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4 December 2020

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Prüfbericht / Test Report

Nr. / No. TR-64038-83123-09 (Edition 1)

Auftraggeber <i>Applicant</i>	Marquardt GmbH
Geräteart <i>Type of equipment</i>	Passive Car Entry Key
Typenbezeichnung <i>Type designation</i>	BK1
Seriennummer / <i>Serial number</i>	88BA99B6
Auftragsnummer / <i>Order No.</i>	6200401493-G51
Prüfgrundlage <i>Test standards</i>	ARIB STD-T93 Edition 1.1 3.2 Transmitter 3.3 Receiver Article 2, Paragraph 1, Item (8)

Summary

Prüfergebnisse / <i>Test Results</i>		Auftragsnummer / <i>Order No.</i> 6200401493-G51			
Die Prüfungen wurden nach folgenden Vorschriften durchgeführt: <i>Tests were performed according to:</i> ARIB STD-T93 Edition 1.1 3.2 Transmitter 3.3 Receiver					
<i>Durchgeführte Prüfung</i> Test performed		Prüfergebnis <i>Test result</i>			
		<i>Erfüllt</i> <i>Passed</i>	<i>Nicht erfüllt</i> <i>Not Passed</i>	<i>Nicht zutreffend</i> <i>Not applicable</i>	<i>Nicht spezifiziert</i> <i>Not specified</i>
3.2 Transmitter:					
(1) Antenna power		☒	☐	☐	☐
(2) Tolerance for Antenna Power		☒	☐	☐	☐
(3) Oscillation method		☐	☐	☐	☒
(4) Frequency Tolerance		☒	☐	☐	☐
(5) Modulation scheme		☐	☐	☐	☒
(6) Frequency shift		☐	☐	☐	☒
(7) Modulation rate		☐	☐	☐	☒
(8) Sign format		☐	☐	☐	☒
(9) Adjacent channel leakage power		☐	☐	☐	☒
(10) Tolerance of the occupied bandwidth		☒	☐	☐	☐
(11) Permissible Values of Unwanted Emission Intensity		☒	☐	☐	☐
(12) Time fall sending rising and falling		☐	☐	☐	☒
3.3 Receiver:					
(1) Limit of Secondary Radiated Emissions		☐	☐	☒	☐

Bemerkungen / Remarks:

Die Prüfergebnisse beziehen sich ausschließlich auf das zur Prüfung vorgestellte Prüfmuster. Ohne schriftliche Genehmigung des Prüflabors darf der Prüfbericht auszugsweise nicht vervielfältigt werden. *The test results relate only to the individual item which has been tested. Without the written approval of the test laboratory this report may not be reproduced in extracts.*

Datum / Date	Geprüft von / Tested by	Freigabe durch / Checked by	Prüfergebnis / Test Result
2020-12-04	 SIGN-ID 429427 Alex Fink Responsible for testing	 SIGN-ID 430094 Matthias Stumpe Reviewer	☒ Erfüllt / Passed ☐ Nicht erfüllt / Not passed

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1 Administrative Data

Application details	
Applicant:	Marquardt GmbH Schloss-Str. 16 78604 Rietheim-Weilheim Germany
Contact person:	Mr. Matthias Kiefer
Intercompany contact:	TÜV SÜD Product Service GmbH Ridlerstr. 65 80339 München / Munich Mr. Thomas Ring
Order number:	6200401493-G51
Receipt of EUT:	2020-07-27
Return of EUT:	---
Date(s) of test:	2020-08-12 to 2020-08-13
Note(s):	---
Responsible for testing:	Mr. Alex Fink
Responsible for test report:	Mr. Alex Fink
Test report checked by:	Mr. Matthias Stumpe

Report details	
Report number:	TR-64038-83123-09
Edition:	1
Issue date:	2020-12-04

2 Details about the Test Laboratory

Details about the Test Laboratory	
Company name:	TÜV SÜD Product Service GmbH
Address:	Äußere Frühlingstraße 45 D-94315 Straubing Germany
Contact:	Mr. Markus Bibberger Phone: +49 9421 5522-0 Fax: +49 9421 5522-99

3 Description of the Equipment Under Test

Equipment characteristics	
Type designation:	BK1
Parts of the system:	---
Options and accessories:	---
Type of equipment:	Passive Car Entry Key
Manufacturer:	Marquardt GmbH Schloss-Str. 16 78604 Rietheim-Weilheim Germany
Serial number:	88BA99B6
Version:	---
Application ¹ :	Non-Specific Short Range Device; Inductive Applications
Equipment class:	Equipment for portable use
Kind of equipment	Transceiver
Power supply	Lithium battery: 3.0 V DC
Highest internal frequency:	7987.2 MHz (radio)

¹ Classification according to CEPT/ERC Recommendation 70-03

4 Operation Mode and Configuration of EUT

Operation Mode(s)

Continuously transmitting with modulation on 315 MHz

List of ports and cables

No.	Description	Classification ²	Cable type	Cable length used	maximum ³
---	---	---	---	---	---

List of devices connected to EUT

No.	Description	Type designation	Serial no. or ID	Manufacturer
---	---	---	---	---

List of support devices

No.	Description	Type designation	Serial no. or ID	Manufacturer
	Notebook with control software	E460	TPS-STR-NB04	Lenovo

² Ports shall be classified as ac power, dc power or signal/control port.

³ As specified by applicant

5 Referenced Regulations

<i>Publication</i>	<i>Title</i>
ARIB STD-T93 Edition 1.1	Specified low-power radio station 315 MHz band for telemetry, telecontrol and data transmission for radio equipment

6 Measurement Uncertainty Values

Radio Testing			
Test	k_p	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Radio Interference Emission Testing			
Test	k_p	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50 Ω /50 μ H AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50 Ω /50 μ H AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50 Ω /5 μ H AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50 Ω /50 μ H AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50 Ω /50 μ H AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1

Radio Interference Emission Testing (continued)			
Test	k_p	Expanded Uncertainty	Note
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Immunity Testing			
Test	k_p	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$, providing a level of confidence of $p = 95.45\%$

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$, providing a level of confidence of $p = 95.45\%$

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$

Note 8:

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$

7 Test Results

ARIB STD-T93			
Section(s)	Test performed	Page	Test Result
3.2 (1)	Antenna power	14	Test passed
3.2 (2)	Tolerance for Antenna Power	17	Test passed
3.2 (3)	Oscillation method	---	Not specified
3.2 (4)	Frequency Tolerance	20	Test passed
3.2 (5)	Modulation scheme	---	Not specified
3.2 (6)	Frequency shift	---	Not specified
3.2 (7)	Modulation rate	---	Not specified
3.2 (8)	Sign format	---	Not specified
3.2 (9)	Adjacent channel leakage power	---	Not specified
3.2 (10)	Tolerance of the occupied bandwidth	23	Test passed
3.2 (11)	Limit of Secondary Radiated Emissions	26	Test passed
3.2 (12)	Time fall sending rising and falling	---	Not specified
3.3 (1)	Limit of Secondary Radiated Emissions	32	Test passed

7.1 Antenna power (e.i.r.p.)

7.1.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐ Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☒ EMI test receiver		ESW44	39897	101814	Rohde & Schwarz
☐ EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐ EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐ EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐ Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐ Preamplifier		R14601	1142	13120026	Advantest
☐ Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐ Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐ Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒ ULTRALOG Antenna		HL562E	39969	101062	Rohde & Schwarz
☐ Fully anechoic room		No. 2	1452	---	Albatross
☐ Semi anechoic room		No. 3	1453	---	Siemens
☐ Semi anechoic room		No. 8	2057	---	Albatross
☒ Semi anechoic room		No.11	42961	---	Frankonia

7.1.2 Test Results

Results for antenna power (e.i.r.p.) test are documented as listed below.

