- The modular transmitter approval of ANNA-B112 does not exempt the end product from being evaluated against applicable regulatory demands. The evaluation of the end product shall be performed with the ANNA-B112 module installed and operating in a way that reflects the intended end product use case. The upper frequency measurement range of the end product evaluation is the 5th harmonic of 2.4 GHz as declared in 47 CFR Part 15.33 (b)(1).
- The following requirements apply to all products that integrate a radio module:
    - Subpart B - UNINTENTIONAL RADIATORS
      To verify that the composite device of host and module complies with the requirements of FCC part 15B the integrator shall perform sufficient measurements using ANSI 63.4-2014.
    - Subpart C - INTENTIONAL RADIATORS
      It is required that the integrator carry out sufficient verification measurements using ANSI 63.10-2013 to validate that the fundamental and out of band emissions of the transmitter part of the composite device complies with the requirements of FCC part 15C.
- When the items listed above are fulfilled the host manufacturer can use the authorization procedures presented in Table 1 of 47 CFR Part 15.101.

#### 6.3.6.2 Co-location (simultaneous transmission)

If the module is to be co-located with another transmitter, additional measurements for simultaneous transmission are required.

## 6.4 Japan radio equipment compliance

### 6.4.1 Compliance statement

The ANNA-B112 module complies with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT N°. 37, 1981), Article 2, Paragraph 1:

- Item 19 "2.4 GHz band wide band low power data communication system".

### 6.4.2 End product labelling requirement

When a product integrating a ANNA-B112 series module is placed on the Japanese market the product must be affixed with a label with the “Giteki” marking as shown in Figure 7. The marking must be visible for inspection.


**Figure 7: Giteki mark, R and the ANNA-B112 MIC certification number**

☞ The required minimum size of the Giteki mark is Ø3.0 mm.

### 6.4.3 End product user manual requirement

As the MIC ID is not included on the ANNA-B112 marking, the end product manufacturer must include a copy of the ANNA-B112 Japan Radio Certificate to the end product technical documentation.

# 7 Antennas

This chapter gives an overview of the different external antennas that can be used together with the module.

☞ Note that not all antennas are approved for use in all markets/regions.

⚠ This radio transmitter IC: 8595A-ANNAB1 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

⚠ Cet émetteur radio IC: 8595A-ANNAB1 été approuvé par Industry Canada pour fonctionner avec les types d'antenne énumérés ci-dessous avec le gain maximum autorisé et l'impédance nécessaire pour chaque type d'antenne indiqué. Les types d'antenne ne figurant pas dans cette liste et ayant un gain supérieur au gain maximum indiqué pour ce type-là sont strictement interdits d'utilisation avec cet appareil.

For each antenna, the "Approvals" field defines in which test reports the antenna is included. Definitions of the «Approvals» field are:

- FCC - The antenna is included in the FCC test reports and thus approved for use in countries that accept the FCC radio approvals, primarily US.
- IC - The antenna is included in the IC (Industrie Canada) test reports and thus approved for use in countries that accept the IC radio approvals, primarily Canada.
- RED - The antenna is included in the ETSI test reports and thus approved for use in countries that accept the Radio Equipment Directive, primarily the European countries.
- MIC - The antenna is included in the Japanese government affiliated MIC test reports and thus approved for use in the Japanese market.
- NCC - The antenna is included in the Taiwan NCC test reports and thus approved for use in Taiwan.
- KCC - The antenna is included in the KCC test reports and thus approved for use in South Korea.
- ANATEL – The antenna is included in the Brazil Anatel test reports and thus approved for use in Brazil.
- ACMA – The antenna is included in the Australia and New Zealand test reports and thus approved for use in Australia and New Zealand.
- ICASA – The antenna is included in the South Africa ICASA test reports and thus approved for use in South Africa.

