



RF - TEST REPORT

- FCC 15.231 -

Type / Model Name : BCM37WBL

Product Description : Body Control Module

Applicant : Continental Automotive GmbH

Address : Siemensstrasse 12

93055 REGENSBURG, GERMANY

Manufacturer : Continental Automotive GmbH

Address : Siemensstrasse 12

93055 REGENSBURG, GERMANY

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

POSITIVE

Test Report No. : 80211112-00 Rev_2

17. July 2024

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

FCC ID: KR5BCM37WBL

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ATTACHMENT A to ATTACHMENT C as separate supplement

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (April 2024)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (April 2024)

Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz

ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
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ETSI TR 100 028 V1.3.1: 2001-03	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2
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2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.3 Photo documentation of the EUT

Detailed photos see ATTACHMENT A and ATTACHMENT B

Attachment A: External views

Attachment B: Internal views

Attachment C: Test setup

2.4 Short description of the equipment under test (EUT)

The VW BCM37WBL BCM is a Body Control Module with integrated UHF transceiver which handles KESSY (Keyless Entry Start SYstem), Service Key and FZV (central door locking) wireless functions. The VW BCM37WBL integrated TRX is the wireless gateway between vehicle keys (handheld TRX) and BCM. The BCM is only transmitting in KESSY and Service key mode. FZV is a receiving only function. The KESSY and Service key modes have different power settings.

Number of tested samples:	2
Serial number:	SME-RBG12.04.2400420498 (Kessy) SME-RBG12.04.2400420499 (Service Key)
Firmware version:	H26
Hardware version:	0322(VW VR18 PV4)

2.5 Variants of the EUT

There are no variants.

Only one test sample with the power settings for "KESSY" and another for "Service key" was provided by the manufacturer, otherwise both versions are 100% identical!

2.6 Operation frequency and modulation characteristics

Center frequency:	433.92 MHz and 434.36 MHz
Frequency deviation:	center frequency +/- 20 kHz
Modulation:	2FSK
Data rate:	19.2 kbps

2.7 Antenna

The antenna is a PCB monopole antenna with a gain of -1.1 dBi.

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2.8 Transmit operating modes

- Continuous unmodulated TX mode at 433.90 MHz and 434.34 MHz (-20 kHz frequency deviation)
- Continuous modulated TX mode at 433.92 MHz and 434.36 MHz
- Normal / periodic transmission at 433.92 MHz and 434.36 MHz

2.9 Power supply system utilised

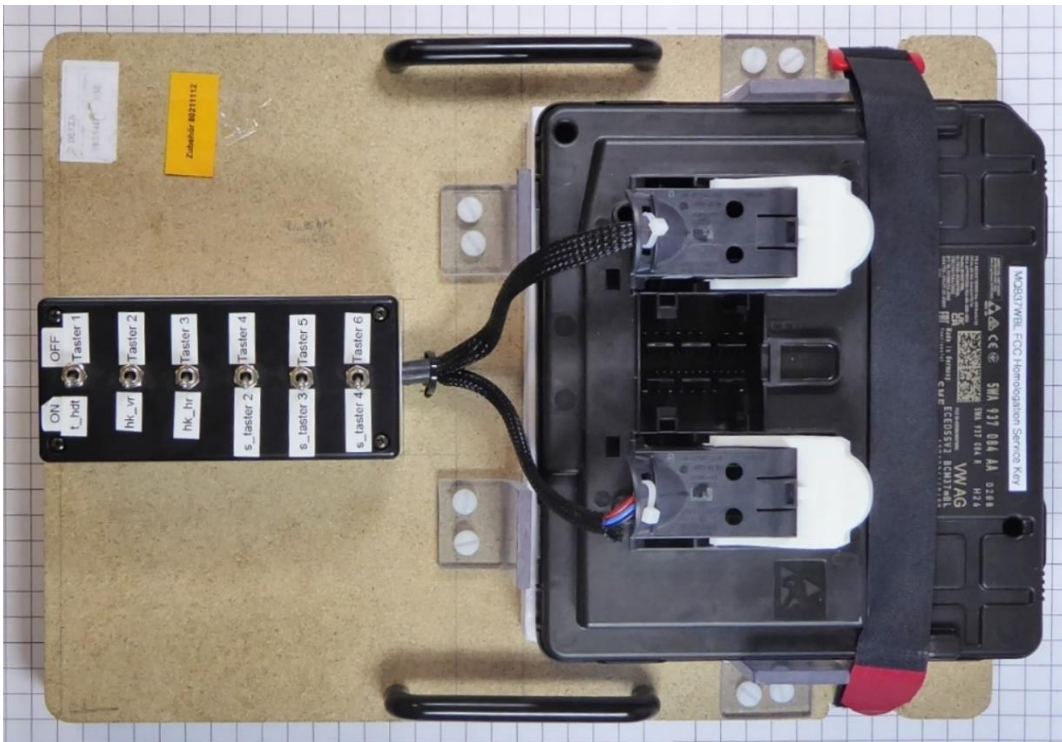
Power supply voltage, V_{nom} : 12 V DC

2.10 Peripheral devices and interface cables

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

- Test jig _____ Model : Customer specific _____

2.11 Test Jig



2.12 Determination of worst-case conditions for final measurement

Measurements are made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in horizontal position.

2.13 Test software

No special test software is used.

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3 TEST RESULT SUMMARY

FCC Rule Part	Description	Result
15.207(a)	AC power line conducted emissions	not applicable ¹⁾
15.231(b)	Field strength of the fundamental wave	passed
15.231(b)	Spurious emissions (magnetic field) 9 kHz – 30 MHz	passed
15.231(b)	Spurious emissions radiated (electric field)	passed
15.35(c)	Correction for pulse operation (duty cycle)	passed
15.231(a1)	Signal deactivation	passed
15.231(c)	Emission bandwidth and OBW99	passed

Note: ¹⁾ The EuT has no AC mains connections and is vehicular powered.

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80211112-00	0	15 May 2024	Initial test report
80211112-00	1	11. June 2024	Change of type designation.
80211112-00	2	16. July 2024	Errors in the table 5.2.5, 5.2.6, 5.4.5 & 5.4.6. Correct is "Corrected AV level dBμV/m".

The test report with the highest revision number replaces the previous test reports.

3.2 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 06 May 2024

Testing concluded on : 08 May 2024

Checked by:

Tested by:



Klaus Gegenfurtner
I confirm the correctness and
integrity of this document
2024.07.17 10:32:19 +02'00'

Klaus Gegenfurtner
Teamleader Radio



Josef Knab
I'm the autor of this
document.
2024.07.17 10:15:17
+02'00'

Josef Knab
Radio Team

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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 on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. 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 power line conducted emissions	0.15 MHz to 30 MHz	95%	$\pm 3.29 \text{ dB}$
EBW and OBW	2400 MHz to 30000 MHz	95%	$\pm 2.5 \times 10^{-7}$
Output power ERP, radiated	1000 MHz to 7000 MHz	95%	$\pm 2.71 \text{ dB}$
Field strength of the fundamental	1000 MHz to 7000 MHz	95%	$\pm 2.71 \text{ dB}$
Power spectral density	2400 MHz to 3000 MHz	95%	$\pm 0.62 \text{ dB}$
Spurious Emissions, conducted	9 kHz to 10000 MHz	95%	$\pm 2.15 \text{ dB}$
Spurious Emissions, conducted	10000 MHz to 40000 MHz	95%	$\pm 3.47 \text{ dB}$
Spurious Emissions, radiated	9 kHz to 30 MHz	95%	$\pm 3.53 \text{ dB}$
Spurious Emissions, radiated	30 MHz to 1000 MHz	95%	$\pm 4.44 \text{ dB}$
Spurious Emissions, radiated	1000 MHz to 30000 MHz	95%	$\pm 2.34 \text{ dB}$
Spurious Emissions, radiated	30000 MHz to 40000 MHz	95%	$\pm 5.13 \text{ dB}$

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4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement Protocol for FCC and ISED

4.5.1 GENERAL INFORMATION

4.5.1.1 Test methodology

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011

ISED: DE0009

The test methods used comply with ANSI C63.10, „Testing Unlicensed Wireless Devices “.

