

SIEMENS

SIMATIC Ident

RFID systems SIMATIC RF615A

Operating Instructions

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Characteristics

SIMATIC RF615A	Characteristics	
	Area of application	The SIMATIC RF615A is a universal UHF antenna in a compact size for industrial applications, e.g. for installation directly on the robot arm.
	Frequency range	<ul style="list-style-type: none"> • 865 to 868 MHz (RF615A ETSI) • 902 to 928 MHz (RF615A FCC)
	Read range	Max. 2 m
	Polarization	Linear
	Degree of protection	IP67 (IP rating is not investigated by UL)
	Mounting	2 x M4
	Connection	30 cm connecting cable (connected permanently to the antenna) and RP-TNC coupling An antenna cable is required for connection to the reader (e.g. 6GT2815-0BH30).

Frequency ranges

The antenna is a narrowband antenna and is available in the following two frequency range variants.

- RF615A ETSI: 865 to 868 MHz
- RF615A FCC: 902 to 928 MHz

Function

The SIMATIC RF615A is used for transmitting and receiving data in the UHF range. The antennas are connected to the SIMATIC RF600 readers via antenna cables that are available in different lengths.

Ordering data

Table 2- 1 RF615A ordering data

Product	Article number
SIMATIC RF615A (ETSI)	6GT2812-0EA00
SIMATIC RF615A (FCC)	6GT2812-0EA01

Table 2- 2 Ordering data accessories

Product	Article number	
Connecting cable between reader and antenna	1 m (cable loss 0.5 dB)	6GT2815-0BH10
	3 m (cable loss 1.0 dB)	6GT2815-0BH30
	5 m, suitable for drag chains (cable loss 1.5 dB)	6GT2815-2BH50
	10 m (cable loss 2.0 dB)	6GT2815-1BN10
	10 m (cable loss 4.0 dB)	6GT2815-0BN10
	15 m, suitable for drag chains (cable loss 4.0 dB)	6GT2815-2BN15
	20 m (cable loss 4.0 dB)	6GT2815-0BN20
	40 m (cable loss 5.0 dB)	6GT2815-0BN40

Installing and mounting

Two holes for M4 screws are provided for mounting the antenna. The antenna is suitable for mounting on metallic and non-metallic surfaces.

Note

Maximum read/write range

The maximum read/write ranges are only reached when the antenna is mounted on a metallic surface with a minimum size of 150 x 150 mm.

Note

Antenna gain depends on the mounting surface

Note that the antenna gain depends on the material of the mounting surface. If the antenna is mounted on a metallic surface, the antenna gain is -5 dBi. If the antenna is mounted on a non-metallic surface, the antenna gain is -13 dBi.

Connecting the antenna

4.1 Connecting the antenna

The SIMATIC RF615A antenna must be connected to the reader using an antenna cable.

Preassembled standard cables in lengths of 1 m, 3 m, 5 m, 10 m, 15 m, 20 m and 40 m are available to connect the antenna.

The range of the antenna is limited by the cable loss. The maximum range can be achieved with the cable 6GT2815-0BH10 (length 1 m), since this cable has the lowest cable loss.

Requirement

Note

Use of Siemens antenna cable

To ensure optimum functioning of the antenna, it is recommended that a Siemens antenna cable is used in accordance with the list of accessories.

Strain relief

To protect the antenna connecting cable from strain, you can attach strain relief, e.g. in the form of a strain relief clamp. The following graphic shows the optimum mounting point for attaching strain relief.

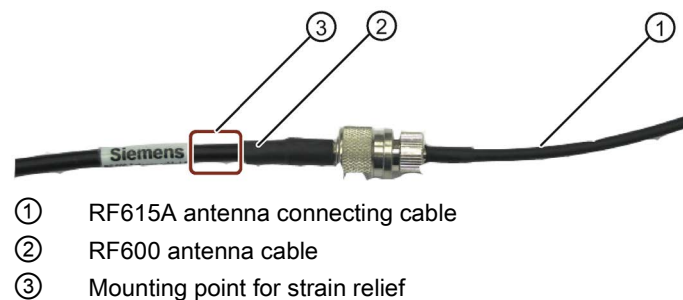


Figure 4-1 Strain relief

4.2 Bending radii and bending cycles of the cable

Table 4- 1 Bending radii and bending cycles of the antenna cable

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm] ¹⁾
Antenna cable	6GT2815-0BH10	1	0.5	51
Antenna cable	6GT2815-0BH30	3	1	51
Antenna cable (suitable for drag chains)	6GT2815-2BH50	5	1.5	44 ²⁾
Antenna cable	6GT2815-1BN10	10	2	77
Antenna cable	6GT2815-0BN10	10	4	51
Antenna cable (suitable for drag chains)	6GT2815-2BN15	15	4	44 ²⁾
Antenna cable	6GT2815-0BN20	20	4	77
Antenna cable	6GT2815-0BN40	40	5	77

1) Permissible minimum bending radius with multiple bending.

2) With cables capable of being used in drag chains, 100,000 bending cycles at a bending radius of 100 mm and a bend of $\pm 180^\circ$ or 3 million torsion cycles with a bend of $\pm 180^\circ$ on a cable length of 1 m are permitted.

Antenna parameter assignment

Depending on the country or region in which the antenna is being operated, it is subject to regional limitations with respect to the radiated power.

Limitations in the EU, EFTA, or Turkey

Note

Limitation of the radiated power according to EN 302 208 V1.4.1 (ETSI)

RF600 systems that are put into operation in the EU, EFTA or Turkey must not exceed the following radiated power with an RF615A antenna:

- 500 mW ERP (or 27 dBm ERP)
Converted into EIRP: 820 mW EIRP (or 29 dBm EIRP)
-

Make the following settings to ensure that the maximum permitted radiated power of the antenna is not exceeded:

- Antenna gain: -5 dBi
- Radiated power: ≤ 340 mW ERP (or 25.35 dBm ERP)
Converted into EIRP: ≤ 560 mW EIRP (or 27.5 dBm EIRP)
- Use of cable loss associated with the antenna cable.

