



# ANN-MB5

## L1/L5 multi-band standard precision GNSS antenna

### Data sheet



#### Abstract

This Data sheet describes the ANN-MB5 multi-band L1/L5 active GNSS antenna that supports GPS, Galileo, and BeiDou. The antenna provides a fast and easy solution for standard precision applications with an excellent price-to-performance ratio.

# Document information

|                               |  |            |
|-------------------------------|--|------------|
| <b>Title</b>                  | <b>ANN-MB5</b>                                   |            |
| <b>Subtitle</b>               | L1/L5 multi-band standard precision GNSS antenna |            |
| <b>Document type</b>          | Data sheet                                       |            |
| <b>Document number</b>        | UBX-22038811                                     |            |
| <b>Revision and date</b>      | R03  | 6-Nov-2023 |
| <b>Disclosure restriction</b> | C1-Public  |            |

| <b>Product status</b>         | <b>Corresponding content status</b> |  |
|-------------------------------|-------------------------------------|--|
| 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:

| <b>Product name</b> | <b>Type number</b> | <b>Connector type</b> | <b>IN/PCN reference</b>    | <b>Product status</b> |
|---------------------|--------------------|-----------------------|----------------------------|-----------------------|
| ANN-MB5             | ANN-MB5-00-00      | SMA                   | IN: UBXDOC-963802114-12401 | Mass production       |

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# Contents

|  |           |
|--|-----------|
| <b>Document information</b> .....                | <b>2</b>  |
| <b>Contents</b> .....                            | <b>3</b>  |
| <b>1 Overview</b> .....                          | <b>4</b>  |
| <b>2 Electrical specifications</b> .....         | <b>5</b>  |
| <b>3 Mechanical specifications</b> .....         | <b>6</b>  |
| 3.1 Mechanical drawing.....                      | 6         |
| 3.2 Mechanical data .....                        | 6         |
| 3.3 Connector type .....                         | 6         |
| <b>4 Environmental information</b> .....         | <b>7</b>  |
| <b>5 Absolute maximum ratings</b> .....          | <b>7</b>  |
| <b>6 Antenna characteristics</b> .....           | <b>8</b>  |
| 6.1 Block diagram .....                          | 8         |
| 6.2 Radiation pattern .....                      | 8         |
| <b>7 Labeling and ordering information</b> ..... | <b>9</b>  |
| 7.1 Product labeling.....                        | 9         |
| 7.2 Explanation of product codes.....            | 9         |
| 7.3 Ordering codes.....                          | 9         |
| <b>8 Qualifications and approvals</b> .....      | <b>10</b> |
| 8.1 Approvals .....                              | 10        |
| 8.2 Safety precaution.....                       | 10        |
| <b>Revision history</b> .....                    | <b>11</b> |
| <b>Contact</b> .....                             | <b>11</b> |

# 1 Overview

The u-blox ANN-MB5 multi-band (L1/L5/E5a/B2a/NavIC) active GNSS antenna is designed for the new generation of multi-frequency, multi-constellation standard precision GNSS technology, which can achieve the most accurate, reliable, and robust positioning even in challenging environments.

The compact design, excellent price-to-performance ratio, and easy mounting features of ANN-MB5 ensure a fast, easy, and reliable multi-band antenna solution for mass adoption. ANN-MB5 is a perfect match to the u-blox L1/L5 multi-band meter-level GNSS technology (e.g. F10 standard precision platform), providing customers with the ready-to-use, multi-frequency antenna they need to minimize the evaluation and design efforts, and speed up time-to-market.

ANN-MB5 includes a high-performance multi-band RHCP single-feed stacked-patch antenna element, a built-in LNA with SAW pre-filtering, and a 3-meter antenna cable with an SMA connector.

## 2 Electrical specifications

| Parameter                 | L1 band                | L5/E5a/B2a/NavIC band  |
|---------------------------|------------------------|------------------------|
| Frequency <sup>1</sup>    | 1559-1608 MHz          | 1164-1186 MHz          |
| Impedance <sup>1</sup>    | 50 Ω                   | 50 Ω                   |
| Gain <sup>1</sup>         | Typ. 4.5 dBic (Zenith) | Typ. 4.0 dBic (Zenith) |
| Axial ratio <sup>1</sup>  | Typ. 3.2 dB (Zenith)   | Typ. 6.3 dB (Zenith)   |
| Efficiency <sup>1</sup>   | Typ. 43%               | Typ. 65%               |
| Polarization <sup>1</sup> | RHCP                   | RHCP                   |