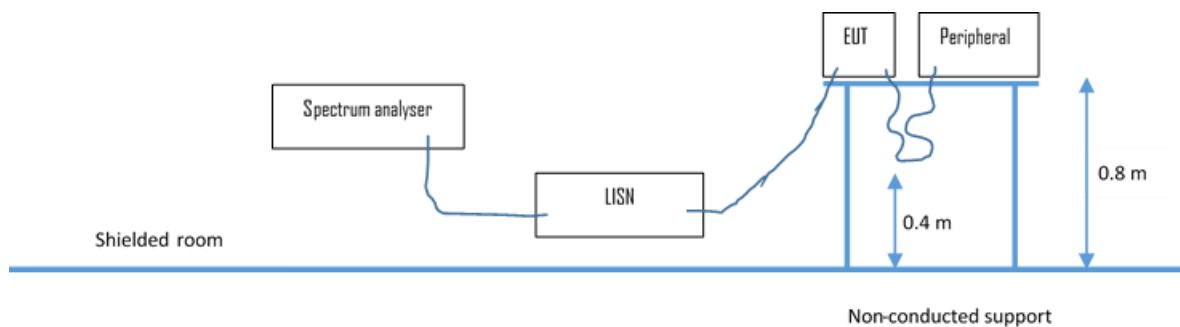
4.5.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.2 Details of test procedures

4.5.2.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB μ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

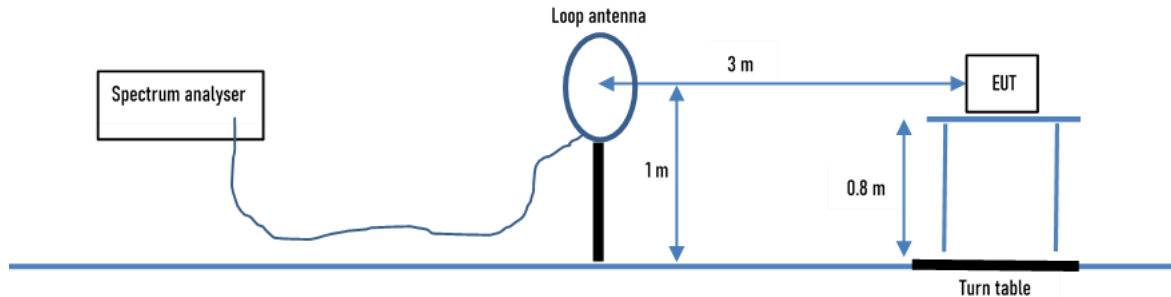
Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

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4.5.2.2 Radiated emission

4.5.2.2.1 OATS1 test site (9 kHz - 30 MHz):

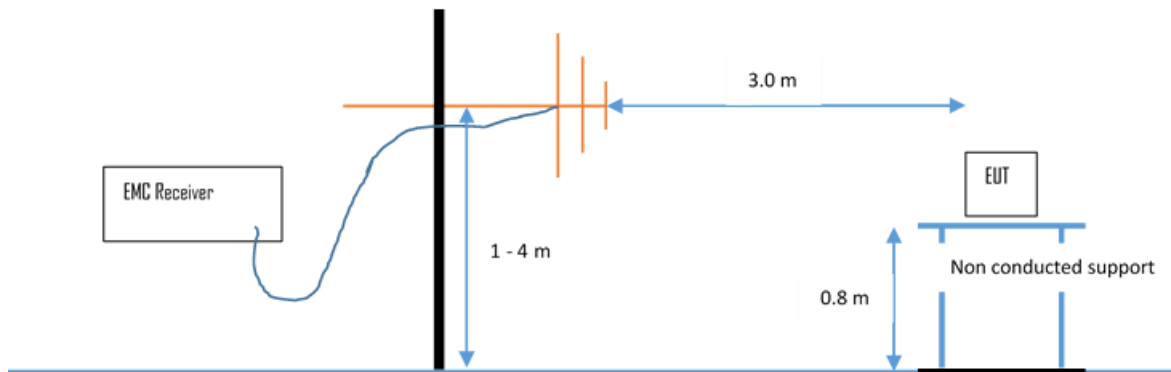
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.2.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

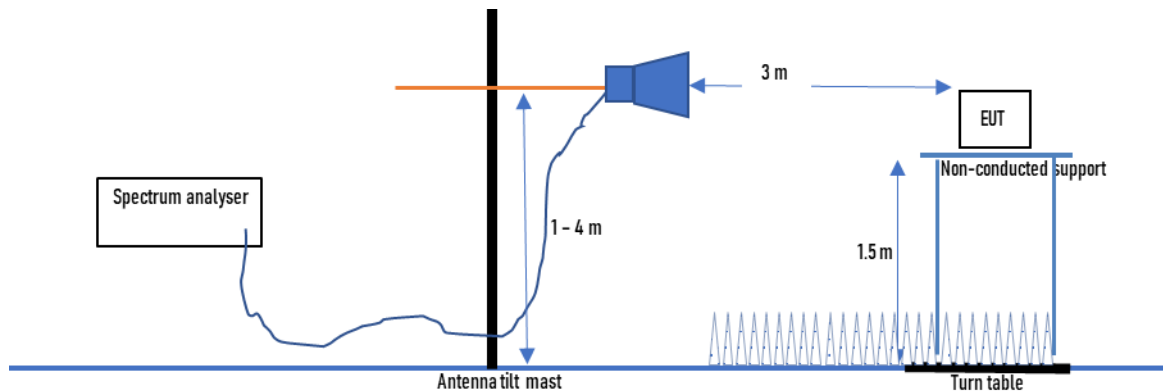
Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	Limit (dBµV/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

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4.5.2.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

Test setup according to ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

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5 TEST RESULTS

5.1 Conducted emissions

For test instruments and accessories used, see section 6 Part A 4.

5.1.1 Description of the test location

Test location: NONE

Remarks: The measurement is not applicable.

The EuT has no AC mains connections and is vehicular powered.

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5.2 Field strength of the fundamental wave

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

5.2.1 Description of the test location

Test location: OATS 1
Test distance: 3 m

5.2.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.2.3 Applicable standard

According to FCC Part 15C, Section 15.231(b):

The field strength of emissions from intentional radiators shall not exceed the effective field strength limits.

5.2.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

EMI test receiver settings:

30 MHz – 1000 MHz: RBW: 120 kHz

5.2.5 Test result – KESSY

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
433.90	75.0	-	24.1	-18.9	80.2	80.8	-0.6
434.34	74.9	-	24.2	-18.9	80.2	80.8	-0.6

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

5.2.6 Test result – Service key

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
433.90	65.0	-	24.1	-8.7	80.4	80.8	-0.4
434.34	64.6	-	24.2	-8.7	80.1	80.8	-0.7

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

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Limit according to FCC Part 15, Section 15.231(b)

Fundamental frequency (MHz)	Field strength of fundamental ($\mu\text{V/m}$)	Limit for 433.90 MHz	
		($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
40.66-40.70	2250		
70-130	1250		
130-174	1250 to 3750*		
174-260	3750		
260-470	3750 to 12500*	10995.8	80.8
Above 470	12500		

Note: *Linear interpolation.

Fundamental frequency (MHz)	Field strength of fundamental ($\mu\text{V/m}$)	Limit for 434.34 MHz	
		($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
40.66-40.70	2250		
70-130	1250		
130-174	1250 to 3750*		
174-260	3750		
260-470	3750 to 12500*	11014.2	80.8
Above 470	12500		

Note: *Linear interpolation.

The requirements are **FULFILLED**.

Remarks: None.

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5.3 Spurious emissions (magnetic field) 9 kHz – 30 MHz

For test instruments and accessories used see section 6 Part SER 1.

5.3.1 Description of the test location

Test location: OATS 1
Test distance: 3 m

5.3.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.3.3 Applicable standard

According to FCC Part 15C, Section 15.209:

The emissions from intentional radiators shall not exceed the field strength limits for spurious emissions in the table.

5.3.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: RBW: 200 Hz

150 kHz – 30 MHz: RBW: 9 kHz

Detector: QP (In frequency range 9-90 kHz and 110-490 kHz a linear average detector is used)

5.3.5 Test result < 30MHz accd. to FCC

Frequency (kHz)	Level @3m (dBμV)	Ant. factor (dB 1/m)	Field strength @3m dB(μV/m)	Extrapolation factor @300m (dB)	Field strength level @300m dB(μV/m)	Limit dB(μV/m)	Delta (dB)
100*)	17.2	18.3	35.5	-80.0	-44.5	27.6	-72.1

Note: *) Ambient noise, no other spurious emissions could be detected

Frequency (kHz)	Level @3m (dBμV)	Ant. factor (dB 1/m)	Field strength @3m dB(μV/m)	Extrapolation factor @30m (dB)	Field strength level @30m dB(μV/m)	Limit dB(μV/m)	Delta (dB)
500 *)	11.3	17.1	28.4	-40.0	-11.6	33.6	-45.2
1000*)	6.9	18.2	25.1	-40.0	-14.9	27.6	-42.5
5000*)	6.1	17.5	23.6	-40.0	-16.4	29.5	-45.9
15000*)	4.8	18.3	23.1	-40.0	-16.9	29.5	-46.4
25000*)	2.3	17.8	20.1	-40.0	-19.9	29.5	-49.4

Note: *) Ambient noise, no other spurious emissions could be detected

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5.3.6 Test result < 30MHz accd. to RSS

Frequency (kHz)	Level @3m (dBμA)	Ant. factor (dB 1/m)	Field strength @3m dB(μA/m)	Extrapolation factor @300m (dB)	Field strength level @300m dB(μA/m)	Limit dB(μA/m)	Delta (dB)
100*)	-34.3	18.3	-16.0	-80.0	-96.0	-23.9	-72.1

Note: *) Ambient noise, no other spurious emissions could be detected

Frequency (kHz)	Level @3m (dBμA)	Ant. factor (dB 1/m)	Field strength @3m dB(μA/m)	Extrapolation factor @30m (dB)	Field strength level @30m dB(μA/m)	Limit dB(μA/m)	Delta (dB)
500 *)	-40.2	17.1	-23.1	-40.0	-63.1	-17.9	-45.2
1000*)	-44.6	18.2	-26.4	-40.0	-66.4	-23.9	-42.5
5000*)	-45.4	17.5	-27.9	-40.0	-67.9	-21.9	-46.0
15000*)	-46.7	18.3	-28.4	-40.0	-68.4	-21.9	-46.5
25000*)	-49.2	17.8	-31.4	-40.0	-71.4	-21.9	-49.5

Note: *) Ambient noise, no other spurious emissions could be detected

Limit according to FCC Part 15, Section 15.209(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance
	(μV/m)	dB(μV/m)	(metres)
0.009 - 0.490	2400/F(kHz)	--	300
0.490 - 1.705	24000/F (kHz)	--	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The requirements are **FULFILLED**.

