ANN-MB2

L1/L2/L5/E6/B3/L all-band high precision GNSS antenna

Data sheet

Abstract

This technical data sheet describes the ANN-MB2 all-band L1/L2/L5/E6/B3/L active external GNSS antenna that supports all major GNSS systems for maximum position availability. The antenna provides a fast and easy solution for u-blox high precision solution applications with an excellent price-to-performance ratio.

Document information

Title	**ANN-MB2**	
Subtitle	L1/L2/L5/E6/B3/L all-band high precision GNSS antenna	
Document type	Data sheet	
Document number	UBXDOC-963802114-12775	
Revision and date	R01	02-Sep-2024
Disclosure restriction	C1-Public	

Product status	Corresponding content status	
Functional sample	Draft	For functional testing. Revised and supplementary data will be published later.
In development / prototype	Objective specification	Target values. Revised and supplementary data will be published later.
Engineering sample	Advance information	Data based on early testing. Revised and supplementary data will be published later.
Initial production	Early production information	Data from product verification. Revised and supplementary data may be published later.
Mass production / End of life	Production information	Document contains the final product specification.

This document applies to the following products:

Product name	Type number	Connector type	IN/PCN reference	Product status
ANN-MB2	ANN-MB2-00-00	SMA	N/A	Engineering sample

Contents

1 Overview

The u-blox ANN-MB2 all-band (L1/L2/L5/E6/B3/L) active GNSS antenna is designed to reduce time-to-market for the modern wide-frequency, multi-constellation, high precision GNSS applications, which require centimeter-level accuracy and a reliable RTK positioning fix even in challenging environments.

The robust design, excellent price-to-performance ratio, and flexible mounting options make the ANN-MB2 an ideal choice for mass market applications requiring an all-band high precision GNSS antenna. The ANN-MB2 is a perfect match to the u-blox F9 high precision products (e.g. ZED-F9K, ZED-F9P, LEA-F9T, and ZED-F9T) supporting L1, L2, and L5 bands, along with the L-band for RTK corrections. With ANN-MB2, customers have a reliable, ready-to-use all-band antenna that streamlines evaluation, minimizes design efforts, and speeds up mass adoption.

ANN-MB2 includes a high-performance, multi-band, RHCP dual-feed stacked-patch antenna element, a built-in high gain LNA with wide-band SAW pre-filtering, and a 5-meter antenna cable with an SMA connector.

2 Electrical specifications

2.1 Patch antenna specification

Parameter	L/L1 band	L5/L2/B3/E6 band
Frequency[1]	1535 – 1602 MHz	1166 – 1285 MHz
Impedance[1]	50 Ω	50 Ω
Gain[1]	L: Typical 5.4 dBic L1: Typical 5.0 dBic	L5: Typical 4.5 dBic L2: Typical 5.0 dBic E6: Typical 4.2 dBic
Efficiency data[1]	L: Typical 64% L1: Typical 56%	L5: Typical 55% L2: Typical 60% E6: Typical 50%
Axial ratio[1]	Typical 0.5-1.3 dB (Zenith)	Typical 1.9-2.9 dB (Zenith)
Polarization[1]	RHCP	RHCP

Table 1: ANN-MB2 patch antenna element specification

2.2 Amplifier specification

Parameter	L/L1 band	L5/L2/B3/E6 band
Frequency	1535 – 1602 MHz	1166 – 1285 MHz
Impedance	50 Ω	50 Ω
LNA gain[2,3]	Typical 31.0±3 dB	Typical 31.5±3 dB
LNA noise figure[2,3]	Typical 3 dB	Typical 2.5 dB
Output VSWR	Typical 2.0	Typical 2.0
Cable insertion loss (RG-174, length 5 m)	Typical 6.5 dB	Typical 5.5 dB
Total gain[2,4]	Typical 23.0 dB	Typical 23.0 dB
Out-of-band rejection min. 100 MHz from GNSS band edges at selected cellular bands	Typical 45 dB (at <1435 MHz), 50 dB (>1702 MHz) Typical 60 / 60 / 50 / 45 / 45 dB (at 698 / 960 / 1710 / 2170 / 2690 MHz)	Typical 40 dB (at <1066 MHz), 40 dB (>1385 MHz) Typical 65 / 45 / 35 / 55 / 50 dB (at 698 / 960 / 1710 / 2170 / 2690 MHz)
Supply voltage[5]	3.0 – 5.0 V	
Supply current[2,5]	Typical 15.0 mA	