## 7.1 Approved antennas

| **ANNA-B112 internal antenna** | | |
|---|---|---|
| Gain | +0.7 dBi |  |
| Comment | Internal antenna on ANNA-B112, see section 2.2.1 and ANNA-B112 system integration manual [1] for reference design for more info.<br>Should not be mounted inside a metal enclosure. | |
| Approval | FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA | |

# B Antenna reference designs

Designers can take full advantage of ANNA-B112's Single-Modular Transmitter certification approval by integrating the u-blox reference design into their products. This approach requires compliance with the following rules:

- Only listed antennas can be used. Refer to ANNA-B112 Data sheet [2] for the listed antennas.
- Schematics and parts used in the design must be identical to u-blox. RF components may show different behavior at the frequencies of interest due to different construction and parasitic; use u-blox's validated parts for antenna matching.
- PCB layout must be identical to the one provided by u-blox. Implement one of the reference designs included in this section or contact u-blox.
- The designer must use the stack-up provided by u-blox. RF traces on the carrier PCB are part of the certified design.

Three different reference designs are available as listed below:

- Using the internal antenna with the module in the corner of the PCB
- Using the internal antenna with the module along the edge of the PCB
- Using an external antenna by a short trace to a U.FL connector

## B.1 Internal antenna reference design with module at PCB corner

When using the ANNA-B112 together with this antenna reference design, the circuit trace layout must be made in strict compliance with the instructions below.

This section describes where the critical copper traces are positioned on the reference design.

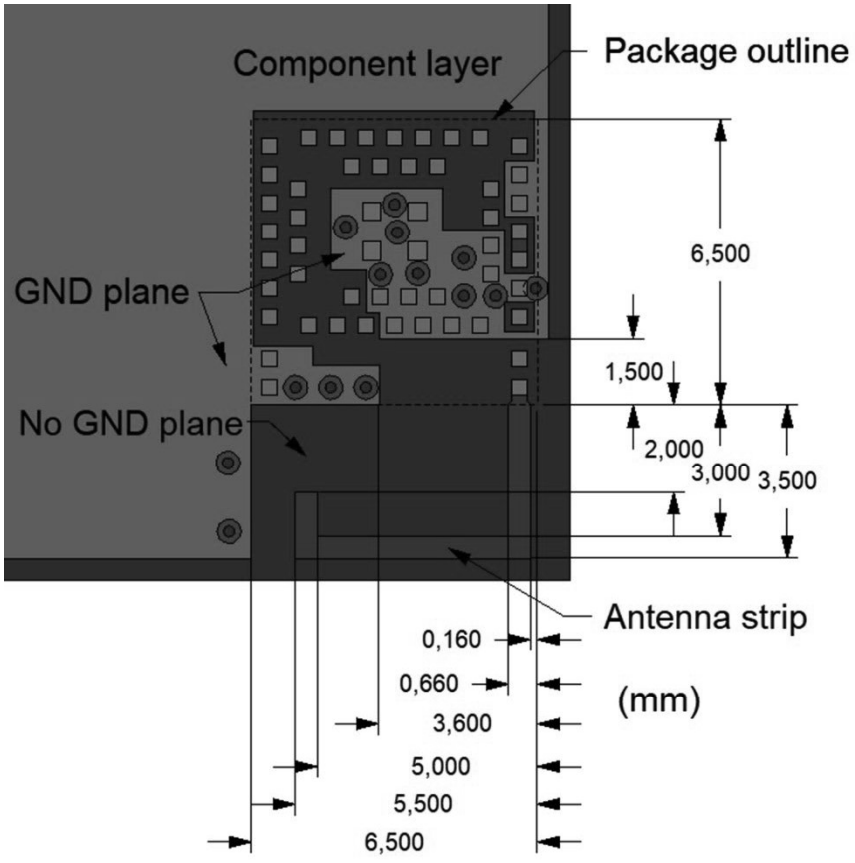


**Figure 30: Reference design for internal antenna, corner version, top layer. Traces and vias for other signals not present.**