

EMI – TEST REPORT

- FCC Part 15.249, RSS210 -

Type / Model Name : 995364

Product Description : remote transceiver for car access

Applicant : Continental Automotive GmbH

Address : Siemensstr. 12

93055 Regensburg

GERMANY

Manufacturer : Continental Guadalajara México, S.A. de C.V.

Address : Camino a la Tijera No.3

45640 Tlajomulco de Zúñiga, Jalisco

MEXICO

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : T37598-02-01JP

11. July 2016

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results
without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (October, 2015)

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2013)

Part 15, Subpart C, Section 15.209

Radiated emission limits, general requirements

Part 15, Subpart C, Section 15.215

20dB bandwidth

Part 15, Subpart C, Section 15.249

Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz

RSS-Gen Issue 4, November 2014

General Requirements and Information for the Certification of Radio Apparatus

RSS-Gen Sub clause 4.6.1

Occupied Bandwidth

RSS-Gen Sub clause 7.2.5

Spurious Emissions Limits

RSS-210 Issue 8, December 2010

Licence-exempt Radio Apparatus (All Frequency Bands):

Category I Equipment

RSS-210 Sub clause A2.9

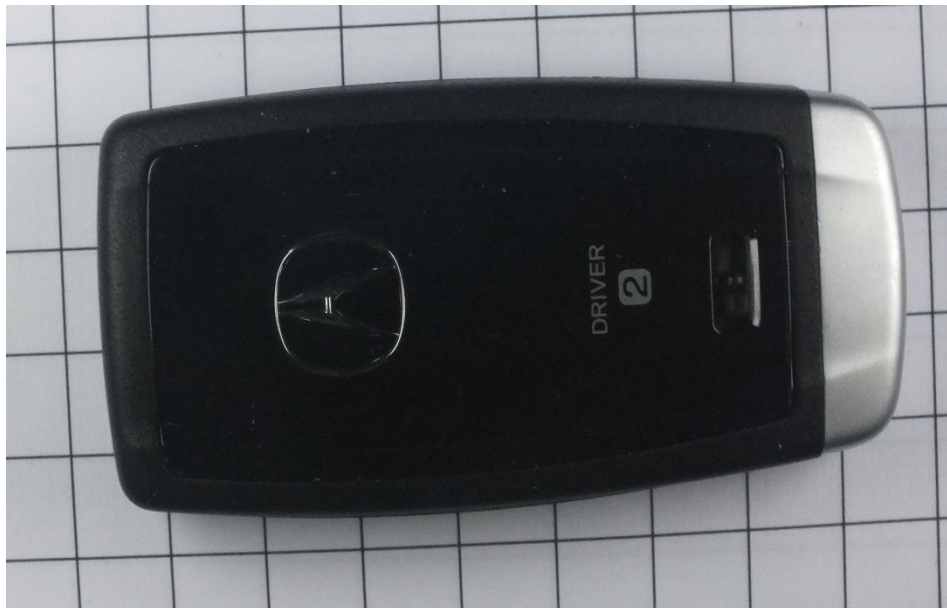
Bands 902-928, 2400-2483.5 and 5725-5875 MHz

ANSI C63.10: 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT





2.2 Short description of the equipment under test (EUT)

The EuT is a bidirectional RF key designed to provide remote engine start with feedback, remote keyless entry, passive entry, passive engine start, and immobilization functionality.

The EuT incorporates long range channels (LR CH01 and LR CH02), tested according to FCC Part 15.247 and RSS-247, refer to separate report. The short range channels (SR CH01 and SR CH02) as well as PASE function are tested according to FCC Part 15.249 and RSS-210, part of this report.