Limitations in the USA and Canada

Note

Limitation of the radiated power (FCC)

RF600 systems that are put into operation in the USA and Canada must not exceed the following radiated power with an RF615A antenna:

- 4000 mW EIRP (or 36 dBm EIRP)
-

Make the following settings to ensure that the maximum permitted radiated power of the antenna is not exceeded:

- Conducted power P (dBm) of the RF600 reader: < 30 dBm
- Antenna gain G_i (dBi) in the FCC frequency band: ≤ -5 dBi
- Cable loss a_k (dB): ≥ 1 dB

$$P \text{ (dBm)} \leq 30 \text{ dBm} - (G_i - 6 \text{ dBi}) + a_k$$

Limitations in China

Note

Limitation of the radiated power (CMIIT)

RF600 systems that are put into operation in China must not exceed the following radiated power with an RF615A antenna:

- 2000 mW ERP (or 33 dBm ERP)
Converted into EIRP: 3250 mW EIRP (or 35 dBm EIRP)
-

Make the following settings to ensure that the maximum permitted radiated power of the antenna is not exceeded:

- Radiated power: ≤ 2000 mW ERP (or 33 dBm ERP)
Converted into EIRP: ≤ 3250 mW EIRP (or 35 dBm EIRP)
- Use of cable loss associated with the antenna cable.

Limitations in Japan

Note

Limitation of the radiated power (ARIB)

RF600 systems that are put into operation in Japan must not exceed the following radiated power with an RF615A antenna:

- 500 mW EIRP (or 27 dBm EIRP) for operation with RF650R (ARIB STD-T107)
 - 4000 mW EIRP (or 36 dBm EIRP) for operation with RF680R/RF685R (ARIB STD-T106)
-

The maximum permissible radiated power of the antenna cannot be reached or exceeded due to the negative antenna gain.

Antenna patterns

6.1 Alignment of transponders to the antenna

Polarization axis

Since the RF615A antenna has linear polarization, it is necessary to consider the alignment of the transponders with regard to the polarization axis of the antenna.

The polarization axes of antenna and transponder must always be parallel. The symbol on the antenna indicates the polarization axis.



Figure 6-1 Polarization axis

Alignment

The following diagram shows the optimum alignment of the RF600 transponders to the RF615A antenna.

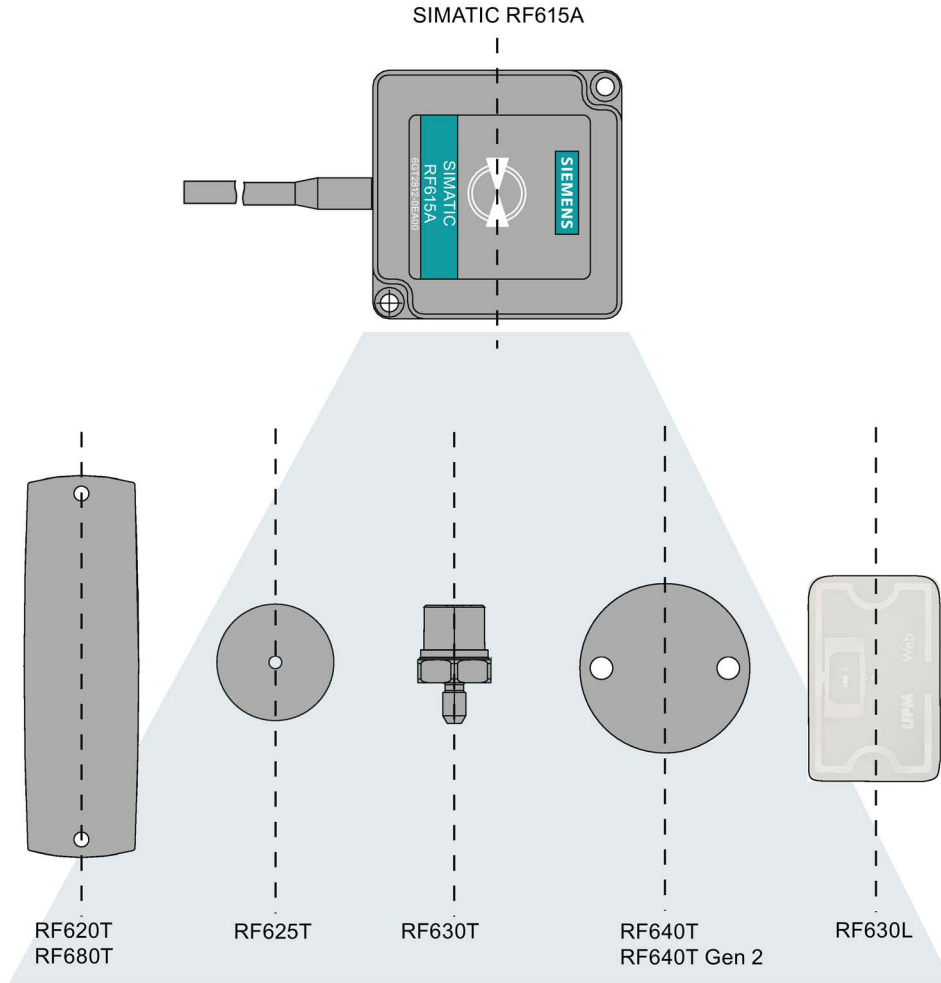


Figure 6-2 Optimum alignment of transponders to the antenna

Angle deviation diagram for alignment

The following diagram shows the dependence of the following factors:

- Alignment angle of transponder to antenna
- Maximum range of antenna

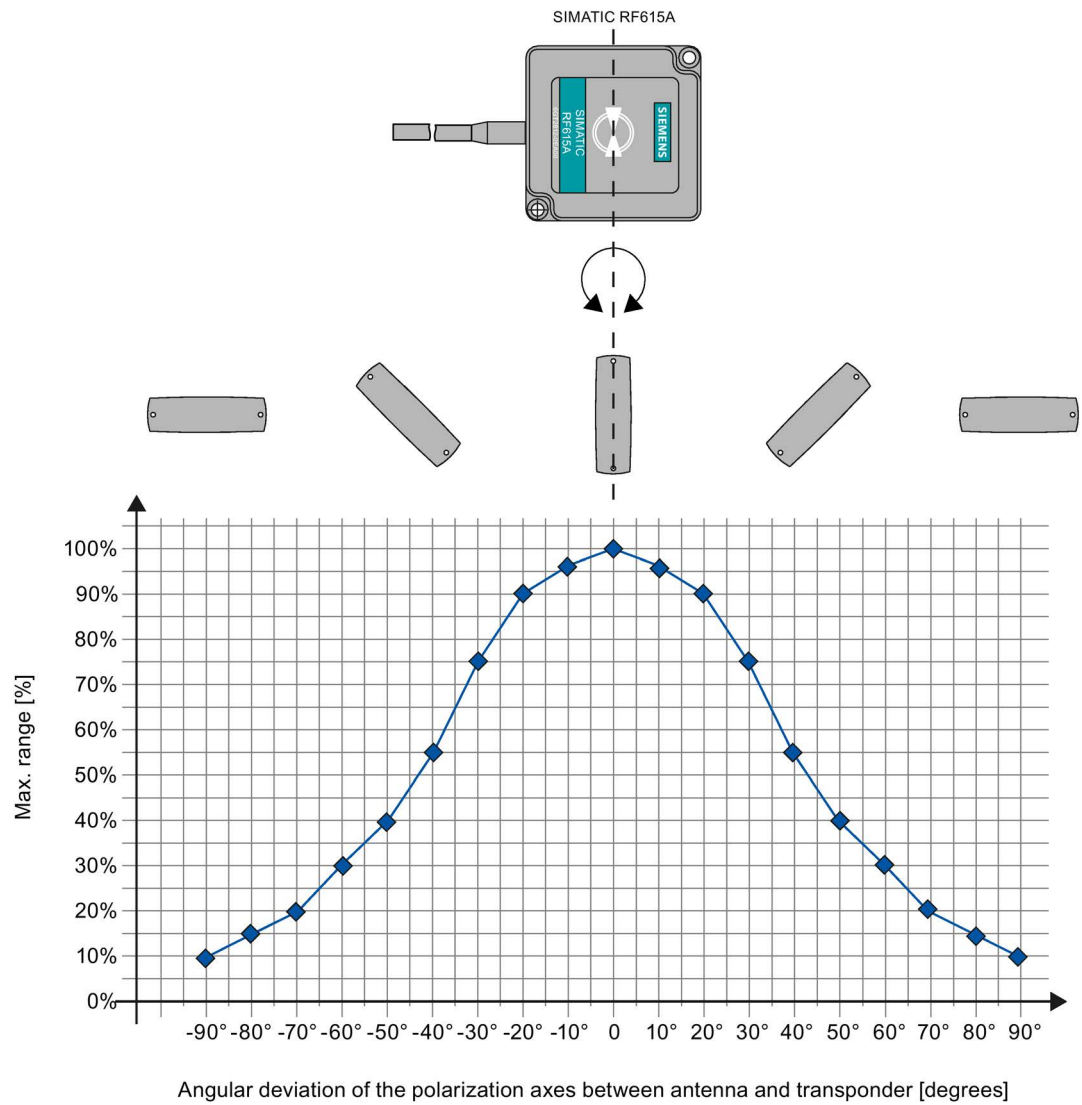


Figure 6-3 Effect on the read/write range depending on the antenna alignment

6.2 Antenna pattern ETSI

Directional radiation pattern ETSI

The directional radiation pattern is shown for nominal alignment and a center frequency of 866.3 MHz. The nominal antenna alignment is given when the antenna elevation is provided as shown in the following figure.

