5.6.4 Configuration/integration

An Ethernet interface is available for integrating the device into system environments/networks. The RF685R can be configured via the Ethernet interface and with direct connection to the PC. You can configure and program the reader using the following tools:

- STEP 7 Basic/Professional (TIA Portal)
- or via EtherNet/IP
- Web Based Management (WBM)
- OPC UA or XML based user applications

Note that configuration in parallel is not possible using different tools. Simple process controls (e.g. a traffic signal) can be implemented directly using the reader via four digital inputs/outputs.

Figure 5-48 Overview: Configuration of RF685R readers

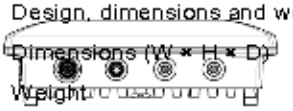
5.6.5 Technical specifications

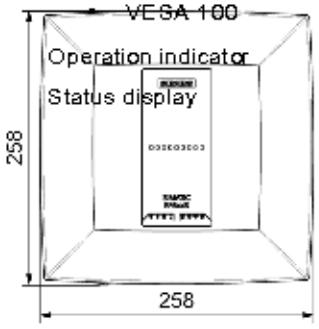
Table 5- 55 Technical specifications of the RF685R reader

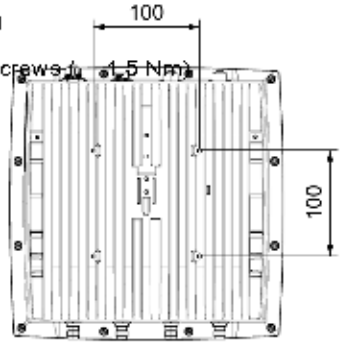
	6GT2811-6CA10-xAA0
Product type designation	SIMATIC RF685R
Radio frequencies	
Operating frequency	
▪ ETSI	▪ 865 to 868 MHz
▪ FCC	▪ 902 to 928 MHz
▪ CMIIT	▪ 920 to 925 MHz
▪ ARIB (STD-T106)	▪ 916.8 MHz to 920.4 MHz
Transmit power [1]	
▪ ETSI	▪ 3 to 2000 mW
▪ FCC	▪ 3 to 2000 mW
▪ CMIIT	▪ 3 to 2000 mW
▪ ARIB (STD-T106)	▪ 3 to 1000 mW
Maximum radiated power per antenna	
▪ ETSI	▪ 2000 mW ERP
▪ FCC	▪ 4000 mW EIRP
▪ CMIIT	▪ 2000 mW ERP
▪ ARIB (STD-T106)	▪ 4000 mW EIRP
Electrical data	
Range (internal antenna)	
▪ ETSI	▪ ≤ 8 m
▪ FCC	▪ ≤ 8 m
▪ CMIIT	▪ ≤ 8 m
▪ ARIB (STD-T106)	▪ ≤ 8 m
Protocol	ISO 18000-62/-63
Transmission speed	≤ 300 kbps
Frequency accuracy	≤ ±10 ppm

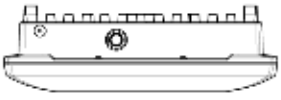
	6GT2811-6CA10-xAA0
Channel spacing	
▪ ETSI	▪ 600 kHz
▪ FCC	▪ 500 kHz
▪ CMIIT	▪ 250 kHz
▪ ARIB (STD-T106)	▪ 1200 kHz
Modulation methods	ASK: DSB modulation & PR-ASK modulation encoding, Manchester or Pulse Interval (PIE)
Multitag capability	Yes
Typical transmission time per byte	
▪ Write access	▪ 2 ms
▪ Read access	▪ 0.15 ms
Supply voltage	24 V DC (20 ... 30 V DC) [2]
Maximum permitted current consumption	2 A
Maximum permitted current consumption via DI/DQ interface	1 A [3]
Current consumption (on standby), typical	
▪ 20 V input voltage on the reader	▪ 220 mA / 4.4 W
▪ 24 V input voltage on the reader	▪ 190 mA / 4.5 W
▪ 30 V input voltage on the reader	▪ 150 mA / 4.5 W
Current consumption (at 1000 mW transmit power), typical	
▪ 20 V input voltage on the reader	▪ 450 mA / 9.0 W
▪ 24 V input voltage on the reader	▪ 380 mA / 9.1 W
▪ 30 V input voltage on the reader	▪ 300 mA / 9.6 W
Current consumption (at 2000 mW transmit power), typical	
▪ 20 V input voltage on the reader	▪ 610 mA / 12.2 W
▪ 24 V input voltage on the reader	▪ 500 mA / 12.0 W
▪ 30 V input voltage on the reader	▪ 410 mA / 12.3 W
Interfaces	
Antenna connectors	1x RP-TNC
Power supply	1x M12 (8-pin)
DI/DQ interface	1x M12 (12-pin)
Digital inputs	4
Digital outputs	4
Ethernet interface	2x M12 (4-pin), 100 Mbps

	6GT2811-6CA10-xAA0
Mechanical specifications	
Material	
▪ Upper part of housing	▪ Pocan (silicone-free)
▪ Lower part of housing	▪ Aluminum
Color	
▪ Upper part of housing	▪ TI-Grey
▪ Lower part of housing	▪ Silver
Permitted ambient conditions	
Ambient temperature	
▪ During operation	▪ -25 ... +55 °C
▪ During transportation and storage	▪ -40 ... +85 °C
Degree of protection	IP65
Shock resistant to EN 60068-2-27	25.5 g [4]
Vibrations according to EN 60068-2-6	3.1 g [4]
Design, dimensions and weight	
Dimensions (W × H × D)	258 × 258 × 80 mm
Weight	2.47 kg
Type of mounting	
▪ Mounting rail	▪ Hanging
▪ VESA 100	▪ 4x M4 screws (1.5 Nm)
Operation indicator	8 LEDs
Status display	9 LEDs









	6GT2811-6CA10-xAA0
Standards, specifications, approvals	
Proof of suitability	EN 301 489-1 V1.9.2 / EN 301 489-3 V1.6.1 / EN 302 208-1/-3 V1.4.1 FCC CFR 47, Part 15 section 15.247
MTBF	29 years

1) Measured at the output of the antenna socket.

2) All supply and signal voltages must be safety extra low voltage (SELV/PELV according to EN 60950). The voltage sources must meet the requirements of limited power sources (LPS) and NEC Class 2.

Note that, depending on the power consumption, using extension cables > 20 m (6GT2891-4FN50) may lead to a voltage drop on the reader. This voltage drop can mean that the necessary minimum voltage on the reader is below the required 20 V.

3) Keep to the switching schemes of the DI/DQ interface.

4) The values for shock and vibration are maximum values and must not be applied continuously. These values only apply to mounting using screws.

5.6.6 Dimension drawing

Figure 5-49 Dimension drawing RF685R

All dimensions in mm (± 0.5 mm tolerance)

5.6.7 Certificates and approvals

Note

Marking on the readers according to specific approval

The certificates and approvals listed here apply only if the corresponding mark is found on the readers.

Table 5- 56 6GT2811-6CA10-0AA0

Labeling	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
	South Africa radio approval: Radio Equipment Type Approval
India	India wireless approval Marking on the reader: No. NR-ETA/1589
	Radio approval for Russia, Belarus, Kazakhstan

Table 5- 57 6GT2811-6CA10-1AA0

Labeling	Description
Federal Communications Commission	FCC CFR 47, Part 15 section 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. FCC ID: NXW-RF600R2
Industry Canada Radio Standards Specifications	RSS-210 Issue 6, Section 2.2, A8 IC: 267X-RF600R2, Model: RF685R
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment UL Report E 115352

Labeling	Description
	Brazil radio approval Marking on the reader (6GT2811-6CA10-1AA0): Statement about approval: Este equipamento opera em caráter secundário, isto é, não tem direito à proteção contra interferência prejudicial, mesmo de estações do mesmo tipo e não pode causar interferência a sistemas operando em caráter primário. Reader certificate: ANATEL 2892-15-4794
	KCC Certification Type of equipment: A급 기기 (업무용 방송통신기자재) Class A Equipment (Industrial Broadcasting & Communication Equipment) 이 기기는 업무용(A급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라 며, 가정외의 지역에서 사용하는 것을 목적으로 합니다. This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home. Certificate of the reader: MSIP-CMM-RF5-RF685R
HC-141617	Argentina radio approval: Registro de la COMISION NACIONAL DE COMUNICACIONES
RCPSISI14-1926-A2	Mexico radio approval: CERTIFICADO DE HOMOLOGACION, IFETEL
	Australia radio approval: This product meets the requirements of the AS/NZS 3548 Norm.

Table 5- 58 6GT2811-6CA10-2AA0

Standard	
CMIIT Certification	China radio approval Marking on the reader: CMIIT ID: 2014DJ3989

5.6.7.1 FCC information

Siemens SIMATIC RF685R (FCC): 6GT2811-6CA10-1AA0

FCC ID: NXW-RF600R2

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Notice

To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification.

It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

FCC Exposure Information

To comply with FCC RF exposure compliance requirements, the antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

5.6.7.2 IC-FCB information

Siemens SIMATIC RF685R (FCC): 6GT2811-6CA10-1AA0

IC: 267X-RF600R2

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d`Industrie Canada applicables aux appareils radio exempts de licence. L`exploitation est autorisée aux deux conditions suivantes :

(1) L`appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l`appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d`en compromettre le fonctionnement.

Industry Canada Notice

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Transmitter power and antenna information for antennas with a gain less than 6 dBi:

This device has been designed to operate with the SIMATIC RF620A antenna 902-928, the SIMATIC RF640A antenna 902-928 as well as the SIMATIC RF660A antenna 902-928 listed below, and having a maximum gain of 5,5 dBi. Arbitrary transmission power settings in combination with other antennas or antennas having a gain greater than 5,5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 Ohms.

Transmitter power and antenna information for antennas with a gain greater 6 dBi:

This device requires professional installation. Antennas with a gain greater 6 dBi may be used provided the system does not exceed the radiation power of 4000 mW E.I.R.P. This device has been designed to operate with the SIMATIC RF642A antenna 902-928 exceeding the maximum gain of 5,5 dBi under the restriction that the RF power at the input of the antenna must be set to meet the following relation: RF power (dBm) ≤ 30 dBm – (antenna gain (dBi) – 6 dBi) Other antennas or system configurations for antennas having a gain greater than 6 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 Ohms.

5.7 SIMATIC RF650M

5.7.1 Description

SIMATIC RF650M expands the RF600 identification system with a powerful mobile reader for applications in the areas of logistics, production and service. In addition, it is an indispensable aid for startup and testing.

5.7.2 Field of application and features

Device variants for different frequency ranges

The SIMATIC RF650M device is available in two variants:

- for the frequency range ETSI (6GT2813-0CA00)
- for the frequency range FCC (6GT2813-0CA10)

Implementation environment, field of application and features

- Field of application

  Due to its protection class IP65 the handheld terminal SIMATIC RF650M is also suitable for use in a harsh environment. The device is extremely rugged and protected against spray water. The backlit display is easy to read even under unfavorable lighting conditions.

- RFID system

  The device can be used to process all RF600 transponders and transponders compatible with them.

- Radio transmission protocols

  The following radio transmission protocols are supported:

  – ISO 18000-63

- API software interface

  The SIMATIC RF650M Mobile handheld terminal is supplied with an API software interface that can be used by customized user programs.

You can perform the following functions with the SIMATIC RF650M handheld terminal:

Functions

- Reading the EPC-ID
- Writing the EPC-ID to a transponder
- Reading data from the transponder
- Writing the data to the transponder
- Reading and displaying the ID number of the transponder (identify transponder) ● Localizing transponders
- Representing and editing the data in hexadecimal and ASCII format
- Password protection for all write functions that can be enabled or disabled (Write, Lock, Kill)
- Menu guidance in English and German (switchable)
- Easy creation of your own RFID applications with the software "Application Interface" (API)

You will find further information on the RF650M handheld terminal in the operating instructions "SIMATIC RF650M mobile handheld terminal (https://support.industry.siemens.com/cs/ww/en/view/109475735)".