Number of tested samples: 1
Serial number: none

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

2.3 Variants of the EUT

none

2.4 Operation frequency and channel plan

Operating frequency band is 902 MHz to 928 MHz

Channel	Frequency	modulation	Regulation applied
TX-LR-CH1*	923.99955 MHz	DSSS (spreading 15x)	FCC Part 15.247 & RSS-247
		DSSS (spreading 31x)	
TX-LR-CH2*	924.00045 MHz	DSSS (spreading 15x)	FCC Part 15.247 & RSS-247
		DSSS (spreading 31x)	
RX-LR-DSSS*	926.0000 MHz	DSSS	FCC Part 15.247 & RSS-247
TX-SR-CH1	924.6000 MHz	FSK	FCC Part 15.249 & RSS-210
TX-SR-CH2	923.6250 MHz	FSK	FCC Part 15.249 & RSS-210
RX-SR-CH1	926.2250 MHz	FSK	FCC Part 15.249 & RSS-210
RX-SR-CH2	925.4000 MHz	FSK	FCC Part 15.249 & RSS-210
PASE	924.6000 MHz	FSK	FCC Part 15.249 & RSS-210

* not covered by this test report. Refer to separate test report

2.5 Antenna

EuT uses integrated antenna without access of the end user.

2.6 Power supply system utilised

Power supply voltage : 3.0 V / DC (Lithium battery CR2032)

2.7 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- none Model : none

2.8 Determination of worst case conditions for final measurement

Measurements have been performed in all three orthogonal axes. The test report shows the worst case values.

3 TEST RESULT SUMMERY

FCC Rule Part	RSS Rule Part	Description	Result
15.207	RSS Gen, 8.8	AC power line conducted emissions	not applicable ¹
15.215	-	20dB Bandwidth	passed
-	RSS-Gen, 6.6	99% Bandwidth	passed
15.249	RSS-210, A2.9	Field strength of fundamental	passed
15.209	RSS-Gen, 8.9	Out-of-band emission, radiated	passed
15.249	RSS210, A2.9		
-	RSS-Gen, 6.11	Transmitter frequency stability	not applicable ²

¹The EuT is battery supplied and has no AC port

²the EuT operates outside the specified frequency bands (see RSS-Gen 8.11)

3.1 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 21 June 2016

Testing concluded on : 05 July 2016

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Jürgen Pessinger

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	$\pm 3.29 \text{ dB}$
20 dB Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
99% Occupied Bandwidth	Center frequency of EuT	95%	$\pm 2.5 \times 10^{-7}$
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	$\pm 3.53 \text{ dB}$
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	$\pm 3.71 \text{ dB}$
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	$\pm 2.34 \text{ dB}$
Peak conducted output power	902 MHz to 928 MHz	95%	$\pm 0.35 \text{ dB}$
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	$\pm 2.15 \text{ dB}$

4.4 Measurement protocol for FCC and ISED

4.4.1 General information

4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

The Open Area test sites are listed Open Sites under the Canadian Test-Sites File-No:

IC 3009A-1 (OATS1) and IC 3009A-3 (OATS3)

The anechoic chamber site is listed chamber under the Canadian Test-Sites File-No:

IC 3009A-2

In compliance with RSS 210 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 Details of test procedures

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 Field strength of fundamental

For test instruments and accessories used see section 6 Part CPR 2.

5.1.1 Description of the test location

Test location: OATS3
Test distance: 3 m

5.1.2 Photo documentation of the test set-up



5.1.1 Applicable standard

According to FCC Part 15C, Section 15.249 and to RSS-210, A2.9

5.1.2 Description of Measurement

The set up of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 6.5.

The resolution bandwidth during the measurement is as follows:
30 MHz – 1000 MHz: ResBW: 120 kHz

5.1.3 Test result

Mode	Frequency (MHz)	Reading level QP (dB μ V)	Correction factor (dB)	Corrected level QP dB(μ V/m)	Limit QP dB(μ V/m)	Delta (dB)
TX-SR-CH1	924.6000	40.9	29.0	69.9	94.0	-24.1
TX-SR-CH2	923.6250	40.7	29.0	69.7	94.0	-24.3
PASE	924.6000	58.5	29.0	87.5	94.0	-6.5

Note: The correction factor includes cable loss and antenna factor.

