Multipack label without 2D bar codes

2.6.2 Labeling for modules

Figure 44 and Figure 45 show typical batch labels for standard, professional, and automotive grade modules, where only the latter includes batch information.

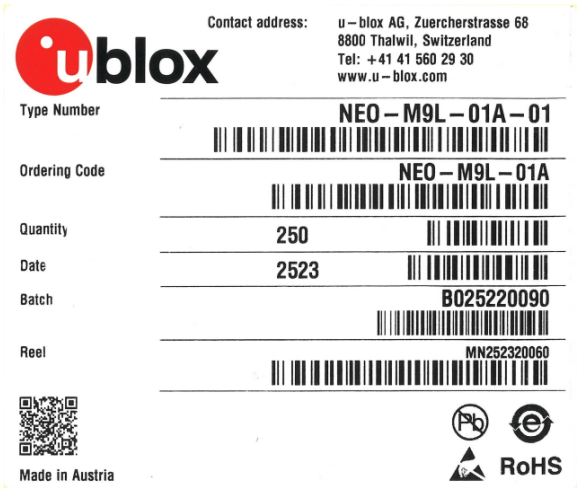


Figure 44: Typical batch label for automotive grade modules

Figure 45: Typical batch label for standard and professional grade modules

Batch labels for all module grades include a 2D QR-code with a comma separator and the following fields: site ID, type number, ordering code, quantity, packing date, and unique reel ID. Typical examples of the label fields are shown in Table 17 and Table 18.

Label field	Example information
Site ID	AT01
Type number	NEO-M9L-01A-01
Ordering Code	NEO-M9L-01A
Quantity	250
Packing date	2523
Batch	B025220090
Unique reel ID	MN252320060

Table 17: Label example with 2D barcodes automotive product grade modules

Label field	Example information
Site ID	AT01
Type number	NORA-B206-00B-00
Ordering Code	NORA-B206
Quantity	500
Packing date	2524
Batch	NA (no batch number)
Unique reel ID	MNO252400004

Table 18: Label example with 2D barcodes for standard and professional grade modules

Figure 46 shows a multipack label (left) and batch labels reserved for u-blox modules where no marking is possible due to small size and space needed for CE accreditation (right).

Figure 46: Multipack label (left) and batch label for u-blox modules with CE accreditation (right side)

2.6.2.1 Unique reel ID definition

In the case of product recall, rework, or other such cases, the unique reel ID on the batch label allows the tracking of the products back to the customer. For example, the unique reel ID MZ233900105 shown in Table 17 contains the following information:

Unique reel ID = XIIIYYWWDDDDD

- X: Production site
- I: Product form factor identifier (varies in length)
- YYWW: Year and calendar week (ISO 8601)
- DDDDD: Decimal counter with weekly reset

2.6.2.2 Label dimensions

Figure 47 shows the dimensions and positioning of barcode information for a typical batch label.

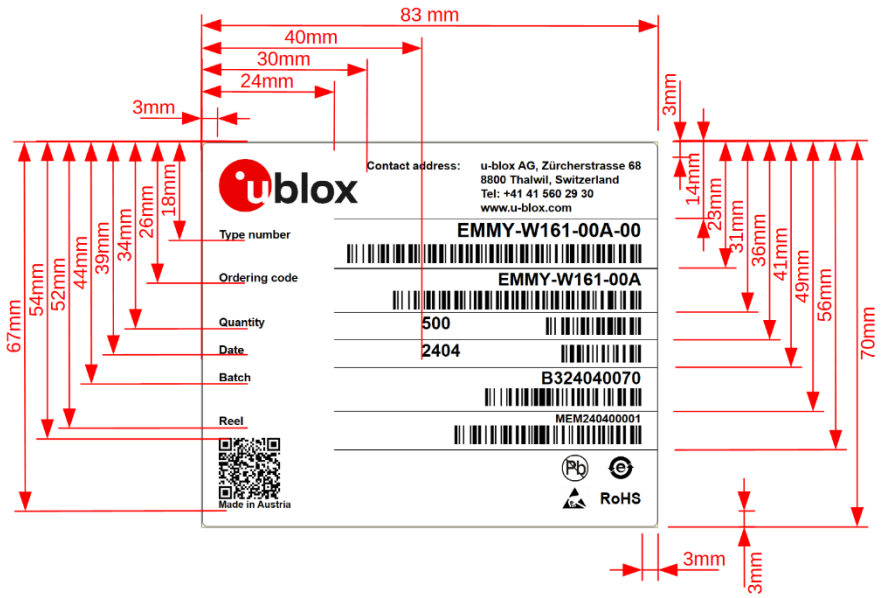


Figure 47: Batch label dimensions

Figure 48 shows the dimensions and positioning of barcode information on a typical multipack label.

