

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.
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): <ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ ETSI: 865 to 868 MHz ▪ FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Polarization	Linear
	Memory	<ul style="list-style-type: none"> ▪ 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/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

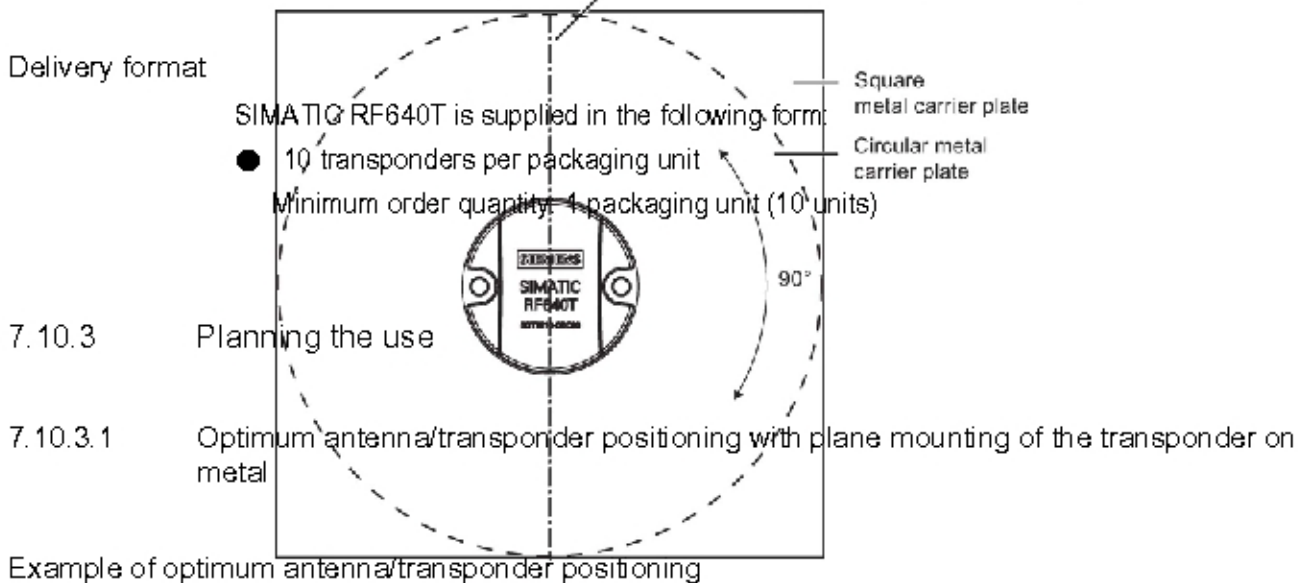


Figure 7-26 Example of optimum antenna/transponder positioning with RF600 readers and an RF600 antenna

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 \varnothing 150 mm	100 %
Metal plate \varnothing 120 mm	approx. 80%
Metal plate \varnothing 85 mm	approx. 55%
Metal plate \varnothing 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^m °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 RF 640T 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	T6	$T_{max} T6$
-25 °C to +74 °C	T6	$T_{max} T5$
		$T_{max} T4$
		$T_{max} T3$
		$T_{max} T2$

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	P [mW / ERP]	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 to +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
$-25\text{ °C} \leq T_a \leq +85\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +85\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +60\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +85\text{ °C}$	$T_{\text{value}}\text{ °C}^{1)}$

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
$-25\text{ °C} \leq T_a \leq T_{\text{max. Ambient}}\text{ °C}^{1)}$	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:

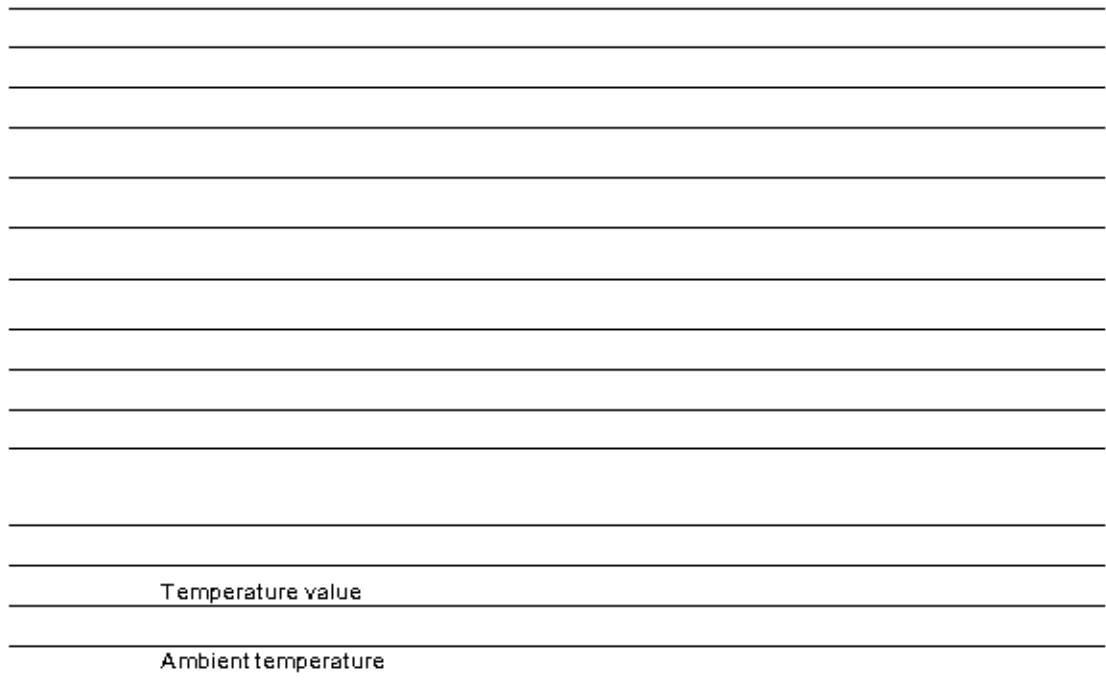


Figure 7-29 Temperature value and maximum permitted ambient temperature in relation to the radiated power

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 ⁸
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

- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ In operation, during write/read access ▪ In operation, outside write/read access ▪ During transportation and storage | <ul style="list-style-type: none"> ▪ -25 ... +85 °C ³⁾ ▪ -40 ... +125 °C ▪ -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.

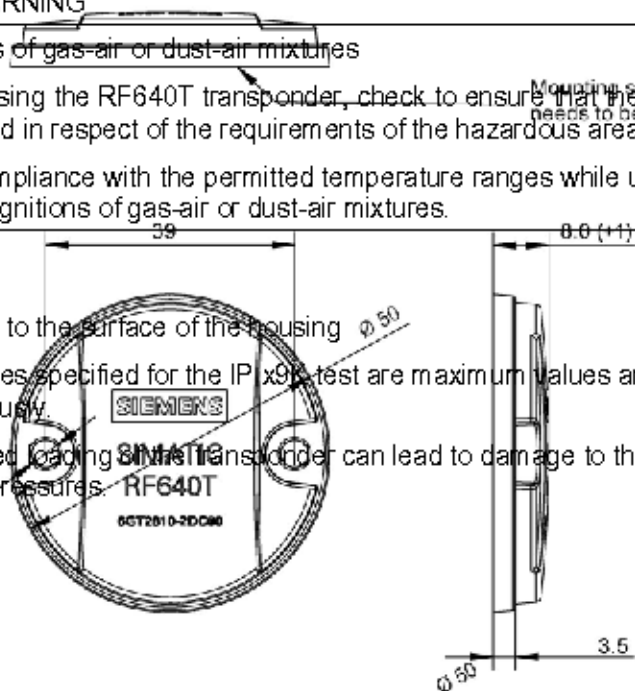
Non-compliance with the permitted temperature ranges while using the transponder can lead to ignitions of gas-air or dust-air mixtures.

