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

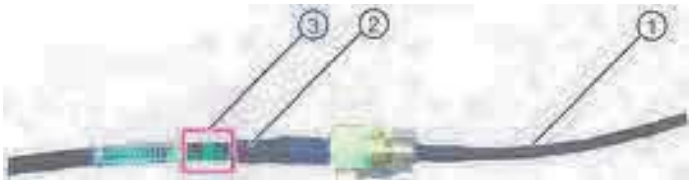
Note

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.

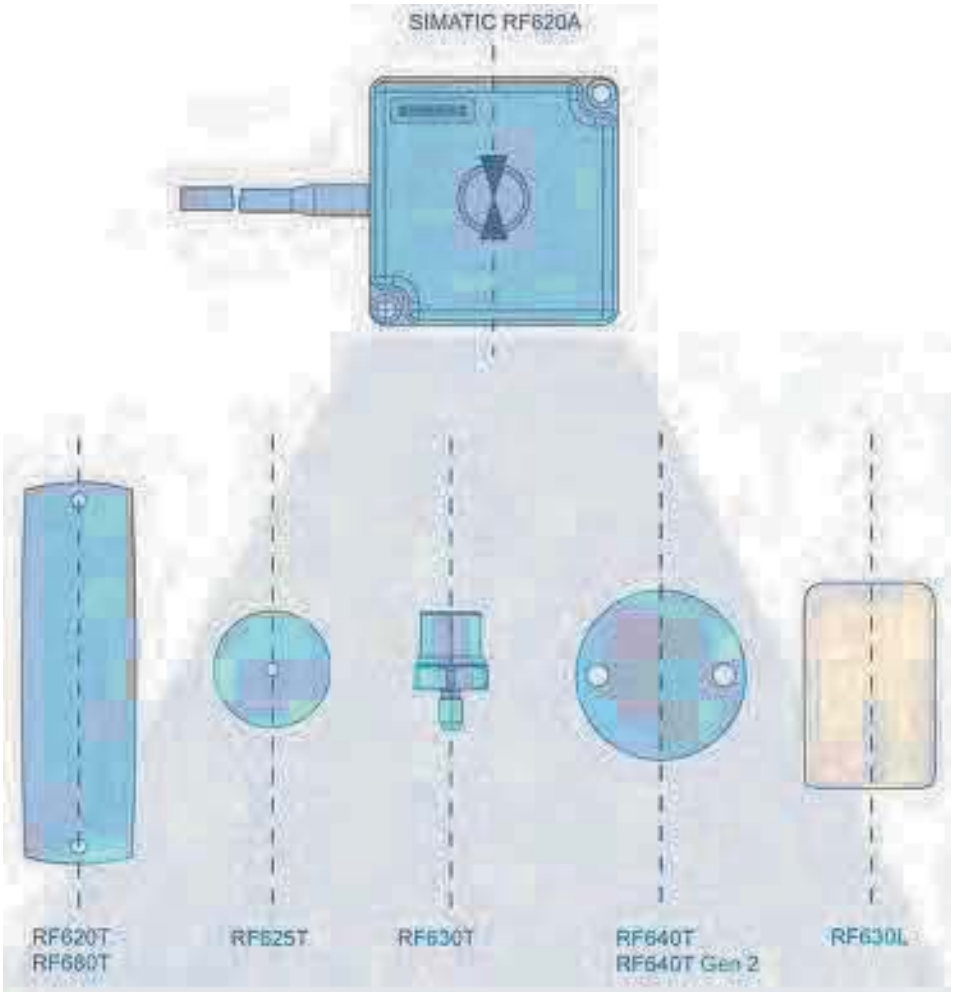


Figure 6-14 Antenna/transponder alignment

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

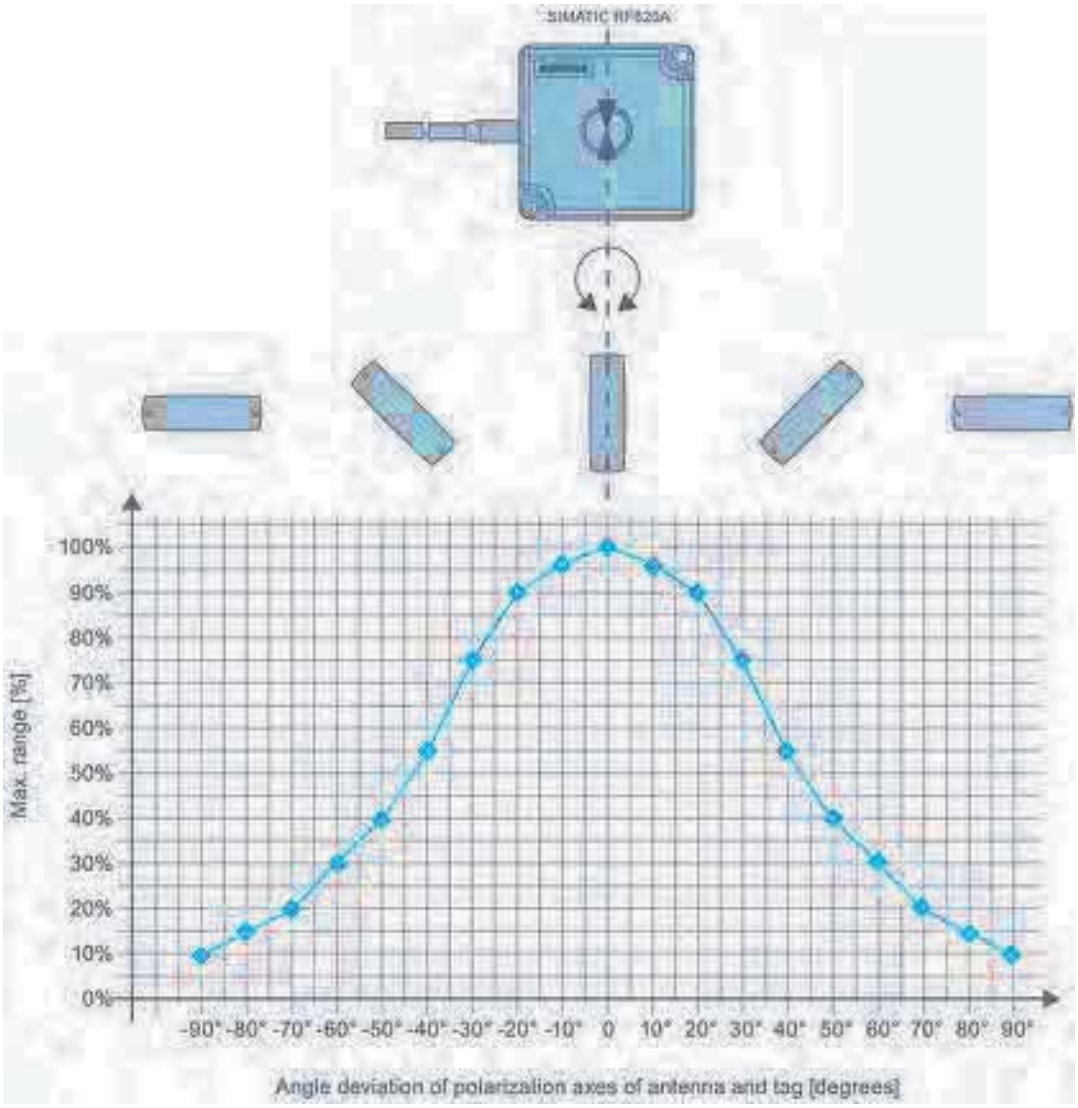


Figure 6-15 Angle deviation diagram for alignment

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.

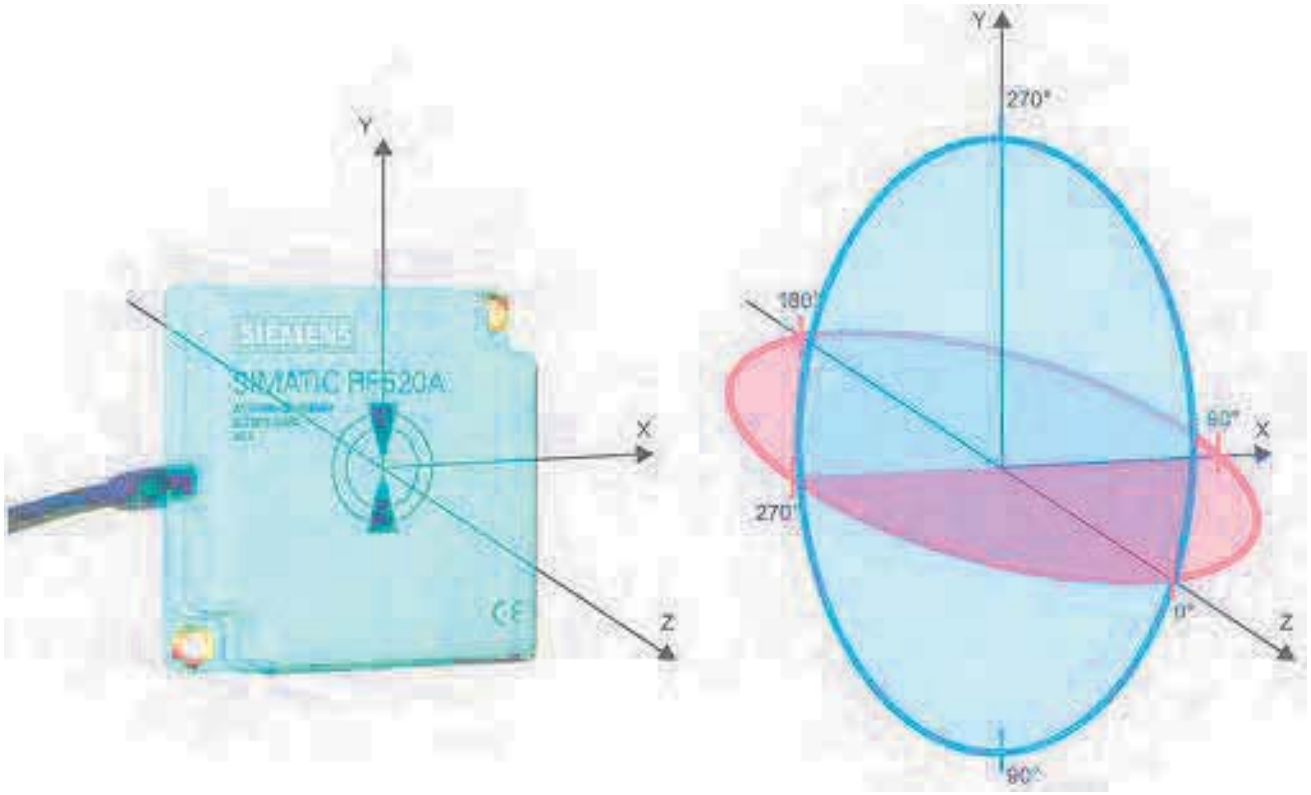


Figure 6-16 Reference system

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)

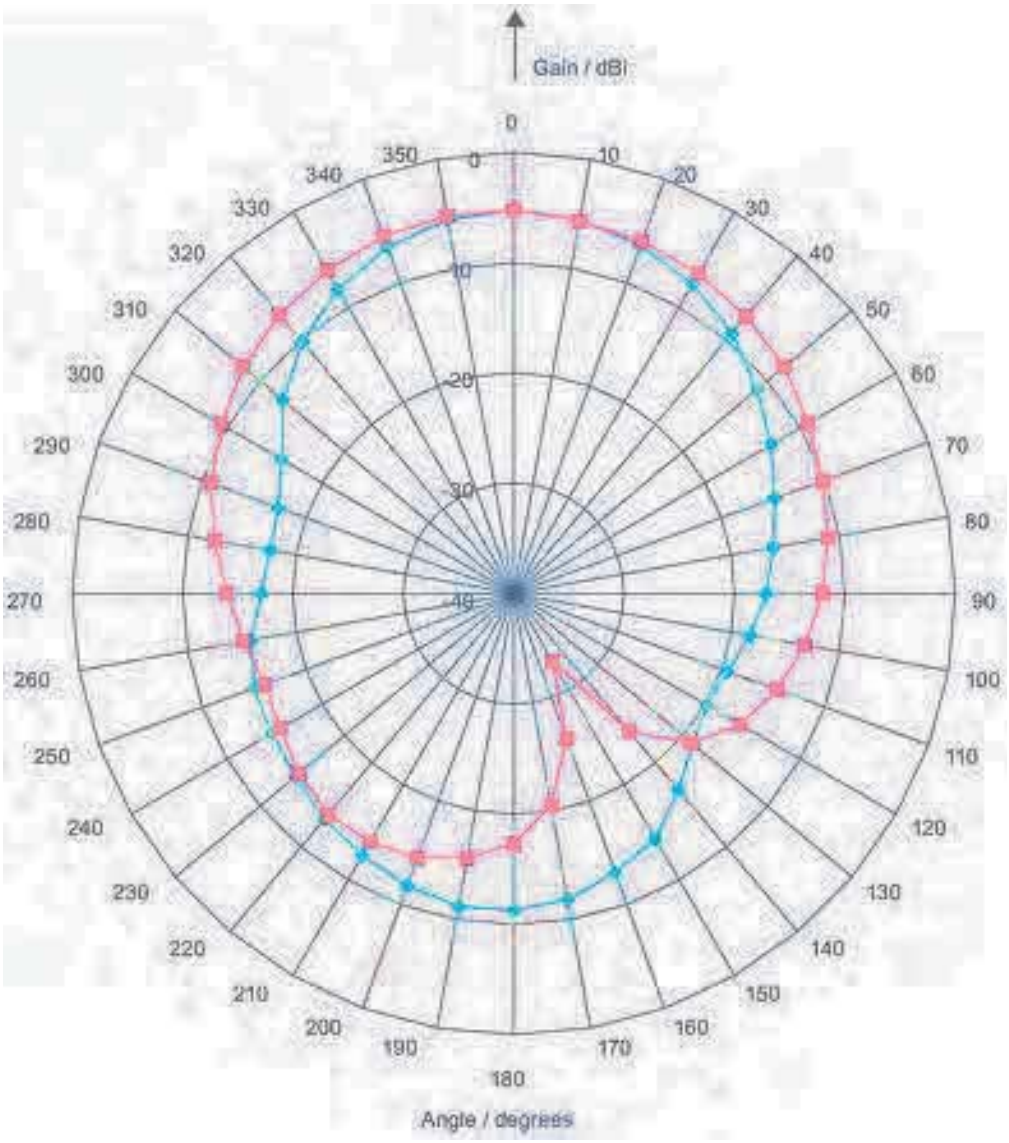
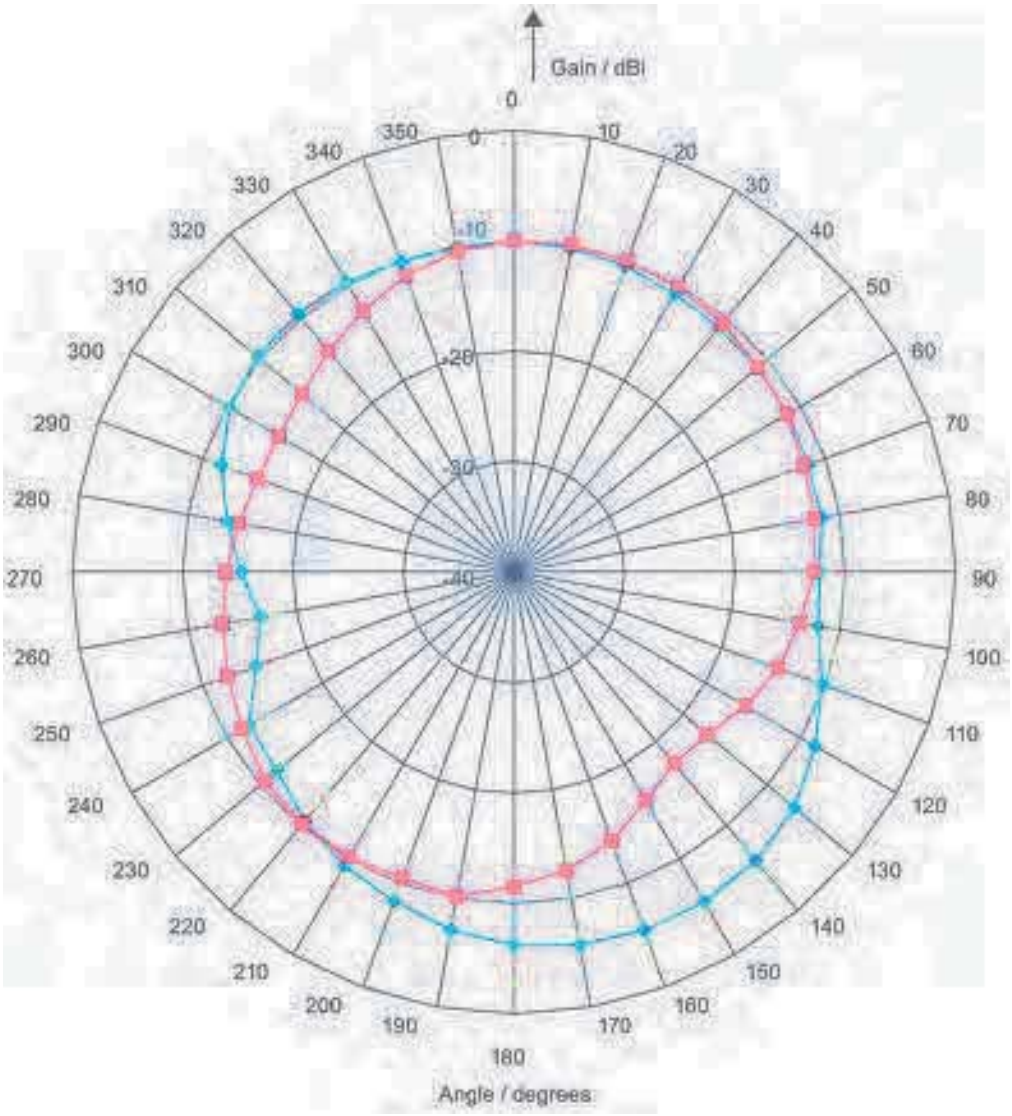


Figure 6-17 Directional radiation pattern RF620A ETSI on metallic mounting surface

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.

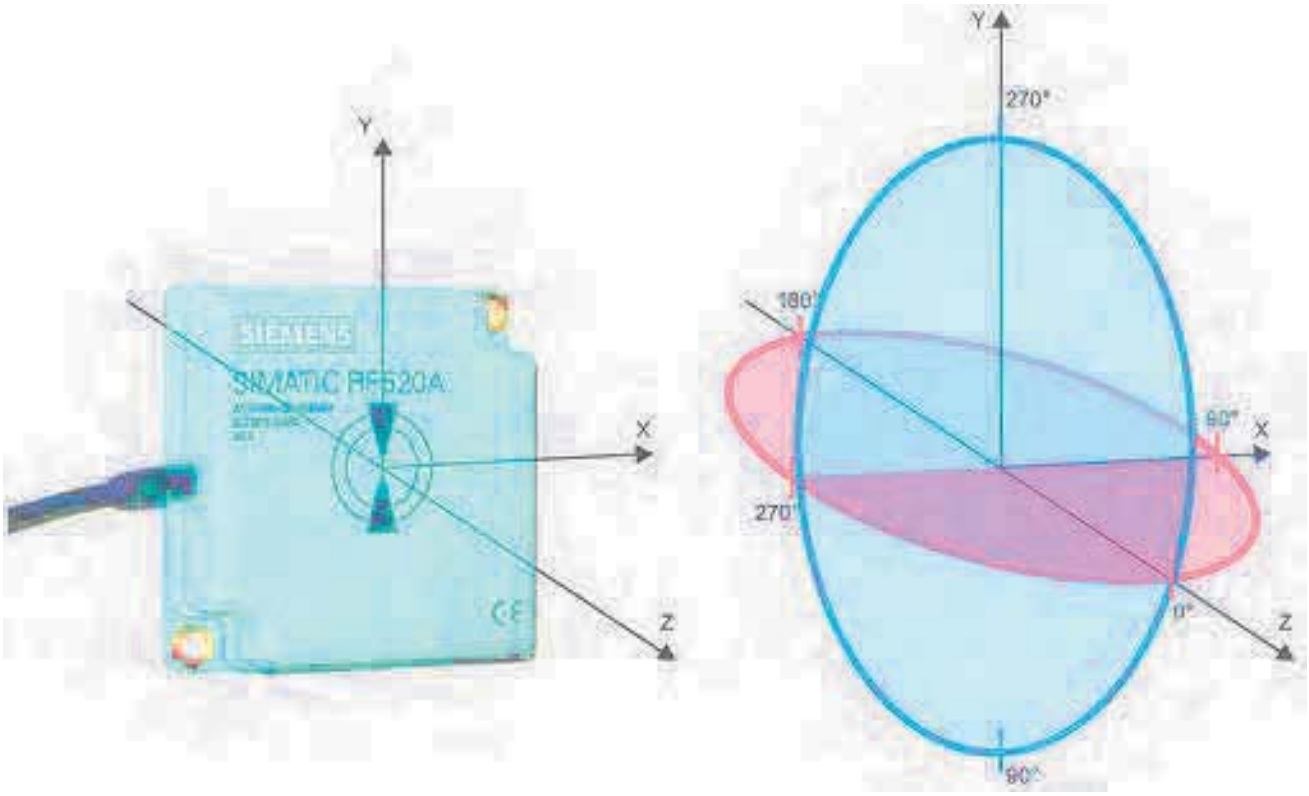
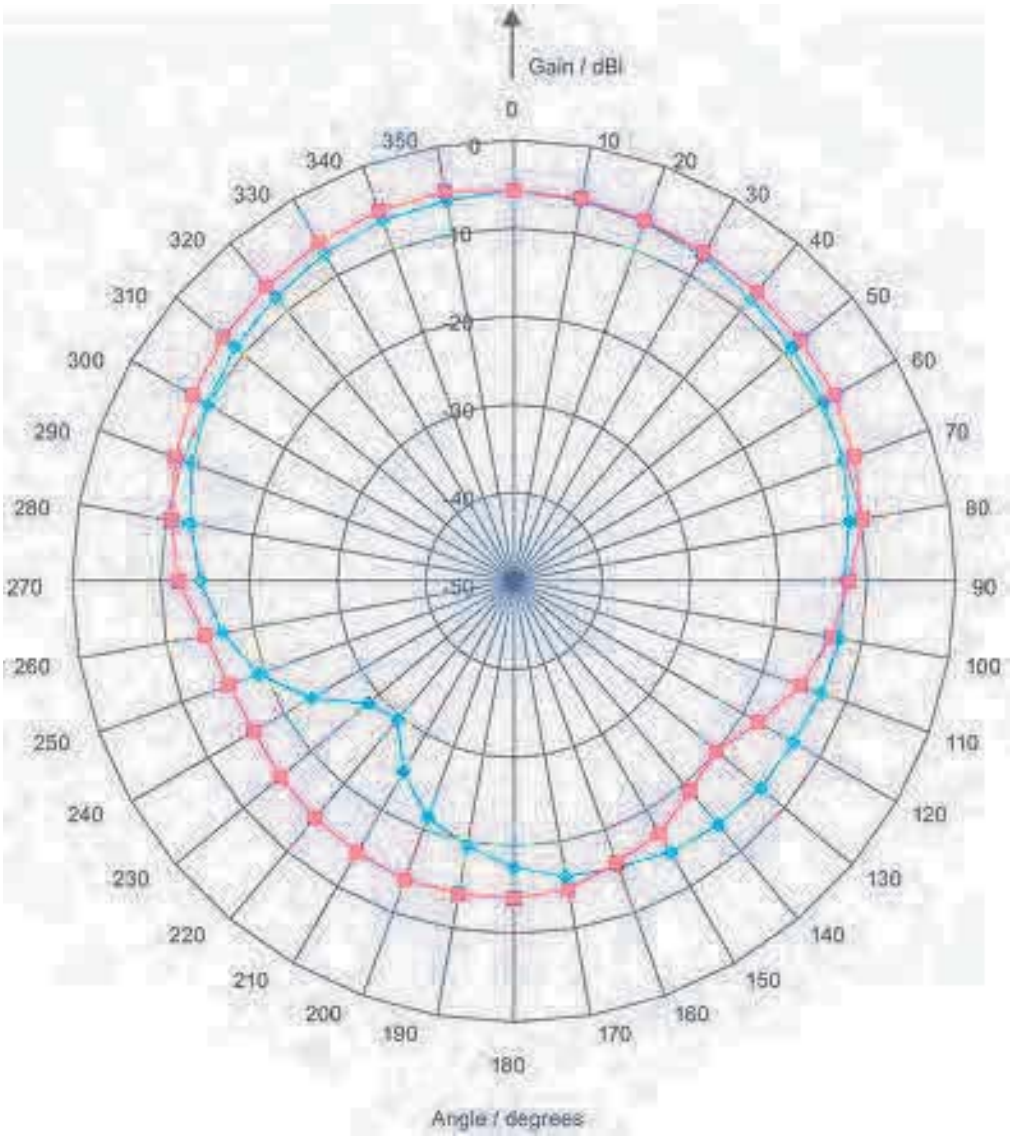


Figure 6-19 Reference system

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)

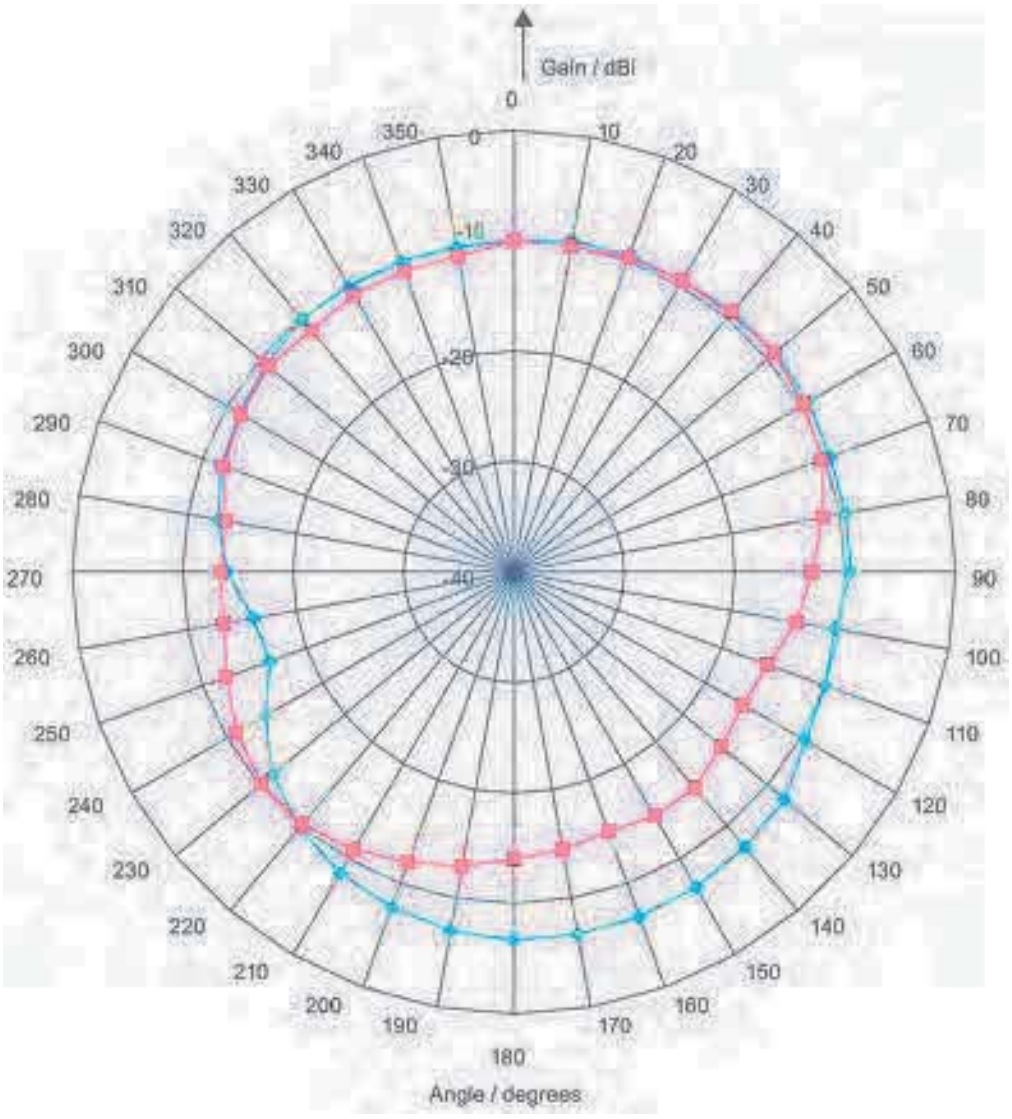


Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

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



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

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

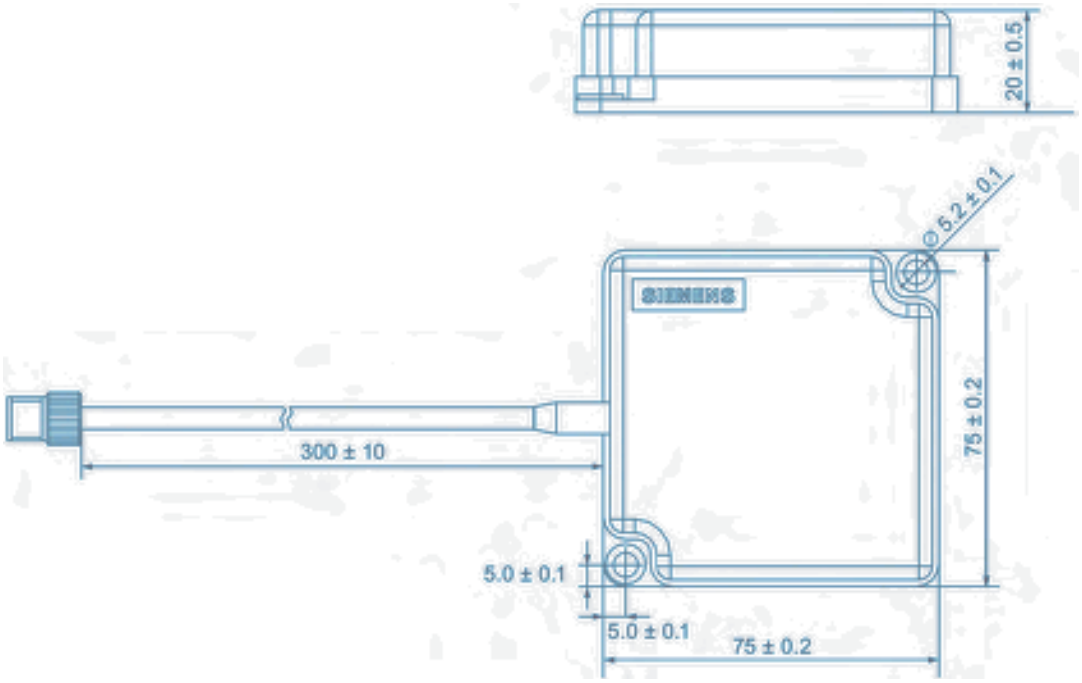


Figure 6-22 Dimension drawing RF620A

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
 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 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

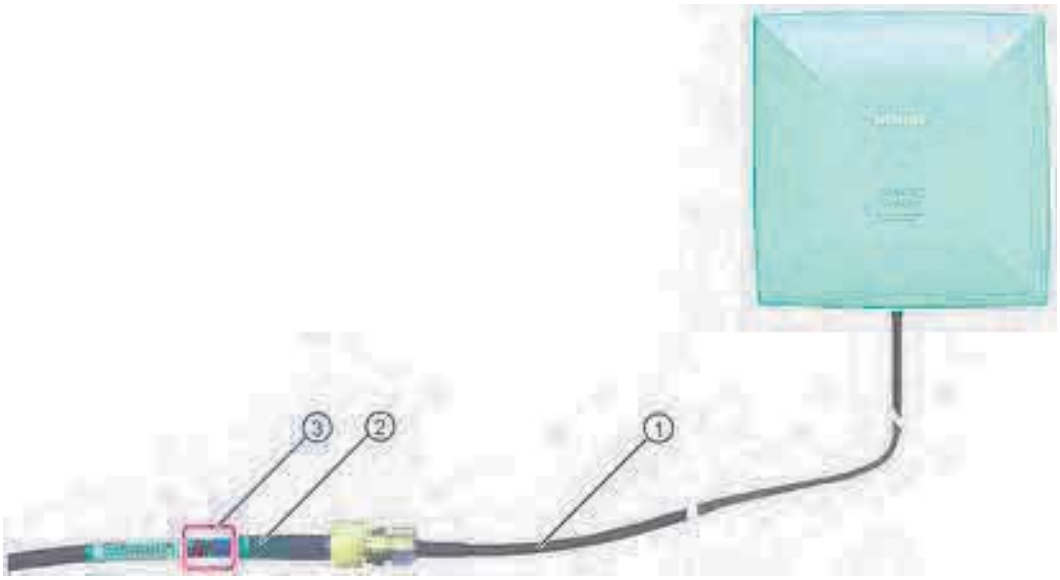
Note

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.

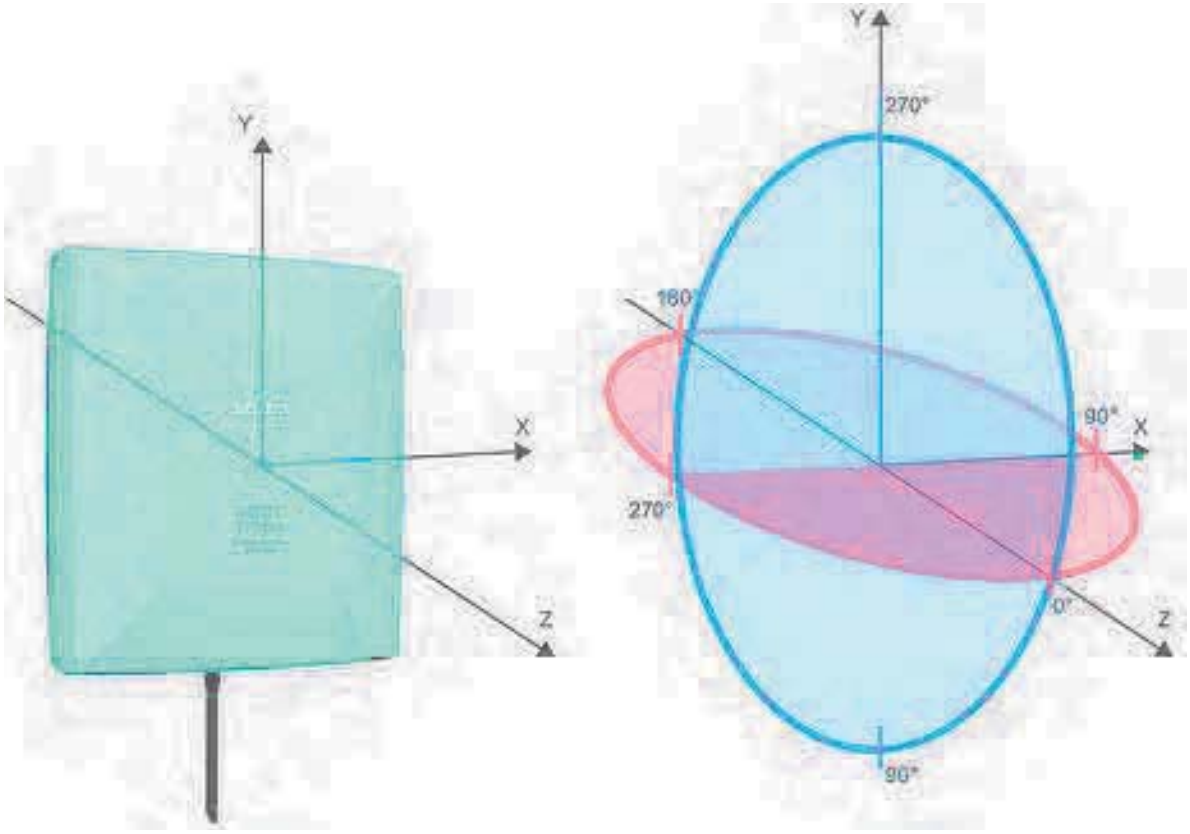


Figure 6-24 Reference system

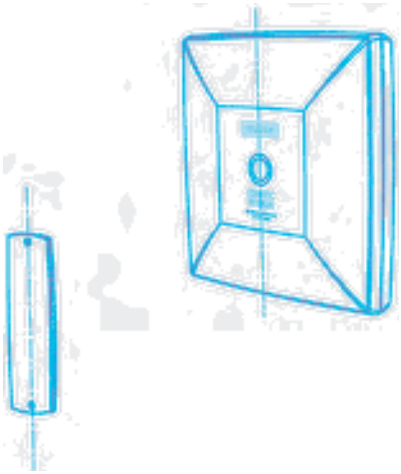
The half-power beam width of the antenna is defined by the angle between the two -3 dB points. The range (in %) corresponding to the dB values in the patterns can be obtained from this table (Page 288).

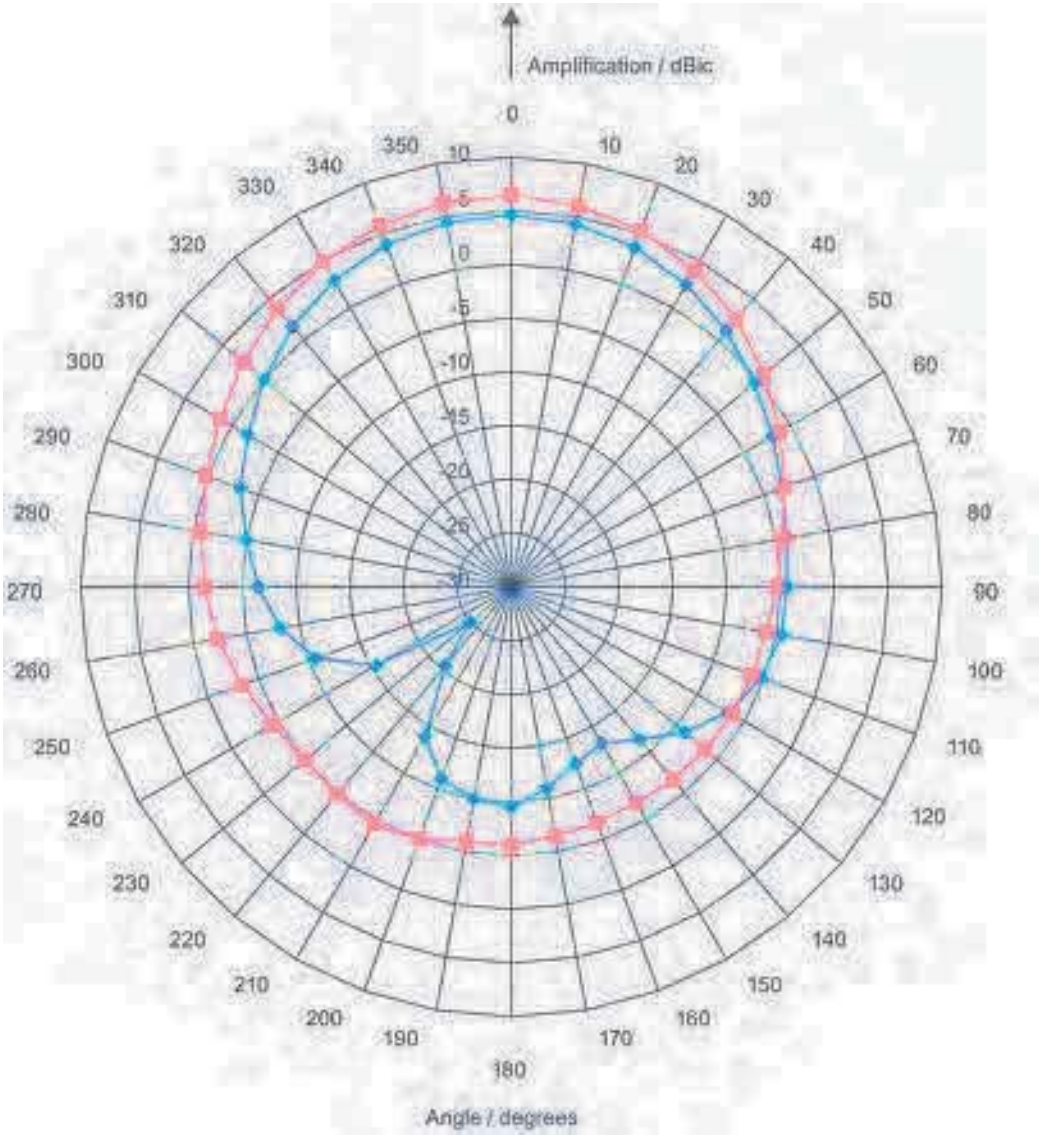
Note that the measurements presented graphically below were carried out in a low-reflection environment. Deviations can therefore occur in a normally reflecting environment.

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.





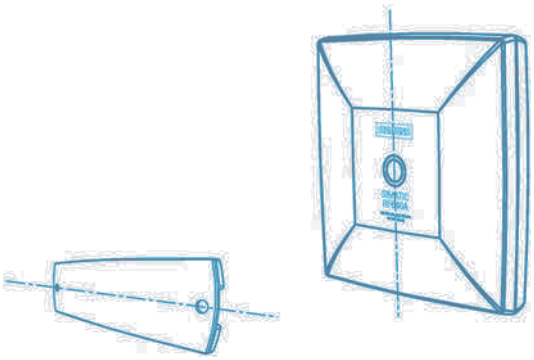
Pattern of the vertical plane of the antenna

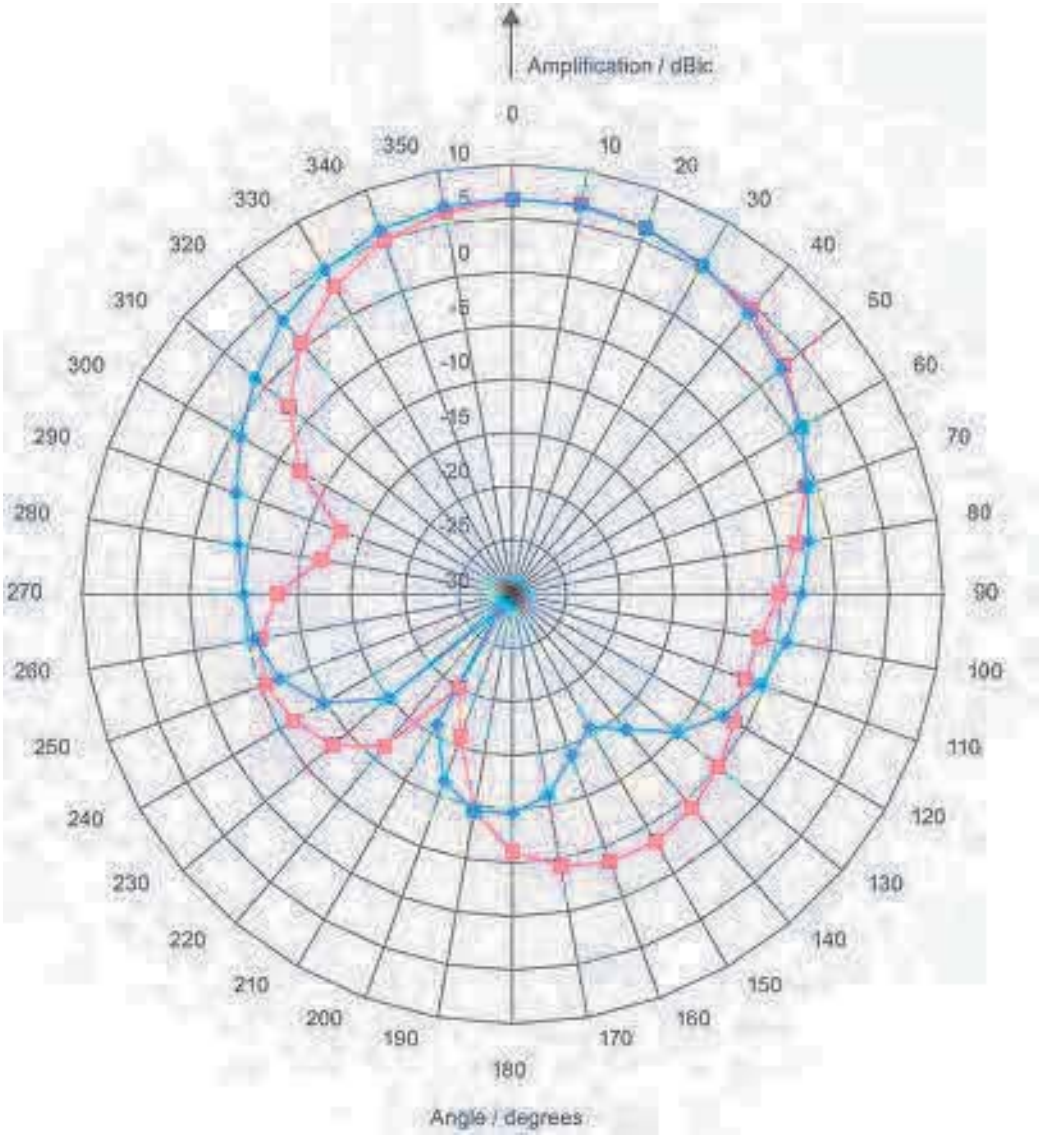
Pattern of the horizontal plane of the antenna

Figure 6-25 The RF640A directional radiation pattern in the ETSI frequency band, polarization axis of the transponder, and axis of symmetry of the antenna are parallel to each other.

Polarization axis and axis of symmetry are orthogonal to each other

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 orthogonal to each other.





Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-26 The RF640A directional radiation pattern in the ETSI frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are orthogonal to each other

6.4.6.2 Antenna radiation patterns in the FCC frequency band

Directional radiation pattern USA (FCC)

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

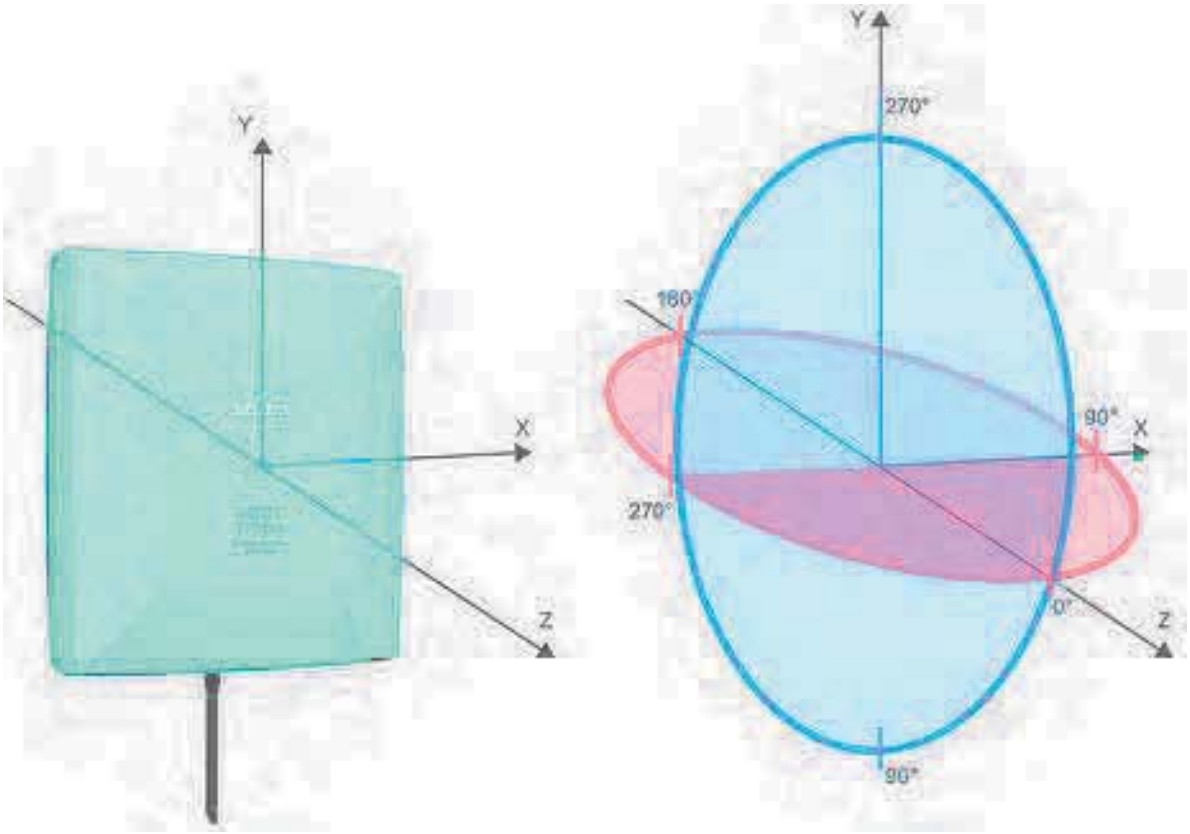


Figure 6-27 Reference system

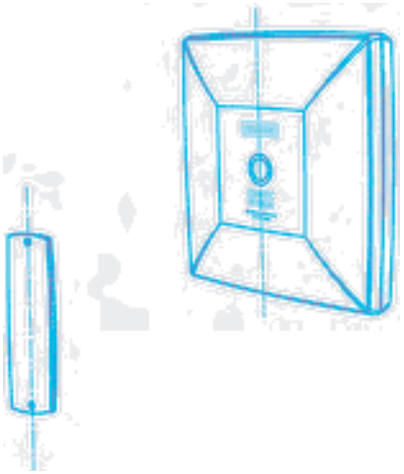
The half-power beam width of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power referred to the maximum power). Which range (in %) corresponds to the dB values in the patterns can be obtained from this table (Page 288).