Figure 48: Multipack label dimensions

2.6.3 Customer-specific labeling

For key customers, u-blox offers customer-specific labeling on the primary packaging level.

The scope of this service covers:

- Individually designed labels according to customer requirements
- Three labels per packing carton: one on the carton, one loose in carton, and one on vacuum bag
- Label size is standardized at 14 x 9 cm

Figure 49, Figure 50, and Figure 51 show examples of customer-specific, labeled shipments.

Figure 49: Customer-specific label on a packing carton

Figure 50: Customer-specific label on a vacuum bag

Figure 51: Customer-specific label loose in a carton

2.7 Shipping of non-standard quantities

Orders with quantities not corresponding to an exact number of a reel size or tray size may vary from the packaging description above.

Although some variation in the packaging arrangements of some products can occur, the following packaging policy generally applies:

- Product orders for volumes less than that normally delivered on full reel are accommodated by cutting-off the requested quantity from the reeled tape. The tape is then rolled up and affixed with adhesive tape before dispatching the carrier tape in a sealed bag – without the reel. A desiccant bag and a humidity indicator card are included in the bag before it is sealed, as shown in Figure 52.
- Trays used for product shipping are normally stacked on top of one another. For safe delivery, partially filled trays are usually covered with another empty tray. The trays are secured with ESD tape and a product label, as shown in Figure 53. See also Shipping parcels for trays or compartments.
- Very small quantities are normally packed in a cushioned envelope, as shown in Figure 54.
- All outer packages bear the standard u-blox label also shown in Figure 54.

☞ Product orders for volumes less than order quantities specified in the product data sheet or integration manual must be requested specifically in the purchase order. The number of pieces on a single reel of tape varies between products but is defined in the respective product data sheet.

Figure 52: Product off reel on carrier tape

Figure 53: Partially filled trays and product label (right)

Figure 54: Labels on special quantity packages

3 Storage and handling of chips and modules

u-blox chips and modules are sensitive to moisture and electrostatic charges. Carefully read the storage and handling precautions outlined in this chapter to prevent damage from moisture intake and electrostatic charges.

3.1 Moisture sensitivity levels

The moisture sensitivity level (MSL) relates to the required packaging and handling precautions for semiconductor devices, including u-blox chips and modules. The MSL for each u-blox device is defined in either the product data sheet or integration manual.

Table 19 summarizes the dry pack requirements for different MSLs in the IPC/JEDEC specification.

MSL	Dry pack requirement
1	Optional
2	Required
2a	Required
3	Required
4	Required

Table 19: JEDEC specification of dry pack requirements

According to IPC/JEDEC specification J-STD-020, if a device passes MSL 1 it is not classified as 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.

3.1.1 Dry packing

u-blox ships products rated at MSL2 or above are dry-packed in a moisture barrier bag (MBB). Carrier materials such as trays, tubes, and reels that are placed in the MBB can affect the moisture level within the dry bag. A desiccant is put in the MBB to minimalize the effect of any moisture on these materials and ensure the shelf life of the SMT packages. See also Moisture sensitivity.

☞ u-blox uses humidity indicator cards that are free from cobalt dichloride.

IPC/JEDEC specifications require that MSD-sensitive devices are also packaged with a Humidity Indicator Card (HIC) to measure the amount of humidity the devices have been exposed to during shipment. If no moisture has been absorbed, the three fields in the HIC indicate blue color.

☞ Micro lead frame (MLF) and Quad-flat, no-lead (QFN) chipset packages are rated MSL=1 and do not need to be dry-packed.

3.1.2 Humidity indicator card and desiccant bag

Figure 55 and Figure 56 show typical humidity indicator card and desiccant bag but the aspect may vary depending on the product.

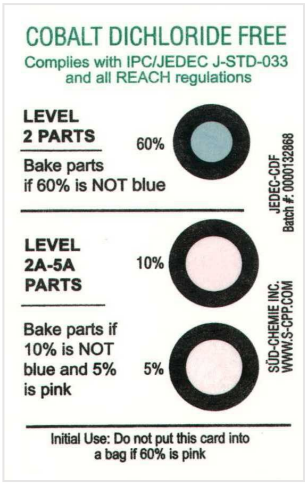


Figure 55: Humidity indicator card

Figure 56: Desiccant bag

3.1.3 MSD label

The dry bag provides an IPC/JEDEC-compliant MSD label that describes the handling requirements to prevent humidity intake. Figure 57 shows an example of an MSD label affixed to a dry bag along with a detailed enlargement.