Note

Damage to the surface of the housing

The values specified for the IP x95 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	Description
	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	<ul style="list-style-type: none"> ▪ ETSI: 865 to 868 MHz ▪ FCC: 902 to 928 MHz
	Air interface	According to ISO 18000-63
	Memory	<ul style="list-style-type: none"> ▪ EPC: 56 bytes / 448 bits ▪ User memory: 256 bytes / 2048 bits
	Read range	Max. 6.0 m ¹⁾
	Mounting	<ul style="list-style-type: none"> ▪ 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	▪ 885 to 888 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)

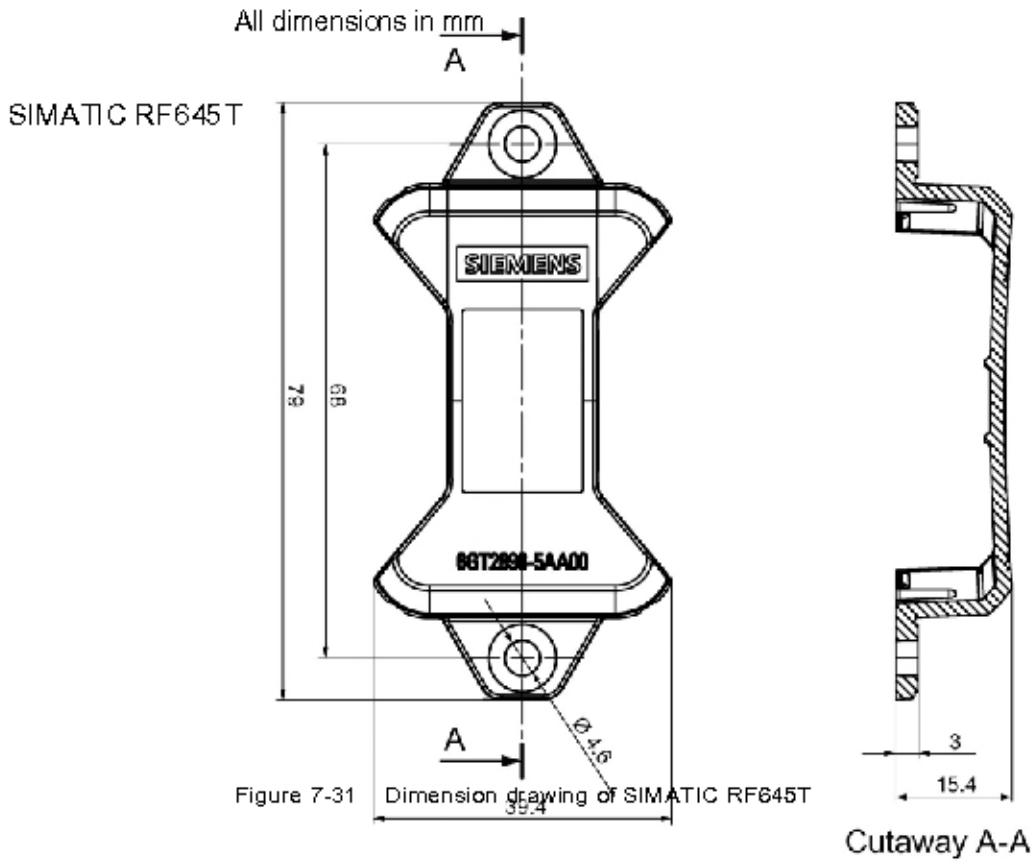
6GT2810-2HC05

Mechanical specifications	
Material	Plastic (ABS)
Silicone-free	Yes
Color	Black
Antenna material	Aluminum
Printing	No
Permitted ambient conditions	
Ambient temperature	
<ul style="list-style-type: none"> ▪ In operation, during write/read access ▪ In operation, outside write/read access ▪ During transportation and storage 	<ul style="list-style-type: none"> ▪ -40 ... +85 °C ▪ -40 ... +85 °C ▪ -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	<ul style="list-style-type: none"> ▪ 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



Retaining bracket for SIMATIC RF645T

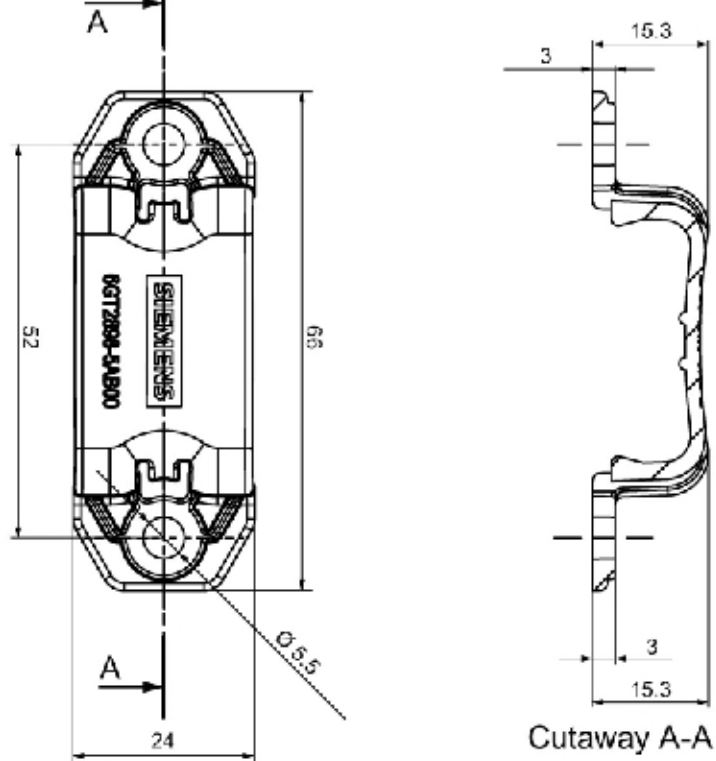


Figure 7-32 Dimension drawing mounting cover (6GT2898-5AA00) for SIMATIC RF645T





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

7.11.5 Certificates and approvals

Table 7- 45 Certificates and approvals

Labeling	Description
	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.

7.12 SIMATIC RF680T

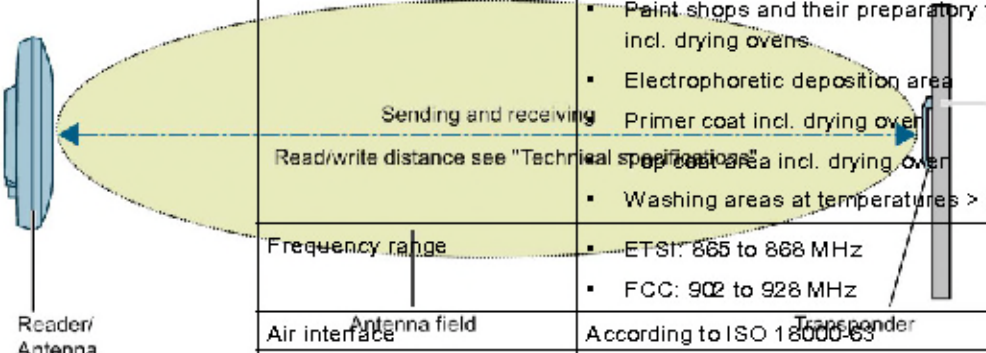
7.12.1 Characteristics

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: <ul style="list-style-type: none"> ▪ Paint shops and their preparatory treatments, incl. drying ovens ▪ Electrophoretic deposition area ▪ Primer coat incl. drying oven ▪ Electrocoat area incl. drying oven ▪ Washing areas at temperatures > 85 °C
	Frequency range	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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

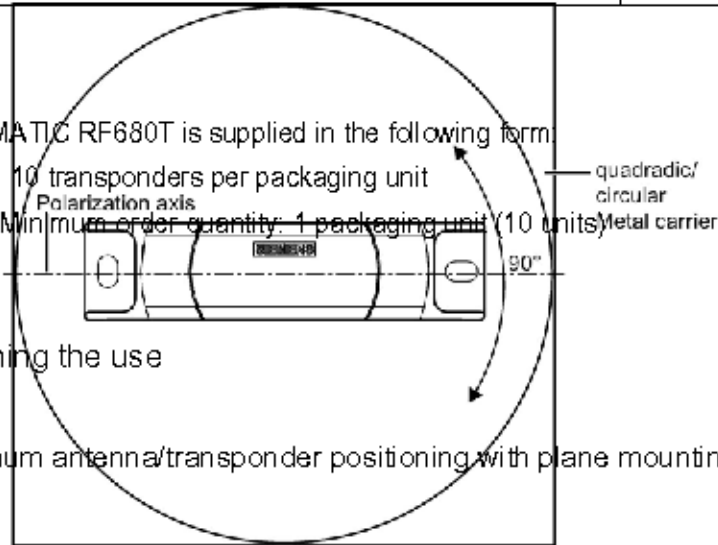
Table 7- 46 Ordering data RF680T

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.