Antennas

6

6.1 Overview

The following table shows the most important features of the RF600 antennas at a glance:

Table 6- 1 Characteristics of the RF615A, RF620A and RF660A antennas

Characteristics	RF615A		RF620A		RF660A	
Material	PA 6, silicone-free		PA 12, silicone-free			
Frequency range	865-868 MHz	902-928 MHz	865-868 MHz	902-928 MHz	865-868 MHz	902-928 MHz
Impedance	50 ohms nominal					
Antenna gain	-13 ... -5 dBi [1]		-10 ... -5 dBi [1]		7 dBi	6 dBi
VSWR (standing wave ratio)	2:1 max.					
Polarization	Linear				RH circular	
Radiating/receiving angle	Depending on the mounting surface				55° - 60°	60° - 75°
Connector	RP-TNC coupling					
Mounting type	2 x M4 screws		2 x M5 screws		4x screws M4 (VESA 100 fastening system)	
Degree of protection	IP67 (IP rating is not investigated by UL)		IP67			
Permissible ambient temperature	-20 °C ... +70 °C				-25 °C ... +75 °C	

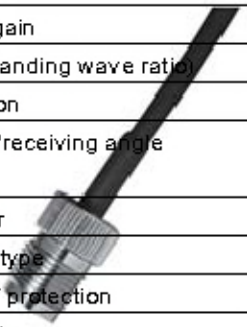
[1] Lowest values apply when mounted on non-metallic surfaces; the higher values apply when mounted on metallic surfaces.

Table 6- 2 Characteristics of the RF640A and RF642A antennas

Characteristics	RF640A		RF642A	
Material	PA 12, silicone-free			
Frequency range	865-868 MHz	902-928 MHz	865-868 MHz	902-928 MHz
Impedance	50 ohms nominal			
Antenna gain	4 dBi (7 dBic)	4.3 dBi (7.3 dBic)	6 dBi	7 dBi
VSWR (standing wave ratio)	Max. 1.25	Max. 1.6	Max. 1.4	
Polarization	RH circular		Linear	
Radiating/receiving angle	Horiz. plane: 80°	Horiz. plane: 75°	Horiz. plane: 75°	Horiz. plane: 80°
	Vertic. plane: 75°	Vertic. plane: 85°	Vertic. plane: 70°	Vertic. plane: 70°
Connector	RP-TNC coupling			
Mounting type	4x screws M4 (VESA 100 fastening system)			
Degree of protection	IP65			
Permissible ambient temperature	-25 °C ... +75 °C			

Table 6- 3 Characteristics of the RF650A and RF680A antennas

Characteristics	RF650A		RF680A	
Material	Pocan DPCF2200, silicone free			
Frequency range	865-868 MHz	902-928 MHz	865-868 MHz	902-928 MHz
Impedance	50 ohms nominal			
Antenna gain	4 dBi (7 dBic)	3.5 dBi (6.5 dBic)	3.5 dBi (6.5 dBic)	3.5 dBi (6.5 dBic)
VSWR (standing wave ratio)	Max. 1.45		Max. 1.45	
Polarization	RH circular		RH circular / linear	
Radiating/receiving angle	Horiz. plane: 83°	Horiz. plane: 90°	Horiz. plane: 85°	Horiz. plane: 90°
	Vertic. plane: 70°	Vertic. plane: 76°	Vertic. plane: 80°	Vertic. plane: 77°
Connector	RP-TNC coupling			
Mounting type	4x screws M4 (VESA 100 fastening system)			
Degree of protection	IP65			
Permissible ambient temperature	-25 °C ... +75 °C			



6.2 SIMATIC RF615A

6.2.1 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	▪ 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.

6.2.2 Ordering data

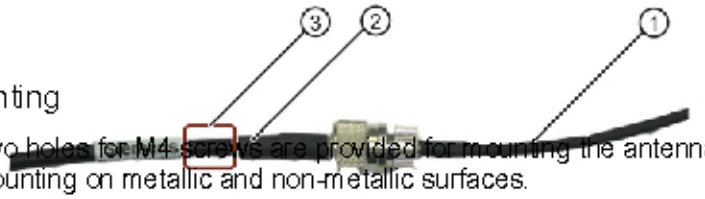
Table 6- 4 RF615A ordering data

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

Table 6- 5 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

6.2.3 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.

6.2.4 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.

① RF615A antenna connecting cable
② RF600 antenna cable
③ Mounting point for strain relief

Figure 6-1 Strain relief

The following listed bending radii are minimum values, which may not be fallen below and are based on repeated bending.

Table 6- 6 Bending radii of the antenna cable

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
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	45 [1)2)]
Antenna cable	6GT2815-1BN10	10	2	77
Antenna cable	6GT2815-0BN10	10	4	51

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
Antenna cable (suitable for drag chains)	6GT2815-2BN15	15	4	45 [1) 2)]
Antenna cable	6GT2815-0BN20	20	4	77
Antenna cable	6GT2815-0BN40	40	5	77

1) Permissible minimum bending radius with one-time bending: 28 mm

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 ± 180° or 3 million torsion cycles with a bend of ± 180° on a cable length of 1 m are permitted.

6.2.5 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

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

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

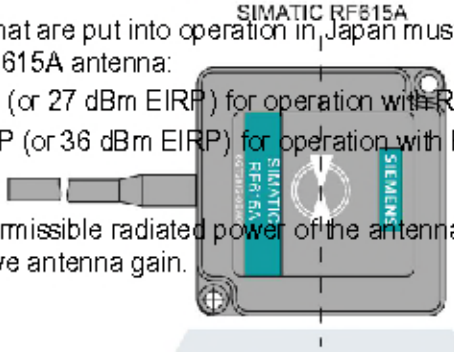
Note

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.



6.2.6 Antenna patterns

6.2.6.1 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.

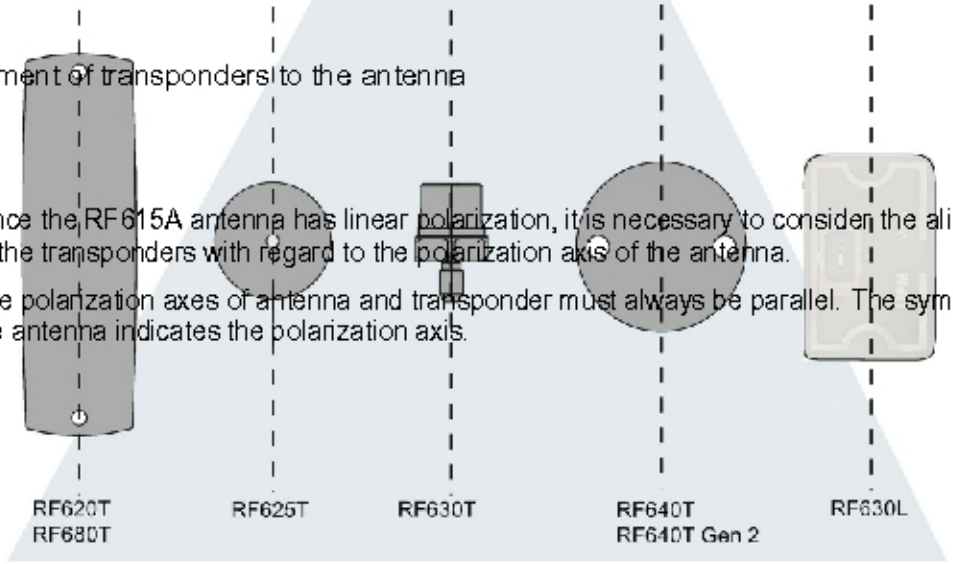


Figure 6-2 Polarization axis

Alignment

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

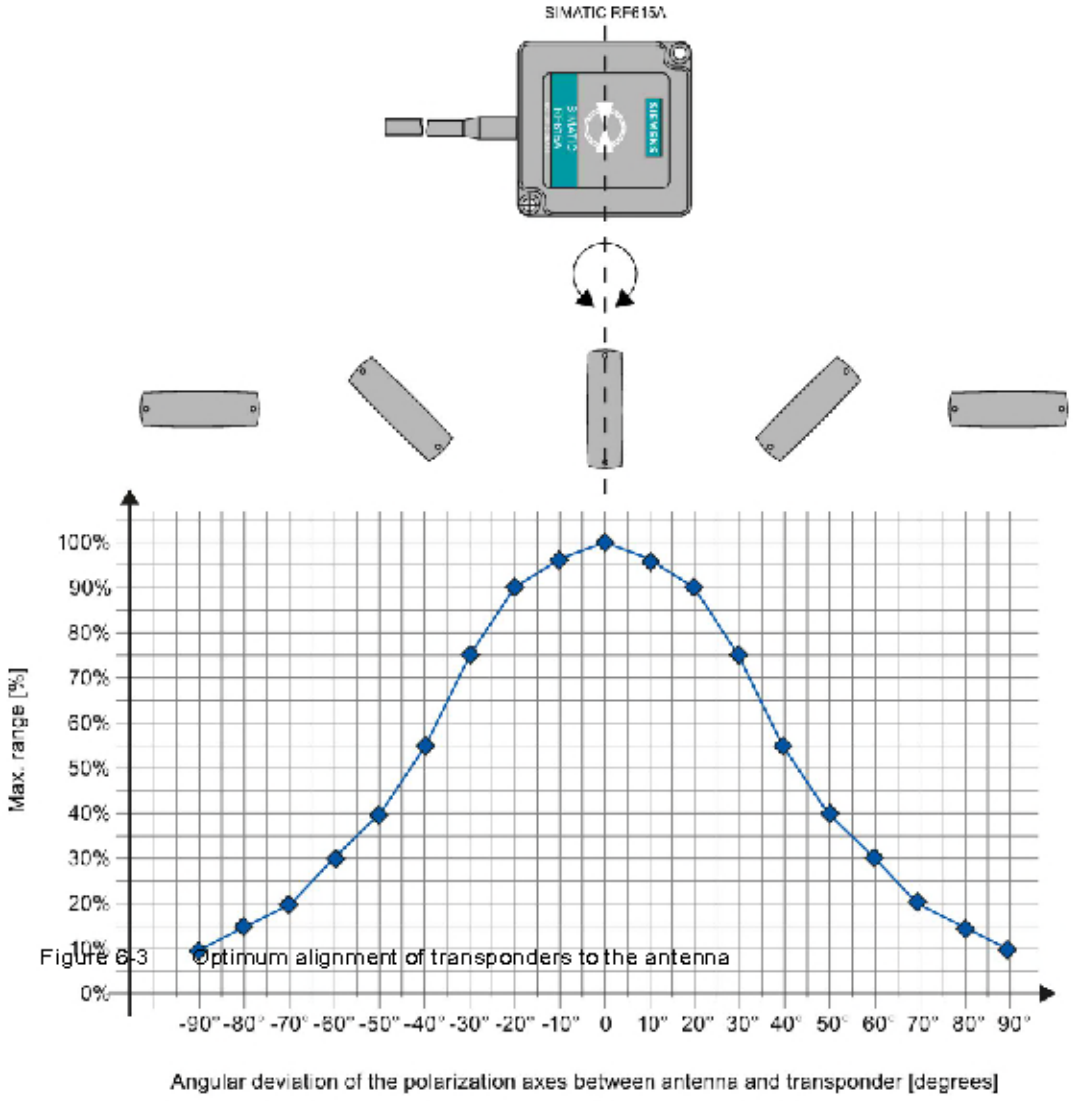


Figure 6-3 Optimum alignment of transponders to the antenna

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

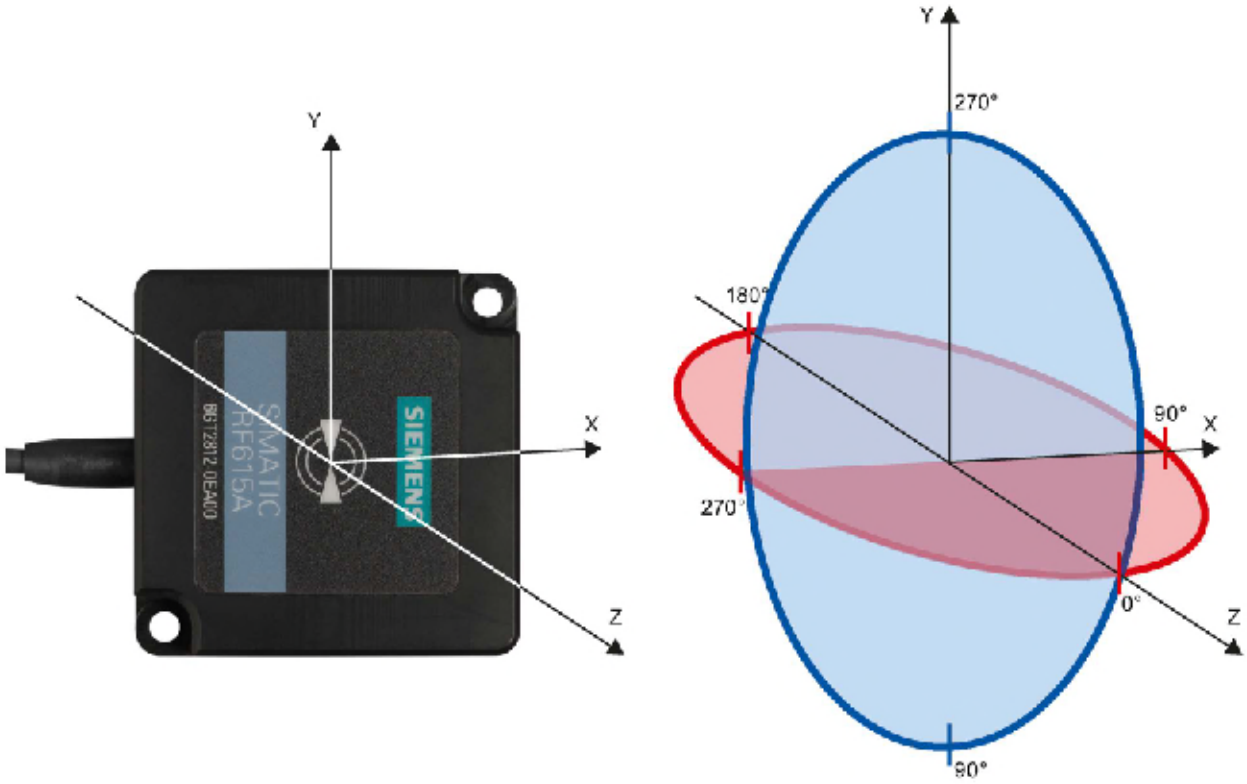


Figure 6-4 Effect on the read/write range depending on the antenna alignment

6.2.6.2 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.