Figure 57: Reel in hermetically sealed dry bag showing MSD label

3.1.4 Storage and floor life

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

Table 20 lists the 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 20: 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.

⚠ Risk of oxidation: 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 baking times SMT packages are limited by soldering constraints. The cumulative baking time at temperatures greater than +90 °C and up to +125 °C shall not exceed 96 hours. There is no limit on the bake time for temperatures less than +90 °C. Do not bake SMT packages in temperatures higher than +125 °C.

3.1.5 Drying

Both encapsulated 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, for example, exposure to excessive seasonal humidity.

☞ For the recommended baking procedures, refer to Section 4 of IPC/JEDEC J-STD-033. In addition to other recommendations, Table 4-1 of the specification also lists the required conditions for drying.

Table 21 describes the required baking times for different package thicknesses and MSL level. For example, an SMD package with a thickness between 2.0 and 4.5 mm that has exceeded its floor life by >72 hours must be baked at +125 °C for 48 hours. Floor life commences with time = 0 immediately after the bake. Package thicknesses and MSL values are specified in the product data sheet or integration manual.

Package thickness[1]	MSL level [1]	Bake time at +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 21: Bake times for SMD packages exceeding floor life by > 72 hours (see also IPC/JEDEC J-STD-033, section 4)

⚠ 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.

⚠ Risk of oxidation: 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 baking times SMT packages are limited by soldering constraints. The cumulative baking time at temperatures greater than +90 °C and up to +125 °C shall not exceed 96 hours. There is no limit on the bake time for temperatures less than +90 °C. Do not bake SMT packages in temperatures higher than +125 °C.

3.2 Handling

⚠ u-blox chips and modules are electrostatic sensitive devices (ESD) that demand the observance of special ESD precautions during any handling. Failure to observe these precautions can result in severe damage to the device.

3.2.1 ESD handling precautions

Proper ESD handling and packaging procedures must be applied throughout the processing, handling, and operation of any application that incorporates these products. Handling without proper ESD protection may destroy or damage them permanently. The risk of electrostatic charges makes patch antennas particularly susceptible to damage.

The absolute maximum ratings that define the stresses beyond which can cause permanent damage to the device are specified in the respective product 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 ANN-MS

ANN-MS GPS antennas are delivered in individual carton boxes, as shown in Figure 58. The box dimensions are given Figure 59.

Figure 58: ANN-MS GPS antenna in a shipping box

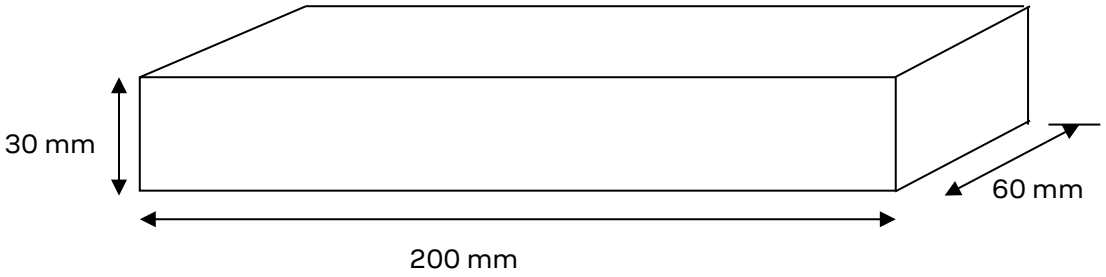


Figure 59: Dimensions of the ANN-MS shipping box

Figure 60: 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)

Figure 61: Explanation of package codes

4.2 ANN-MB/MB1

ANN-MB and ANN-MB1 high precision multi-band GNSS antennas are delivered in individual carton boxes, as shown in Figure 62. The box dimensions are given in Figure 63.