Remarks: Only ambient noise could be measured.

There are no differences between "KESSY" and "Service key" settings.

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5.4 Spurious emissions radiated (electric field)

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

5.4.1 Description of the test location

Test location: OATS 1
 Test location: Anechoic chamber 1
 Test distance: 3 m

5.4.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.4.3 Applicable standard

According to FCC Part 15C, Section 15.231(b), Section 15.209(a) and Section 15.205(a):
 The emissions from intentional radiators shall not exceed the effective field strength limits.

5.4.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz: RBW: 120 kHz
 1000 MHz – 4500 MHz RBW: 1 MHz

Example:

Frequency (MHz)	Level (dBμV)	+	Factor (dB)	=	Level dB(μV/m)	-	Limit dB(μV/m)	=	Delta (dB)
170.5	5	+	20	=	25	-	30	=	-5

5.4.5 Test result – KESSY f < 1 GHz

Continuous unmodulated TX mode at 433.90 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
867.80	4.7	-	32.9	-18.9	18.7	60.8	-42.1

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

Continuous unmodulated TX mode at 434.34 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
868.68	4.8	-	32.9	-18.9	18.8	60.8	-42.0

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

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5.4.6 Test result – Service key f < 1 GHz

Continuous unmodulated TX mode at 433.90 (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
867.80	2.6	-	32.9	-8.7	26.8	60.8	-34.0

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

Continuous unmodulated TX mode at 434.34 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected AV level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
868.68	3.0	-	32.9	-8.7	27.2	60.8	-33.6

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

5.4.7 Test result – KESSY f > 1 GHz

Continuous unmodulated TX mode at 433.90 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected PK level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
1057.38	50.8	-	-13.4	0.0	37.4	54.0	-16.6
2253.88	47.4	-	-7.9	0.0	39.5	54.0	-14.5
3195.41	46.2	-	-6.6	0.0	39.6	60.8	-21.3
3742.55	47.6	-	-6.3	0.0	41.3	54.0	-12.7

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

Continuous unmodulated TX mode at 434.34 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected PK level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
1052.68	50.3	-	-13.4	0.0	36.9	54.0	-17.1
1235.97	48.4	-	-10.7	0.0	37.7	54.0	-16.3
1821.10	47.8	-	-9.1	0.0	38.7	60.8	-22.1
2029.85	47.3	-	-8.4	0.0	38.9	60.8	-21.9
3949.74	46.8	-	-6.1	0.0	40.7	54.0	-13.3

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

FCC ID: KR5BCM37WBL
5.4.8 Test result – Service key f > 1 GHz

Continuous unmodulated TX mode at 433.90 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected PK level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
1173.31	47.6	-	-12.1	0.0	35.5	54.0	-18.5
1708.70	46.6	-	-10.7	0.0	35.9	54.0	-18.1
2496.31	47.0	-	-7.1	0.0	39.9	54.0	-14.1
2641.22	46.3	-	-7.3	0.0	39.0	60.8	-21.8
3200.11	46.7	-	-6.6	0.0	40.1	60.8	-20.7

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

Continuous unmodulated TX mode at 434.34 MHz (-20 kHz frequency deviation)

Frequency (MHz)	Level PK (dBμV)	Level QP (dBμV)	Correct. factor (dB)	Duty Cycle correction factor (dB)	Corrected PK level dB(μV/m)	Limit dB(μV/m)	Delta (dB)
1048.37	46.7	-	-13.5	0.0	33.2	54.0	-20.8
1171.74	47.4	-	-12.2	0.0	35.2	54.0	-18.8
1250.46	47.5	-	-10.6	0.0	36.9	60.8	-23.9
2408.58	47.2	-	-7.1	0.0	40.1	60.8	-20.7
3200.90	47.2	-	-6.6	0.0	40.6	60.8	-20.2
3789.94	47.2	-	-6.3	0.0	40.9	54.0	-13.1

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

Limit according to FCC Part 15, Section 15.231(b), Section 15.209(a) and Section 15.205(a)

Fundamental frequency (MHz)	Field strength of spurious emissions (μV/m)	Limit for 433.90 MHz	
		(μV/m)	dB(μV/m)
40.66-40.70	225		
70-130	125		
130-174	125 to 375*		
174-260	375		
260-470	375 to 1250*	1099.7	60.8
Above 470	1250		

Note: *Linear interpolation.

Fundamental frequency (MHz)	Field strength of spurious emissions (μV/m)	Limit for 434.34 MHz	
		(μV/m)	dB(μV/m)
40.66-40.70	225		
70-130	125		
130-174	125 to 375*		
174-260	375		
260-470	375 to 1250*	1101.4	60.8
Above 470	1250		

Note: *Linear interpolation.

FCC ID: KR5BCM37WBL

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in the table above or to the general limits shown in the table below according to § 15.209, whichever limit permits a higher field strength.

Frequency (MHz)	15.209 Limits (µV/m)	15.209 Limits dB(µV/m)
30 - 88	100	40
88 - 216	150	43,5
216 - 960	200	46
Above 960	500	54

Additionally, there is a limit according to §15.35(b) on the radio frequency emissions, as measured with a peak detector, corresponding to 20 dB above the maximum permitted average limits.

Restricted bands of operation according to FCC Part 15C, Section 15.205(a):

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

The requirements are **FULFILLED**.

Remarks: The measurement is performed up to the 10th harmonic.

FCC ID: KR5BCM37WBL

5.5 Correction for pulse operation (duty cycle)

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

5.5.1 Description of the test location

Test location: Shielded Room S4

5.5.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.5.3 Applicable standard

According to FCC Part 15C, Section 15.35(c):

The emissions from intentional radiators shall not exceed the effective field strength limits.

5.5.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

The Duty cycle factor (dB) is calculated applying the following formula:

$$KE = 20 \log ((t_{ON})/T)$$

KE: Pulse operation correction factor (dB)

t_{ON}: Determined by summing the duration of all of the pulses within the pulse train (ms)

T: If the pulse train is periodic (i.e., consists of a series of pulses that repeat in a characteristic pattern over a constant time period), and the period (T) is less than or equal to 100 ms.

5.5.5 Test result

Duty cycle Within 100 ms	<i>t_{ON}</i> (ms)	<i>T</i> (ms)	<i>KE</i> (dB)
KESSY 433.92 MHz	11.40	100	-18.9
KESSY 434.36 MHz	11.40	100	-18.9
Service key 433.92 MHz	36.70	100	-8.7
Service key 434.36 MHz	36.71	100	-8.7

Remarks: The pulse train exceeds 100 ms, therefore the duty cycle has been calculated by averaging

the sum of the pulse widths over the 100 ms width with the highest average value.

For detailed test results please see the following test protocols.