For 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

SIMATIC RF680T		IS: A TBC 1100.0085		Ex ib IIB 16 bis 12 Gb	
(1) Ex ib IIB 16 bis 12 Gb		Ex ib IIB T 135°C Do			
Carrier material	UL LISTED	FC	Ex	CE	Range
Transponder on wooden carrier (dry, degree of moisture < 15%)	IND. CONT. EQ. 1B24		II 2G II 2D		typically 50 % 0158
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

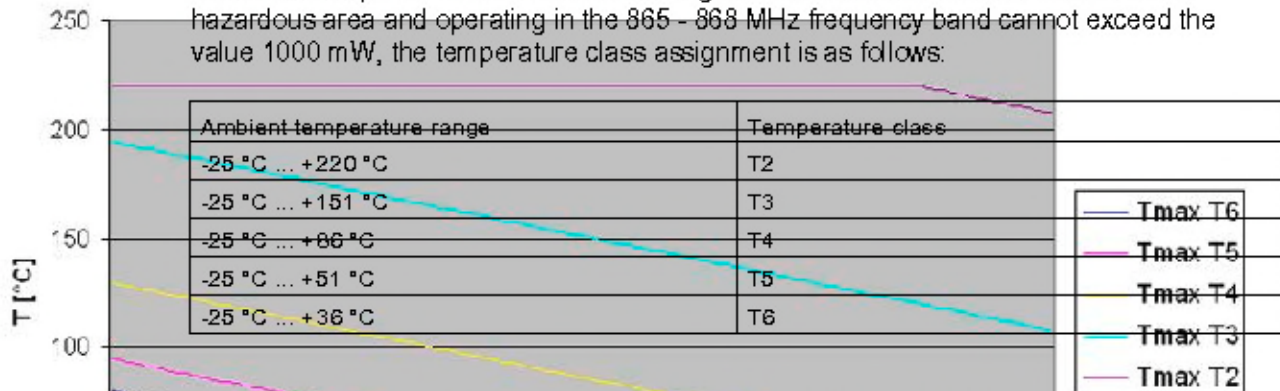
Temperature class assignment for gases and a radiated power less than 500 mW ERP

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

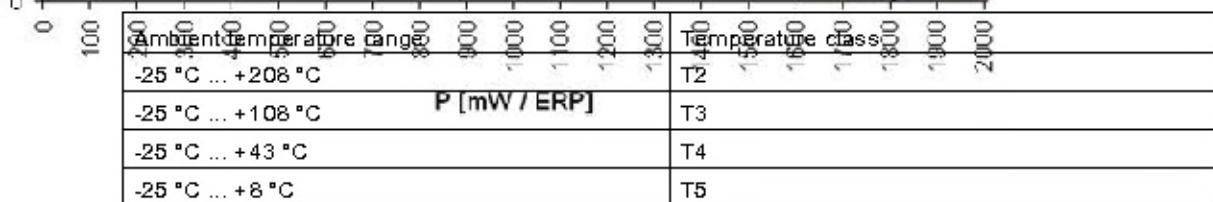
Temperature class assignment for gases and radiated power for 1000 mW ERP

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:



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:



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
$-25\text{ °C} \leq T_a \leq +125\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +108\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +86\text{ °C}$	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
$-25\text{ °C} \leq T_a \leq +43\text{ °C}$	T135 °C

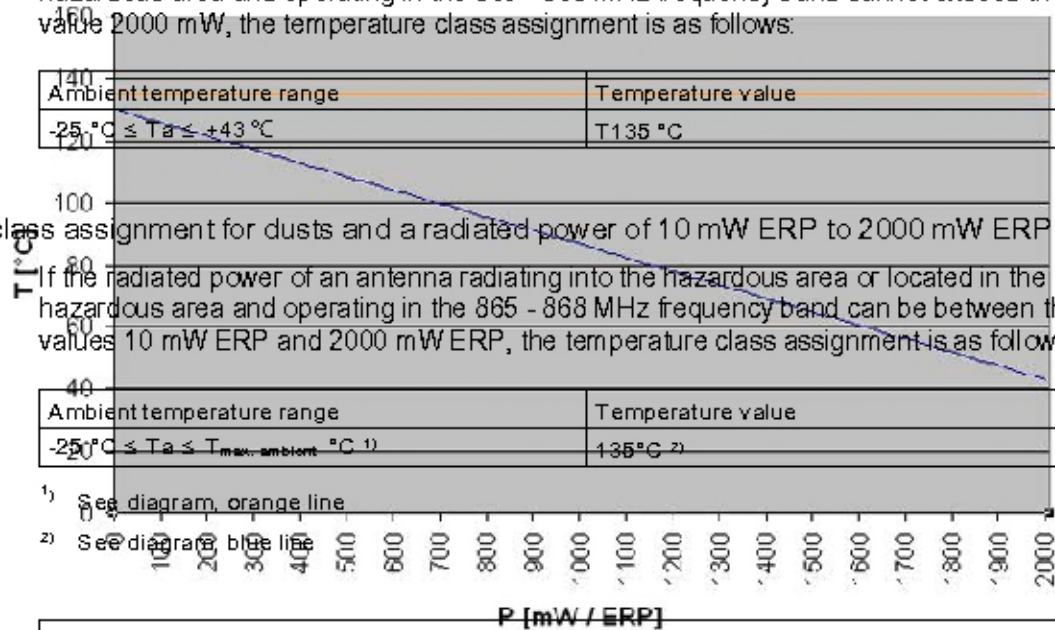
Temperature class assignment for dusts and a radiated power of 10 mW ERP to 2000 mW ERP

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 2000 mW ERP, the temperature class assignment is as follows:

Ambient temperature range	Temperature value
$-25\text{ °C} \leq T_a \leq T_{\text{max-ambient}}\text{ °C}^{1)}$	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:

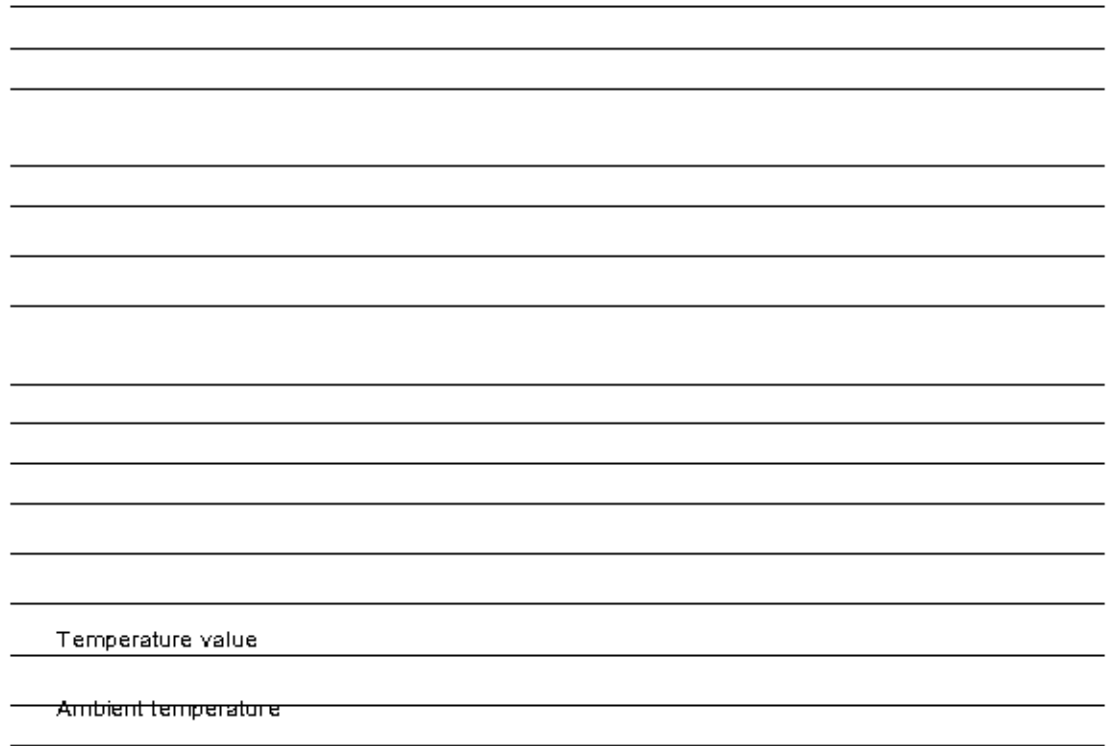
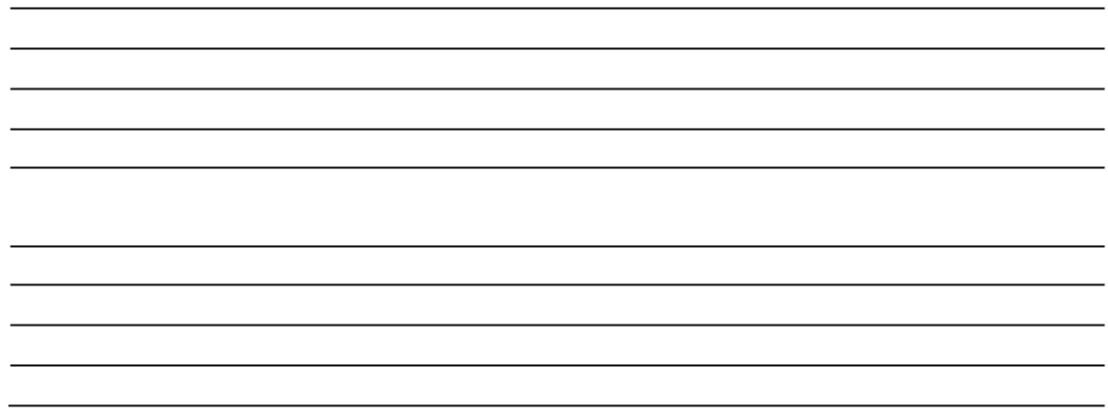