Figure 62: ANN-MB/MB1 GNSS antenna in a shipping box

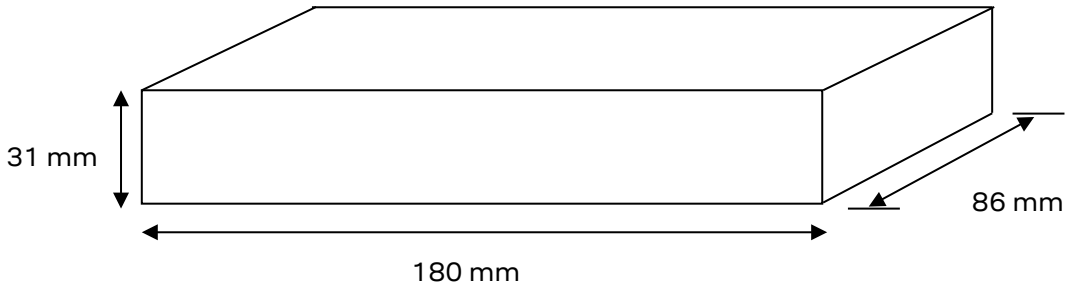


Figure 63: Dimensions of the ANN-MB/MB1 shipping box

Figure 64: Package labeling variants of the ANN-MB GNSS antenna

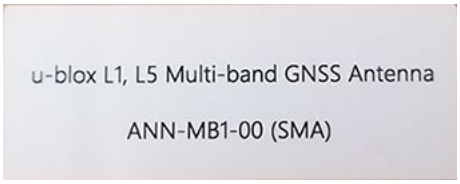


Figure 65: Package labeling of the ANN-MB1 GNSS antenna

4.3 ANN-MB5

ANN-MB5 L1/L5 multi-band standard precision GNSS antennas are delivered in individual carton boxes, as shown in Figure 66. The box dimensions are given in Figure 67.

Figure 66: ANN-MB5 GNSS antenna in a shipping box

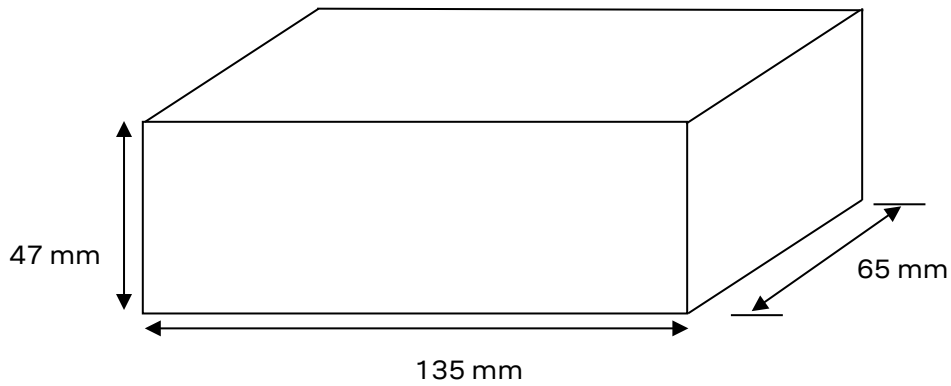


Figure 67: Dimensions of the ANN-MB5 shipping box

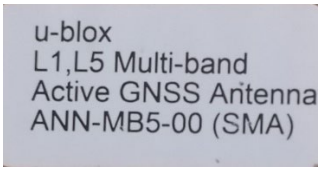


Figure 68: Package labeling of the ANN-MB5 GNSS antenna

4.4 ANN-MB2

ANN-MB2 all-band high precision GNSS antennas are delivered in individual carton boxes, as shown in Figure 69. The box dimensions are given in Figure 70.