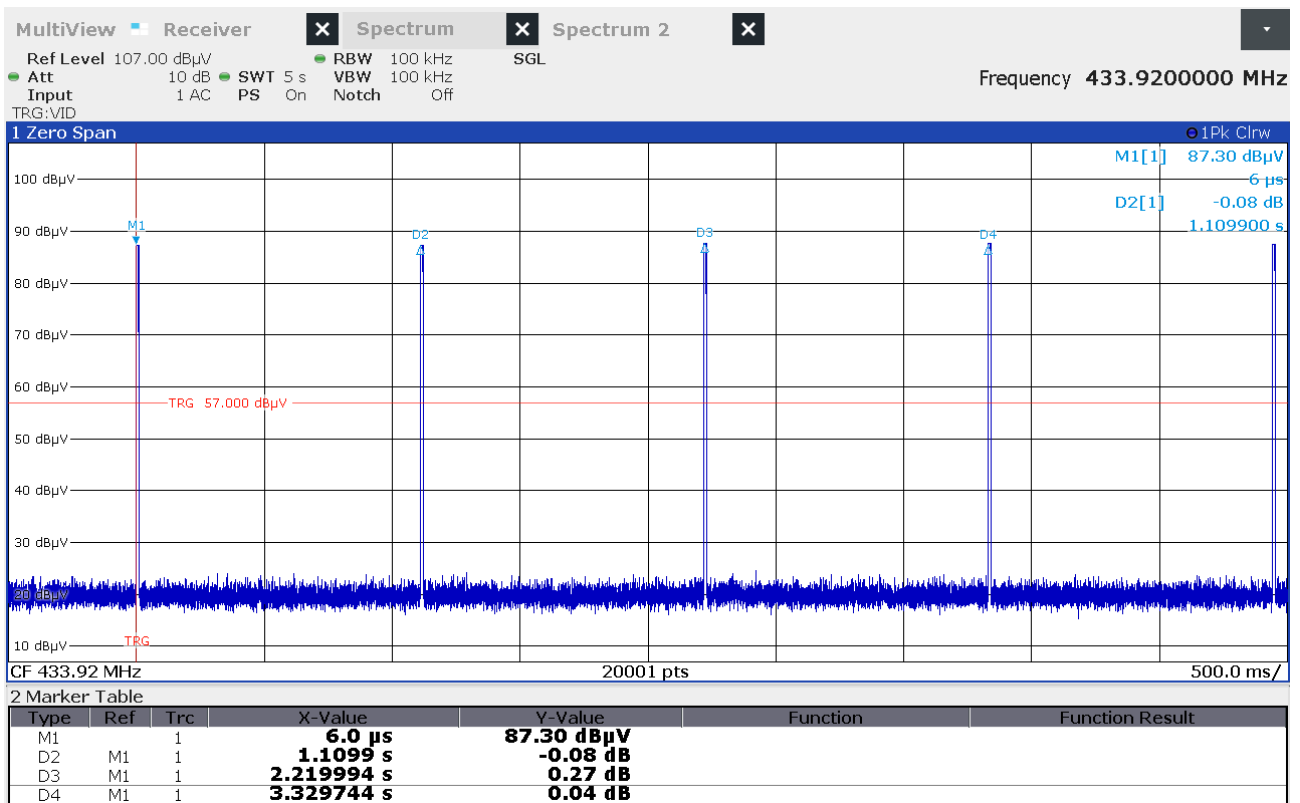
FCC ID: KR5BCM37WBL
5.5.6 Test protocol – KESSY 433.92 MHz
Correction for pulse operation (duty cycle)

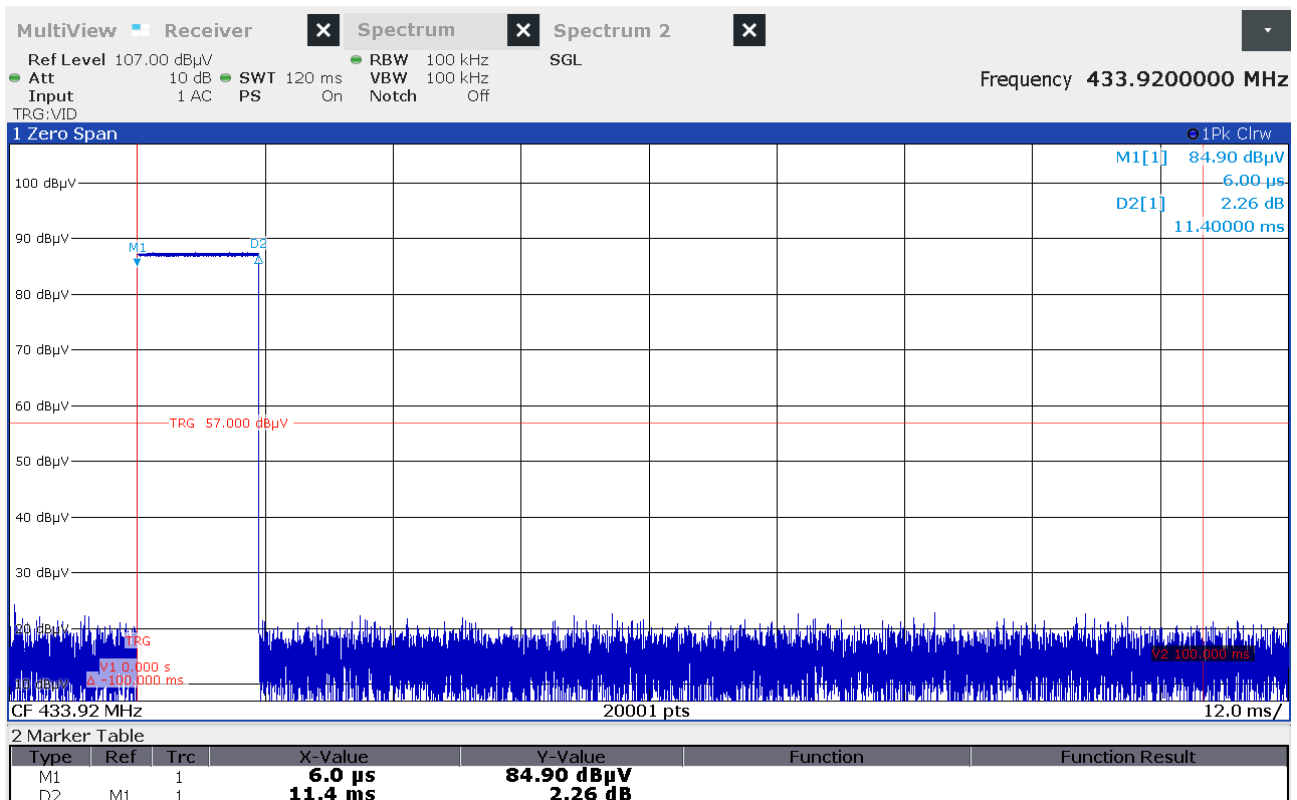
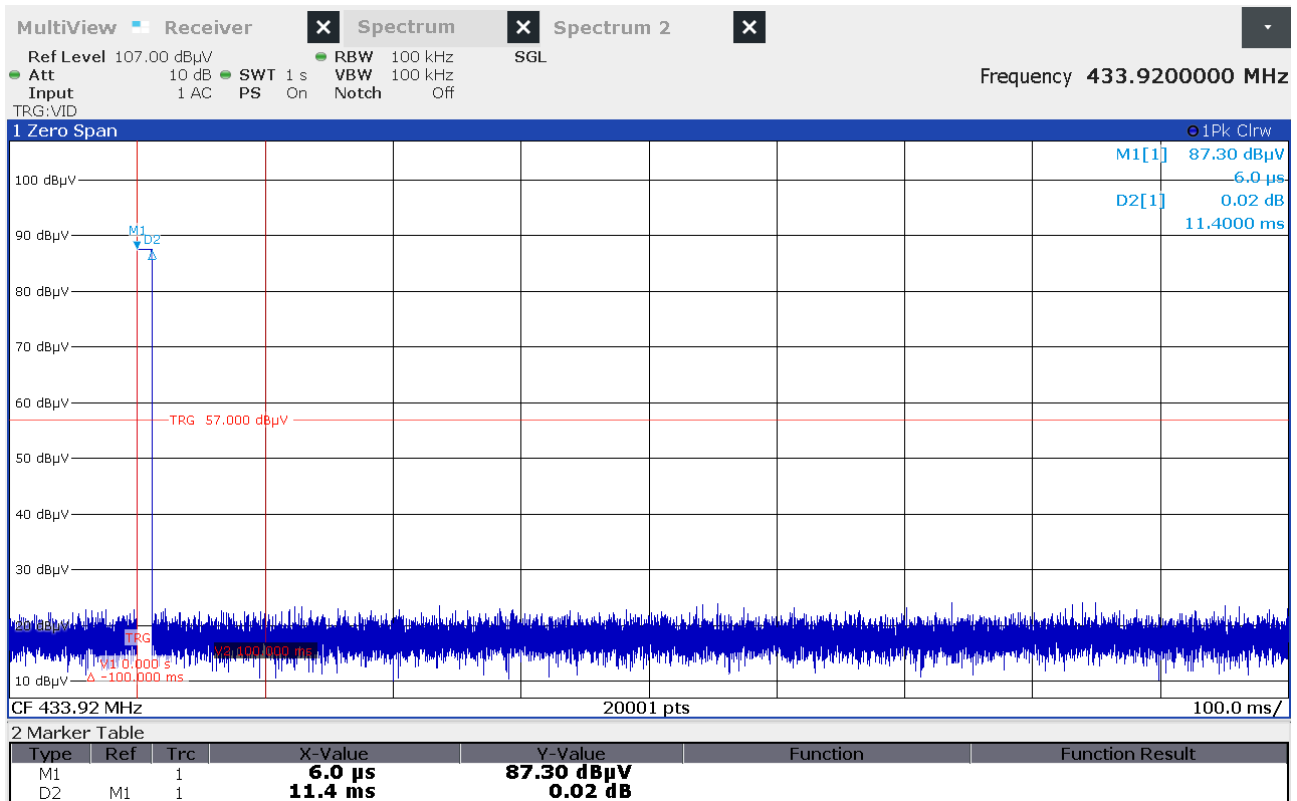
FCC Part 15C, Section 15.35(c)

The plot shows the telegram which is send by the BCM (EuT) to the handheld wireless key. If the vehicles doorhandle is pulled, the start/stop button is pressed or an automatic trigger event happens, the BCM(EuT) transmits this telegram after some communication (RF/LF) between BCM(EuT) and external wireless key.