Table 2: ANN-MB2 amplifier specifications

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[1] Measured on a ø12 cm ground plane. Measured values include the antenna feed network (hybrid coupler).

[2] Measured using 5.0 V supply voltage

[3] Includes LNA and SAW pre-filter section

[4] Includes LNA gain and cable insertion loss

[5] Single supply for L/L1 and L5/L2/B3/E6 bands
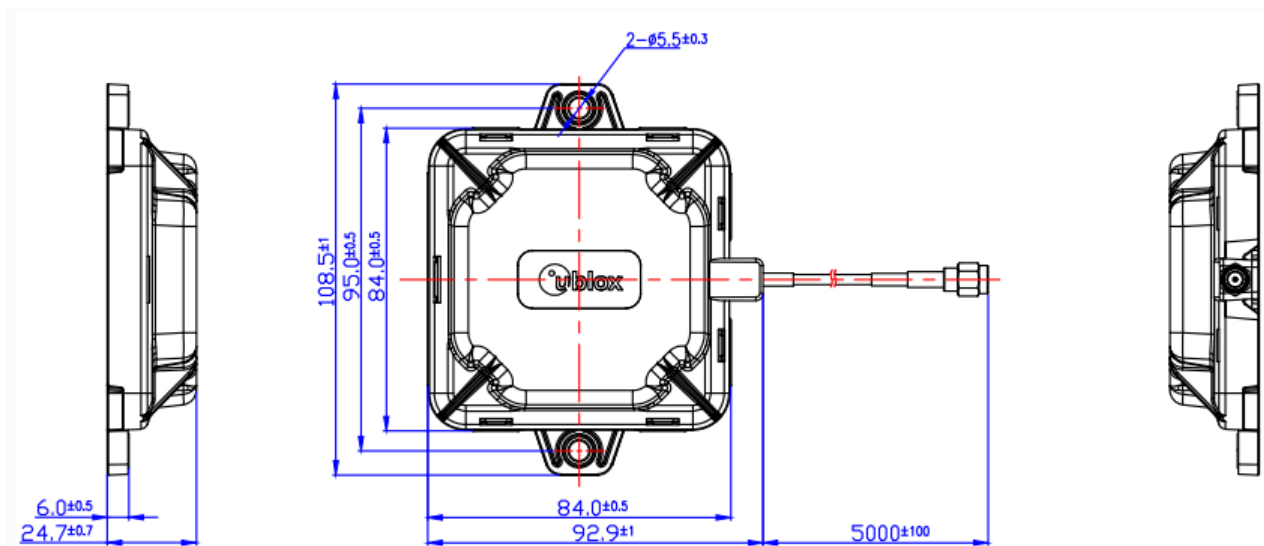
3 Mechanical specifications

3.1 Mechanical drawing

Figure 1: ANN-MB2 mechanical drawing. Dimensions are given in mm.

3.2 Mechanical data

Parameter	Specification
Weight (typical incl. cable)	260 g
Size	108.5(L) x 92.9(W) x 24.7(H) mm
Connector options	SMA (plug)
Cable type, length	RG174, 5.0 m
Mounting	Magnetic base, fixed installation option (screw mount, 2 x M4 screws)
Housing color	Black

Table 3: ANN-MB2 Mechanical specifications

3.3 Connector type

Figure 2: ANN-MB2 SMA (plug)

4 Absolute maximum ratings

⚠ CAUTION. Risk of device damage. Exceeding the absolute maximum ratings may affect the lifetime and reliability of the device or permanently damage it. Do not exceed the absolute maximum ratings.