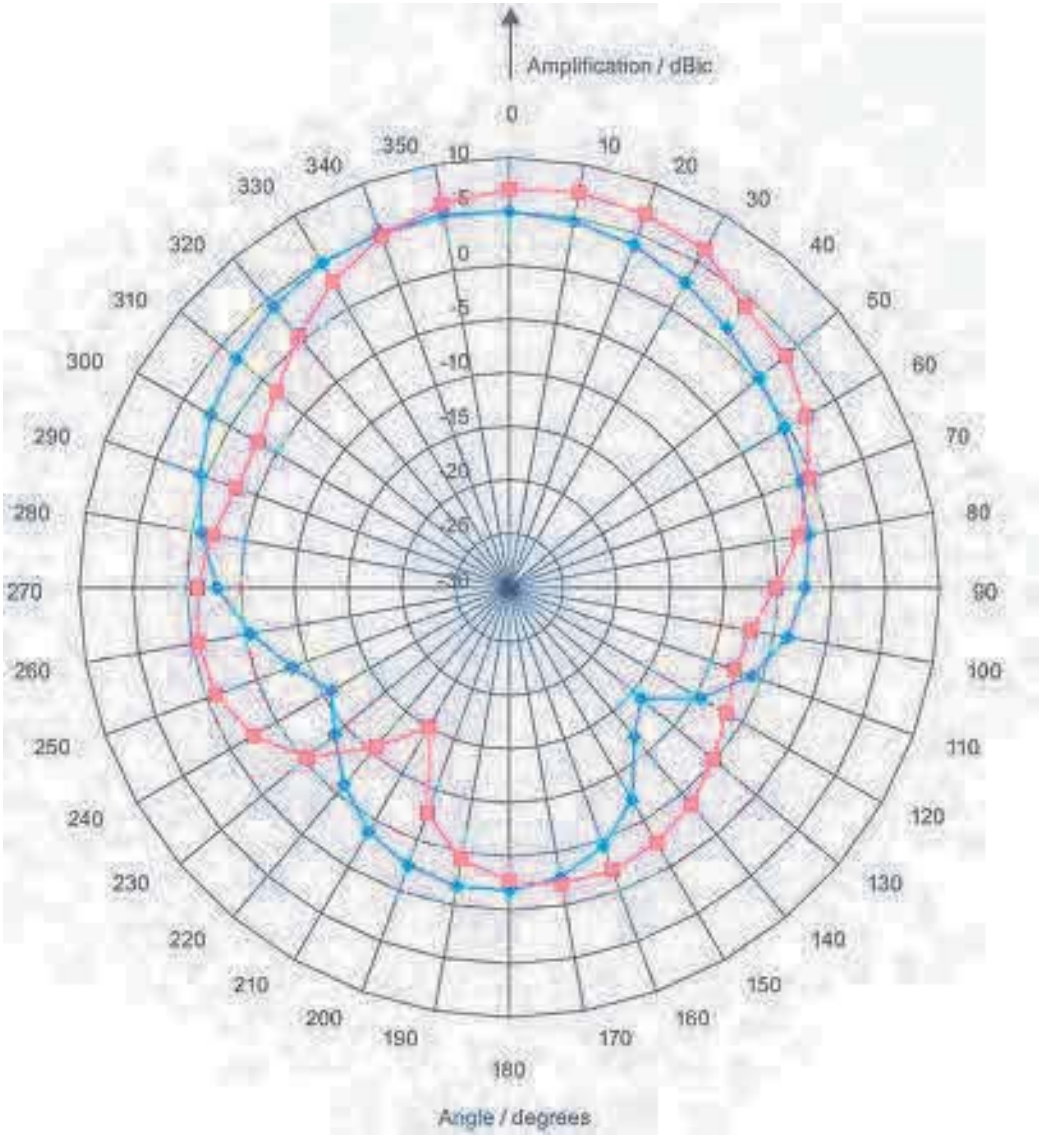
Note that the measurements presented graphically below were carried out in a low-reflection environment. Deviations can therefore occur in a normally reflecting environment.

Directional radiation pattern in the FCC frequency band

Polarization axis and axis of symmetry are parallel

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





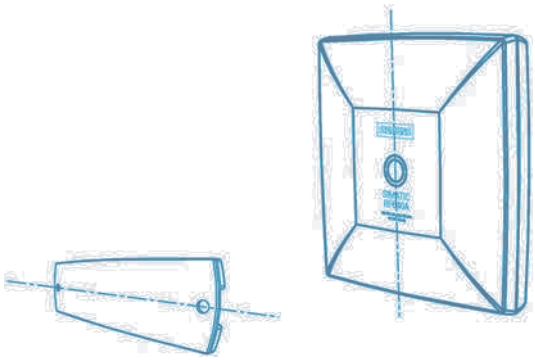
Pattern of the vertical plane of the antenna

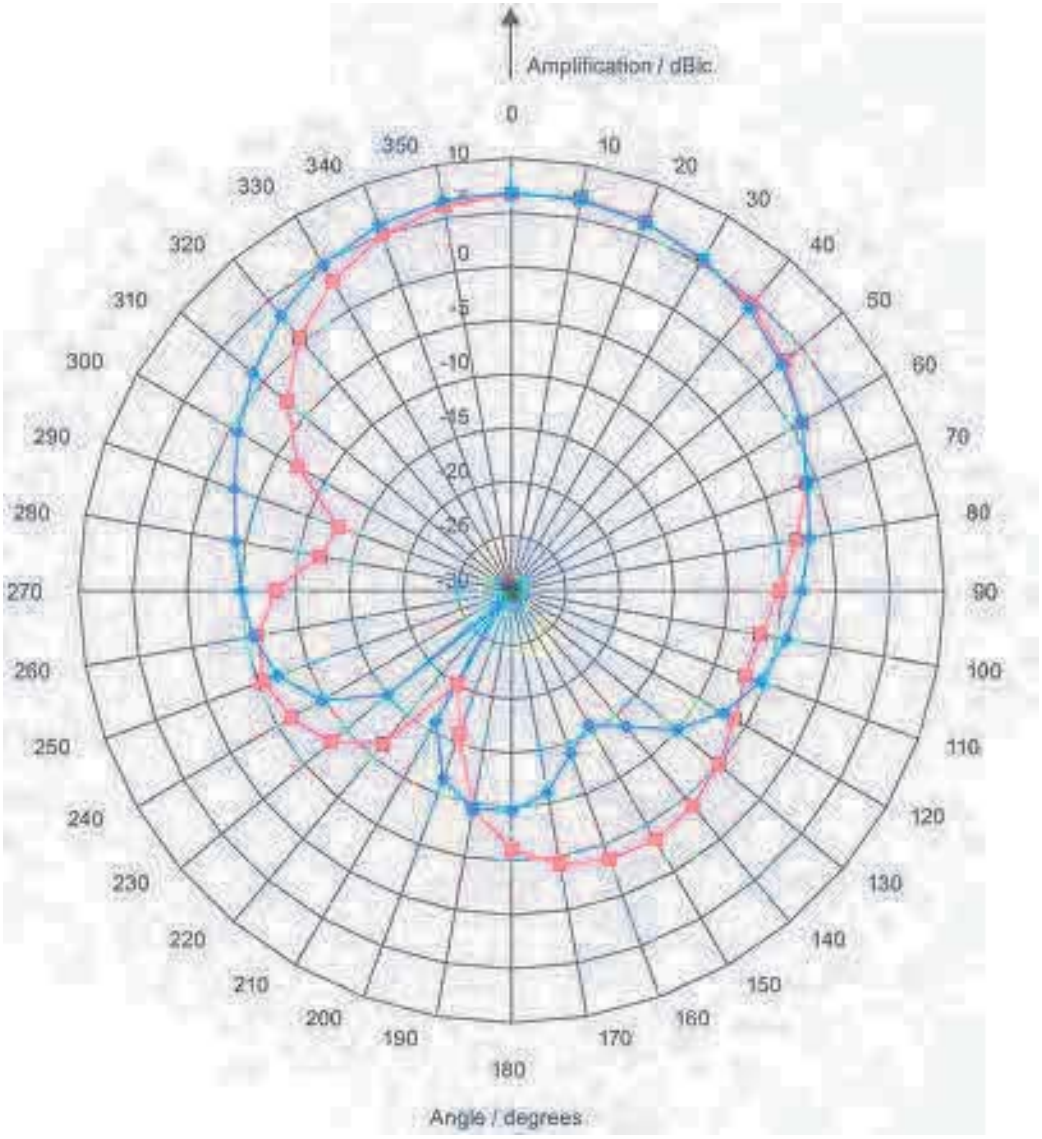
Pattern of the horizontal plane of the antenna

Figure 6-28 The RF640A directional radiation pattern in the FCC frequency band, polarization axis of the transponder, and axis of symmetry of the antenna are parallel to each other

Polarization axis and axis of symmetry are orthogonal to each other

In the following directional radiation pattern of the antenna, the axis of symmetry of the antenna and the polarization axis of the transponder are orthogonal to each other.





Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-29 The RF640A directional radiation pattern in the FCC frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are orthogonal to each other

6.4.6.3 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/dBic value and a second dBi/dBic 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 in Directional radiation patterns in the ETSI frequency band (Page 279), the maximum antenna gain in the vertical plane is 3.45 dBi (6.45 dBic). In this plane, and with the polarization axis of the transponder parallel to the axis of symmetry of the antenna, the antenna gain drops to about 0.5 dBic at +50° or 310°. Therefore the dBr value is -6. The antenna range is only 50% of the maximum range at + 50° or 310° from the Z axis within the vertical plane (see values shown in blue in the directional radiation pattern: Characteristic of the vertical plane of the antenna (Page 279) and the associated representation of the reference system (Page 278)).

6.4.7 Technical data

Table 6- 19 Technical specifications for the RF640A antenna

	6GT2812-0GA08
Product type designation	SIMATIC RF640A
Radio frequencies	
Operating frequency	865 to 928 MHz
Maximum radiated power	
• ETSI	• RF650R: ≤ 1360 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• FCC	• RF650R: ≤ 2400 mW EIRP RF680R/RF685R: ≤ 4000 mW EIRP
• CMIIT	• RF650R: ≤ 1300 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 4000 mW EIRP
Antenna gain	
• ETSI	• 4 dBi (7 dBic)
• FCC	• 4.3 dBi (7.3 dBic)
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm [1)]	
• ETSI	• Horizontal plane: 80° Vertical plane: 75° see section "Directional radiation patterns in the ETSI frequency band (Page 279)"
• FCC	• Horizontal plane: 75° Vertical plane: 85° see section "Directional radiation pattern in the FCC frequency band (Page 284)"
Front-to-back ratio	
• ETSI	• 14 dB ± 2.4 dB (depends on orientation of the transponder)
• FCC	• 9 dB ± 2.7 dB (depends on orientation of the transponder)

	6GT2812-0GA08
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Circular
VSWR (standing wave ratio)	
• ETSI	• ≤ 1.25
• FCC	• ≤ 1.6
Power	2 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	-25 ... +75 °C
• During transportation and storage	-40 ... +85 °C
Degree of protection	IP65
Shock resistant to EN 60068-2-27	25.5 g [2]
Vibrations according to EN 60068-2-6	1g [2]
Design, dimensions and weight	
Dimensions (H x W x D)	185 x 185 x 45 mm
Weight	600 g
Standards, specifications, approvals	
Proof of suitability	CE (according to RED), FCC (Title 47, Part 15.247), cULus
MTBF	445 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.

6.4.8 Dimension drawing

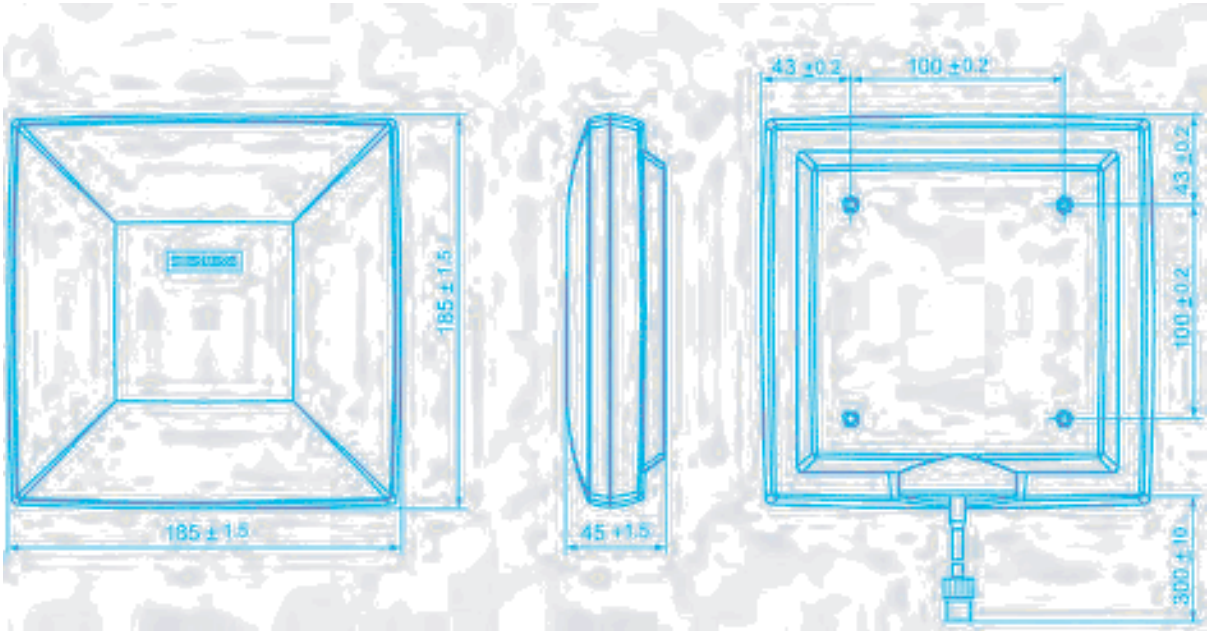


Figure 6-30 Dimension drawing RF640A

All dimensions in mm

6.4.9 Approvals & certificates

Table 6- 20 6GT2812-0GA08

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

Table 6- 21 6GT2812-0GA08

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 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements • CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment • UL Report E 205089

6.5 SIMATIC RF642A

6.5.1 Characteristics

SIMATIC RF642A	Characteristics	
	Area of application	The SIMATIC RF642A is a universal UHF antenna in a medium size with high range for industrial applications in production and logistics.
	Frequency range	865 to 928 MHz
	Read range	Max. 8 m
	Polarization	Linear
	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 RF642A 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.

6.5.2 Ordering data

Table 6- 22 Ordering data RF642A

Product	Article number
SIMATIC RF642A	6GT2812-1GA08

Table 6- 23 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

6.5.3 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.

6.5.4 Connecting the antenna

The SIMATIC RF642A 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

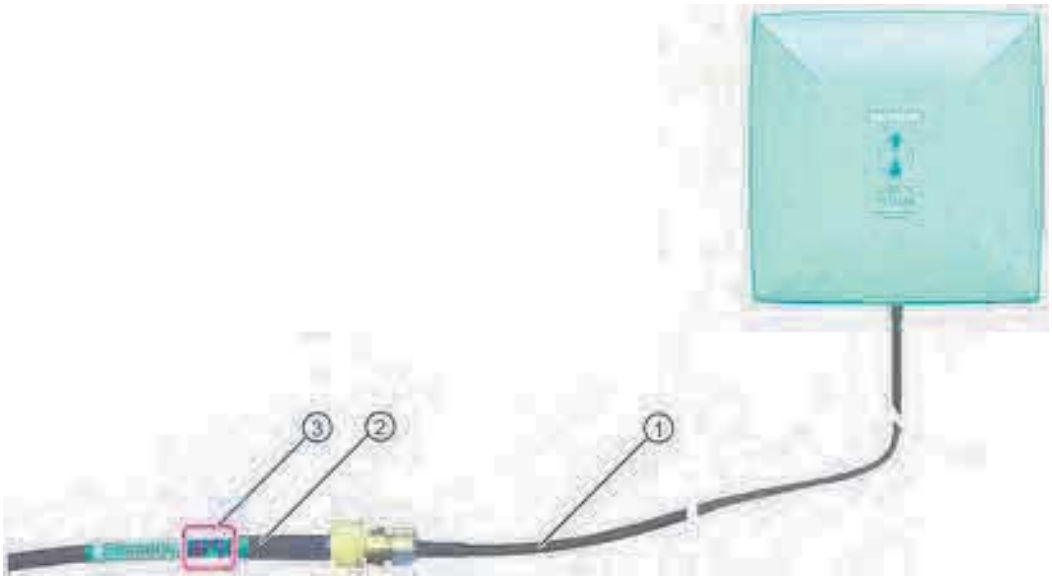
Note

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 RF642A antenna connecting cable
② RF600 antenna cable
③ Mounting point for strain relief

Figure 6-31 Strain relief

6.5.4.1 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- 24 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.

6.5.5 Antenna parameter assignment

6.5.5.1 Alignment of transponders to the antenna

Polarization axis

Since the RF642A 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 6-32 Polarization axis

Alignment

The following diagram shows the optimum alignment of the RF600 transponders to the RF642A antenna.

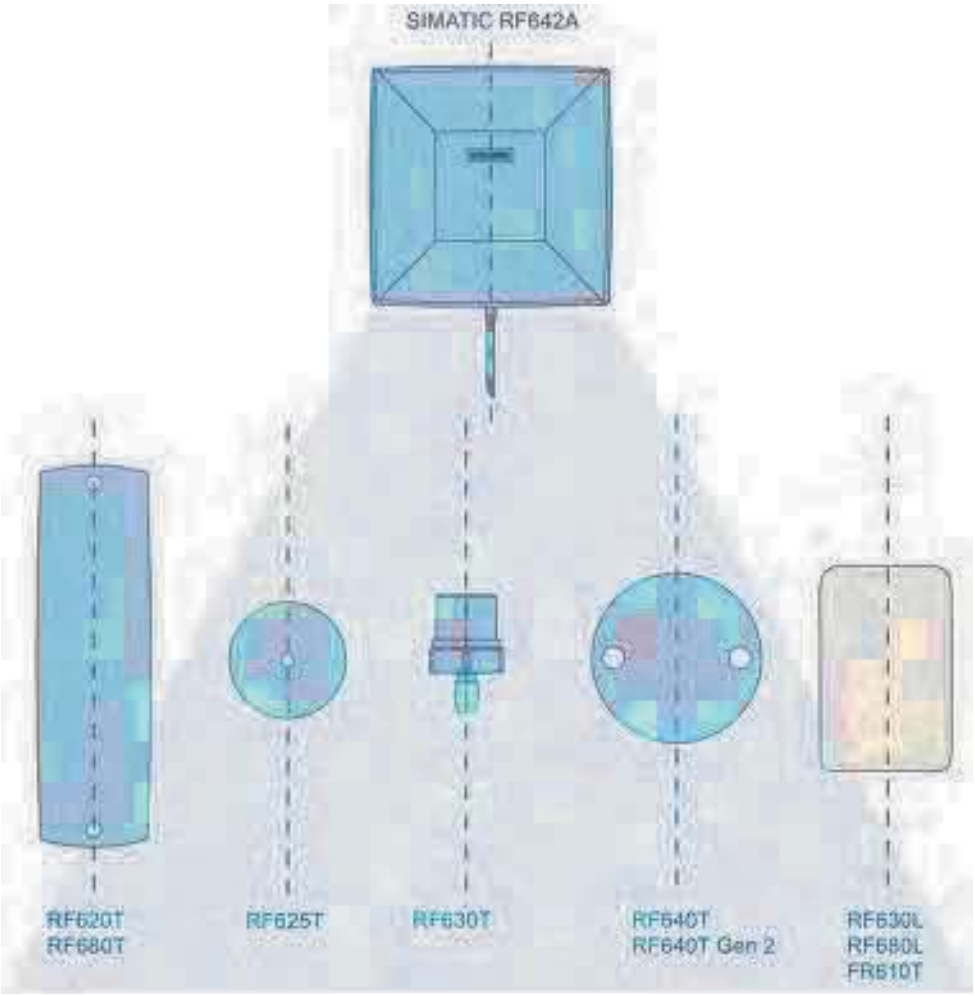


Figure 6-33 Antenna/transponder alignment

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

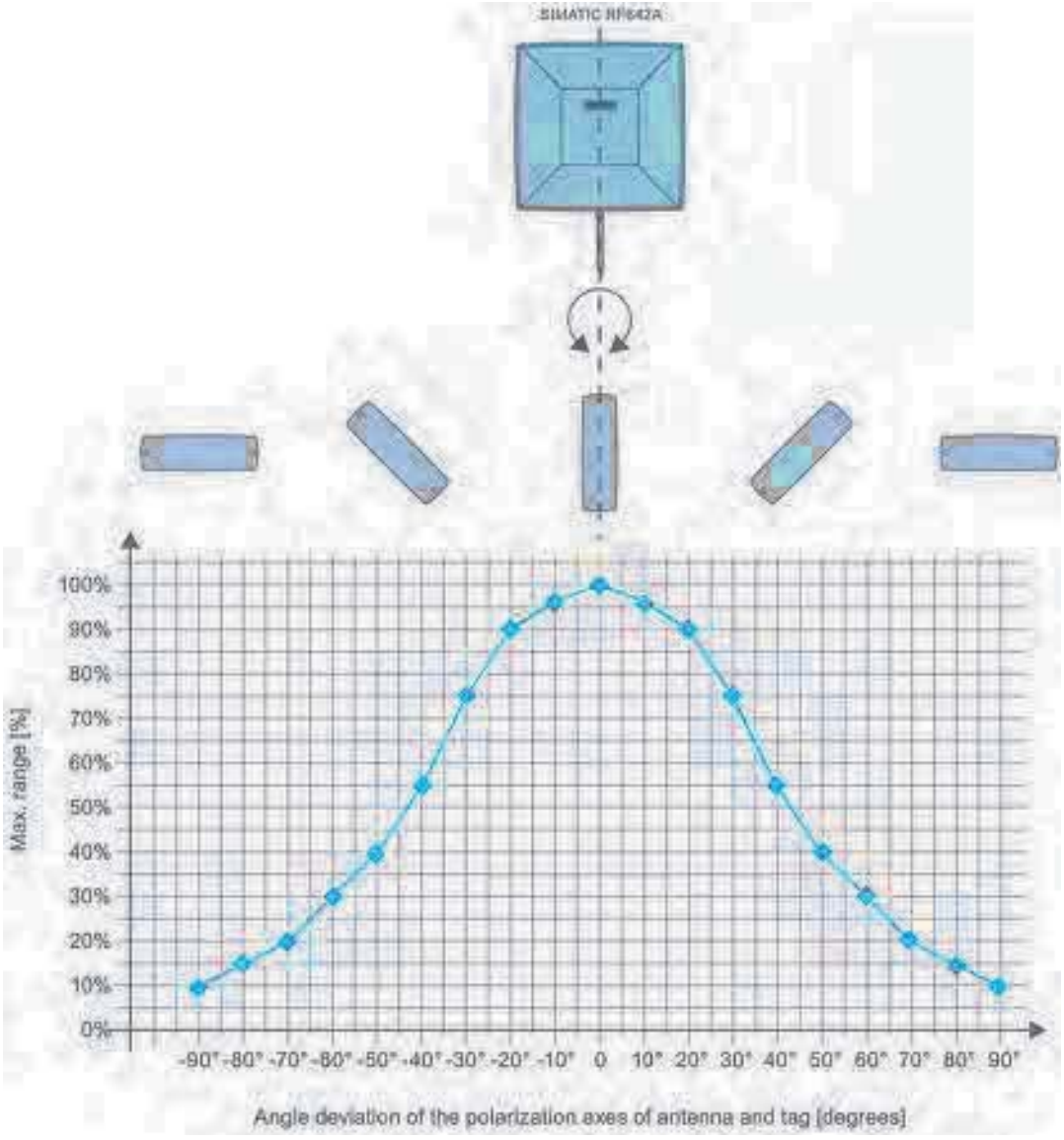


Figure 6-34 Angle deviation diagram for alignment

6.5.5.2 RF642A 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 RF642A 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: 6 dBi
- 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 RF642A 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: ≤ 7 dBi
- Cable loss a_k (dB): ≥ 1 dB

P (dBm) ≤ 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 RF642A 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: 7 dBi (or 10 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 RF642A antenna:

- 500 mW EIRP (or 27 dBm EIRP) for operation with RF650R (ARIB STD-T107)

6.5.6 Antenna patterns

6.5.6.1 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.

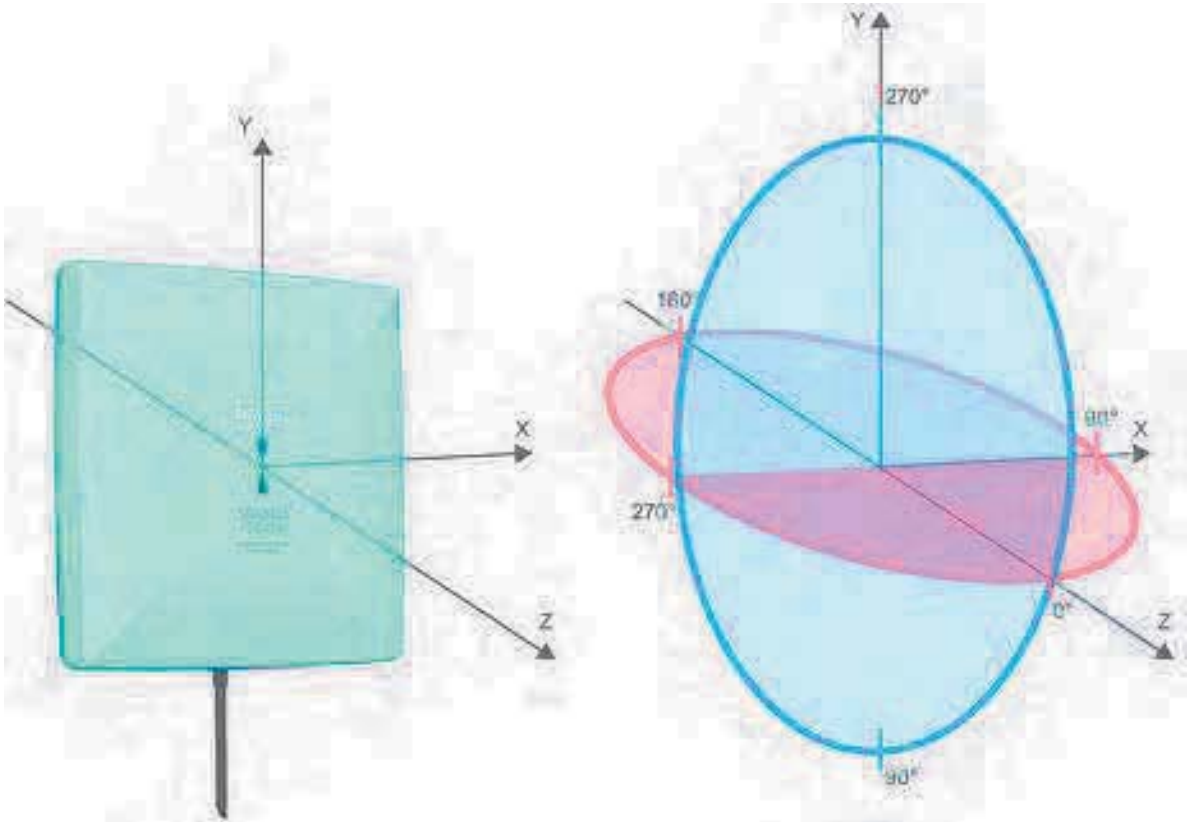
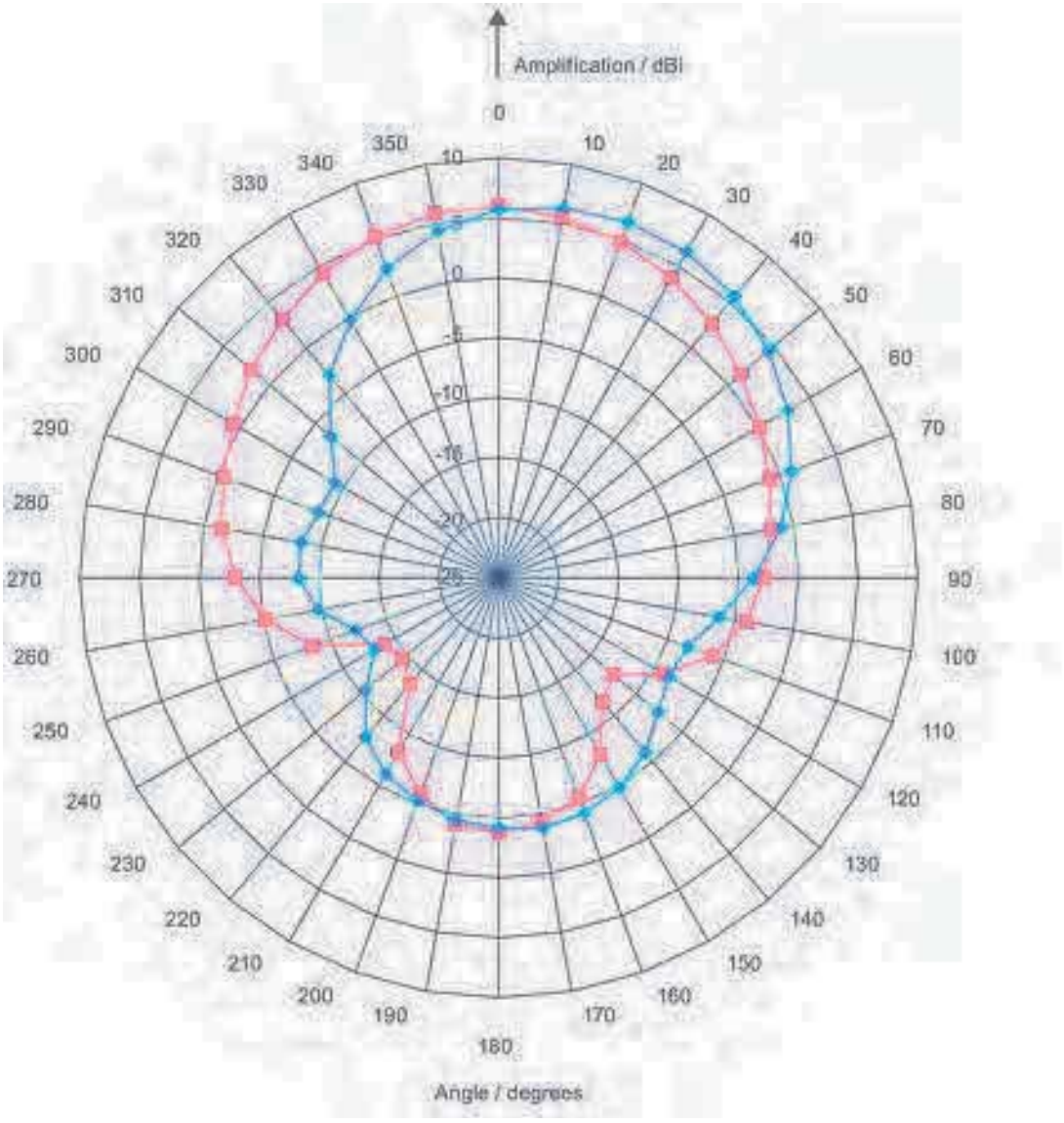


Figure 6-35 Reference system

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 306).

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 in the ETSI frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-36 Directional radiation pattern of RF642A in the ETSI frequency band

6.5.6.2 Antenna radiation patterns in the FCC frequency band

Directional radiation pattern USA (FCC)

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

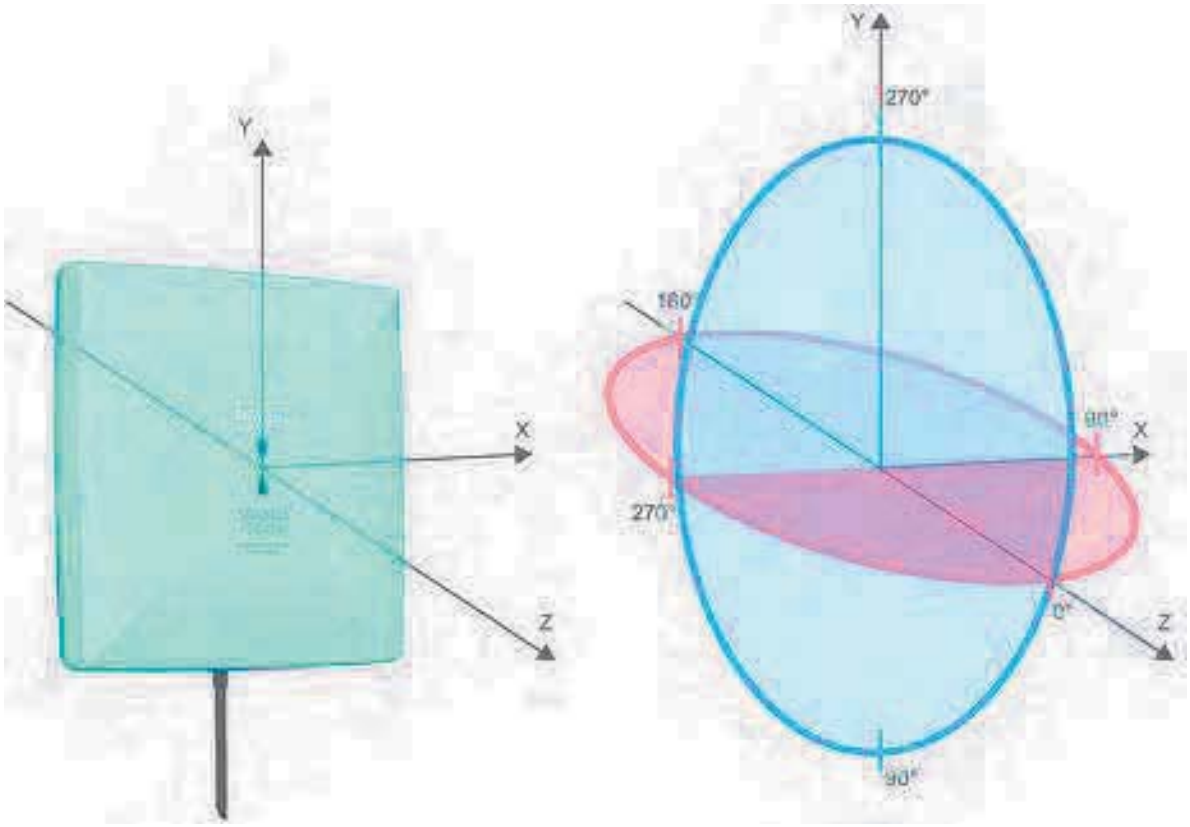
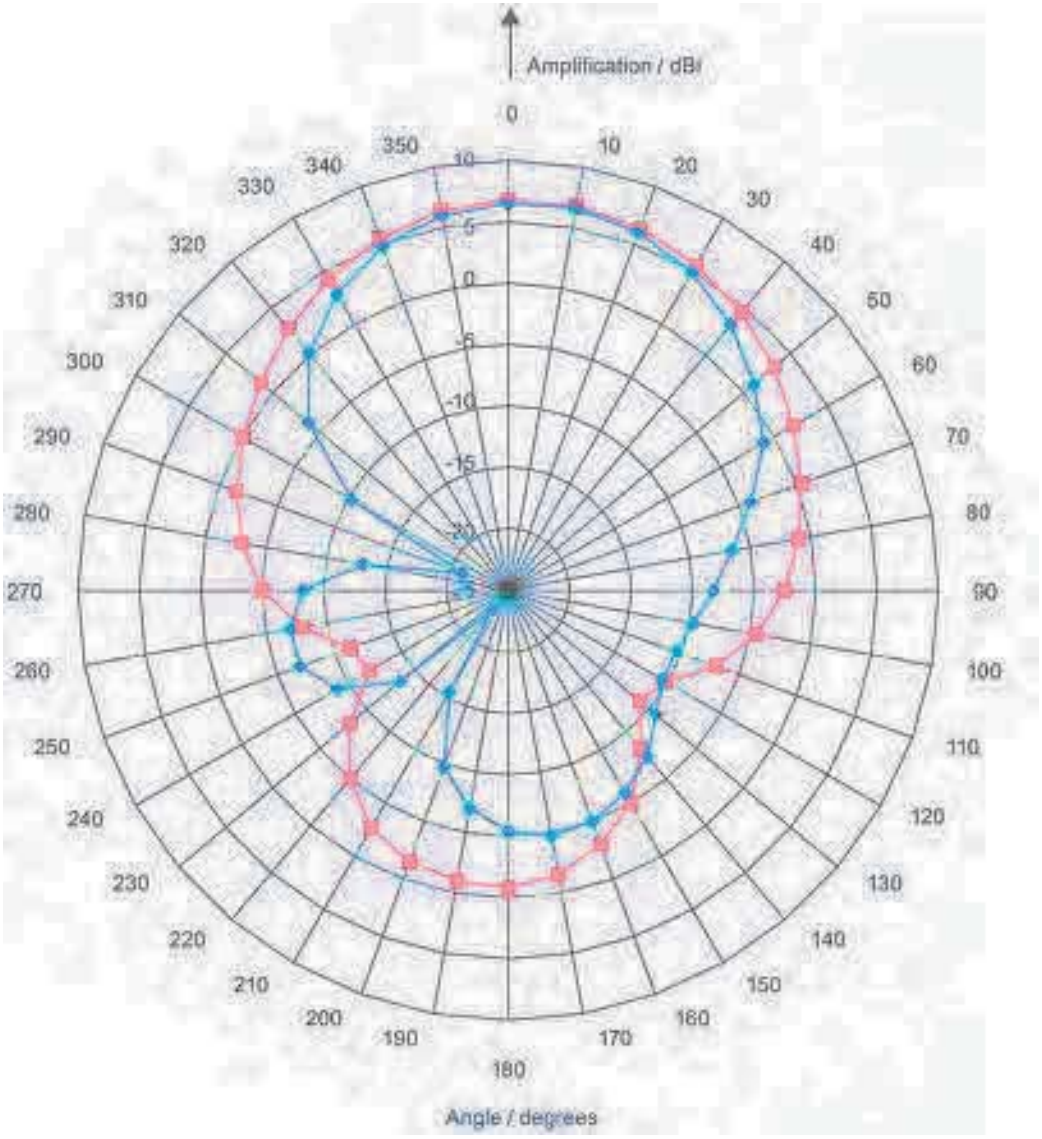


Figure 6-37 Reference system

The half-power beam width of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power referred 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. Deviations can therefore occur in a normally reflecting environment.

Directional radiation pattern of the RF642A in the FCC frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-38 Directional radiation pattern of the RF642A in the FCC frequency band

6.5.6.3 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 in Directional radiation pattern in the ETSI frequency band (Page 303), the maximum antenna gain in the horizontal plane is 6 dBi. In this plane and with the parallel polarization axis at +70° or 300°, the antenna gain dropped to about 0 dBi. Therefore the dBr value is 6. The antenna range is only 70° of the maximum range at + 50° or +300° from the Z axis within the horizontal plane (see values shown in red in the directional radiation pattern: Characteristic of the vertical plane of the antenna (Page 302) and the associated representation of the reference system (Page 302)).

6.5.7 Technical data

Table 6- 25 Technical specifications for the RF642A antenna

	6GT2812-1GA08
Product type designation	SIMATIC RF642A
Radio frequencies	
Operating frequency	865 to 928 MHz
Maximum radiated power	
• ETSI	• RF650R: ≤ 2000 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• FCC	• RF650R: ≤ 4000 mW EIRP RF680R/RF685R: ≤ 4000 mW EIRP
• CMIIT	• RF650R: ≤ 1900 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP
Antenna gain	
• ETSI	• 6 dBi
• FCC	• 7 dBi
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm [1)]	
• ETSI	• Horizontal plane: 75° Vertical plane: 70° see section "Directional radiation pattern in the ETSI frequency band (Page 303)"
• FCC	• Horizontal plane: 80° Vertical plane: 70° see section "Directional radiation pattern of the RF642A in the FCC frequency band (Page 305)"
Front-to-back ratio	
• ETSI	• 10 dB
• FCC	• 9.8 dB ± 2.2 dB
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Linear
VSWR (standing wave ratio)	≤ 1.5
Power	2 W

	6GT2812-1GA08
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	• -25 ... +75 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection	IP65
Shock resistant to EN 60068-2-27	25.5 g [2)]
Vibrations according to EN 60068-2-6	1 g [2)]
Design, dimensions and weight	
Dimensions (H x W x D)	185 x 185 x 45 mm
Weight	600 g
Standards, specifications, approvals	
Proof of suitability	CE (according to RED), FCC (Title 47, Part 15.247), cULus
MTBF	16880 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.

6.5.8 Dimension drawing

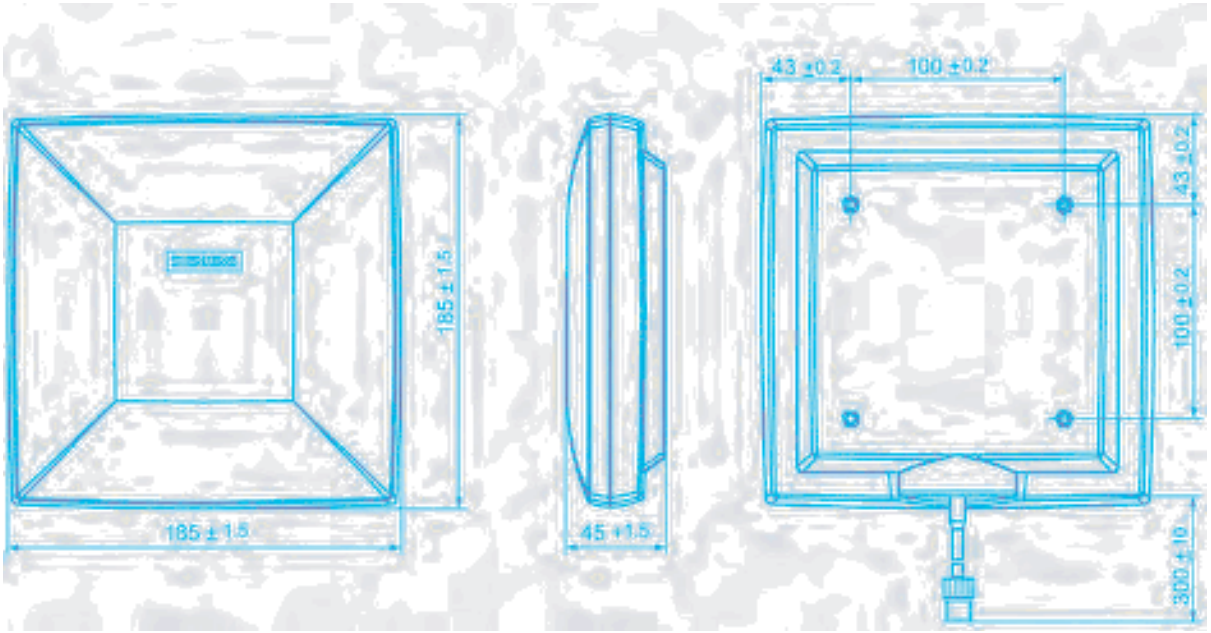


Figure 6-39 Dimensional drawing of RF642A

All dimensions in mm

6.5.9 Approvals & certificates

Table 6- 26 6GT2812-1GA08

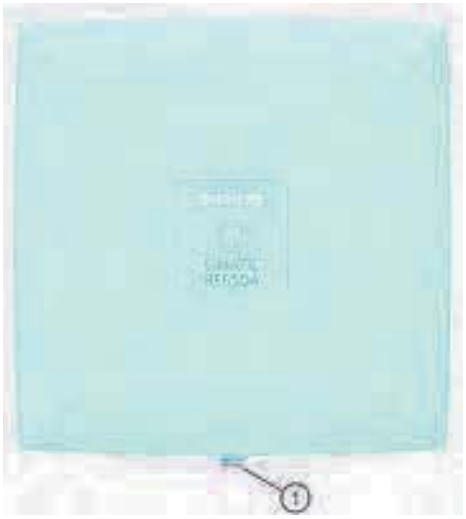
Labeling	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU

Table 6- 27 6GT2812-1GA08

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 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements • CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment • UL Report E 205089

6.6 SIMATIC RF650A

6.6.1 Characteristics

SIMATIC RF650A	Characteristics	
	Area of application	The SIMATIC RF650A 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	The antenna is connected directly to the housing with an RP-TNC coupling ①.

Frequency ranges

The antenna is a broadband antenna and covers the frequency ranges from 865 to 928 MHz.

Function

The SIMATIC RF650A 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.

6.6.2 Ordering data

Table 6- 28 Ordering data RF650A

Product	Article number
SIMATIC RF650A	6GT2812-0GB08

Table 6- 29 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

6.6.3 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.

6.6.4 Connecting the antenna

The SIMATIC RF650A 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

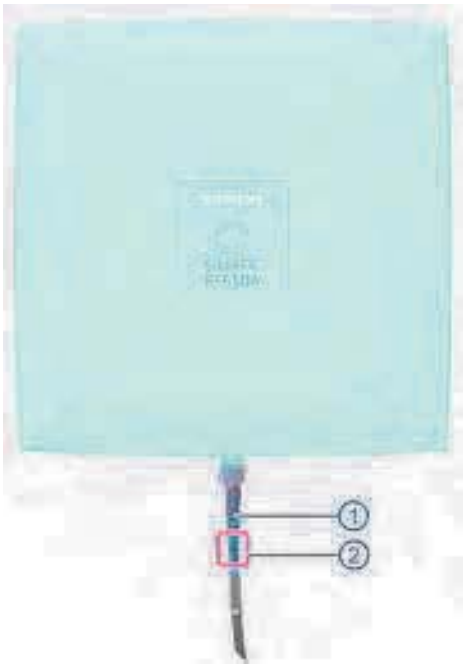
Note

Use of Siemens antenna cables

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

Strain relief

To protect the antenna 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 RF600 antenna cable
② Mounting point for strain relief

Figure 6-40 RF 650A strain relief

6.6.4.1 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- 30 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.

6.6.5 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 RF650A 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 (7 dBic)
- Radiated power: ≤ 1300 mW ERP (or 31.15 dBm ERP)

  Converted into EIRP: ≤ 2140 mW EIRP (or 33.3 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 RF650A 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: ≤ 3.5 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 RF650A 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: 3.5 dBi (6.5 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)

RF600 systems that are put into operation in Japan must not exceed the following radiated power with an RF650A 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)

6.6.6 Antenna patterns

Transponder alignment

The RF650A antenna has a circular antenna. With a circular antenna the alignment of the antenna axis of symmetry changes between horizontal and vertical each time it transmits. For this reason the alignment of the transponder polarization axis (horizontal/vertical) is unimportant. Make sure, however, that the transponder is aligned with the antenna.