Limit according to FCC Part 15C, Section 15.249(a) and RSS-210, A2.9:

Frequency (MHz)	Field strength of fundamental	
	(mV/m)	dB(μ V/m)
902 - 928	50	94

The requirements are **FULFILLED**.

Remarks: none

5.2 Out-of-band emission, radiated

For test instruments and accessories used see section 6 Part **SER1**, **SER 2**, **SER 3**.

5.2.1 Description of the test location

Test location: OATS3
Test location: OATS1
Test location: Anechoic chamber 1

Test distance: 3 m

5.2.2 Photo documentation of the test set-up

Test setup 9 kHz – 30 MHz (OATS1):



Test setup 30 MHz – 1000 MHz (OATS3):



Test setup 1 GHz – 18 GHz (Anechoic chamber 1):



5.2.3 Applicable standard

According to FCC Part 15C, Section 15.209 & 15.249 and RSS-Gen, 8.9 & RSS-210 A2.9.

5.2.4 Description of Measurement

The set up of the EUT and the measurement procedure is in accordance to ANSI C63.10, item 6.4, 6.5 and 6.6.

Instrument settings:

9 kHz – 150 kHz	RBW:	200 Hz
150 kHz - 30 MHz	RBW:	9 kHz
30 MHz – 1000 MHz:	RBW:	120 kHz
1 GHz – 10 GHz	RBW:	1 MHz

5.2.1 Test result $f < 30$ MHz

Note: In the frequency range 9 kHz to 30 MHz no emission above noise level could be detected. The listed level are noise level. The measurement results from distance 3 m are extrapolated (D factor) to the specified distance.

Frequency (MHz)	Reading level PK (dB μ V) @ 3m	D-factor (dB)	Extrapolated level PK (dB μ V) @ specified distance	Correction factor (dB/m)	Corrected level PK dB(μ V/m)	Limit QP/AV dB(μ V/m)	Margin (dB)
0.047	31.6	-80	-48.4	20.4	-28.0	34.2	-62.2
1.5	30.5	-40	-9.5	20.5	11.0	24.1	-13.1
18.2	18.5	-40	-21.5	20.5	-1.0	29.5	-30.5

5.2.2 Test result 30 MHz < f < 1 GHz

Note: In the frequency range 30 MHz to 1000 MHz no emission above noise level could be detected. The listed level are noise level.

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
50,00	4,8	4,3	15,2	14,2	20,0	18,5	40,0	-20,0
150,00	6,0	5,9	13,9	14,8	19,9	20,7	43,5	-22,8
250,00	5,5	5,8	13,8	14,0	19,3	19,8	46,0	-26,2
500,00	6,5	6,7	22,5	22,3	29,0	29,0	46,0	-17,0
750,00	7,6	7,7	28,3	27,7	35,9	35,4	46,0	-10,1
1000,00	8,2	8,3	32,4	31,9	40,6	40,2	54,0	-13,4

5.2.3 Test result f > 1 GHz

Note: Tables below show PK-values vs AV-limit. All PK-values are below AV-limit therefore no duty cycle correction was applied.

TX-SR-CH1

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
1849,20	62,5	55,4	-16,8	-16,8	45,7	38,5	54,0	-8,3
2773,80	52,3	53,4	-13,3	-13,3	39,0	40,1	54,0	-13,9
3698,40	53,3	52,7	-12,5	-12,5	40,8	40,1	54,0	-13,2
4623,00	39,4	39,3	2,2	2,2	41,6	41,6	54,0	-12,4
5547,60	36,7	39,2	4,5	4,5	41,2	43,7	54,0	-10,3
6472,20	36,6	39,1	6,4	6,4	43,0	45,4	54,0	-8,6