Figure 69: ANN-MB2 GNSS antenna in a shipping box

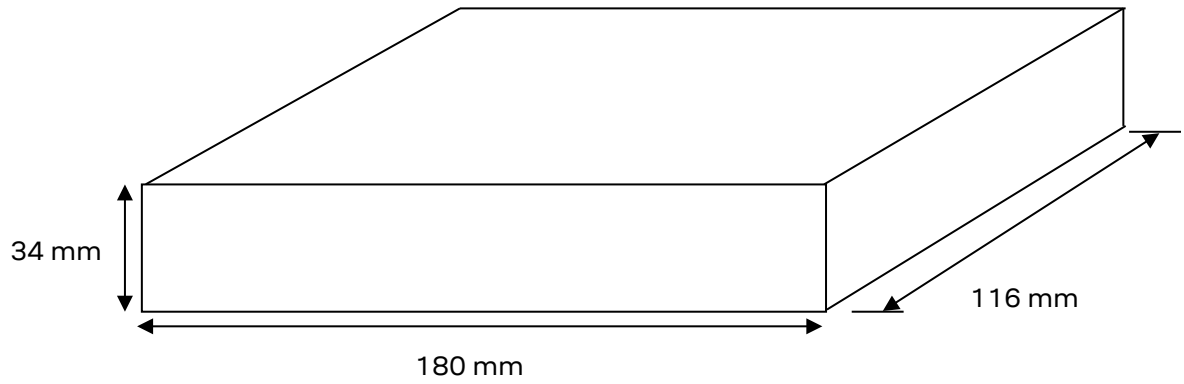


Figure 70: Dimensions of the ANN-MB2 shipping box

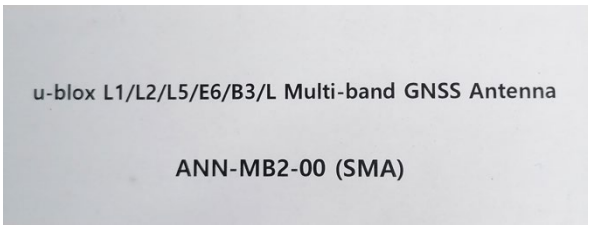


Figure 71: Package labeling of the ANN-MB2 GNSS antenna

Revision history

Revision	Date	Name	Comments
-	19-Sep-2011	tgri	Initial release
1	10-Oct-2011	tgri	Added Table 21 to section 3.1.3 Last revision with old document number GPS-X-11004
R03	19-May-2014	smos	u-blox CI revisions. Added packing information for PAM-7Q trays.
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 and CE marking information to section 2.6.
R06	12-Jun-2015	julu, kgom	Updated reel descriptions in section 2.1. 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. Removed shipping parcel for FW2770, FW75-C200.
R08	3-Feb-2016	kgom	Updated Table 1. Added shipping parcel info for ELIN-W1 modules.
R09	24-Mar-2016	kgom, smos	Added MPCI tray, carton and label information. Simplified intro chapter by removing the overview table, which provided same information as the ToC.
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 and customer specific labeling
R12	25-Apr-2017	gbor	Deleted option for small additional label
R13	27-Nov-2017	mbab	Added information about partial reels.
R14	25-May-2018	smos	Note about MPCI tray added
R15	29-Jun-2018	gbor	Updated outer carton size
R16	21-Aug-2018	gbor	Packaging description for non-standard quantities (section 2.7)
R17	30-Oct-2018	smos	Added description of Type F reel and its carton and shipping parcel.
R18	12-Feb-2019	smos	Added section 4.2 for ANN-MB antenna packaging
R19	29-Oct-2019	smos	Added labeling information for BMD modules (section 2.5.5).
R20	02-Apr-2020	smos	Updated MPCI tray information, section 2.5.2; Added RCB-F9T packaging information, section 2.5.3; Removed ELIN-W1 parcel information
R21	19-Aug-2020	ctur, smos	Removed obsolete NANO packaging information.
R22	10-Mar-2021	mala, gbor	Added more labeling and reel number info. Added description of split shipments.
R23	15-Mar-2021	mala, gbor	Added information on ANN-MB1 antenna. Updated information on packages.
R24	21-Apr-2022	ctur, lalb, lber	Structural changes and editorial updates in all chapters.
R25	12-Dec-2022	hisa	Added Shipping parcel 229 x 324 x 60 mm for M2 cards. Added CE mark to batch labels reserved for u-blox modules with CE accreditation in Labeling for modules. Revised contact information and updated disclaimer.
R26	04-Jul-2023	smos	Updated Figure 43 and Table 15 with a different chip shipping label.
R27	22-Sep-2023	julu, alos	Added ANN-MB5 antenna package information in section 4.3. Updated section 2.1 to add type G figure; Added section 2.1.7 for reel type G, section 2.2 for carton type G, and section 2.3.4 for shipping parcels for type G reels.
R28	05-Feb-2024	kval, ctur	Added Shipping parcel 345 x 345 x 70 mm.
R29	30-Apr-2024	bcor	Clarifications about chipset / module reels Type A (2.1.1) and batch labels (0)
R30	27-Aug-2024	julu	Added ANN-MB2 antenna package information in section 4.4.
R31	03-Mar-2025	bcor	Simplification of 2.2 and chapter 2.5.1 updated.
R32	26-Jun-2025	bcor	Added Type A5 in 2.1.1 and 2.2 3.1.2.1 – 3.1.2.2 – 3.1.2.3 about HIC and desiccant merged in one chapter 3.1.1.2

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