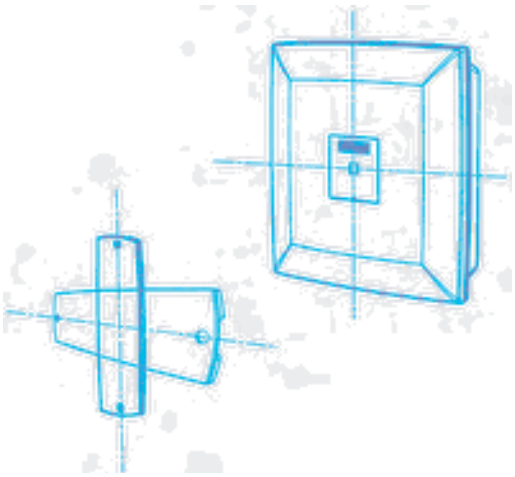


Figure 6-41 Alignment of the transponder polarization axis with a circular antenna axis of symmetry

6.6.6.1 Antenna 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.

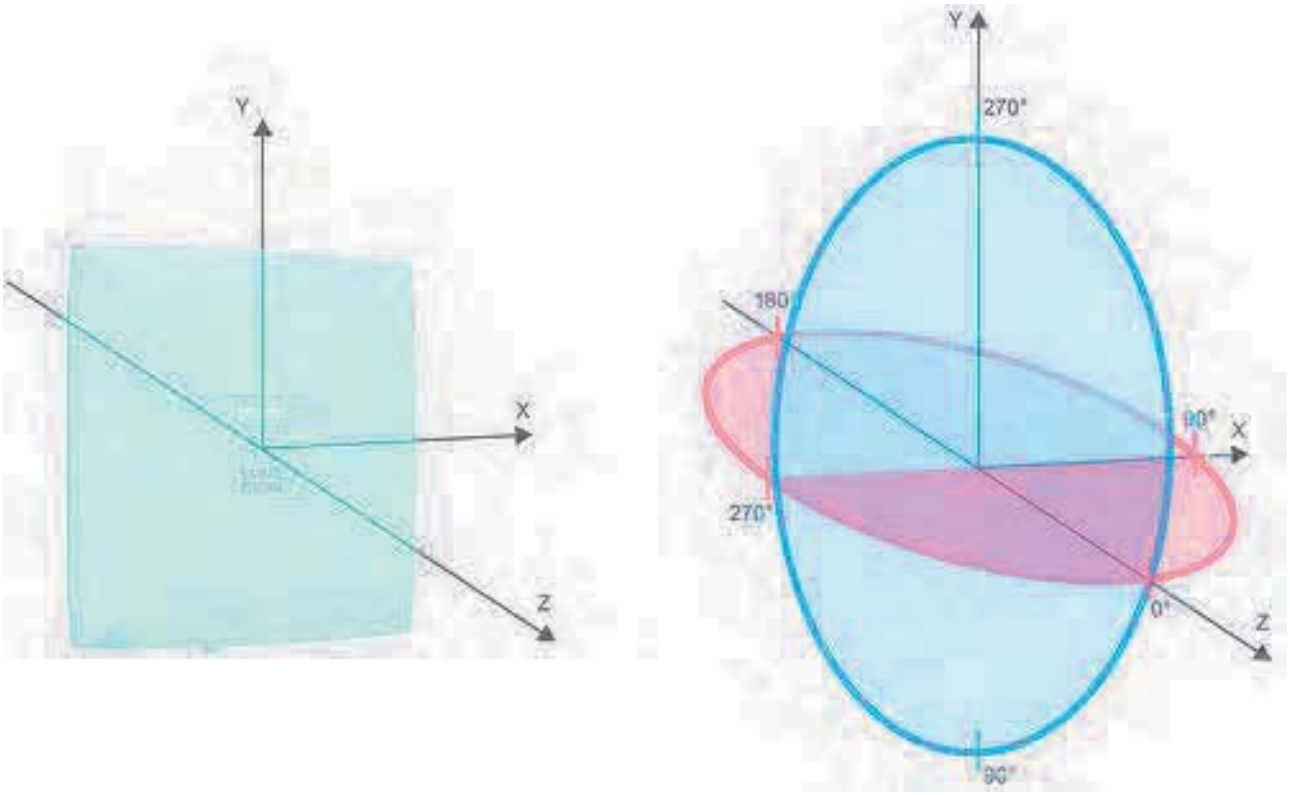
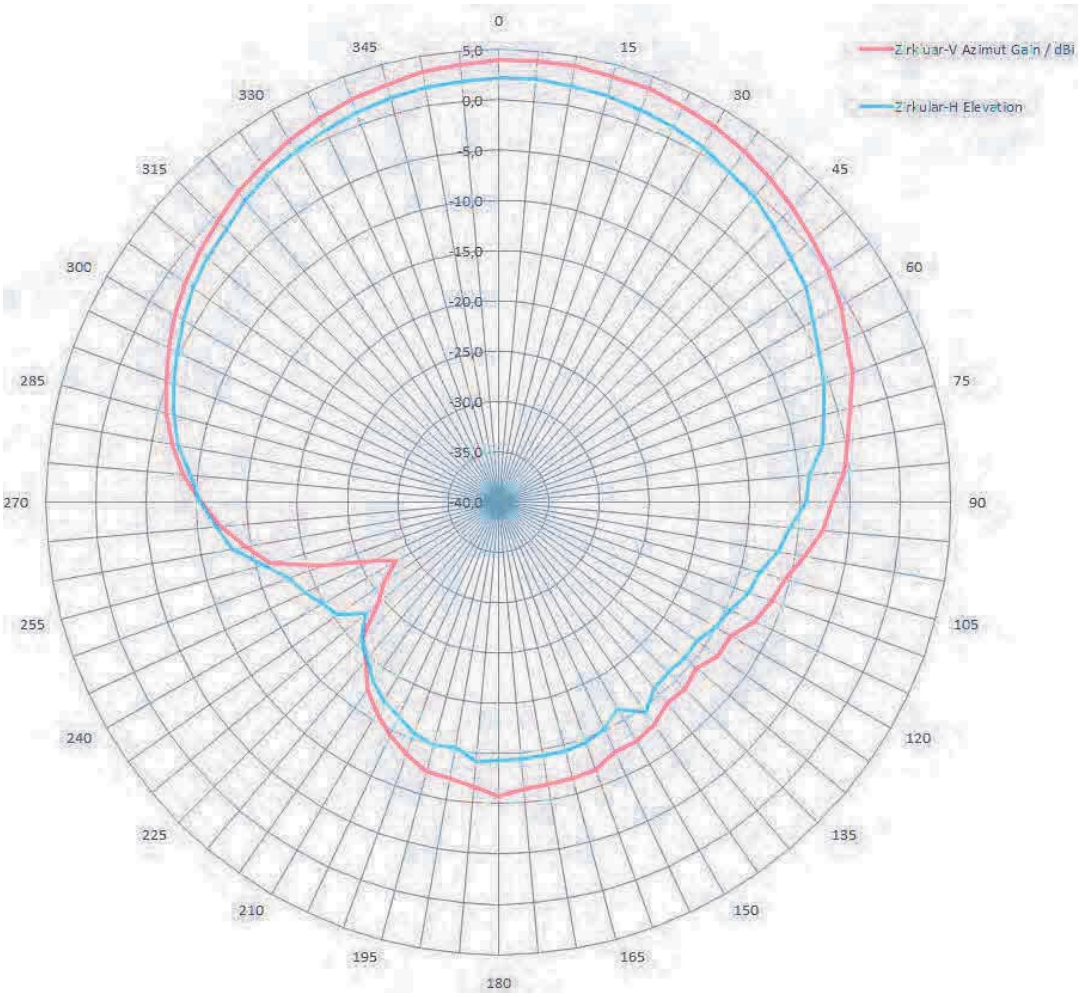


Figure 6-42 Reference system

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 321).

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

Radiation diagram (circular) in the ETSI frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-43 Directional radiation pattern of RF650A in the ETSI frequency band

6.6.6.2 Antenna patterns in the FCC frequency band

Directional radiation pattern FCC

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

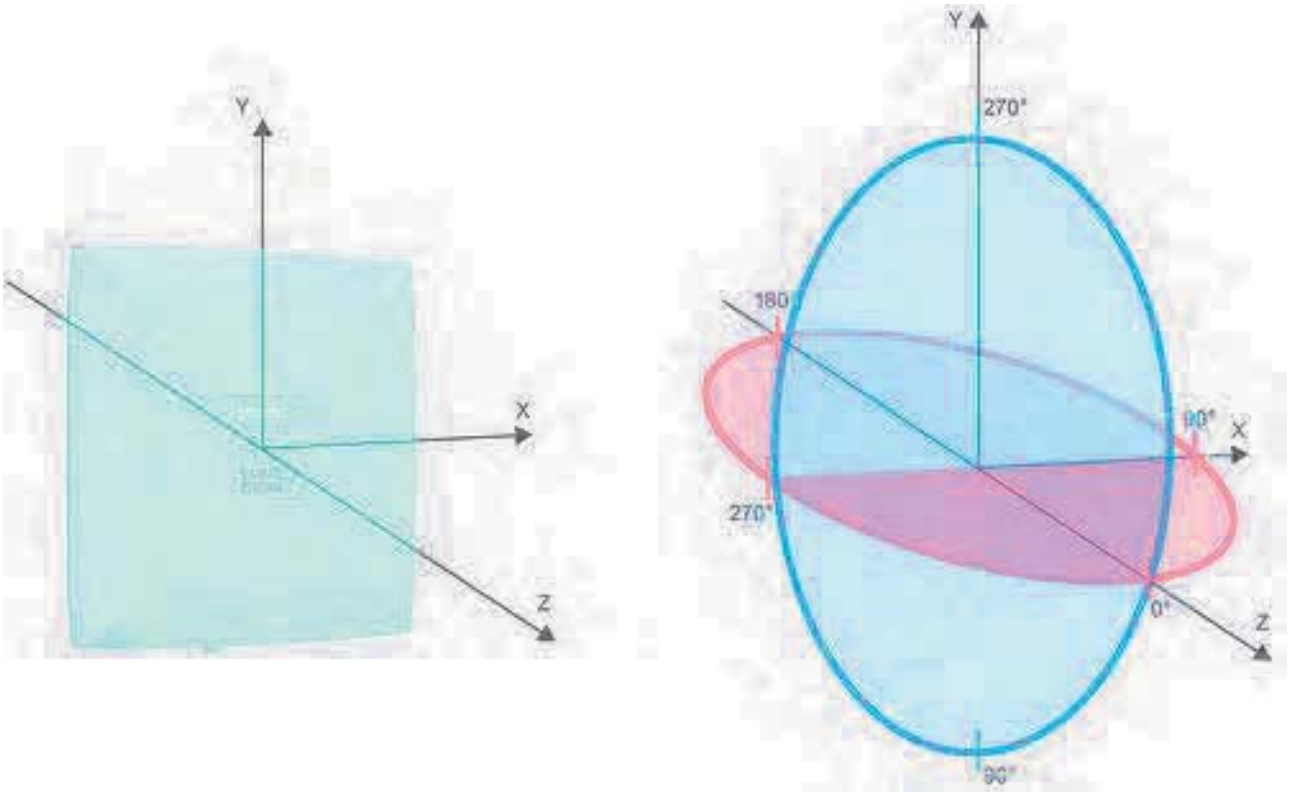
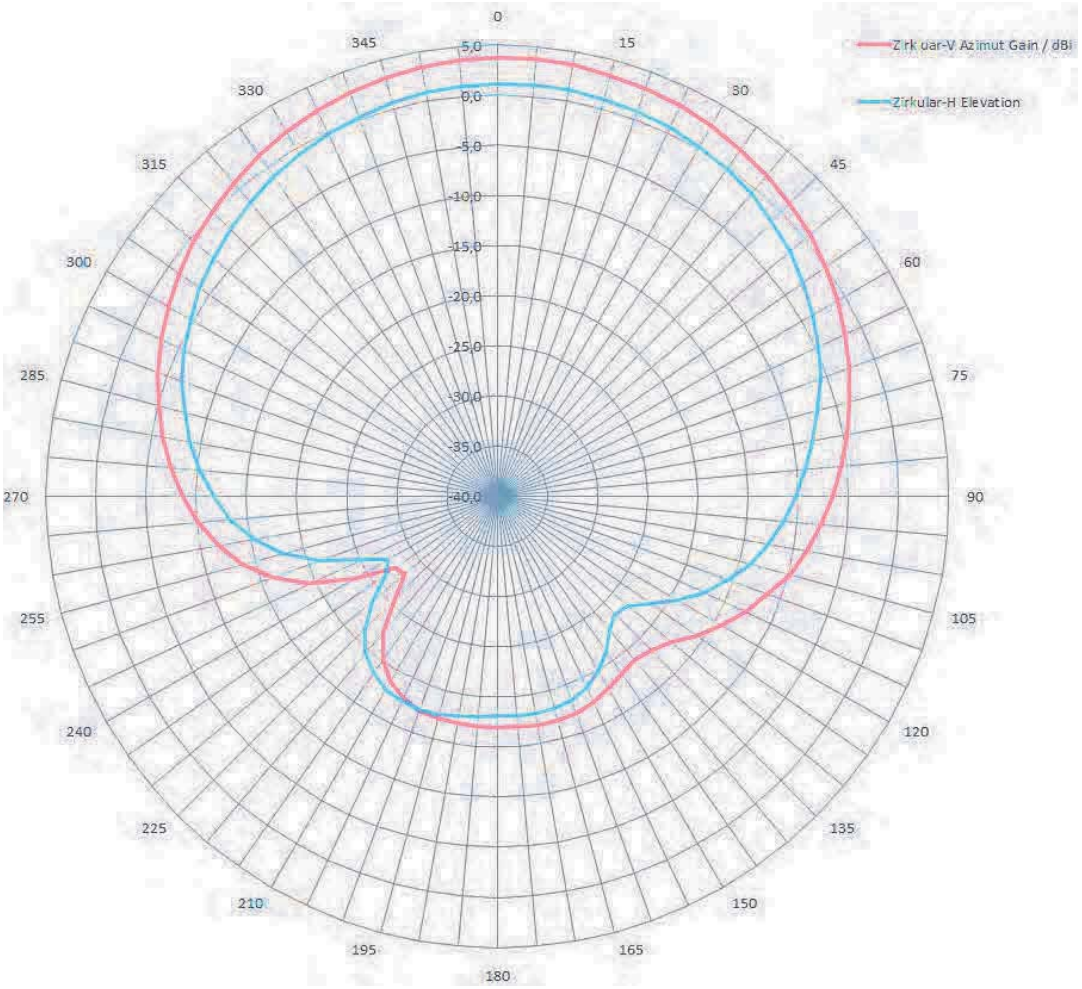


Figure 6-44 Reference system

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 321).

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

Radiation diagram (circular) in the FCC frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-45 Directional radiation pattern of the RF650A in the FCC frequency band

6.6.6.3 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/dBic value and a second dBi/dBic value.

Table 6- 31 Interpretation of directional radiation patterns

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 in "Antenna patterns in the ETSI frequency band (Page 317)" the maximum antenna gain in the vertical plane is 3.45 dBi (6.45 dBic). In this plane, and with the polarization axis of the transponder parallel to the axis of symmetry of the antenna, the antenna gain drops to about 0.5 dBic at +50° or 310°. This means that the dBr value is -6. The antenna range is only +50% of the maximum range at + 50° or 310° from the Z axis within the vertical plane (see values shown in blue in the directional radiation pattern: Characteristic of the vertical plane of the antenna (Page 317)and the associated representation of the reference system (Page 317)).

6.6.7 Technical data

Table 6- 32 Technical specifications for the RF650A antenna

	6GT2812-0GB08
Product type designation	SIMATIC RF650A
Radio frequencies	
Operating frequency	865 to 928 MHz
Maximum radiated power	
• ETSI	• RF650R: ≤ 1365 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• FCC	• RF650R: ≤ 2240 mW EIRP RF680R/RF685R: ≤ 4000 mW EIRP
• CMIIT	• RF650R: ≤ 1365 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 4000 mW EIRP
Antenna gain	
• ETSI	• 4 dBi (7 dBic)
• FCC	• 3.5 dBi (6.5 dBic)
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm [1)]	
• ETSI	• Horizontal plane: 83° Vertical plane: 70° see section "Antenna patterns in the ETSI frequency band (Page 317)"
• FCC	• Horizontal plane: 90° Vertical plane: 76° see section "Antenna patterns in the FCC frequency band (Page 319)"
Front-to-back ratio	
• ETSI	• 15 dB ± 2 dB (depends on orientation of the transpond-er)
• FCC	• 17.5 dB ± 2.5 dB (depends on orientation of the transpond-er)

	6GT2812-0GB08
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Circular
VSWR (standing wave ratio)	≤ 1.45
Power	≤ 2 W
Interfaces	
Plug connection	RP-TNC coupling (for connection of the antenna cable)
Mechanical specifications	
Material	Pocan
Color	Pastel turquoise
Tightening torque (at room temperature)	≤ 2 Nm
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +75 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection	IP65
Shock resistant to EN 60068-2-27	30 g [2]
Vibrations according to EN 60068-2-6	10 g [2]
Design, dimensions and weight	
Dimensions (H x W x D)	198 x 198 x 60 mm
Weight	680 g
Standards, specifications, approvals	
Proof of suitability	CE (according to RED), FCC (Title 47, Part 15.247), cULus
MTBF	946 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.

6.6.8 Dimension drawing

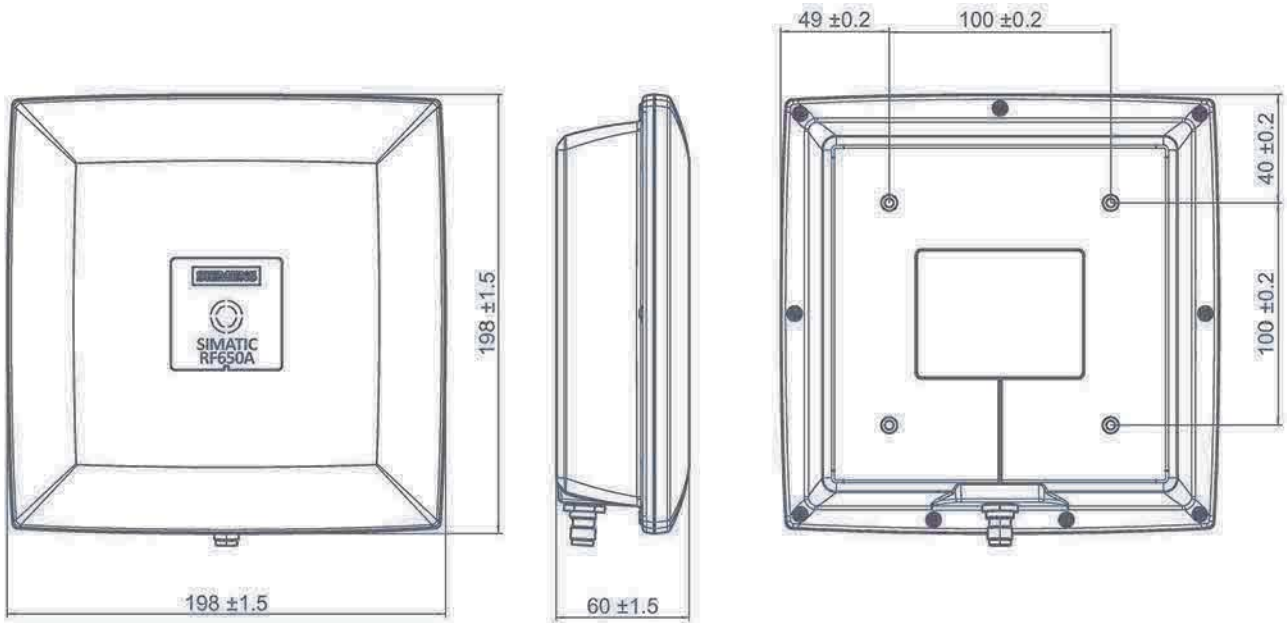


Figure 6-46 Dimension drawing RF650A

All dimensions in mm

6.6.9 Approvals & certificates

Table 6- 33 6GT2812-0GB08

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

Table 6- 34 6GT2812-0GB08

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-RF615R (for RF615R: 6GT2811-6CC10-1AA0) • FCC ID: NXW-RF600R2 (for RF650R: 6GT2811-6AB20-1AA0, RF680R: 6GT2811-6AA10-1AA0, RF685R: 6GT2811-6CA10-1AA0)
Industry Canada Radio Standards Specifications	RSS-247 Issue 2 The approval for Industry Canada is granted in association with the Industry Canada approval of the following RF600 readers: • IC: 267X-RF615R, Model RF615R (for 6GT2811-6CC10-1AA0) 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 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

6.7 SIMATIC RF660A

6.7.1 Characteristics

SIMATIC RF660A	Characteristics	
	Area of application	The SIMATIC RF660A is a universal UHF antenna with high range for industrial applications in production and logistics.
	Frequency ranges	• 865 to 868 MHz (RF660A FCC) • 902 to 928 MHz (RF660A FCC)
	Read range	Max. 8 m
	Polarization	Circular
	Degree of protection	IP67
	Mounting	4 x M4 (VESA 100 fixing system)
	Connector	The antenna is connected directly to the housing with an RP-TNC coupling.

Frequency ranges

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

- RF660A ETSI: 865 to 868 MHz
- RF660A FCC: 902 to 928 MHz

Function

The SIMATIC RF660A 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.

6.7.2 Ordering data

Table 6- 35 Ordering data RF660A

Product	Article number
SIMATIC RF660A (ETSI)	6GT2812-0AA00
SIMATIC RF660A (FCC)	6GT2812-0AA01

Table 6- 36 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

6.7.3 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.

6.7.4 Connecting the antenna

The SIMATIC RF660A 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 1m), 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.

Figure 6-47 Rear of antenna with RTNC connection

6.7.4.1 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- 37 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

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
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.

6.7.5 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 RF660A 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: 7 dBi (10 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 RF660A 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: ≤ 6 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 RF660A 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: 6 dBi (9 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 RF660A 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)

6.7.6 Antenna patterns

Spatial directional radiation pattern

The following schematic diagram shows the main and auxiliary fields of the RF660A antenna in free space in the absence of reflecting/absorbing materials. Please note that the diagram is not to scale.

The recommended working range lies within the main field that is shown in green.

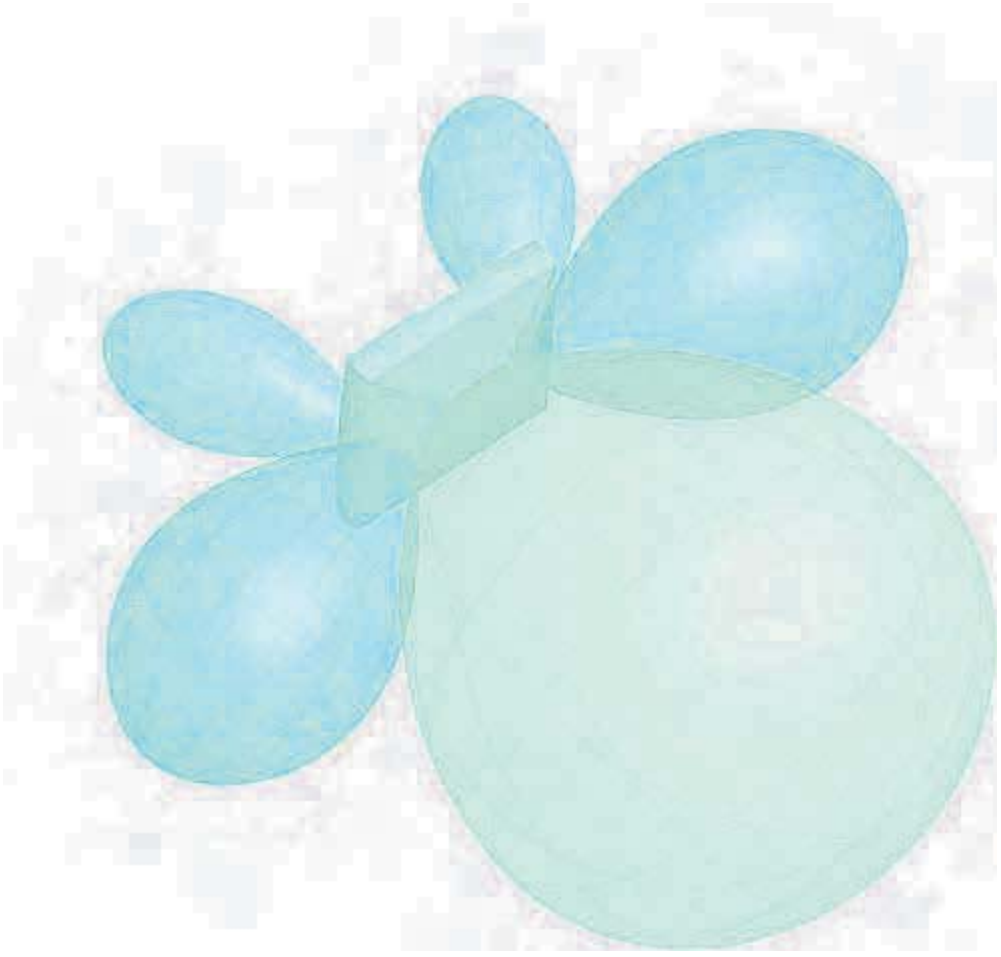


Figure 6-48 Main and auxiliary fields of the RF660A antenna

Radiation diagram (horizontal)

Europe (ETSI)

The radiation diagram is shown for horizontal alignment and for a center frequency of 865 MHz. Horizontal antenna alignment is provided when the TNC connection on the antenna points vertically up or down.

The radiating/receiving angle of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power referred to the maximum performance at a 0° angle).

The optimum radiating/receiving angle is therefore approximately ±30 degrees.

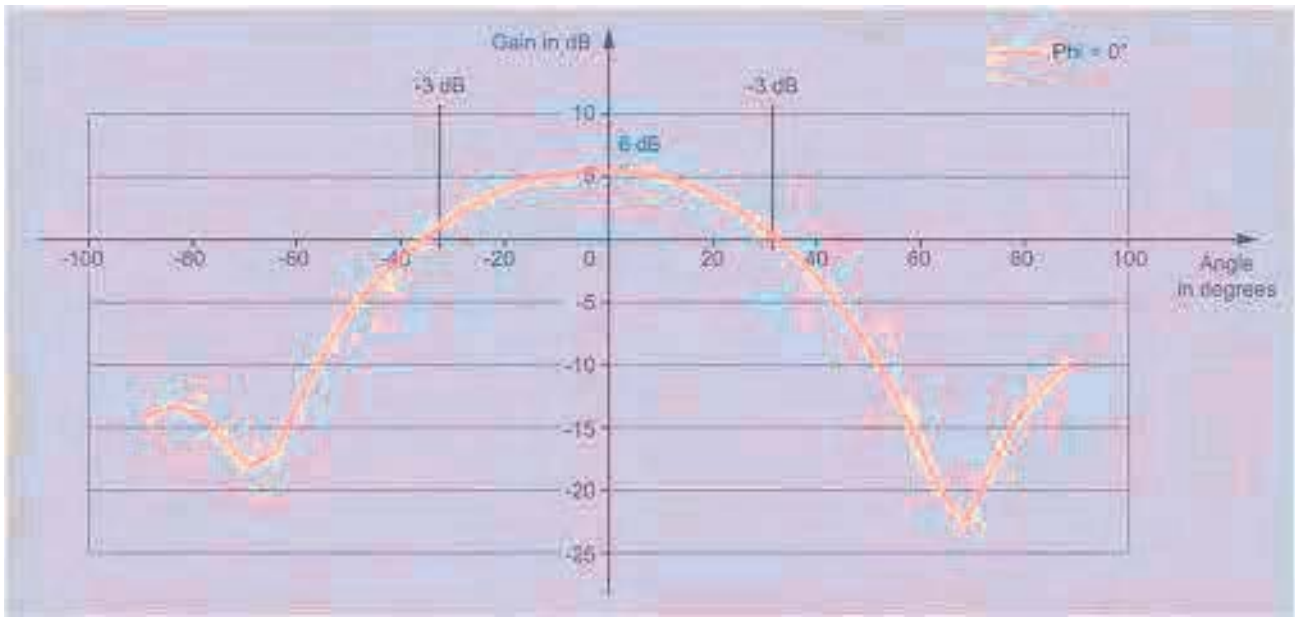


Figure 6-49 Directional radiation pattern of the antenna (at 865 MHz, horizontal alignment)

USA (FCC)

The radiation diagram is shown for horizontal alignment and for a center frequency of 915 MHz.

The radiating/receiving angle of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power referred to the maximum performance at a 0° angle).

The optimum radiating/receiving angle is therefore approximately ±35 degrees.

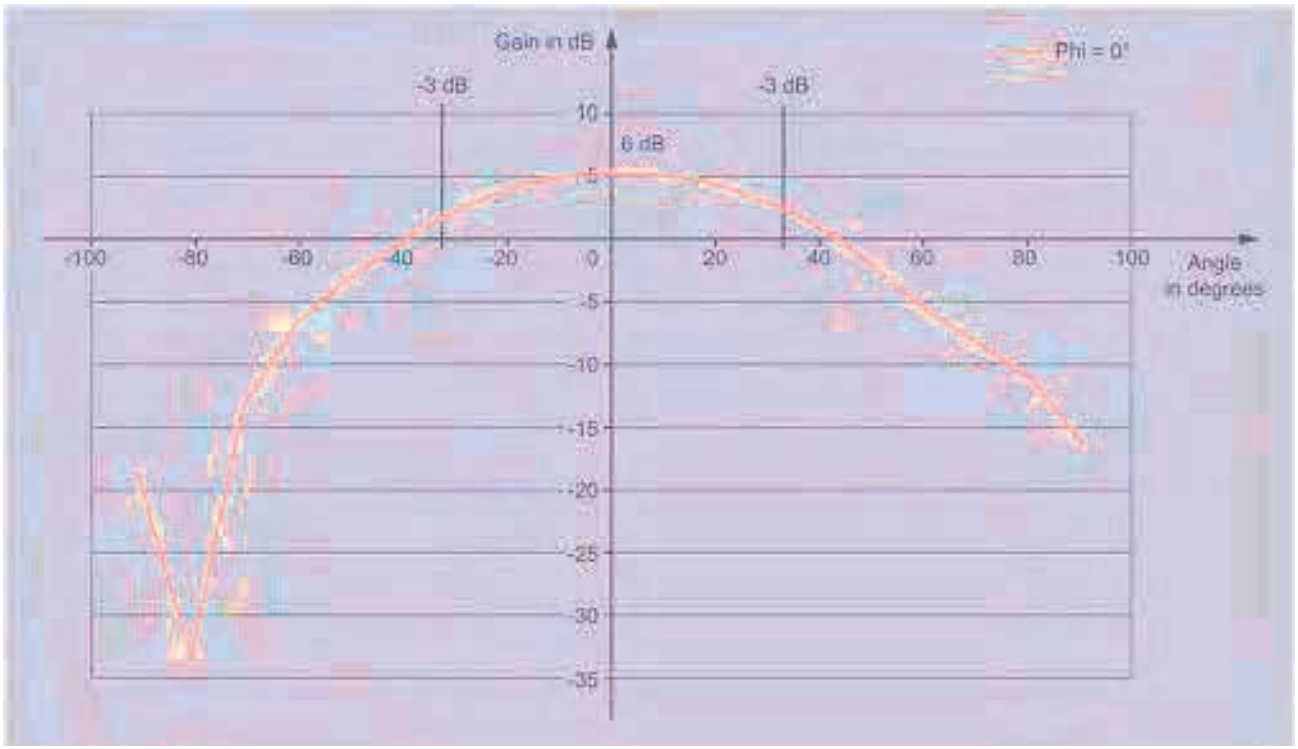


Figure 6-50 Directional radiation pattern of the antenna (at 915 MHz, horizontal alignment)

6.7.7 Technical data

Table 6- 38 Technical specifications for the RF660A antenna

	6GT2812-0AA0x
Product type designation	SIMATIC RF660A
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Maximum radiated power	
• ETSI	• RF650R: ≤ 2000 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• FCC	• RF650R: ≤ 4000 mW EIRP RF680R/RF685R: ≤ 4000 mW EIRP
• CMIIT	• RF650R: ≤ 2000 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 4000 mW EIRP
Antenna gain	
• ETSI	• 5 ... 7 dBi (8 ... 10 dBic)
• FCC	• 6 dBi (9 dBic)
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm [1)]	
• ETSI	• Horizontal plane: 55° Vertical plane: 60° see section "Antenna patterns (Page 331)"
• FCC	• Horizontal plane: 60° Vertical plane: 75° see section "Antenna patterns (Page 331)"
Front-to-back ratio	
• ETSI	• 10 dB ± 2 dB
• FCC	• 15 dB ± 2 dB

	6GT2812-0AA0x
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Circular
VSWR (standing wave ratio)	≤ 2
Power	≤ 2 W
Interfaces	
Plug connection	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	• -25 ... +75 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection	IP67
Shock resistant to EN 60068-2-27	25.5 g [2]
Vibrations according to EN 60068-2-6	1 g [2]
Design, dimensions and weight	
Dimensions (H x W x D)	313 x 313 x 80 mm
Weight	1.6 kg
Standards, specifications, approvals	
Proof of suitability	CE (ETSI EN 302208), FCC (Title 47, Part 15.247), cULus
MTBF	228310 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.

6.7.8 Dimension drawing

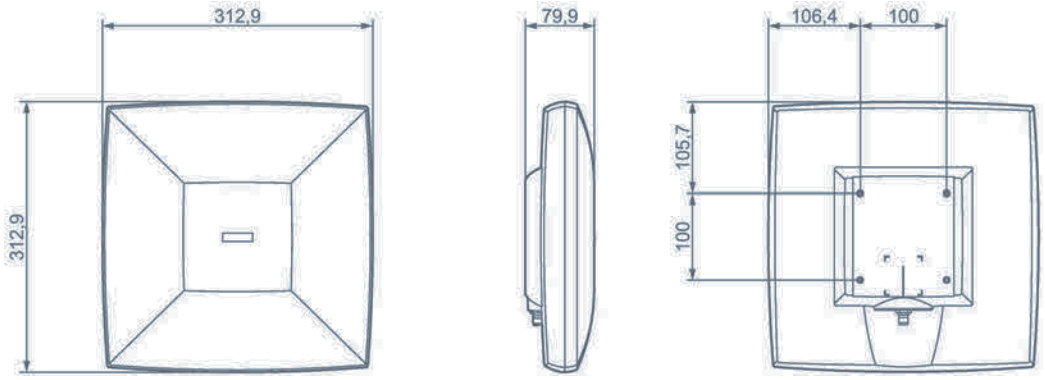


Figure 6-51 Dimension drawing RF660A

All dimensions in mm (± 0.5 mm tolerance)

6.7.9 Approvals & certificates

Table 6- 39 6GT2812-0AA00

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

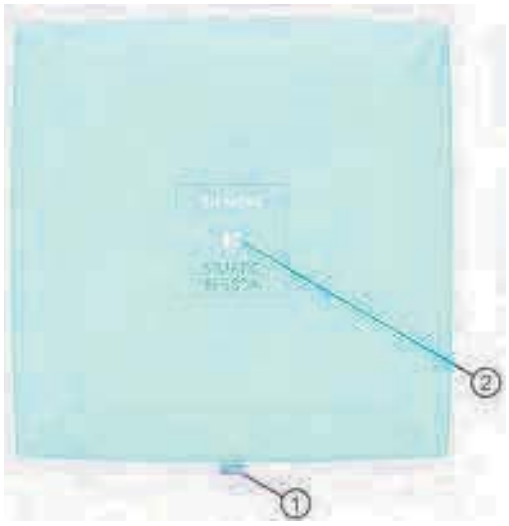
Table 6- 40 6GT2812-0AA01

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 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements • CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment • UL Report E 205089

6.8 SIMATIC RF680A

NOTICE
Note on release The use of the adaptive antenna SIMATIC RF680A with the readers RF650R, RF680R and RF685R as of version V2.2.0 (supplied as of 03/2016) is possible. You will find the version on the type plate of the device.

6.8.1 Characteristics

SIMATIC RF680A	Characteristics	
	Area of application	The SIMATIC RF680A is an adaptive UHF antenna in a medium size with high range for industrial applications in production and logistics.
	Frequency range	865 to 928 MHz
	Read range	Max. 8 m
	Polarization	Selectable (circular, linear horizontal, linear vertical)
	Degree of protection	IP65
	Mounting	4 x M4 (VESA 100 fixing system)
	Connector	The antenna is connected directly to the housing with an RP-TNC coupling ①.
	Status display	1 LED ②

Frequency ranges

The antenna is a broadband antenna and covers the frequency ranges from 865 to 928 MHz.

Function

The SIMATIC RF680A 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.

LED status display

The operating statuses of the antenna are displayed by an LED status display. The LED can adopt the colors green, red or yellow and the statuses off, on, flashing:

Table 6- 41 Display of operating statuses of the antenna

LED	Meaning
	LED static for 1 second when the reader starts up: The device is ready for operation and the connection to the reader is established; operational staus.
	The device is ready for operation but currently inactive.
	The device is active but there is no transponder in the antenna field.
	The device is active and there is at least one transponder in the antenna field.
	Identification of the antenna by the reader function "buzz test".
	There is an error or antenna firmware update is being made.

Indication of the quality of the antenna alignment (RSSI)

When aligning the antenna using the WBM, the three-color LED status display indicates the RSSI value with which the transponder was detected:

- Red: Low RSSI value
- Yellow: Medium RSSI value
- Green: High RSSI value

6.8.2 Ordering data

Table 6- 42 Ordering data RF680A

Product	Article number
SIMATIC RF680A	6GT2812-2GB08

Table 6- 43 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

6.8.3 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.

6.8.4 Connecting the antenna

The SIMATIC RF680A 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.

NOTICE
Connecting the antenna Do not connect the adaptive antenna RF680A during operation. Only connect the antenna to a reader that has been switched off and then restart the reader.

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 cables

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

Strain relief

To protect the antenna 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 RF600 antenna cable
② Mounting point for strain relief

Figure 6-52 Strain relief

6.8.4.1 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- 44 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)]

Cable designation	Article number	Length [m]	Cable loss [dB]	Bending radius [mm]
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.

6.8.5 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 RF680A 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: 3.5 dBi (6.5 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 RF680A 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: ≤ 3.5 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 RF680A 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: 3 dBi (6 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)

RF600 systems that are put into operation in Japan must not exceed the following radiated power with an RF680A 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)

6.8.6 Antenna patterns

Transponder alignment

The antenna RF680A has an adjustable antenna (circular or linear horizontal or linear vertical). With a circular antenna the alignment of the antenna axis of symmetry changes between horizontal and vertical each time it transmits. For this reason, with a circular antenna the alignment of the transponder polarization axis (horizontal/vertical) is unimportant. Make sure, however, that the transponder is aligned with the antenna.

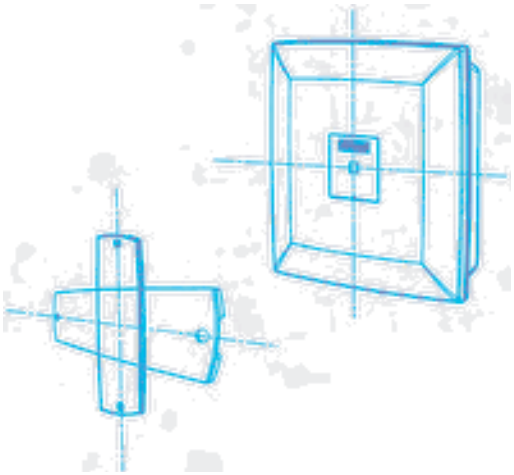


Figure 6-53 Alignment of the transponder polarization axis with a circular antenna axis of symmetry

With a linear vertical or linear horizontal antenna, the alignment of the transponder polarization axis, must correspond to the alignment of the antenna axis of symmetry.

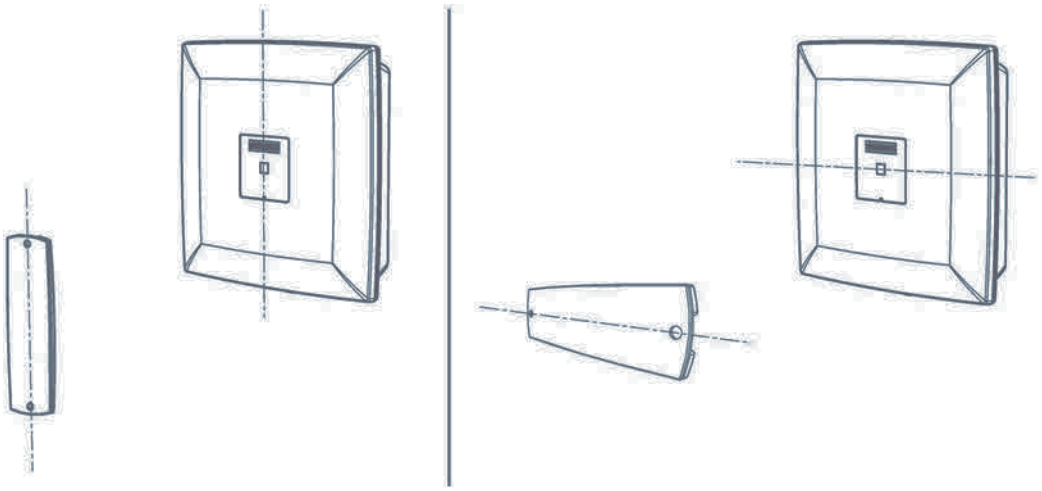


Figure 6-54 Alignment of the transponder polarization axis with a linear vertical or linear horizontal antenna axis of symmetry

6.8.6.1 Antenna 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.

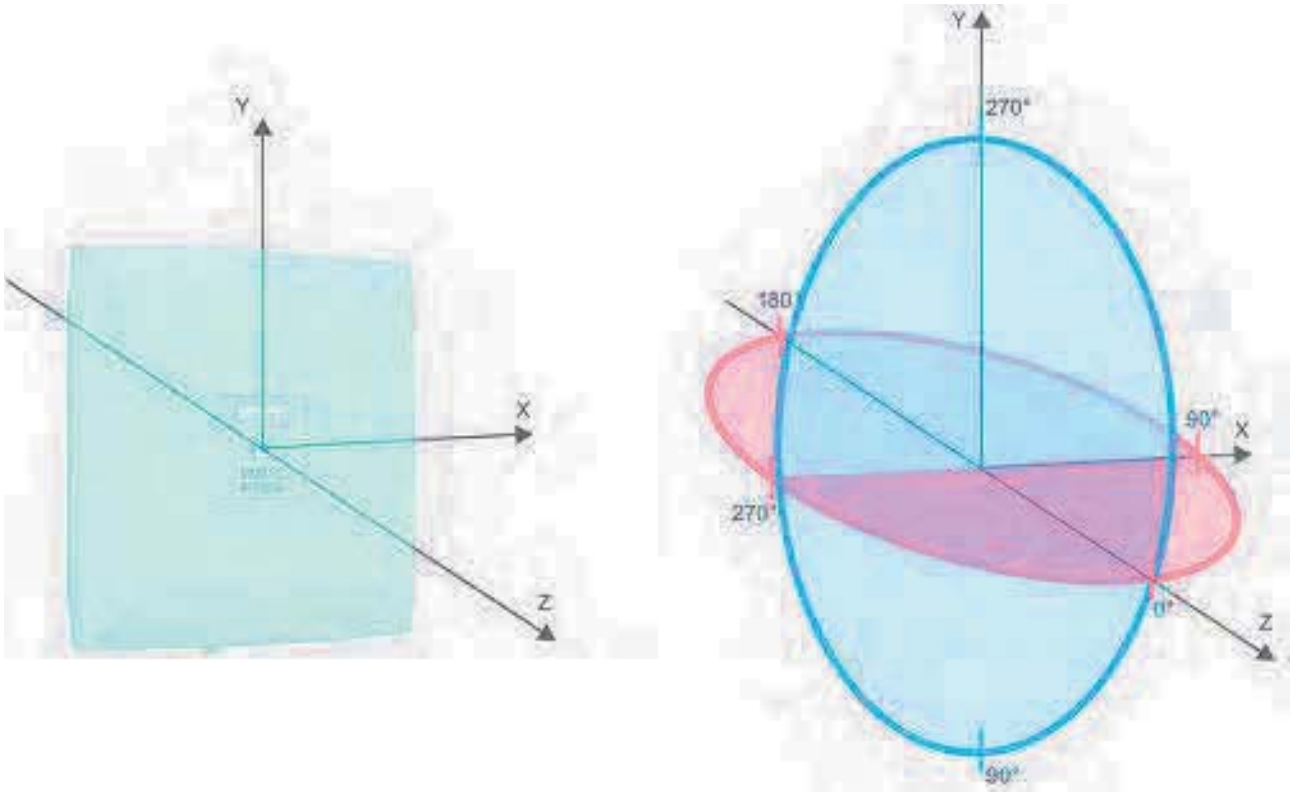
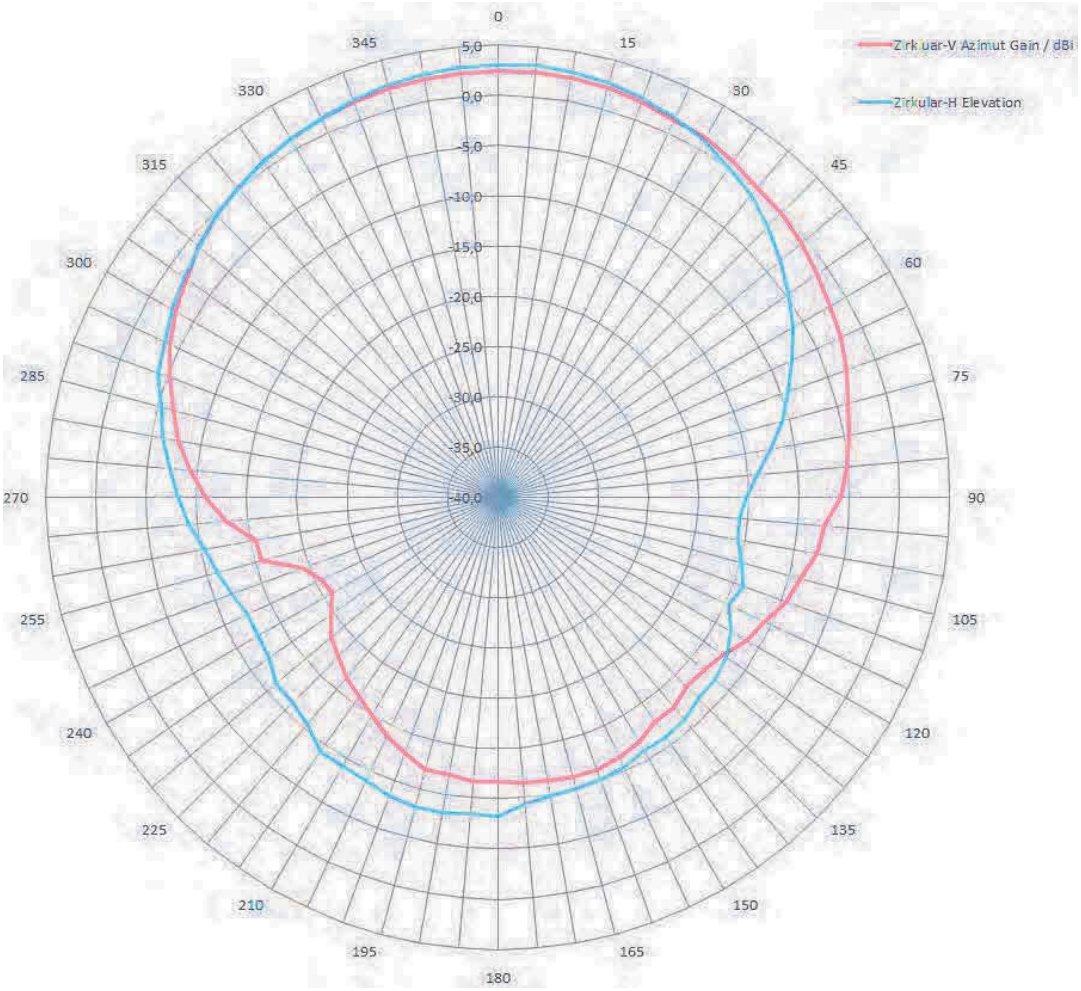


Figure 6-55 Reference system

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 354).