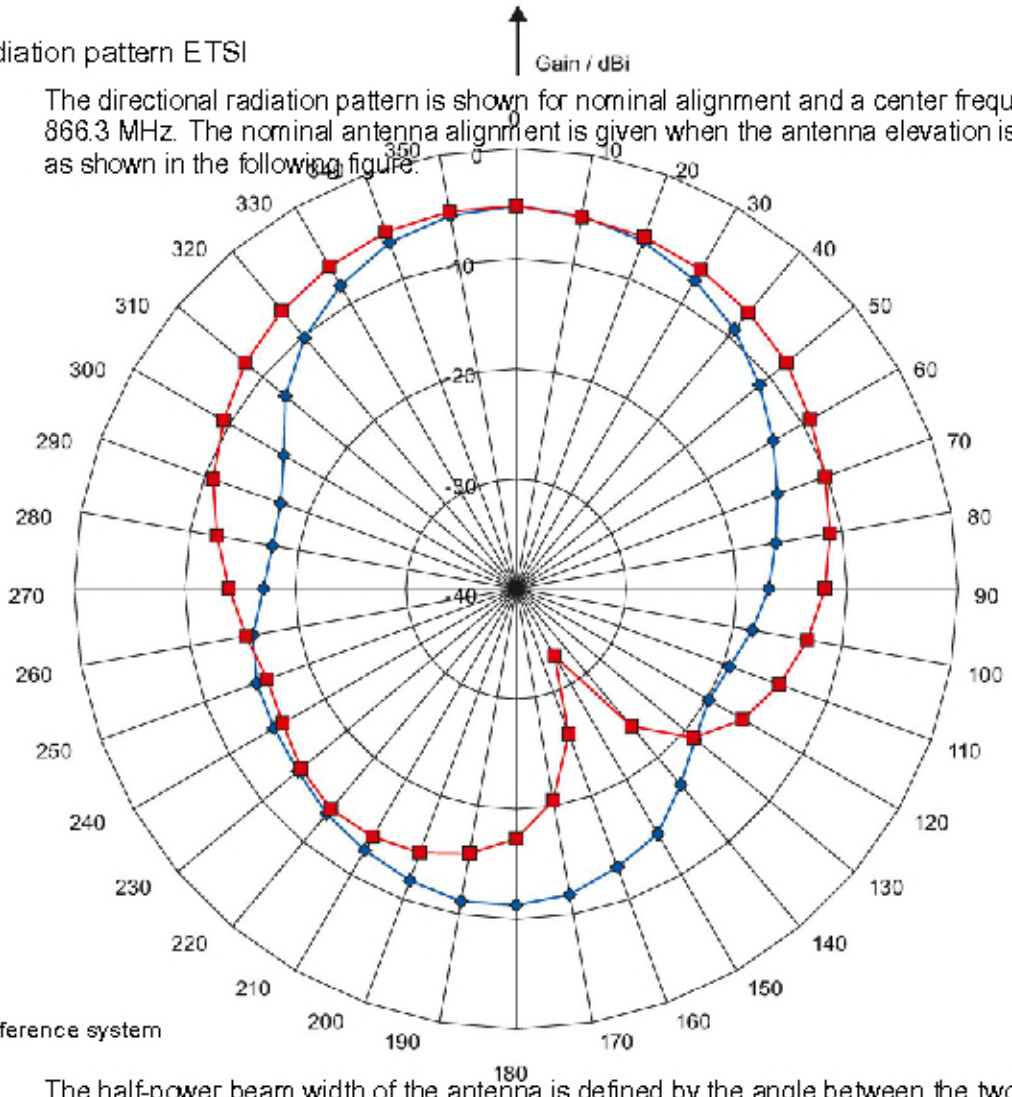


Figure 6-5 Reference system

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

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)

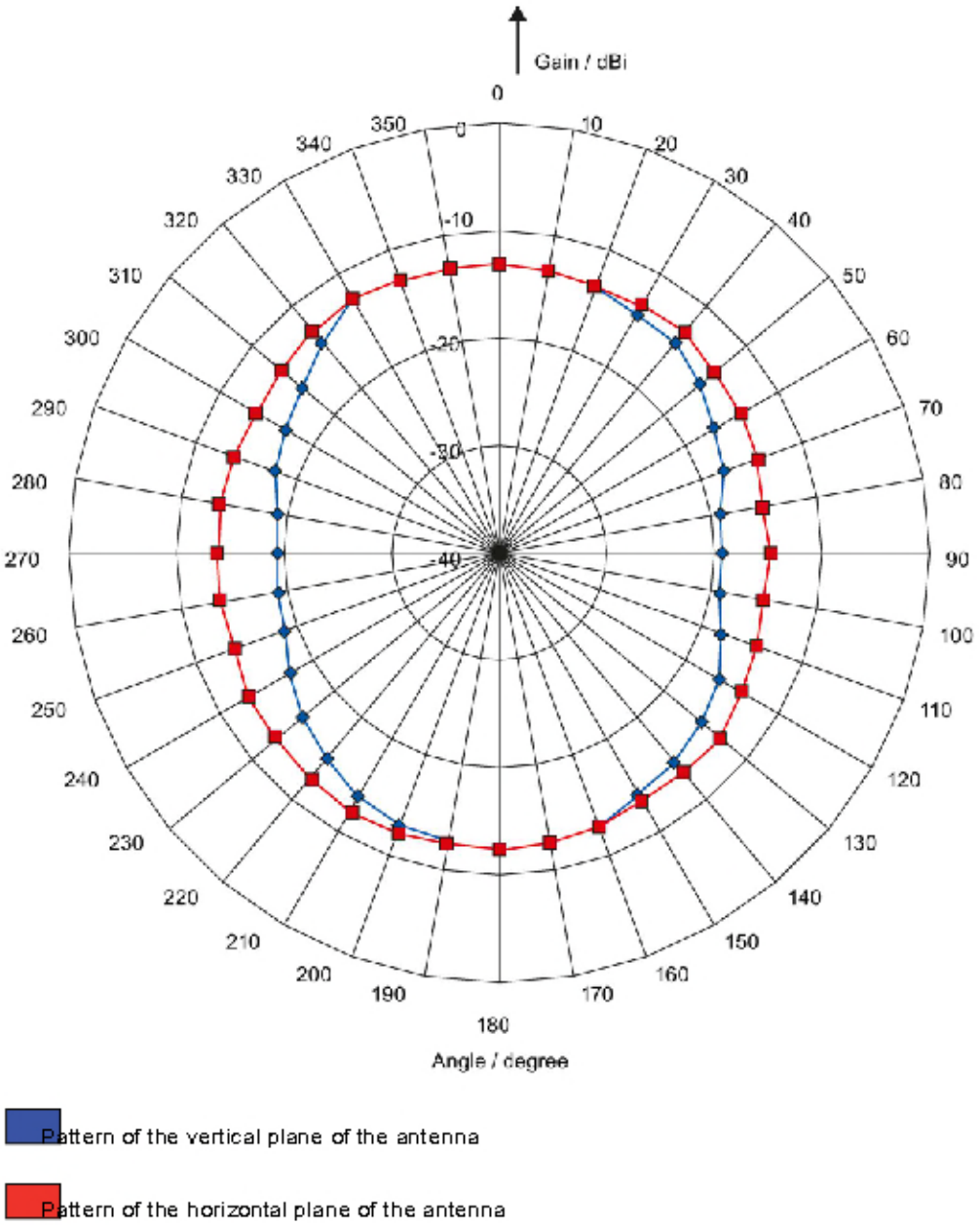
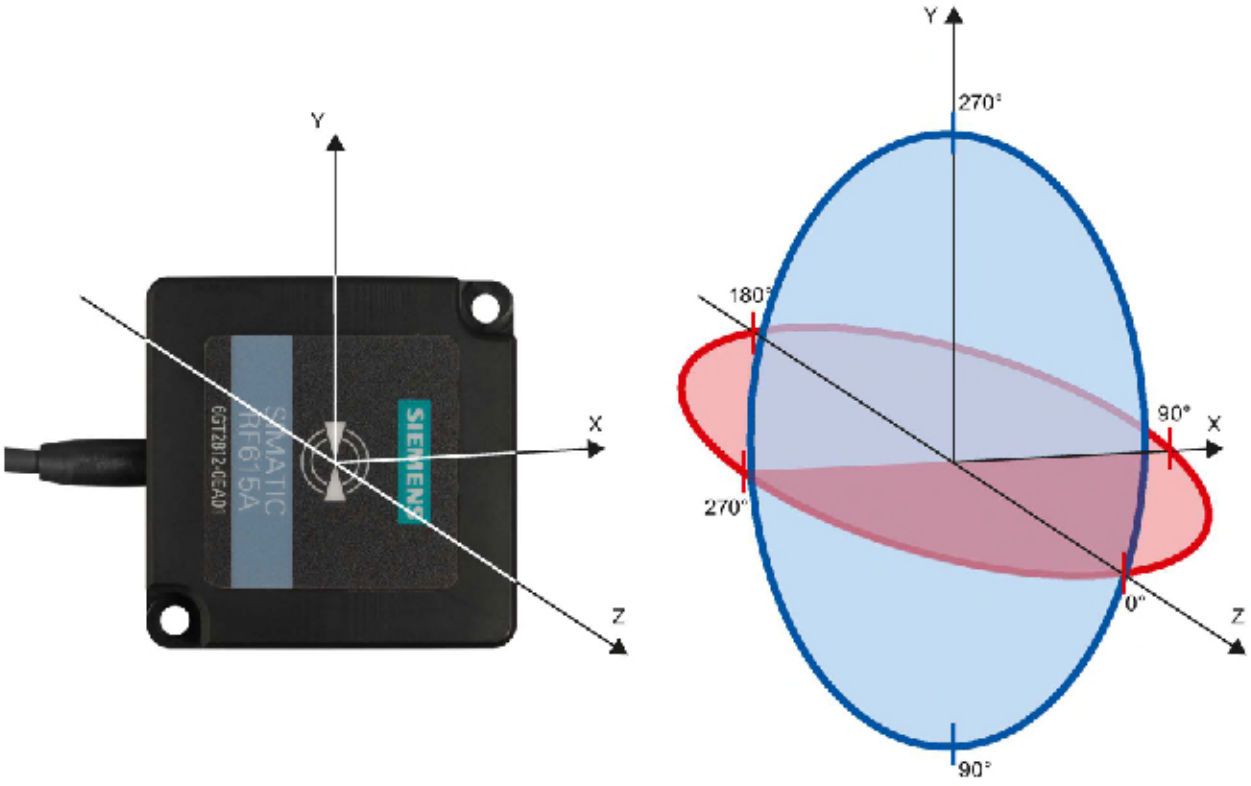


Figure 6-6 Directional radiation pattern RF615A ETSI on metallic mounting surface

Directional radiation pattern ETSI on non-metallic mounting surface



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-7 Directional radiation pattern RF615A ETSI on non-metallic mounting surface