⚠ This product is not protected against overvoltage or reversed voltages. Use appropriate protection to avoid device damage from voltage spikes exceeding the specified boundaries.

Parameter	Symbol	Condition	Min	Max	Units
Power supply voltage	VCC		0.0	10.0	V
Operating temperature	TGP		−40	+85	°C
Storage temperature	TSTG		−40	+85	°C

Table 4: Absolute maximum ratings

5 Antenna characteristics

5.1 Block diagram

A simplified block diagram for ANN-MB2 all-band antenna is shown in Figure 3. The block diagram is divided into patch antenna element and amplifier sections. The patch antenna element section is specified in Patch antenna specification and the amplifier section in Amplifier specification. The 5-meter coaxial cable is connected to the amplifier section output.
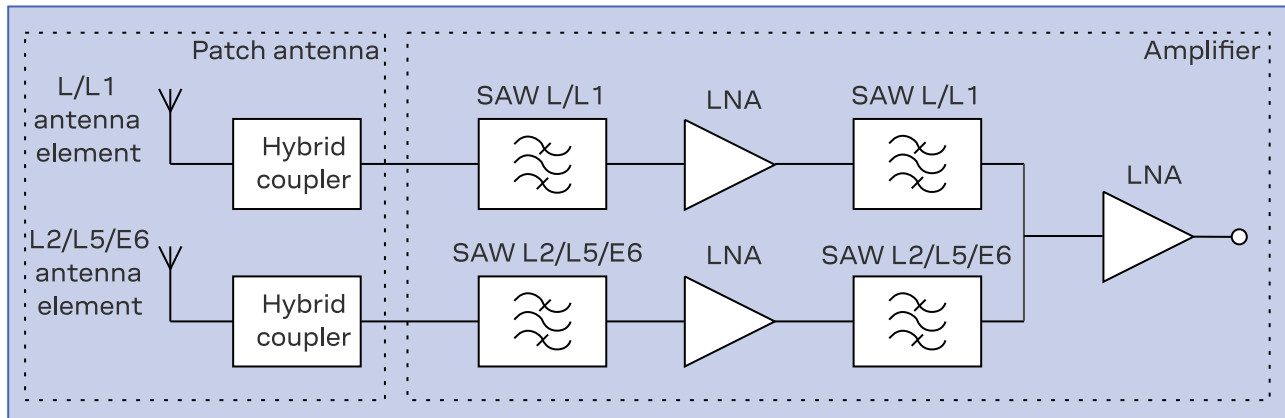

Figure 3: Simplified ANN-MB2 block diagram

5.2 Radiation pattern

The radiation patterns at the L/L1 and L5/L2/E6 bands are shown in Figure 5 and Figure 6, respectively. The RHCP gain value is the total gain including the passive antenna element, the amplifier section, and the RG174 cable. The planes for the 2-D cuts are H (xy plane), E1 (xz plane), and E2 (yz plane). The coordinate axes are defined in Figure 4.