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

Radiation diagram circular in the ETSI frequency band

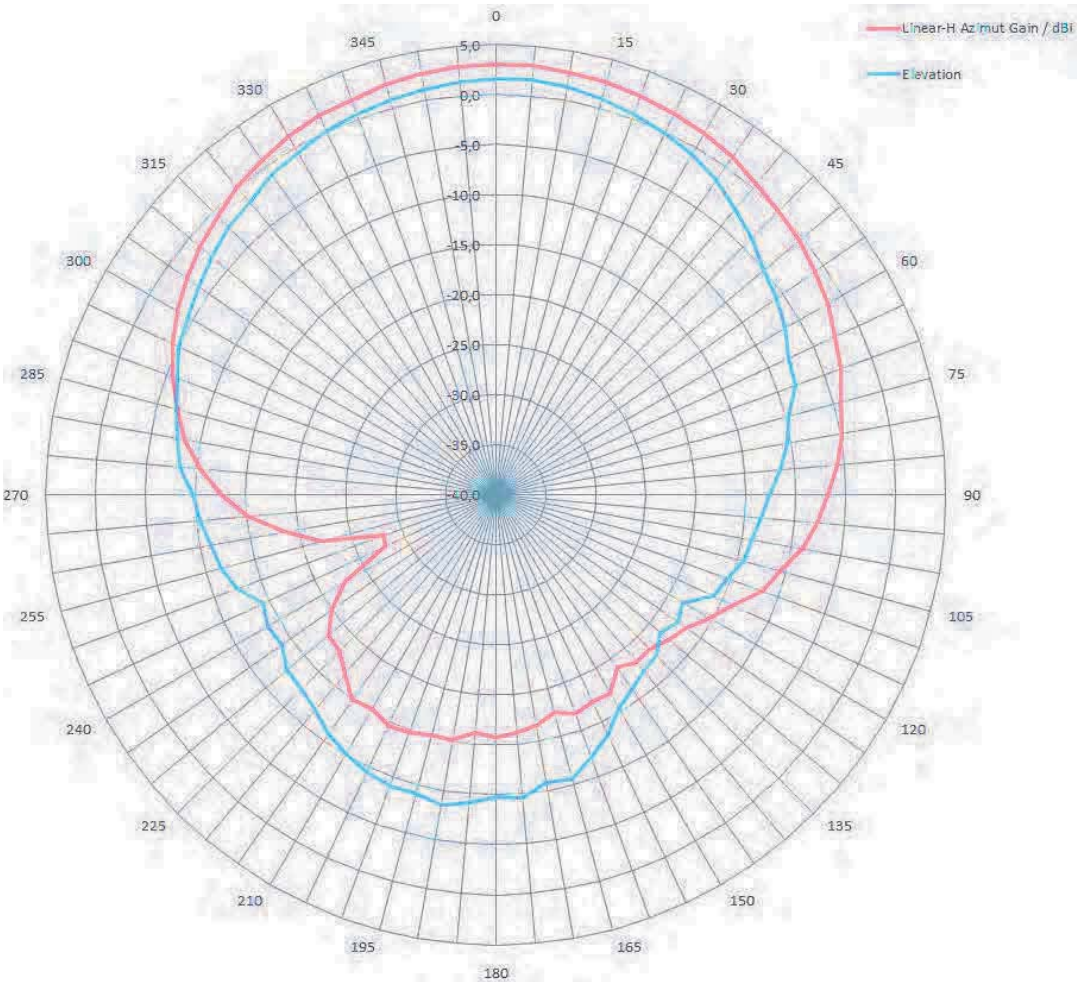


Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-56 Directional radiation pattern of RF680A in the ETSI frequency band

Radiation diagram (linear horizontal) in the ETSI frequency band

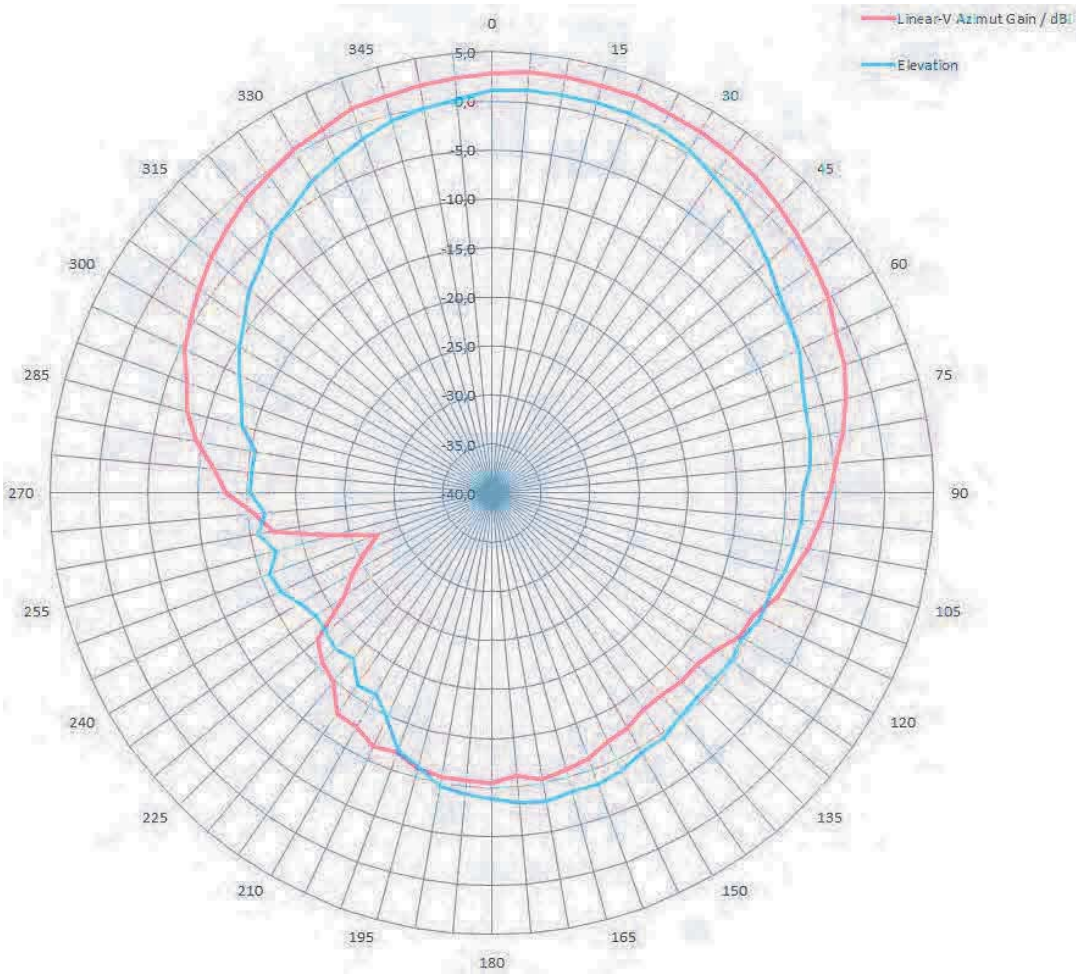


Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-57 The RF680A directional radiation pattern in the ETSI frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are aligned horizontally

Radiation diagram (linear vertical) in the ETSI frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-58 The RF680A directional radiation pattern in the ETSI frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are aligned vertically

6.8.6.2 Antenna patterns in the FCC frequency band

Directional radiation pattern FCC

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

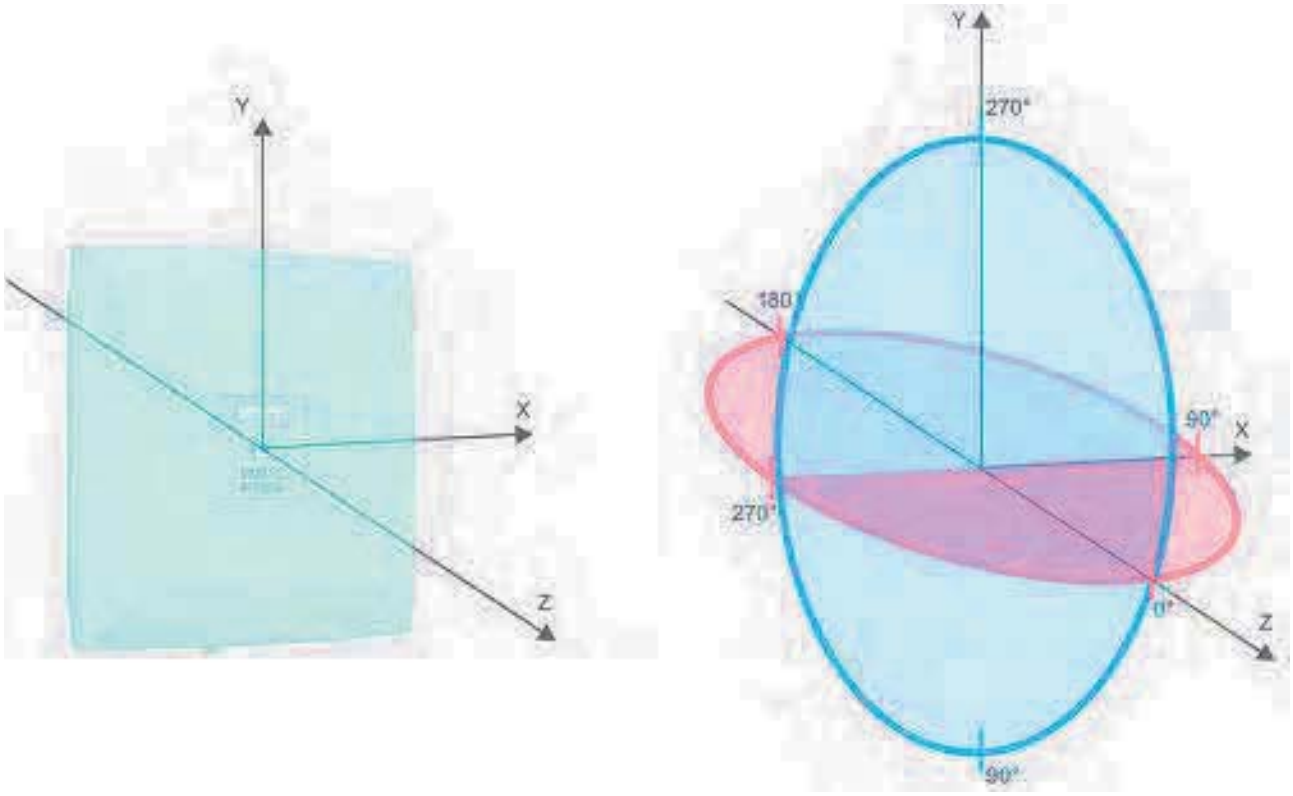
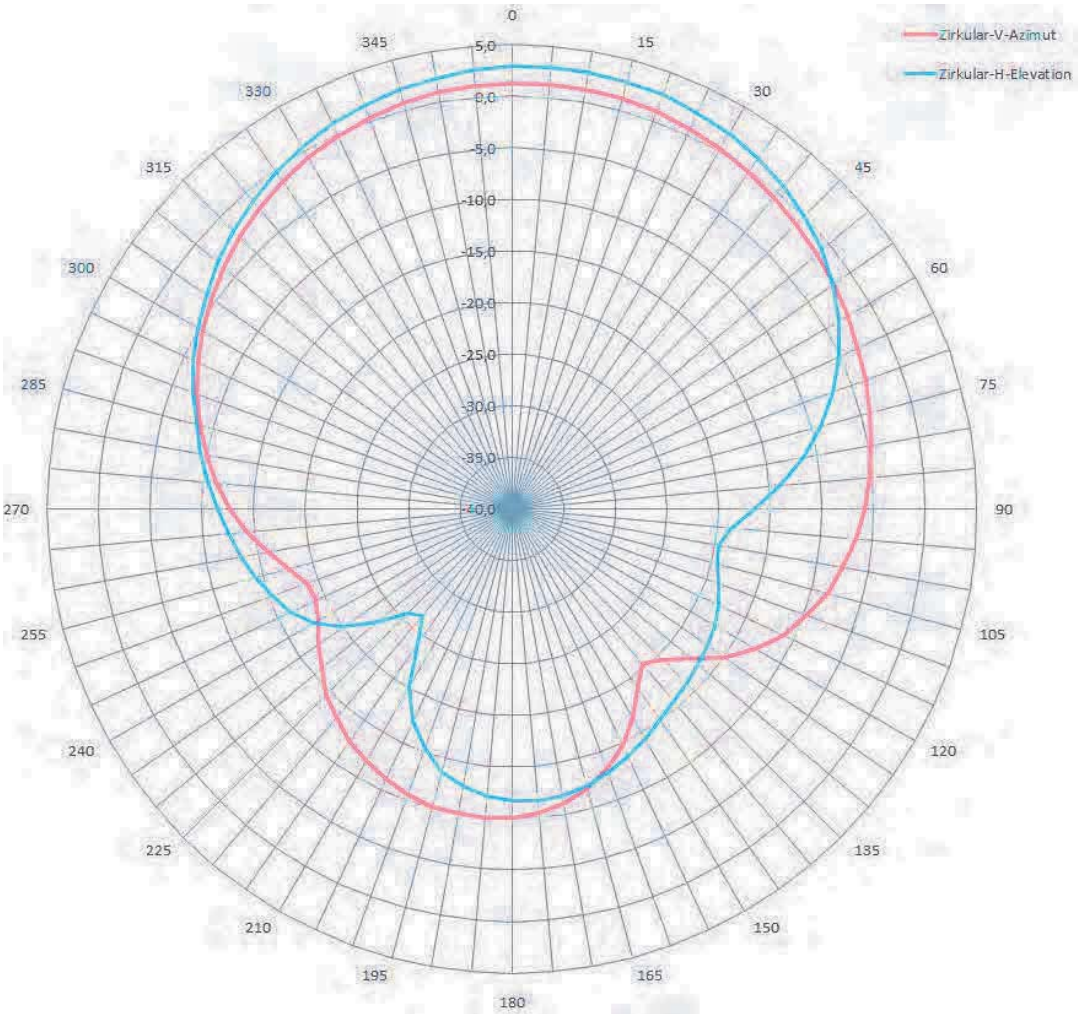


Figure 6-59 Reference system

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 354).

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

Radiation diagram circular in the FCC frequency band

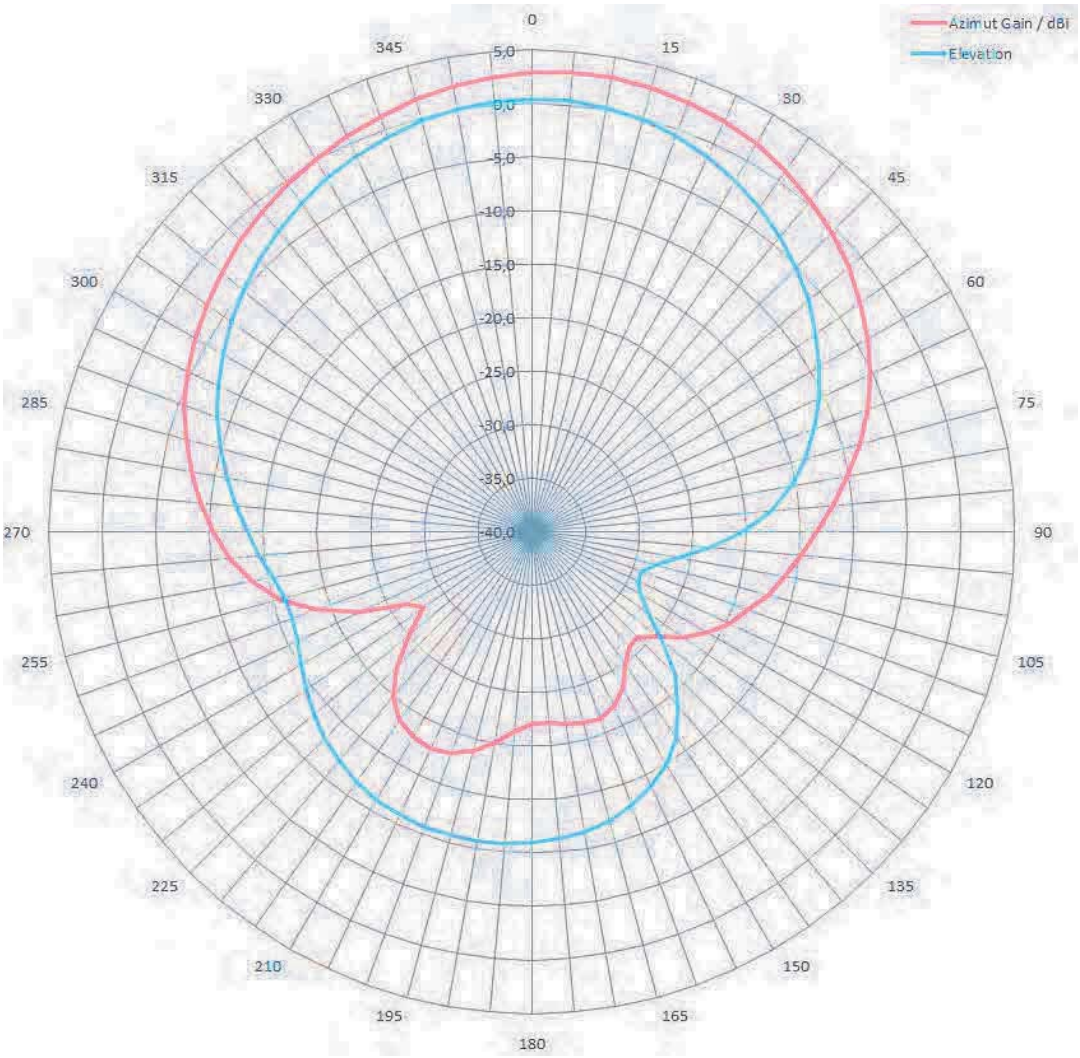


Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-60 Directional radiation pattern of the RF680A in the FCC frequency band

Radiation diagram (linear horizontal) in the FCC frequency band

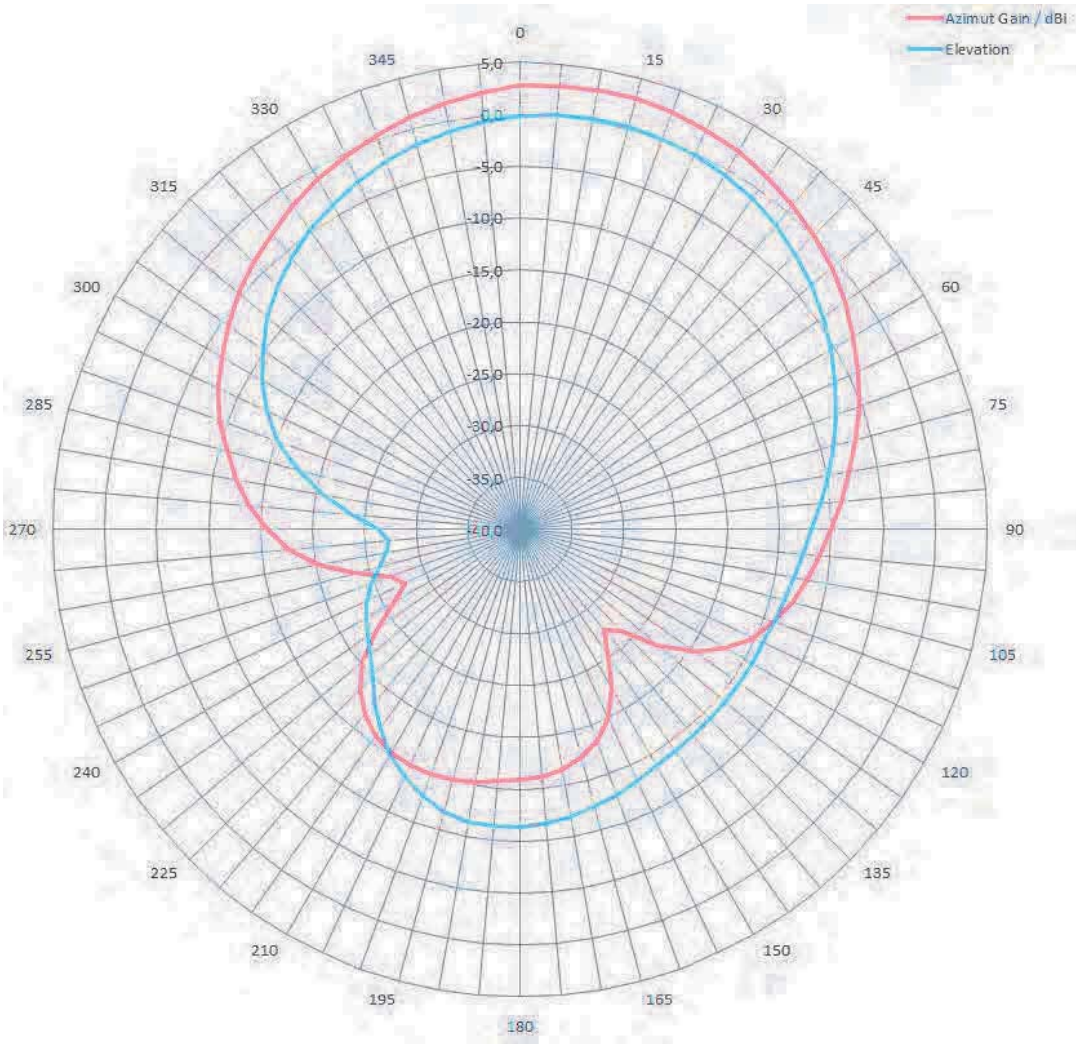


Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-61 The RF680A directional radiation pattern in the FCC frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are aligned horizontally

Radiation diagram (linear vertical) in the FCC frequency band



Pattern of the vertical plane of the antenna

Pattern of the horizontal plane of the antenna

Figure 6-62 The RF680A directional radiation pattern in the FCC frequency band, axis of symmetry of the antenna, and polarization axis of the transponder are aligned vertically

6.8.6.3 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/dBic value and a second dBi/dBic value.

Table 6- 45 Interpretation of directional radiation patterns

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 in "Antenna patterns in the ETSI frequency band (Page 346)" the maximum antenna gain in the vertical plane is 3.45 dBi (6.45 dBic). In this plane, and with the polarization axis of the transponder parallel to the axis of symmetry of the antenna, the antenna gain drops to about 0.5 dBic at +50° or 310°. This means that the dBr value is -6. The antenna range is only +50% of the maximum range at + 50° or 310° from the Z axis within the vertical plane (see values shown in blue in the directional radiation pattern: Characteristic of the vertical plane of the antenna (Page 346)and the associated representation of the reference system (Page 346)).

6.8.7 Technical data

Table 6- 46 Technical specifications for the RF680A antenna

	6GT2812-2GB08
Product type designation	SIMATIC RF680A
Radio frequencies	
Operating frequency	865 to 928 MHz
Maximum radiated power	
• ETSI	• RF650R: ≤ 1220 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• FCC	• RF650R: ≤ 2000 mW EIRP RF680R/RF685R: ≤ 4000 mW EIRP
• CMIIT	• RF650R: ≤ 1220 mW ERP RF680R/RF685R: ≤ 2000 mW ERP
• ARIB	• STD-T107: RF650R: ≤ 500 mW EIRP • STD-T106: RF680R/RF685R: < 4000 mW EIRP
Antenna gain	
• ETSI	• 3.5 dBi (6.5 dBic)
• FCC	• 3.5 dBi (6.5 dBic)
Opening angle for sending/receiving when mounted on a metal surface of 15 cm x 15 cm [1)]	
• ETSI	• Horizontal plane: 87° Vertical plane: 80° see section "Antenna patterns in the ETSI frequency band (Page 346)"
• FCC	• Horizontal plane: 90° Vertical plane: 77° see section "Antenna patterns in the FCC frequency band (Page 350)"
Front-to-back ratio	
• ETSI	• 14 dB ± 4 dB (depends on orientation of the transponder)
• FCC	• 14 dB ± 4 dB (depends on orientation of the transponder)

	6GT2812-2GB08
Electrical data	
Range	See section "Maximum read/write ranges of transponders (Page 59)"
Impedance	50 Ω
Polarization	Linear, circular (can be switched over)
VSWR (standing wave ratio)	≤ 1.45
Power	≤ 2 W
Interfaces	
Plug connection	RP-TNC coupling (for connection of the antenna cable)
Mechanical specifications	
Material	Pocan
Color	Pastel turquoise
Tightening torque (at room temperature)	≤ 2 Nm
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +75 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection	IP65
Shock resistant to EN 60068-2-27	30 g [2]
Vibrations according to EN 60068-2-6	10 g [2]
Design, dimensions and weight	
Dimensions (H x W x D)	198 x 198 x 60 mm
Weight	690 g
Status display	1 LED
Standards, specifications, approvals	
Proof of suitability	CE (according to RED), FCC (Title 47, Part 15.247), cULus
MTBF	218 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.

6.8.8 Dimension drawing

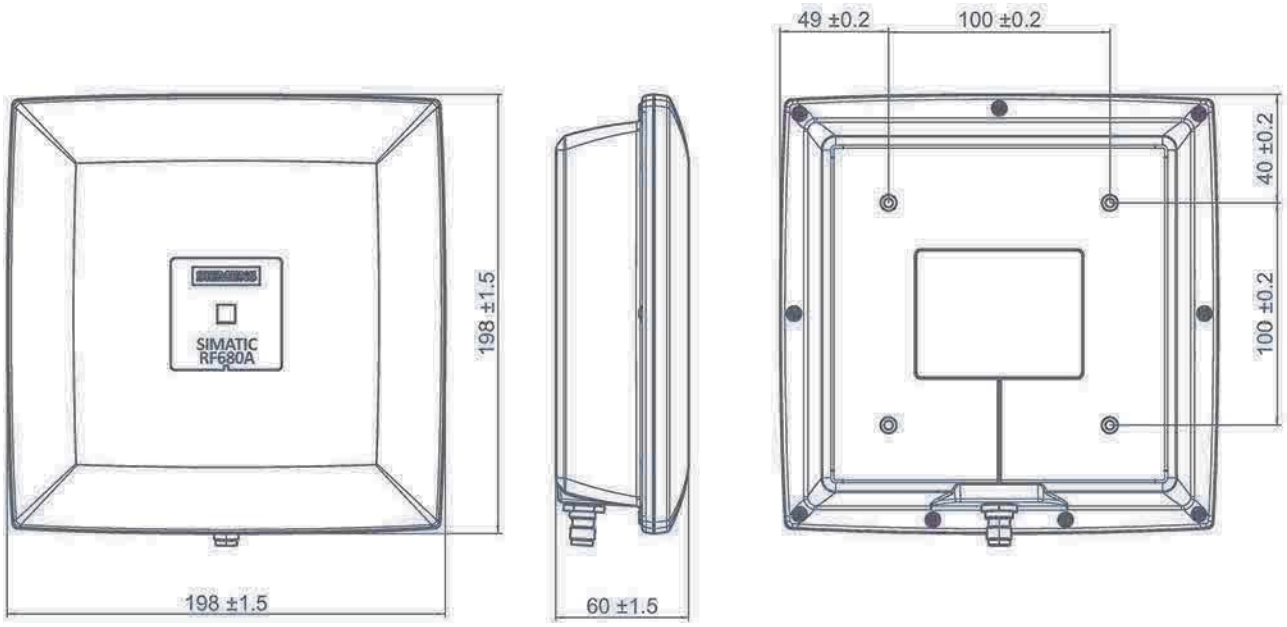


Figure 6-63 Dimension drawing RF680A

All dimensions in mm

6.8.9 Approvals & certificates

Table 6- 47 6GT2812-2GB08

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

Table 6- 48 6GT2812-2GB08

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 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements • CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment • UL Report E115352
	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 antenna: MSIP-REI-S49-RF680A

Transponder

7

7.1 Overview

7.1.1 Mode of operation of transponders

The transponder mainly comprises a microchip with an integrated memory and a dipole antenna.

The principle of operation of a passive RFID transponder is as follows:

- Diversion of some of the high-frequency energy emitted by the reader to supply power to the integrated chip
- Receiving commands from the reader
- Responses are transmitted to the reader antenna by modulating the reflected radio waves (backscatter technique)

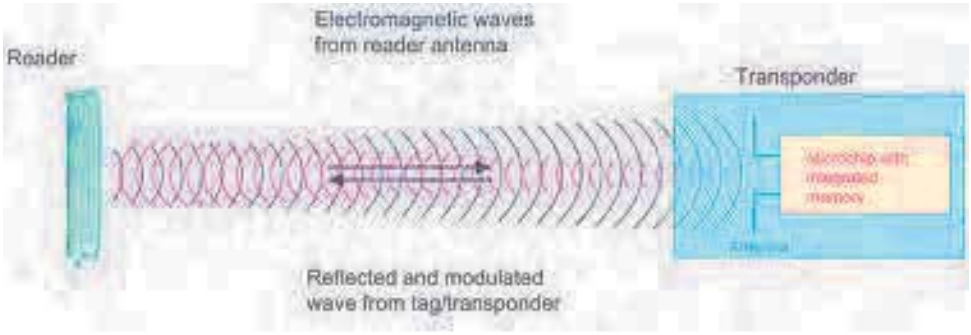


Figure 7-1 Mode of operation of transponders

The transmission ranges achieved vary depending on the size of the transponder and therefore its dipole antenna. In general the following rule applies: The smaller the transponder and therefore the antenna, the shorter the range.

7.1.2 Transponder classes and generations

The transponder classes are distinguished by the different communication protocols used between the reader and transponder. Transponder classes are usually not mutually compatible.

The following transponder classes/protocol types are supported by the RF600 system:

- ISO 18000-62
- ISO 18000-63

Transponders supported

RF600 system supports passive transponders with the following minimum characteristics:

- EPC ID (Electronic Product Code IDentifier)
- TID
- A function which permanently ensures that transponders no longer respond.
- After the lock programming can no longer be reprogrammed.

7.1.3 Electronic Product Code (EPC)

The Electronic Product Code (EPC) supports the unique identification of objects (e.g. retail items, logistical items or transport containers). This makes extremely accurate identification possible. In practical use, the EPC is stored on a transponder and scanned by the reader.

There are different EPC number schemes with different data lengths. Below is the structure of a GID-96-bit code (EPC Global Tag Data Standards V1.1 Rev. 1.27) :

- **Header:** identifies the EPC identification number that follows with regard to length, type, structure and version of the EPC
- **EPC Manager:** identifies the company/corporation
- **Object class**: Corresponds to the article number
- **Serial Number:** consecutive number of the article

The Siemens UHF transponders are all suitable for working with EPC and other number schemes. Before a transponder can work with a number scheme, the relevant numbers must first be written to the transponder.

Presetting of the EPC memory of industrial Siemens transponders RF6xxT

The first 12 bytes of the EPC memory ("0x00 - 0x0B") are preset. As of byte 13 ("0x0C") the EPC memory is not preset.

Table 7- 1 Presetting of the EPC memory

Address UID	Address with FB (UID)	Value
0x00	0xFF00	0x00
...	...	...
0x04	0xFF04	0x00
0x05	0xFF05	Transponder type [1]
0x06	0xFF06	Year produced [1]
0x07	0xFF07	Month produced [1]
0x08	0xFF08	Day produced [1]
0x09	0xFF09	Consecutive number [1]
0x0A	0xFF0A	
0x0B	0xFF0B	

[1] In the following table, these values are described in greater detail.

Note that the RF6xxT transponders cannot be disabled using a kill password.

Table 7- 2 Explanation of the values

Transponder type	Year produced	Month produced	Day produced	Consecutive number [1]		
RF620T = 0x3E	2018 = 0x12	Jan. = 0x01	01 = 0x01	0x00	0x00	0x01
RF625T = 0x8E	2019 = 0x13	Feb. = 0x02	02 = 0x02	0x00	0x00	0x02
RF630T = 0x3F	...	...	...	...	...	...
RF640T = 0x40	...	...	...	...	...	...
RF645T = 0x84	...	...	...	...	...	...
RF680T = 0x44	...	...	...	...	...	...
RF682T = 0x64	...	...	...	...	...	...
	...	Dec. = 0x0C	31 = 0x1F	0xFF	0xFF	0xFF

[1] The consecutive number is counted absolutely as of the respective production date and is therefore unique.

7.1.4 SIMATIC memory configuration of the RF600 transponders and labels

Special memory configuration of the RF600 transponders and smartlabels

Address spaces of the transponder versions

With the RF600 readers, the user data, TID, EPC and passwords are read out via the relevant memory banks. To read out the required data, the relevant memory bank must be selected.

The table above shows the area and length of the user data ("USER" column). You can read out the EPC-ID using an inventory command. As an alternative, you can also read out the EPC-ID using a Read command to memory bank 1, start address 0x04.

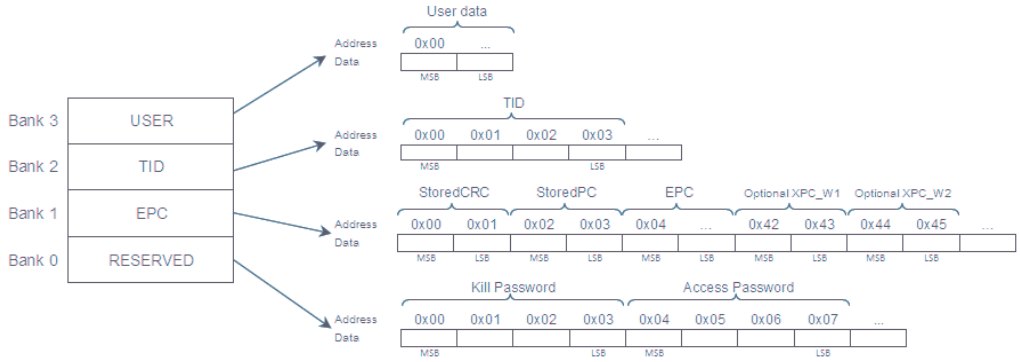


Figure 7-2 Memory configuration

Note

Information on the detailed memory configuration

The memory configuration of the various transponders and smartlabels varies and depends on the chip type used. You will find detailed information of the memory configuration in the data sheets of the chip manufacturer.

Note

Preset EPC ID

The EPC ID of the transponders RF620T to RF680T are preset with a 12 byte long identifier. This identifier is based on a numbering scheme. You will find more information on this in the section "Electronic Product Code (EPC) (Page 360)".

7.1.5 Storage and transportation roll goods

NOTICE
Notes on storage and transportation of rolls Note the following information on the storage and transportation of rolls: • Protect the transponders from direct sunlight and heat (e.g. heating appliances). • Prior to use, store the label rolls in the polyethylene bag or the shrink film of the original packaging. • Store the label rolls in a cool and dry location. Ideal conditions: 18 °C ±5 °C, 40-60 % humidity • Stack several label rolls lying flat and centered one above the other. • Avoid external pressure (e.g. a narrow box).

Figure 7-3 Storage of transponders

7.2 SIMATIC RF630L Smartlabel

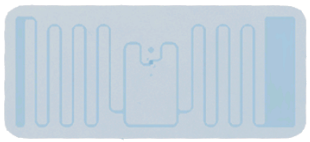
7.2.1 Features

SIMATIC RF630L smart labels are passive, maintenance-free data carriers based on UHF Class 1 Gen2 technology that are used to store the "Electronic Product Code" (EPC).

Smart labels offer numerous possible uses for a wide range of applications and support efficient logistics throughout the process chain.

Smartlabel SIMATIC RF630L (6GT2810-2AB0x)				
	6GT2810-2AB01-0AX1	6GT2810-2AB02-0AX0	6GT2810-2AB03	6GT2810-2AB04
Product photo				
Area of application	Simple identification such as barcode replacement or supplementation, through warehouse and distribution logistics, right up to product identification.			
EPC memory	32 bytes / 256 bits	12 ... 16 bytes / 96 ... 128 bits	12 ... 30 bytes / 96 ... 240 bits	32 bytes / 256 bits
User memory	64 bytes / 512 bits	64 bytes / 512 bits	64 bytes / 512 bits	64 bytes / 512 bits
Read range	max. 4 m [1]	Max. 5 m [1]		max. 4 m [1]
Mounting	Self-adhesive, for attaching to plastic surfaces.	Self-adhesive, for example for attaching to packaging units, paper or cartons		
	Not suitable for fixing straight onto metal or onto liquid containers			

[1] Depending on the environment, the reader/the antennas and the set power

Smartlabel SIMATIC RF630L (6GT2810-2AC82; 6GT2810-2AE8x)			
	6GT2810-2AC82	6GT2810-2AE80-0AX2	6GT2810-2AE81-0AX1
Product photo			
Area of application	Simple identification such as barcode replacement or supplementation, through warehouse and distribution logistics, right up to product identification.		
EPC memory	16 bytes / 128 bits	12 ... 60 bytes / 96 ... 480 bits [1]	16 bytes / 128 bits
User memory	16 bytes / 128 bits	16 ... 64 bytes / 128 ... 512 bits [1]	--
Read range	max. 3.5 m [2]	max. 4 m [2]	
Mounting	Self-adhesive, for attaching to plastic surfaces.		
	Not suitable for fixing straight onto metal or onto liquid containers		

[1] The EPC memory has a default size of 96 bits. If necessary, the EPC memory size can be expanded to 480 bits in increments of 16 bits at the cost of the user memory.

[2] Depending on the environment, the reader/the antennas and the configured power

7.2.2 Ordering data

Table 7- 3 Ordering data RF630L

Product	Article number
SIMATIC RF630L [1] Smartlabel 101.6 × 50.8 mm	6GT2810-2AB01-0AX1
SIMATIC RF630L [2] Smartlabel 97 × 27 mm	6GT2810-2AB02-0AX0
SIMATIC RF630L [3] Smartlabel 54 × 34 mm	6GT2810-2AB03
SIMATIC RF630L [3] Smartlabel 74 × 27 mm	6GT2810-2AB04
SIMATIC RF630L [4] Smartlabel 45 × 20 mm	6GT2810-2AC82
SIMATIC RF630L [5] Smartlabel 105 × 25 mm	6GT2810-2AE80-0AX2
SIMATIC RF630L [6] Smartlabel 90 × 30 mm	6GT2810-2AE81-0AX1

Delivery format

SIMATIC RF630L smart label is supplied in the following form:

- [1] 4 000 Smartlabels per packaging unit: 1 000 labels on a roll
  Minimum order quantity: 1 packaging unit (4 000 units)
- [2] 5 000 smart labels per packaging unit: 5 000 labels on one roll
  Minimum order quantity: 1 packaging unit (5 000 units)
- [3] 2 000 Smartlabels per packaging unit: 2 000 labels on one roll
  Minimum order quantity: 1 packaging unit (2 000 units)
- [4] 10 000 Smartlabels per packaging unit: 2 500 labels on a roll
  Minimum order quantity: 1 packaging unit (10 000 units)
- [5] 5 000 Smartlabels per packaging unit: 1 000 labels on a roll
  Minimum order quantity: 5 packaging unit (5 000 units)
- [6] 7 000 Smartlabels per packaging unit: 3 500 labels on a roll
  Minimum order quantity: 1 packaging unit (7 000 units)

7.2.3 Technical data

Table 7- 4 Technical specifications of the transponder SIMATIC RF630L

	6GT2810-2AB01-0AX1	6GT2810-2AB02-0AX0
Product type designation	SIMATIC RF630L	
Radio frequencies		
Operating frequency	860 to 960 MHz	
Memory		
Chip (manufacturer/type)	NXP / G2IM	IMPINJ / MONZA 4QT
Memory type	EEPROM	
Memory configuration		
• EPC	• 32 bytes / 256 bits	• 12 ... 16 bytes / 96 ... 128 bits
• User memory	• 64 bytes / 512 bits	• 64 bytes / 512 bits
• TID	• 12 bytes / 96 bits	• 4 bytes / 32 bits
Number of write cycles (< 40 °C)	> 10^5	
Number of read cycles (< 40 °C)	> 10^{14}	
Data retention time (< 40 °C)	30 years	

	6GT2810-2AB01-0AX1	6GT2810-2AB02-0AX0
Electrical data		
Range	≤ 4 m [1]	≤ 5 m [1]
Protocol	ISO 18000-63	
Transmission speed	≤ 320 kbps	
Polarization	Linear	
Multitag capability	Yes	
Mechanical specifications		
Material	Paper	
Silicone-free	Yes	
Color	White	
Antenna material	Aluminum	
Type of antenna	Shortened dipole	
Printing	Can be printed using heat transfer technique	
Roll core diameter	76 mm	
Roll outer diameter	≤ 120 mm	
Permitted ambient conditions		
Ambient temperature		
• In operation, during write/read access	• -25 ... +65 °C	• -40 ... +65 °C
• In operation, outside write/read access	• -25 ... +80 °C	• -40 ... +80 °C
• During transportation and storage	• +15 ... +25 °C [2]	
Distance from metal	Not suitable for mounting directly on metal	
Degree of protection	IP67 (when adhered)	
Resistance to mechanical stress	Torsion and bending stress conditionally permissible	
Design, dimensions and weight		
Dimensions (L x W x D)	101.6 x 50.8 × 0.3 mm	27 × 97 × 0.3 mm
Weight	1 g	

[1] The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[2] For more information, refer to the section "Storage and transportation roll goods (Page 363)".

Table 7- 5 Technical specifications of the transponder SIMATIC RF630L

	6GT2810-2AB03	6GT2810-2AB04
Product type designation	SIMATIC RF630L	
Radio frequencies		
Operating frequency	860 to 960 MHz	
Memory		
Chip (manufacturer/type)	NXP / G2XM	NXP / G2iM
Memory type	EEPROM	
Memory configuration		
• EPC	• 12 ... 30 bytes / 96 ... 240 bits	• 32 bytes / 256 bits
• User memory	• 64 bytes / 512 bits	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits	• 12 bytes / 96 bits
Number of write cycles (< 40 °C)	> 10^5	
Number of read cycles (< 40 °C)	> 10^{14}	
Data retention time (< 40 °C)	10 years	30 years
Electrical data		
Range	≤ 5 m [1)]	≤ 4 m [1)]
Protocol	ISO 18000-63	
Transmission speed	≤ 320 kbps	
Polarization	Linear	
Multitag capability	Yes	
Mechanical specifications		
Material	Paper	PET
Silicone-free	Yes	
Color	White	
Antenna material	Aluminum	
Type of antenna	Shortened dipole	
Printing	Can be printed using heat transfer technique	
Roll core diameter	76 mm	
Roll outer diameter	≤ 120 mm	

	6GT2810-2AB03	6GT2810-2AB04
Permitted ambient conditions		
Ambient temperature		
• In operation, during write/read access	• -40 ... +65 °C	• -20 ... +65 °C
• In operation, outside write/read access	• -40 ... +80 °C	• -20 ... +85 °C
• During transportation and storage	• +15 ... +25 °C [2]	
Distance from metal	Not suitable for mounting directly on metal	
Degree of protection	IP67 (when adhered)	
Resistance to mechanical stress	Torsion and bending stress conditionally permissible	
Design, dimensions and weight		
Dimensions (L x W x D)	34 × 54 × 0.3 mm	74 × 27 × 0.3 mm
Weight	1 g	

[1] The information relates to the maximum read range. You can find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[2] For more information, refer to the section "Storage and transportation roll goods (Page 363)".

Table 7- 6 Technical specifications of the transponder SIMATIC RF630L

	6GT2810-2AC82
Product type designation	SIMATIC RF630L
Radio frequencies	
Operating frequency	860 to 960 MHz
Memory	
Chip (manufacturer/type)	Alien / Higgs4
Memory type	EEPROM
Memory configuration	
• EPC	• 16 bytes / 128 bits [1)]
• User memory	• 16 bytes / 128 bits
• TID	• 24 bytes / 192 bits
Number of write cycles (≈ 22 °C)	> 10 000; at least 1 000
Number of read cycles (≈ 22 °C)	> 10^{14}
Data retention time (< 55 °C)	50 years
Electrical data	
Range	max. 3.5 m [2)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 Kbps
Polarization	Linear
Mechanical specifications	
Material	PET
Silicone-free	Yes
Color	White
Antenna material	Aluminum
Type of antenna	Compressed dipole
Printing	Can be printed using heat transfer technique
Roll core diameter	76.2 mm
Roll outer diameter	170 (±3) mm

	6GT2810-2AC82
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 … +85 °C
• In operation, outside write/read access	• -25 ... +85 °C Special feature: 1 hour at +95 °C
• During transportation and storage	• +5 ... +25 °C [3]
Distance from metal	Not suitable for mounting directly on metal
Degree of protection	IP67 [4]
Resistance to mechanical stress	Torsion and bending stress conditionally permissible
Design, dimensions and weight	
Dimensions (L x W x D)	45 (±0.5) × 20 (±0.5) x 0.3 mm
Weight	Approx. 0.5 g

[1] The EPC-ID has different IDs preset.

[2] The information relates to the maximum read range. You can find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3] For more information, refer to the section "Storage and transportation roll goods (Page 363)".

[4] When affixed and if the ambient conditions are adhered to (operating temperature -25 ... +85 °C).

Table 7- 7 Technical specifications of the transponder SIMATIC RF630L

	6GT2810-2AE80-0AX2	6GT2810-2AE81-0AX1
Product type designation	SIMATIC RF630L	
Radio frequencies		
Operating frequency	860 to 960 MHz	
Memory		
Chip (manufacturer/type)	Alien / Higgs3	NXP / G2iL
Memory type		
Memory configuration		
• EPC	• 12 ... 60 bytes / 96 ... 480 bits [1)]	• 16 bytes / 128 bits
• User memory	• 16 ... 64 bytes / 128 ... 512 bits [1)]	• --
• TID	• 4 bits / 32 Byte	• 8 bytes / 64 bits
Number of write cycles (≈ 22 °C)	> 100 000	
Number of read cycles (≈ 22 °C)	unlimited	
Data retention time (< 55 °C)	30 years	
Electrical data		
Range	≤ 4 m [2)]	
Protocol	ISO 18000-63	
Transmission speed	≤ 320 Kbps	
Polarization	Linear	
Mechanical specifications		
Material	PET	
Silicone-free	Yes	
Color	White	
Antenna material	Aluminum	
Type of antenna	ALN-9640 "Squiggle®" inlay	Belt
Printing	Can be printed using heat transfer technique	
Roll core diameter	76.2 mm	76.4 mm
Roll outer diameter	110 mm	200 (±3) mm
Winding direction	Wound to the outside	

	6GT2810-2AE80-0AX2	6GT2810-2AE81-0AX1
Permitted ambient conditions		
Ambient temperature		
• In operation, during write/read access	• -25 … +85 °C	• -25 … +85 °C
• In operation, outside write/read access	• -25 ... +85 °C Special feature: at +130 °C: Storage retention tested for 30 minutes	• -25 ... +85 °C Special feature: starting at +140 °C: No processing possible at -40 °C and +160 °C: Storage retention tested for 90 minutes
• During transportation and storage	• +5 ... +25 °C [3]	
Distance from metal	Not suitable for mounting directly on metal	
Degree of protection	IP67 [4]	
Resistance to mechanical stress	Torsion and bending stress conditionally permissible	
Design, dimensions and weight		
Dimensions (L x W x D)	105 (±1) × 25 (±1) × 0.3 mm	90 (±0.5) × 30 (±0.5) × 0.3 mm
Weight	Approx. 1 g	

[1] The EPC memory has a default size of 96 bits. If necessary, the EPC memory size can be expanded to 480 bits in increments of 16 bits at the cost of the user memory.

[2] The information relates to the maximum read range. You can find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3] For more information, refer to the section "Storage and transportation roll goods (Page 363)".

[4] When affixed and if the ambient conditions are adhered to (operating temperature -25 ... +85 °C).

7.2.4 Dimension drawings

All dimensions in [mm].