TX-SR-CH2

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
1847,25	58,2	56,2	-16,9	-16,9	41,4	39,3	54,0	-12,6
2770,88	53,5	52,1	-13,3	-13,3	40,2	38,8	54,0	-13,8
3694,50	51,6	53,9	-12,6	-12,6	39,0	41,4	54,0	-12,6
4618,13	36,9	39,1	2,2	2,2	39,1	41,4	54,0	-12,6
5541,75	38,8	39,6	4,5	4,5	43,3	44,1	54,0	-9,9
6465,38	37,4	36,4	6,4	6,4	43,8	42,8	54,0	-10,2

RX-SR-CH1

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
1852,45	60,6	52,6	-16,8	-16,8	43,8	35,9	54,0	-10,2
3704,90	60,6	51,4	-12,5	-12,5	48,1	38,9	54,0	-5,9

RX-SR-CH2

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
1850,80	60,0	52,8	-16,8	-16,8	43,2	36,0	54,0	-10,8
3701,60	52,7	51,3	-12,5	-12,5	40,2	38,8	54,0	-13,8

PASE

Frequency (MHz)	Reading PK Vert. (dBµV)	Reading PK Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level QP Vert. (dBµV/m)	Level QP Hor. (dBµV/m)	Limit AV (dBµV/m)	Dlimit (dB)
1846,00	54,3	57,8	-16,9	-16,9	37,4	40,9	54,0	-13,1
2776,00	53,0	56,6	-13,3	-13,3	39,6	43,3	54,0	-10,7
7552,00	38,5	38,0	6,7	6,7	45,2	44,7	54,0	-8,8
8320,00	38,8	40,5	7,2	7,2	46,0	47,7	54,0	-6,3
9248,00	37,0	44,4	7,6	7,6	44,5	52,0	54,0	-2,0

Limit according to FCC Part 15C, Section 15.209 and RSS-Gen 8.9:

Frequency (MHz)	15.209 Limits ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - -0.49	$2400/f(\text{kHz})$	300
0.49 – 1.705	$24000/f(\text{kHz})$	30
1.705 – 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Limit according to FCC Part 15C, Section 15.249(a) and RSS-210 A2.9:

Fundamental frequency (MHz)	Field strength of harmonics	
	($\mu\text{V/m}$)	$\text{dB}(\mu\text{V/m})$
902 - 928	500	54

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic (10000 MHz).

 In the frequency ranges were the AV limit is kept by PK values, no duty cycle correction

 was applied. The general limit according to FCC Part 15.209 and RSS-Gen 8.9 is kept.

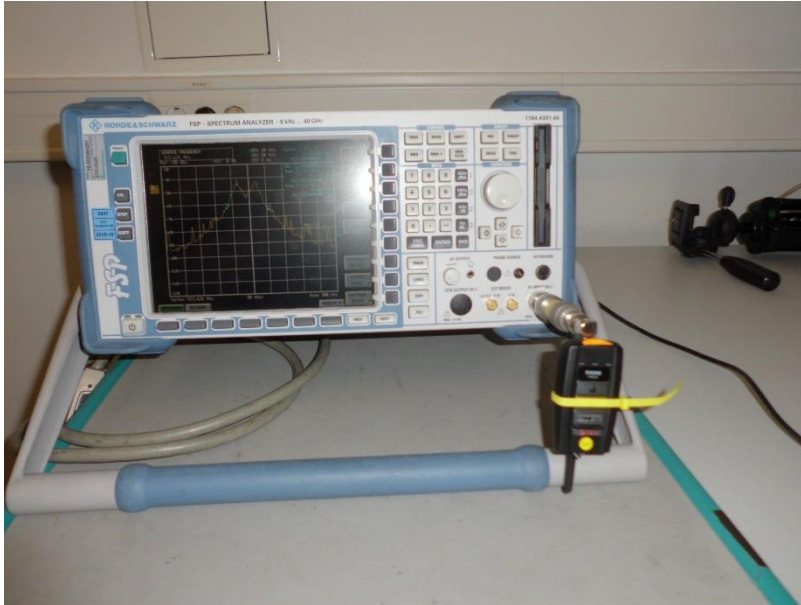
5.3 Band edge compliance

For test instruments and accessories used see section 6 Part MB.