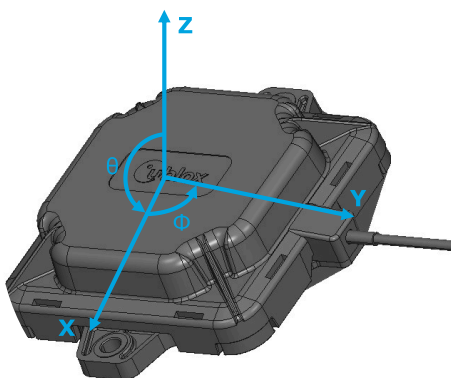**Figure 4: Definition of coordinate axes for radiation pattern plots.**
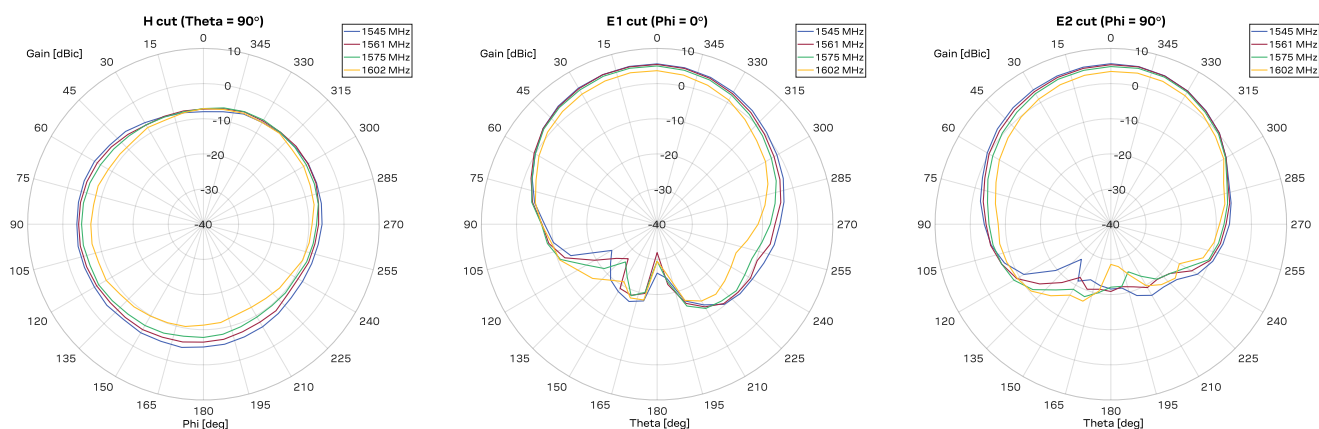
Figure 5: Radiation pattern at the L/L1 band. The 2-D cuts are measured at 1545 - 1602 MHz (ten frequencies).
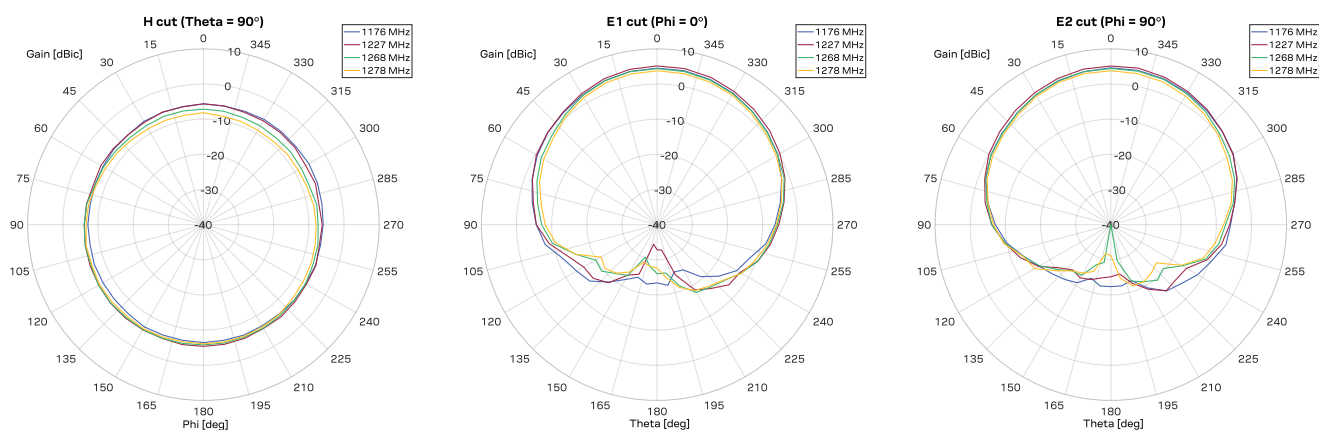

Figure 6: Radiation pattern at the L5/L2/E6 band. The 2-D cuts are measured at 1176 - 1278 MHz (nine frequencies).

6 Labeling and ordering information

This section provides information about product labeling and ordering.