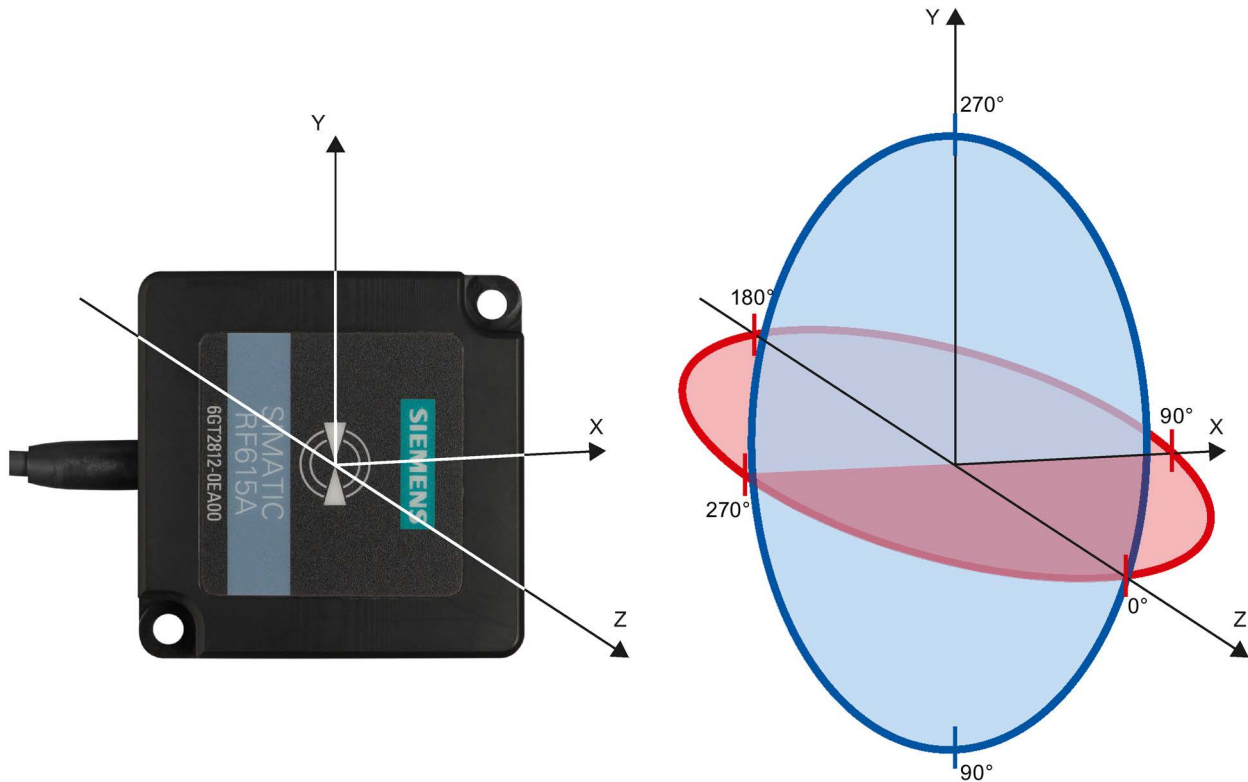


Figure 6-4 Reference system

The half-power beam width of the antenna is defined by the angle between the two -3 dB points. Which range (in %) corresponds to the dB values in the patterns can be obtained from this table (Page 24).

Note that the measurements presented graphically below were carried out in a low-reflection environment. Deviations can therefore occur in a normally reflecting environment.

Directional radiation pattern ETSI on metallic mounting surface (15 cm x 15 cm)

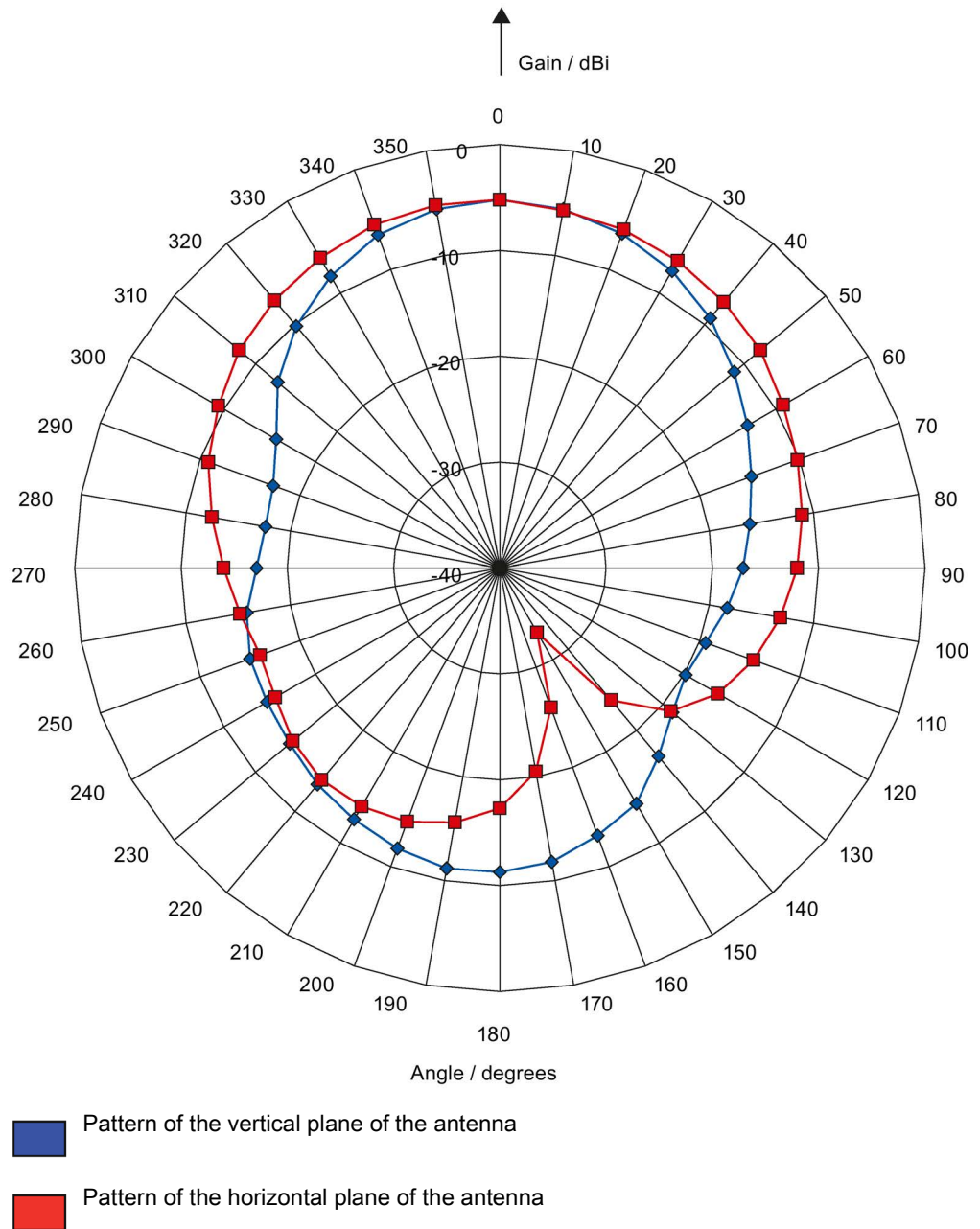


Figure 6-5 Directional radiation pattern RF615A ETSI on metallic mounting surface