For testing purposes, this telegram was sent periodically every 1.1 seconds.

The max. length of the telegram is 11.4 ms.



FCC ID: KR5BCM37WBL


FCC ID: KR5BCM37WBL

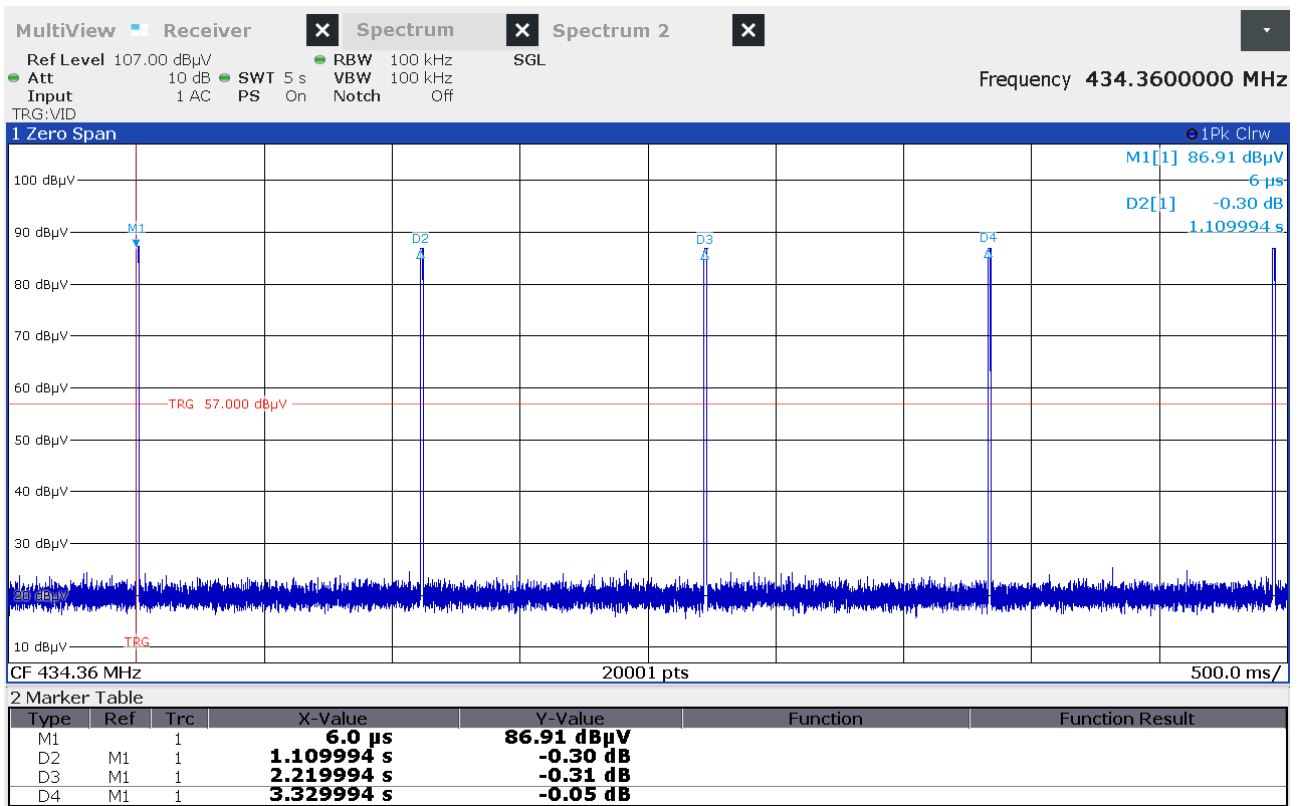
5.5.7 Test protocol – KESSY 434.36 MHz

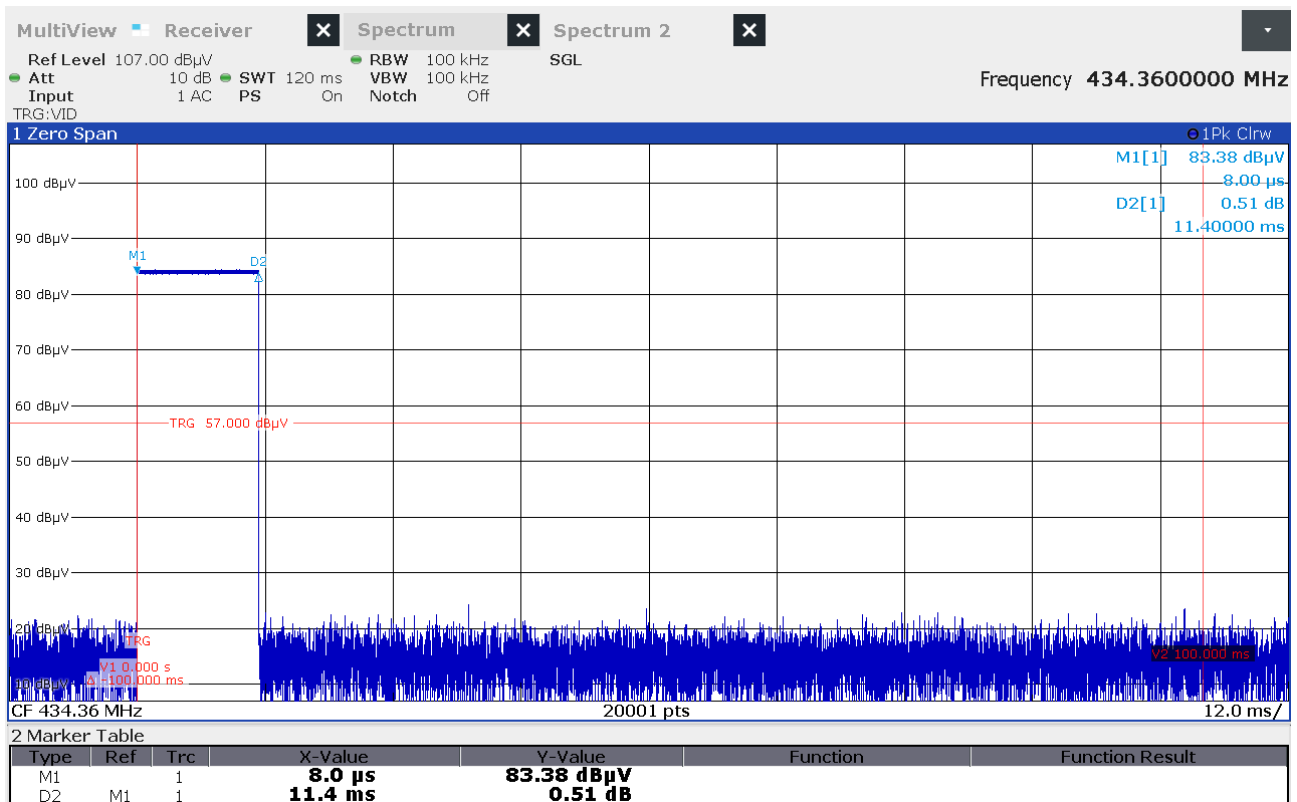
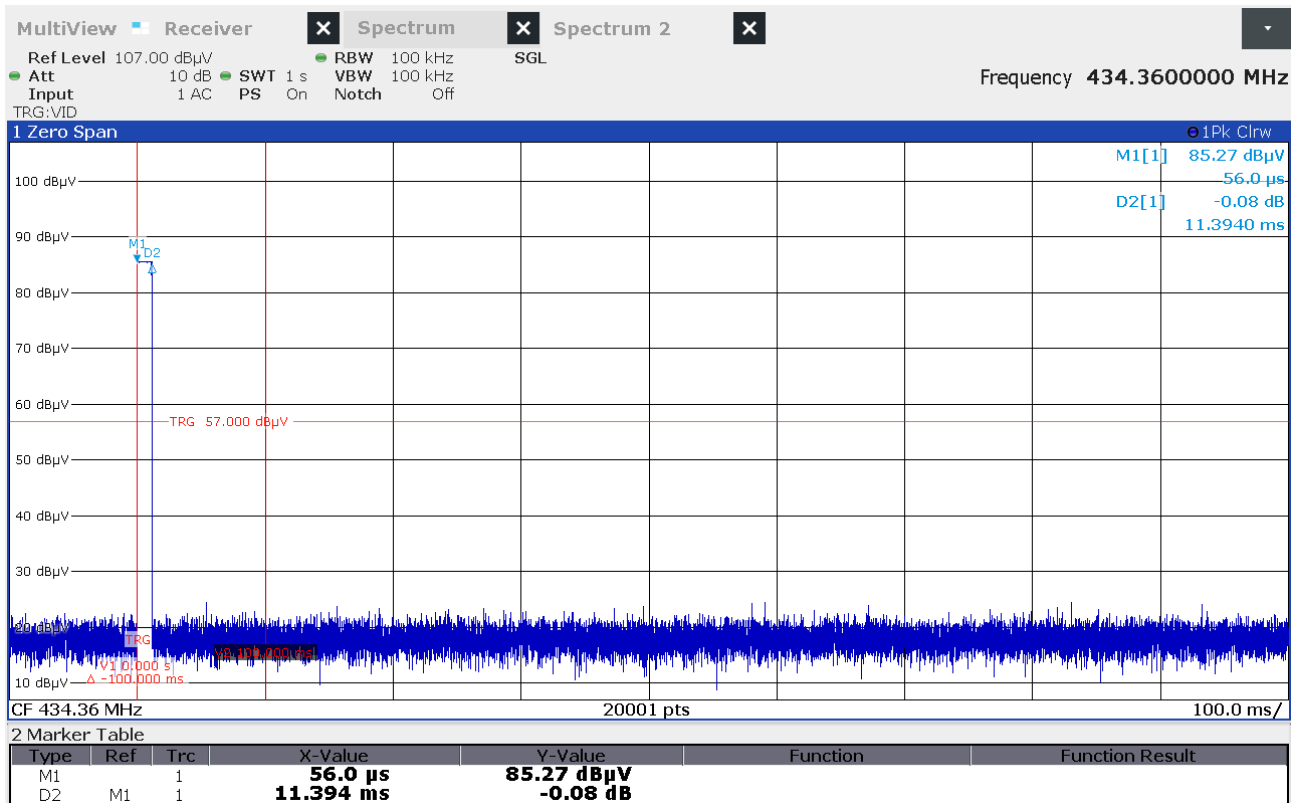
Correction for pulse operation (duty cycle) FCC Part 15C, Section 15.35(c)