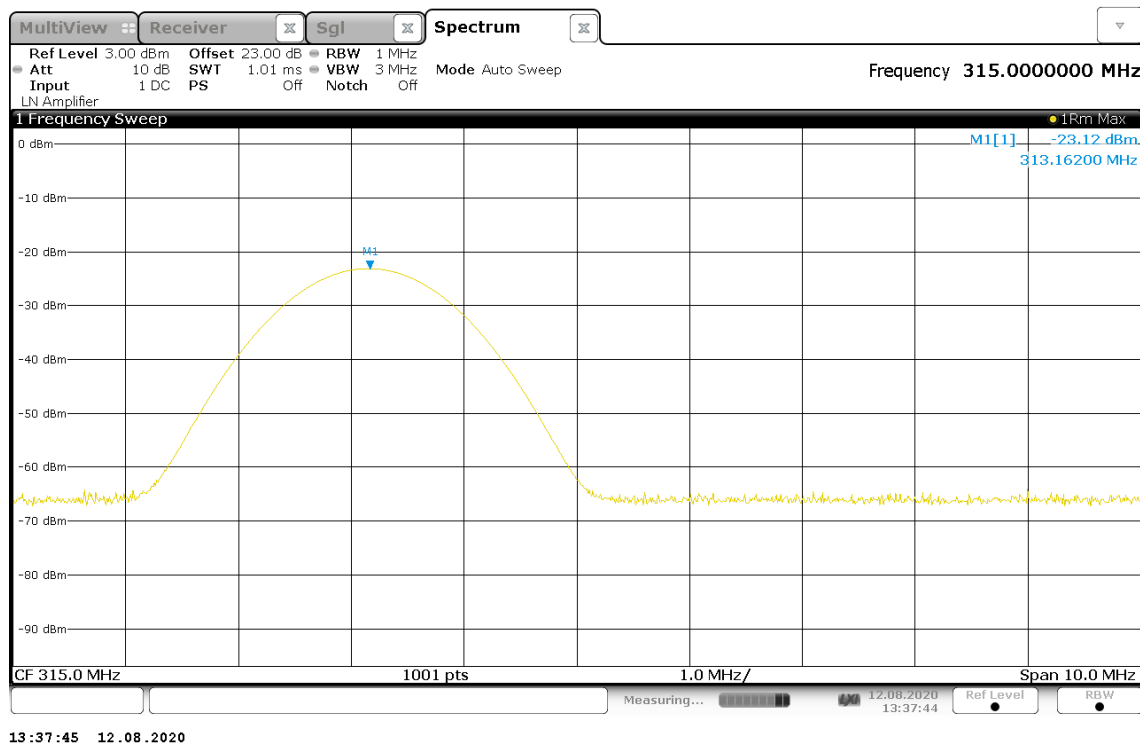
Antenna power (e.i.r.p.)

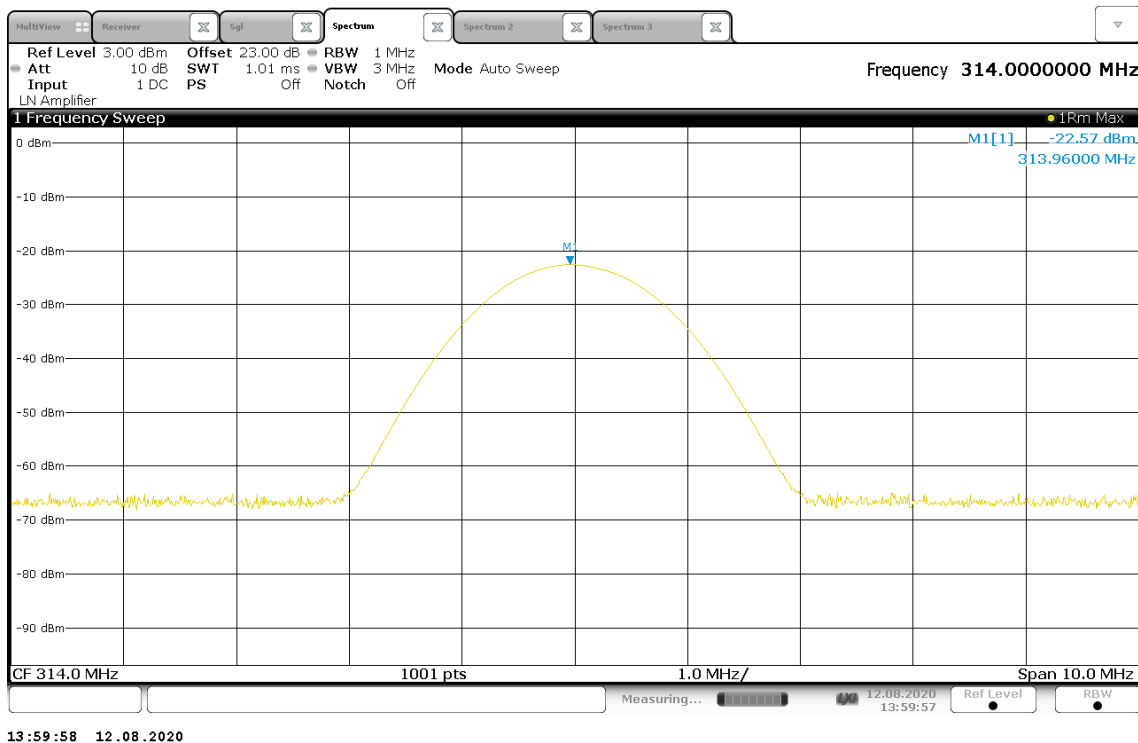
Prüfdatum / Date of test:	2020-08-12
Prüfer / Operator:	Alex Fink
Messplatz / Test site:	Semi anechoic room, cabin no. 11

Prüfergebnis / Test Result	
☒	Erfüllt / Passed
☐	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	976 hPa
Relative Luftfeuchtigkeit / Relative humidity:	44 %
Temperatur / Ambient temperature:	24 °C

Prüfgrundlage / Specifications:	ARIB STD-T93 Section 3.2 (1)
Nominelle Sendeleistung / Rated carrier power:	Channel 1: - 23.12 dBm Channel 2: - 22.57 dBm
Betriebsart / Operation mode:	See chapter 4
Kommentar / Comment:	---





Grenzwert / Limit

Radiated power should be less than 250 μ W e.i.r.p. (-6 dBm e.i.r.p.) when the center frequency of the occupied bandwidth plus the frequency deviation of the occupied bandwidth ranges from 312 MHz to 315.25 MHz.