Figure 7-37 Temperature value and maximum permitted ambient temperature in relation to the radiated power

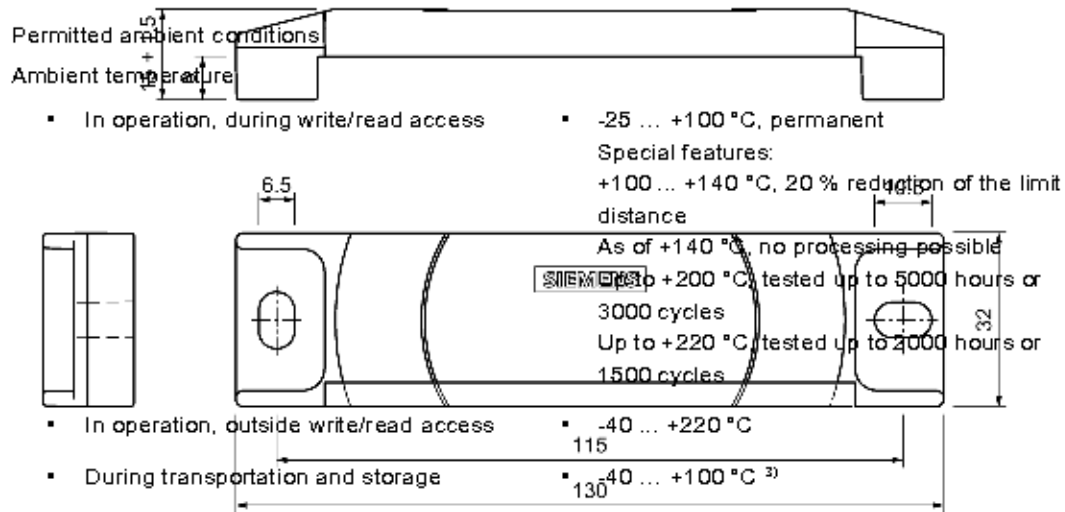


7.12.4 Technical specifications

Table 7- 48 Technical specifications of the transponder SIMATIC RF680T

6GT2810-2HG80	
Product type designation	SIMATIC RF680T
Radio frequencies	
Operating frequency	
<ul style="list-style-type: none"> ▪ ETSI ▪ FCC 	<ul style="list-style-type: none"> ▪ 865 to 868 MHz ▪ 902 ... 928 MHz ¹⁾
Memory	
Chip (manufacturer/type)	NXP / G2XM
Memory type	EEPROM
Memory configuration	
<ul style="list-style-type: none"> ▪ EPC ▪ User memory ▪ TID ▪ Reserved (passwords) 	<ul style="list-style-type: none"> ▪ 12 ... 30 bytes / 96 ... 240 bits ▪ 64 bytes / 512 bits ▪ 8 bytes / 64 bits ▪ 8 bytes / 64 bits
Number of write cycles (< 40 °C)	> 10 ¹⁴
Number of read cycles (< 40 °C)	> 10 ⁹
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



- 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
 - 130 °C ... +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 x 15 x 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

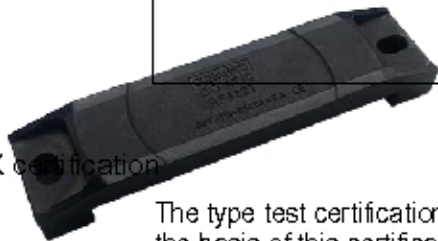
Table 7- 49 6GT2810-2HG80 - RF680T

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): <ul style="list-style-type: none"> ▪ 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/E 111.

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

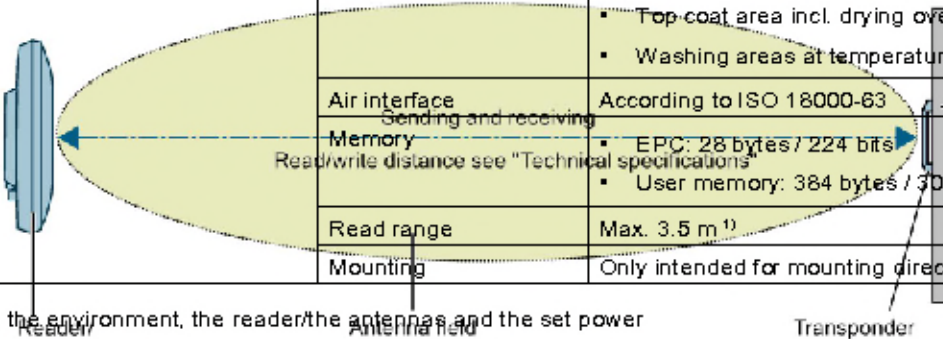
7.13.1 Characteristics

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: <ul style="list-style-type: none"> ▪ 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 antenna, 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

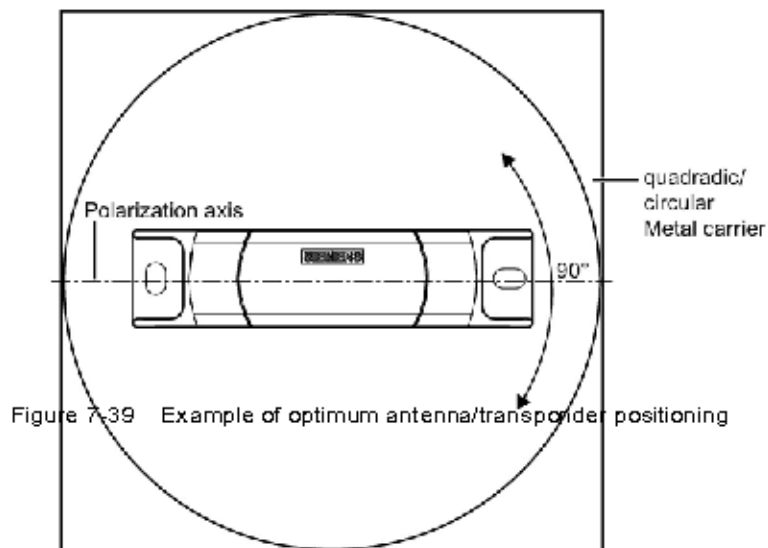


Figure 7-39 Example of optimum antenna/transponder positioning

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 $> +80\text{ }^{\circ}\text{C}$ 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.