**Table 1: Patch antenna element specifications**

| Parameter                                 | L1 band   | L5/E5a/B2a/NavIC band   |
|---|---|---|
| Frequency                                 | 1559-1608 MHz   | 1164-1186 MHz   |
| Impedance                                 | 50 Ω  | 50 Ω  |
| LNA gain <sup>2,3</sup>                   | Typ. 15 ± 3.0 dB  | Typ. 16 ± 3.0 dB  |
| LNA noise figure <sup>2,3</sup>           | Typ. 2.0 dB   | Typ. 2.0 dB   |
| Output VSWR                               | Typ. 2.0  | Typ. 2.0  |
| Cable insertion loss (RG-174, length 3 m) | Typ. 3.6 dB   | Typ. 3.3 dB   |
| Total gain <sup>2,4</sup>                 | Typ. 11.4 dB  | Typ. 12.7 dB  |
| Out-of-band rejection                     |   |   |
| min 100 MHz from GNSS band edges          | Typ. 45 dB (at <1459 MHz), 35 dB (>1708 MHz)                                      | Typ. 40 dB (at <1064 MHz), 25 dB (>1288 MHz)                                      |
| at selected cellular bands                | Typ. 35 / 35 / 35 / 40 / 45 / 40 dB (at 698 / 785 / 915 / 1710 / 2170 / 2690 MHz) | Typ. 35 / 40 / 40 / 45 / 45 / 45 dB (at 698 / 785 / 915 / 1710 / 2170 / 2690 MHz) |
| Supply voltage <sup>5</sup>               |   | 3.0-5.0 V   |
| Supply current <sup>2,5</sup>             |   | Typ. 17 mA  |

**Table 2: Amplifier specifications**

<sup>1</sup> Measured on a ø12 cm ground plane. Measured values include the antenna feed network (hybrid coupler).

<sup>2</sup> Measured using 5.0 V supply voltage

<sup>3</sup> Includes LNA and SAW pre-filter section

<sup>4</sup> Includes LNA gain and cable insertion loss

<sup>5</sup> Single supply for L1 and L5 bands

## 3 Mechanical specifications

### 3.1 Mechanical drawing

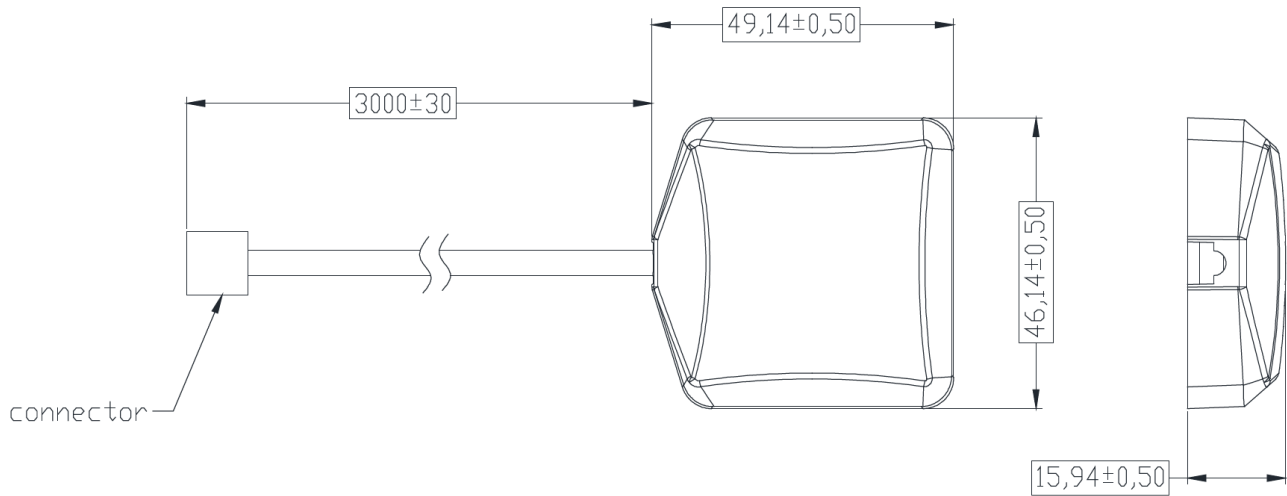


Figure 1: ANN-MB5 mechanical drawing. Dimensions are given in mm.