6.2.6.3 Antenna pattern FCC

Directional radiation pattern FCC

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

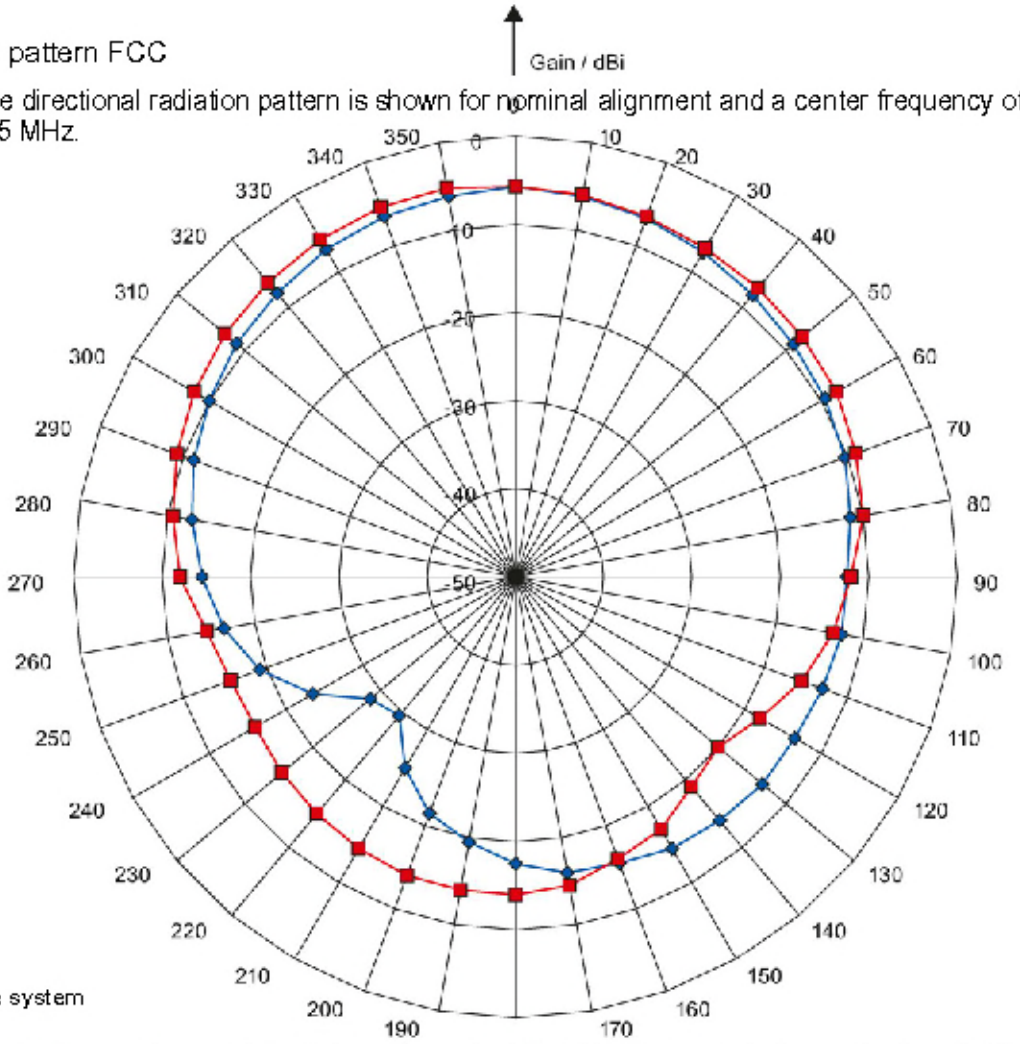


Figure 6-8 Reference system

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 .

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)

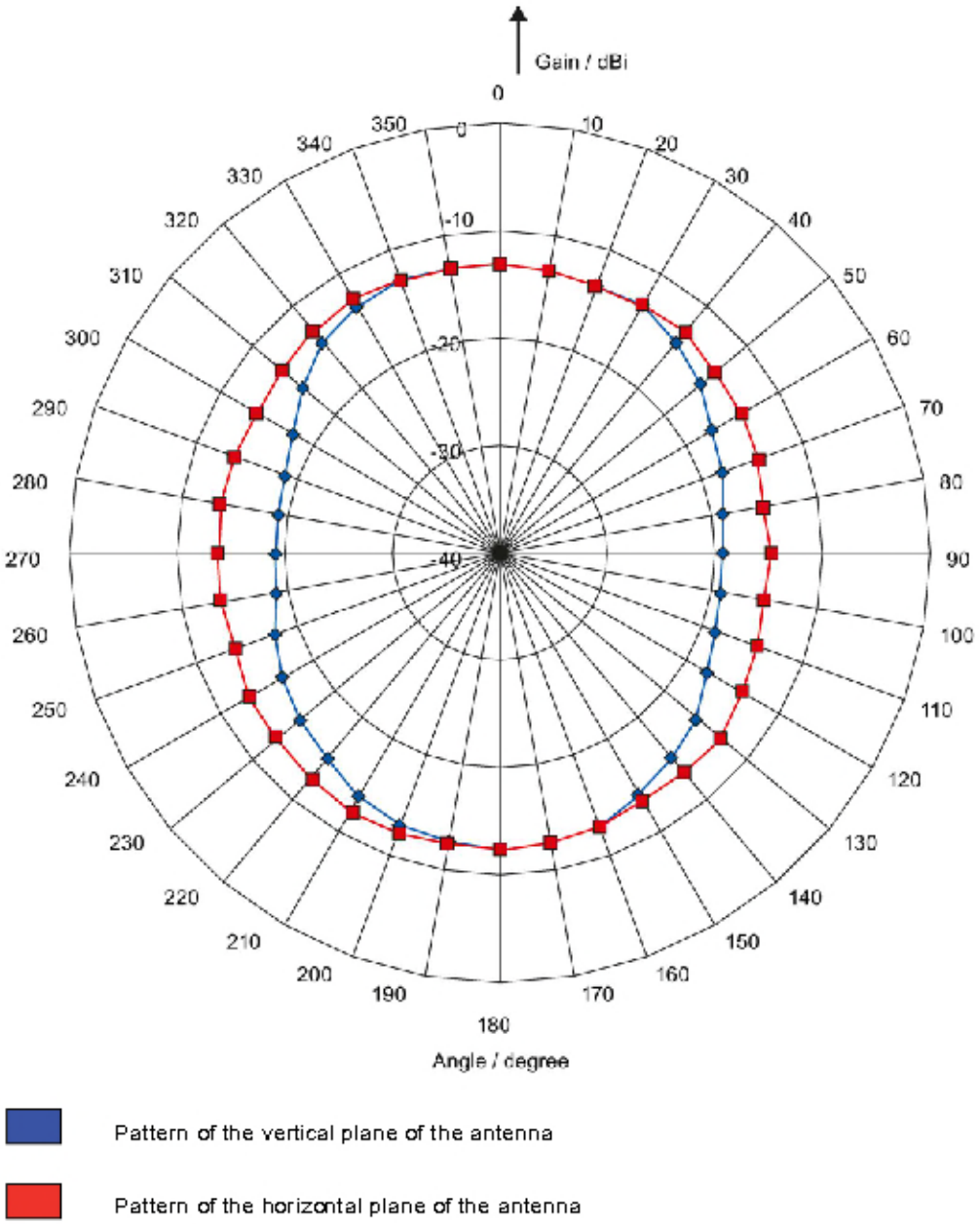


Figure 6-9 Directional radiation pattern of the RF615A (FCC) on metallic mounting surface

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

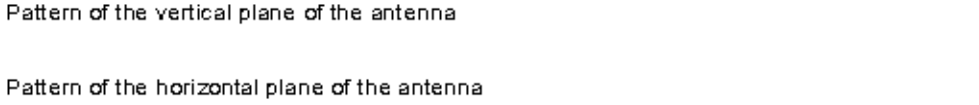


Figure 6-10 Directional radiation pattern of the RF615A (FCC) on non-metallic mounting surface

6.2.6.4 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

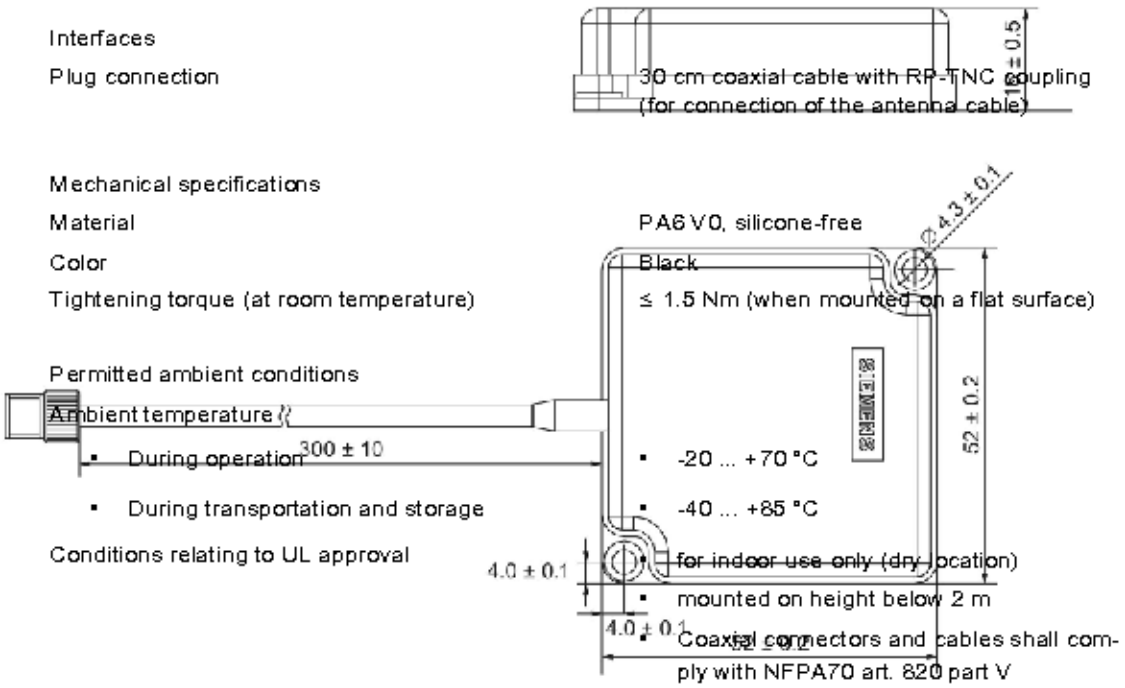
As can be seen from the Antenna pattern ETSI (Page 241), the maximum antenna gain is -5 dBi. In the vertical plane, the antenna gain has dropped to approx. -11 dBi at +50°. This means that the dBr value is -6. The antenna range is only 50% of the maximum range at + 50° from the Z axis within the vertical 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).

6.2.7 Technical data

Table 6- 7 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	-13 dBi ... -5 dBi
• ETSI	• Depends on background, refer to the section "Antenna pattern ETSI (Page 241)"
• FCC	• Depends on background, refer to the section "Antenna pattern FCC (Page 244)"
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 241)"
• FCC	• Horizontal plane: 130 Vertical plane: 105° see section "Antenna pattern FCC (Page 244)"

	6GT2812-0EA0x
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Linear
VSWR (standing wave ratio)	≤ 2:1
Power	
▪ ETSI	▪ ≤ 2 W
▪ FCC	▪ ≤ 1 W
Interfaces	
Plug connection	30 cm coaxial cable with RP-TNC coupling (for connection of the antenna cable)
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	
▪ During operation	▪ -20 ... +70 °C
▪ During transportation and storage	▪ -40 ... +85 °C
Conditions relating to UL approval	▪ 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.

6.2.8 Dimension drawing

Figure 6-11 Dimension drawing RF615A

All dimensions in mm

6.2.9 Certificates & approvals

Table 6- 8 6GT2812-0EA00

Labeling	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU

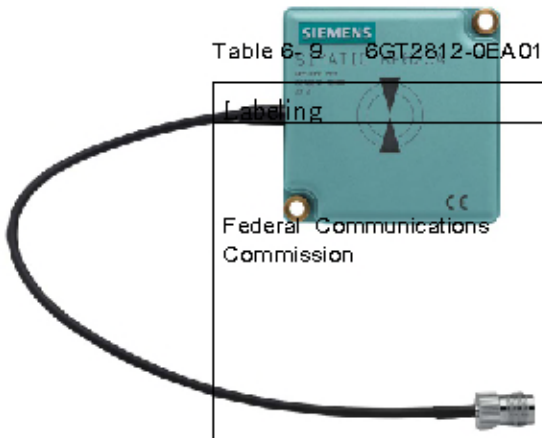


Table 6- 9 6GT2812-0EA01

Labeling	Description
Federal Communications Commission	FCC CFR 47, Part 15 sections 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. The FCC approval is granted in association with the FCC approval of the following RF600 readers: • FCC ID: NXW-RF600R2 (for RF650R: 6GT2811-6AB20-1AA0, RF680R: 6GT2811-6AA10-1AA0, RF685R: 6GT2811-6CA10-1AA0)
Industry Canada Radio Standards Specifications	RSS-210 Issue 7, June 2007, Sections 2.2, A8 The approval for Industry Canada is granted in association with the Industry Canada approval of the following RF600 readers: • IC: 267X-RF600R2, Model RF650R (for 6GT2811-6AB20-1AA0) • IC: 267X-RF600R2, Model RF680R (for 6GT2811-6AA10-1AA0) • IC: 267X-RF600R2, Model RF685R (for 6GT2811-6CA10-1AA0)
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL Report E115352 • UL 62368-1 - AVICT Equipment - Part 1: Safety Requirements • CSA C22.2 No. 62368-1-14 AVICT Equipment - Part 1: Saftey Requirements

6.3 SIMATIC RF620A

6.3.1 Characteristics

SIMATIC RF620A	Characteristics	
	Area of application	The SIMATIC RF620A is a universal UHF antenna in a compact size for industrial applications in limited installation spaces.
	Frequency range	▪ 865 to 868 MHz (RF620A ETSI) ▪ 902 to 928 MHz (RF620A FCC)
	Read range	Max. 2 m
	Polarization	Linear
	Degree of protection	IP67
	Mounting	2x M5
	Connector	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.