Ergebnis / Test result

The antenna power is -23.12 dBm (4.88 μ W) for Channel 1 and -22.57 dBm (5.53 μ W) for Channel 2, less than 250 μ W.

7.2 Tolerance for Antenna Power

7.2.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐ Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☒ EMI test receiver		ESW44	39897	101814	Rohde & Schwarz
☐ EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐ EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐ EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐ Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐ Preamplifier		R14601	1142	13120026	Advantest
☐ Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐ Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐ Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒ ULTRALOG Antenna		HL562E	39969	101062	Rohde & Schwarz
☐ Fully anechoic room		No. 2	1452	---	Albatross
☐ Semi anechoic room		No. 3	1453	---	Siemens
☐ Semi anechoic room		No. 8	2057	---	Albatross
☒ Semi anechoic room		No.11	42961	---	Frankonia

7.2.2 Test Results

Results for allowable deviation of antenna power test are documented as listed below.

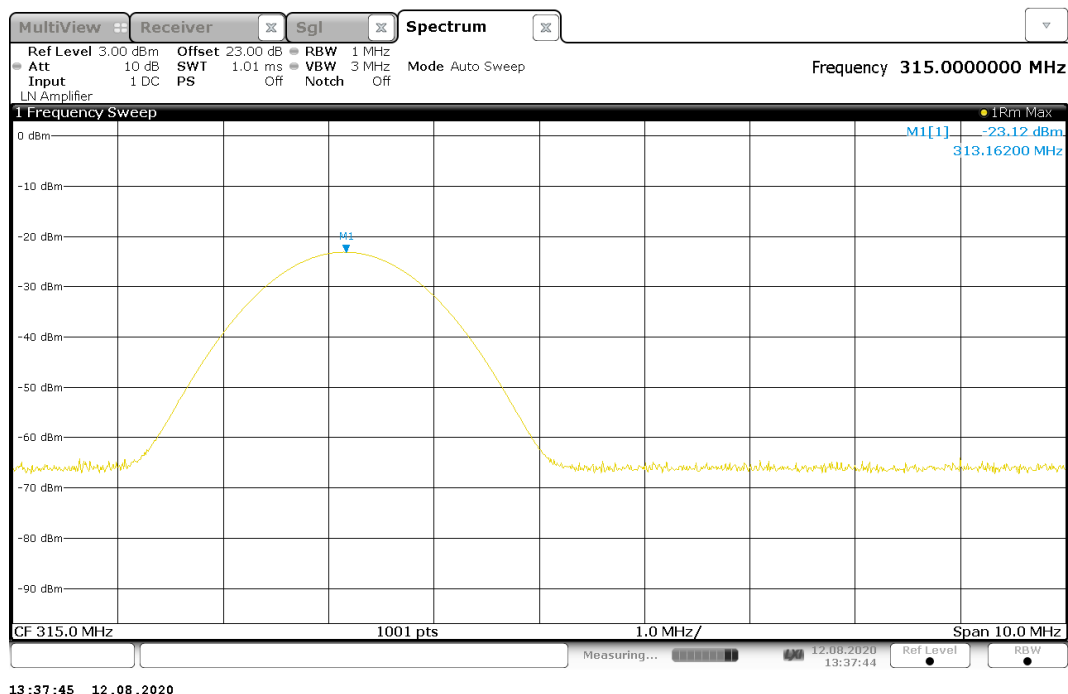
Tolerance for Antenna Power

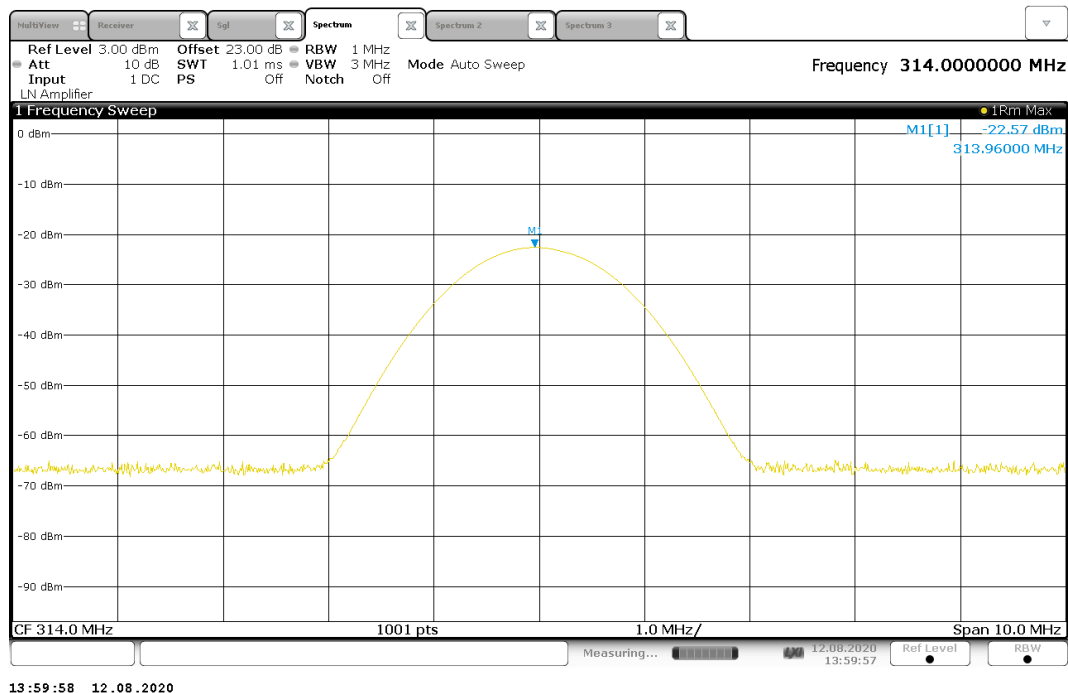
Prüfdatum / Date of test:	2020-08-12
Prüfer / Operator:	Alex Fink
Messplatz / Test site:	Semi anechoic room, cabin no. 11

Prüfergebnis / Test Result	
☒	Erfüllt / Passed
☐	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	976 hPa
Relative Luftfeuchtigkeit / Relative humidity:	44 %
Temperatur / Ambient temperature:	24 °C

Prüfgrundlage / Specifications:	ARIB STD-T93 Section 3.2 (2)
Nominelle Sendeleistung / Rated carrier power:	-16.00 dBm
Betriebsart / Operation mode:	See chapter 4
Kommentar / Comment:	---





Grenzwert / Limit

Variation from rated power is only defined for upper side as +20 % maximum. Lower side is not defined.

Ergebnis / Test result

Maximum radiated power variation is within the limits of +20 %, as seen above.

7.3 Frequency Tolerance

7.3.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐ Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☒ EMI test receiver		ESW44	39897	101814	Rohde & Schwarz
☐ EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐ EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐ EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐ Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐ Preamplifier		R14601	1142	13120026	Advantest
☐ Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐ Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐ Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒ ULTRALOG Antenna		HL562E	39969	101062	Rohde & Schwarz
☐ Fully anechoic room		No. 2	1452	---	Albatross
☐ Semi anechoic room		No. 3	1453	---	Siemens
☐ Semi anechoic room		No. 8	2057	---	Albatross
☒ Semi anechoic room		No.11	42961	---	Frankonia

7.3.2 Test Results

Results for frequency of acceptable deviation test are documented as listed below.