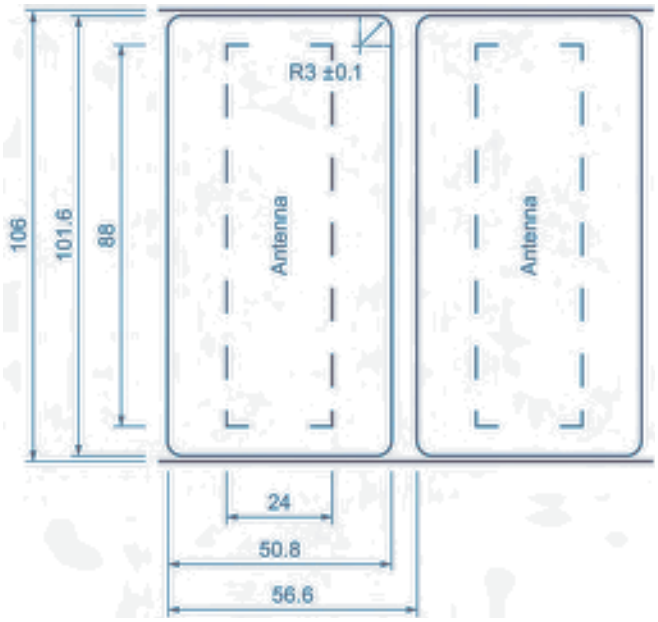


Figure 7-4 Dimension drawing SIMATIC RF630L (6GT2810-2AB01-0AX1)

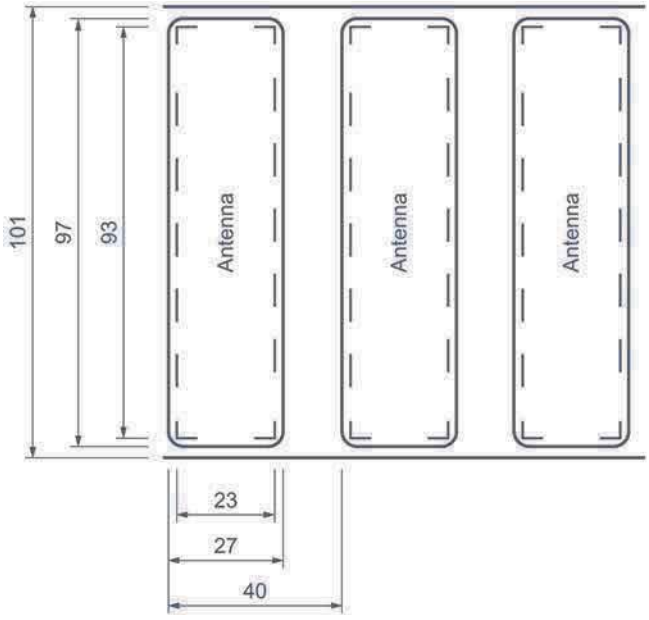


Figure 7-5 Dimension drawing SIMATIC RF630L (6GT2810-2AB02-0AX0)

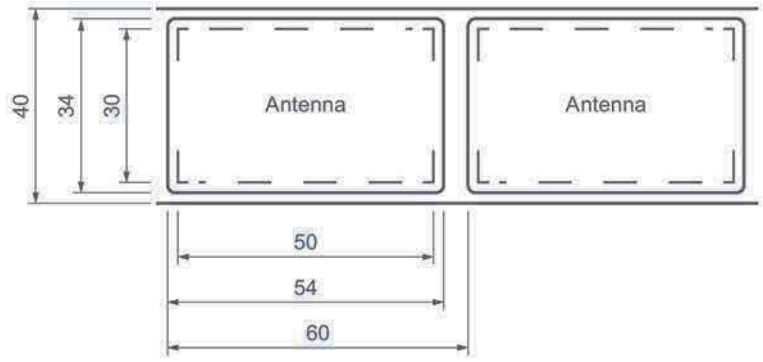


Figure 7-6 Dimension drawing SIMATIC RF630L (6GT2810-2AB03)

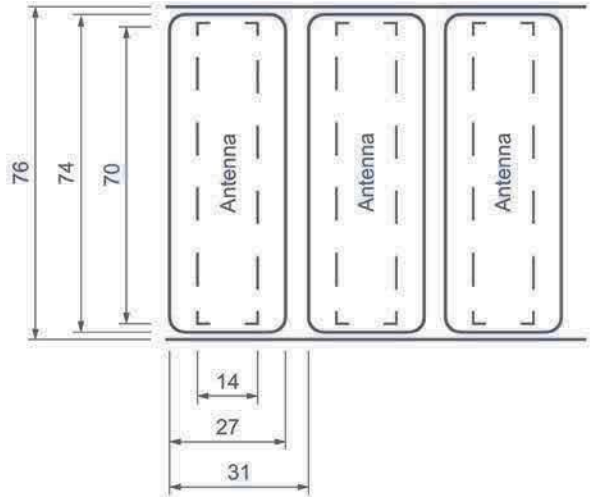


Figure 7-7 Dimension drawing SIMATIC RF630L (6GT2810-2AB04)

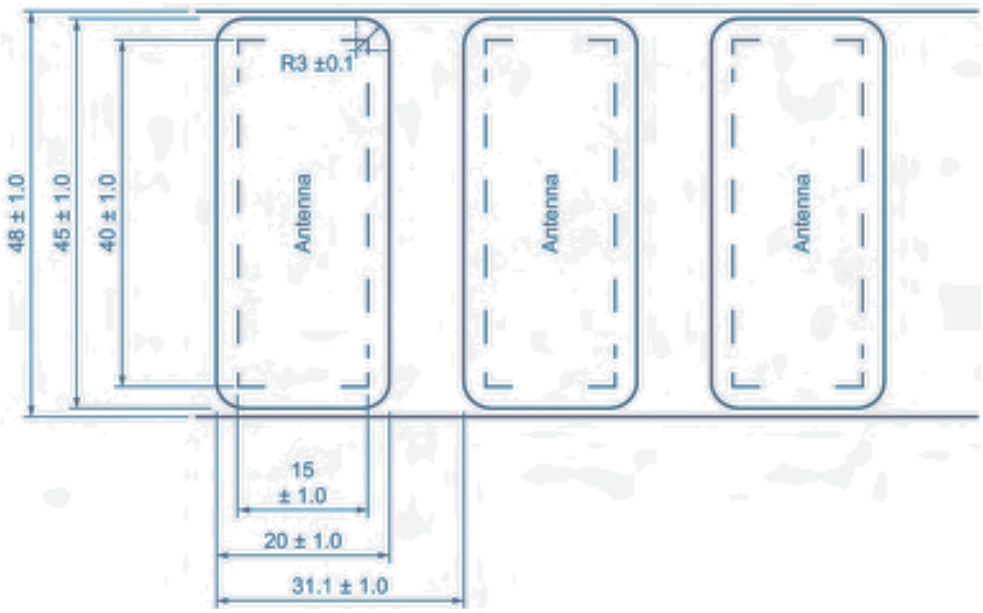


Figure 7-8 Dimension drawing SIMATIC RF630L (6GT2810-2AC82)

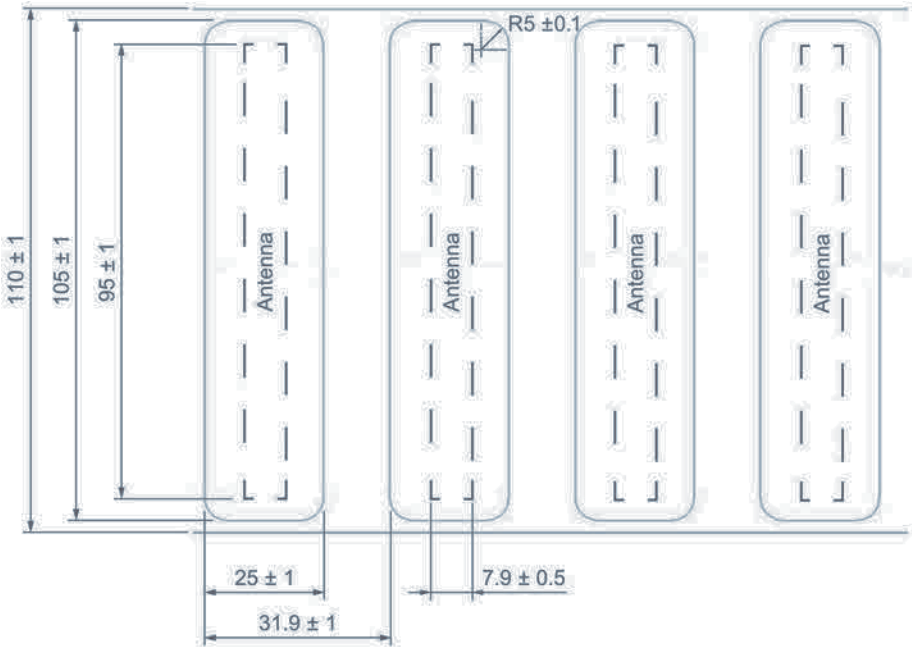


Figure 7-9 Dimension drawing SIMATIC RF630L (6GT2810-2AE80-0AX2)

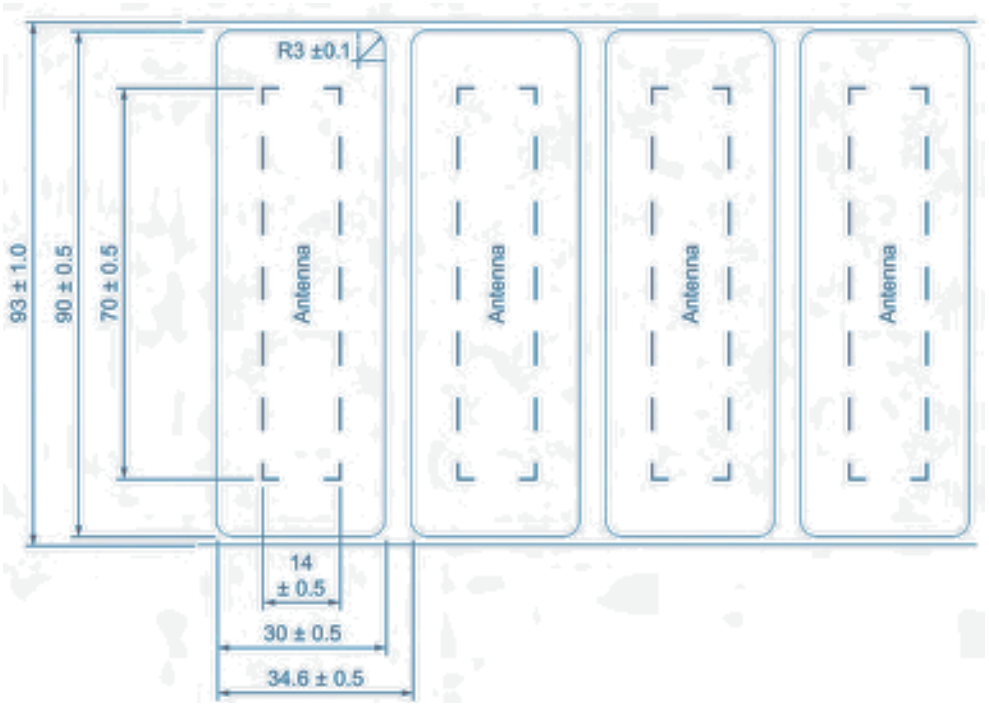


Figure 7-10 Dimension drawing SIMATIC RF630L (6GT2810-2AE81-0AX1)

7.2.5 Certificates and approvals

Certificate	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.

7.3 SIMATIC RF642L Smartlabel

7.3.1 Features

The SIMATIC RF642L-Smartlabel is a passive and maintenance-free data carrier. The Smartlabel operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) up to 448 bits. The transponder also has 2048 bits of user memory.

The SIMATIC RF642L is designed for direct mounting on metal surfaces. When used on non-metallic surfaces, the reading range can be reduced by up to 70 %.

SIMATIC RF642L Smartlabel	Characteristics	
	Area of application	Industrial plant management, identification of tools, containers and metallic equipment.
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Memory	• EPC: 56 bytes / 448 bits • User memory: 256 bytes / 2048 bits
	Read range	Max. 2.8 m on metal [1]
	Mounting	Self-adhesive Designed for mounting directly on metal

[1] Depending on the environment, the employed reader/the antennas and the set power

7.3.2 Ordering data

Table 7- 8 RF642L ordering data

Product	Article number
SIMATIC RF642L (ETSI)	6GT2810-3AC00
SIMATIC RF642L (FCC)	6GT2810-3AC10

Delivery form

SIMATIC RF642L Smartlabel is delivered in the following form:

- 500 Smartlabels per packaging unit: 500 labels on one roll
  Minimum order quantity: 1 packaging unit (500 units)
- The Smartlabels have a unique 12-byte EPC ID.

7.3.3 Technical specifications

Table 7- 9 Technical specifications of the SIMATIC RF642L transponder

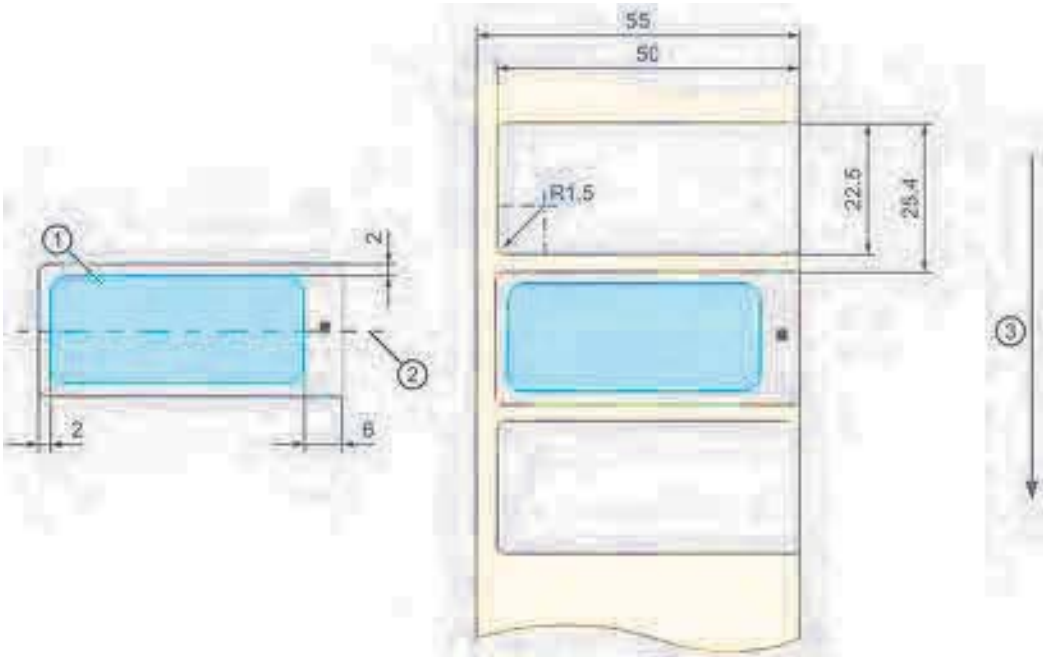
	6GT2810-3ACx0
Product type designation	SIMATIC RF642L
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP / UCODE 7xm-2k
Memory type	EEPROM
Memory configuration	
• EPC	• 56 bytes / 448 bits
• User memory	• 256 bytes / 2048 bits
• TID	• 12 bytes / 96 bits
Number of write cycles (< 40 °C)	$> 10^5$
Number of read cycles (< 40 °C)	$> 10^{14}$
Data retention time (< 40 °C)	50 years
Electrical data	
Range	
• Writing	• ≤ 0.9 m
• Reading	• ≤ 2.8 m
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PET, PE
Silicone-free	Yes
Color	White
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	Can be printed using heat transfer technique
Roll core diameter	76 mm
Roll outer diameter	≤ 200 mm

	6GT2810-3ACx0
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -20 to +85 °C
• In operation, outside write/read access	• -25 to +85 °C
• During transportation and storage	• +13 ... +23 °C [1]
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68 [2]
Resistance to mechanical stress	Torsion and bending stress conditionally permissible
Minimum spacing between labels	
• Vertically	• 50 mm
• Horizontally	• 100 mm
Design, dimensions and weight	
Dimensions (L x W x D)	50 × 22.5 × 1.65 mm
Weight	4 g

1) Ideal storage conditions

2) Water depth 1 m for max. 5 hours

7.3.4 Dimension drawing



① Printable area
② Polarization axis
③ Conveyor direction

Figure 7-11 Dimension drawing RF642L

All dimensions in mm

7.4 SIMATIC RF690L Smartlabel

7.4.1 Characteristics

The SIMATIC RF690L High Temp Smartlabel is a passive and maintenance-free data carrier. It operates based on the UHF Class 1 Gen 2 technology and is used to store the "Electronic Product Code" (EPC). The transponder also has a user memory.

The SIMATIC RF690L can also be mounted on metal.

Smartlabel SIMATIC RF690L	Characteristics	
	Area of application	Heat-proof UHF label for a wide range of possible applications, for example, on metal or with high temperatures up to +160 °C
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Memory	• EPC: 8 ... 60 bytes / 64 ... 480 bits [1] • User memory: 16 ... 64 bytes / 128 ... 512 bits [1]
	Read range	• Max. 5.0 m on non-metallic surface [2] • Max. 2.4 m on metal [2]
	Mounting	Self-adhesive Suitable for mounting directly on metal.

[1] The EPC memory has a default size of 96 bits. When necessary, the EPC memory size can be expanded to 480 bits in steps of 16 bits at the cost of the user memory.

[2] Depending on the environment, the employed reader/the antennas and the set power

7.4.2 Ordering data

Table 7- 10 Ordering data RF690L

Product	Article number
SIMATIC RF690L (ETSI)	6GT2810-2AG00
SIMATIC RF690L (FCC)	6GT2810-2AG10

Delivery format

SIMATIC RF690L smart label is supplied in the following form:

- 400 smart labels per packaging unit: 400 labels on one roll

  Minimum order quantity: 1 packaging unit (400 units)

7.4.3 Memory organization

Transponders with an "Alien Higgs 3" chip have an EPC memory with a standard size of 96 Bits (12 bytes). When necessary, the EPC memory size can be expanded to 480 bits (60 bytes) in steps of 16 bits at the cost of the user memory.

The following table shows how many bytes can be added to the EPC memory and how this affects the size of the user memory.

Table 7- 11 Size of the EPC memory and effect on the user memory

EPC memory		User memory
[bytes]	[bits]	[bytes]
54 ... 60	432 ... 480	16
46 ... 52	368 ... 416	24
38 ... 44	304 ... 352	32
30 ... 36	240 ... 288	40
22 ... 28	176 ... 224	48
14 ... 20	112 ... 160	56
0 ... 12	0 ... 96	64

7.4.4 Technical specifications

Table 7- 12 Technical specifications of the transponder SIMATIC RF690L

	6GT2810-2AGx0
Product type designation	SIMATIC RF690L
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	Alien / Higgs 3
Memory type	EEPROM
Memory configuration	
• EPC	• 8 ... 60 bytes / 64 ... 480 bits [1)]
• User memory	• 16 ... 64 bytes / 128 ... 512 bits [1)]
• TID	• 4 bytes / 32 bits
• Unique TID	• 8 bytes / 64 bits
• TID device configuration	• 12 bytes / 96 bits

	6GT2810-2AGx0
Number of write cycles (< 40 °C)	> 500
Number of read cycles (< 40 °C)	> 10^{14}
Data retention time (< 40 °C)	50 years
Electrical data	
Range	
• Writing	• ??? m
• Reading	• ≤ 5.0 m [2]
Protocol	EPCglobal Class 1 Gen 2 / ISO 18000-63
Polarization	Linear
Mechanical specifications	
Material	PET
Silicone-free	Yes
Color	Beige/silver
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	Can be printed using heat transfer technique
Roll core diameter	76 mm
Roll outer diameter	200 mm
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -25 to +95 °C permanently Special features: As of 100 °C 20% reduction of the write/read distance +140 ... + 160 °C: No processing possible
• During transportation and storage	• +13 ... +23 °C [3]
Distance from metal	0 mm Suitable for mounting directly on metal
Degree of protection	IP67
Resistance to mechanical stress	Torsion and bending stress conditionally permissible

	6GT2810-2AGx0
Design, dimensions and weight	
Dimensions (L x W x D)	
• ETSI	• 88 × 25 × 1.6 mm
• FCC	• 75 × 25 × 1.6 mm
Weight	5 g

[1] The EPC memory has a default size of 96 bits. When necessary, the EPC memory size can be expanded to 480 bits in steps of 16 bits at the cost of the user memory.

[2] The information relates to the maximum read range. You can find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3] For more information, refer to the section "Storage and transportation roll goods (Page 363)"

7.4.5 Dimension drawing

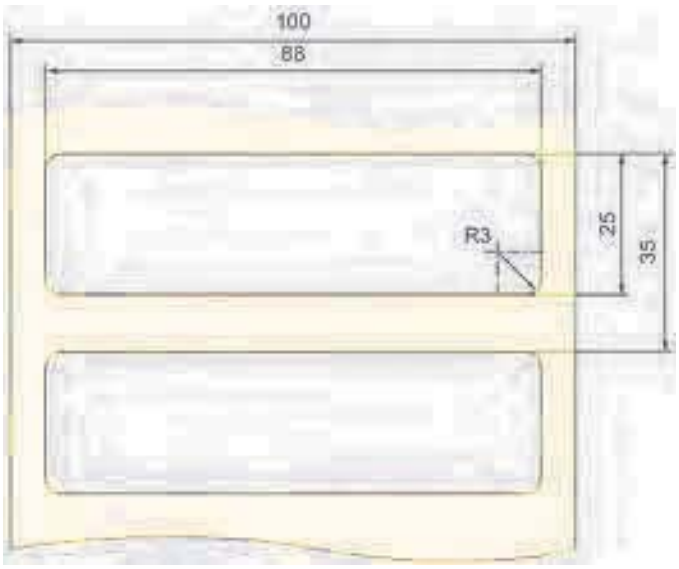


Figure 7-12 Dimension drawing RF690L (ETSI, article number: 6GT2810-2AG00)

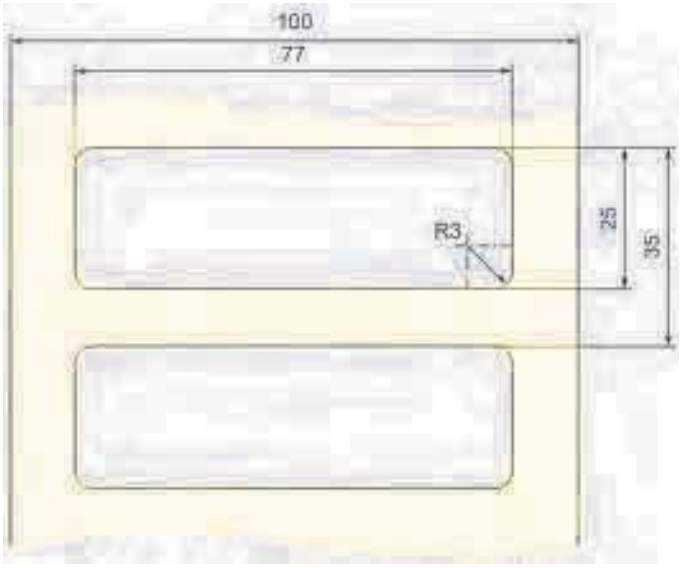


Figure 7-13 Dimension drawing RF690L (FCC, article number: 6GT2810-2AG10)

All dimensions in mm

7.4.6 Certificates and approvals

Certificate	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.

7.5 SIMATIC RF610T

7.5.1 Features

The SIMATIC RF610T is passive and maintenance-free. It operates based on the UHF Class 1 Gen 2 technology and is used for saving the electronic product code (EPC) of 96 bits / 240 bits. The label also has a 512 bit user memory.

The SIMATIC RF610T offers a host of possible uses for a wide range of applications and supports efficient logistics throughout the entire process chain.

Thanks to its antenna geometry, the transponder can be read from any direction. However, the range is reduced if it is not aligned in parallel with the antenna.

SIMATIC RF610T	Characteristics	
	Area of application	• Simple identification, such as barcode replacement or barcode supplement • Warehouse and distribution logistics • Product identification For the Food & Beverage sector, a special version can be supplied on request that is certified for use in contact with food.
	Air interface	According to ISO 18000-63
	Memory	• EPC: 96 ... 240 bits • User memory: 64 bytes
	Read range	Max. 5 m [1]
	Mounting	• Suspended by means of cable ties, or similar • Can also be fixed with screws or glued by customer. • Not suitable for mounting straight onto metal.

[1] Depending on the environment, the reader/the antennas and the set power

7.5.2 Ordering data

Table 7- 13 Ordering data RF610T

Product	Article number
SIMATIC RF610T	6GT2810-2BB80

Delivery format

SIMATIC RF610T is supplied in the following form:

- 500 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (500 units)

7.5.3 Technical specifications

Table 7- 14 Technical specifications of the transponder SIMATIC RF610T

	6GT2810-2BB80
Product type designation	SIMATIC RF610T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 30 bytes / 96 ... 240 bits
• User memory	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits
• Reserved (passwords)	• 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10^5
Number of read cycles (< 40 °C)	> 10^{14}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 5 m [1)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear

	6GT2810-2BB80
Mechanical specifications	
Material	PVC
Silicone-free	Yes
Color	White
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	Can be printed using heat transfer technique
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -40 ... +85 °C
• During transportation and storage	• -40 … +85 °C
Distance from metal	Not suitable for mounting directly on metal
Degree of protection	IP67
Resistance to mechanical stress	Torsion and bending stress conditionally permissible
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [2)]
Vibration to EN 60068-2-6	50 g [2)]
Design, dimensions and weight	
Dimensions (L x W x D)	86 × 54 × 0.6 mm
Weight	3 g

[1)] The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[2)] The values for shock and vibration are maximum values and must not be applied continuously.

Note

Effects of temperatures > 70 °C

Note that in temperature ranges > 70 °C, the transponder can become slightly deformed. However, this has no effect on the transponder function.

7.5.4 Dimension drawing

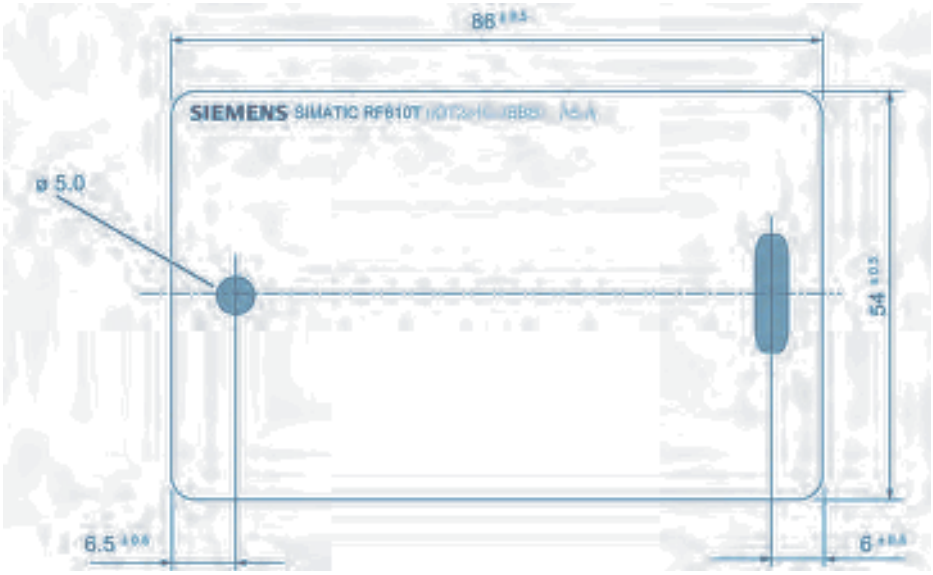


Figure 7-14 Dimensional drawing of SIMATIC RF610T

All dimensions in mm

7.5.5 Certificates and approvals

Certificate	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.
C UL US	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL508 - Industrial Control Equipment • CSA C22.2 No. 142 - Process Control Equipment • UL Report E 120869

7.6 SIMATIC RF610T ATEX

7.6.1 Features

The SIMATIC RF610T special variant ATEX is passive and maintenance-free. It operates based on the UHF Class 1 Gen 2 technology and is used for saving the electronic product code (EPC) of 96 bits / 240 bits. The label also has a 512 bit user memory.

The SIMATIC RF610T special variant ATEX provides numerous possible uses for a wide range of applications and allows efficient logistics throughout the entire process chain.

Thanks to its antenna geometry, the transponder can be read from any direction. However, the range is reduced if it is not aligned in parallel with the antenna.

SIMATIC RF610T	Characteristics	
	Area of application	• Simple identification, such as barcode replacement or barcode supplement • Warehouse and distribution logistics • Product identification For the Food & Beverage sector, a special version can be supplied on request that is certified for use in contact with food.
	Air interface	According to ISO 18000-63
	Memory	• EPC: 96 ... 240 bits • User memory: 64 bytes
	Read range	Max. 5 m [1]
	Mounting	• Suspended by means of cable ties, or similar • Can also be fixed with screws or glued by customer. • Not suitable for mounting straight onto metal.

[1] Depending on the environment, the reader/the antennas and the set power

7.6.2 Ordering data

Table 7- 15 Ordering data RF610T ATEX

Product	Article number
SIMATIC RF610T ATEX	6GT2810-2BB80-0AX1

Delivery format

SIMATIC RF610 T ATEX is supplied in the following form:

- 500 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (1 000 units)

NOTICE
Approved use This device/system may only be used for the applications described in the catalog and the technical documentation "System manual SIMATIC RF600 (https://support.industry.siemens.com/cs/ww/en/ps/15069/man)" and only in combination with third-party devices and components recommended and/or approved by Siemens.

7.6.3 Use of the transponder in hazardous areas

In a conformity declaration, TÜV NORD CERT GmbH has confirmed compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the directive 2014/34/EU.

The essential health and safety requirements are satisfied in accordance with standards EN 60079-0: 2012 + A11: 2013, EN 60079-11: 2012.

This allows the RF610T special variant ATEX transponder to be used in hazardous areas for gases, for the device category 3 G and gas group IIB, or alternatively in hazardous areas for dusts, for the device category 3 D and group IIIB.

WARNING
Ignitions of gas-air mixtures or dust-air mixtures The SIMATIC RF610T transponder must be set up and maintained in such a way that electrostatic discharges are excluded. The SIMATIC RF610T transponder may not be installed in areas influenced by processes that generate high electrostatic charges.

Identification and warning on the transponder

Figure 7-15 Schematic representation of the SIMATIC RF610T ATEX transponder

The labeling of the front of the transponder shown above is an example and can vary between batches produced at different times.

This does not affect the hazardous area marking.

Order number and serial number

6GT2810-2BB80-0AX1 / (S) B0000007

Identification

TÜV 11 ATEX 081778 X
II 3 G Ex ic IIB T6/T5/T4 Gc

II 3 D Ex ic IIIB T_5 120°C Dc,
-25 °C < Ta < +85 °C

Warning

WARNING
WARNING POTENTIAL ELECTROSTATIC CHARGIMG HAZARD-SEE INSTRUCTIONS

Manufacturer's address - distributor

Siemens AG

DE-76181 Karlsruhe

7.6.3.1 Use of the transponder in hazardous areas for gases

Temperature class grading for gases with up to 2000 mW ERP

The temperature class of the transponder for hazardous areas depends on the ambient temperature range.

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class grading is as follows:

Table 7- 16 Temperature class grading for gases

Ambient temperature range	Temperature class
-25 °C to +85 °C	T4
-25 °C to +65 °C	T5
-25 °C to +50 °C	T6

WARNING

Ignitions of gas-air mixtures

When using the RF610T transponder, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of gas-air mixtures.

WARNING

Ignitions of gas-air mixtures

The maximum radiated power of the transmitter used to operate the transponder must not exceed 2000 mW ERP.

Non-compliance with the permitted radiated power can lead to ignitions of gas-air mixtures.

7.6.3.2 Use of the transponder in hazardous areas for dusts

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 210 °C (smoldering temperature). The ignition temperature specified here according to EN 60079-0: 2012 + A11: 2013 for ignition protection type ic in this case references the smoldering temperature of a layer of combustible flyings (ic IIIA) or alternatively non-conductive dusts (ic IIIB).

Temperature class grading for dusts with up to 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class grading is as follows:

Table 7- 17 Temperature class grading for dusts

Ambient temperature range	Temperature value
-25 °C < Ta < +85 °C	T_5 120 °C

WARNING

Ignitions of dust-air mixtures

When using the RF610T transponder, make sure that the temperature values are adhered to in keeping with the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of dust-air mixtures.

7.6.4 Technical specifications

Table 7- 18 Technical specifications of the transponder SIMATIC RF610T special variant ATEX

	6GT2810-2BB80-0AX1
Product type designation	SIMATIC RF610T special variant ATEX
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 30 bytes / 96 ... 240 bits
• User memory	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits
• Reserved (passwords)	• 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10^5
Number of read cycles (< 40 °C)	> 10^{14}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 5 m [1)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PVC
Silicone-free	Yes
Color	White
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	Can be printed using heat transfer technique

	6GT2810-2BB80-0AX1
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -40 ... +85 °C
• During transportation and storage	• -40 … +85 °C
Distance from metal	Not suitable for mounting directly on metal
Degree of protection	IP67
Resistance to mechanical stress	Torsion and bending stress conditionally permissible
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [2]
Vibration to EN 60068-2-6	50 g [2]
Design, dimensions and weight	
Dimensions (L x W x D)	86 × 54 × 0.4 mm
Weight	3 g
Standards, specifications, approvals	
Proof of suitability	TÜV 11 ATEX 081778 X (EN 60079-0, EN 60079-11): II 3 G Ex ic IIB T6/T5/T4 Gc, II 3 D Ex ic IIIB T_5 120°C Dc, -25 °C < Ta < +85 °C
MTBF	1712 years

[1] The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[2] The values for shock and vibration are maximum values and must not be applied continuously.

Note

Effects of temperatures > 70 °C

Note that in temperature ranges > 70 °C, the transponder can become slightly deformed. However, this has no effect on the transponder function.

7.6.5 Dimension drawing

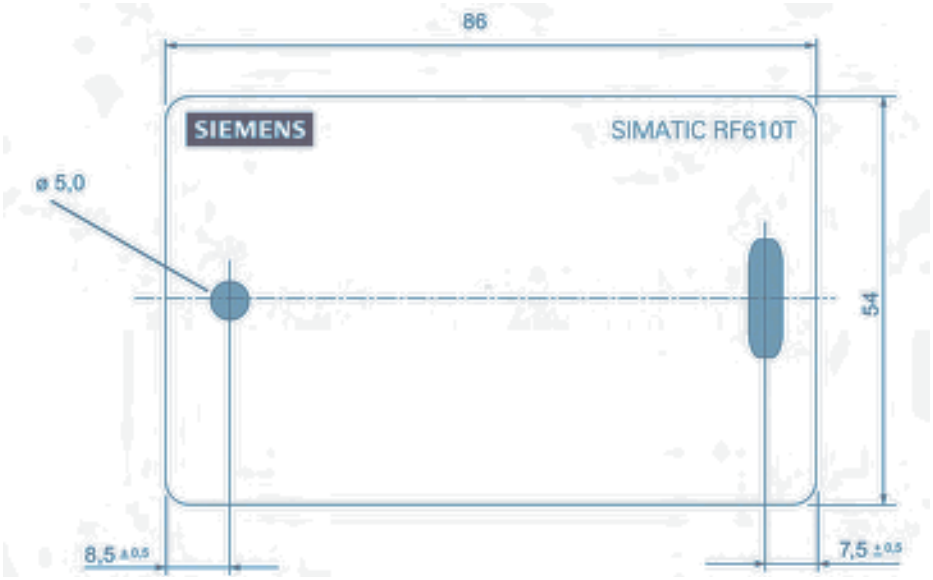


Figure 7-16 Dimension drawing SIMATIC RF610T (special variant ATEX)

All dimensions in mm

7.6.6 Certificates and approvals

Certificate	Description
	Conformity with the ATEX directive 2014/34/EU based on: Conformity statement no. TÜV 11 ATEX 081778 X Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.

7.7 SIMATIC RF620T

7.7.1 Characteristics

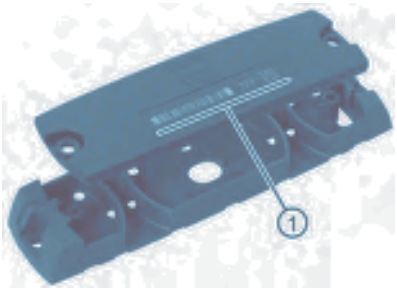
The SIMATIC RF620T Transponder is passive and maintenance-free, based on the UHF Class 1 Gen2 technology for storing the 96-bit/128-bit "electronic product code" (EPC).

The transponder also has a 64-byte user memory.

The container tag for industrial applications is rugged and highly resistant to detergents. It is designed for easy attachment onto plastic, wood, glass, e.g. containers, palettes, and trolleys.

The optimum functionality/range of the RF620T on metal is achieved by means of the spacer. Since the plastic is food safe, it is also suitable for use in the food-processing industry.

This container tag is designed for the frequency range of 860 MHz to 960 MHz and can be operated in combination with our UHF system RF600.

SIMATIC RF620T Transponder	Characteristics	
	Area of application	Transponder for rugged, industrial requirements such as RF identification in warehouses and the logistics and transport area.
	Frequency range	860 to 960 MHz
	Polarization	Linear
	Memory	• EPC: 96 / 128 bits • User memory: 64 bytes
	Read range	Max. 8 m [1]
	Mounting	• Screw, bond • On metal by means of spacers
	① Labeling area	You can inscribe the transponder itself using laser, or adhere a label to position ①. Possible types of labeling: • Barcode • Inscription in plain text • Data matrix code
	Housing color	Anthracite

[1] Depending on the environment, the reader/the antennas and the set power

7.7.2 Ordering data

Table 7- 19 Ordering data RF620T

Product	Article number
SIMATIC RF620T	6GT2810-2HC81
Spacer for SIMATIC RF620T	6GT2898-2AA00

Delivery format

SIMATIC RF620T is supplied in the following form:

- 20 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (20 units)

7.7.3 Planning the use

7.7.3.1 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. When using a circular antenna and when the transponder is centrally mounted on a plane metal plate, which may either be almost square or circular, it can be aligned in any direction. When using a linear antenna, the polarization axes of antenna and transponder must always be aligned in parallel.

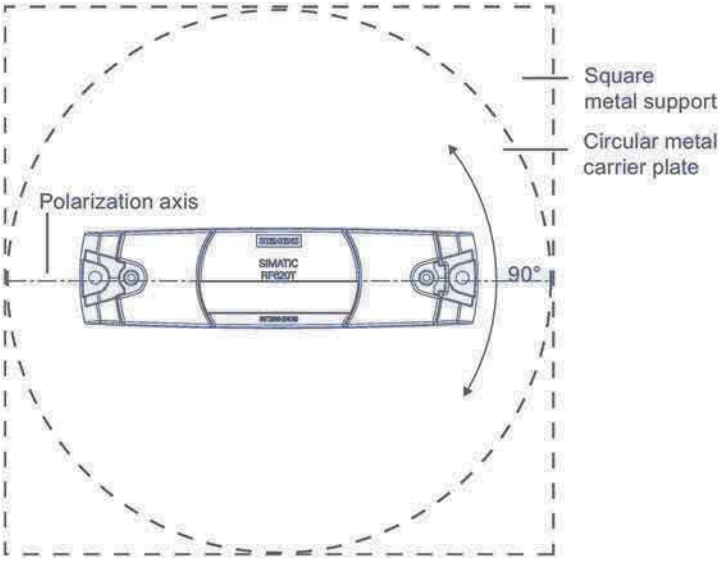


Figure 7-17 Optimum positioning of the transponder on a (square or circular) metal surface

Table 7- 20 Range with metallic, flat carriers without spacers

Carrier material	Range
Metal plate at least 300 x 300 mm	typically 40%

Table 7- 21 Range with flat metallic carriers with spacers

Carrier material	Range
Metal plate at least 300 x 300 mm	typically 100%

The use of spacers on metallic surfaces is recommended.

On rectangular carrier plates, the range depends on the mounting orientation of the transponder.

You will find more information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.7.3.2 Range when mounted on non-metallic carrier materials

Table 7- 22 Range with non-metallic carriers

Carrier material	Range
Transponder on wooden carrier (dry, degree of moisture < 15%)	typically 75 %
Transponder on plastic carrier	typically 75 %
Transponder on glass	typically 75 %
Transponder on mineral water container	typically 15 %

You will find more information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.7.4 Technical specifications

Table 7- 23 Technical specifications of the transponder SIMATIC RF620T

	6GT2810-2HC81
Product type designation	SIMATIC RF620T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	IMPINJ / MONZA 4QT
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 16 bytes / 96 ... 128 bits
• User memory	• 64 bytes / 512 bits
• TID	• 4 bytes / 32 bits
Number of write cycles (< 40 °C)	> 10^5
Number of read cycles (< 40 °C)	> 10^{14}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 8 m [1)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PP
Silicone-free	Yes
Color	Anthracite
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	Can be printed using heat transfer technique

	6GT2810-2HC81
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -40 ... +85 °C
• During transportation and storage	• -40 … +80 °C
Distance from metal	≥ 12 mm (with spacer) Not suitable for mounting directly on metal
Degree of protection	IP67
Resistance to mechanical stress	Torsion and bending stress is not permitted
Shock resistant to EN 60068-2-27	100 g [2]
Vibration to EN 60068-2-6	50 g [2]
Design, dimensions and weight	
Dimensions (L x W x D)	
• Transponder	• 127 × 38 × 6 mm
• Spacer	• 157 × 39 × 12 mm
Weight	
• Transponder	• 18 g
• Spacer	• 22 g
Type of mounting	2 x M4 screws ≤ 1.2 Nm

[1] The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[2] The values for shock and vibration are maximum values and must not be applied continuously.

7.7.5 Dimension drawing

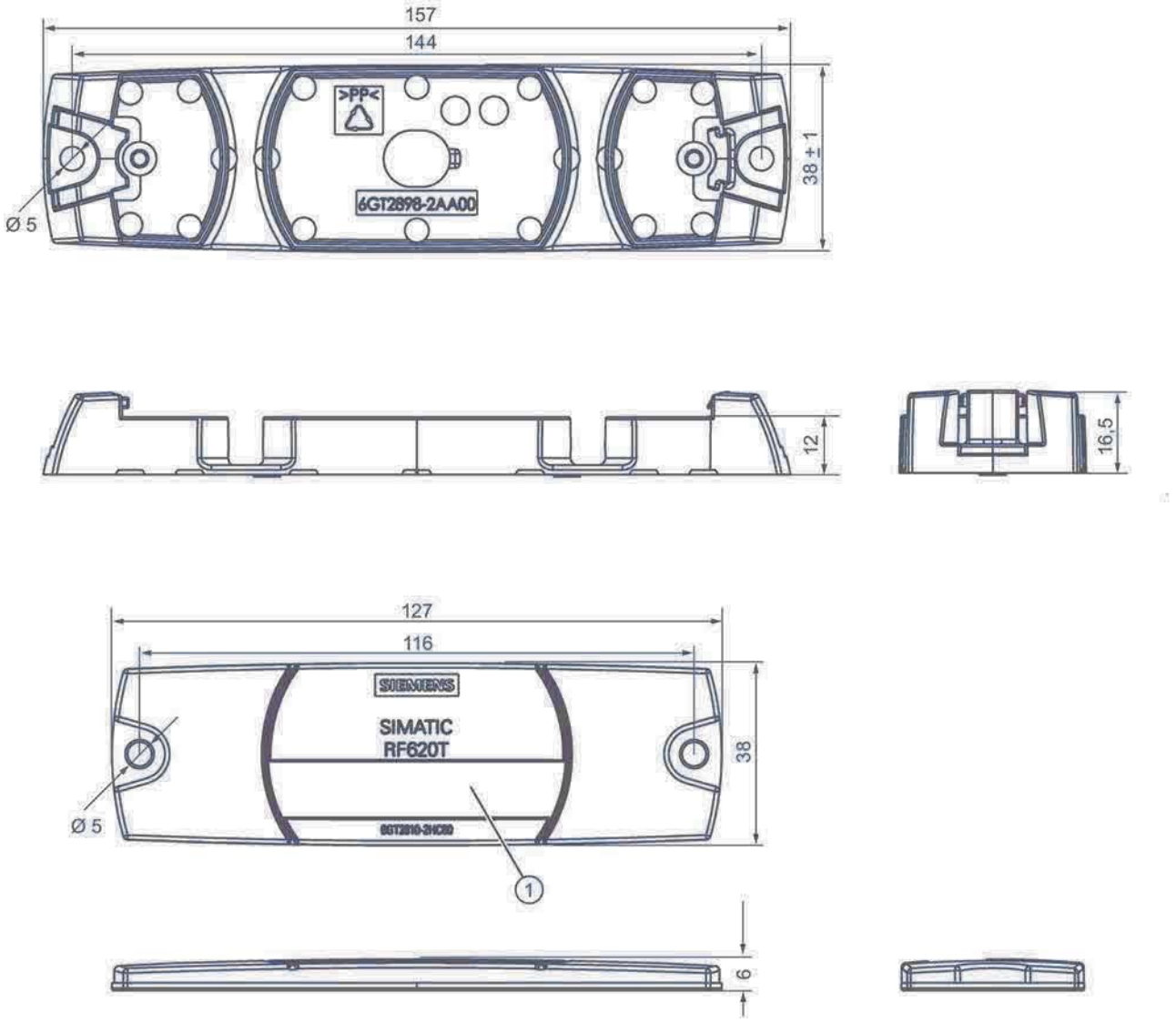


Figure 7-18 SIMATIC RF620T UHF container tag

Units of measurement: All dimensions in mm

Tolerances, unless indicated otherwise, are +-0.5 mm.

① Labeling area, see Section Characteristics (Page 399)

7.7.6 Certificates and approvals

Table 7- 24 6GT2810-2HC00 - RF620T

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

Table 7- 25 6GT2810-2HC80 - RF620T

Certificate	Description
 Federal Communications Commission	Passive labels or transponders comply with the valid regulations; certification is not required.
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL508 - Industrial Control Equipment • CSA C22.2 No. 142 - Process Control Equipment • UL Report E 120869

7.8 SIMATIC RF625T

7.8.1 Characteristics

The SIMATIC RF625T transponder is a passive, maintenance-free data carrier with a round design. It operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) of 96 bits/128 bits. The transponder also has a 512-bit user memory.

The areas of application are industrial asset management, RF identification of tools, containers and metallic equipment.

The Disk Tag is small and rugged and suitable for industrial applications with degree of protection IP68. It is highly resistant to oil, grease and cleaning agents.

Ideally, the SIMATIC RF625T is mounted directly on a flat metal surface of at least 150 mm diameter where it achieves a typical sensing distance of 1.5 m.

SIMATIC RF625T	Characteristics	
	Area of application	Identification tasks in rugged industrial environments
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Polarization	Linear
	Memory	• EPC: 96 / 128 bits • User memory: 64 bytes
	Read range	Max. 1.5 m [1)]
	Mounting	1 x M3 screw
	Mounting	Designed for direct mounting on conductive materials (preferably metal).

1) Depending on the environment, the reader/the antennas and the set power

7.8.2 Ordering data

Table 7- 26 Ordering data RF625T

Product	Article number
SIMATIC RF625T (ETSI)	6GT2810-2EE00
SIMATIC RF625T (FCC)	6GT2810-2EE01

Delivery format

SIMATIC RF625T is supplied in the following form:

- 10 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (10 units)

7.8.3 Planning the use

7.8.3.1 Optimum antenna/transponder positioning with planar mounting of the transponder on metal

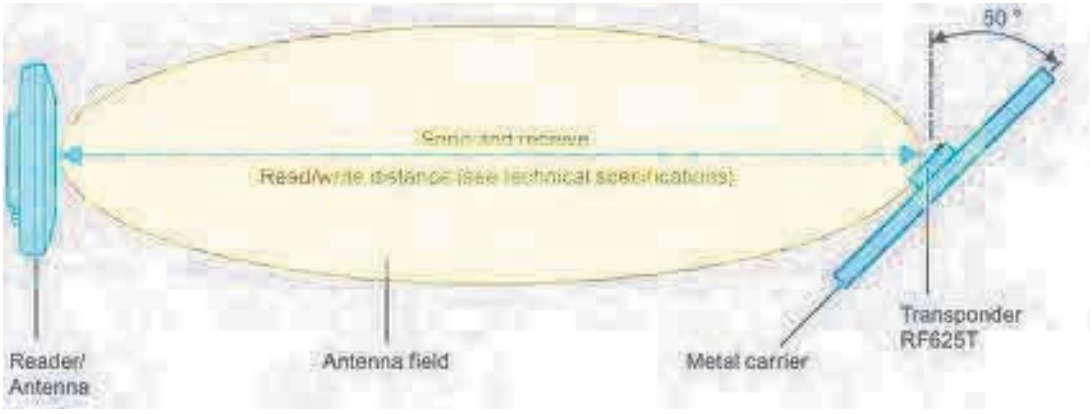


Figure 7-19 Example of optimum reader/antenna transponder positioning

The graphic shows an example of optimum positioning of the transponder relative to the reader or the antenna. This positioning is regardless of whether you are working with the internal reader antenna or with one of the external RF600 antennas.

7.8.3.2 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. When using a circular antenna and when the transponder is centrally mounted on a plane metal plate, which may either be almost square or circular, it can be aligned in any direction. When using a linear antenna, the polarization axes of antenna and transponder must always be aligned in parallel.

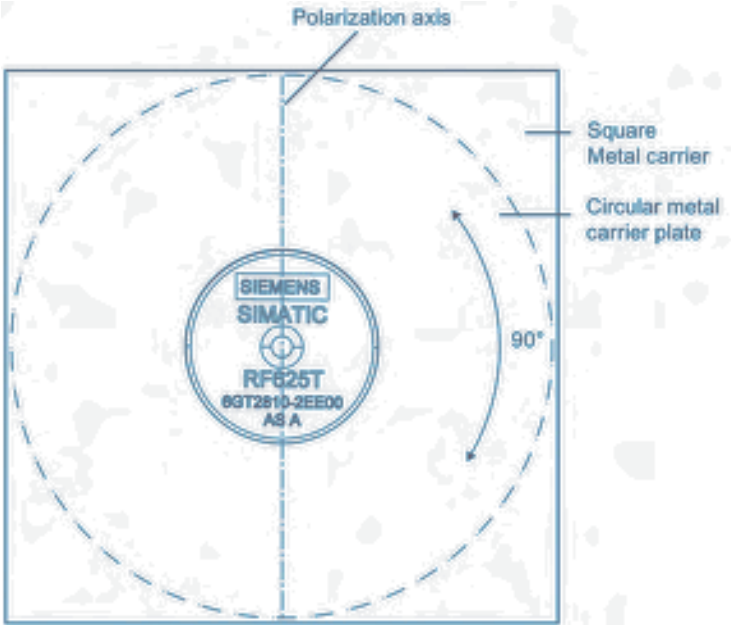


Figure 7-20 Optimum positioning of the transponder on a (square or circular) metal surface

Table 7- 27 Range on flat metallic carriers

Carrier material	Range
Metal plate of at least Ø 150 mm	100%
Metal plate Ø 120 mm	approx. 70%
Metal plate Ø 85 mm	approx. 60%
Metal plate Ø 65 mm	approx. 60%

On rectangular carrier plates, the range depends on the mounting orientation of the transponder.

You will find more information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.8.3.3 Range when mounted on non-metallic carrier materials

The transponder is generally designed for mounting on metallic objects which provide the conditions for the maximum reading ranges

Table 7- 28 Range with non-metallic carriers

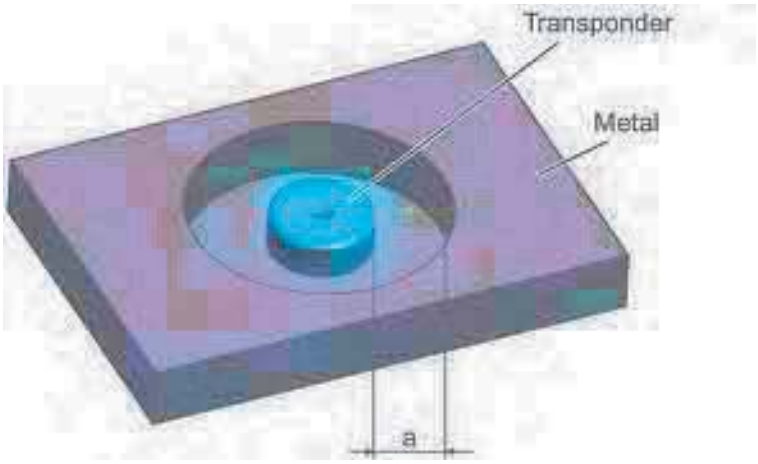
Carrier material	Range
Transponder on wooden carrier	approx. 60%
Transponder on plastic carrier	approx. 65 %
Transponder on plastic mineral water bottle	approx. 70%
Transponder without base	approx. 50 %

The maximum range of 100% is achieved by mounting the transponder in a free space with low reflections on a flat metal carrier with a diameter of at least 150 mm.

You will find more detailed information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.8.3.4 Mounting in metal

It is possible to mount the transponder in metal. If there is not enough clearance to the surrounding metal, this reduces the reading range.