- RF620A ETSI: 865 to 868 MHz
- RF620A FCC: 902 to 928 MHz

Function

The SIMATIC RF620A 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.

6.3.2 Ordering data

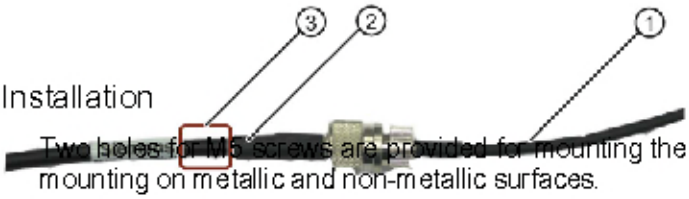
Table 6- 10 Ordering data RF620A

Product	Article number
SIMATIC RF620A (ETSI)	6GT2812-1EA00
SIMATIC RF620A (FCC)	6GT2812-1EA01

Table 6- 11 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

6.3.3 Installation



Two holes for M5 screws are provided for mounting the antenna. The antenna is suitable for mounting on metallic and non-metallic surfaces.

Note

Achieving optimum wave propagation

To achieve optimum wave propagation, the antenna should not be surrounded by conducting objects. The area between antenna and transponder should also allow wave propagation without interference.

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 -10 dBi.

6.3.4 Connecting the antenna

The SIMATIC RF620A 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

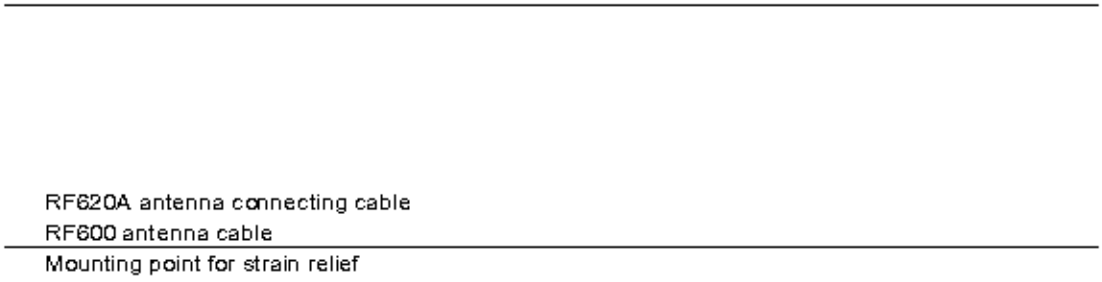
Note

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.



① RF620A antenna connecting cable
② RF600 antenna cable
③ Mounting point for strain relief

Figure 6-12 Strain relief

6.3.4.1 Bending radii and bending cycles of the cable

The following listed bending radii are minimum values, which may not be fallen below and are based on repeated bending.

Table 6- 12 Bending radii of the antenna cable

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
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	45 [1) 2)]

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
Antenna cable	6GT2815-1BN10	10	2	77
Antenna cable	6GT2815-0BN10	10	4	51
Antenna cable (suitable for drag chains)	6GT2815-2BN15	15	4	45 [1) 2)]
Antenna cable	6GT2815-0BN20	20	4	77
Antenna cable	6GT2815-0BN40	40	5	77

1) Permissible minimum bending radius with one-time bending. 28 mm

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 ± 180° or 3 million torsion cycles with a bend of ± 180° on a cable length of 1 m are permitted.

6.3.5 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 RF620A 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 RF620A 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

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

Limitations in China

Note

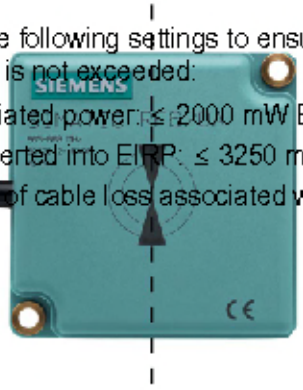
Limitation of the radiated power (CMIIT)

RF600 systems that are put into operation in China must not exceed the following radiated power with an RF620A 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 RF620A 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.

6.3.6 Antenna patterns

6.3.6.1 Alignment of transponders to the antenna

Polarization axis

Since the RF620A 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.

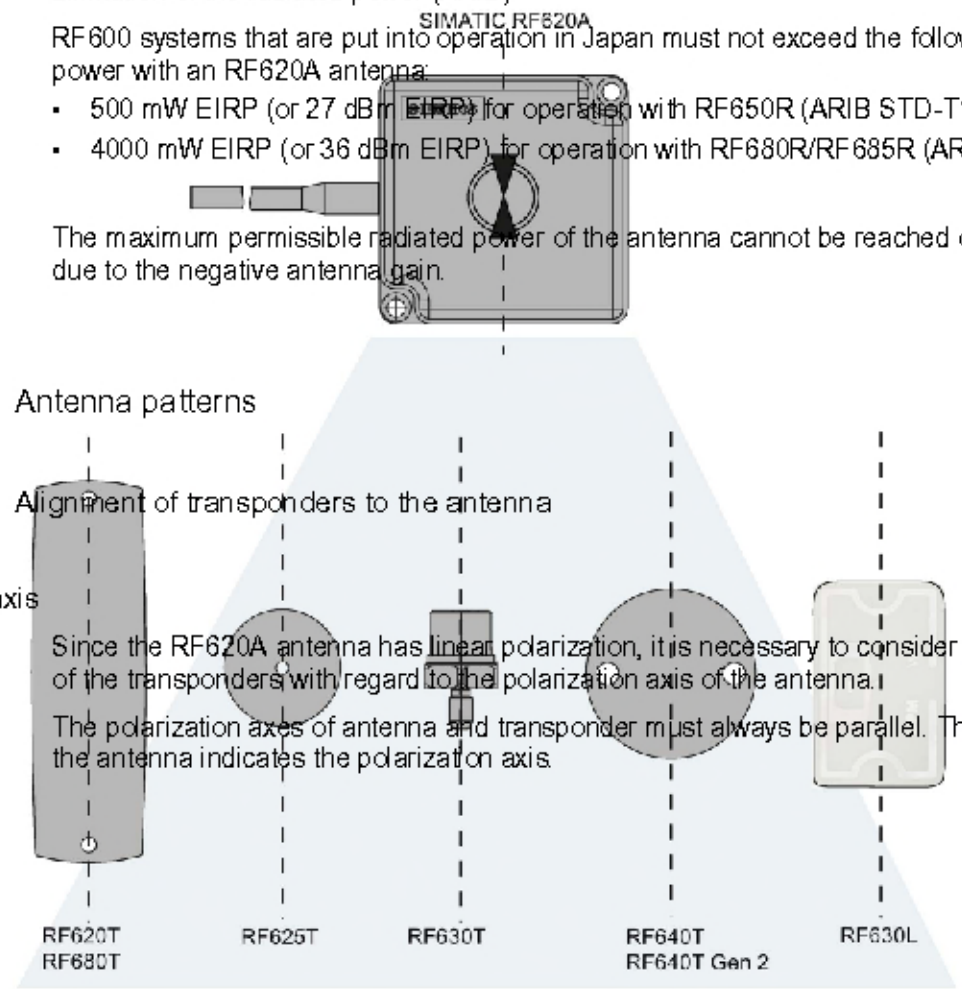


Figure 6-13 Polarization axis

Alignment

The following diagram shows the optimum alignment of the RF600 transponders to the RF620A antenna.