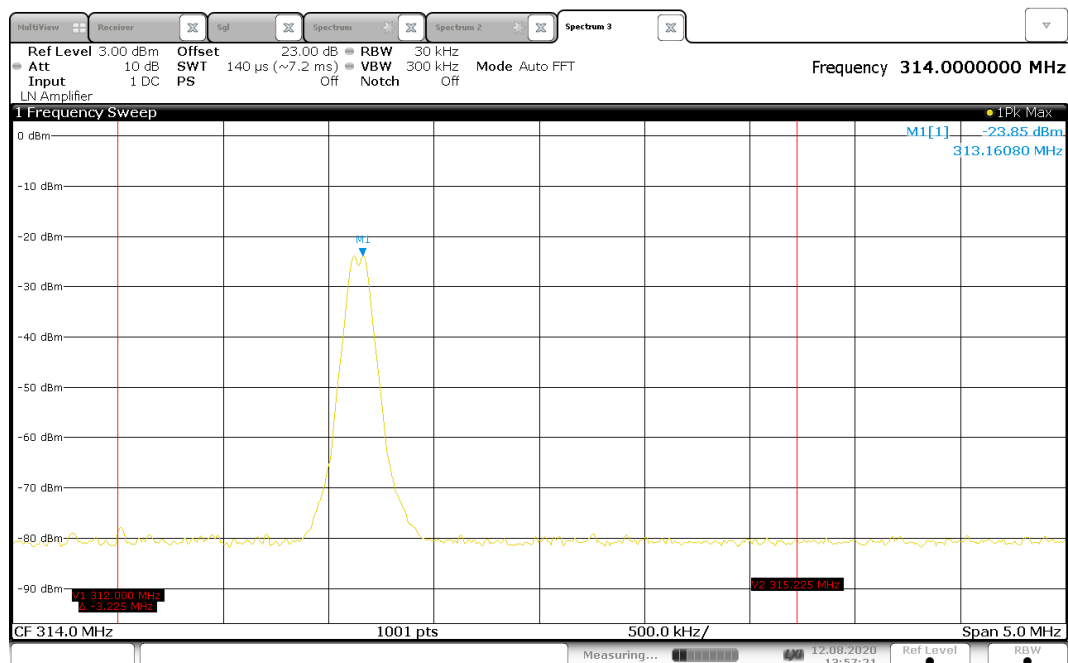
Frequency Tolerance

Prüfdatum / Date of test: 2020-08-12
Prüfer / Operator: Alex Fink
Messplatz / Test site: Semi anechoic room, cabin no. 11

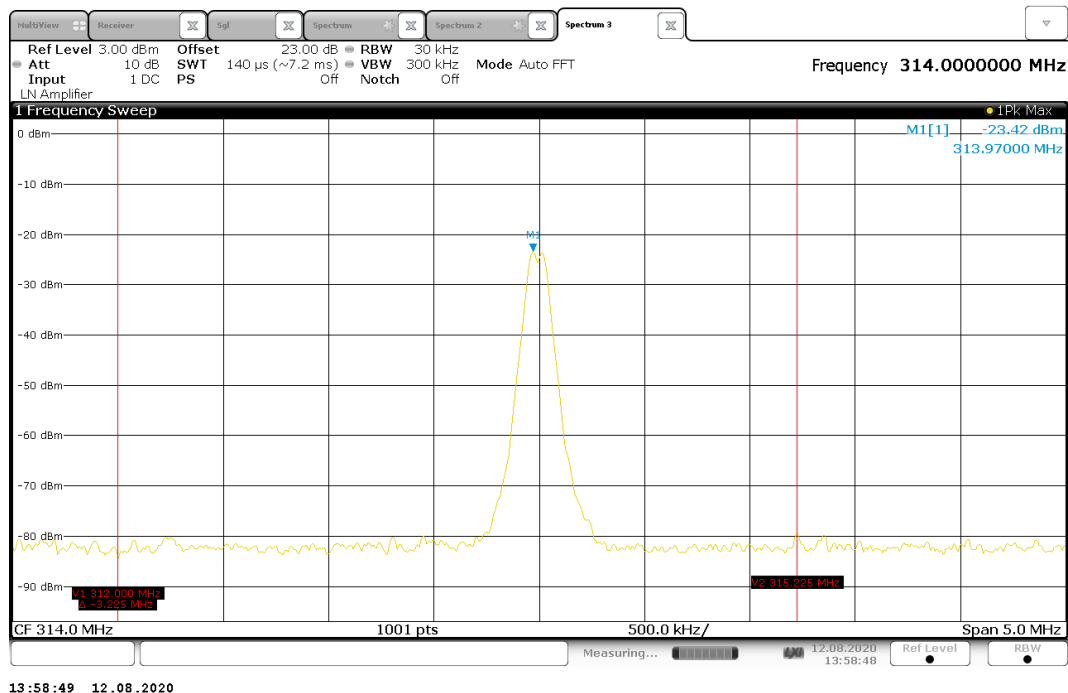
Prüfergebnis / Test Result
☒ Erfüllt / Passed
☐ Nicht erfüllt / Not passed

Luftdruck / Barometric pressure: 976 hPa
Relative Luftfeuchtigkeit / Relative humidity: 44 %
Temperatur / Ambient temperature: 24 °C

Prüfgrundlage / Specifications: ARIB STD-T93 Section 3.2 (4)
Nominelle Sendeleistung / Rated carrier power: -16.00 dBm
Betriebsart / Operation mode: See chapter 4
Kommentar / Comment: ---



13:57:21 12.08.2020



Grenzwert / Limit

The transmitted frequency should be entirely between 312 MHz and 315.25 MHz

Ergebnis / Test result

The lowest carrier frequency is 313.15 MHz and highest carrier frequency 314.00 MHz and is inside the specific band.

7.4 Tolerance of the occupied bandwidth

7.4.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐ Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☒ EMI test receiver		ESW44	39897	101814	Rohde & Schwarz
☐ EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐ EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐ EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐ Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐ Preamplifier		R14601	1142	13120026	Advantest
☐ Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐ Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐ Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒ ULTRALOG Antenna		HL562E	39969	101062	Rohde & Schwarz
☐ Fully anechoic room		No. 2	1452	---	Albatross
☐ Semi anechoic room		No. 3	1453	---	Siemens
☐ Semi anechoic room		No. 8	2057	---	Albatross
☒ Semi anechoic room		No.11	42961	---	Frankonia

7.4.2 Test Results

Results for tolerance of the occupied bandwidth test are documented as listed below.