Directional radiation pattern ETSI on non-metallic mounting surface

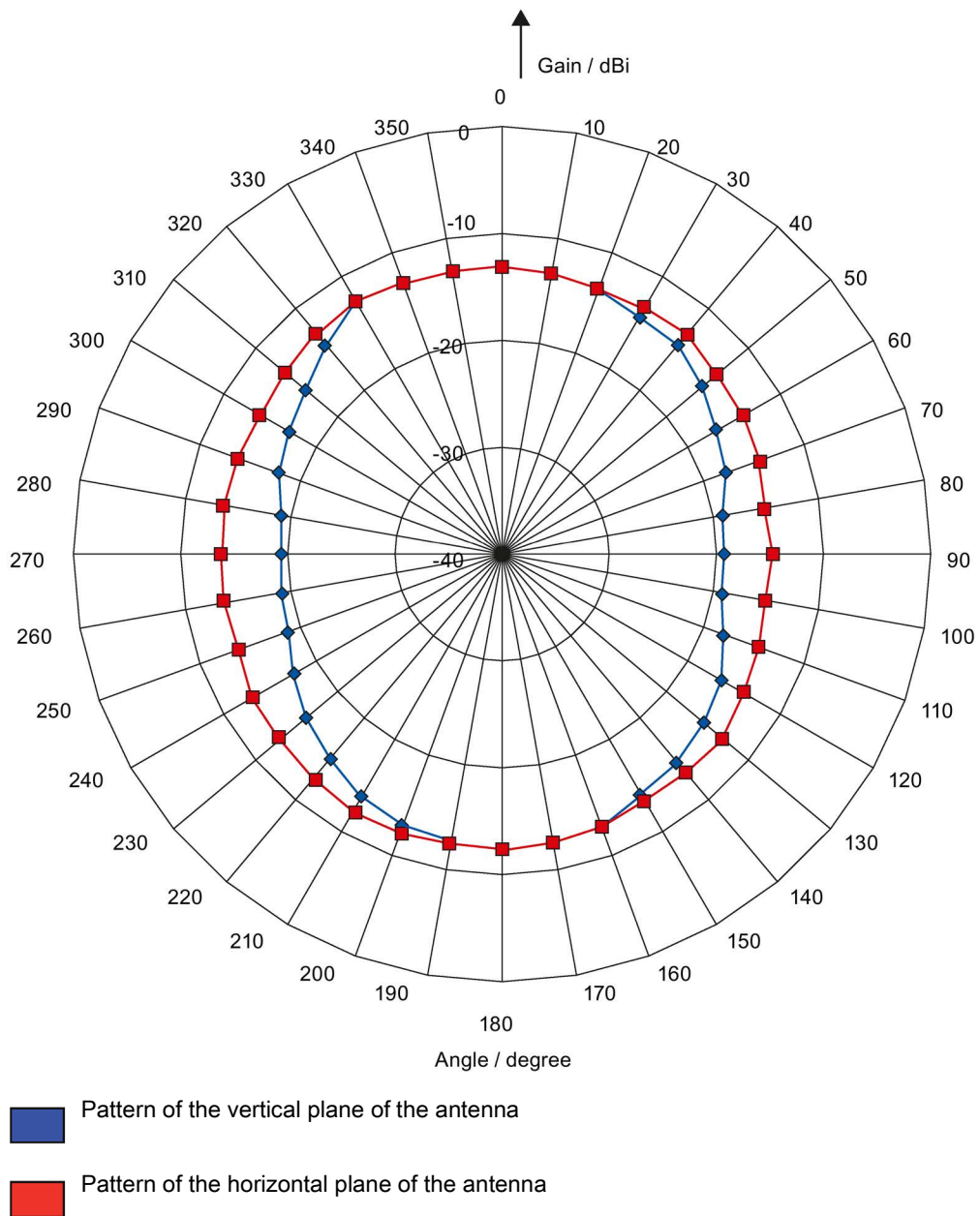


Figure 6-6 Directional radiation pattern RF615A ETSI on non-metallic mounting surface

6.3 Antenna pattern FCC

Directional radiation pattern FCC

The directional radiation pattern is shown for nominal alignment and a center frequency of 915 MHz.