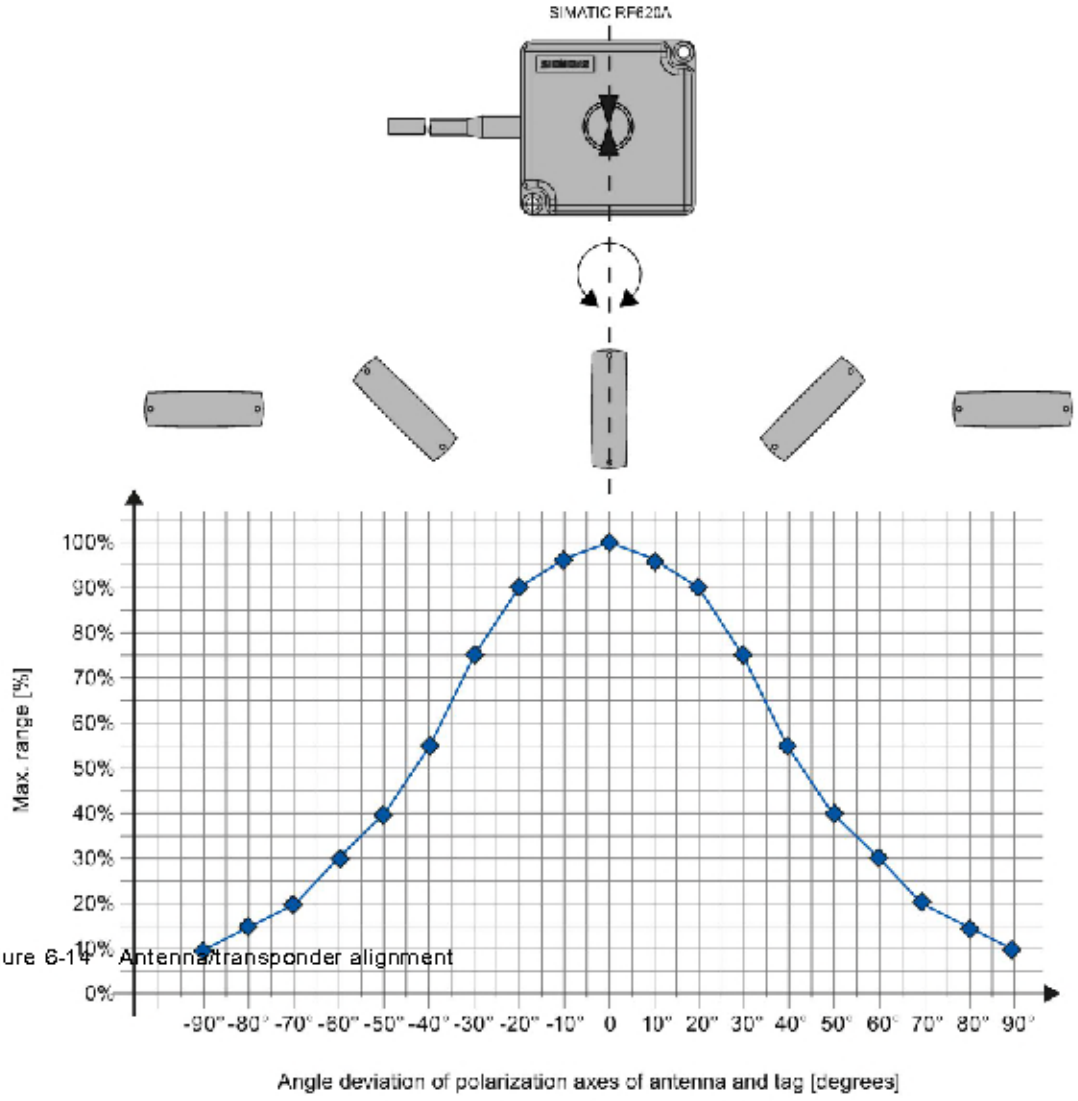


Figure 6-14 Antenna/transponder alignment

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

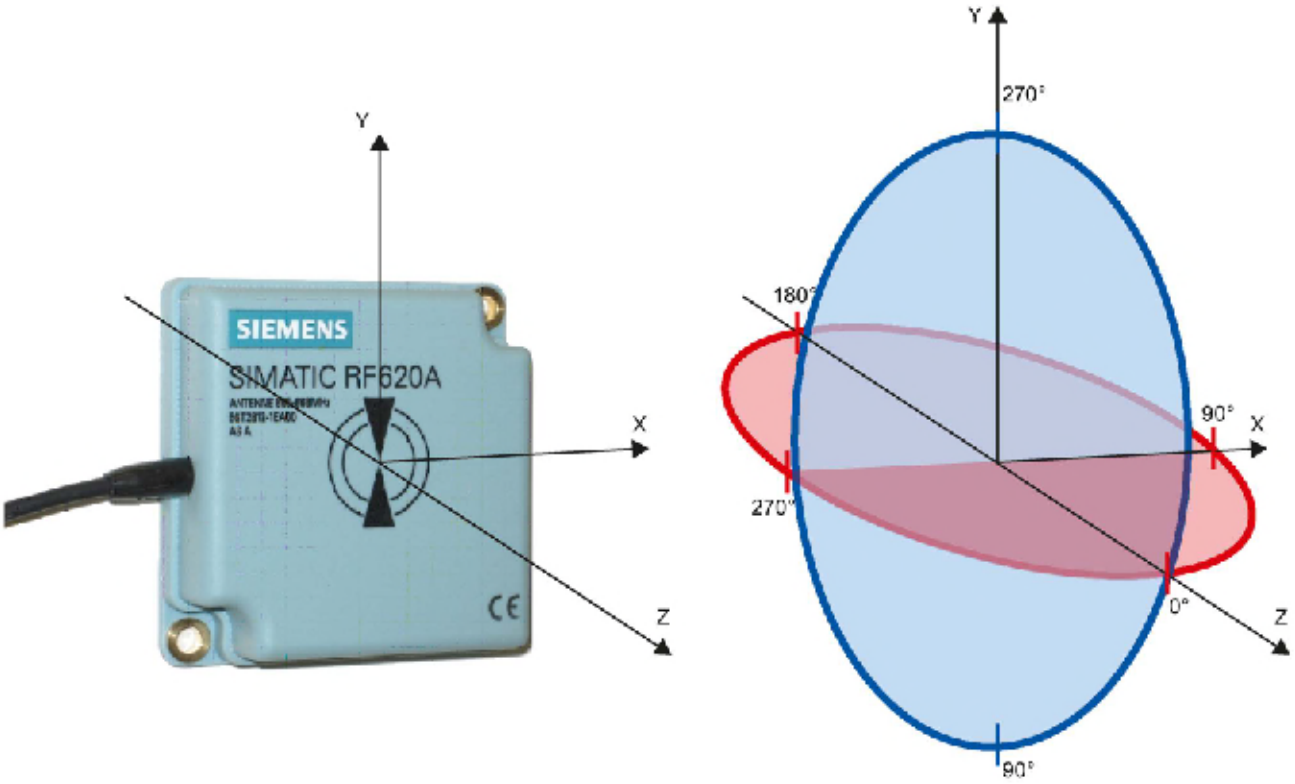


Figure 6-15 Angle deviation diagram for alignment

6.3.6.2 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.

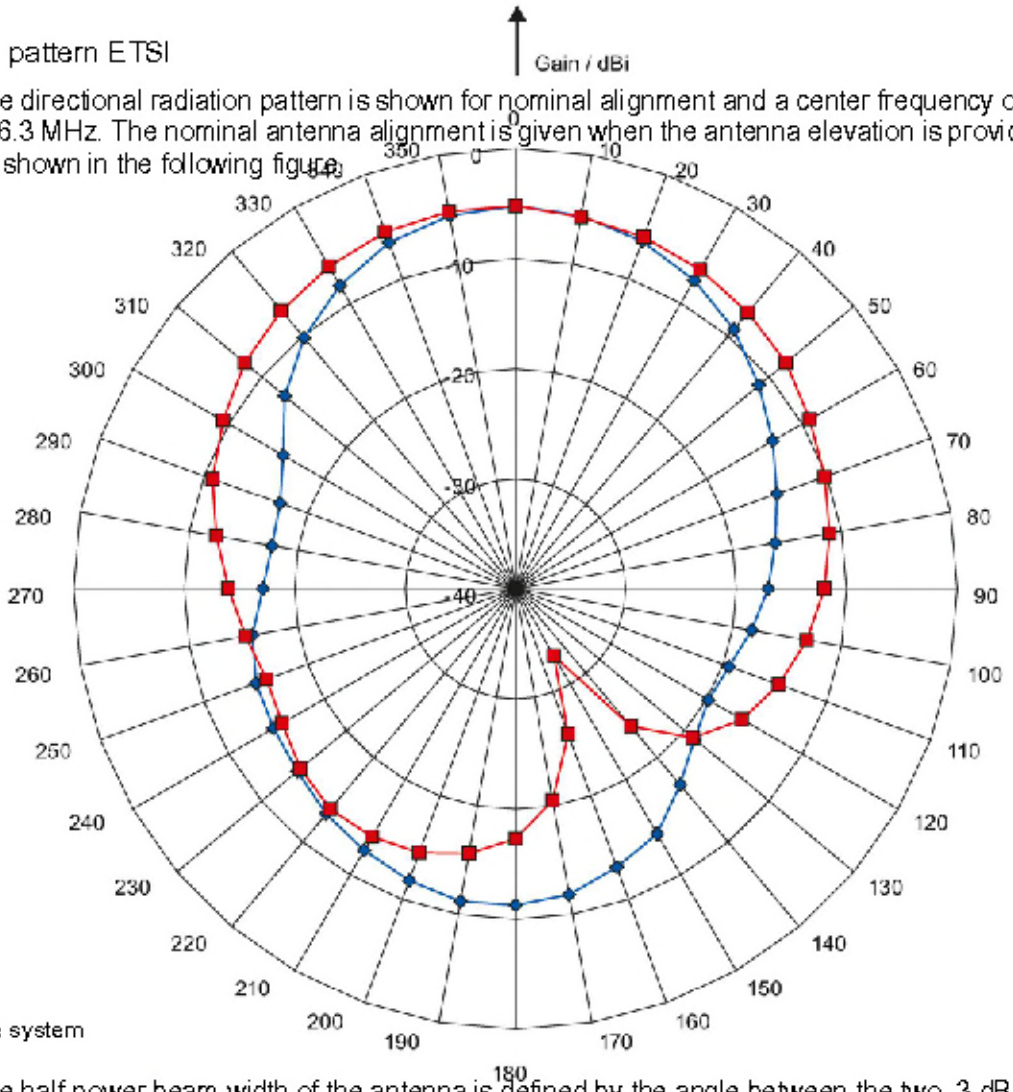


Figure 6-16 Reference system

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 .

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)

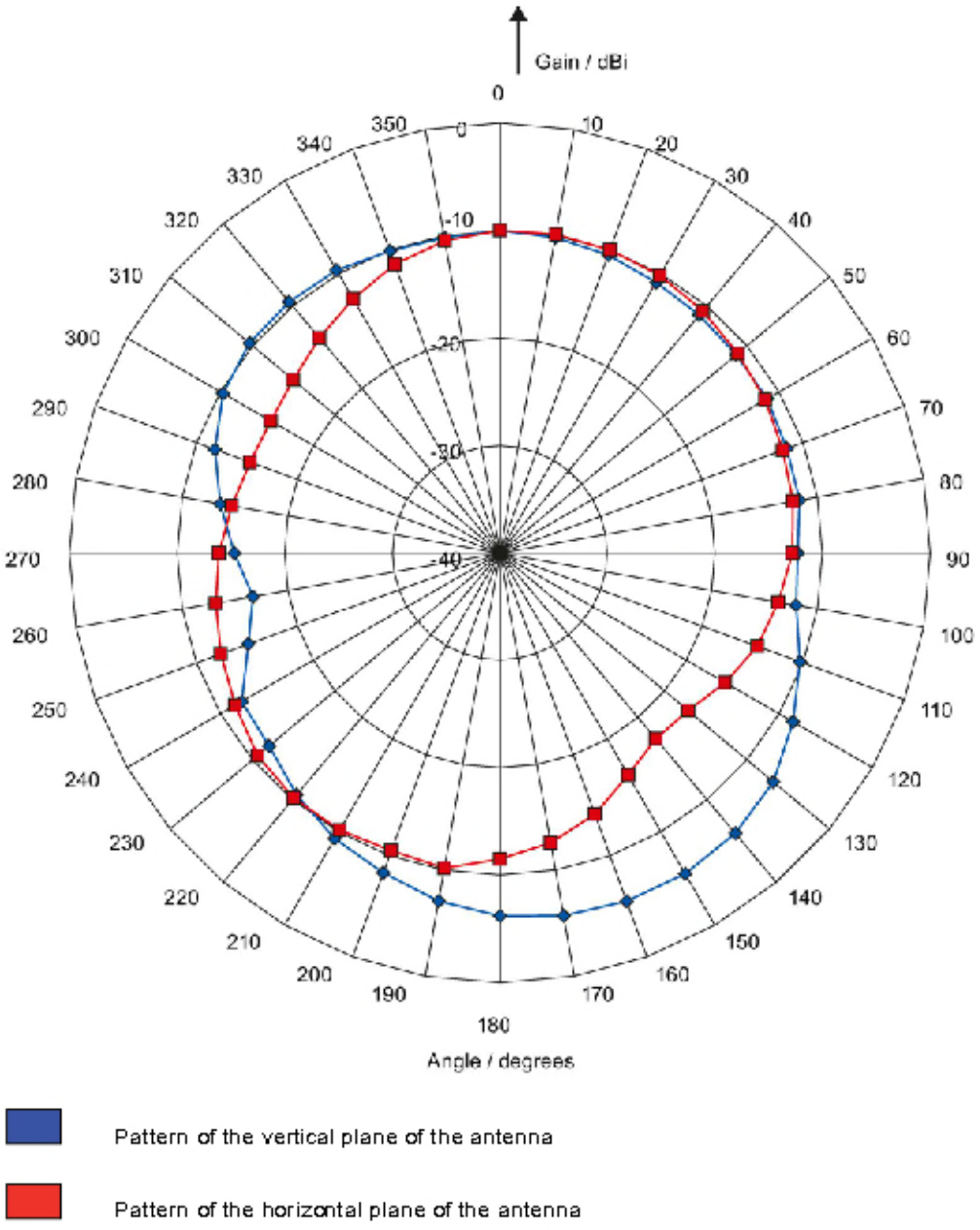
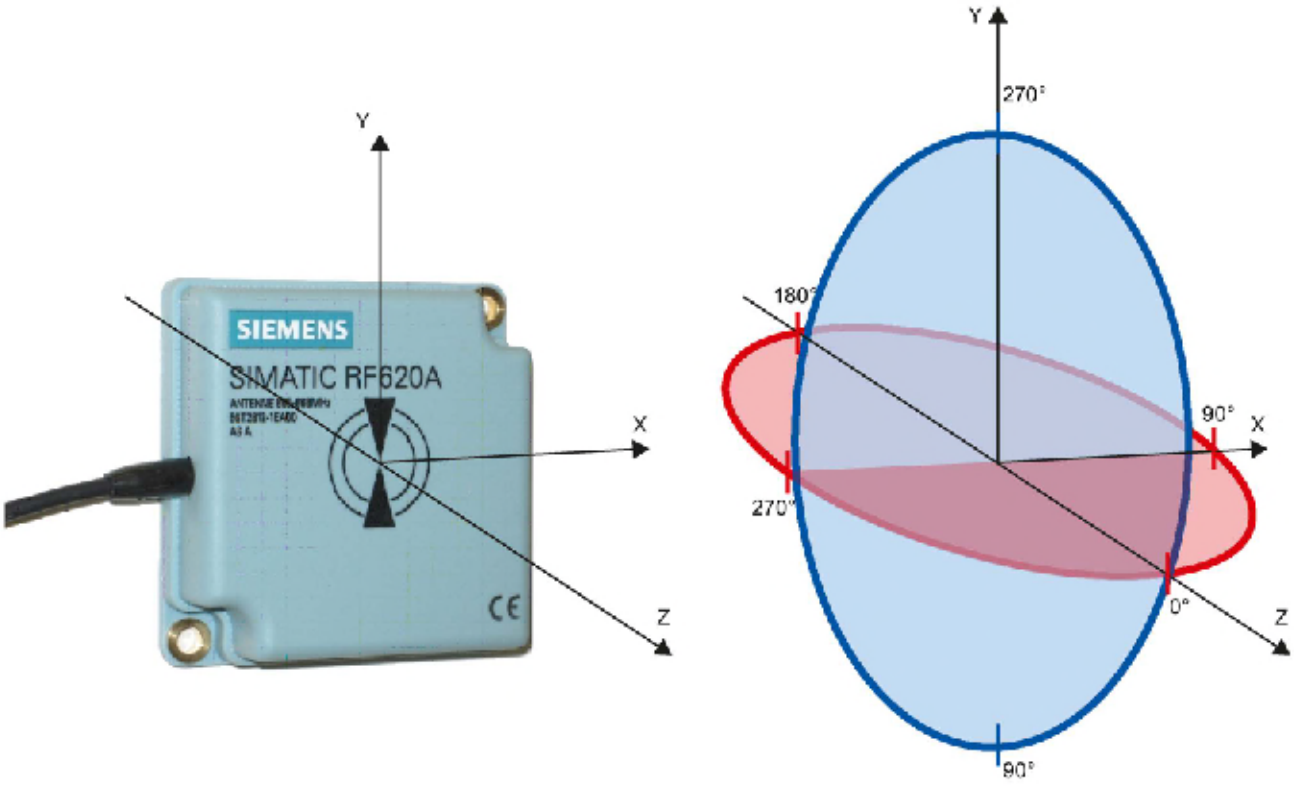