5.3.1 Description of the test location

Test location: AREA4

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

According to FCC Part 15C, Section 15.209 & 15.249 and RSS-Gen, 8.9 & RSS-210 A2.9.

5.3.4 Description of Measurement

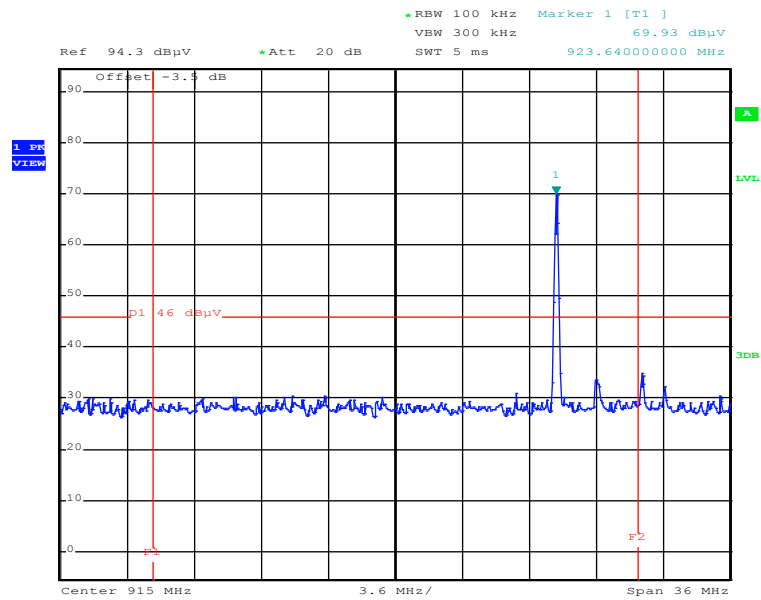
The set up of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 6.5.

The resolution bandwidth during the measurement is as follows:

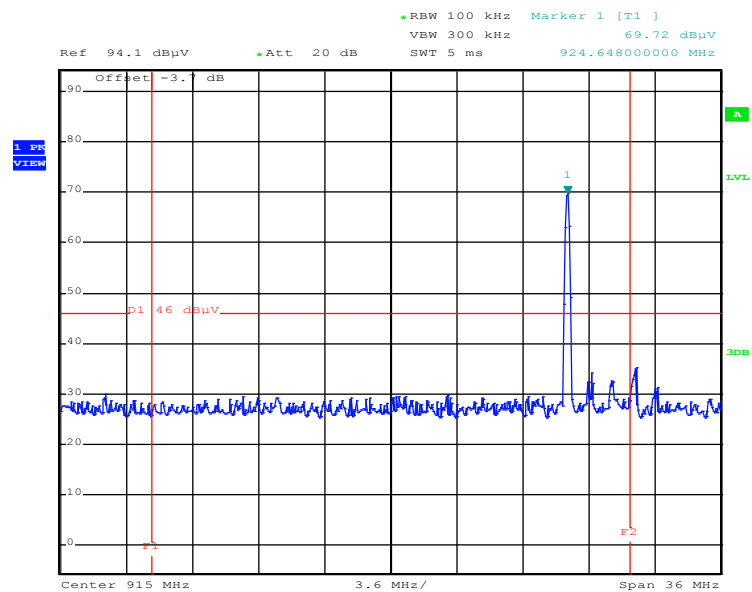
RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace: Max hold, Sweep: auto