The plot shows the telegram which is send by the BCM (EuT) to the handheld wireless key. If the vehicles doorhandle is pulled, the start/stop button is pressed or an automatic trigger event happens, the BCM(EuT) transmits this telegram after some communication (RF/LF) between BCM(EuT) and external wireless key.

For testing purposes, this telegram was sent periodically every 1.1 seconds.

The max. length of the telegram is 11.4 ms.



FCC ID: KR5BCM37WBL


FCC ID: KR5BCM37WBL

5.5.8 Test protocol – Service key 433.92 MHz

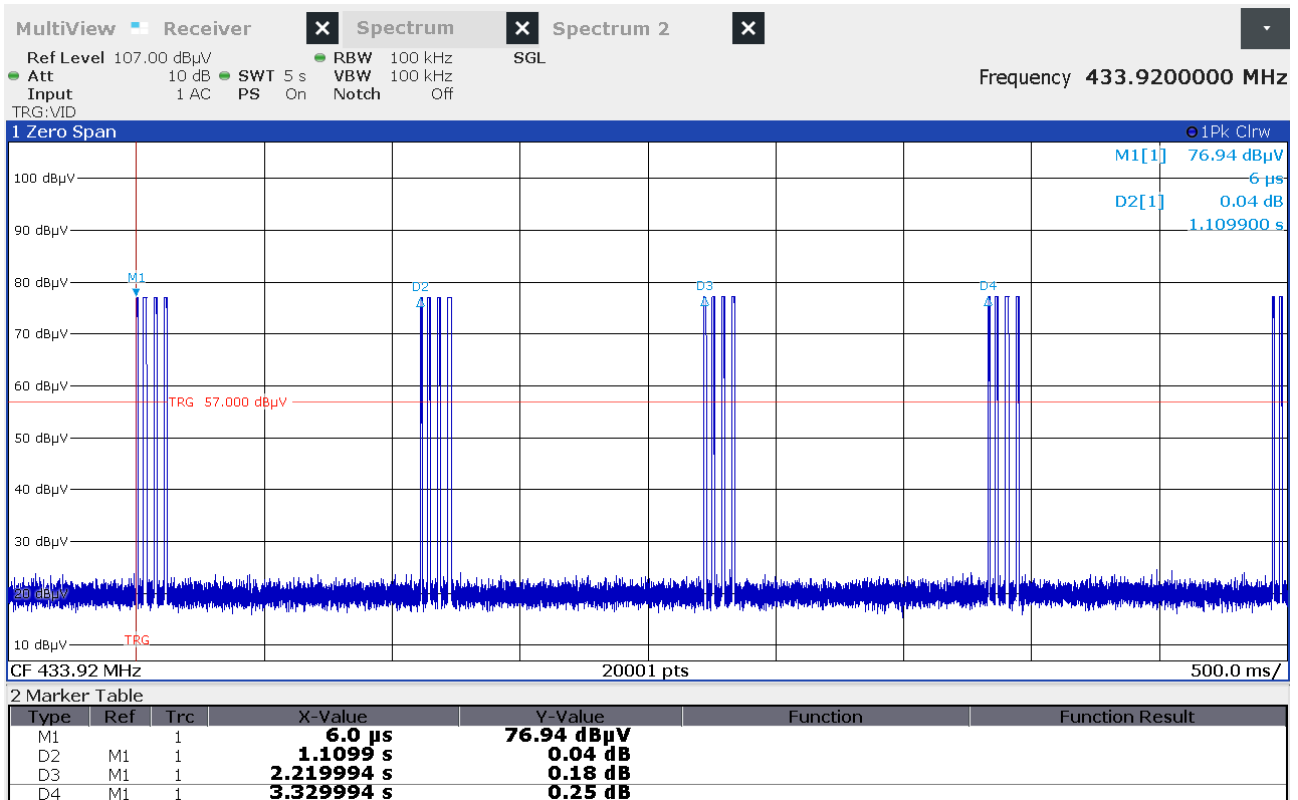
Correction for pulse operation (duty cycle)