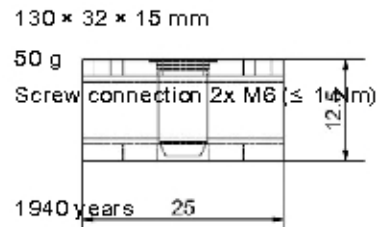
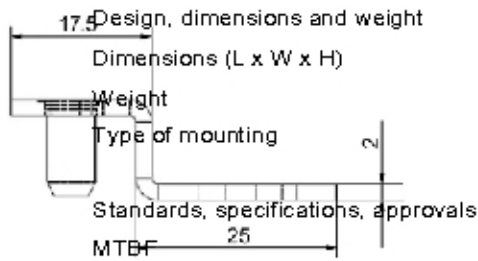
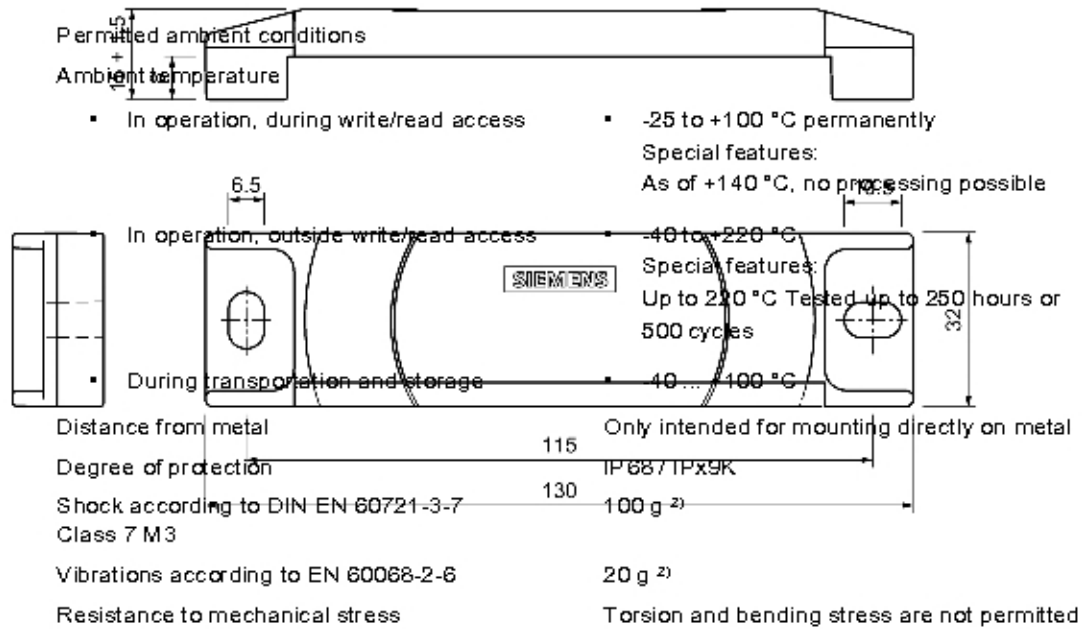
On rectangular carrier plates, the range depends on the mounting orientation of the transponder.

7.13.4 Technical specifications

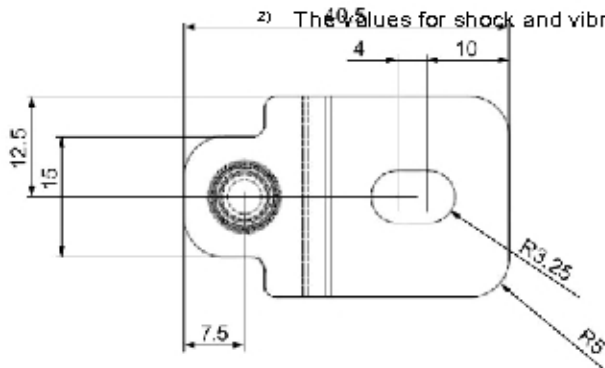
Table 7- 52 Technical specifications of SIMATIC RF682T

	6GT2810-3HG80
Product designation	SIMATIC RF682T
Radio frequency	
Operating frequency	
<ul style="list-style-type: none"> ▪ ETSI ▪ FCC 	<ul style="list-style-type: none"> ▪ 865 to 868 MHz ▪ 902 to 928 MHz
Memory	
Chip (manufacturer/type)	NXP UCode DNA
Memory type	EEPROM
Memory configuration	
<ul style="list-style-type: none"> ▪ EPC ▪ User memory ▪ TID 	<ul style="list-style-type: none"> ▪ 28 bytes / 224 bits ▪ 384 bytes / 3072 bits ▪ 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	
<ul style="list-style-type: none"> ▪ Writing ▪ Reading 	<ul style="list-style-type: none"> ▪ Up to 1.8 m ¹⁾ ▪ 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



- 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

8.1 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

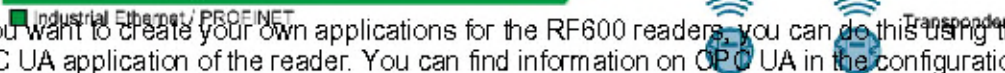
If you want to create your own applications for the RF600 readers, you can do this using the XML-based demo application of the reader. You can find information on XML commands in the configuration manual "SIMATIC RF600".



Connecting the RF600 readers using OPC UA

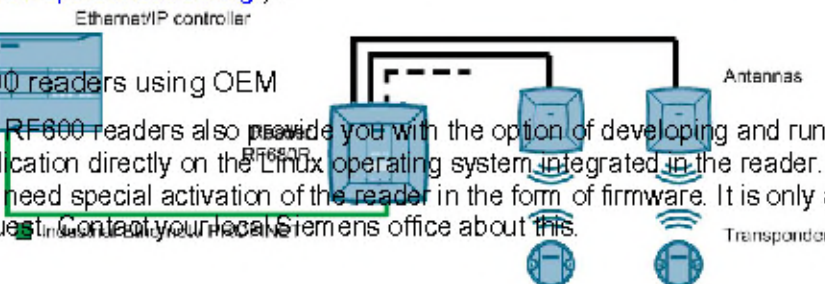
If you want to create your own applications for the RF600 readers, you can do this using the OPC UA application of the reader. You can find information on OPC UA in the configuration manual "SIMATIC RF600".

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.

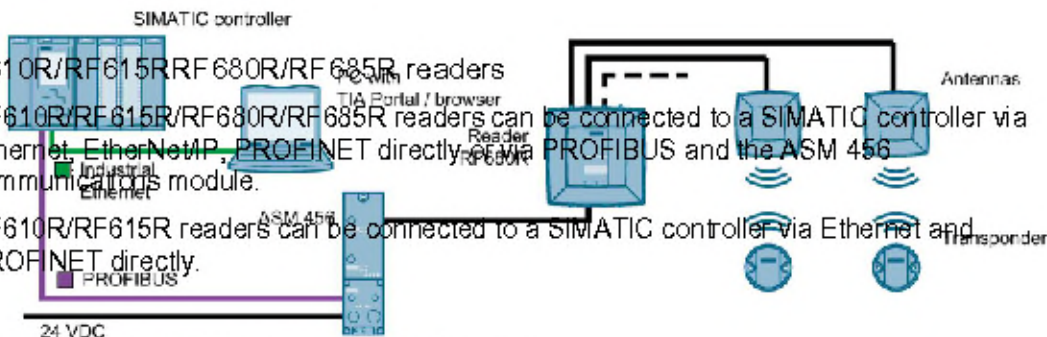


8.3 Integration in control networks

Connecting the RF610R/RF615R/RF680R/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 PROFIBUS 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>)".