5.3.5 Test result

TX-SR-CH1



TX-SR-CH2



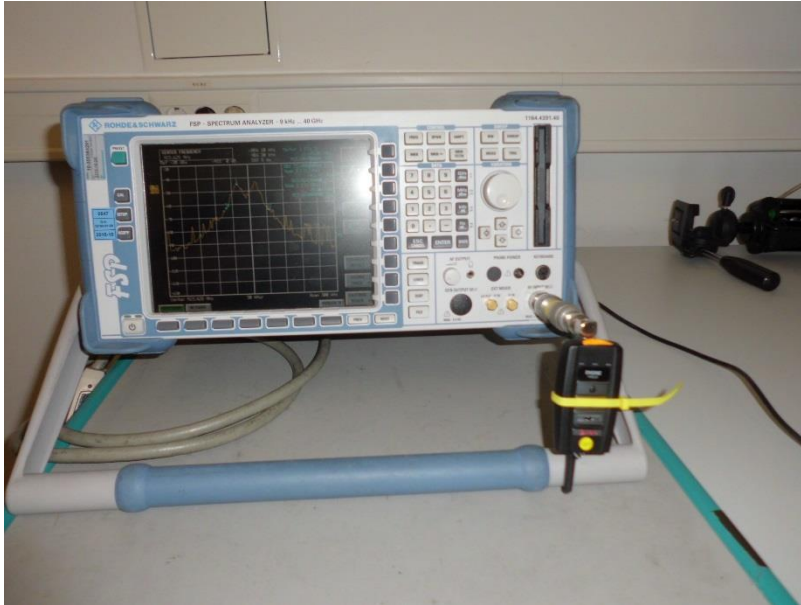
5.4 20dB bandwidth and 99% bandwidth

For test instruments and accessories used see section 6 Part MB.

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up



5.4.3 Applicable standard

According to FCC Part 15, Section 15.215 and RSS-Gen, 6.6

5.4.4 Description of Measurement

The measurement procedure is in accordance to ANSI C63.10, Item 6.9 and RSS-Gen 6.6.

5.4.5 Test result

Mode	20dB Bandwidth (kHz)	99% Bandwidth FMCW (kHz)
TX-SR-CH1	80.0	77.6
TX-SR-CH2	80.4	77.6
PASE	53.6	72.8

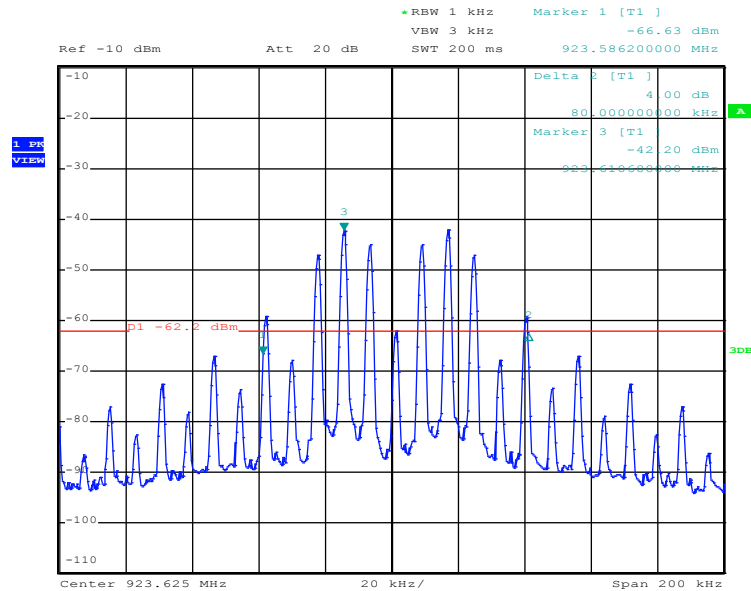
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocols.