Figure 6-17 Directional radiation pattern RF620A ETSI on metallic mounting surface

Directional radiation pattern ETSI on non-metallic mounting surface



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-18 Directional radiation pattern RF620A ETSI on non-metallic mounting surface

6.3.6.3 Antenna pattern FCC

Directional radiation pattern FCC

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

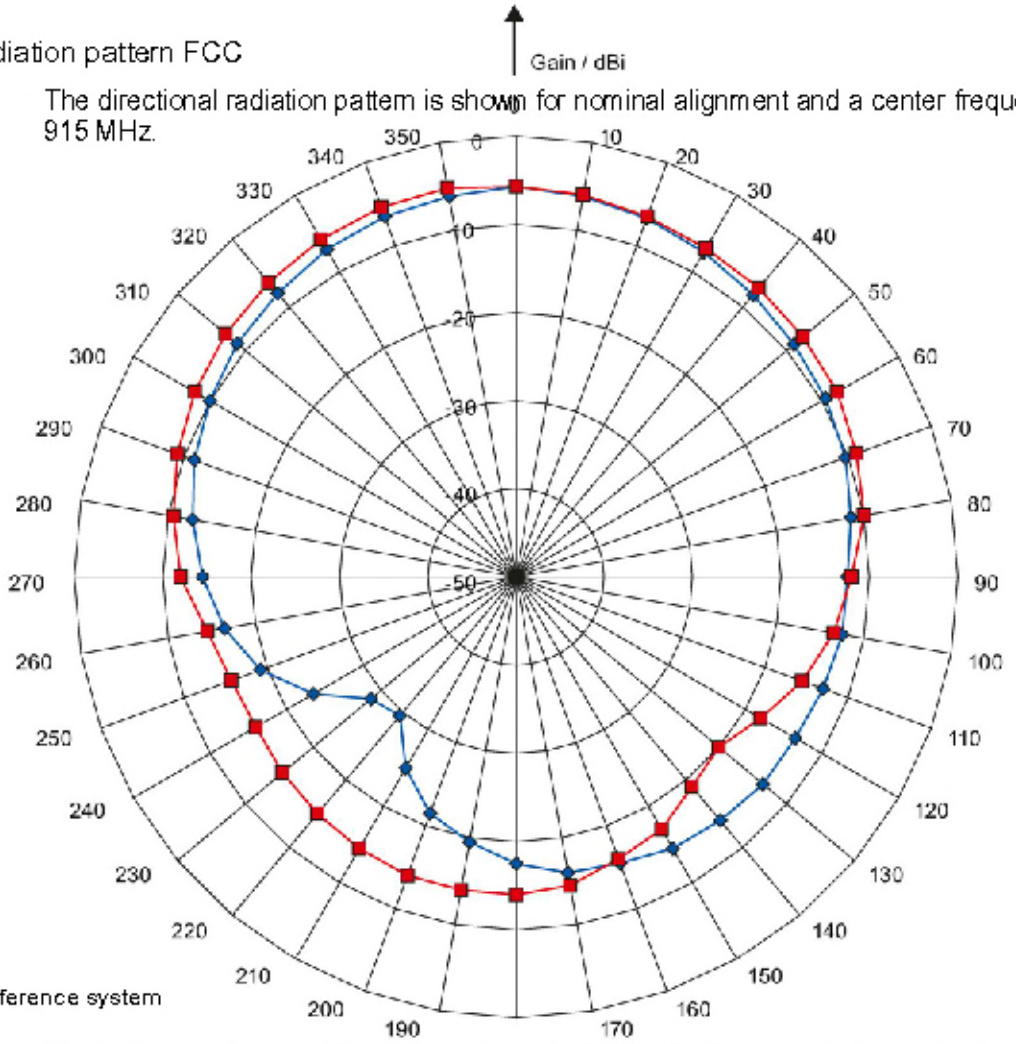


Figure 6-19 Reference system

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 .

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 RF620A (FCC) on metallic mounting surface (15 cm x 15 cm)

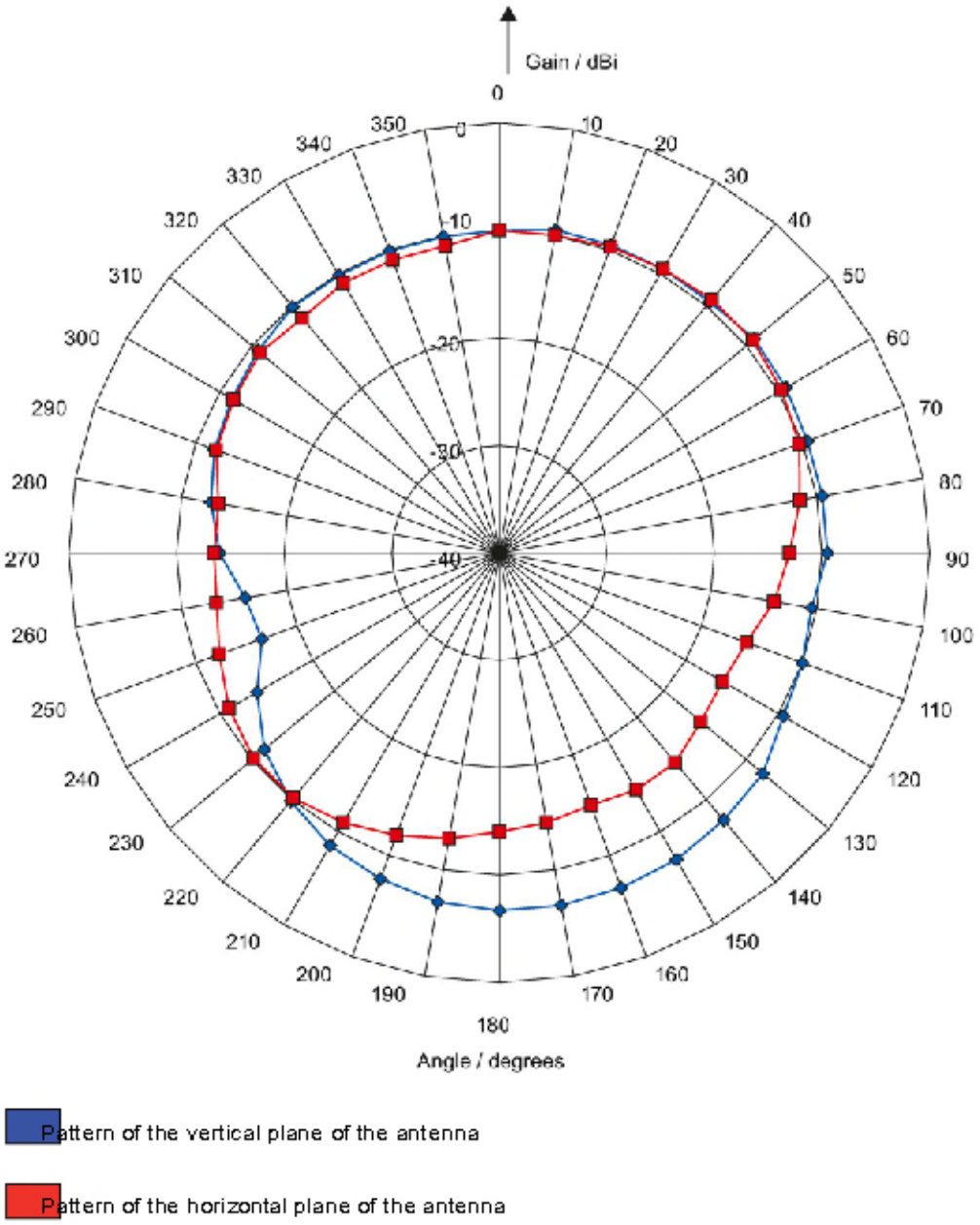


Figure 6-20 Directional radiation pattern of the RF620A (FCC) on metallic mounting surface

Directional radiation pattern of the RF620A (FCC) on non-metallic mounting surface

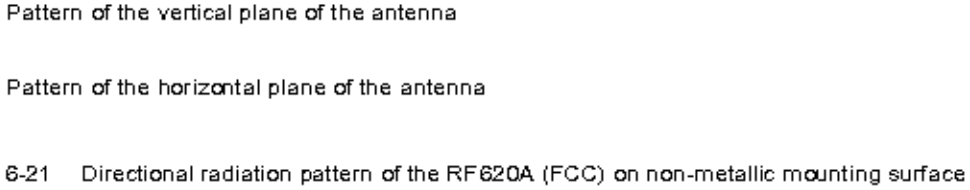


Figure 6-21 Directional radiation pattern of the RF620A (FCC) on non-metallic mounting surface

6.3.6.4 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

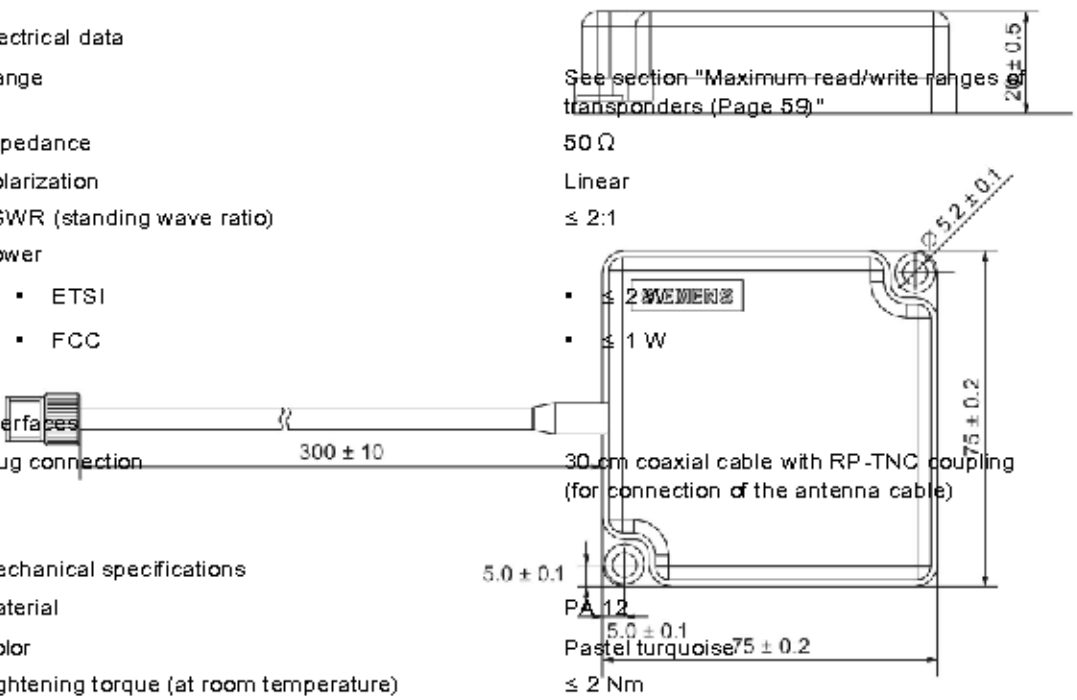
As can be seen from the Antenna pattern ETSI (Page 260), the maximum antenna gain is -5 dBi. In the vertical plane, the antenna gain has dropped to approx. -11 dBi at +40° and 320°. This means that the dBr value is -6. The antenna range is only 50% of the maximum range at ± 40° from the Z axis within 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).