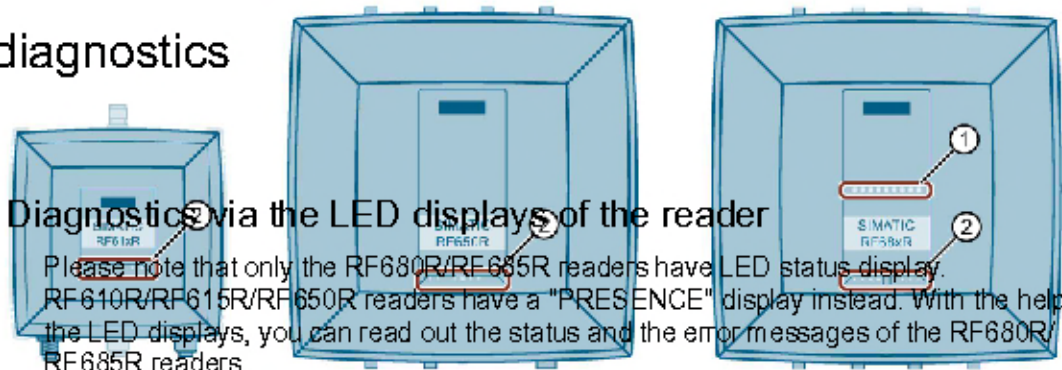
Integration into networks

8.3 Integration in control networks

System diagnostics

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) Shows whether the reader needs maintenance.
- only with RF610R/RF615R/RF680R/RF685R
 - POWER (PWR) Shows whether the reader is supplied with power.
 - PRESENCE (PRE) 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.
- only with RF610R/RF615R/RF650R
 - 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) Indicates that there is a connection via Ethernet interface "2".
- only with RF680R/RF685R
 - RECEIVE/TRANSMIT 2 (R/T2) Indicates that data is being sent and/or received via Ethernet interface "2".
- only with RF680R/RF685R

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)".

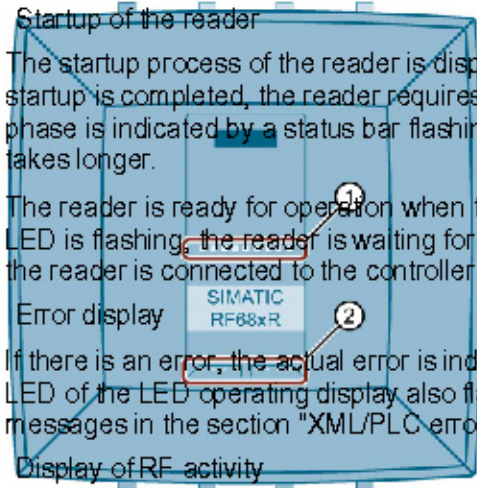
- Display of RF activity

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.

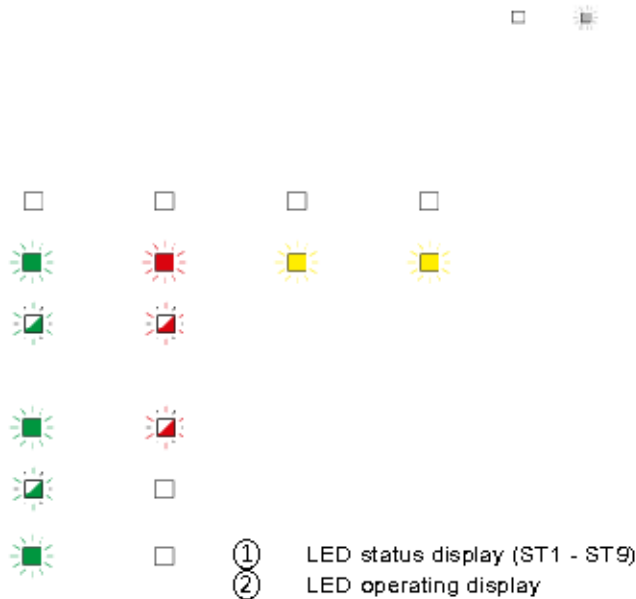


Figure 9-2 LED displays of the RF680R/RF685R readers

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. <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> ▪ The antenna or the antenna cable is defective. ▪ Error in the connection to the reader; the reader is not answering (in PROFIBUS operation). <ul style="list-style-type: none"> – 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 <p>Possible corrective measures:</p> <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> ▪ "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. <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ You are accessing a read point that is not configured.
--	0xCC	0xE4FE8C	<ul style="list-style-type: none"> ▪ Communication error between Ident profile and communications module. Handshake error. <ul style="list-style-type: none"> – 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 <p>This error is only indicated when access monitoring has been enabled in the PROFIBUS configuration.</p> <ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> ▪ Firmware error Possible cause: The firmware update was not run completely. ▪ Internal communications error of the communications module/reader <ul style="list-style-type: none"> – 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 <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> ▪ 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	<p>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.</p> <ul style="list-style-type: none"> ▪ 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	<p>Unknown command An uninterpretable XML command was sent to the reader or the Ident profile sends an uninterpretable command to the reader.</p> <p>Possible causes:</p> <ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ A parameter of an XML command has an invalid value or the parameter assignment of the communications module or the reader was incorrect. <p>Possible causes / action to be taken:</p> <ul style="list-style-type: none"> – 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". <ul style="list-style-type: none"> ▪ The parameter assignment of the reader or communications module on PROFIBUS/PROFINET was incorrect and the command cannot be executed. <p>Possible causes / action to be taken:</p> <ul style="list-style-type: none"> – 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. <ul style="list-style-type: none"> ▪ Error when processing the command. <p>Possible causes / action to be taken:</p> <ul style="list-style-type: none"> – 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. <ul style="list-style-type: none"> ▪ The wrong reset block was selected. <p>Possible causes / action to be taken:</p> <ul style="list-style-type: none"> – Regardless of the selected reader system, use the "Reset_Reader" function block.
--	0x64	0xE6FE04	<p>Presence error</p> <p>A transponder has passed through the transmission window of a reader without being processed.</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ Check whether the buffers TXBUF/RXBUF are at least as large as specified in LEN_DATA. ▪ With S7-1200/1500: <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> ▪ 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.

System diagnostics
9.2 XML/PLC error messages



Accessories

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	IP 67
	Design features	<ul style="list-style-type: none"> ▪ 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
<p>Danger to life</p> <p>It is not permitted to open the device or to modify the device.</p> <p>The following must also be taken into account:</p> <ul style="list-style-type: none">• 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 and 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
<p>Liability</p> <p>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.</p> <p>Note the conditions specified in the UL approval.</p>

10.1 Wide-range power supply unit for SIMATIC RF systems

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

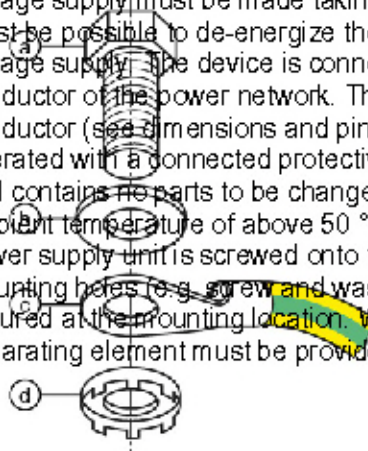
If the readers are operated permanently at full load and the digital inputs/outputs are loaded with the maximum total current of 1.1 A, the maximum current consumption of a reader can reach 2 A. In this case, a maximum of one reader may be connected per wide-range power supply unit.

10.1 Wide-range power supply unit for SIMATIC RF systems

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

Installation instructions


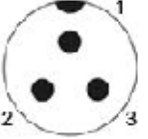
The power supply unit must be connected with the described connecting cables in the primary and secondary circuits. The connectors at the power supply unit end may only be removed or inserted when no voltage is applied. The degree of protection IP67 is only achieved with correctly connected and locked 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	
	<p>(a) Hexagon-head screw (M5)</p> <p>(b) Flat washer</p> <p>(c) Cable lug</p> <p>(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</p>
	

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	PF
2	L (100 ... 240 VAC)
3	N (100 ... 240 VAC)

10.1.7 Technical specifications

Table 10- 8 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 $U_m = 230 VAC, f = 50 Hz$
Mains buffering t_n	≥ 50 ms at $U_m = 230 VAC$
Power supply unit classification	Level 3 acc. to CSA

10.1 Wide-range power supply unit for SIMATIC RF systems

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 °C
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 61000-4-4 Symmetrical: 2 kV Asymmetrical: 2 kV
▪ Surge	▪ EN 61000-6-5 / EN 61000-4-5 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

