



# 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	
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<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	N/A	Engineering sample

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# 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

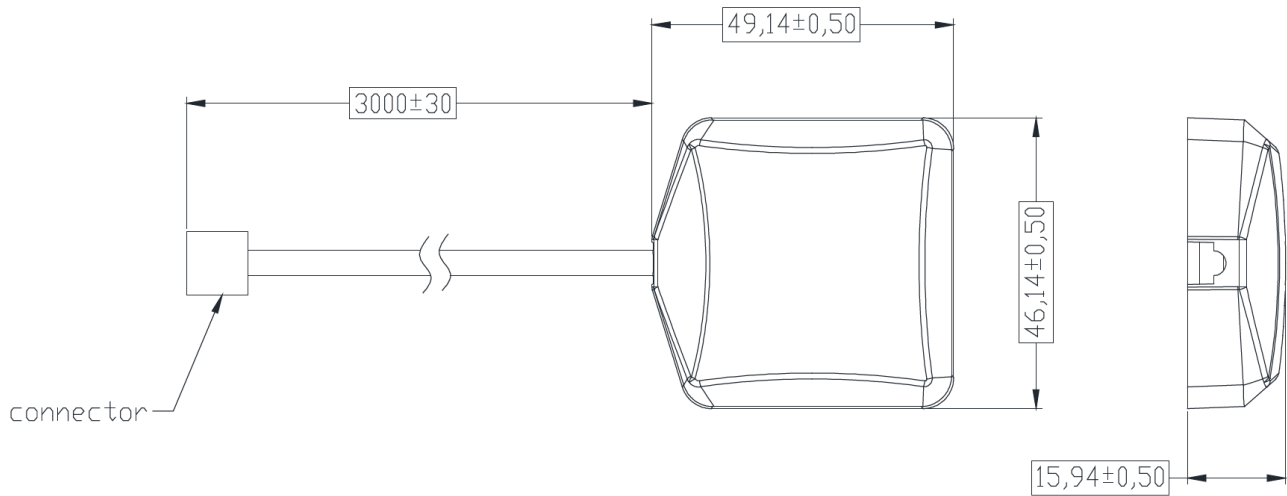


Figure 1: ANN-MB5 mechanical drawing. Dimensions are given in mm.

### 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

Parameter	Symbol	Condition	Min	Max	Units
Power supply voltage	VCC		0.0	6.0	V
Operating temperature	T <sub>OP</sub>		-40	+85	°C
Storage temperature	T <sub>STG</sub>		-40	+85	°C

Table 6: Absolute maximum ratings

- 
 Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or at any other conditions above those given below is not implied. Exposure to limiting values for extended periods may affect device reliability.
- 
 The product is not protected against overvoltage or reversed voltages. Voltage spikes exceeding the power supply voltage specification, given in the table above, must be limited to values within the specified boundaries by using appropriate protection diodes.