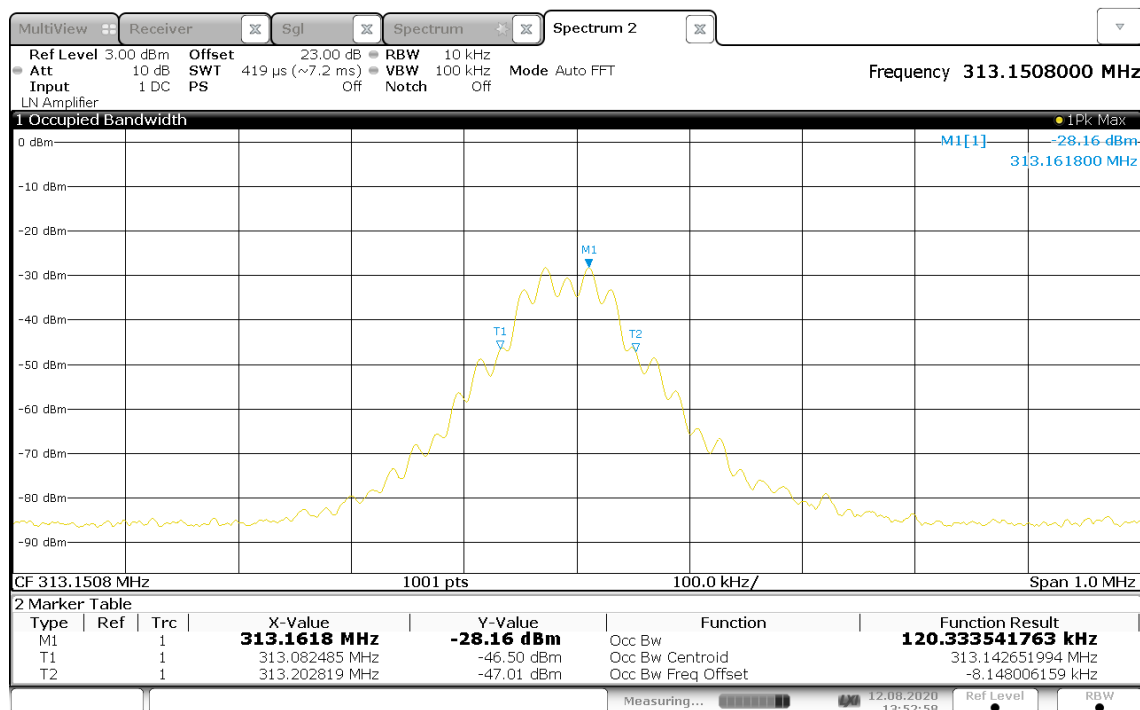
Tolerance of the occupied bandwidth

Prüfdatum / Date of test:	2020-08-12
Prüfer / Operator:	Alex Fink
Messplatz / Test site:	Semi anechoic room, cabin no. 11

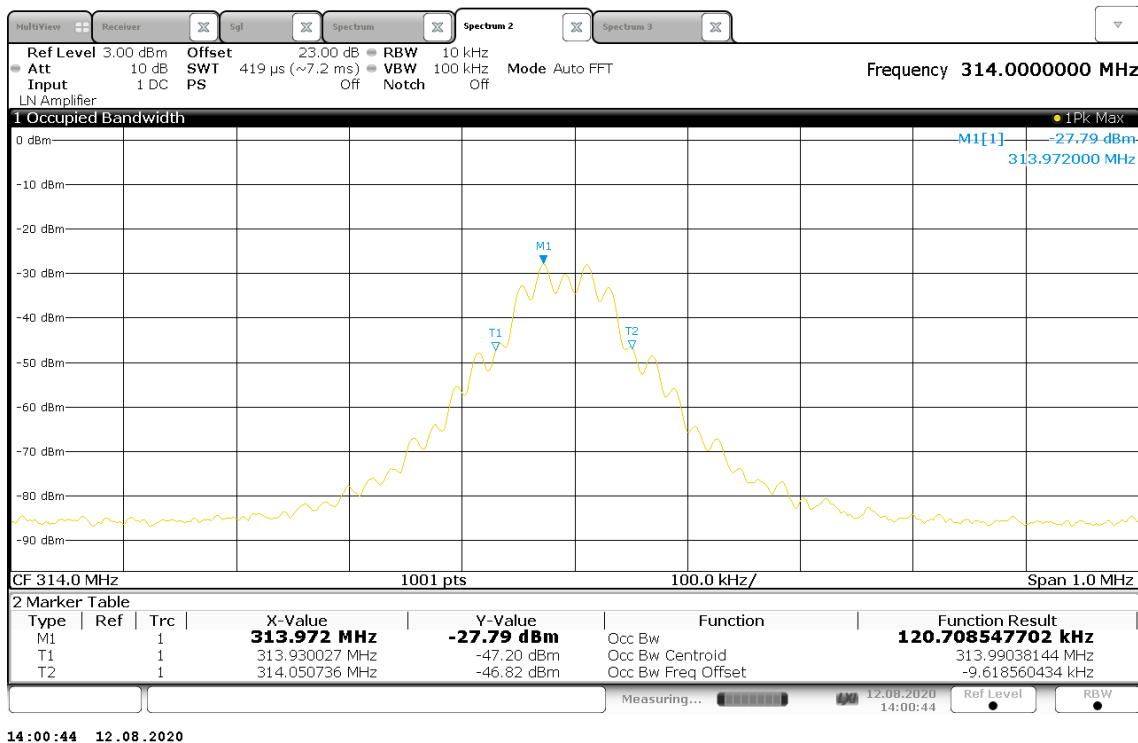
Prüfergebnis / Test Result	
☒	Erfüllt / Passed
☐	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	976 hPa
Relative Luftfeuchtigkeit / Relative humidity:	44 %
Temperatur / Ambient temperature:	24 °C

Prüfgrundlage / Specifications:	ARIB STD-T93 Section 3.2 (10)
Nominelle Sendeleistung / Rated carrier power:	-16.00 dBm
Betriebsart / Operation mode:	See chapter 4
Kommentar / Comment:	---



13:52:58 12.08.2020



Grenzwert / Limit

In the case of modulation by a standard coding test signal: 1 MHz.

Ergebnis / Test result

Tested OBW is 120.3 kHz and 120.7 kHz

7.5 Permissible Values of Unwanted Emission Intensity

7.5.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐	Spectrum analyzer	FSP30	1666	100036	Rohde & Schwarz
☒	EMI test receiver	ESW44	39897	101814	Rohde & Schwarz
☐	EMI test receiver Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐	EMI test receiver	ESU8	2044	100232	Rohde & Schwarz
☐	EMI test receiver	ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐	Preamplifier Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐	Preamplifier	R14601	1142	13120026	Advantest
☐	Trilog antenna Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐	Trilog antenna Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐	Trilog antenna Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒	ULTRALOG Antenna	HL562E	39969	101062	Rohde & Schwarz
☐	Fully anechoic room	No. 2	1452	---	Albatross
☐	Semi anechoic room	No. 3	1453	---	Siemens
☐	Semi anechoic room	No. 8	2057	---	Albatross
☒	Semi anechoic room	No.11	42961	---	Frankonia

7.5.2 Test Results

Results for permissible value of the unwanted emission intensity test are documented as listed below.