Clearance (all-round)	Reading range [1]
a = 5 mm	Approx. 50 %
a = 10 mm	Approx. 70%

[1] The read range information applies when the transponder is mounted on a metallic carrier with a diameter of at least 150 mm.

Figure 7-21 Flush-mounting of RF625T in metal

7.8.4 Technical specifications

Table 7- 29 Technical specifications of the transponder SIMATIC RF625T

	6GT2810-2EE0x
Product type designation	SIMATIC RF625T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 ... 928 MHz [1)]
Memory	
Chip (manufacturer/type)	IMPINJ / MONZA 4QT
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 16 bytes / 96 ... 128 bits
• User memory	• 64 bytes / 512 bits
• TID	• 4 bytes / 32 bits
• Reserved (passwords)	• 64 bytes / 512 bits
Number of write cycles (< 40 °C)	> 10^{14}
Number of read cycles (< 40 °C)	> 10^{5}
Data retention time (< 40 °C)	22 years
Electrical data	
Range	≤ 1.5 m [2)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PA6.6
Silicone-free	Yes
Color	Black
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	No

	6GT2810-2EE0x
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -40 ... +125 °C
• During transportation and storage	• -40 … +125 °C
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68 / IPx9K
Resistance to mechanical stress	Torsion and bending stress is not permitted
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [3]
Vibration to EN 60068-2-6	50 g [3]
Design, dimensions and weight	
Dimensions (∅ × D)	30 × 8 mm
Weight	6 g
Type of mounting	1 x M3 countersunk screw ≤ 0.5 Nm
Standards, specifications, approvals	
MTBF	1141 years

[1] The range is reduced to 70% at the band limits 902 MHz or 928 MHz. Due to frequency fluctuations, this effect has no impact.

[2] Mounting on a flat metal surface with a diameter of at least 150 mm and at room temperature. The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)". When these minimum distances are not achieved, there is a reduction in the maximum possible read and write distances of the transponder.

[3] The values for shock and vibration are maximum values and must not be applied continuously.

7.8.5 Dimension drawing

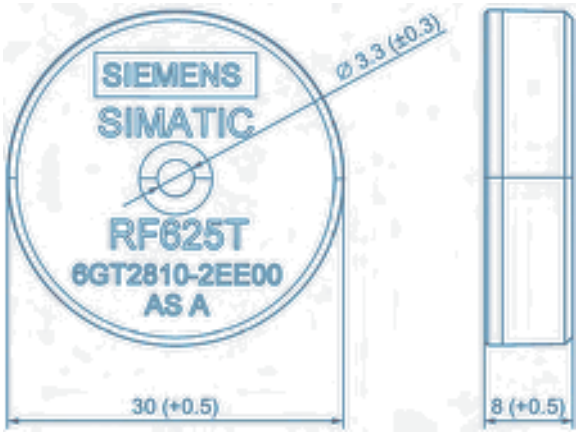


Figure 7-22 SIMATIC RF625T UHF Disk Tag

Units of measurement: All dimensions in mm

7.8.6 Certificates and approvals

Table 7- 30 6GT2810-2EE00 - RF625T

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

Table 7- 31 6GT2810-2EE01 - RF625T

Certificate	Description
FC Federal Communications Commission	Passive labels or transponders comply with the valid regulations; certification is not required
cULus	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL508 - Industrial Control Equipment • CSA C22.2 No. 142 - Process Control Equipment • UL Report E 120869

7.9 SIMATIC RF630T

7.9.1 Characteristics

The SIMATIC RF630T transponder is a passive (i.e. battery-free) and maintenance-free, cylindrical data carrier. It operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) of 96 bits/240 bits. The transponder also has a 512-bit user memory.

Areas of application include the mounting of metallic components (e.g. engine assembly in the automobile industry) as well as RF identification of tools, containers and metal frames.

The RF630T is small and rugged and suitable for industrial applications with IP68/IPX9K degree of protection. It is highly resistant to oil, grease and cleaning agents.

The SIMATIC RF630T is mounted directly onto metal surfaces to ensure optimum functioning.

SIMATIC RF630T	Characteristics	
	Area of application	Identification tasks in rugged industrial environments
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Polarization	Linear
	Memory	• EPC: 96 ... 240 bits • User memory: 64 bytes
	Read range	Max. 1.2 m [1]
	Mounting	Screw-in
	Mounting	Designed for direct mounting on conductive materials (preferably metal).

[1] Depending on the environment, the reader/the antennas and the set power

7.9.2 Ordering data

Table 7- 32 Ordering data RF630T

Product	Article number
SIMATIC RF630T (ETSI)	6GT2810-2EC00
SIMATIC RF630T (FCC)	6GT2810-2EC10

Delivery format

SIMATIC RF630T is supplied in the following form:

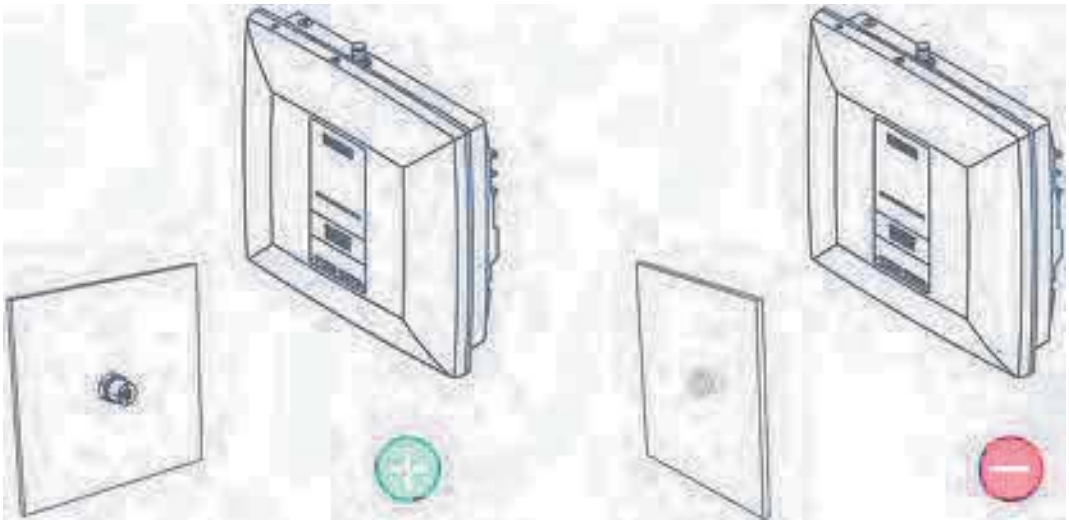
- 10 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (10 units)

7.9.3 Planning application

7.9.3.1 Optimum antenna/transponder positioning

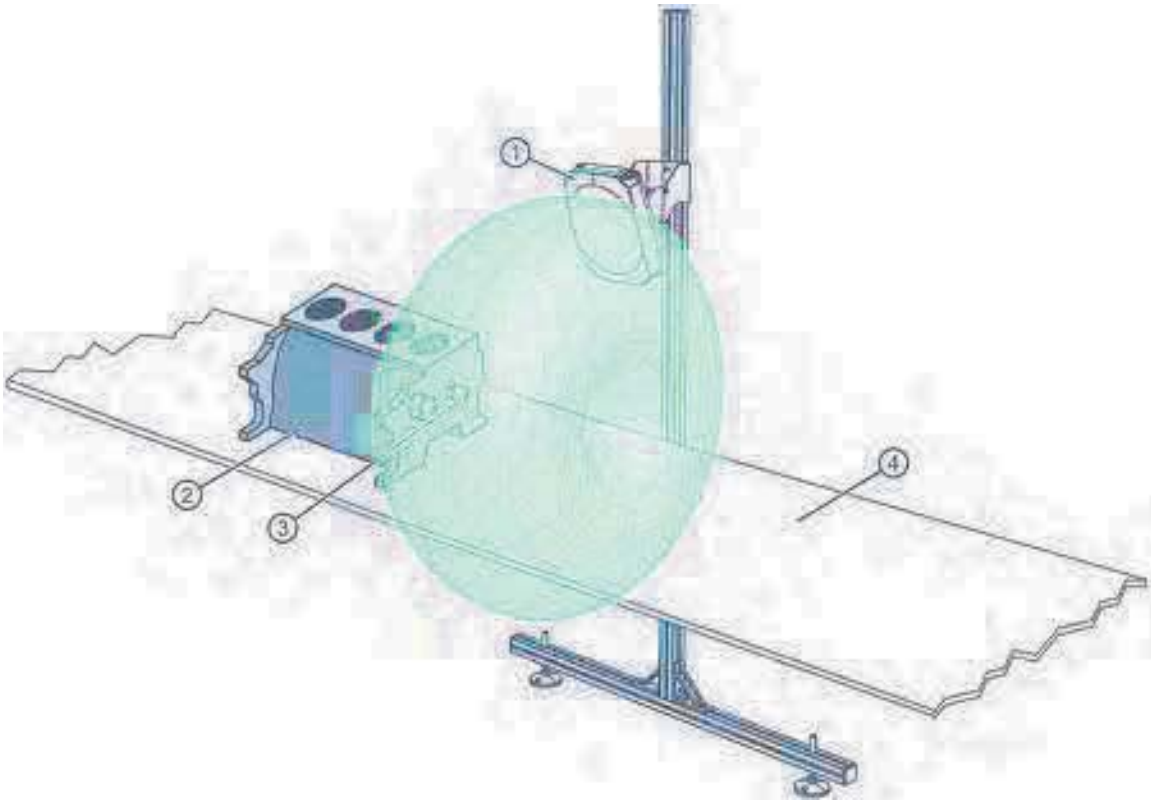
The maximum reading range is achieved when the reader antenna is positioned at right angles to the mounting surface. In the case of parallel mounting directly above the transponder, detection is not possible.



Optimum alignment of the transponder to the transmitting antenna

Incorrect alignment of the transponder to the transmitting antenna

Application example



① Antenna
② Object made of metal (e.g. motor block)
③ Transponder
④ Conveyor belt

Figure 7-23 RF630T application example

7.9.3.2 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. If the tag is mounted in the center of a flat metal plate, which is either approximately square or circular, it can be aligned in any direction since the transmitting and receiving RF660A antennas operate with circular polarization.

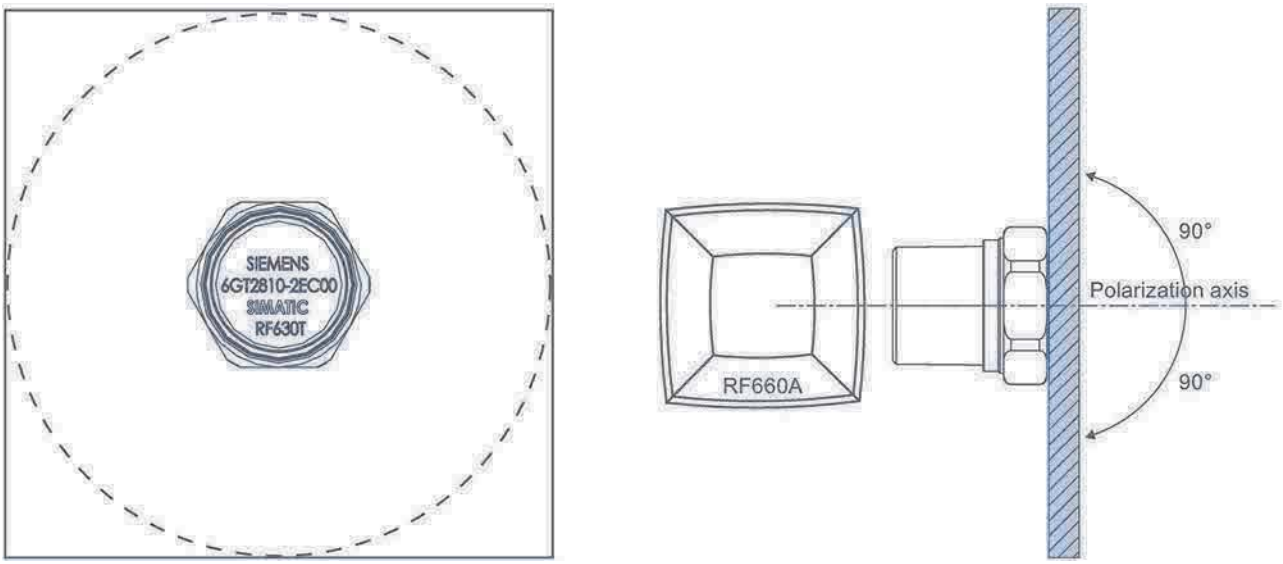


Figure 7-24 Optimum positioning of the transponder on a (square or circular) metal surface

Table 7- 33 Range on flat metallic carriers

Carrier material	Range
Metal plate of at least Ø 300 mm	100 %
Metal plate Ø 150 mm	approx. 75 %
Metal plate Ø 120 mm	approx. 50 %
Metal plate Ø 85 mm	approx. 40%

On rectangular carrier plates, the range depends on the mounting orientation of the transponder

You will find more detailed information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.9.4 Technical specifications

Table 7- 34 Technical specifications of the transponder SIMATIC RF630T

	6GT2810-2EC0x
Product type designation	SIMATIC RF630T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 ... 928 MHz [1)]
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 30 bytes / 96 ... 240 bits
• User memory	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10^{14}
Number of read cycles (< 40 °C)	> 10^{5}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 2 m [2)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PA6.6 GF
Silicone-free	Yes
Color	Black/silver
Antenna material	Aluminum
Type of antenna	Shortened dipole
Printing	No

	6GT2810-2EC0x
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C
• In operation, outside write/read access	• -40 ... +125 °C
• During transportation and storage	• -40 … +125 °C
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68 / IPx9K
Resistance to mechanical stress	Torsion and bending stress is not permitted
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [3)]
Vibration to EN 60068-2-6	20 g [3)]
Design, dimensions and weight	
Dimensions (∅ × D)	21 × 20 mm
Weight	22 g
Type of mounting	Screw-in, SW 19 mm ≤ 6 Nm
Standards, specifications, approvals	
MTBF	1712 years

[1)] The range is reduced to 70% at the band limits 902 MHz or 928 MHz. Due to frequency fluctuations, this effect has no impact.

[2)] Mounting on a flat metal surface with a diameter of at least 150 mm and at room temperature. The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3)] The values for shock and vibration are maximum values and must not be applied continuously.

7.9.5 Dimension drawing

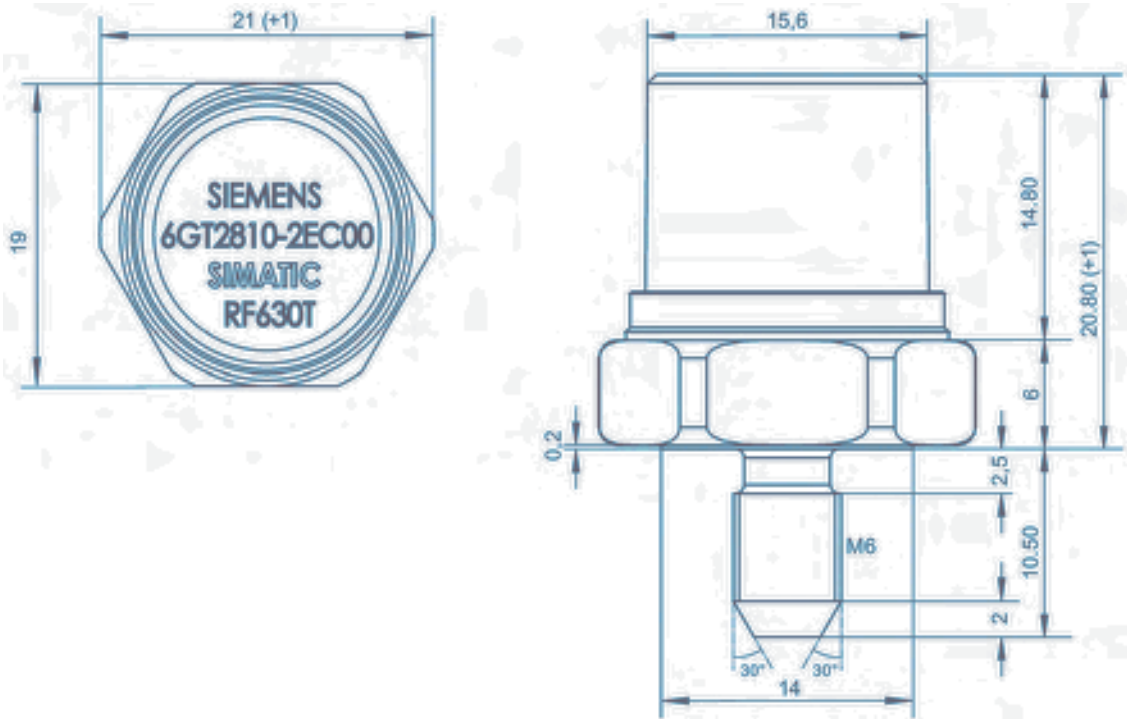


Figure 7-25 SIMATIC RF630T

Units of measurement: All dimensions in mm

General tolerances in accordance with DIN ISO 2768f.

7.9.6 Certificates and approvals

Table 7- 35 6GT2810-2EC00 - RF630T

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

Table 7- 36 6GT2810-2EC10 - RF630T

Standard	
Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.
C UL US	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL508 - Industrial Control Equipment • CSA C22.2 No. 142 - Process Control Equipment • UL Report E 120869

7.10 SIMATIC RF640T

7.10.1 Characteristics

SIMATIC RF640T transponder is a passive (i.e. battery-free) and maintenance-free, round-shaped data carrier. It operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) of 96 bits/240 bits. The transponder also has a 512-bit user memory.

The areas of application are industrial asset management, RF identification of tools, containers and metallic equipment.

The tool tag is small and rugged and suitable for industrial applications with degree of protection IP68. It is highly resistant to oil, grease and cleaning agents.

SIMATIC RF640T should preferably be mounted directly on a flat metal surface of at least 150 mm in diameter.

SIMATIC RF640T	Characteristics	
	Area of application	Identification tasks in rugged industrial environments Suitable for use in hazardous areas.
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Polarization	Linear
	Memory	• EPC: 96 ... 240 bits • User memory: 64 bytes
	Read range	Max. 4.0 m [1]
	Mounting	2 x M4 screws
	Mounting	Designed for direct mounting on conductive materials (preferably metal).

[1] Depending on the environment, the reader/the antennas and the set power

7.10.2 Ordering data

Table 7- 37 RF640T ordering data

Product	Article number
SIMATIC RF640T (ETSI)	6GT2810-2DC00
SIMATIC RF640T (FCC)	6GT2810-2DC10

Delivery format

SIMATIC RF640T is supplied in the following form:

- 10 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (10 units)

7.10.3 Planning the use

7.10.3.1 Optimum antenna/transponder positioning with plane mounting of the transponder on metal

Example of optimum antenna/transponder positioning

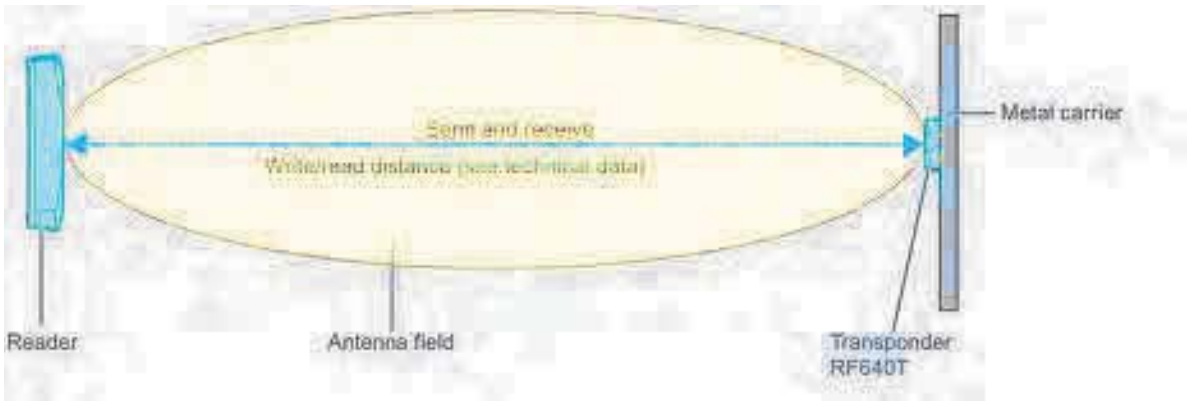


Figure 7-26 Example of optimum antenna/transponder positioning with RF600 readers and an RF600 antenna

Note that reflections may occur with large metal surfaces. These can be minimized by changing the radiation angle.

7.10.3.2 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. If the tag is mounted in the center of a flat metal plate, which is either approximately square or circular, it can be aligned in any direction since the transmitting and receiving RF660A antennas operate with circular polarization.

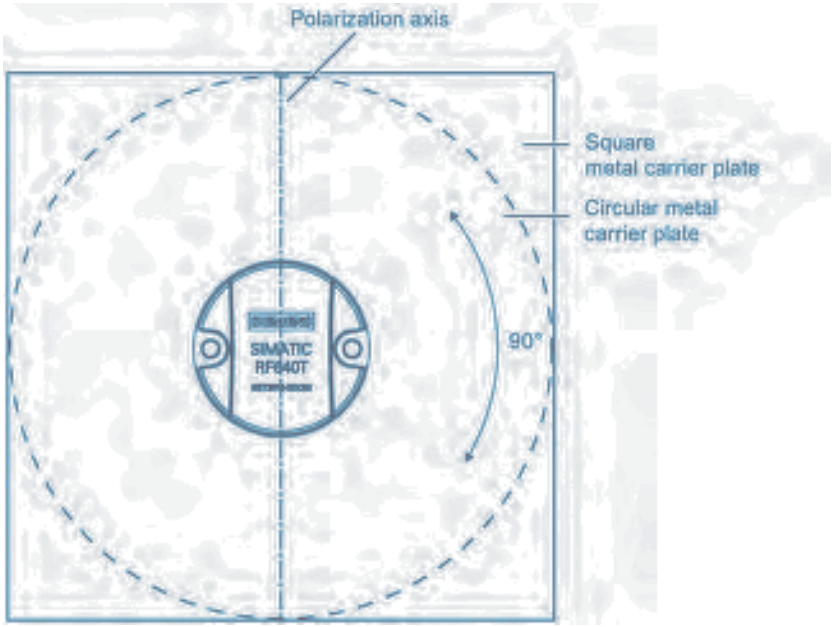


Figure 7-27 Optimum positioning of the transponder on a (square or circular) metal surface

Table 7- 38 Range on flat metallic carriers

Carrier material	Range
Metal plate of at least Ø 150 mm	100 %
Metal plate Ø 120 mm	approx. 80%
Metal plate Ø 85 mm	approx. 55%
Metal plate Ø 65 mm	approx. 40%

On rectangular carrier plates, the range depends on the mounting orientation of the transponder

You will find more detailed information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.10.3.3 Range when mounted on non-metallic carrier materials

The transponder is generally designed for mounting on metallic objects which provide the conditions for the maximum reading ranges

Table 7- 39 Range with non-metallic carriers

Carrier material	Range
Transponder on wooden carrier	approx. 40%
Transponder on plastic carrier	approx. 35%
Transponder on plastic mineral water bottle	approx. 55%
Transponder without base	approx. 30%

The maximum range of 100% is achieved by mounting the transponder in a free space with low reflections on a flat metal carrier with a diameter of at least 150 mm.

You will find more detailed information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.10.3.4 Use of the transponder in hazardous areas

TÜV NORD CERT GmbH, appointed center no. 0044 as per Article 9 of the Directive 94/9/EC of the European Council of 23 March 1994, has confirmed the compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the Directive.

The essential health and safety requirements are satisfied in accordance with standards EN 60079-0: 2012 + A11: 2013 and EN 60079-11: 2012.

This allows the RF640T transponder to be used in hazardous areas for gases, for the device category 2G and gas group IIB, or alternatively in hazardous areas for dusts, for the device category 2D and group IIIB.

Note

Readability of the serial number on the type plate

When using the transponder, make sure that the serial number can be read. The serial number is lasered and can be hidden by paint or other materials making it illegible.

The customer is responsible for making sure that the serial number of a transponder for the hazardous area can be read at all times.

Identification

The identification is as follows:

II 2 G Ex ib IIB T6 ... T3 Gb or.

II 2 D Ex ib IIIB T* °C Db

7.10.3.5 Use of the transponder in hazardous areas for gases

Note

Transponder labeling

The labeling of the front of the transponder shown above is an example and can vary between batches produced at different times.

This does not affect the hazardous area marking.

Temperature class grading for gases

The temperature class of the transponder for hazardous atmospheres (gases) depends on the ambient temperature and the radiated power of an antenna in the 865 - 868 MHz frequency band within the hazardous area.

WARNING

Ignitions of gas-air mixtures

When using the RF640T transponder, check that the temperature class is adhered to in keeping with the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of gas-air mixtures.

WARNING

Ignitions of gas-air mixtures

The maximum transmitting power of the transmitter used to operate the transponder must not exceed 2 W.

Non-compliance with the permissible transmitting power can lead to ignitions of gas-air mixtures.

Temperature class assignment for gases and a radiated power less than 100 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 100 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C to +85 °C	T5
-25 °C ... +74 °C	T6

Temperature class assignment for gases and a radiated power less than 500 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 500 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C to +85 °C	T4
-25 °C to +65 °C	T5
-25 °C to +50 °C	T6

Temperature class assignment for gases and radiated power for 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C to +85 °C	T3
-25 °C to +85 °C	T4
-25 °C ... +30 °C	T5
--	T6

Temperature class assignment for gases and a radiated power of 10 mW to 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or of an antenna located in the hazardous area in the 865 - 868 MHz frequency band cannot exceed the radiated power selected in the following diagram, the maximum permitted ambient temperature range can be found in the corresponding temperature function of the diagram. This makes the following temperature class assignment valid:

Ambient temperature range	Temperature class
-25 °C to +85 °C	T2
-25 °C to +85 °C	T3
-25 °C to +85 °C	T4
-25 °C to T_{max} (T5) °C	T5
-25 °C to T_{max} (T6) °C	T6

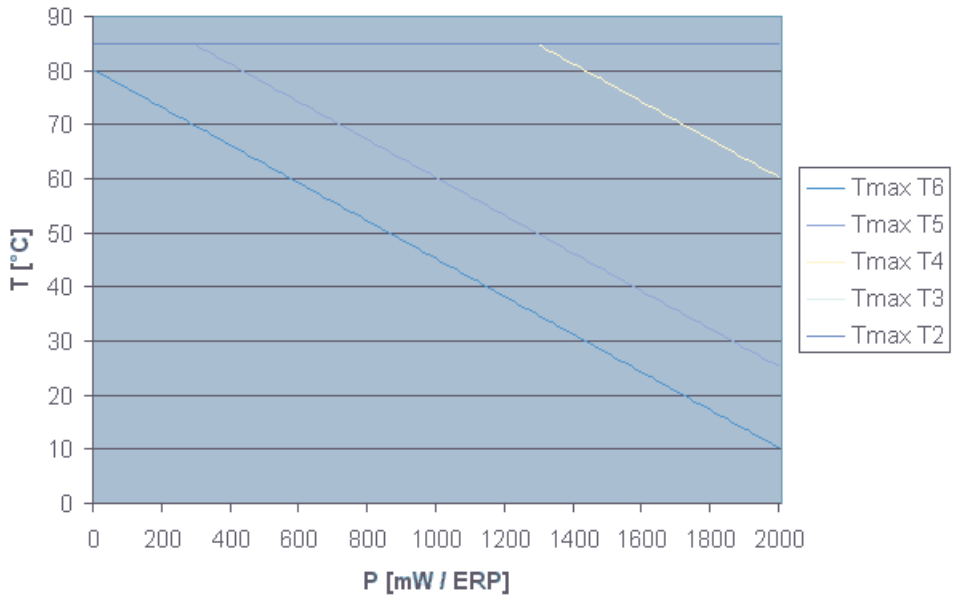


Figure 7-28 Maximum permitted ambient temperature depending on the radiated power

7.10.3.6 Use of the transponder in hazardous areas for dusts

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 210 °C (smoldering temperature). The ignition temperature specified here according to IEC 60079-0: 2011 for ignition protection type ib in this case references the smoldering temperature of a layer of combustible flyings (ib IIIA) or alternatively non-conductive dusts (ib IIIB).

Temperature class grading for dusts

WARNING

Ignitions of dust-air mixtures

When using the RF640T transponder, check that the temperature values are adhered to in keeping with the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of dust-air mixtures.

Temperature class assignment for dusts and a radiated power less than 100 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 100 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +85 °C	T96 °C

Temperature class assignment for dusts and a radiated power less than 500 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 500 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +85 °C	T120 °C

Temperature class assignment for dusts and a radiated power less than 1280 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 1280 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +85 °C	T135 °C

Ambient temperature range for dust and radiated power of 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +60 °C	T135 °C

Temperature class assignment for dusts and a radiated power of 10 mW ERP to 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band can be between the values 10 mW ERP and 1280 mW ERP, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +85 °C	T_{value} °C [1]

[1] See diagram, blue line

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band can be between the values 1280 mW ERP and 2000 mW ERP, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ $T_{max. Ambient}$ °C [1]	135°C

[1] See diagram, orange line

WARNING

Ignitions of dust-air mixtures

Using the RF640T transponder with radiant power greater than 1280 mW ERP requires compliance with the reduced maximum ambient temperature (see diagram) for maintaining the maximum temperature value of 135 °C.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of dust-air mixtures.

The respective temperature value and the maximum allowed ambient temperature in relation to the radiated power of the antenna is shown in the diagram below:

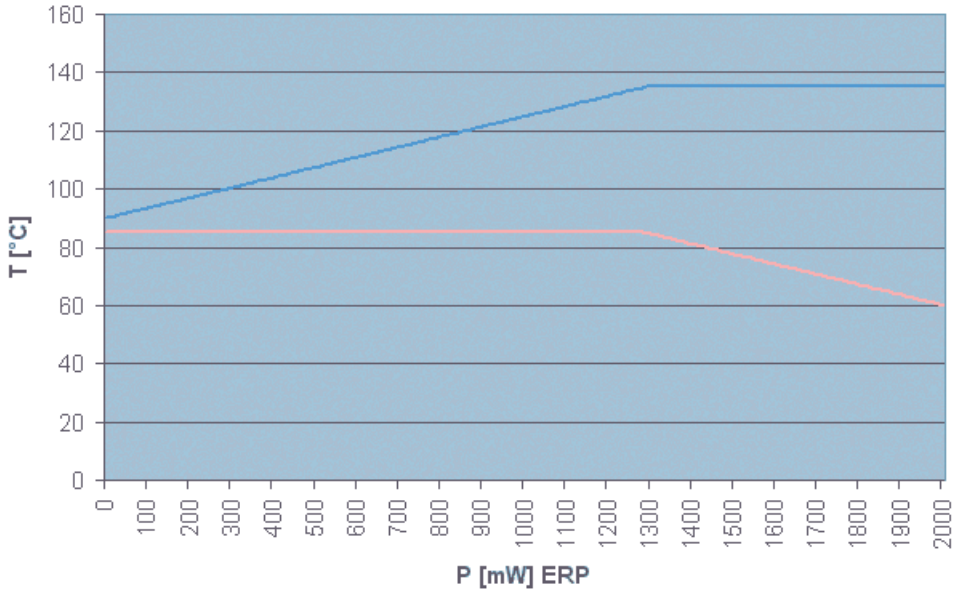


Figure 7-29 Temperature value and maximum permitted ambient temperature in relation to the radiated power

7.10.4 Technical specifications

Table 7- 40 Technical specifications of the transponder SIMATIC RF640T

	6GT2810-2DC0x
Product type designation	SIMATIC RF640T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 ... 928 MHz [1)]
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 30 bytes / 96 ... 240 bits
• User memory	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits
• Reserved (passwords)	• 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10^{14}
Number of read cycles (< 40 °C)	> 10^{5}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 4 m [2)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PA12
Silicone-free	Yes
Color	Anthracite
Printing	No

	6GT2810-2DC0x
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 ... +85 °C [3]
• In operation, outside write/read access	• -40 ... +125 °C
• During transportation and storage	• -40 … +125 °C
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68 / IPx9K
Resistance to mechanical stress	Torsion and bending stress is not permitted
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [4]
Vibration to EN 60068-2-6	20 g [4]
Design, dimensions and weight	
Dimensions (∅ × D)	50 × 8 mm
Weight	13 g
Type of mounting	2 x M4 screws ≤ 1.2 Nm
Standards, specifications, approvals	
Proof of suitability	Ex: II 2 G Ex ib IIB T6 ... T3 Gb, II 2 D Ex ib IIIB T* °C Db, -25 °C < Ta°< +85 °C
MTBF	1757 years

[1] The range is reduced to 70% at the band limits 902 MHz or 928 MHz. Due to frequency fluctuations, this effect has no impact.

[2] Mounting on a flat metal surface with a diameter of at least 150 mm and at room temperature. The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3] To use the transponder in hazardous areas, directive 94/9/EC of the European Council of 23 March 1994 must be complied with. Note the information in the section "Use of the transponder in hazardous areas (Page 424)".

[4] The values for shock and vibration are maximum values and must not be applied continuously.

Note

Effects of temperatures > 70 °C

Note that in temperature ranges > 70 °C, the transponder can become slightly deformed. However, this has no effect on the transponder function.

WARNING

Ignitions of gas-air or dust-air mixtures

When using the RF640T transponder, check to ensure that the temperature values are observed in respect of the requirements of the hazardous area of application.

Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of gas-air or dust-air mixtures.

Note

Damage to the surface of the housing

The values specified for the IP x9K test are maximum values and must not be applied continuously.

Protracted loading of the transponder can lead to damage to the surface of the housing due to high pressures.

7.10.5 Dimension drawing

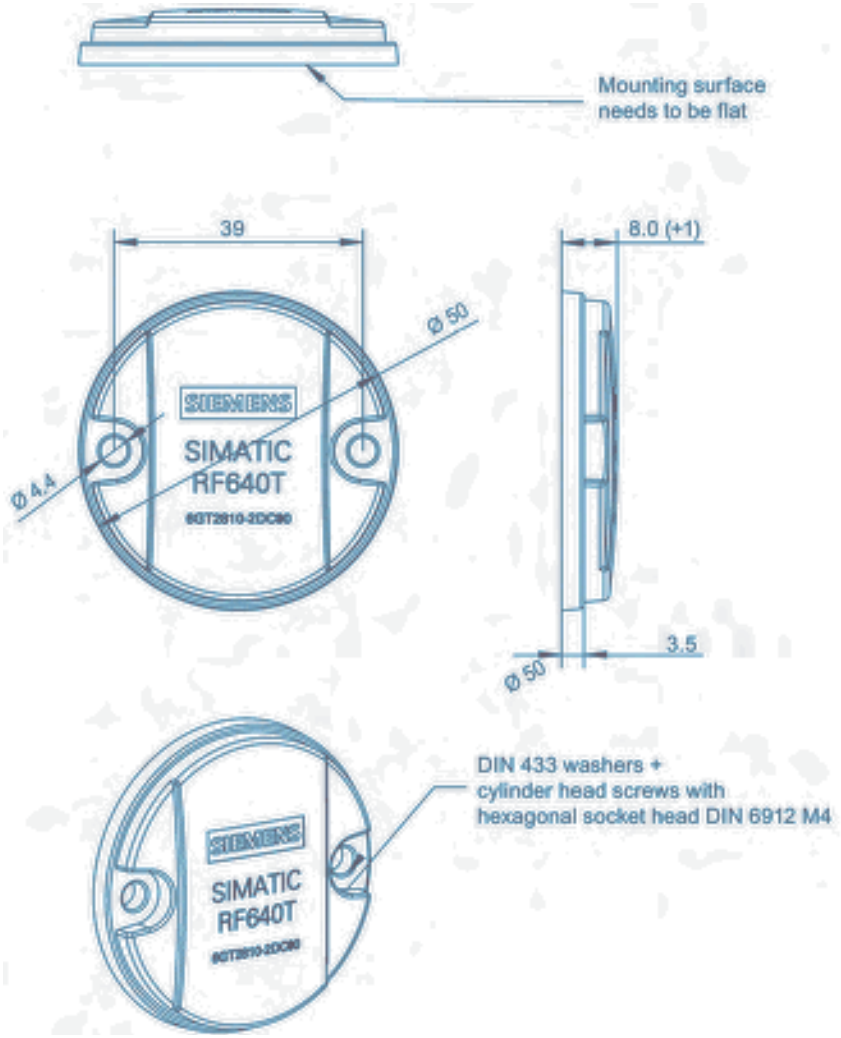


Figure 7-30 SIMATIC RF640T

Units of measure: All dimensions in mm

7.10.6 Certificates and approvals

Table 7- 41 6GT2810-2DC00 - RF640T

Certificate	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU Conformity with the ATEX directive 2014/34/EU

Table 7- 42 6GT2810-2DC10 - RF640T

Standard	
 Federal Communications Commission	Passive labels or transponders comply with the valid regulations; certification is not required.
	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 205089

ATEX certification

The type test certification for the RF640T is stored by TÜV 07 ATEX 346241 / Version 1. On the basis of this certification, the CE declaration by the manufacturer has been made according to directive 94/9/EC.
The producing factory of the RF640T has an ATEX quality assurance system recognized by the DEKRA EXAM GmbH with notice number BVS 11 ATEX ZQS/E111.

Manufacturer's address - distributor

Siemens Aktiengesellschaft (PD PA CI)
Process Industries and Drives Division
Process Automation
Industrial Communication and Identification
D-76181 Karlsruhe, Germany

Manufacturer's address - factory

Siemens Aktiengesellschaft (DF FA CE)
Digital Factory
Factory Automation
Control Components and System Engineering
Breslauer Straße 5
D-90766 Fürth, Germany

7.11 SIMATIC RF645T

7.11.1 Characteristics

SIMATIC RF645T is a passive and maintenance-free on-metal data storage medium. It is specially designed for mounting directly on metal surfaces. It operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) up to 448 bits. The transponder also has 2048 bits of user memory.

SIMATIC RF645T	Characteristics	
	Area of application	The areas of application are industrial asset management, RF identification of tools, containers and metallic equipment.
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Memory	• EPC: 56 bytes / 448 bits • User memory: 256 bytes / 2048 bits
	Read range	Max. 6.0 m [1]
	Mounting	• Glued • Mounting cover (M4) • Retaining bracket (M5)
	Mounting	Designed for direct mounting on conductive materials (preferably metal).

[1] Depending on the environment, the reader/the antennas and the set power

7.11.2 Ordering data

Table 7- 43 Ordering data

Product	Article number
SIMATIC RF645T	6GT2810-2HC05
Mounting cover for SIMATIC RF645T	6GT2898-5AA00
Retaining bracket for SIMATIC RF645T	6GT2898-5AB00

Delivery format

The SIMATIC RF645T is supplied in the following form:

- 20 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (20 units)

The mounting cover for SIMATIC RF645T is supplied in the following form:

- Minimum order quantity: 1 packaging unit (20 units)

The retaining bracket for SIMATIC RF645T is supplied in the following form:

- Minimum order quantity: 1 packaging unit (20 units)

7.11.3 Technical specifications

Table 7- 44 Technical specifications of SIMATIC RF645T

	6GT2810-2HC05
Product designation	SIMATIC RF645T
Radio frequency	
Operating frequency (broadband)	
• ETSI	• 865 to 868 MHz
• FCC, CMIIT and others	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP / UCODE 7xm-2k
Memory configuration	
• EPC	• 56 bytes / 448 bits
• User memory	• 256 bytes / 2048 bits
• TID	• 12 bytes / 96 bits
Number of write cycles (< 40 °C)	> 100 000
Number of read cycles (< 40 °C)	> 10^{14}
Data retention time (< 40 °C)	20 years
Electrical data	
Read range (on the metallic support)	≤ 6 m [1)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear (long side = polarization axis)

	6GT2810-2HC05
Mechanical specifications	
Material	Plastic (ABS)
Silicone-free	Yes
Color	Black
Antenna material	Aluminum
Printing	No
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -40 ... +85 °C
• In operation, outside write/read access	• -40 ... +85 °C
• During transportation and storage	• -40 ... +85 °C
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68
Shock according to DIN EN 60721-3-7 Class 7 M3 [2]	500 m/s^2
Vibrations according to EN 60068-2-6 [2]	200 m/s^2
Resistance to mechanical stress	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	52 (±0.5) × 36 (±0.5) × 12.5 mm
Weight	Approx. 25 g
Type of mounting	• Glued • Mounting cover (M4) • Retaining bracket (M5)

[1] Depending on the environment

[2] The values for shock and vibration are maximum values and must not be applied continuously.

7.11.4 Dimension drawing

All dimensions in mm

SIMATIC RF645T

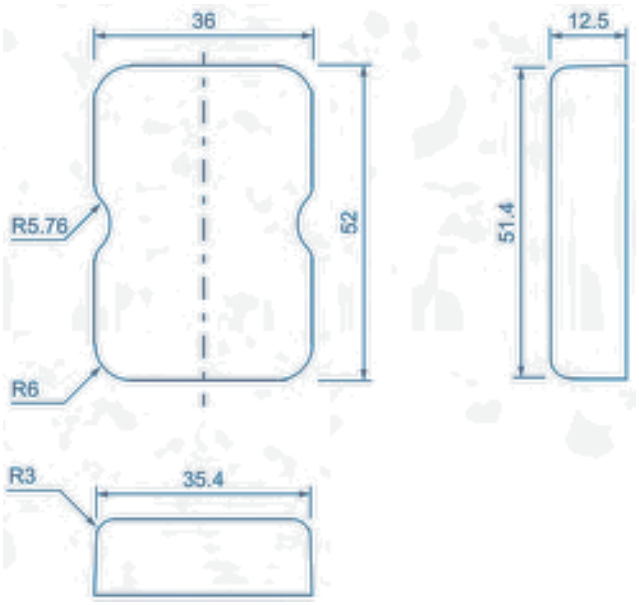


Figure 7-31 Dimension drawing of SIMATIC RF645T

Retaining bracket for SIMATIC RF645T

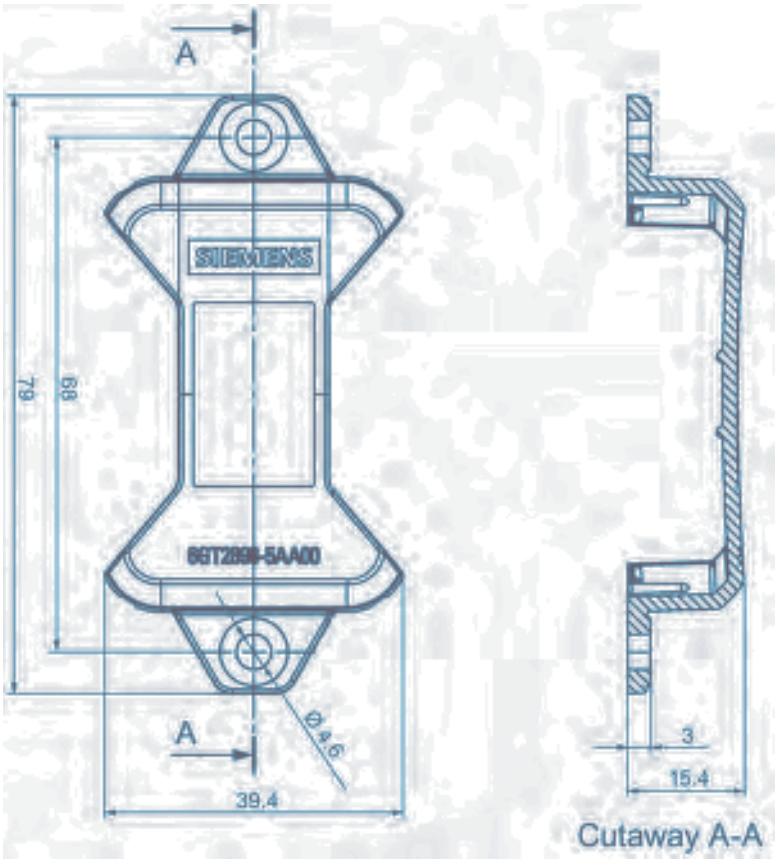


Figure 7-32 Dimension drawing mounting cover (6GT2898-5AA00) for SIMATIC RF645T

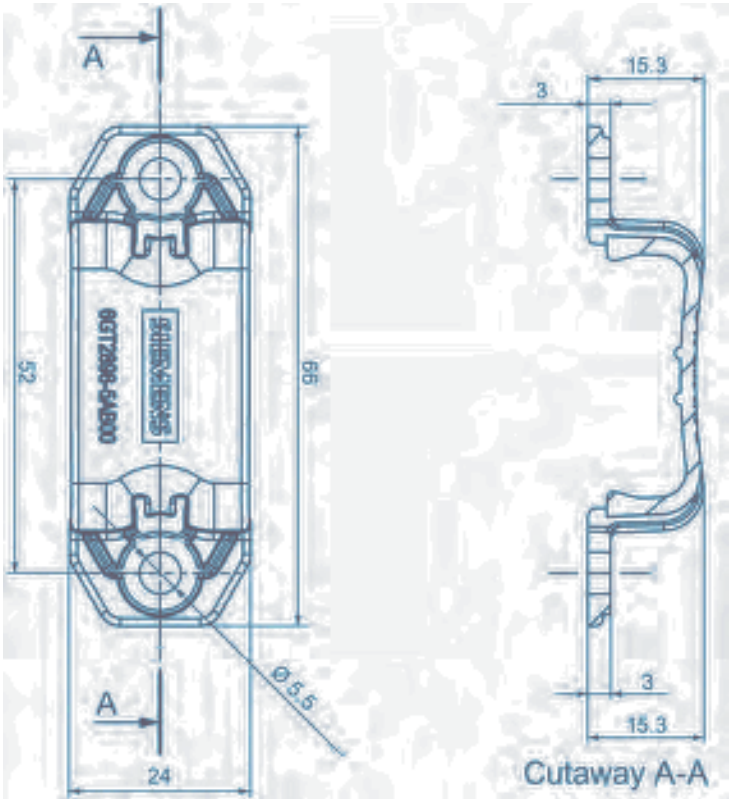


Figure 7-33 Dimension drawing (6GT2898-5AB00) for SIMATIC RF645T

7.11.5 Certificates and approvals

Table 7- 45 Certificates and approvals

Labeling	Description
CE	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
FC Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.

7.12 SIMATIC RF680T

7.12.1 Characteristics

The heat-resistant SIMATIC RF680T transponder is a passive, maintenance-free data carrier. It operates based on UHF Class 1 Gen 2 technology and is used to save the "Electronic Product Code" (EPC) of 96 bits/240 bits. The transponder also has a 512-bit user memory.

These transponders are ideally suited to high-temperature applications (e.g. painting) as well as applications in production logistics. Depending on the temperatures at which it is used, the lifetime of the transponder is limited.

The RF680T is rugged and suitable for industrial applications with IP68/IPX9K degree of protection. It is highly resistant to oil, grease and cleaning agents.

The SIMATIC RF680T is mounted directly onto metal carriers to ensure optimum functioning.

SIMATIC RF680T	Characteristics	
	Area of application	Applications with high temperatures (up to +220 °C). Suitable for use in hazardous areas. Typical areas of application: • Paint shops and their preparatory treatments, incl. drying ovens • Electrophoretic deposition area • Primer coat incl. drying oven • Top coat area incl. drying oven • Washing areas at temperatures > 85 °C
	Frequency range	• ETSI: 865 to 868 MHz • FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Polarization	Linear
	Temperature range	up to 220 °C
	Memory	• EPC: 96 ... 240 bits • User memory: 64 bytes
	Read range	Max. 5 m [1]
	Mounting	2 x M6 screws
	Mounting	Designed for direct mounting on conductive materials (preferably metal).

[1] Depending on the environment, the reader/the antennas and the set power

7.12.2 Ordering data

Table 7- 46 Ordering data RF680T

Product	Article number
SIMATIC RF680T	6GT2810-2HG80

Delivery format

SIMATIC RF680T is supplied in the following form:

- 10 transponders per packaging unit

  Minimum order quantity: 1 packaging unit (10 units)

7.12.3 Planning the use

7.12.3.1 Optimum antenna/transponder positioning with plane mounting of the transponder on metal

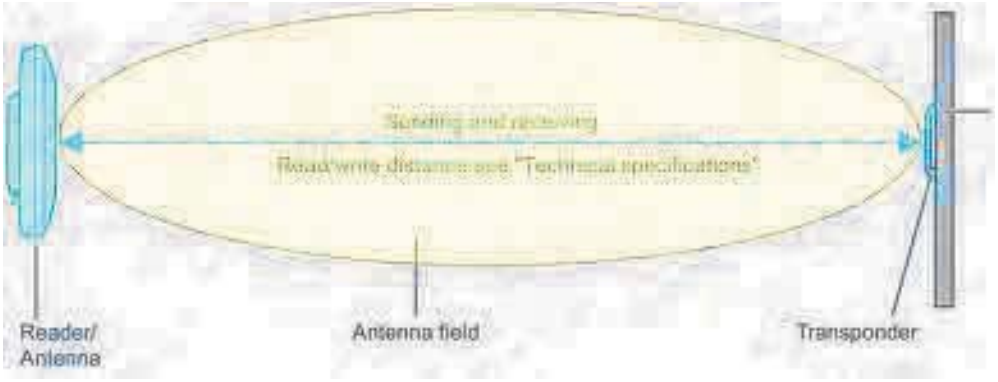


Figure 7-34 Example of optimum antenna/transponder positioning

7.12.3.2 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. If the transponder is centrally mounted on a plane metal plate, which may either be almost square or circular, it can be aligned in any direction if the transmitting and receiving antennas operate with circular polarization (such as the RF660A).