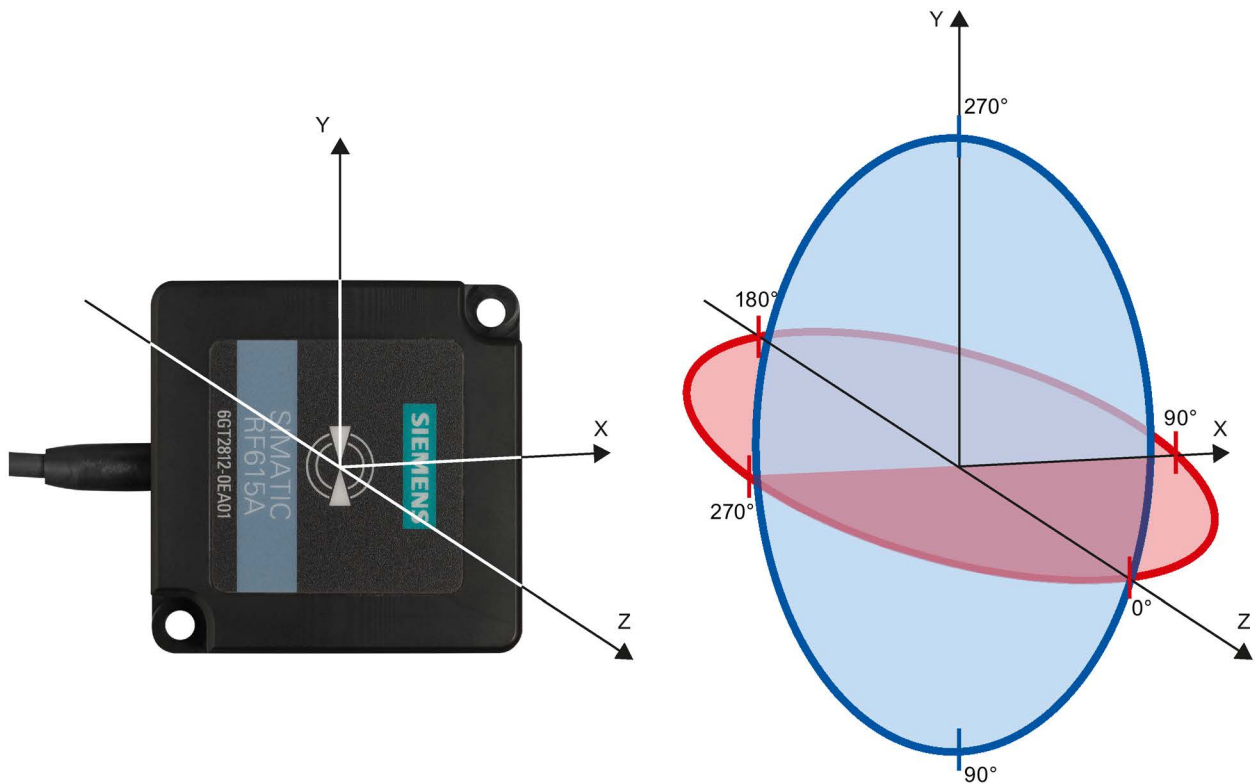


Figure 6-7 Reference system

The half-power beam width of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power in relation to the maximum power). Which range (in %) corresponds to the dB values in the patterns can be obtained from this table (Page 24).

Note that the measurements presented graphically below were carried out in a low-reflection environment. Low deviations can therefore occur in a normally reflecting environment.

Directional radiation pattern of the RF615A (FCC) on metallic mounting surface (15 cm x 15 cm)

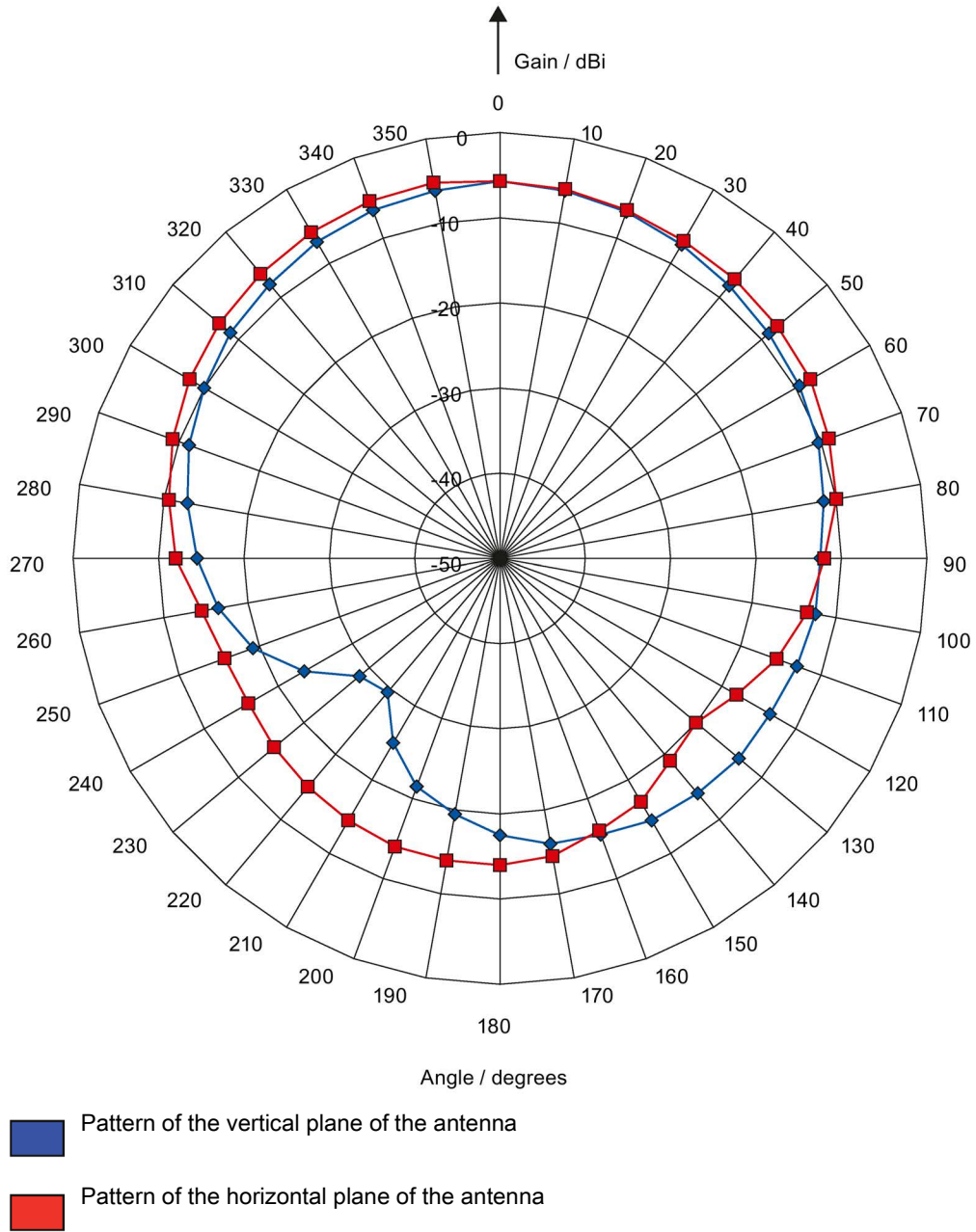


Figure 6-8 Directional radiation pattern of the RF615A (FCC) on metallic mounting surface

Directional radiation pattern of the RF615A (FCC) on non-metallic mounting surface