Permissible Values of Unwanted Emission Intensity

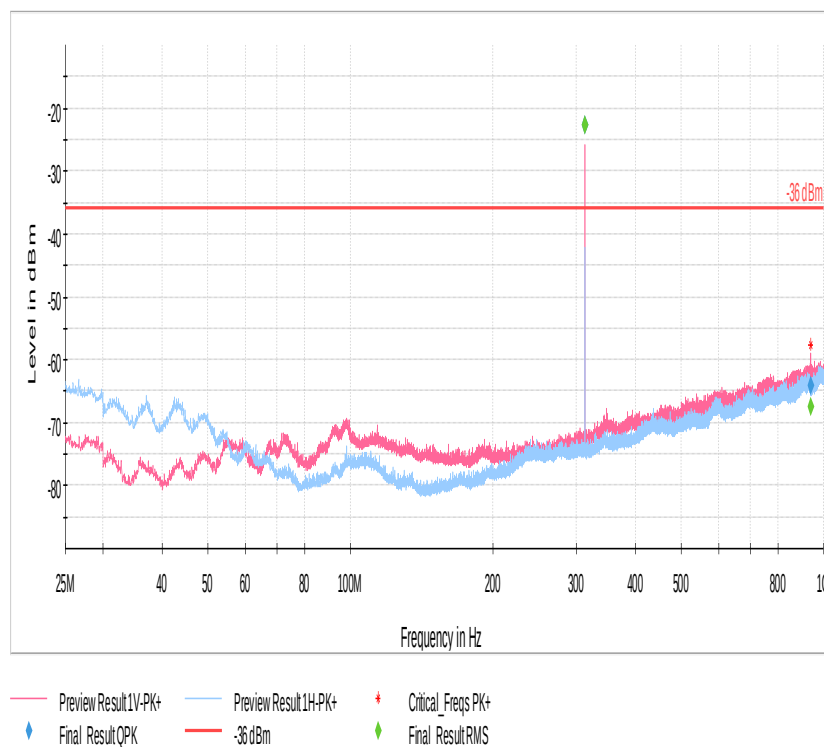
Prüfdatum / Date of test:	2020-08-13
Prüfer / Operator:	Alex Fink
Messplatz / Test site:	Semi anechoic room, cabin no. 11

Prüfergebnis / Test Result	
☒	Erfüllt / Passed
☐	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	976 hPa
Relative Luftfeuchtigkeit / Relative humidity:	44 %
Temperatur / Ambient temperature:	24 °C

Prüfgrundlage / Specifications:	ARIB STD-T93 Section 3.2 (11)
Nominelle Sendeleistung / Rated carrier power:	-16.00 dBm
Betriebsart / Operation mode:	See chapter 4
Kommentar / Comment:	---

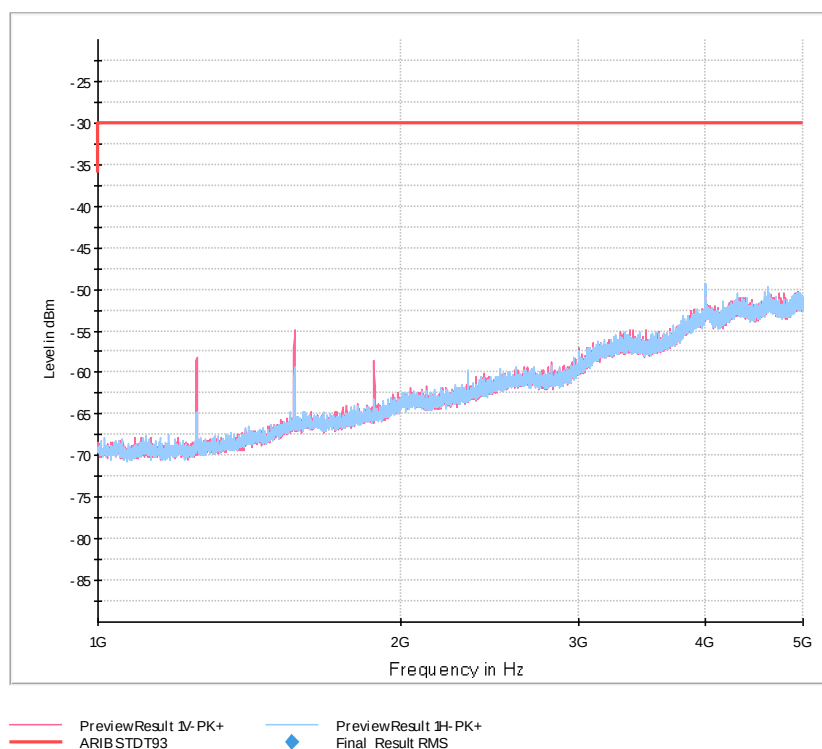
Transmitting on 315 MHz, Channel 1



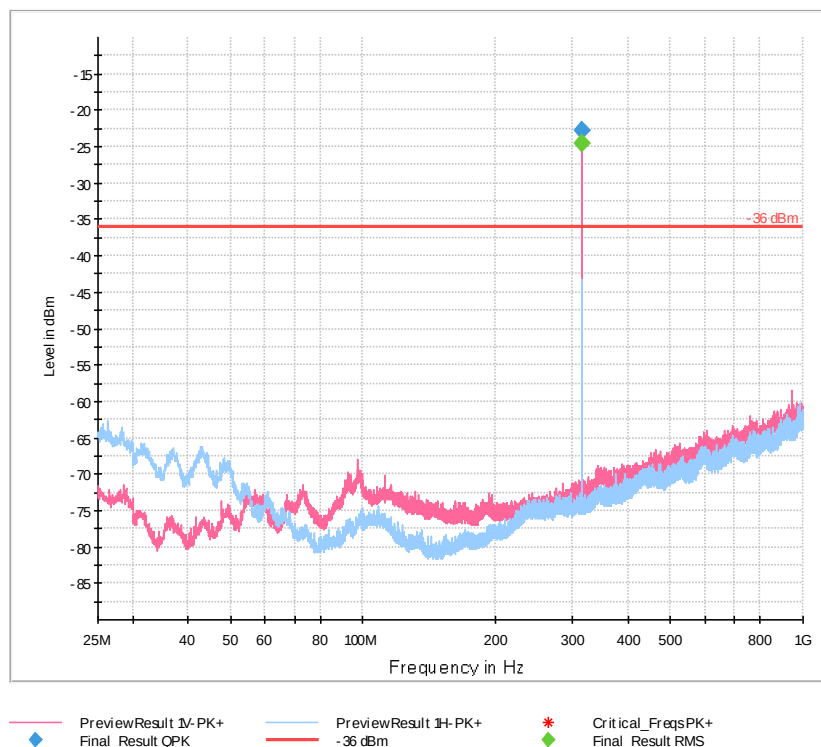
Final Results:

Frequency MHz	QuasiPeak dBm	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
313.150000	-22.79	---	#1	#1	1000.0	120.000	104.0	V	-31.0	-83.9
313.150000	---	-22.79	#1	#1	1000.0	120.000	104.0	V	-31.0	-83.9
939.460000	---	-67.41	36.00	31.41	1000.0	120.000	149.0	V	88.0	-75.1
939.460000	-64.01	---	36.00	28.01	1000.0	120.000	149.0	V	88.0	-75.1