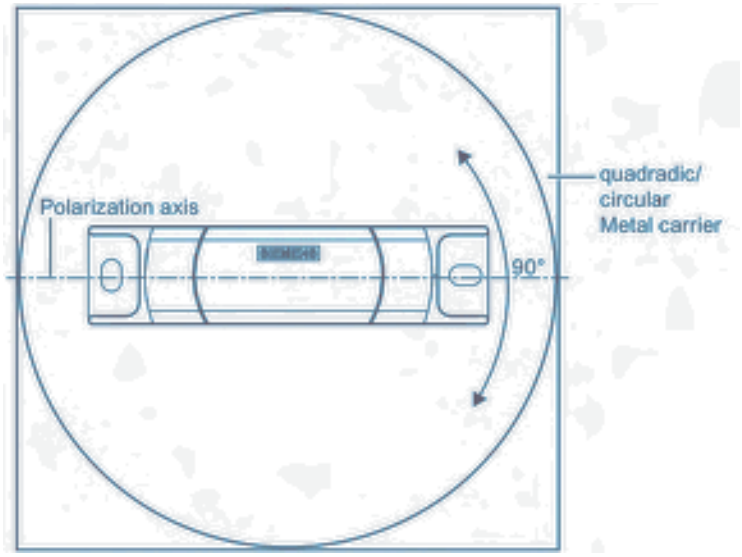


Figure 7-35 Optimum positioning of the transponder on a (square or circular) metal surface

To achieve the listed maximum ranges, the transponder must be mounted on a metallic mounting surface with a minimum diameter of 150 mm.

On rectangular carrier plates, the range depends on the mounting orientation of the transponder.

You will find more information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.12.3.3 Range when mounted on non-metallic carrier materials

Table 7- 47 Range with non-metallic carriers

Carrier material	Range
Transponder on wooden carrier (dry, degree of moisture < 15%)	typically 50 %
Transponder on plastic carrier	typically 50 %
Transponder on glass	typically 50 %

The maximum range of 100% is achieved by mounting the transponder in a free space with low reflections on a flat metal carrier with a diameter of at least 300 mm.

You will find more information on the range in the section "Minimum distances and maximum ranges (Page 55)".

7.12.3.4 Use of the transponder in the hazardous area

TÜV NORD CERT GmbH, appointed center no. 0044 as per Article 9 of the Directive 94/9/EC of the European Council of 23 March 1994, has confirmed the compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the Directive.

The essential health and safety requirements are satisfied in accordance with standards IEC 60079-0:2011 and EN 60079-11:2012.

This allows the RF680T transponder to be used in hazardous areas for gases, for the device category 2G and gas group IIB, or alternatively in hazardous areas for dusts, for the device category 2D and group IIIB.

Note

Readability of the serial number on the type plate

When using the transponder, make sure that the serial number can be read. The serial number is lasered and can be hidden by paint or other materials making it illegible.

The customer is responsible for making sure that the serial number of a transponder for the hazardous area can be read at all times.

Identification

The identification is as follows:

II 2G Ex ib IIB T6 to T2 Gb or

II 2D Ex ib IIIB T135 °C Db

7.12.3.5 Use of the transponder in the hazardous area for gases

Note

Transponder labeling

The labeling of the front of the transponder shown above is an example and can vary between batches produced at different times.

This does not affect the hazardous area marking.

Temperature class delineation for gases

The temperature class of the transponder for hazardous atmospheres (gases) depends on the ambient temperature and the radiated power of an antenna in the 865 - 868 MHz frequency band within the hazardous area.

WARNING

Ignitions of gas-air mixtures

When using the RF680T transponder, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of gas-air mixtures.

WARNING

Ignitions of gas-air mixtures

The maximum transmitting power of the transmitter used to operate the transponder must not exceed 2 W. Non-compliance with the permissible transmitting power can lead to ignitions of gas-air mixtures.

Temperature class assignment for gases and a radiated power less than 100 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 100 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C ... +200 °C	T2
-25 °C ... +190 °C	T3
-25 °C ... +125 °C	T4
-25 °C ... +90 °C	T5
-25 °C ... +75 °C	T6

Temperature class assignment for gases and a radiated power less than 500 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 500 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C ... +220 °C	T2
-25 °C ... +173 °C	T3
-25 °C ... +108 °C	T4
-25 °C ... +73 °C	T5
-25 °C ... +58 °C	T6

Temperature class assignment for gases and radiated power for 1000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 1000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C ... +220 °C	T2
-25 °C ... +151 °C	T3
-25 °C ... +86 °C	T4
-25 °C ... +51 °C	T5
-25 °C ... +36 °C	T6

Temperature class assignment for gases and radiated power for 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature class
-25 °C ... +208 °C	T2
-25 °C ... +108 °C	T3
-25 °C ... +43 °C	T4
-25 °C ... +8 °C	T5

Temperature class assignment for gases and a radiated power of 10 mW to 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or of an antenna located in the hazardous area in the 865 - 868 MHz frequency band cannot exceed the radiated power selected in the following diagram, the maximum permitted ambient temperature range can be found in the corresponding temperature function of the diagram. This makes the following temperature class assignment valid:

Ambient temperature range	Temperature class
-25 °C ... T_{max} (T2) °C	T2
-25 °C ... T_{max} (T3) °C	T3
-25 °C ... T_{max} (T4) °C	T4
-25 °C ... T_{max} (T5) °C	T5
-25 °C ... T_{max} (T6) °C	T6

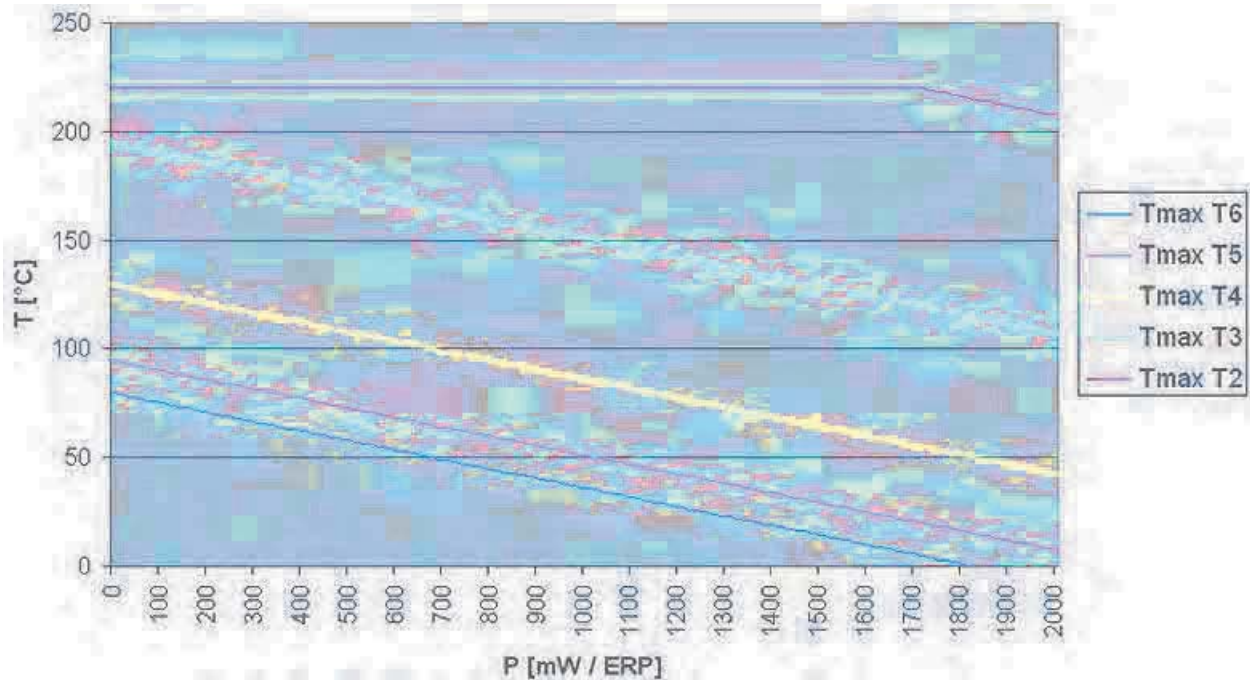


Figure 7-36 Maximum permitted ambient temperature depending on the radiated power

7.12.3.6 Use of the transponder in the hazardous area for dusts

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 210 °C (smoldering temperature). The ignition temperature specified here according to IEC 60079-0:2011 for ignition protection type ib in this case references the smoldering temperature of a layer of combustible flyings (ib IIIA) or alternatively non-conductive dusts (ib IIIB).

Temperature class delineation for dusts

WARNING
Ignitions of dust-air mixtures When using the RF680T transponder, check to make sure that the temperature values are adhered to in keeping with the requirements of the area of application Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of dust-air mixtures.

Temperature class assignment for dusts and a radiated power less than 100 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 100 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +125 °C	T135 °C

Temperature class assignment for dusts and a radiated power less than 500 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 500 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +108 °C	T135 °C

Temperature class assignment for dusts and a radiated power less than 1000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 1000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +86 °C	T135 °C

Ambient temperature range for dust and radiated power of 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band cannot exceed the value 2000 mW, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ +43 ℃	T135 °C

Temperature class assignment for dusts and a radiated power of 10 mW ERP to 2000 mW ERP

If the radiated power of an antenna radiating into the hazardous area or located in the hazardous area and operating in the 865 - 868 MHz frequency band can be between the values 10 mW ERP and 2000 mW ERP, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
-25 °C ≤ Ta ≤ $T_{max. ambient}$ °C [1]	135°C [2]

[1] See diagram, orange line

[2] See diagram, blue line

WARNING

Ignitions of dust-air mixtures

Using the RF680T transponder with radiant power greater than 1280 mW ERP, requires compliance with the reduced maximum ambient temperature (see diagram) for maintaining the temperature value to a maximum of 135 °C. Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of dust-air mixtures.

The respective temperature value and the maximum allowed ambient temperature in relation to the radiated power of the antenna is shown in the diagram below:

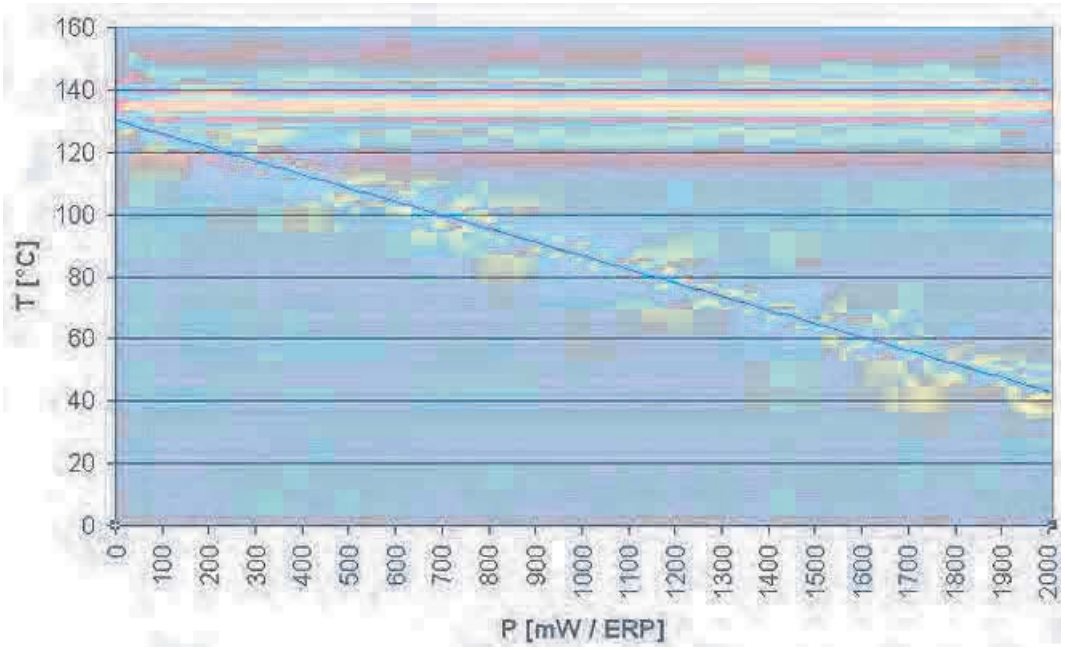


Figure 7-37 Temperature value and maximum permitted ambient temperature in relation to the radiated power

7.12.4 Technical specifications

Table 7- 48 Technical specifications of the transponder SIMATIC RF680T

	6GT2810-2HG80
Product type designation	SIMATIC RF680T
Radio frequencies	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 ... 928 MHz [1)]
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
• EPC	• 12 ... 30 bytes / 96 ... 240 bits
• User memory	• 64 bytes / 512 bits
• TID	• 8 bytes / 64 bits
• Reserved (passwords)	• 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10^{14}
Number of read cycles (< 40 °C)	> 10^{5}
Data retention time (< 40 °C)	10 years
Electrical data	
Range	≤ 5 m [2)]
Protocol	ISO 18000-63
Transmission speed	≤ 320 kbps
Polarization	Linear
Mechanical specifications	
Material	PPS
Silicone-free	Yes
Color	Black
Printing	No

	6GT2810-2HG80
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 … +100 °C, permanent Special features: +100 ... +140 °C, 20 % reduction of the limit distance As of +140 °C, no processing possible Up to +200 °C, tested up to 5000 hours or 3000 cycles Up to +220 °C, tested up to 2000 hours or 1500 cycles
• In operation, outside write/read access	• -40 ... +220 °C
• During transportation and storage	• -40 … +100 °C [3]
Distance from metal	0 mm Designed for mounting directly on metal
Degree of protection	IP68 / IPx9K
Resistance to mechanical stress	Torsion and bending stress is not permitted
Shock-resistant according to DIN EN 60721-3-7, Class 7 M3	100 g [4]
Vibration to EN 60068-2-6	20 g [4]
Design, dimensions and weight	
Dimensions (L x W x D)	32 × 15 × 130 mm
Weight	50 g
Type of mounting	2 x M6 screws ≤ 1 Nm
Standards, specifications, approvals	
Proof of suitability	II 2G Ex ib IIB T6 to T2 Gb, II 2D Ex ib IIIB T135 °C Db
MTBF	1940 years

[1] The range is reduced to 70% at the band limits 902 MHz or 928 MHz. Due to frequency fluctuations, this effect has no impact.

[2] Mounting on a flat metal surface with a diameter of at least 300 mm and at room temperature. The information relates to the maximum read range. You will find more information on ranges in the section "Minimum distances and maximum ranges (Page 55)".

[3] To use the transponder in hazardous areas, directive 94/9/EC of the European Council of 23 March 1994 must be complied with. Note the information in the section "Use of the transponder in the hazardous area (Page 444)".

[4] The values for shock and vibration are maximum values and must not be applied continuously.

7.12.5 Dimension drawing

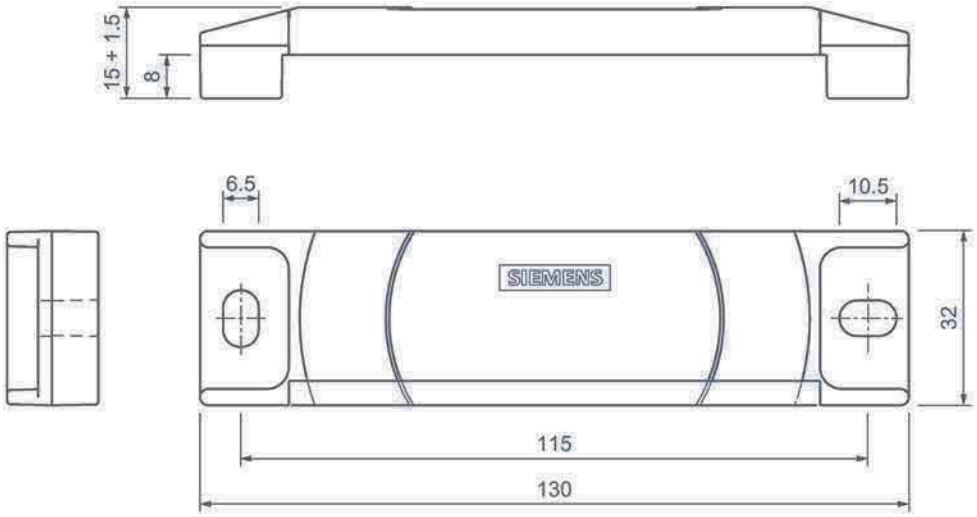


Figure 7-38 Dimension drawing of SIMATIC RF680T

All dimensions in mm

Tolerances unless indicated otherwise ±0.5 mm.

7.12.6 Certificates and approvals

Table 7- 49 6GT2810-2HG80 - RF680T

Certificate	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU Conformity with the ATEX directive 2014/34/EU

Table 7- 50 6GT2810-2HG80 - RF680T

Standard	
 Federal Communications Commission	Passive labels or transponders comply with the valid regulations; certification is not required.
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): • UL508 - Industrial Control Equipment • CSA C22.2 No. 142 - Process Control Equipment • UL Report E 120869

ATEX certification

The type test certification for the RF680T Version 1 is stored by TÜV 07 ATEX 346241. On the basis of this certification, the CE declaration by the manufacturer has been made according to directive 94/9/EC.
The producing factory of the RF680T Version 1 has an ATEX quality assurance system recognized by the DEKRA EXAM GmbH with certificate number BVS 11 ATEX ZQS/E111.

Manufacturer's address - distributor

Siemens Aktiengesellschaft (PD PA CI)
Process Industries and Drives Division
Process Automation
Industrial Communication and Identification
D-76181 Karlsruhe, Germany

Manufacturer's address - factory

Siemens Aktiengesellschaft (DF FA CE)
Digital Factory
Factory Automation
Control Components and System Engineering
Breslauer Straße 5
D-90766 Fürth, Germany

7.13 SIMATIC RF682T

7.13.1 Characteristics

The heat-proof SIMATIC RF682T is a passive and maintenance-free data carrier. The RF682T operates based on the UHF Class 1 Gen 2 technology and is used to store the "Electronic Product Code" (EPC) of 224 bits. The transponder also has a 3072-bit user memory.

These transponders with a limited service life are ideally suited to high-temperature applications (e.g. the painting of vehicle bodies) as well as applications in production logistics.

The RF682T is rugged and suitable for industrial applications with degree of protection IP68/IPX9K. It is highly resistant to oil, grease and cleaning agents.

The SIMATIC RF682T is mounted directly onto metal surfaces to ensure optimum functioning.

SIMATIC RF682T	Characteristics	
	Area of application	Applications with high temperatures (briefly up to +220 °C). Typical areas of application: • Paint shops and their preparatory treatments, incl. drying ovens • Electrophoretic deposition area • Primer coat incl. drying oven • Top coat area incl. drying oven • Washing areas at temperatures > 85 °C
	Air interface	According to ISO 18000-63
	Memory	• EPC: 28 bytes / 224 bits • User memory: 384 bytes / 3072 bits
	Read range	Max. 3.5 m [1)]
	Mounting	Only intended for mounting directly on metal.

1) Depending on the environment, the reader/the antennas and the set power

7.13.2 Ordering data

Table 7- 51 Ordering data

	Article number
SIMATIC RF682T	6GT2810-3HG80
Mounting set for SIMATIC RF68xT (2x bracket)	6GT2890-2AA00

Delivery format

The SIMATIC RF682T is available in the following form:

- 10 transponders per packaging unit

  Minimum order quantity: 1 packaging unit

The mounting set for SIMATIC RF682T is available in the following form:

- 10 mounting sets per packaging unit

  Minimum order quantity: 1 packaging unit

7.13.3 Planning operation

7.13.3.1 Optimum antenna/transponder positioning with plane mounting of the transponder on metal

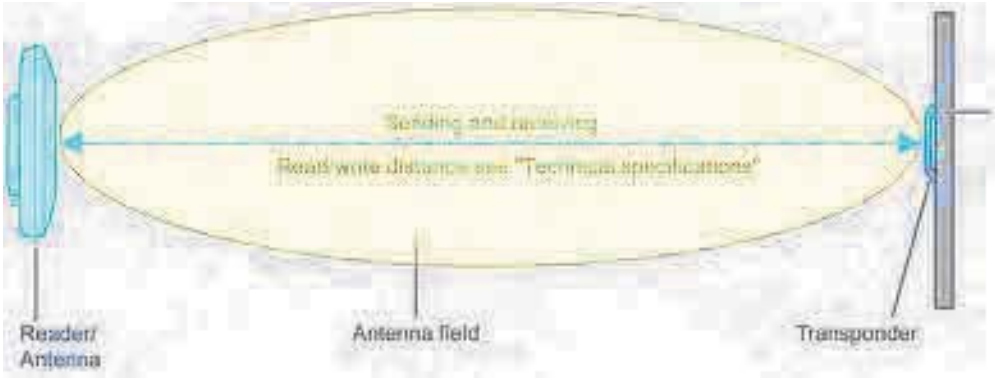


Figure 7-39 Example of optimum antenna/transponder positioning

7.13.3.2 Note on installation

NOTICE
Reduction of the write/read range When mounting on metal or conductive material, ensure that the space below the transponder remains empty.

NOTICE
Mounting at a high temperature To relieve mechanical strain or tension on the transponder, when using the transponder at temperatures > +80 °C the transponder should be mechanically separated from the supporting surface by using the mounting brackets (due to the differing expansion coefficients of all materials).

7.13.3.3 Range when mounted on flat metallic carrier plates

The transponder generally has linear polarization. The polarization axis runs as shown in the diagram below. The polarization axis of the transponder should always run parallel to the polarization axis of the antenna to achieve optimum distances and results.

If the transponder is centrally mounted on a plane metal plate, which may either be almost square or circular, it can be aligned in any direction if the transmitting and receiving antennas operate with circular polarization (such as the RF650A).

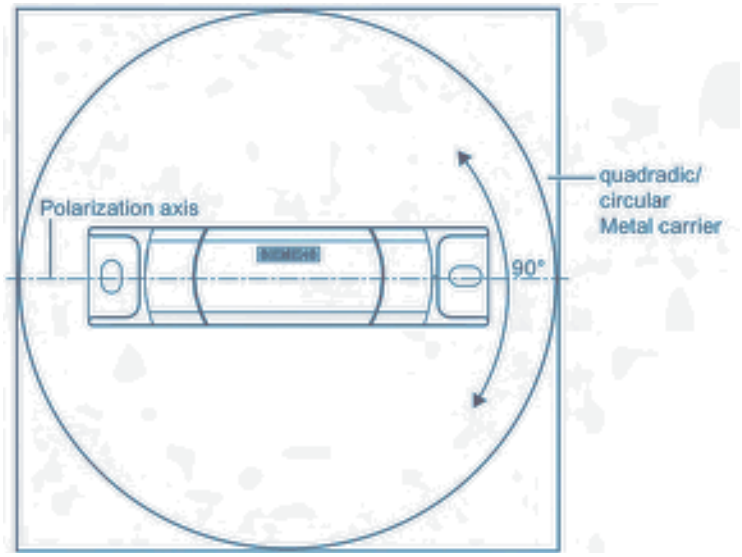


Figure 7-40 Optimum positioning of the transponder on a (square or circular) metal plate

The metal plate must have a minimum diameter of 150 x 150 mm. Smaller surfaces can cause a reduction of the read/write distances.

On rectangular carrier plates, the range depends on the mounting orientation of the transponder.

7.13.4 Technical specifications

Table 7- 52 Technical specifications of SIMATIC RF682T

	6GT2810-3HG80
Product designation	SIMATIC RF682T
Radio frequency	
Operating frequency	
• ETSI	• 865 to 868 MHz
• FCC	• 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP UCode DNA
Memory type	EEPROM
Memory configuration	
• EPC	• 28 bytes / 224 bits
• User memory	• 384 bytes / 3072 bits
• TID	• 12 bytes / 96 bits
Number of write cycles (< 40 °C)	> 10^5
Number of read cycles (< 40 °C)	unlimited
Data retention time (< 40 °C)	20 years
Electrical data	
Range	
• Writing	• Up to 1.8 m [1)]
• Reading	• Up to 3.5 m [1)]
Protocol	EPCglobal Class 1 Gen 2 / ISO 18000-63
Transmission speed	≤ 400 kbps
Polarization	Linear
Mechanical specifications	
Material	Plastic (PPS)
Silicone-free	Yes
Color	Black
Imprint	No

	6GT2810-3HG80
Permitted ambient conditions	
Ambient temperature	
• In operation, during write/read access	• -25 to +100 °C permanently Special features: As of +140 °C, no processing possible
• In operation, outside write/read access	• -40 to +220 °C Special features: Up to 220 °C Tested up to 250 hours or 500 cycles
• During transportation and storage	• -40 ... +100 °C
Distance from metal	Only intended for mounting directly on metal
Degree of protection	IP68 / IPx9K
Shock according to DIN EN 60721-3-7 Class 7 M3	100 g [2]
Vibrations according to EN 60068-2-6	20 g [2]
Resistance to mechanical stress	Torsion and bending stress are not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	130 × 32 × 15 mm
Weight	50 g
Type of mounting	Screw connection 2x M6 (≤ 1 Nm)
Standards, specifications, approvals	
MTBF	1940 years

1) Depending on the environment, the reader / the antennas and the set power

2) The values for shock and vibration are maximum values and must not be applied continuously.

7.13.5 Dimension drawing

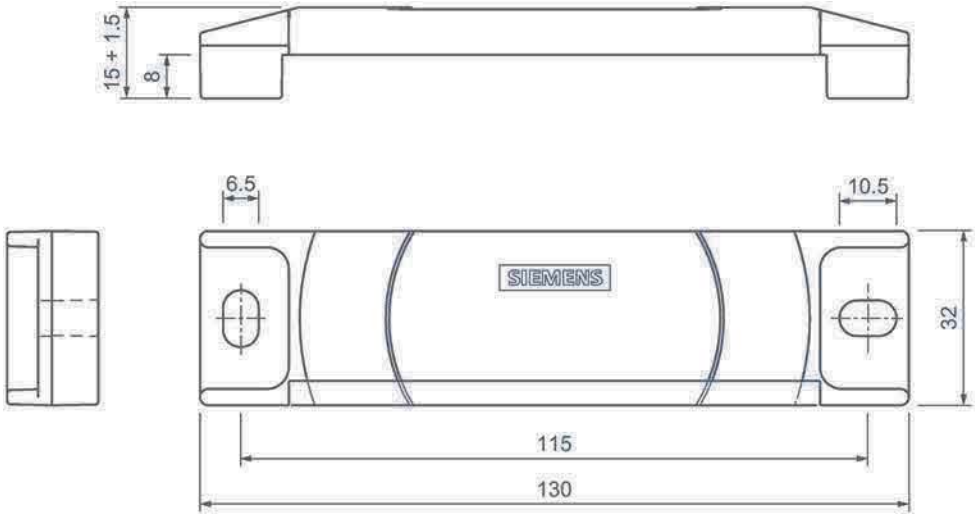


Figure 7-41 Dimension drawing of SIMATIC RF682T

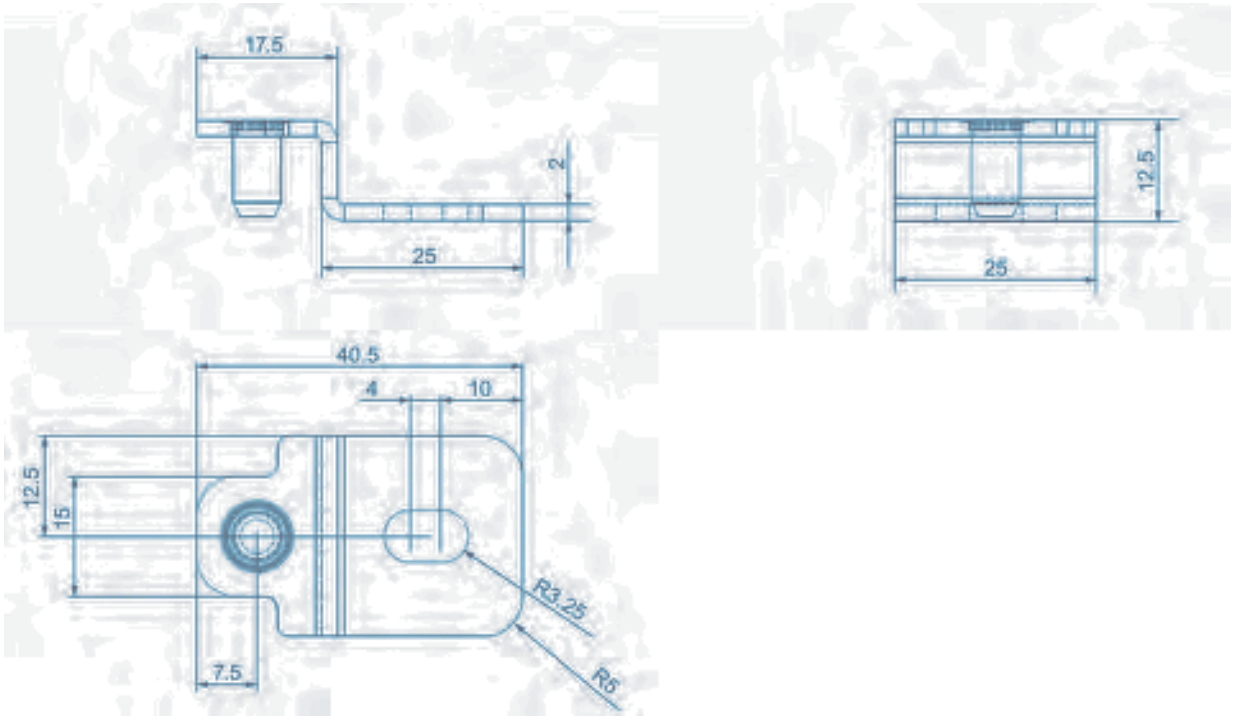


Figure 7-42 Dimension drawing mounting for SIMATIC RF68xT

All dimensions in mm

Tolerances unless indicated otherwise ±0.5 mm.

7.13.6 Certificates and approvals

Table 7- 53 Certificates and approvals

Labeling	Description
	Conformity with the RED directive 2014/53/EU Conformity with the RoHS directive 2011/65/EU
 Federal Communications Commission	Passive labels and transponders comply with the valid regulations; certification is not required.

Integration into networks

8

8.1 Overview of parameterization of RF600 reader

The parameter assignment possibilities that are available to you for each reader of the RF600 family are outlined below. You will find detailed information on parameter assignment in the specified chapters of the documentation:

Table 8- 1 Reader parameter assignment options

	SIMATIC RF650R	SIMATIC RF610R/RF615R/RF680R/RF685R
SIMATIC STEP 7	--	Configuration manual "SIMATIC RF600", section "Interface to the SIMATIC controller"
XML commands	Configuration manual "SIMATIC RF600", section "XML interface"	Configuration manual "SIMATIC RF600", section "XML interface"
Ethernet/IP	--	Configuration manual "SIMATIC RF600", section "Interface to the Rockwell controller"
OPC UA	Configuration manual "SIMATIC RF600", section "OPC UA interface"	Configuration manual "SIMATIC RF600", section "OPC UA interface"

You can find the "SIMATIC RF600" configuration manual on the pages of "Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15088/man)".

8.2 Integration in IT networks via the user application

Connecting the RF600 readers using XML

If you want to create your own applications for the RF600 readers, you can do this using the XML-based demo application of the reader. You can find information on XML commands in the configuration manual "SIMATIC RF600".

Connecting the RF600 readers using OPC UA

If you want to create your own applications for the RF600 readers, you can do this using the OPC UA application of the reader. You can find information on OPC UA in the configuration manual "SIMATIC RF600".

You will find more information on OPC UA on the pages of the "OPC Foundation (https://opcfoundation.org/)".

Connecting the RF600 readers using OEM

The RF600 readers also provide you with the option of developing and running your application directly on the Linux operating system integrated in the reader. For this function, you need special activation of the reader in the form of firmware. It is only available upon request. Contact your local Siemens office about this.

8.3 Integration in control networks

Connecting the RF610R/RF615RRF680R/RF685R readers

RF610R/RF615R/RF680R/RF685R readers can be connected to a SIMATIC controller via Ethernet, EtherNet/IP, PROFINET directly or via PROFIBUS and the ASM 456 communications module.

RF610R/RF615R readers can be connected to a SIMATIC controller via Ethernet and PROFINET directly.

Interfaces and blocks of the communications modules/readers

Table 8- 2 Interfaces and blocks of the communications modules/readers

ASM/CM	Interfaces to the application (PLC)	Blocks	Reader connections
ASM 456	PROFIBUS DP-V1	Ident profile	1
RF610R/ RF615R/ RF680R/ RF685R	PROFINET IO	Ident profile	--
	EtherNet/IP	--	--
	OPC UA	--	--

Example configurations

The following configuration graphics show as an example how the RF600 readers can be connected to SIMATIC controllers.

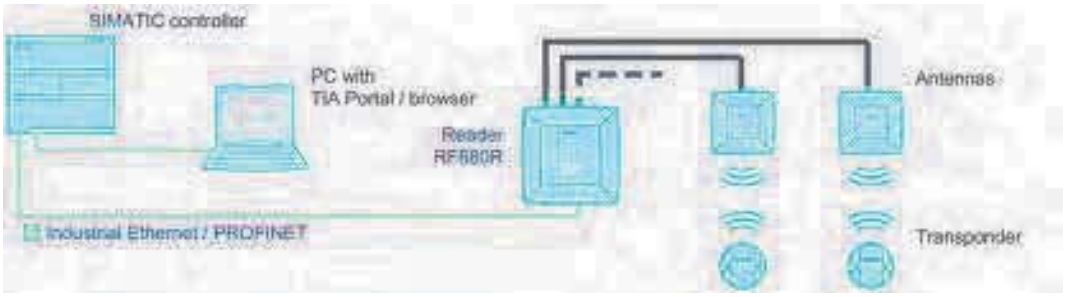


Figure 8-1 Configuration graphic with SIMATIC RF680R (or RF685R, RF610R, RF615R) and PROFINET connection

Figure 8-2 Configuration graphic with SIMATIC RF680R (or RF685R) and PROFINET connection via an EtherNet/IP controller

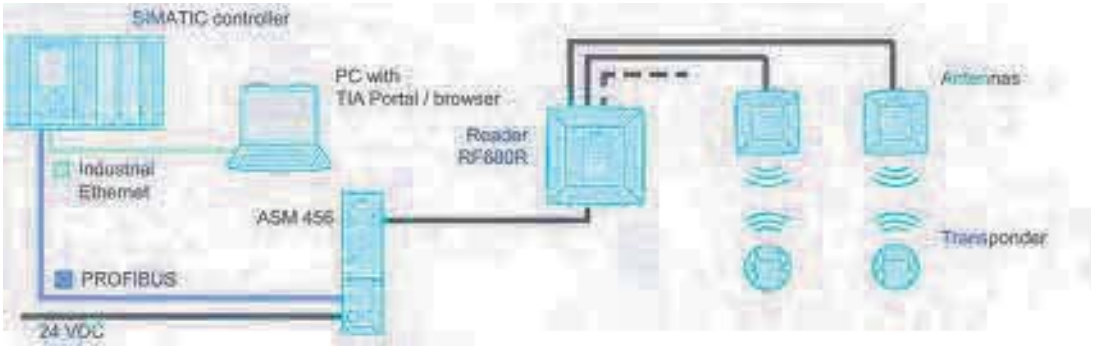


Figure 8-3 Configuration graphic with SIMATIC RF680R (or RF685R, RF610R, RF615R) and PROFIBUS connection

You will find more information on the ASM 456 in the operating instructions "ASM 456 (https://support.industry.siemens.com/cs/ww/en/view/32629442)".

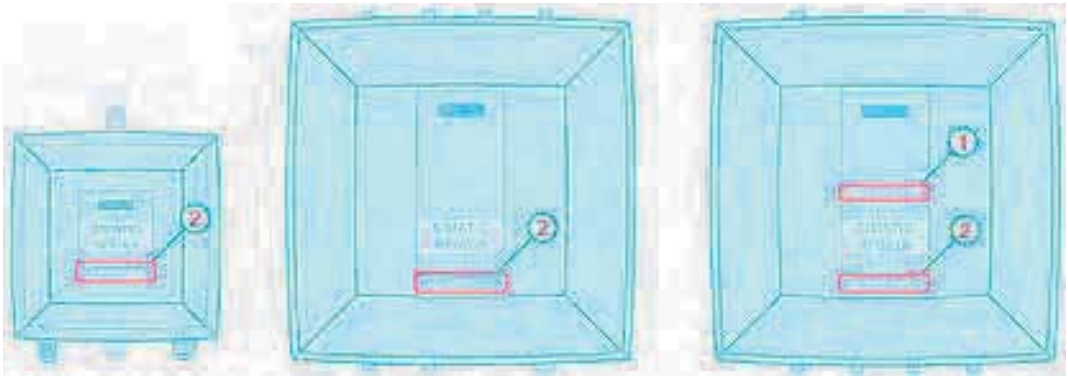
System diagnostics

9

9.1 Diagnostics via the LED displays of the reader

Please note that only the RF680R/RF685R readers have LED status display. RF610R/RF615R/RF650R readers have a "PRESENCE" display instead. With the help of the LED displays, you can read out the status and the error messages of the RF680R/RF685R readers.

The LED status display is in the middle on the front of the reader. The LED operating display is at the bottom on the front of the reader.



① LED status display (ST1 - ST9) - RF680R/RF685R only

② LED operating display

- RUN/STOP (R/S) — Shows whether the reader is ready for operation.
- ERROR (ER) — Indicates whether an error has occurred.
- MAINTENANCE (MAINT) - only with RF610R/RF615R/RF680R/RF685R — Shows whether the reader needs maintenance.
- POWER (PWR) — Shows whether the reader is supplied with power.
- PRESENCE (PRE) - only with RF610R/RF615R/RF650R — Among other things, indicates whether or not there are multiple transponders in the antenna field. With the RF680R/RF685R readers, this is indicated by the status display.
- LINK 1 (LK1) — Indicates that there is a connection via Ethernet interface "1".
- RECEIVE/TRANSMIT 1 (R/T1) — Indicates that data is being sent and/or received via Ethernet interface "1".
- LINK 2 (LK2) - only with RF680R/RF685R — Indicates that there is a connection via Ethernet interface "2".
- RECEIVE/TRANSMIT 2 (R/T2) - only with RF680R/RF685R — Indicates that data is being sent and/or received via Ethernet interface "2".

Figure 9-1 LED displays of the RF61xR, RF650R and RF68xR reader

Functions of the "PRE" LED (RF610R/RF615R/RF650R)

- Display of RF activity

  Indicates whether the reader is sending via the antenna (constant green), whether transponders were detected by the reader (flashing yellow) and whether a transponder was sent to the user application (constant yellow).

- Indication of the quality of the antenna alignment (RSSI)

  When aligning the antenna using the WBM, the "PRE" LED indicates the RSSI value with which the transponder was detected:

  – Red: Low RSSI value

  – Yellow: Medium RSSI value

  – Green: High RSSI value

- Error displays

  With the RF610R/RF615R readers, errors are displayed by means of a red flashing "PRE" LED.

Functions of the LED status display (RF680R/RF685R)

With the LED operating display, you can read out the various operating statuses of the readers. The LED status display of the RF680R and RF685R readers has several functions. Among other things, the status display provides the following functions:

- Startup of the reader

  The startup process of the reader is displayed by a status bar lit yellow. As soon as the startup is completed, the reader requires several seconds before it is operational. This phase is indicated by a status bar flashing yellow. During a firmware update, the startup takes longer.

  The reader is ready for operation when the "R/S" LED is lit/flashes green. If the "R/S" LED is flashing, the reader is waiting for a connection. If the "R/S" LED is lit constantly, the reader is connected to the controller or PC.

- Error display

  If there is an error, the actual error is indicated by the lighting/flashing pattern. The "ER" LED of the LED operating display also flashes. You will find more information on error messages in the section "XML/PLC error messages (Page 473)".

- Display of RF activity

  Indicates whether the reader is sending via the antenna (constant green), whether transponders were detected by the reader (flashing yellow) and whether a transponder was sent to the user application (constant yellow).

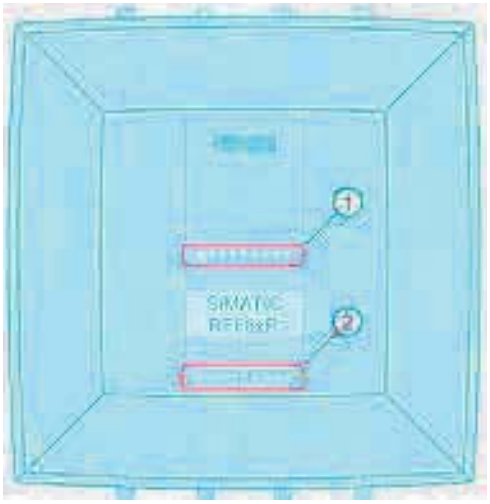
- Indication of the quality of the antenna alignment (RSSI)

  When aligning the antenna, using the WBM, the status display indicates the RSSI value with which the transponder was detected. The more LEDs light up (first 3x red, then 3x yellow, then 3x green), the higher the RSSI value with which the transponder was detected.

  You can find more information on the antenna alignment in the configuration manual "SIMATIC RF600".

9.1.1 How the LED status display works

Note that the RF610R/RF615R/RF650R readers do not have an LED status display. The LED status display displays the error messages of the RF680R/RF685R readers.



① LED status display (ST1 - ST9)
② LED operating display

Figure 9-2 LED displays of the RF680R/RF685R readers

Error messages are indicated by red flashing status LEDs and the red flashing "ER" LED. A distinction is made between hardware errors (faults) and normal errors. With hardware errors, the LEDs flash with a fast frequency of 4 Hz. With all other errors, the LEDs flash with a slow frequency of 2 Hz.

The detailed LED error display described here is enabled as default. If required, you can disable this in the "Settings - General" menu item of the WBM. If the LED error display is enabled, a separate LED pattern is assigned to every error in the LED status display. The displayed LED patterns are based on the error code of the hexadecimal error message converted to binary.

Example

The error "0x12" (XML error message) is displayed. Converted to binary, this results in the value "0001 0010". This converted value is displayed in the LED status display. The value "0" means that the corresponding LED does not light up, whereas the value "1" means that the corresponding LED is lit red. The middle (5th LED) of the LED status display serves as a "delimiter" and is always lit yellow.

XML error message hexadecimal	Error message binary	LED fault display
0x12	0001 0010	

9.1.2 Diagnostics via LED operating display

The operating states of the reader are displayed by the "RUN/STOP", "ERROR", "MAINTENANCE" and "PRESENCE" LEDs. The LEDs can adopt the colors green, red or yellow and the statuses off, on, flashing:

Table 9- 1 Display of operating statuses

R/S	ER	MAINT[1]	PRE[2]	Meaning
				The device is turned off.
				The device is starting up.
		--	--	The device is ready for operation. The connection to the application (XML, OPC UA, controller) is not established. There may be an error.
		--	--	The device is ready for operation but there is an error.
		--	--	The device is ready for operation. The connection to the application (XML, OPC UA, controller) is established.
		--	--	The device is working. • STEP 7, Ethernet/IP: The "writeconfig" command was received. • XML application: The "hostGreeting" command was received. • OPC UA: Connection to the client is established.
				Flash test for reader identification.
--		--	--	There is an error. You will find more information on error messages in the section "XML/PLC error messages (Page 473)".
--		--	--	The network load too high. The functioning of the device is being disturbed due to receiving too many network packets.
--	--	--		The antenna is switched on. There is no transponder in the antenna field.
--	--	--		There is at least one transponder in the antenna field.
--	--	--		One or more transponders have been detected as valid.

1) Not present on the RF650R.

2) Not present on the RF680R/RF685R.

--: Not relevant

9.2 XML/PLC error messages

Note that if there are error messages, the ERR LED ("ER") of the reader flashes. You can read the error using the XML or PLC error codes. As an alternative, you can also recognize the error using the LED status display of the RF680R and RF685R readers as described in the section "How the LED status display works (Page 471)".

The following table explains the XML/PLC error codes. Only the errors relevant to the RF600 readers are included in the PLC error codes (STEP 7). You can find all other error codes in the corresponding Ident profile manual.

Table 9- 2 Error messages of the RF600 readers

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
2 Hz	0x11	0xE1FE01	Cannot write to the memory of the transponder. • Transponder memory is defective. • Transponder EEPROM was written too frequently and has reached the end of its service life.
2 Hz	0x12	0xE1FE02	Presence error The transponder is no longer within the transmission window of the reader. The command was not or only partially executed. Read command: There is no valid data in "IDENT_DATA". Write command: The transponder that has just left the antenna field contains an incomplete data record. Possible causes: • Operating distance between reader and transponder is not being maintained. • Configuration error: The data record to be processed is too large (in dynamic mode).
2 Hz	0x13	0xE1FE03	Address error The address area of the transponder has been exceeded. Possible causes: • Start address of the command start has been incorrectly set. • Wrong transponder type • The area to be written to is write-protected.
2 Hz	0x1A	0xE1FE0A	The transponder is read/write-protected.
2 Hz	0x91	0xE1FE81	The transponder is not responding.
2 Hz	0x92	0xE1FE82	The transponder password is incorrect. Access is denied.
2 Hz	0x93	0xE1FE83	The verification of the written transponder data has failed.
2 Hz	0x94	0xE1FE84	General transponder error
2 Hz	0x95	0xE1FE85	The transponder has too little power to execute the command.
2 Hz	0x22	0xE2FE02	More transponders are located in the transmission window than can be processed at the same time by the reader.
2 Hz	0xA1	0xE2FE81	There is no transponder with the required EPC ID in the transmission window or there is no transponder at all in the antenna field.
2 Hz	0xA2	0xE2FE82	The requested data is not available.
2 Hz	0xA3	0xE2FE83	CRC error in reader-transponder communication.