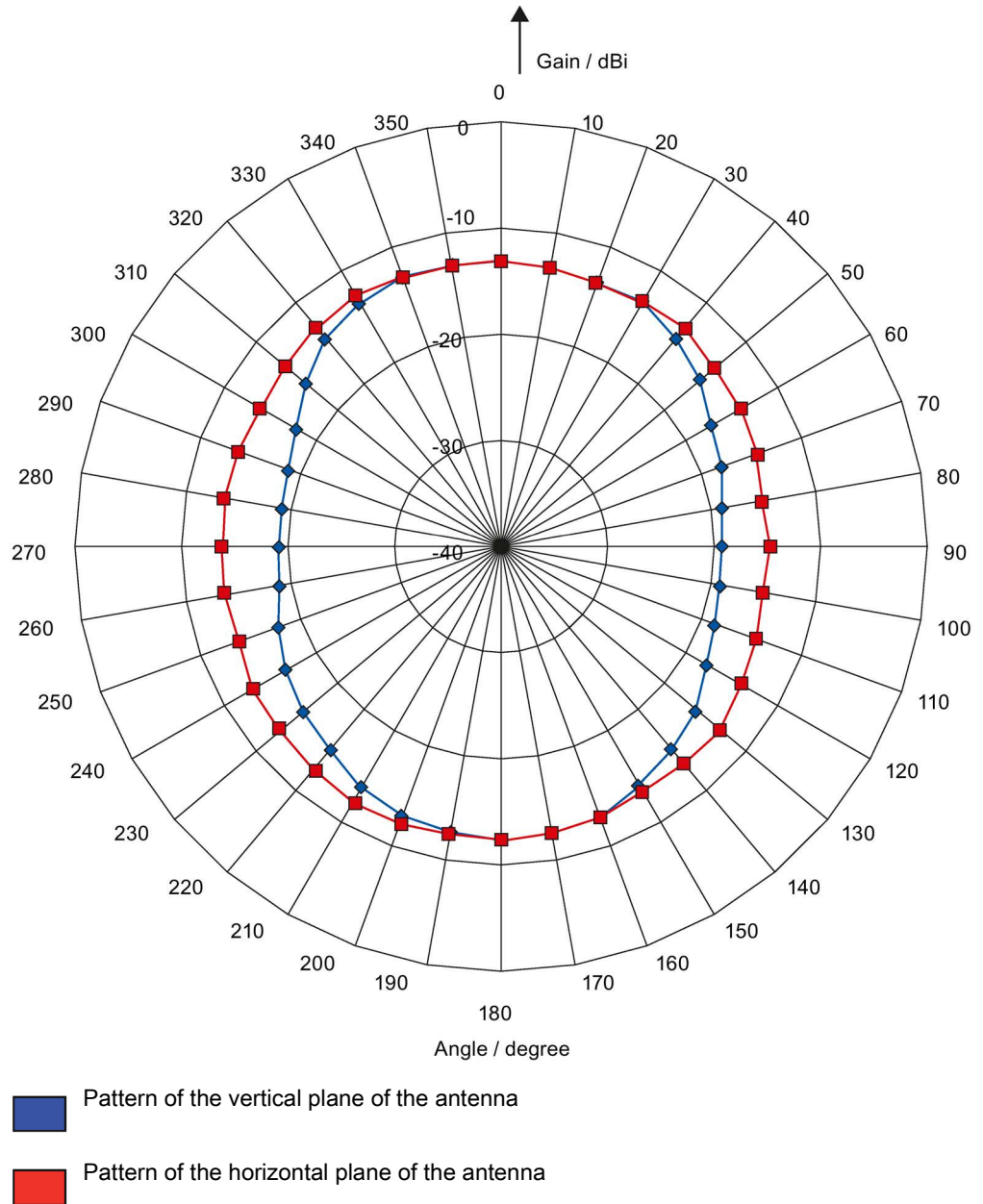


Figure 6-9 Directional radiation pattern of the RF615A (FCC) on non-metallic mounting surface

6.4 Interpretation of directional radiation patterns

The following overview table will help you with the interpretation of directional radiation patterns.

The table shows which dBi values correspond to which read/write ranges (in %): You can read the radiated power depending on the reference angle from the directional radiation patterns, and thus obtain information on the read/write range with this reference angle with regard to a transponder.

The dBr values correspond to the difference between the maximum dBi value and a second dBi value.

Deviation from maximum antenna gain [dBr]	Read/write range [%]
0	100
-3	70
-6	50
-9	35
-12	25
-15	18
-18	13

Example

As can be seen from the Antenna pattern ETSI (Page 18), the maximum antenna gain is -5 dBi. In the vertical plane, the antenna gain has dropped to approx. -11 dBi at +50°. This means that the dBr value is -6. The antenna range is only 50% of the maximum range at +50° from the Z axis within the vertical plane (see line shown in blue in the directional radiation pattern: Characteristic of the vertical plane of the antenna and the associated representation of the reference system).

Maximum read/write ranges

Please observe the installation notes (Page 9) and antenna alignment (Page 15) to achieve the maximum read/write range.

The measurements were made under the following conditions:

- Maximum possible radiated power of the reader or antenna
- With a 3 meter long antenna cable with 1 dB cable loss (article number: 6GT2815-0BH30)
- Room temperature of approx. 20 - 25 °C
- Optimized real measurement conditions (laboratory with few metallic reflecting surfaces)

Table 7- 1 Read ranges of the antenna (all ranges in meters [m])

	SIMATIC RF615A with		
	SIMATIC RF650R	SIMATIC RF680R	SIMATIC RF685R
SIMATIC RF630L	0.95	1.35	1.35
SIMATIC RF640L	0.35	0.35	0.35
SIMATIC RF690L	0.7	0.7	0.7
SIMATIC RF610T	0.6	0.85	0.85
SIMATIC RF620T	1.5	2.2	2.2
SIMATIC RF622T	0.4	0.4	0.4
SIMATIC RF625T	0.35	0.5	0.5
SIMATIC RF630T	0.3	0.4	0.4
SIMATIC RF640T	0.6	0.9	0.9
SIMATIC RF645T	1.2	1.5	1.5
SIMATIC RF680T	0.6	0.9	0.9
SIMATIC RF682T	0.7	0.9	0.9

Maximum write ranges

The antenna requires more power for writing than for reading data. When writing, the maximum range reduces by approximately 30% compared with the read range.