Note : #1 : intentional radiation



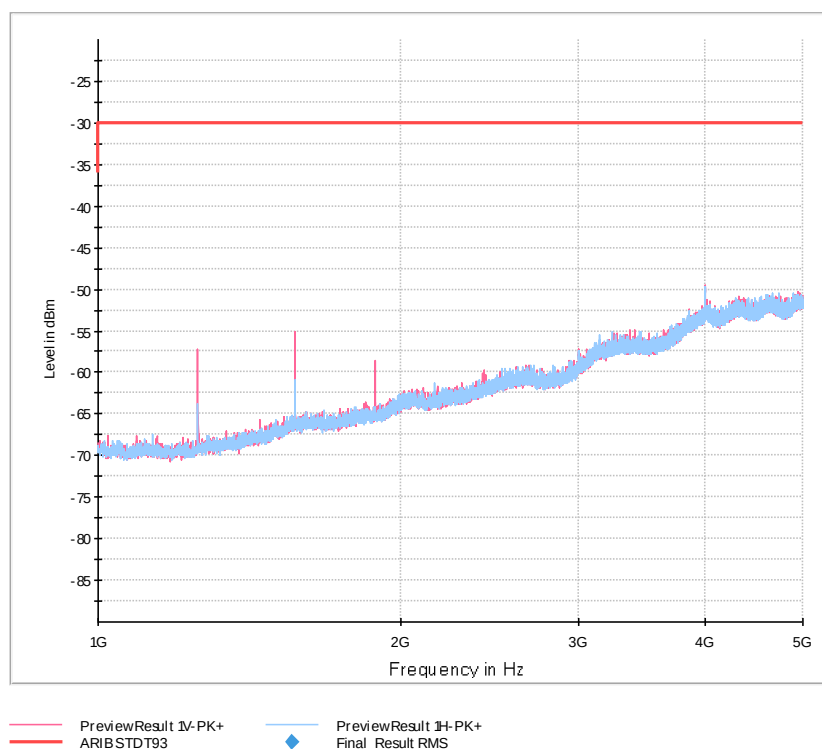
Transmitting on 315 MHz, Channel 2



Final Results:

Frequency MHz	QuasiPeak dBm	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
313.960000	---	-24.63	#1	#1	1000.0	120.000	104.0	V	-32.0	-83.9
313.960000	-22.71	---	#1	#1	1000.0	120.000	104.0	V	-32.0	-83.9

Note : #1 : intentional radiation



7.6 Limit of Secondary Radiated Emissions

7.6.1 Test Equipment List

Type		Designation	Inv.-no.	Serial No. or ID	Manufacturer
☐ Spectrum analyzer		FSP30	1666	100036	Rohde & Schwarz
☒ EMI test receiver		ESW44	39897	101814	Rohde & Schwarz
☐ EMI test receiver	Cabin no. 3	ESPI7	2010	101018	Rohde & Schwarz
☐ EMI test receiver		ESU8	2044	100232	Rohde & Schwarz
☐ EMI test receiver		ESMI	1569	839379/013 839587/006	Rohde & Schwarz
☐ Preamplifier	Cabin no. 2	CPA9231A	1716	3557	Schaffner
☐ Preamplifier		R14601	1142	13120026	Advantest
☐ Trilog antenna	Cabin no. 2	VULB 9163	2058	9163-408	Schwarzbeck
☐ Trilog antenna	Cabin no. 8	VULB 9163	1802	9163-214	Schwarzbeck
☐ Trilog antenna	Cabin no. 2	VULB 9162	2256	9162-048	Schwarzbeck
☒ ULTRALOG Antenna		HL562E	39969	101062	Rohde & Schwarz
☐ Fully anechoic room		No. 2	1452	---	Albatross
☐ Semi anechoic room		No. 3	1453	---	Siemens
☐ Semi anechoic room		No. 8	2057	---	Albatross
☒ Semi anechoic room		No.11	42961	---	Frankonia

7.6.2 Test Results

Results for Limit of Secondary Radiated Emissions test are documented as listed below.

Limit of Secondary Radiated Emissions

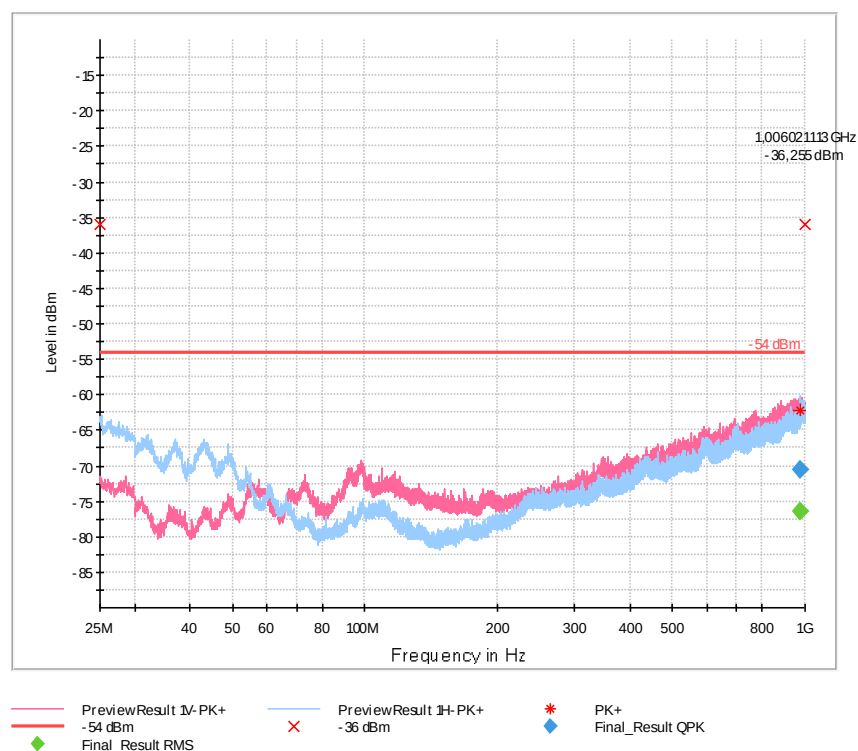
Prüfdatum / Date of test:	2020-08-13
Prüfer / Operator:	Alex Fink
Messplatz / Test site:	Semi anechoic room, cabin no. 11

Prüfergebnis / Test Result	
☒	Erfüllt / Passed
☐	Nicht erfüllt / Not passed

Luftdruck / Barometric pressure:	976 hPa
Relative Luftfeuchtigkeit / Relative humidity:	44 %
Temperatur / Ambient temperature:	24 °C