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
2 Hz	0xA4	0xE2FE84	The selected antenna is not enabled.
2 Hz	0xA5	0xE2FE85	The selected frequency is not enabled.
2 Hz	0xA6	0xE2FE86	The carrier signal is not activated.
2 Hz	0xA7	0xE2FE87	There is more than one transponder in the transmission window.
2 Hz	0xA8	0xE2FE88	General radio protocol error
4 Hz	0x41	0xE4FE01	Warning in the event of low power supply The power supply is very close to the low limit.
4 Hz	0x43	0xE4FE03	Antenna error • The antenna or the antenna cable is defective. • Error in the connection to the reader; the reader is not answering (in PROFIBUS operation). – The cable between the communications module and reader is wired incorrectly or there is a cable break – The 24 V supply voltage is not connected or is turned off or has failed briefly – Automatic fuse on the communications module has blown – Hardware defective – Another reader is in the vicinity and is active – There is a reflecting metal surface in the vicinity that is disrupting the antenna field Possible corrective measures: - Reduce radiated power of antenna. - Change antenna alignment. Avoid parallel alignment of antenna/metal. - Use antenna cable with greater attenuation. - Install attenuator between antenna and reader. – Execute "init_run" after correcting the error
2 Hz	0x44	0xE4FE04	The buffer on the communications module or reader is not adequate to store the command temporarily.
2 Hz	0x45	0xE4FE05	The buffer on the communications module or reader is not adequate to store the data temporarily.
2 Hz	0x46	0xE4FE06	The command is not permitted in this status or is not supported. Possible cause: • "INIT" was chained. • Command repetition was started without "Presence mode".
2 Hz	0x47	0xE4FE07	Startup message from reader/communications module The reader or communications module was off and has not yet received a "Reset_Reader" ("WRITE-CONFIG") command. • Execute "INIT" • The same physical address in the "IID_HW_CONNECT" parameter is being used more than once. Check your "IID_HW_CONNECT" parameter settings. • Check connection to the reader • The baud rate was switched over but power has not yet been cycled

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
2 Hz	0xC1	0xE4FE81	The specified tag field of the transponder is unknown.
2 Hz	0xCA	0xE4FE8A	General error
2 Hz	0xCB	0xE4FE8B	No or bad configuration data/parameters were transferred. Possible cause: • You are accessing a read point that is not configured.
--	0xCC	0xE4FE8C	• Communication error between Ident profile and communications module. Handshake error. – UDT of this communications module is overwritten by other program sections – Check parameter settings of communications module in the UDT – Check the Ident profile command that caused this error – Start "INIT" after correcting the error • Backplane bus / PROFIBUS DP / PROFINET error occurred This error is only indicated when access monitoring has been enabled in the PROFIBUS configuration. – Backplane bus / PROFIBUS DP / PROFINET bus connection was interrupted (wire break on the bus; bus connector on the communications module was briefly unplugged) – Backplane bus / PROFIBUS DP / PROFINET master no longer addressing communications module – Execute "INIT" – The communications module has detected a frame interruption on the bus. The backplane bus, PROFIBUS or PROFINET may have been reconfigured (e.g. with HW Config or TIA Portal)
2 Hz	0xCD	0xE4FE8D	• Firmware error Possible cause: The firmware update was not run completely. • Internal communications error of the communications module/reader – Connector contact problem on the communications module/reader – Hardware of the communications module/reader has a defect; → Send in communications module/reader for repair – Start "INIT" after correcting the error • Internal monitoring error of the communications module/reader – Program execution error on the communications module / reader – Turn the power supply of the communications module/reader off and on again – Start "INIT" after correcting the error
2 Hz	0xCE	0xE4FE8E	The current command was aborted by the "WRITE-CONFIG" ("INIT" or "SRESET") command for the bus connector was pulled. Possible causes: • Communication with the transponder was aborted by "INIT". • This error can only be reported if there is an "INIT" or "SRESET".
2 Hz	0x51	0xE5FE01	Incorrect sequence number order (SN) on the reader/communications module.
--	0x52	0xE5FE02	Incorrect sequence number order (SN) in the Ident profile

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
2 Hz	0x54	0xE5FE04	Invalid data block number (DBN) on the reader/communications module
--	0x55	0xE5FE05	Invalid data block number (DBN) in the Ident profile
2 Hz	0x56	0xE5FE06	Invalid data block length (DBL) on the reader/communications module
--	0x57	0xE5FE07	Invalid data block length (DBL) in the Ident profile
2 Hz	0x58	0xE5FE08	The previous command is still active or the buffer is full. A new command was sent to the reader or communications module although the last command is still active. • The active command can only be aborted with "INIT". • Before a new command can be started, "DONE bit = 1" must be set (exception: "INIT"). • Two Ident profile calls had the same "HW_ID", "CM_CHANNEL" and "LADDR" parameter settings. • Two Ident profile calls are using the same pointer. • After eliminating the error, an "INIT" must be executed. • When working with command repetition (e.g., fixed code transponder), no data is being fetched from the transponder. The data buffer on the reader/communications module has overflowed. Transponder data has been lost.
--	0x59	0xE5FE09	The reader/communications module runs a hardware reset ("INIT_ACTIVE" set to "1"). The Ident profile expects an "INIT" (bit 15 in the cyclic control word).
--	0x5A	0xE5FE0A	The "CMD" command code and the relevant acknowledgement do not match. This can be a software error or synchronization error that cannot occur in normal operation.
--	0x5B	0xE5FE0B	Incorrect sequence of acknowledgement frames (TDB / DBN)
--	0x5C	0xE5FE0C	Synchronization error (incorrect increment of AC_H / AC_L and CC_H / CC_L in the cyclic control word). "INIT" had to be executed.
--	--	0xE5FE81	Communications error between reader and communications module Access denied
--	--	0xE5FE82	Communications error between reader and communications module Resource is occupied
--	--	0xE5FE83	Communications error between reader and communications module Functional error of the serial interface
--	--	0xE5FE84	Communications error between reader and communications module Other faults/errors
2 Hz	0x61	0xE6FE01	Unknown command An uninterpretable XML command was sent to the reader or the Ident profile sends an uninterpretable command to the reader. Possible causes: • The "AdvancedCmd" block was supplied with an incorrect "CMD". • The "CMD" input of the "AdvancedCmd" block was overwritten.
--	0x62	0xE6FE02	Invalid command index (CI)

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
2 Hz	0x63	0xE6FE03	• A parameter of an XML command has an invalid value or the parameter assignment of the communications module or the reader was incorrect. Possible causes / action to be taken: – Check the parameters in the Ident profile. – Check the relevant XML command. – Check the parameter assignment in HW Config / STEP 7 (TIA Portal). – The "WRITE-CONFIG" command has incorrect parameter settings. – After a startup, the reader or communications module has still not received an "INIT". • The parameter assignment of the reader or communications module on PROFIBUS/PROFINET was incorrect and the command cannot be executed. Possible causes / action to be taken: – Length of the input/output areas is too small for the cyclic I/O word. – Check whether you have used the correct GSD file. – User data length set with the command (e.g. "READ") is too high. • Error when processing the command. Possible causes / action to be taken: – The data in "AdvancedCmd" or "IID_CMD_STRUCT" is incorrect (e.g. "WRITE" command with length = 0). Check "AdvancedCmd" or "IID_CMD_STRUCT" and execute an "INIT". – The hardware of the reader/communications module is defective. The reader or communications module receives bad data with an "INIT". – The AB byte does not match the user data length. • The wrong reset block was selected. Possible causes / action to be taken: – Regardless of the selected reader system, use the "Reset_Reader" function block.
--	0x64	0xE6FE04	Presence error A transponder has passed through the transmission window of a reader without being processed. • This error message is not reported immediately. Instead, the reader or communications module waits for the next write / read command. This command is replied to immediately with this error and the write/read command is not executed. The next command is executed normally again by the reader/communications module. • You can reset this error status using an "INIT". • Bit 2 is set in the "OPT1" parameter and there is no transponder in the transmission window.

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
--	0x65	0xE6FE05	An error has occurred that makes a Reset_Reader ("WRITE-CONFIG" with "Config = 3") necessary. Possible causes / action to be taken: • The "WRITE-CONFIG" command is incorrect. • After eliminating the error, execute an "INIT". • Check the "IID_HW_CONNECT" parameter.
--	0x66	0xE6FE06	The reset timer has expired.
2 Hz	0xE1	0xE6FE81	A parameter is missing.
2 Hz	0xE2	0xE6FE82	The parameter has an invalid format.
2 Hz	0xE3	0xE6FE83	The parameter type is invalid.
2 Hz	0xE4	0xE6FE84	Unknown parameter.
2 Hz	0xE5	0xE6FE85	The command or the frame has an invalid format.
2 Hz	0xE6	0xE6FE86	The inventory command failed.
2 Hz	0xE7	0xE6FE87	Read access to the transponder failed.
2 Hz	0xE8	0xE6FE88	Write access to the transponder failed.
2 Hz	0xE9	0xE6FE89	Writing the EPC-ID on the transponder failed.
2 Hz	0xEA	0xE6FE8A	Enabling write protection on the transponder failed.
2 Hz	0xEB	0xE6FE8B	The "Kill" command failed.
2 Hz	0x71	0xE7FE01	In this status, only the "Reset_Reader" command ("WRITE-CONFIG") is permitted.
--	0x72	0xE7FE02	The "CMD" command code is not permitted.
--	0x73	0xE7FE03	The "LEN_DATA" parameter of the command is too long and does not match the global data reserved within the send data buffer (TXBUF).
--	0x74	0xE7FE04	The receive data buffer (RXBUF) or the send data buffer (TXBUF) is too small, the buffer created at TXBUF/RXBUF does not have the correct data types or the parameter "LEN_DATA" as a negative value. Possible cause / action to be taken: • Check whether the buffers TXBUF/RXBUF are at least as large as specified in LEN_DATA. • With S7-1200/1500: – In the Ident profile, only an "Array of Byte" may be created for TXBUF and RXBUF. – In the "Reader_Status" block, only an "Array of Byte" or the corresponding data types ("IID_TAG_STATUS_XX_XXX" or "IID_READER_STATUS_XX_XXX") may be created
--	0x75	0xE7FE05	Error message that informs you that only an "INIT" command is permitted as the next command. All other commands are rejected.
--	0x76	0xE7FE06	Wrong index Permitted index is in the ranges "101 ... 108" and "-20401 ... -20418".
--	0x77	0xE7FE07	The reader or communications module does not respond to "INIT" ("INIT_ACTIVE" is expected in the cyclic status message). The next steps: • Check the address parameter "LADDR".
--	0x78	0xE7FE08	Timeout during "INIT" (60 seconds according to "TC3WG9")

"ER" LED	XML/ LED (hex)	PLC block (hex)	Error description
--	0x97	0xE7FE09	Command repetition is not supported.
--	0x7A	0xE7FE0A	Error during the transfer of the PDU (Protocol Data Unit).

"--" means that the error is not displayed by the LEDs.

Accessories

10

10.1 Wide-range power supply unit for SIMATIC RF systems

10.1.1 Features

The wide range power supply unit for SIMATIC RF systems is a primary switched device for supplying power and for use on single phase AC systems. The two DC outputs (sockets) are connected in parallel and protected by a built-in voltage limiting circuit against overload and short-circuits.

The device is vacuum-cast and prepared for Safety Class I applications. The EU and UK versions satisfy the low-voltage directive as well as the current EU standards for CE conformity. Furthermore, the US version has been UL-certified for the US and Canada.

Table 10- 1 Wide-range power supply unit for SIMATIC RF systems

	Characteristics	
	Area of application	Voltage supply for Siemens Ident devices
	Degree of protection	IP67
	Design features	• Mechanically and electrically rugged design • Short-circuit and no-load stability • Suitable for frame mounting
	Structure	① Network connector (PE) ② DC output 1 ③ DC output 2 ④ Ground connection

10.1.2 Scope of supply

- Wide-range power supply unit for SIMATIC RF systems
- Country-specific power cable (2 m)
- Protective cover for flange outlet
- Operating Instructions

10.1.3 Ordering data

Table 10- 2 Ordering data for the wide-range power supply unit for SIMATIC RF systems

	Article number
Wide-range power supply unit for SIMATIC RF systems (100 - 240 VAC / 24 VDC / 3 A) with 2 m connecting cable with country-specific power cable/plug	EU: 6GT2898-0AC00
	UK: 6GT2898-0AC10
	US: 6GT2898-0AC20

Table 10- 3 Ordering data accessories for the wide-range power supply unit for SIMATIC RF systems

		Article number
24 V DC connecting cable for SIMATIC RF600 readers RF610R/RF615R/RF650R/RF680R/RF685R		
• With plug	5 m	6GT2891-0PH50
• With open ends	2 m	6GT2891-4EH20
• With open ends	5 m	6GT2891-4EH50
24 VDC connecting cable for readers of the SIMATIC product family MOBY D	5 m	6GT2491-1HH50
24 V DC connecting cable for SIMATIC RF200/RF300 readers with RS232	5 m	6GT2891-4KH50
24 V DC connecting cable for SIMATIC RF200 / RF300 readers with RS-232 M8 plug at the 24 V end, reader plug angled	5 m	6GT2891-4KH50-0AX1
24 VDC connecting cable for SIMATIC RF200 / RF300 readers with open ends at the power supply unit end	5 m	6GT2891-4KH50-0AX0

10.1.4 Safety Information

WARNING

Danger to life

It is not permitted to open the device or to modify the device.

The following must also be taken into account:

- Failure to observe this requirement shall constitute a revocation of the CE approval, UL certification for the US and Canada as well as the manufacturer's warranty.
- For installation of the power supply, compliance with the DIN/VDE requirements or the country-specific regulations is essential.
- The area of application of the power supply unit is limited to "Information technology equipment" within the scope of validity of the EN 60950/VDE 0805 standard.
- When the equipment is installed, it must be ensured that the mains socket outlet is freely accessible.
- Within the operating temperature range of the power supply unit, above an ambient temperature of +25 °C, very high temperatures (max. approx. +81.5 °C at an ambient temperature of +70 °C) can occur on the housing due to the internal heating of the device. In this case, make sure that the housing is covered in order to protect people from coming into contact with the hot housing. Adequate ventilation of the power supply must be maintained under these conditions.

Note

Operating range und use of the wide-range power supply unit

The wide-range power supply unit must only be used for SIMATIC products in the specifically described operating range and for the documented intended use.

NOTICE

Liability

If the wide input range power supply for SIMATIC RF systems is connected to third-party products, the end user is responsible and liable for operation of the system or end product that includes the wide input range power supply for SIMATIC RF systems.

Note the conditions specified in the UL approval.

NOTICE
Restriction to the approval of the wide-range power supply Alterations to the SIMATIC RFID modules and devices as well as the use of SIMATIC RFID components with third-party RFID devices are not permitted. Failure to observe this requirement shall constitute a revocation of the radio equipment approvals, CE approval and manufacturer's warranty. Furthermore, the compliance to any salient safety specifications of VDE/DIN, IEC, EN, UL and CSA will not be guaranteed.

Safety notes for the US and Canada

The readers of the SIMATIC RF600 series may only be operated with the wide range power supply unit for SIMATIC RF systems - as an optional component – or with power supply units that are UL-listed in combination with the safety standards specified below:

- UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements
- CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment

NOTICE
Warranty The compliance of the SIMATIC RFID systems to the safety standards mentioned above and the conditions in the UL approval will not be guaranteed if neither the wide-range power supply unit for SIMATIC RF systems nor power supplies listed according to the safety standards named are used.

10.1.5 Mounting & connecting

The wide-range power supply unit for SIMATIC RF systems is sold with a country-specific power cable for EU, UK and US.

Note

Country-specific adaptation of the connector

When necessary, the primary cable can be adapted to country-specific conditions. The connector can be replaced by a country-specific connector.

If you do this, make sure that the protective conductor is connected in the connector and that grounding is ensured. If the protective conductor cannot be connected through the plug, you must connect the grounding connection to the mounting hole ④ provided by the metal shoe.

Follow the steps below to mount and connect the wide-range power supply unit:

1. Mount the wide-range power supply using the 4x screws.

   Remember to make the grounding connection with the mounting hole ④ provided by the metal shoe.

   For detailed information on grounding and compliance with the EMC directives, refer to the "Grounding connection" section below.
2. Connect the reader to the outputs ② and ③ of the wide-range power supply unit.
3. Connect the power cable to the primary input (PE) ① of the wide-range power supply unit.
4. Connect the power cable of the wide-range power supply unit to the voltage supply.

NOTICE
Plugging/pulling the power supply cable Plugging or pulling the power cable of the wide-range power supply unit is only permitted when no voltage is applied (powered-down)

NOTICE
Strain on the power cable connector The power cable is attached to / removed from the power supply using the knurled nut integrated in the plug. Avoid twisting the plug once it is mounted. If high shock and vibration occurs, this stress must be absorbed by the power cable.

NOTICE
Restriction for maximum load If the readers are operated permanently at full load and the digital inputs/outputs are loaded with the maximum total current of 1.1 A, the maximum current consumption of a reader can reach 2 A. In this case, a maximum of one reader may be connected per wide-range power supply unit.

The wide-range power supply unit (protection class I, degree of protection IP67) has four mounting holes for securing the device.

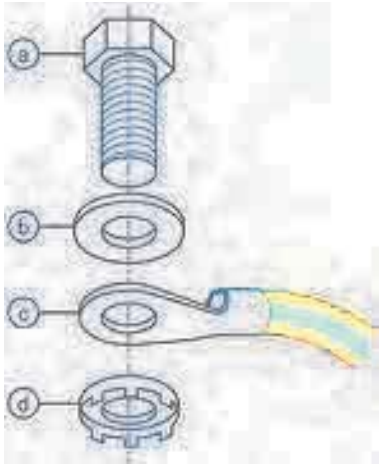
Installation instructions

The power supply unit must be connected with the described connecting cables in the primary and secondary circuits. The connectors at the power supply unit end may only be removed or inserted when no voltage is applied. The degree of protection IP67 is only achieved with correctly connected and locked connectors. Adequate spacing around the power supply unit should be provided to ensure free convection. The connection of the voltage supply must be made taking into account the valid country-specific regulations. It must be possible to de-energize the power supply unit using a suitable device outside the voltage supply. The device is connected with connectors “L” to phase and “N” to the neutral conductor of the power network. The “PE” connector must be connected to the protective conductor (see dimensions and pin assignment). The power supply unit may only be operated with a connected protective conductor. The power supply unit is maintenance-free and contains no parts to be changed by the user. The power derating when operating at an ambient temperature of above 50 °C must be ensured by the user. The base area of the power supply unit is screwed onto the mounting plate or mounting wall using the four mounting holes (e.g. screw and washer M5). Optimum cooling by natural convection must be assured at the mounting location. When used where CSA C22.2 No 107.1-01 applies a separating element must be provided for the output circuit.

Grounding connection

For reasons of EMC, the device should also be grounded via the grounding connection ④, which is connected to the primary input (PE) ①. Ensure that this connection is as short as possible and has a cable cross-section of at least 10 mm². This will ensure that any faults occurring on the shielding can be dissipated as well as possible.

The grounding connection ④ must be electrically connected to the ground potential using a contact disc. Tighten the screw with a torque of ≈ 1.5 Nm.

Grounding connection		
	(a)	Hexagon-head screw (M5)
	(b)	Flat washer
	(c)	Cable lug
	(d)	Contact washer: To make ground contact, use contact washers according to the Siemens standard: SN 70093-6-FStflNnnc- 480h, Siemens item no.: H70093-A60-Z3

Degree of protection

The wide-range power supply unit for SIMATIC RF systems meets degree of protection IP67.

- Dust-tight: No ingress of dust
- Protected against harm from temporary submersion in water: Water must not enter in amounts that can cause damage, if the housing is immersed in water 1 m deep for 30 minutes.

All information applies only when connected and locked. The assignment of degrees of protection is subject to standardized test methods. If no secondary cables are connected, close the secondary sockets with a protective cap.

10.1.6 Pin assignment of DC outputs and mains connection

Table 10- 4 Pin assignment of the DC outputs

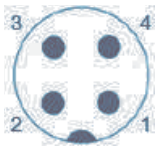
	Assignment	
	1	Ground (0 V)
	2	+24 VDC
	3	+24 VDC
	4	Ground (0 V)

Table 10- 5 Pin assignment of the mains connector

	Assignment	
	1	PE
	2	L (100 … 240 VAC)
	3	N (100 … 240 VAC)

10.1.7 Technical specifications

Table 10- 6 Technical specifications

	6GT2898-0ACx0
Product type designation	Wide-range power supply unit for SIMATIC RF systems
Electrical data	
Insulation strength (prim./sec.) $U_{isol\ p/s}$	AC 3.3 kV Primary- secondary side are galvanically isolated
Insulation resistance R_{ins}	> 1 GΩ
Leakage current I_{leak}	< 200 µA at U_{in} = 230 VAC, f = 50 Hz
Mains buffering t_h	≥ 50 ms at U_{in} = 230 VAC
Power supply unit classification	Level 3 acc. to CSA

	6GT2898-0ACx0
Mechanical specifications	
Housing	
• Material	• Polyamide, glass-fiber reinforced • Casting compound: Polyurethane
• Color	• Black
Housing classification	UL94-V0
MTBF in years	255
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 … +70 °C
• During transportation and storage	• -40 … +85 °C
Self-heating on full-load	max. 45 K
Surface temperature	Max. +81.5 ℃
Degree of protection to EN 60529	IP67
Protection class according to SELV/PELV	Separation of output voltage according to EN 60950-1 / EN 50178
Electrical safety	EN 60950 / UL 60950 / CAN/CSA 22.2 950, 3 Edition
Conducted interference	EN 61000-6-3 / EN 55011 Class B
Noise emission	EN 61000-6-3 / EN 55011 Class B
Noise immunity	
• ESD	• EN 61000-6-2 / EN 61000-4-2 Contact discharge: 4 kV (air discharge): 8 kV
• Burst	• EN 61000-6-2 / EN 61 000-4-4 Symmetrical: 2 kV Asymmetrical: 2 kV
• Surge	• EN 61000-6-5 / EN 61 000-4-5 Symmetrical: 1 kV asymmetrical 2 kV
• HF field	• EN 61000-6-2 / EN 61000-4-3 10 V, 3 V, 1 V (80 MHz ... 2.7 GHz)
HF coupling	EN 61000-6-2 / EN 61000-4-6 10 V_{eff}
Line interruption	EN 61000-6-2 / EN 61000-4-11

	6GT2898-0ACx0
Design, dimensions and weights	
Dimensions (L × W × H)	
• Without plug	• 140 × 85 × 35 mm
• With plug	• 172.7 × 85 × 35 mm
Weight	720 g
Technical specifications of the input	
Rated input voltage U_{in}	100 to 240 VAC
Input frequency f_{in}	50/60 Hz
Radio interference level	EN 55011/B
Switching frequency f_{sw}	approx. 70 kHz typ.
Connector type	7/8", 2-pin + PE 6 ... 8 mm
Technical specifications of the outputs	
Output voltage tolerance ΔU_{out}	$U_{out\ nom}$ ≤ +2 % / -1 % at U_{in} = 230 VAC, f = 50 Hz
Overvoltage protection	$U_{out\ nom}$ +20 % typ.
Noise ΔU_{LF}	≤ 1 % U_{out} at U_{in} = min., BW: 1 MHz
Noise ΔU_{HF}	≤ 2 % U_{out} U_{in} = min., BW: 20 MHz
Regulation	
• Line regulation	• ≤ 1.0% at U_{in} = min./max.
• Load regulation	• ≤ 1.0% at I_{out} = 10...90...10%
Short-circuit current I_{max}	105 ... 130 % I_{nom} at I_{nom} = 3 A (+50 °C)
Settling time t_R load variations	< 5 ms at I_{out} = 10...90...10 %
Temperature coefficient ε	0.01 % / K at T_A = -25 °C ... +70 °C
Overload behavior P_{over}	Constant current
Short-circuit protection/ No-load response	Continuous/no-load stability
Derating	2 % / K at T_A > +50 °C ... +70 °C
Connector type	M12, 4-pin two sockets

Table 10- 7 Output configurations

Input	Outputs U1 = U2	ILoad = I1 + I2	Efficiency (%)	Remarks
110 VAC	24 VDC	0 A	--	No-load protection
110 VAC	24 VDC	3 A	≥ 88	--
220 VAC	24 VDC	0 A	--	No-load protection
220 VAC	24 VDC	3 A	≥ 90	--

All values are measured at full-load and at an ambient temperature of 25 °C (unless specified otherwise).

10.1.8 Dimension drawing

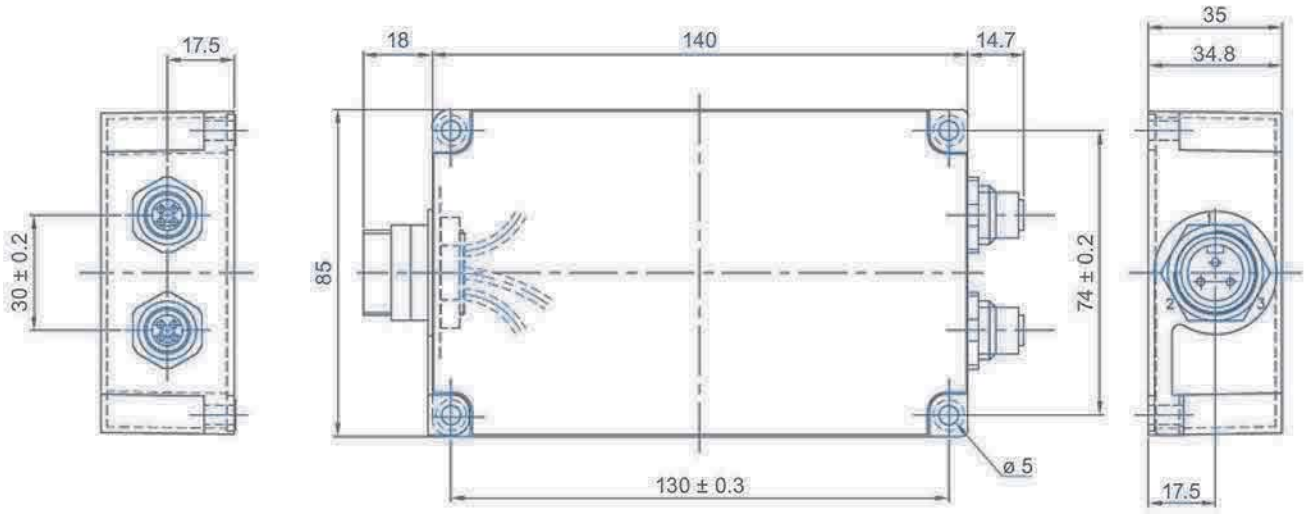


Figure 10-1 Dimension drawing wide-range power supply unit for SIMATIC RF systems

All dimensions in mm

10.1.9 Certificates and approvals

Table 10- 8 Approvals for wide-range power supply unit for SIMATIC RF systems (Europe, UK): 6GT2898-0AC00, 6GT2898-0AC10

Marking	Description
	CE approval acc. to • 2004/108/EG - EMC • 2006/95/EG - Voltage directive
	Radio approval for Russia, Belarus, Kazakhstan

Table 10- 9 Approvals for wide-range power supply unit for SIMATIC RF systems (USA): 6GT2898-0AC20

Marking	Description
	This product is UL-certified for the US and Canada. It meets the following safety standards: • UL 60950-1 Information Technology Equipment - Safety - Part 1: General Requirements • CAN/CSA C22.2 No. 60950-1-07 Safety of Information Technology Equipment. • cURus +CB - UL/IEC 60950-1 and Limited power source under UL 1310 • UL Report E 205089

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by ULLLC. When installed in an end-product, consideration must be given to the following:

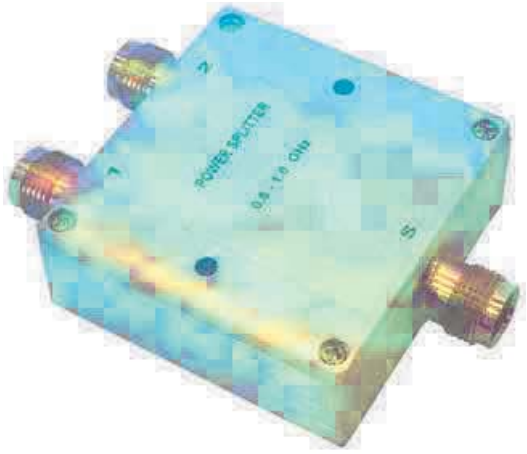
- Reference temperatures on the unit enclosure were measured during heating test. The max obtained temperature with condition C at Enclosure I was 81.5 °C. See chapter "Technical specifications (Page 488)" Additional Information for normal load condition details.
- The unit is completely encapsulated. Potting improve mechanical and thermal properties of the unit.
- The following Production-Line tests are conducted for this product: Electric Strength, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 300 Vrms, 342 Vpk; Primary-SELV: 300 Vrms, 613 Vpk
- The following secondary output circuits are SELV: 24 Vdc output of the unit.
- The following secondary output circuits are at non-hazardous energy levels: 24 Vdc output.
- The following secondary output circuits are supplied by a Limited Power Source: 24 Vdc output.
- The following output terminals were referenced to earth during performance testing: Terminal P4 (-) during DETERMINATION OF WORKING VOLTAGE - WORKING VOLTAGE MEASUREMENT TEST.
- The maximum investigated branch circuit rating is: 20 A
- The investigated Pollution Degree is: 2
- Proper bonding to the end-product main protective earthing termination is: Required
- An investigation of the protective bonding terminals has: Been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral:

  Please see chapter "Mounting & connecting (Page 485)".
- The equipment is suitable for direct connection to: AC mains supply
- Output is supplied by circuit that complies with NEC Class 2 requirements (additional evaluation acc. UL1310 has been conducted during the product investigation).

10.2 Power splitter for RF600 systems

10.2.1 Characteristics

Using the power splitter, two antennas can be connected to one antenna connector of a reader. The power fed in at the input (S) is split over two outputs (1, 2).

Power splitter	Characteristics	
	Application	Designed for distributed mounting of antennas in warehouses, logistics and distribution
	Connectable readers	All readers of the RF600 system
	Connectable antennas[1)]	• SIMATIC RF615A • SIMATIC RF620A • SIMATIC RF640A • SIMATIC RF642A • SIMATIC RF650A • SIMATIC RF660A
	Degree of protection	IP40

1) the antenna RF680A cannot be operated via the power splitter.

10.2.2 Ordering data

Table 10- 10 Power splitter ordering data

	Article number
Power splitter	6GT2890-0BC00

Table 10- 11 Power splitter ordering data for accessories

		Article number
Antenna cable	1 m, 0.5 dB	6GT2815-0BH10
	3 m, 1 dB	6GT2815-0BH30
	5 m, 1.25 dB	6GT2815-2BH50
	10 m, 2 dB	6GT2815-1BN10
	10 m, 4 dB	6GT2815-0BN10
	15 m, 4.5 dB	6GT2815-2BN15
	20 m, 4 dB	6GT2815-0BN20
	40 m, 5 dB	6GT2815-0BN40

10.2.3 Example of a configuration

The following example of a configuration shows a setup with one RF680R reader, one power splitter and two RF650A antennas.

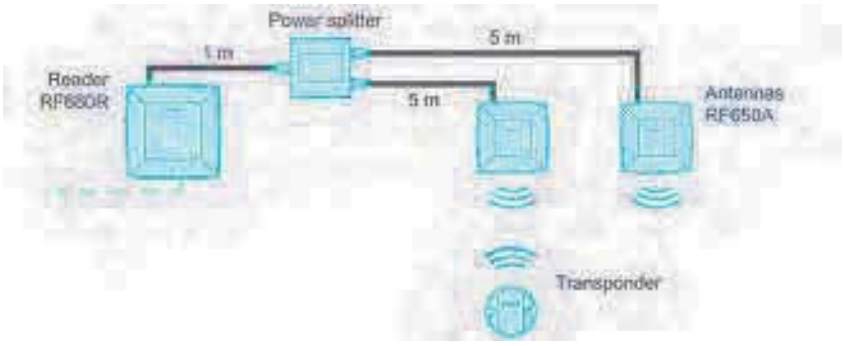


Figure 10-2 Example of a configuration with an RF600 system with a power splitter

The link between the reader and the power splitter (3.2 dB attenuation) is via a cable 1 m in length (0.5 dB cable attenuation). Cables with a length of 5 m (1.25 dB cable attenuation) are used between the power splitter and the antennas.

To calculate the total attenuation made up of the cable attenuation and the attenuation of the power splitter, the various attenuation values need to be added. For the configuration shown above, the total attenuation is as follows:

0.5 dB + 3.2 dB + 1.25 dB = 4.95 dB

The total attenuation of 4.95 dB must be stored in the configuration of the reader as user-defined cable attenuation. When using several different antennas, the antenna gain of the antenna with the highest gain must be specified. This ensures that the maximum permitted transmit power is not exceeded.

Note that when using different antenna cable lengths, the radiated power of the antenna with the longer cable is lower.

10.2.4 Technical specifications

Table 10- 12 Technical specifications

	6GT2890-0BC00
Product type designation	Power splitter
Electrical data	
Transmission frequency	500 ... 1000 MHz
Max. input power	10 W
Impedance	50 Ω
Attenuation between input and outputs	3.2 dB

	6GT2890-0BC00
Connector (input/outputs)	RP-TNC plug
Mechanical specifications	
Housing	
• Material	• Aluminum
• Color	• Silver
Permitted ambient conditions	
Ambient temperature	
• During operation	• -40 ... +85 °C
• During transportation and storage	• -40 ... +100 °C
Degree of protection to EN 60529	IP40
Design, dimensions and weights	
Dimensions (L × W × H)	
• Without plug	• 50.8 × 50.8 × 19.05 mm
• With plug	• 74.7 × 50.8 × 19.05 mm
Weight	170 g

10.2.5 Dimension drawing

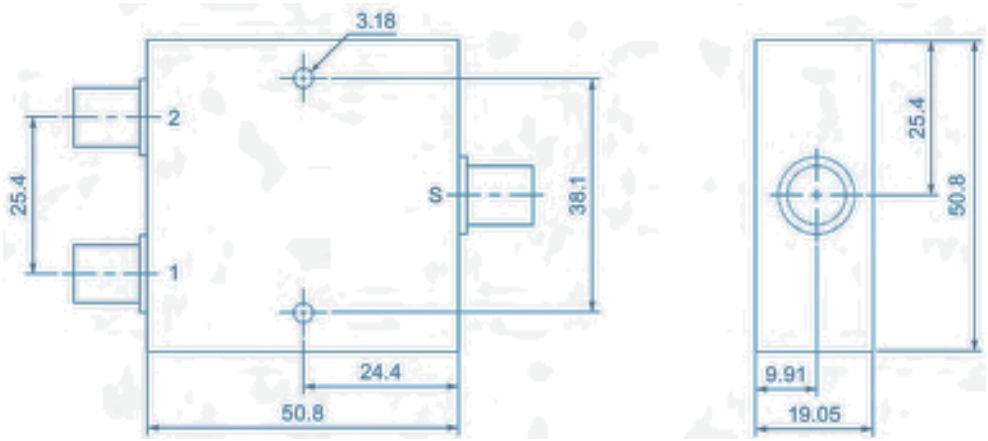


Figure 10-3 Power splitter dimension drawing

All dimensions in mm

10.3 Reader and antenna holders

10.3.1 Overview

The following read points (readers and antennas) have a standardized VESA 100 mounting system (4 x M4) and can be secured with a SIMATIC antenna holder:

- SIMATIC RF610R, RF615R, RF650R, RF680R, RF685R
- SIMATIC RF640A, RF642A, RF650A, RF660A, RF680A

10.3.2 Ordering data

Table 10- 13 Ordering data for SIMATIC antenna holder

Description	Article number
SIMATIC antenna holder for RF600 devices	6GT2890-2AB10

10.3.3 Mounting with the SIMATIC antenna holder

Flexible mounting is possible with the SIMATIC antenna holder. The RF600 readers/antennas can be rotated in any direction with this holder.

Follow the steps below to mount the SIMATIC antenna holder with the reader or the antenna on the wall:

1. Install the wall mounting plate (A) on the wall.
2. Install the articulated joint (B) with the screws ① on the wall mounting plate (A).
3. Fasten the reader or the antenna using the four bore holes on the antenna mounting plate (C).
4. Mount the antenna mounting plate (C) into the articulated joint (B) and fasten it with the help of screws ② to the articulated joint (B).
5. Align the SIMATIC antenna holder by sliding the setting angle on the articulated joint (B) and tighten all the screws.

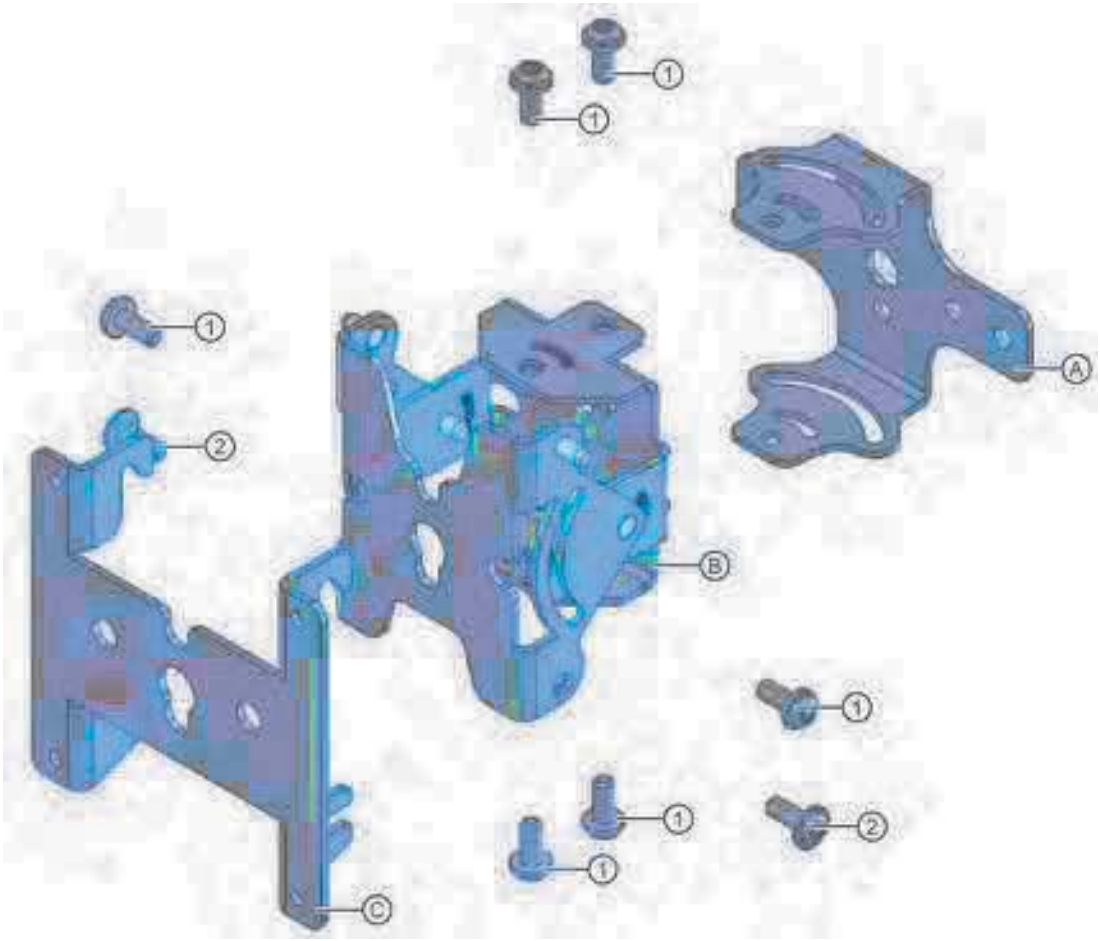


Figure 10-4 Installing the SIMATIC antenna holder

10.3.4 Dimension drawing

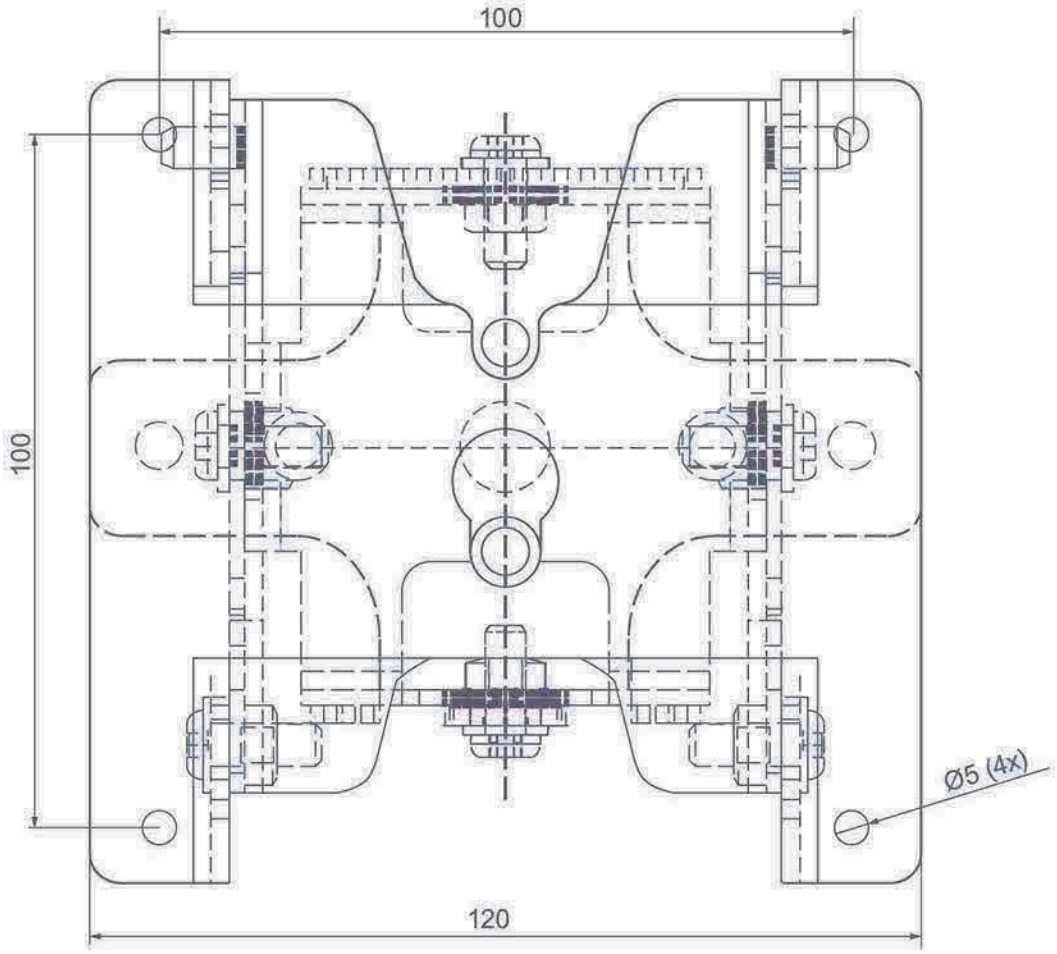


Figure 10-5 Front view

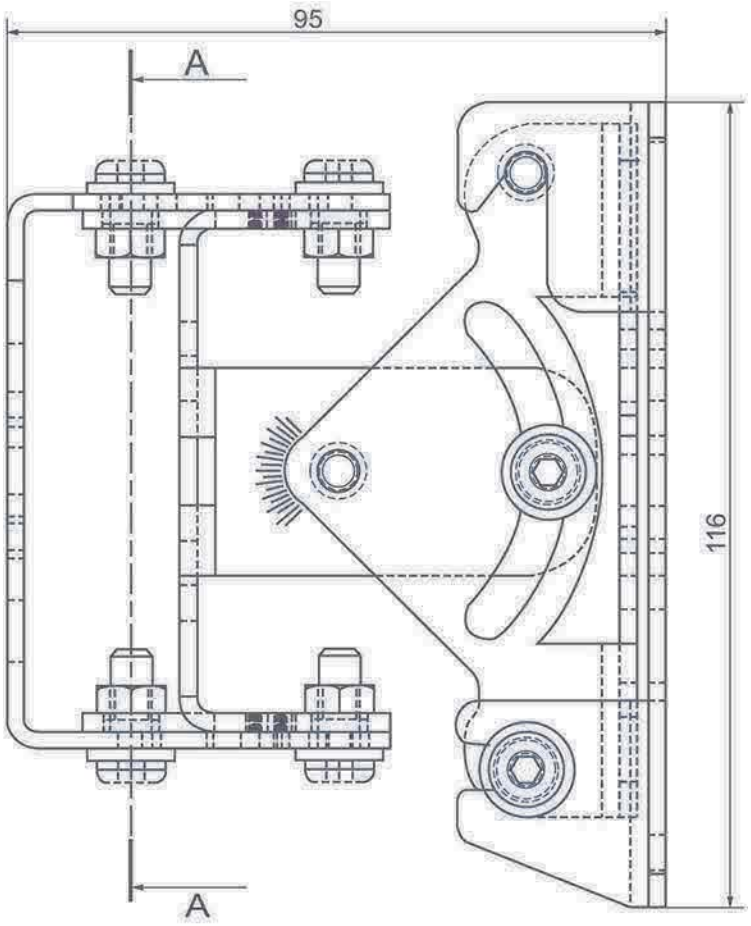


Figure 10-6 Top view with section A-A

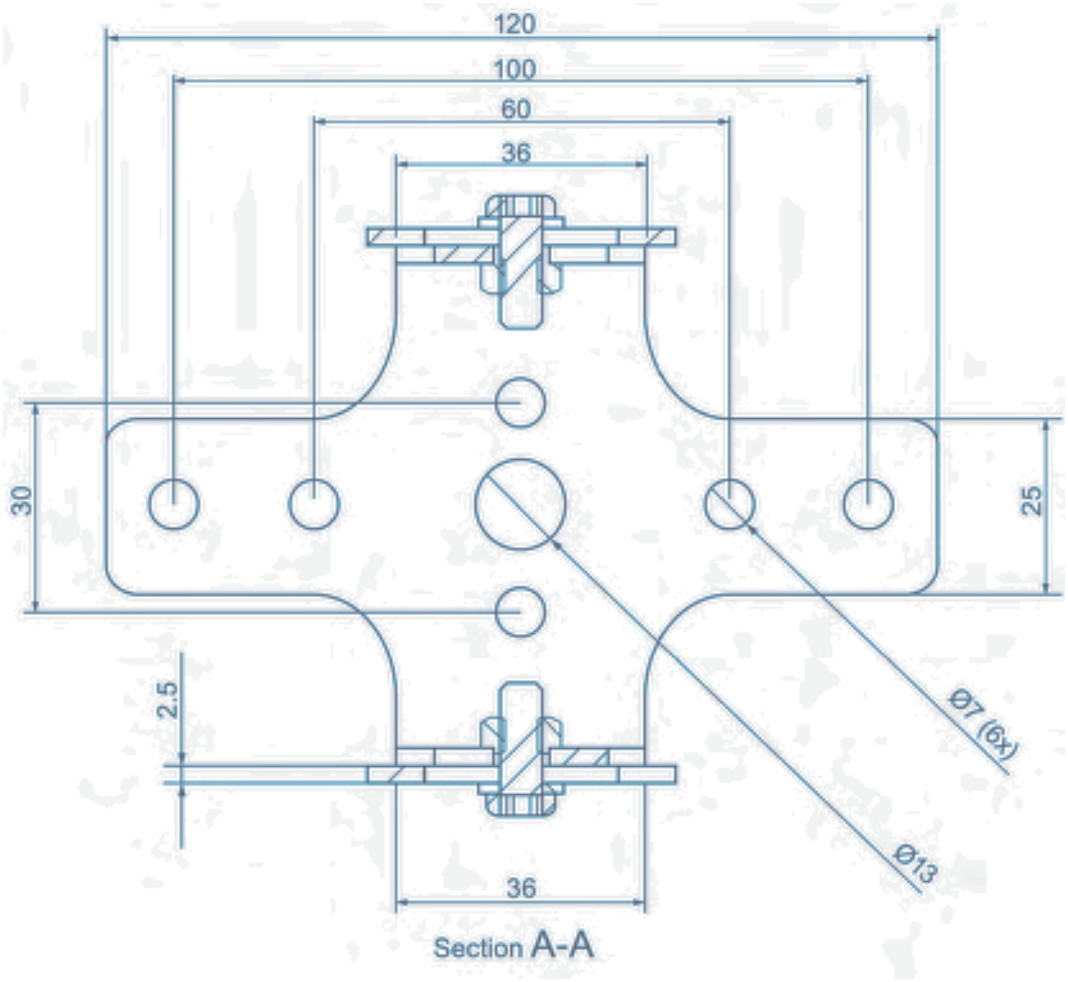


Figure 10-7 Section A-A

All dimensions in mm.

Appendix

A

A.1 Certificates & approvals

All the latest RFID radio approvals are available on the Internet (http://www.siemens.com/rfid-approvals).

Labeling	Description
	Conformity acc. to the RED EU directive

Notes on CE marking

The following applies to the system described in this documentation:
The CE mark on a device indicates the corresponding approval.

DIN ISO 9001 certificate

The quality assurance system for the entire production process (development, production, and marketing) at Siemens fulfills the requirements of ISO 9001 (corresponds to EN29001: 1987).

This has been certified by DQS (the German society for the certification of quality management systems).

EQ-Net certificate no.: 1323-01

Country-specific approvals

Safety

If the device has one of the following markings the corresponding approval has been obtained:

Labeling	Description
	Underwriters Laboratories (UL) to UL 60950 Standard (I.T.E), or to UL508 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to Canadian standard C22.2 No. 60950 (I.T.E) or C22.2 No. 142 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to standard UL 60950, Report E11 5352 and Canadian standard C22.2 No. 60950 (I.T.E) or UL508 and C22.2 No. 142 (IND.CONT.EQ)

Labeling	Description
	UL recognition mark
	Canadian Standard Association (CSA) according to the standard C22.2. No. 60950 (LR 81690) or acc. to C22.2 No. 142 (LR 63533)
	Canadian Standard Association (CSA) per American Standard UL 60950 (LR 81690) or per UL 508 (LR 63533)
	This product meets the requirements of the AS/NZS 3548 Norm.
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 A digital device, pursuant to Part 15 of the FCC Rules.
Industry Canada Radio Standards Specifications	RSS-210 Issue 6, Sections 2.2, A8 RSS-247 Issue 2
CMIIT ID: XXXXYYZZZZ	China (CMIIT)
	Brazil (ANATEL)
	South Korea (KCC)
	Japan (VCCI)
	South Africa (ICASA)
	EAC (Eurasian Conformity) Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan Declaration of conformity according to the technical regulations of the customs union (TR ZU)
Marocco	When using the RF600 readers in Marocco, the frequency band is limited to 867.6 - 868 MHz and the radiant power to a maximum of 500 mW ERP. By selecting the country profile "Marocco" in Web Based Management (WBM), these settings are made automatically.

EMC

USA	
Federal Communications Commission 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. 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.
Shielded Cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of Operations	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.

A.2 Service & support

Industry Online Support

In addition to the product documentation, the comprehensive online information platform of Siemens Industry Online Support at the following Internet address:
Link 1: (https://support.industry.siemens.com/cs/de/en/)

Apart from news, there you will also find:

- Project information: Manuals, FAQs, downloads, application examples etc.
- Contacts, Technical Forum
- The option submitting a support query:
  link 2: (https://support.industry.siemens.com/My/ww/en/requests)
- Our service offer:

  Right across our products and systems, we provide numerous services that support you in every phase of the life of your machine or system - from planning and implementation to commissioning, through to maintenance and modernization.

You will find contact data on the Internet at the following address:
Link 3: (http://w3.siemens.com/aspa_app)

RFID homepage

For general information about our identification systems, visit RFID home page (http://w3.siemens.com/mcms/identification-systems/).

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall home page (https://mall.industry.siemens.com).

SITRAIN - Training for Industry

The training offer includes more than 300 courses on basic topics, extended knowledge and special knowledge as well as advanced training for individual sectors - available at more than 130 locations. Courses can also be organized individually and held locally at your location.

You will find detailed information on the training curriculum and how to contact our customer consultants at the following Internet address:

Link: (http://sitrain.automation.siemens.com/sitrainworld/)