### 3.2 Mechanical data

| Parameter                    | Specification            |
|------------------------------|--------------------------|
| Weight (typical incl. cable) | 104 g                    |
| Size                         | 49.14 x 46.14 x 15.94 mm |
| Connector options            | SMA (plug)               |
| Cable type, length           | RG174, 3.0 m             |
| Mounting                     | Magnetic base            |
| Housing color                | Black                    |

Table 3: Mechanical specifications

### 3.3 Connector type

SMA (plug) ANN-MB5-00



Table 4: ANN-MB5 connector type

## 4 Environmental 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 | IPX7 (protected from temporary immersion in water up to 1 m depth) |
| Humidity                       | 95%RH, 60 °C, 96 hours   |
| Vibration                      | MIL-STD-810G, Method 514.7 Vibration                               |

**Table 5: Environmental information**

## 5 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 | 6.0 | V     |
| Operating temperature | T <sub>GP</sub>  |           | -40 | +85 | °C    |
| Storage temperature   | T <sub>STG</sub> |           | -40 | +85 | °C    |

**Table 6: Absolute maximum ratings**

## 6 Antenna characteristics

### 6.1 Block diagram

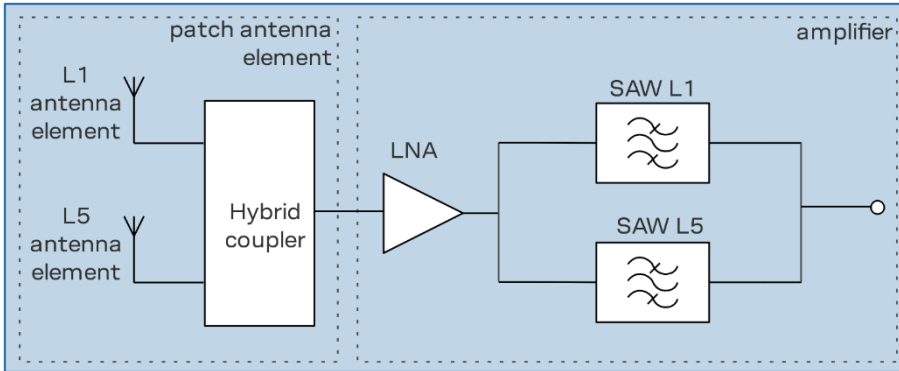


Figure 2: Simplified ANN-MB5 block diagram

### 6.2 Radiation pattern

The radiation patterns at the L1 and L5 bands for the E1 (xz) and E2 (yz) planes are shown in Figure 4. The RHCP gain value is given for the passive antenna element. The coordinate axes are defined in Figure 3.