6.1 Product label

The product information label is found on the underside of the GNSS antenna. The label includes the type number, which provides important information on the product.
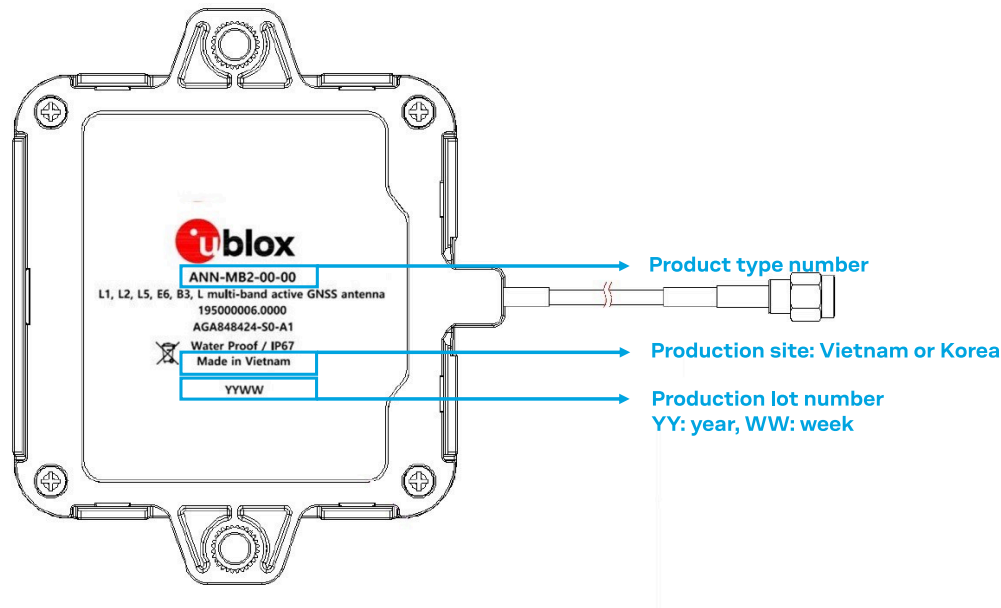

Figure 7: ANN-MB2 all-band GNSS antenna product label.

6.2 Product identifiers

The ANN-MB2 labels feature three identifiers for the product: product name, ordering code and type number. The product name is used across all u-blox products in documentation such as this Data sheet and is independent of packaging and product grade. The ordering code specifies the major product version and product grade and the type number additionally includes the hardware and firmware versions.

Table 5 provides product code formats

Format	Structure	Product code
Product name	PPP-GVY	ANN-MB2
Ordering code	PPP-GVY-NN	ANN-MB2-00
Type number	PPP-GVY-NN-XX	ANN-MB2-00-00

Table 5: Product code formats

6.3 Part identification

The parts of the product code are explained in Table 6.

Identifier	Format	Example
PPP	Product family	ANN

Identifier	Format	Example
GV	Product generation	MB: Multi-band
Y	Product variant	2: L1/L2/L5/E6/B3/L high precision
NN	Major product version	Connector type: 00 = SMA connector
XX	Revision	Hardware and firmware versions

Table 6: Description of product label

6.4 Ordering codes

Ordering code	Product
ANN-MB2-00	L1/L2/L5/E6/B3/L all band active GNSS antenna, 5 m cable, SMA (plug) connector Single units

Table 7: Product ordering codes

7 Evenvironmental information

Parameter	Specification
Operating temperature	−40 to +85 ˚C
Storage temperature	−40 to +85 ˚C
ESD circuit protection	±15 kV (IEC61000-4-2)
Ingress protection (IP) rating	IP67 (protected from dust and temporary immersion in water up to 1 m depth)
Humidity	95%RH, 60 ºC, 96 hours
Vibration	MIL-STD-810G, Method 514.7 Vibration

Table 8: ANN-MB2 environmental information

7.1 Safety

ANN-MB2 shall be supplied by a power supply complying with the requirements of PS1 according to safety standard EN 62368-1 (https://webstore.iec.ch/publication/27412).

Revision history

Revision	Date	Comments
R01	02-Sep-2024	Initial release

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For further support and contact information, visit us at www.u-blox.com/support.