5.4.6 Test protocols

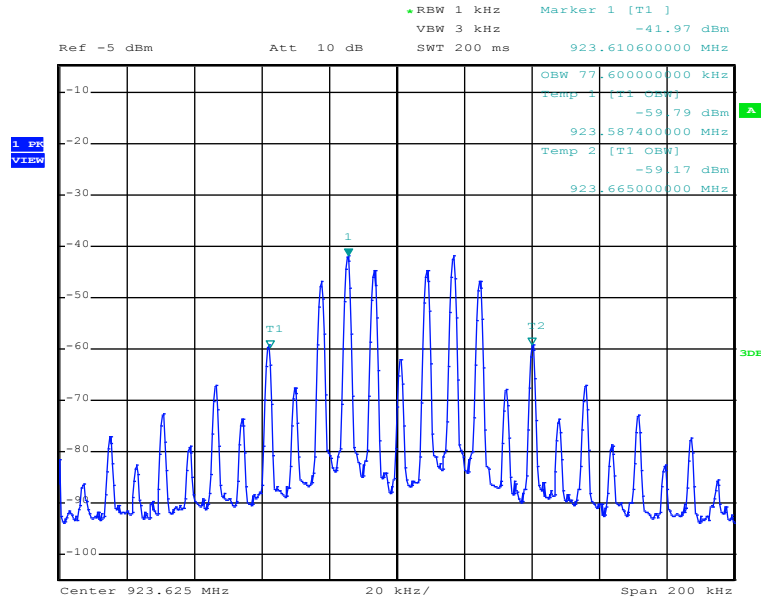
TX-SR-CH1

20 dB bandwidth



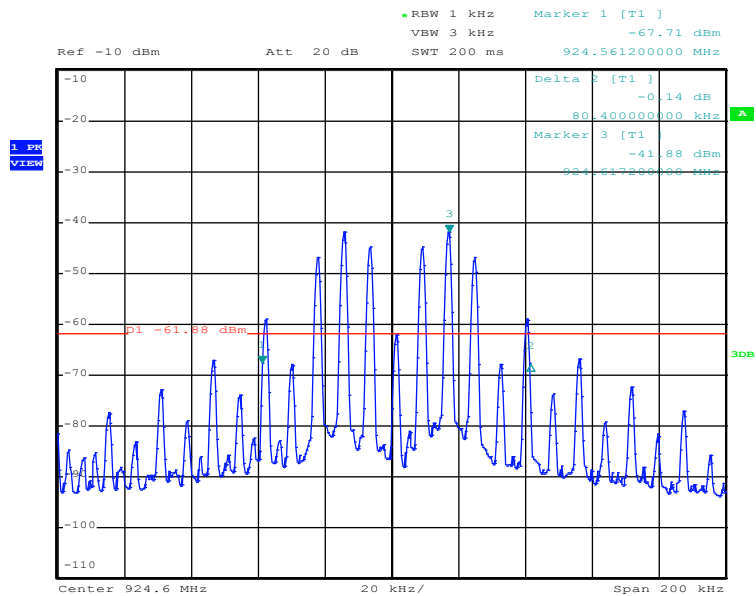
TX-SR-CH1

99% bandwidth



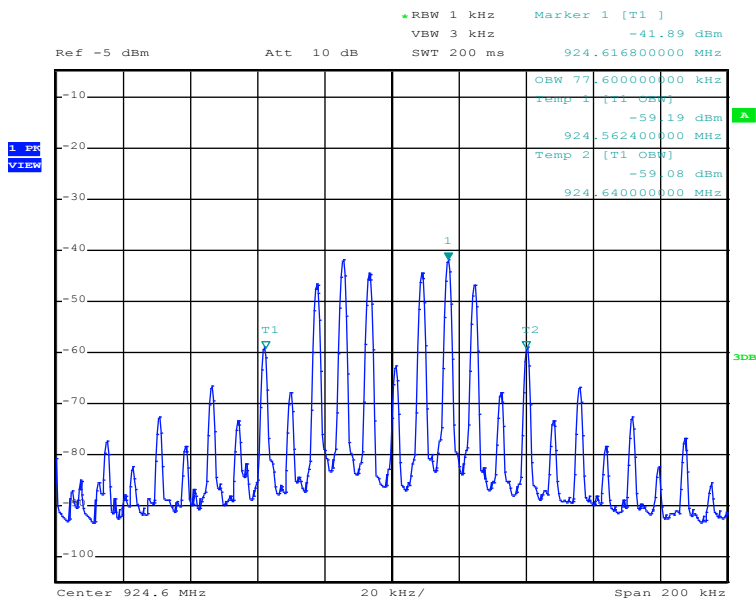
TX-SR-CH2

20 dB bandwidth



TX-SR-CH2

99% bandwidth



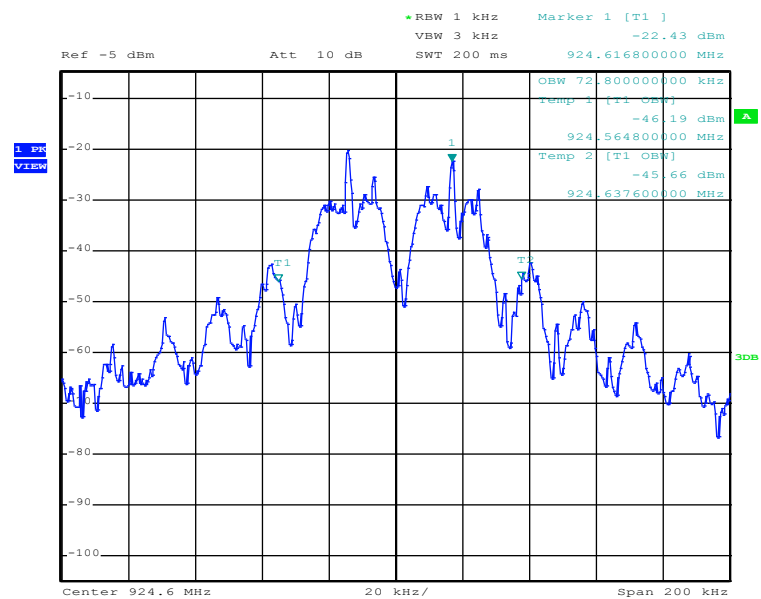
PASE

20 dB bandwidth



PASE

99% bandwidth



6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.	
CPR 2	VULB 9163	01-02/24-01-006	17/11/2017	17/11/2014	13/07/2016	13/01/2016	
	N-40000-N	01-02/50-05-043					
	N-30000-N	01-02/50-05-044	04/07/2017	04/07/2016			
	ESVS 30	02-02/03-05-006					
MB	FSP 40	02-02/11-11-001	28/10/2016	28/10/2015			
	RF Antenna	02-02/24-05-032					
SER 1	FMZB 1516	01-02/24-01-018	17/09/2016	17/09/2015	21/01/2017	21/01/2016	
	ESCI	02-02/03-05-004					
	NW-2000-NB	02-02/50-05-113					
	KK-EF393/U-16N-21N20 m	02-02/50-12-018					
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028					
SER 2	VULB 9163	01-02/24-01-006	17/11/2017	17/11/2014	13/07/2016	13/01/2016	
	N-40000-N	01-02/50-05-043					
	N-30000-N	01-02/50-05-044	04/07/2017	04/07/2016			
	ESVS 30	02-02/03-05-006					
SER 3	FSP 30	02-02/11-05-001	01/10/2016	01/10/2015			
	AFS5-12001800-18-10P-6	02-02/17-06-002					
	AFS4-01000400-10-10P-4	02-02/17-13-002					
	AMF-4F-04001200-15-10P	02-02/17-13-003					
	3117	02-02/24-05-009	24/05/2017	24/05/2016			
	Sucoflex N-2000-SMA	02-02/50-05-075					
	SF104/11N/11N/1500MM	02-02/50-13-015					