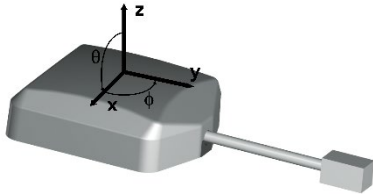


Figure 3: Definition of coordinate axes for radiation pattern plots

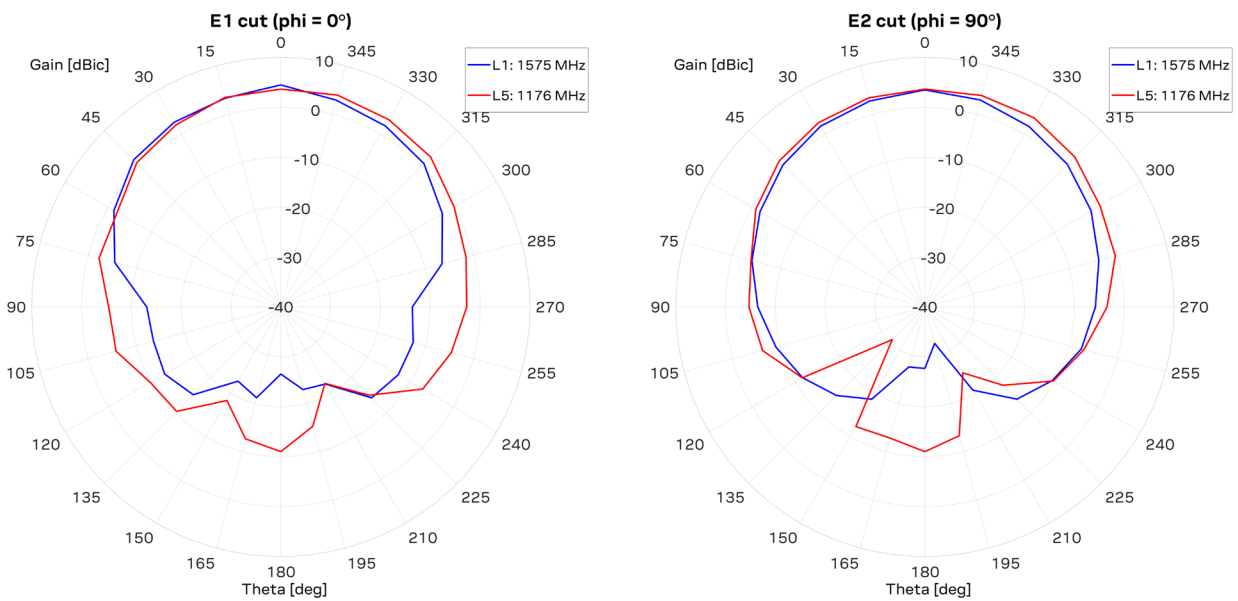


Figure 4: Radiation pattern at the L1 (1575 MHz) and L5 bands (1176 MHz)



## 7 Labeling and ordering information

### 7.1 Product labeling

The product information label is found on the underside of the ANN-MB5 L1/L5 multi-band GNSS antenna. The label includes the product type number, which provides important information on the product.

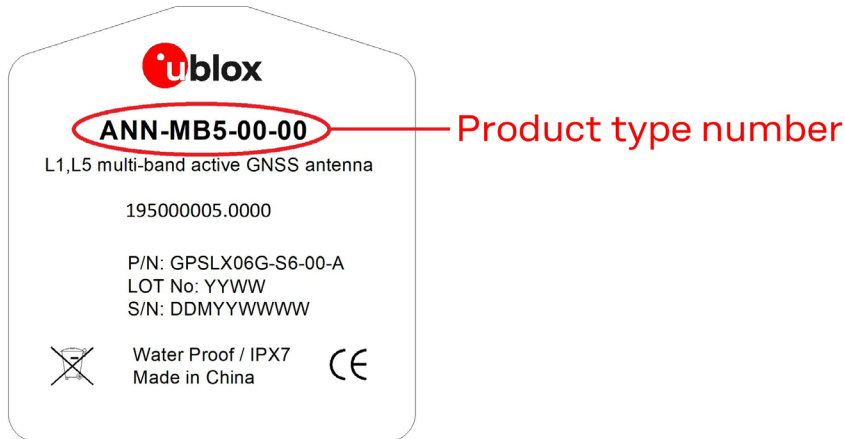


Figure 5: ANN-MB5 multi-band GNSS antenna product label

### 7.2 Explanation of product codes

Three different product code formats are used. The **Product name** is used in general communications about product families and variants. The **Ordering code** includes options, whereas the **Type number** includes information on the hardware version. The product code formats are described in Table 7 and Table 8.

| Format        | Structure     |
|---------------|---------------|
| Product name  | PPP-GVY       |
| Ordering code | PPP-GVY-NN    |
| Type number   | PPP-GVY-NN-XX |

Table 7: Product code formats

| Code | Meaning            | Example                               |
|------|--------------------|---------------------------------------|
| PPP  | Product family     | ANN                                   |
| GV   | Product generation | MB: Multi-band                        |
| Y    | Product variant    | 5: L1/L5 standard precision           |
| NN   | Option             | Connector type:<br>00 = SMA connector |
| XX   | Product revision   |                                       |

Table 8: Explanation of product codes

### 7.3 Ordering codes

| Ordering no. | Product   |
|--------------|---|
| ANN-MB5-00   | L1/L5 multi-band active GNSS antenna, 3 m cable, SMA (plug) connector<br>Single units |

Table 9: Ordering information

## **8 Qualifications and approvals**

### **8.1 Approvals**

The ANN-MB5 complies with all essential requirements for RED 2014/53/EU. The ANN-MB5 Declaration of Conformity (DoC) is available at [www.u-blox.com](http://www.u-blox.com) within Support > Product resources > Conformity Declaration.

The ANN-MB5 complies with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

### **8.2 Safety precaution**

The ANN-MB5 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        | Status/comments   |
|----------|-------------|---|
| R01      | 21-Dec-2022 | Initial release   |
| R02      | 20-Jun-2023 | Product status changed to Engineering sample. Disclosure restriction changed to C1-Public.  |
| R03      | 06-Nov-2023 | Product status changed to Mass production. Updated sections Product labeling and Approvals. |

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