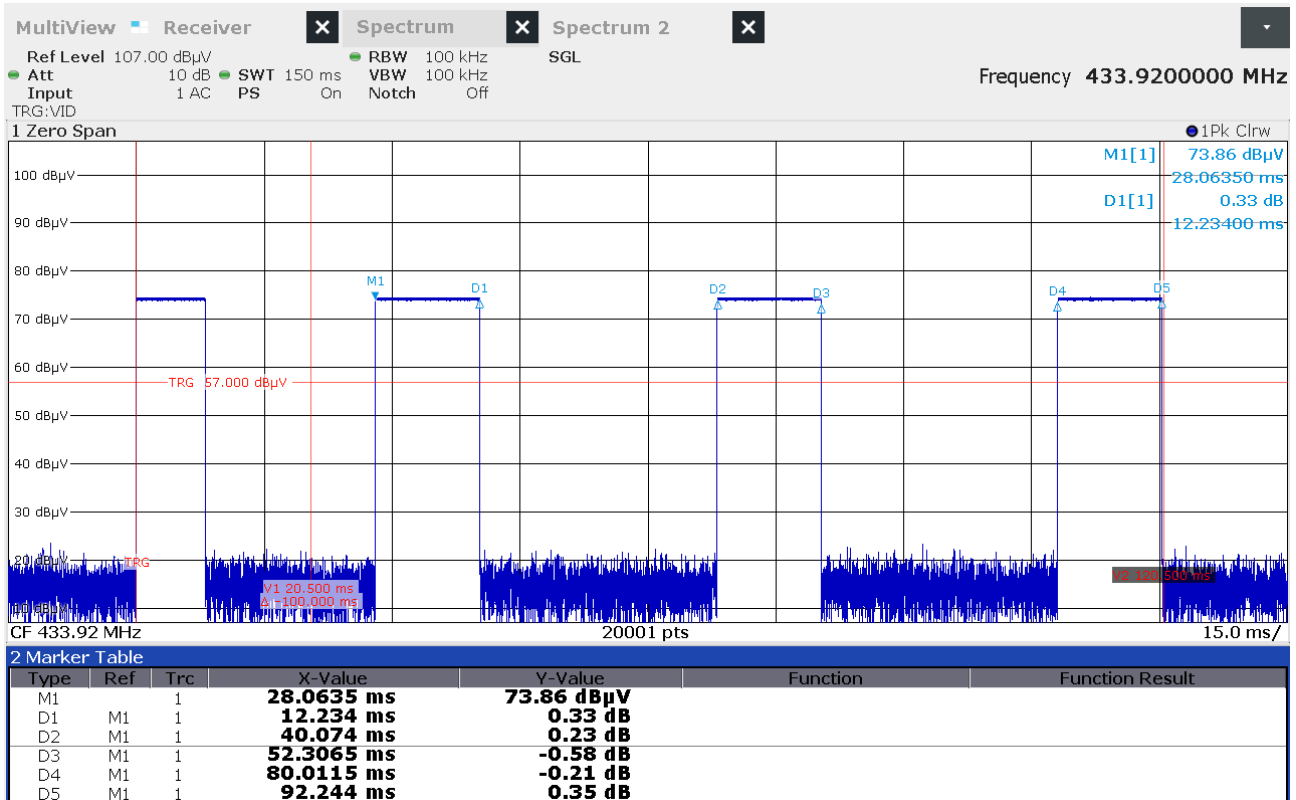
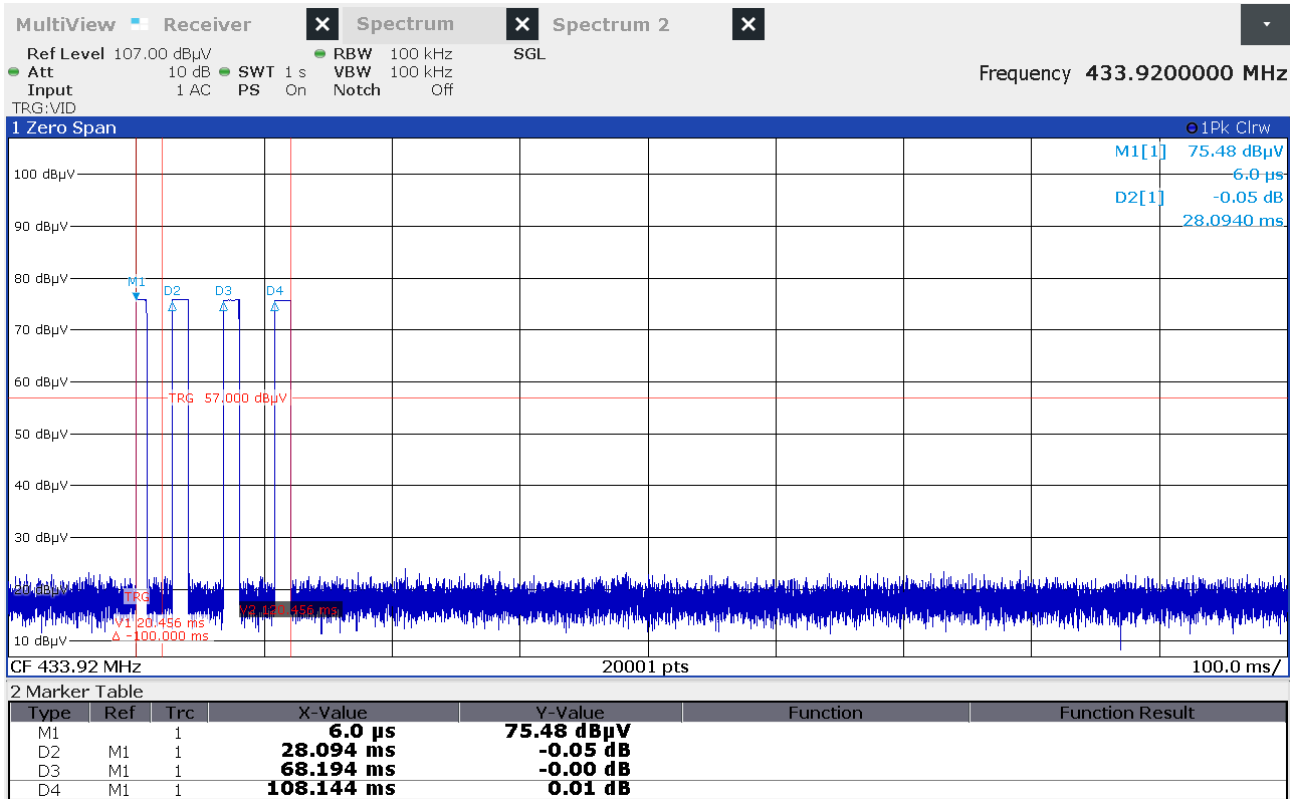
FCC Part 15C, Section 15.35(c)

The plot shows the telegram sequence which is send by the BCM (EuT) to the handheld wireless key. During driving the BCM(EuT) uploads vehicle data for example mileage to the external wireless key.

For testing purposes, this telegram was sent periodically every 1.1 seconds.

The max. length of the telegram is 36.700 ms.



FCC ID: KR5BCM37WBL


Pulse 1 (Marker D1): 12.234 ms Pulse 2 (Marker D3-D2): 12.233 ms Pulse 3 (Marker D5-D4): 12.233 ms
Max. total on time within 100 ms = 36.700 ms

FCC ID: KR5BCM37WBL

5.5.9 Test protocol – Service key 434.36 MHz

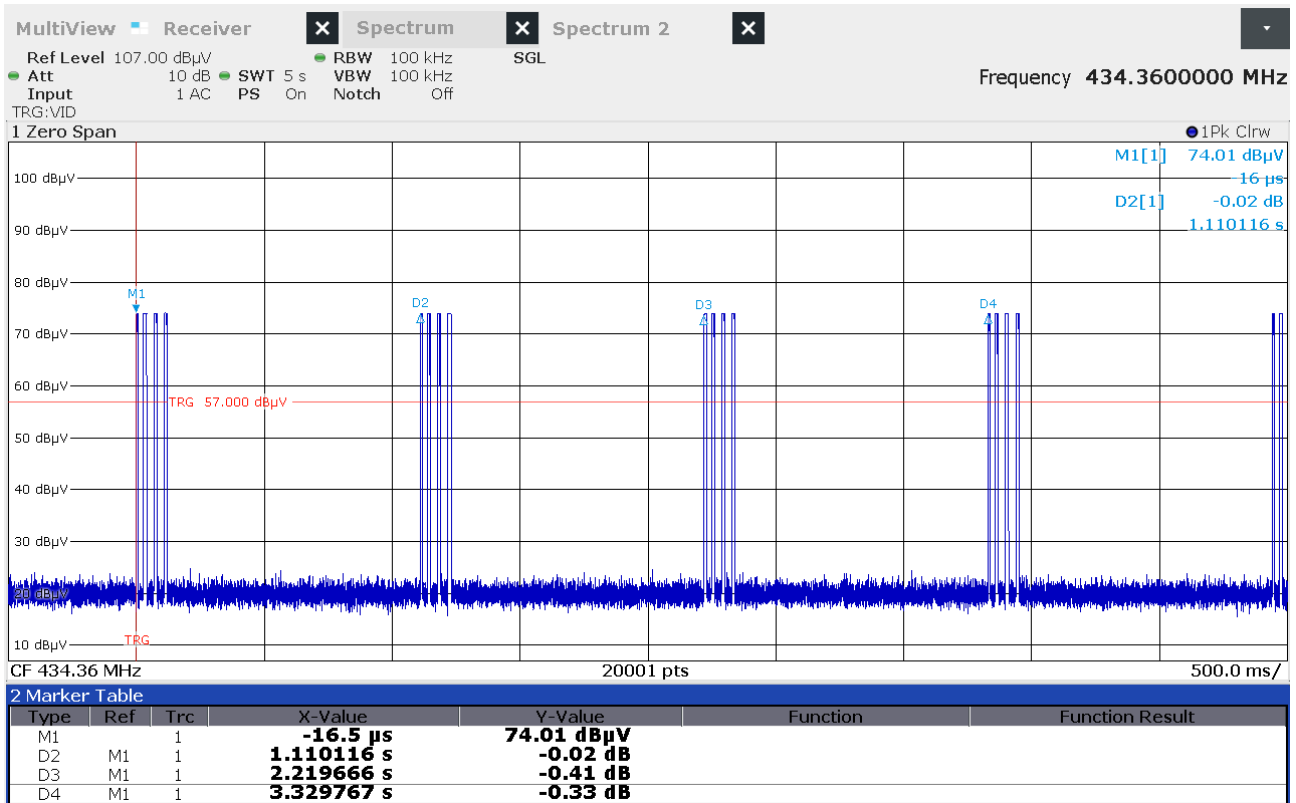
Correction for pulse operation (duty cycle)