Technical data

Table 8- 1 Technical specifications for the RF615A antenna

6GT2812-0EA0x	
Product type designation	SIMATIC RF615A
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Maximum radiated power	
• ETSI	• ≤ 340 mW ERP
• FCC	• ≤ 560 mW EIRP
• CMIIT	• ≤ 340 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 560 mW EIRP
Antenna gain	
• ETSI	• -13 dBi ... -5 dBi • Depends on background, refer to the section "Antenna pattern ETSI (Page 18)"
• FCC	• Depends on background, refer to the section "Antenna pattern FCC (Page 21)"
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm ¹⁾	
• ETSI	• Horizontal plane: 100° Vertical plane: 75° see section "Antenna pattern ETSI (Page 18)"
• FCC	• Horizontal plane: 130° Vertical plane: 105° see section "Antenna pattern FCC (Page 21)"

6GT2812-0EA0x

Electrical data

Range	See section "Maximum read/write ranges (Page 25)"
Impedance	50 Ω
Polarization	Linear
VSWR (standing wave ratio)	≤ 2:1
Power	
<ul style="list-style-type: none"> • ETSI 	<ul style="list-style-type: none"> • ≤ 2 W
<ul style="list-style-type: none"> • FCC 	<ul style="list-style-type: none"> • ≤ 1 W

Interfaces

Plug connection	30 cm coaxial cable with RP-TNC coupling (for connection of the antenna cable)
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Mechanical specifications

Material	PA6 V0, silicone-free
Color	Black
Tightening torque (at room temperature)	≤ 1.5 Nm (when mounted on a flat surface)

Permitted ambient conditions

Ambient temperature	
<ul style="list-style-type: none"> • During operation 	<ul style="list-style-type: none"> • -20 ... +70 °C
<ul style="list-style-type: none"> • During transportation and storage 	<ul style="list-style-type: none"> • -40 ... +85 °C
Conditions relating to UL approval	<ul style="list-style-type: none"> • for indoor use only (dry location) • mounted on height below 2 m • Coaxial connectors and cables shall comply with NFPA70 art. 820 part V
Degree of protection	IP67 (IP rating is not investigated by UL)
Shock resistant to EN 60068-2-27	50 g ²⁾
Vibration to EN 60068-2-6	20 g ²⁾

Design, dimensions and weight

Dimensions (H x W x D)	52 x 52 x 16 mm
Weight	60 g

6GT2812-0EA0x

Standards, specifications, approvals

Proof of suitability FCC: cULus

MTBF 1190 years

- 1) The values differ for different dimensions/materials of the mounting surface.
- 2) The values for shock and vibration are maximum values and must not be applied continuously.

Dimension drawing

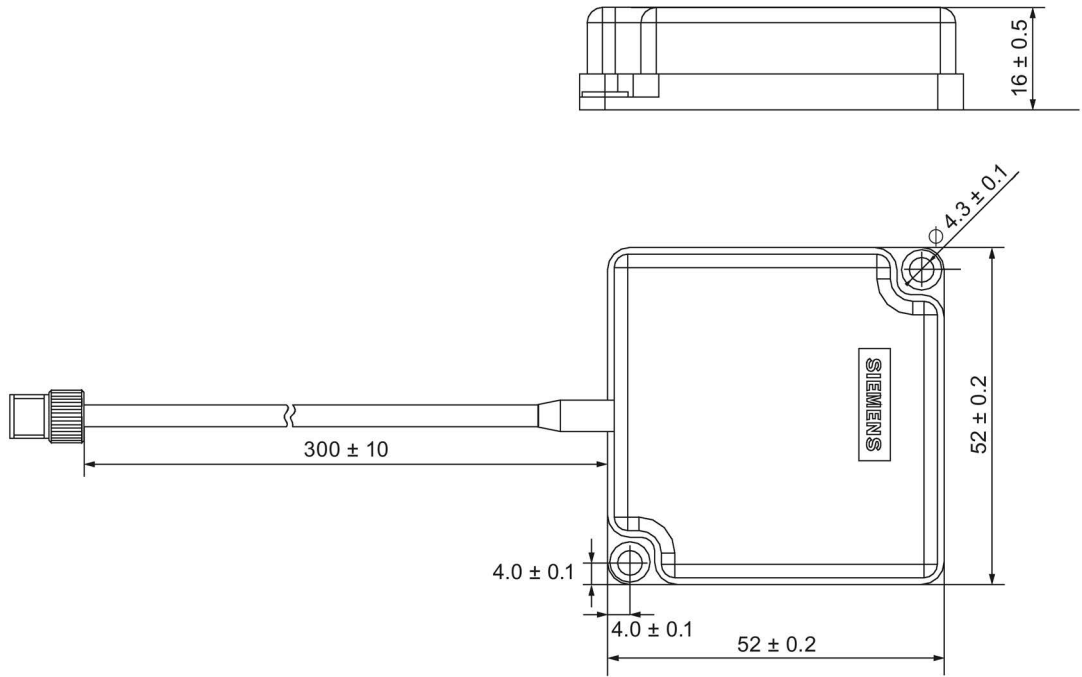



Figure 9-1 Dimension drawing RF615A

All dimensions in mm

Table 10- 1 6GT2812-0EA01

Labeling	Description
	<p>This product is UL-certified for the USA and Canada.</p> <p>It meets the following safety standard(s):</p> <ul style="list-style-type: none">• UL Report E115352• UL 62368-1 - AVICT Equipment - Part 1: Safety Requirements• CSA C22.2 No. 62368-1-14 AVICT Equipment - Part 1: Safety Requirements