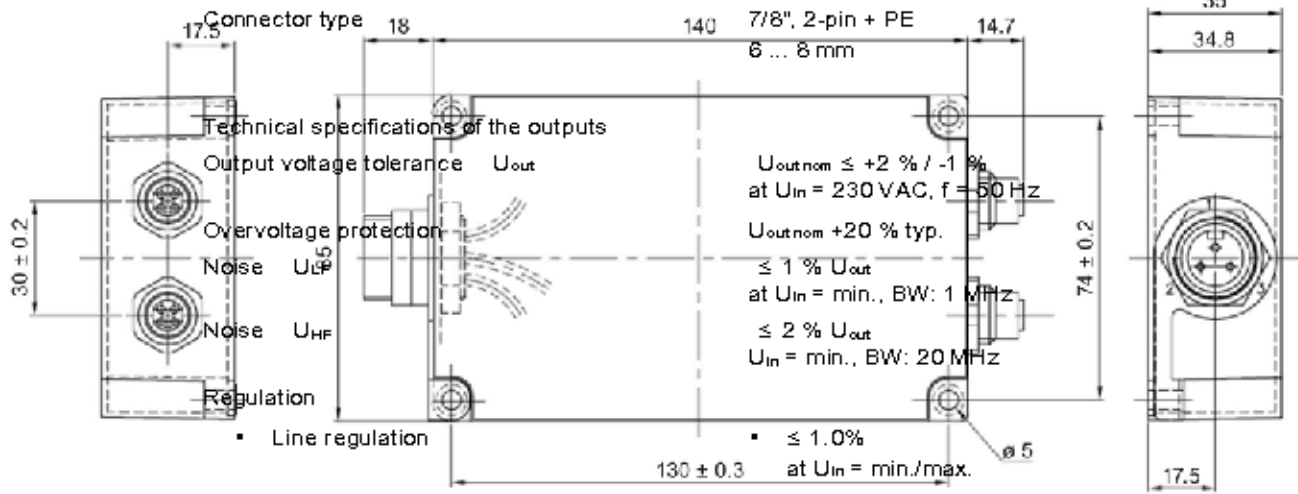
720 g

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 U_{out} $U_{outnom} \leq +2\% / -1\%$
at $U_{in} = 230\text{ VAC}$, $f = 50\text{ Hz}$
- Overvoltage protection $U_{outnom} + 20\%$ typ.
- Noise U_{LP} $\leq 1\% U_{out}$
at $U_{in} = \text{min.}$, BW: 1 MHz
- Noise U_{HF} $\leq 2\% U_{out}$
 $U_{in} = \text{min.}$, BW: 20 MHz
- Regulation
 - Line regulation $\leq 1.0\%$
at $U_{in} = \text{min./max.}$
 - Load regulation $\leq 1.0\%$
at $I_{out} = 10\%..90\%..10\%$

Short-circuit current I_{max}

105 ... 130 % I_{nom}
at $I_{nom} = 3\text{ A}$ (+50 °C)

Settling time t_R load variations

< 5 ms
at $I_{out} = 10\%..90\%..10\%$

Temperature coefficient ϵ

0.01 % / K
at $T_A = -25\text{ °C} \dots +70\text{ °C}$

Overload behavior P_{over}

Constant current

Short-circuit protection/

Continuous/no-load stability

No-load response

Derating

2 % / K
at $T_A > +50\text{ °C} \dots +70\text{ °C}$

Connector type

M12, 4-pin
two sockets

Table 10-7 Output configurations

Input	Outputs U1 = U2	I _{Load} = 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 <ul style="list-style-type: none"> ▪ 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 style="list-style-type: none"> ▪ 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 ULLC. 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)".

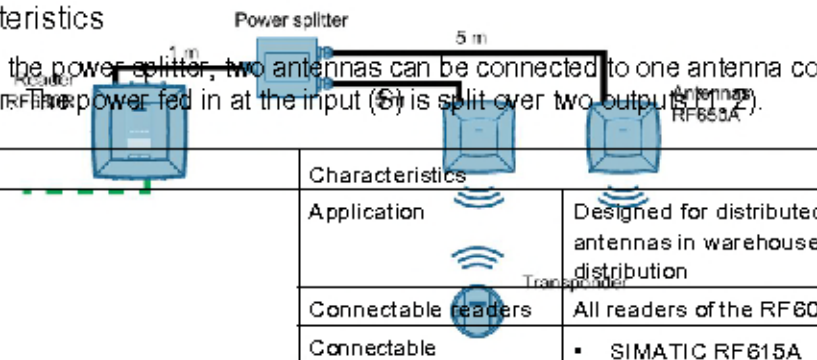
- The equipment is suitable for direct connection to: AC mains supply
- Output is supplied by circuit that complies with NEC Class 2 requirements (additional evaluation acc. UL1310 has been conducted during the product investigation).



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 (6) 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⁾	<ul style="list-style-type: none"> ▪ 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.

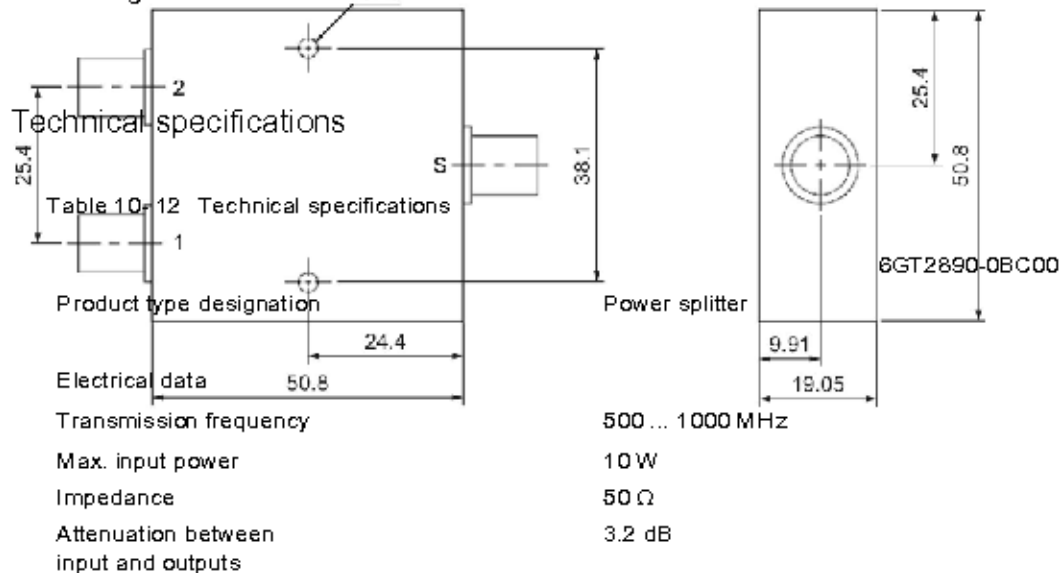
To calculate the total attenuation made up of the cable attenuation and the attenuation of the power splitter, the various attenuation values need to be added. For the configuration shown above, the total attenuation is as follows:

$$0.5 \text{ dB} + 3.2 \text{ dB} + 1.25 \text{ dB} = 4.95 \text{ dB}$$

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



10.2 Power splitter for RF600 systems

	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, RF680A, RF680A

10.3.2 Ordering data

Table 10-13 Ordering data for SIMATIC antenna holder

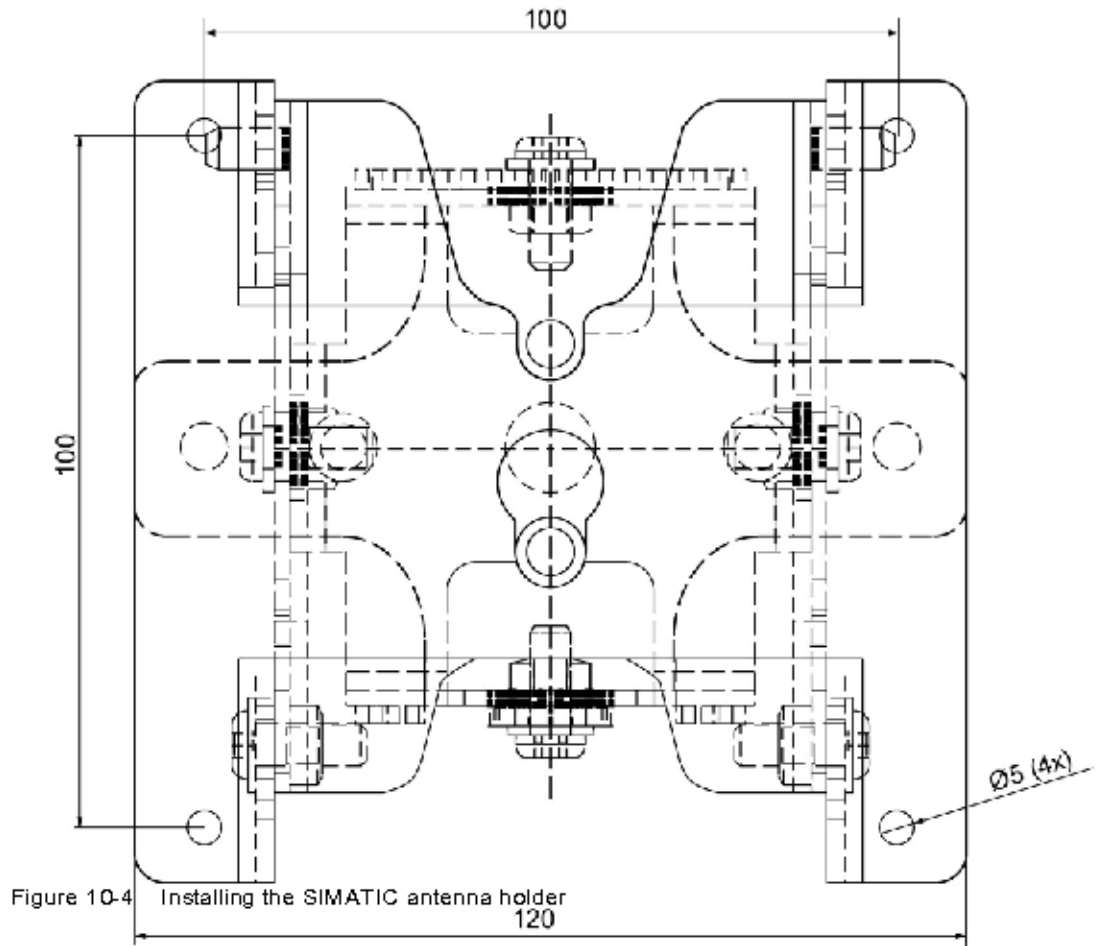
Description	Article number
SIMATIC antenna holder for RF600 devices	6GT2890-2AB10

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.



10.3.4

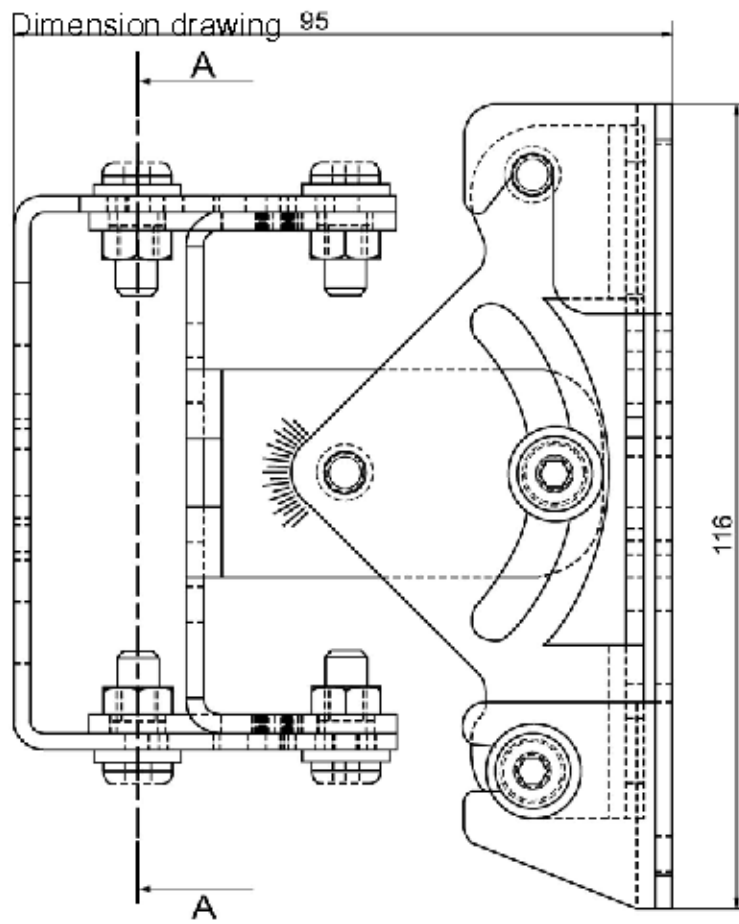


Figure 10-5 Front view

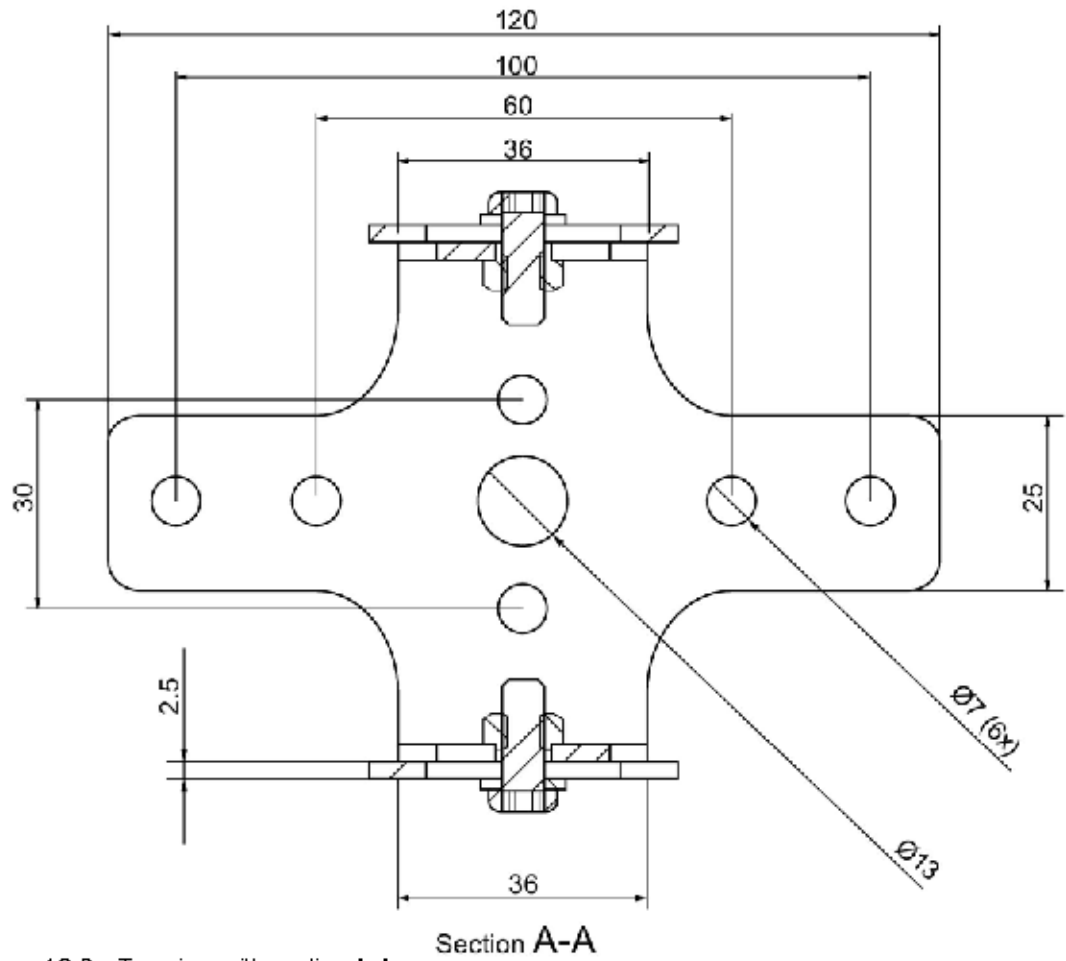


Figure 10-6 Top view with section A-A

Figure 10-7 Section A-A


All dimensions in mm.



Appendix

A.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



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: XXXXYY ZZZZ	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/>)