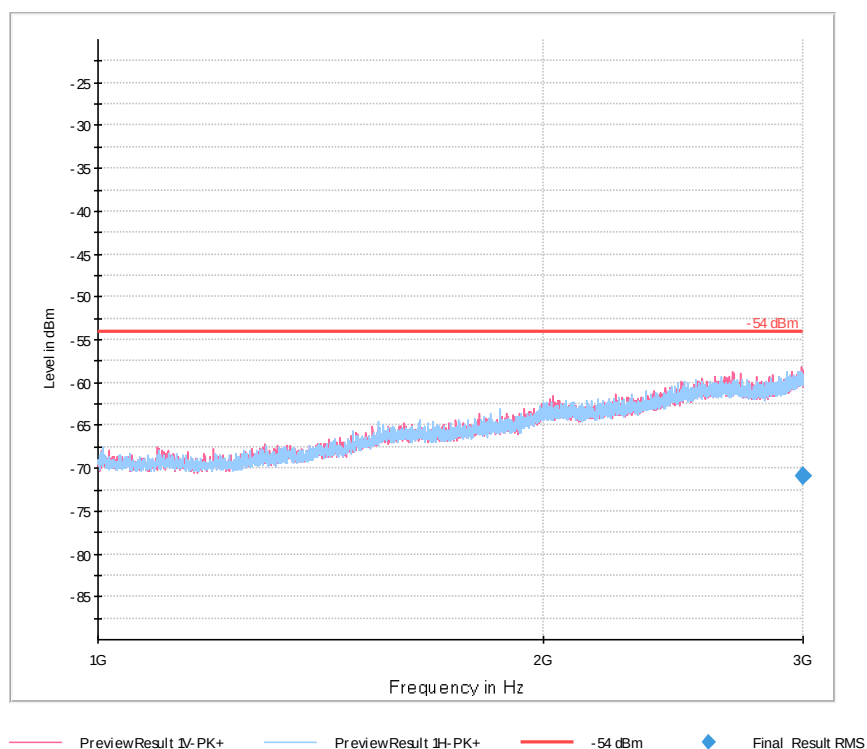
Prüfgrundlage / Specifications:	ARIB STD-T93 Section 3.3 (1)
Nominelle Sendeleistung / Rated carrier power:	-16.00 dBm
Betriebsart / Operation mode:	See chapter 4
Kommentar / Comment:	---

Receiving on 315 MHz, Channel 1



Final Results:

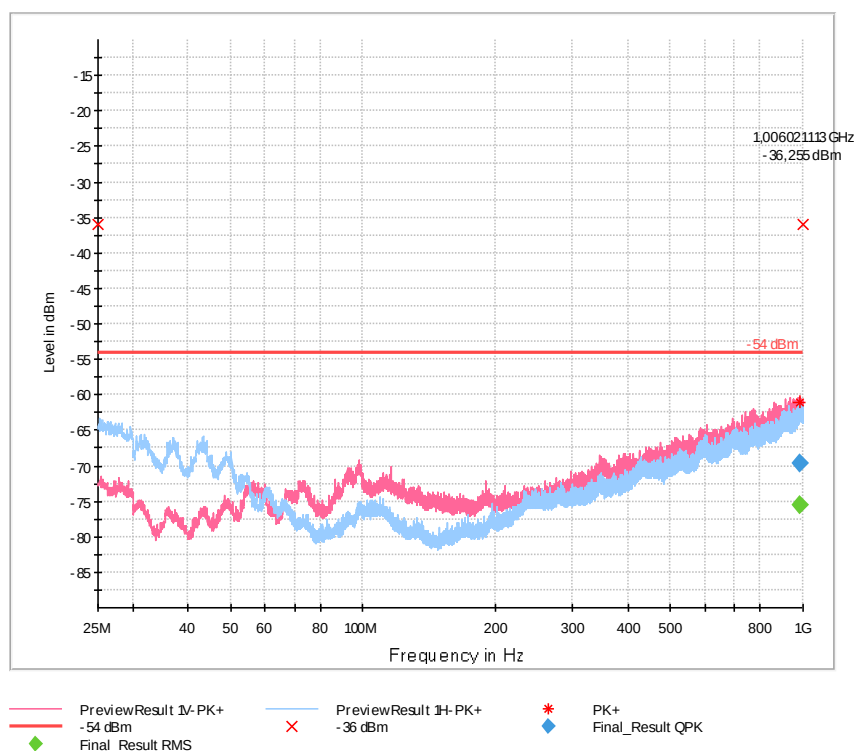
Frequency MHz	QuasiPeak dBm	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
974.890000	---	-76.38	-54.00	22.38	1000.0	120.000	163.0	H	-80.0	-75.7
974.890000	-70.58	---	-54.00	16.58	1000.0	120.000	163.0	H	-80.0	-75.7



Final Results:

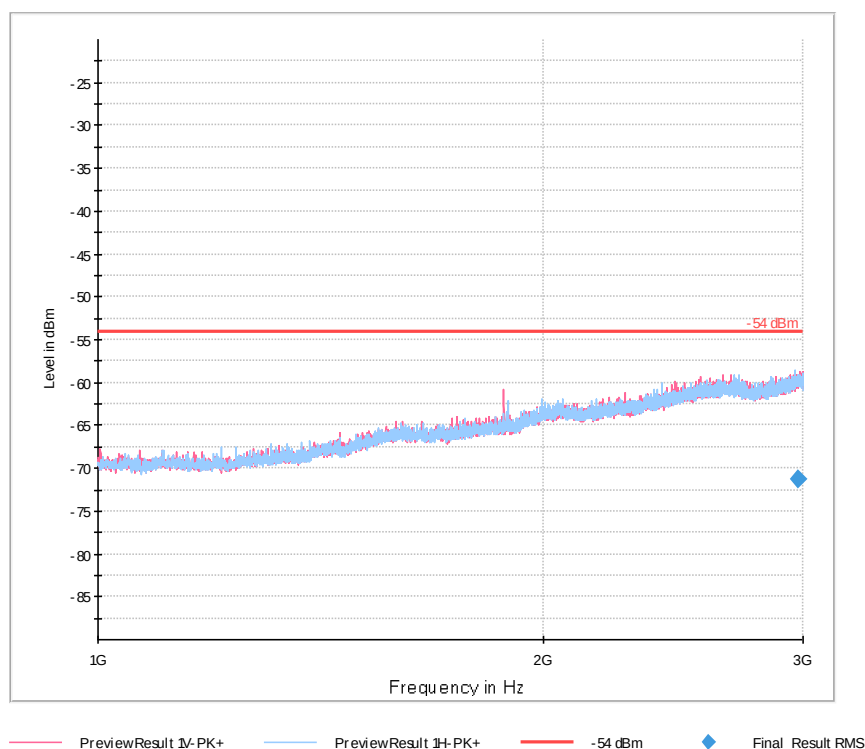
Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
2999.789000	-70.85	-54.00	16.85	1000.0	1000.000	170.0	V	-35.0	-70.0

Transmitting on 315 MHz, Channel 2



Final Results:

Frequency MHz	QuasiPeak dBm	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
982.900000	--	-75.45	-54.00	21.45	1000.0	120.000	160.0	V	-99.0	-74.9
982.900000	-69.69	---	-54.00	15.69	1000.0	120.000	160.0	V	-99.0	-74.9



Final Results:

Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
2974.689000	-71.26	-54.00	17.26	1000.0	1000.000	136.0	H	135.0	-70.3

8 Calibration Data

Type	Inv.- No.	Type Designation	Serial Number	Manufacturer	Calibration Organization	Last Calibration	Next Calibration
EMI test receiver	39897	ESW44	101814	Rohde & Schwarz	Rohde & Schwarz	03/2020	03/2021
ULTRALOG Antenna	39969	HL562E	101062	Rohde & Schwarz	Rohde & Schwarz	02/2019	11/2022
Double ridged horn antenna	40089	HF907	102777	Rohde & Schwarz	Rohde & Schwarz	02/2019	02/2021

9 Revision History

Revision History			
<i>Edition</i>	<i>Date</i>	<i>Issued by</i>	<i>Modifications</i>
1	2020-12-04	Alex Fink	First Edition