# 6 Antenna characteristics

## 6.1 Block diagram

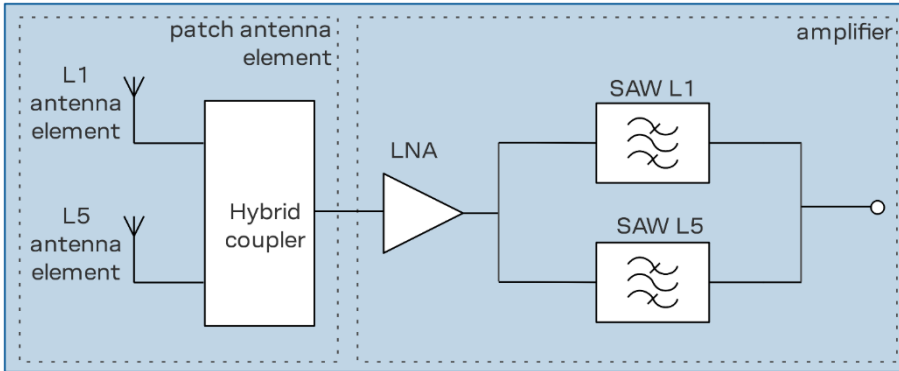


Figure 2: Simplified ANN-MB5 block diagram

## 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.

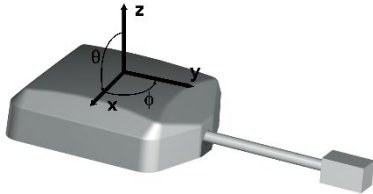


Figure 3: Definition of coordinate axes for radiation pattern plots

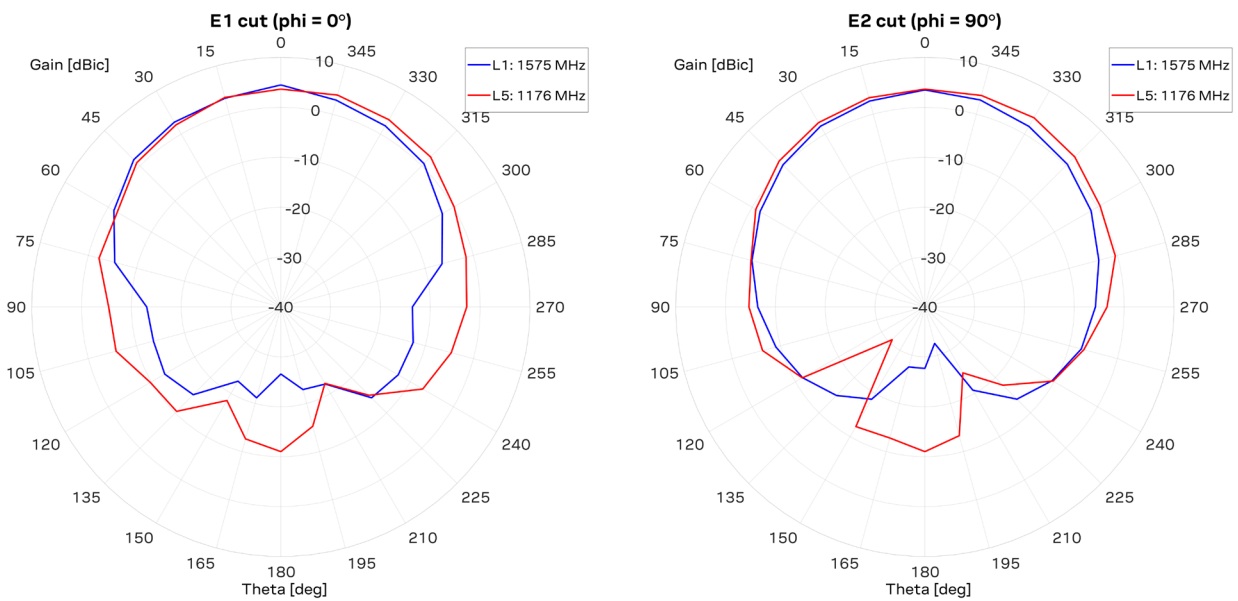


Figure 4: Radiation pattern at the L1 (1575 MHz) and L5 bands (1176 MHz)



## 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.

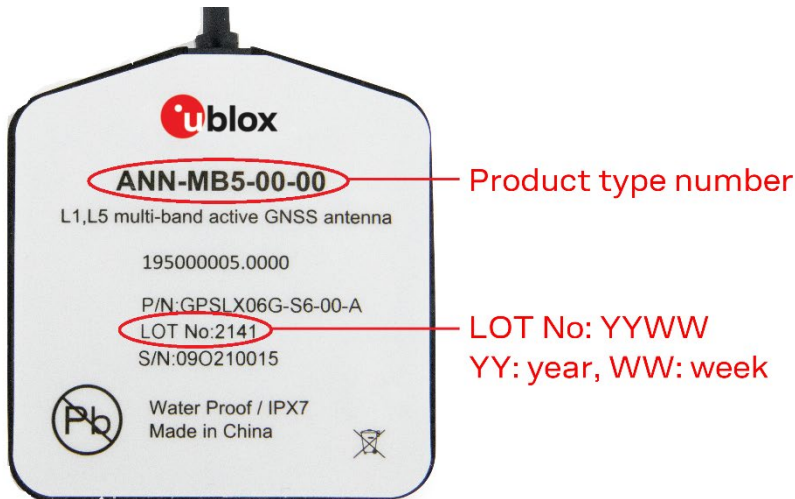


Figure 5: ANN-MB5 multi-band GNSS antenna product label

### 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: 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 Single units

Table 9: Ordering information

# 8 Qualifications and approvals

## 8.1 Approvals

## 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	Name	Comments
R01	21-Dec-2022	rmak	Initial release
R02	20-Jun-2023	rmak	Product status changed to Engineering sample. Disclosure restriction changed to C1-Public.

## Contact

### u-blox AG

Address: Zürcherstrasse 68  
8800 Thalwil  
Switzerland

For further support and contact information, visit us at [www.u-blox.com/support](http://www.u-blox.com/support).