6.3.7 Technical data

Table 6- 13 Technical specifications for the RF620A antenna

	6GT2812-1EA0x
Product type designation	SIMATIC RF620A
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	• ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 4000 mW EIRP
Antenna gain	-10 dBi ... -5 dBi
• ETSI	• Depends on background, refer to the section "Antenna pattern ETSI (Page 260)"
• FCC	• Depends on background, refer to the section "Antenna pattern FCC (Page 263)"
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 260)"
• FCC	• Horizontal plane: 130 Vertical plane: 105° see section "Antenna pattern FCC (Page 263)"

	6GT2812-1EA0x
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Linear
VSWR (standing wave ratio)	≤ 2:1
Power	
▪ ETSI	▪ ≤ 2 W
▪ FCC	▪ ≤ 1 W
Interfaces	
Plug connection	30 cm coaxial cable with RP-TNC coupling (for connection of the antenna cable)
Mechanical specifications	
Material	PA 12
Color	Pastel turquoise
Tightening torque (at room temperature)	≤ 2 Nm



Permitted ambient conditions	
Ambient temperature	
▪ During operation	▪ -20 ... +70 °C
▪ During transportation and storage	▪ -40 ... +85 °C
Degree of protection	IP67
Shock resistant to EN 60068-2-27	50 g [2]
Vibrations according to EN 60068-2-6	20 g [2]
Design, dimensions and weight	
Dimensions (H x W x D)	75 x 75 x 20 mm
Weight	100 g
Standards, specifications, approvals	
Proof of suitability	
▪ ETSI	▪ CE (ETSI EN 302208)
▪ FCC	▪ FCC (Title 47, Part 15.247), 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.

6.3.8 Dimension drawing

Figure 6-22 Dimension drawing RF620A

All dimensions in mm

6.3.9 Approvals & certificates

Table 6- 14 6GT2812-1EA00

Labeling	Designation
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU

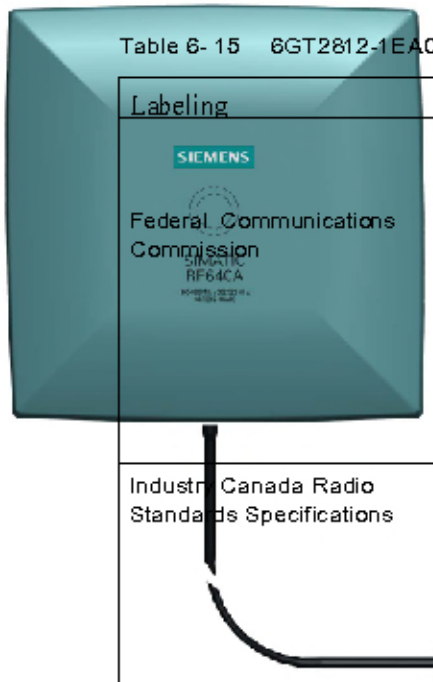


Table 6- 15 6GT2812-1EA01

Labeling	Description
	FCC CFR 47, Part 15 sections 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. The FCC approval is granted in association with the FCC approval of the following RF600 readers: ▪ FCC ID: NXW-RF600R2 (for RF650R: 6GT2811-6AB20-1AA0, RF680R: 6GT2811-6AA10-1AA0, RF685R: 6GT2811-6CA10-1AA0)
Industry Canada Radio Standards Specifications	RSS-210 Issue 7, June 2007, Sections 2.2, A8 The approval for Industry Canada is granted in association with the Industry Canada approval of the following RF600 readers: ▪ IC: 267X-RF600R2, Model RF650R (for 6GT2811-6AB20-1AA0) ▪ IC: 267X-RF600R2, Model RF680R (for 6GT2811-6AA10-1AA0) ▪ IC: 267X-RF600R2, Model RF685R (for 6GT2811-6CA10-1AA0)
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): ▪ UL Report E205089 ▪ UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements ▪ CSA C22.2 No. 60950-1 - Safety of Information Technology Equipment

6.4 SIMATIC RF640A

6.4.1 Characteristics

SIMATIC RF640A	Characteristics	
	Area of application	The SIMATIC RF640A is a universal UHF antenna in a medium size with medium range for industrial applications in production and logistics.
	Frequency range	865 to 928 MHz
	Read range	Max. 6 m
	Polarization	Circular
	Degree of protection	IP65
	Mounting	4 x M4 (VESA 100 fixing system)
	Connector	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 broadband antenna and covers the frequency ranges from 865 to 928 MHz.

Function

The SIMATIC RF640A 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.

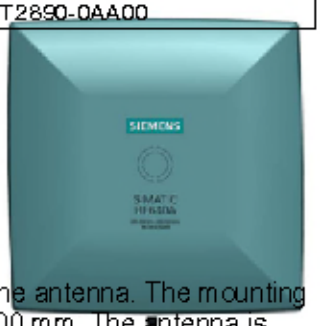
6.4.2 Ordering data

Table 6- 16 Ordering data RF640A

Product	Article number
SIMATIC RF640A	6GT2812-0GA08

Table 6- 17 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
SIMATIC antenna holder for RF600 devices		6GT2890-2AB10
Antenna mounting kit		6GT2890-0AA00



6.4.3 Installation

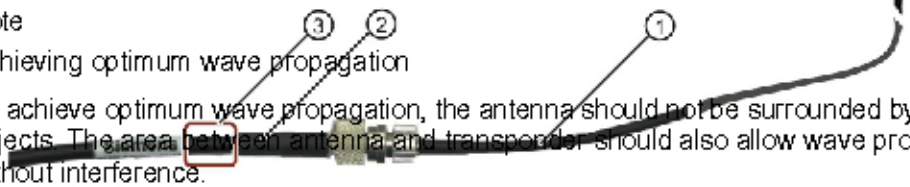
Mounting system

A standardized VESA 100 mounting system is provided to mount the antenna. The mounting system consists of four fixing holes for M4 screws at intervals of 100 mm. The antenna is suitable for mounting on metallic and non-metallic surfaces.

Note

Achieving optimum wave propagation

To achieve optimum wave propagation, the antenna should not be surrounded by conducting objects. The area between antenna and transponder should also allow wave propagation without interference.



Antenna holders

The Siemens antenna holders allow for fine adjustment of the antenna field by setting the solid angle.

6.4.4 Connecting the antenna

The SIMATIC RF640A 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.

① RF640A antenna connecting cable
② RF600 antenna cable
③ Mounting point for strain relief

Figure 6-23 Strain relief

6.4.4.1 Bending radii and bending cycles of the cable

The following listed bending radii are minimum values, which may not be fallen below and are based on repeated bending.

Table 6- 18 Bending radii of the antenna cable

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
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	45 [1) 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	45 [1) 2)]
Antenna cable	6GT2815-0BN20	20	4	77
Antenna cable	6GT2815-0BN40	40	5	77

1) Permissible minimum bending radius with one-time bending. 28 mm

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 ± 180° or 3 million torsion cycles with a bend of ± 180° on a cable length of 1 m are permitted.

6.4.5 Antenna parameter assignment

6.4.5.1 Setting RF640A parameters for RF650R

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 RF640A 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:

- Antenna gain: 4 dBi (or 7 dBiC)
- Radiated power: ≤ 1360 mW ERP (or 31.35 dBm ERP)
  Converted into EIRP: ≤ 2240 mW EIRP (or 33.5 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 RF640A 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: ≤ 4.3 dBi
- Cable loss a_k (dB): ≥ 1 dB

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

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 RF640A antenna:

- 1460 mW ERP (or 31.35 dBm ERP)
  Converted into EIRP: 2400 mW EIRP (or 33.8 dBm EIRP)

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

- Antenna gain: 4.3 dBi (or 7.3 dBiC)
- 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 STD-T107)

RF600 systems that are put into operation in Japan must not exceed the following radiated power with an RF640A antenna:

- 500 mW EIRP (or 27 dBm EIRP)

6.4.5.2 Setting RF640A parameters for RF680R/RF685R

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 RF640A 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:

- Antenna gain: 4 dBi (or 7 dBiC)
- 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 the USA and Canada

Note

Limitation of the radiated power (FCC)

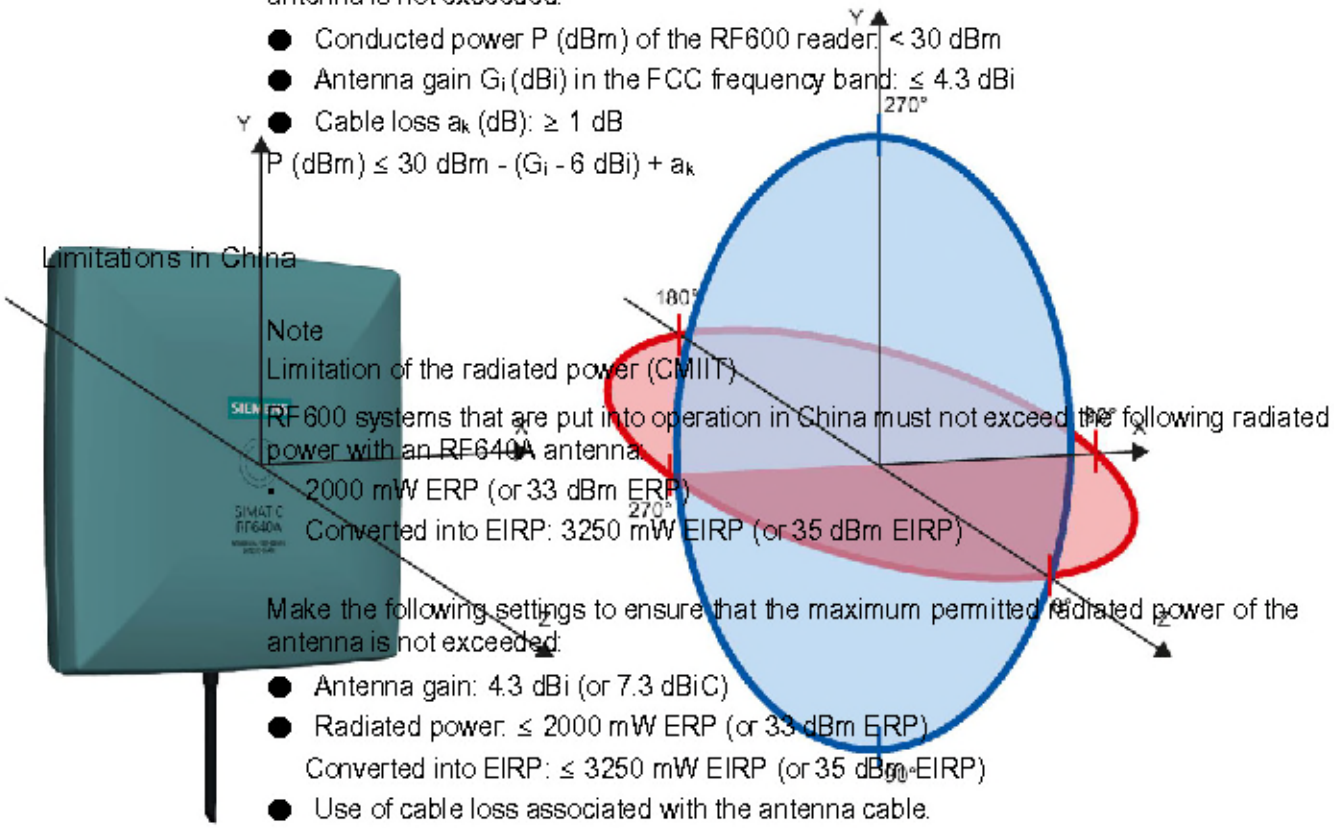
RF600 systems that are put into operation in the USA and Canada must not exceed the following radiated power with an RF640A antenna:

- 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: ≤ 4.3 dBi
- Cable loss a_k (dB): ≥ 1 dB

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



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 RF640A 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:

- Antenna gain: 4.3 dBi (or 7.3 dBiC)
- 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 STD-T106)

RF600 systems that are put into operation in Japan must not exceed the following radiated power with an RF640A antenna:

- 4000 mW EIRP (or 36 dBm EIRP)

6.4.6 Antenna patterns

6.4.6.1 Antenna radiation patterns in the ETSI frequency band

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.

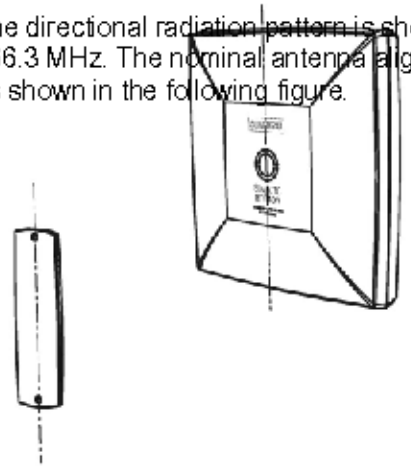


Figure 6-24 Reference system

The half-power beam width of the antenna is defined by the angle between the two -3 dB points. The range (in %) corresponding to the dB values in the patterns can be obtained from this table (Page 288).

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 patterns in the ETSI frequency band

Polarization axis and axis of symmetry are parallel

In a configuration based on the following directional radiation pattern of the antenna, the axis of symmetry of the antenna and the polarization axis of the transponder are parallel.