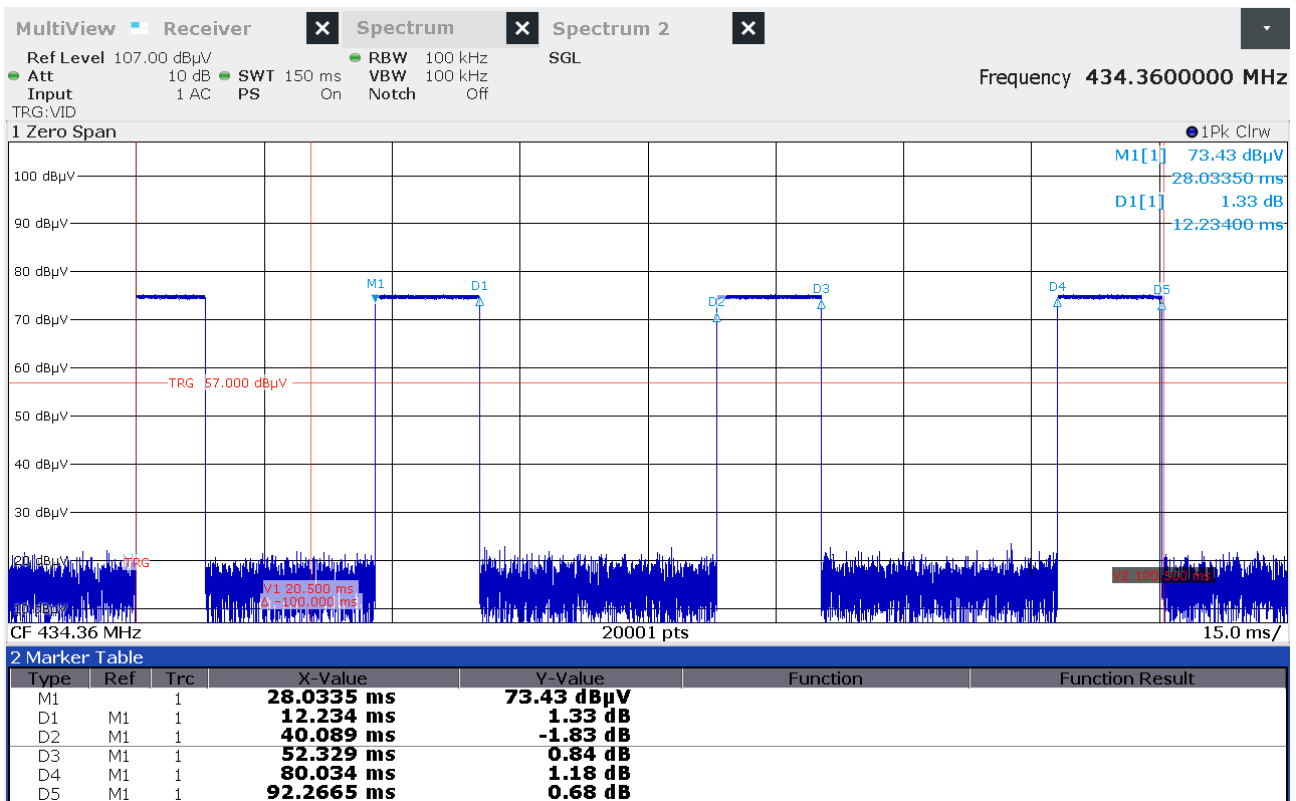
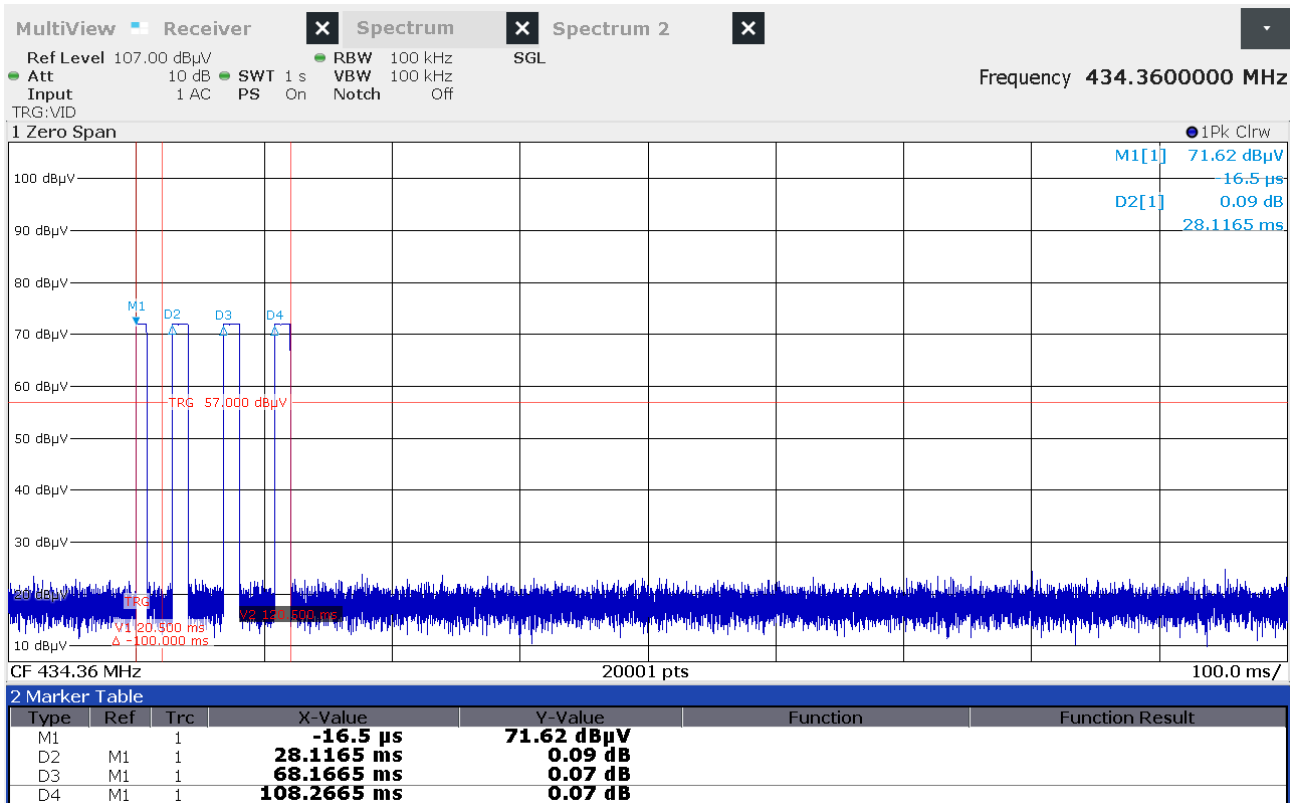
FCC Part 15C, Section 15.35(c)

The plot shows the telegram sequence which is send by the BCM (EuT) to the handheld wireless key.
During driving the BCM(EuT) uploads vehicle data for example mileage to the external wireless key.

For testing purposes, this telegram was sent periodically every 1.1 seconds.

The max. length of the telegram is 36.706 ms.



FCC ID: KR5BCM37WBL


Pulse 1 (Marker D1): 12.234 ms Pulse 2 (Marker D3-D2): 12.240 ms Pulse 3 (Marker D5-D4): 12.232 ms
Max. total on time within 100 ms = 36.706 ms

FCC ID: KR5BCM37WBL

5.6 Emission bandwidth

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

5.6.1 Description of the test location

Test location: Shielded Room S4

5.6.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.6.3 Applicable standard

According to FCC Part 15C, Section 15.231(c):
The bandwidth of the emission shall not exceed the effective limits.

5.6.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

The measurement is performed conducted using a spectrum analyser. The analyser span is set wide enough to capture the most of the power envelope of the signal. The function "20-dB-down" (OBW 99%) is used to determine the BW.

Analyser settings:

Span: 250 kHz,	RBW: 1 kHz	VBW: 3 kHz	Detector: peak;
For RSS:			
Span: 250 kHz,	RBW: 1 kHz	VBW: 3 kHz	Detector: peak;

5.6.5 Test result – KESSY

Centre f (MHz)	20dB bandwidth f_1	20dB bandwidth f_2	Measured EBW (MHz)	Limit ($f \cdot 0.0025$)(MHz)
433.92	433.8767	433.9649	0.0882	1.0848
434.36	434.3165	434.4050	0.0885	1.0859

Centre f (MHz)	99% bandwidth f_1	99% bandwidth f_2	Measured OBW (MHz)	Limit ($f \cdot 0.0025$)(MHz)
433.92	433.8761	433.9658	0.0897	1.0848
434.36	434.3163	434.4056	0.0893	1.0859

FCC ID: KR5BCM37WBL
5.6.6 Test result – Service key

Centre f (MHz)	20dB bandwidth f_1	20dB bandwidth f_2	Measured EBW (MHz)	Limit ($f \cdot 0.0025$)(MHz)
433.92	433.8765	433.9649	0.0884	1.0848
434.36	434.3165	434.4049	0.0884	1.0859

Centre f (MHz)	99% bandwidth f_1	99% bandwidth f_2	Measured OBW (MHz)	Limit ($f \cdot 0.0025$)(MHz)
433.92	433.8755	433.9653	0.0898	1.0848
434.36	434.3163	434.4054	0.0891	1.0859

Limit according to FCC Part 15C Section 15.231(c):

Frequency (MHz)	20 dB BW limit dependent of the carrier (%)
70 – 900	0.25
above 900	0.50

The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

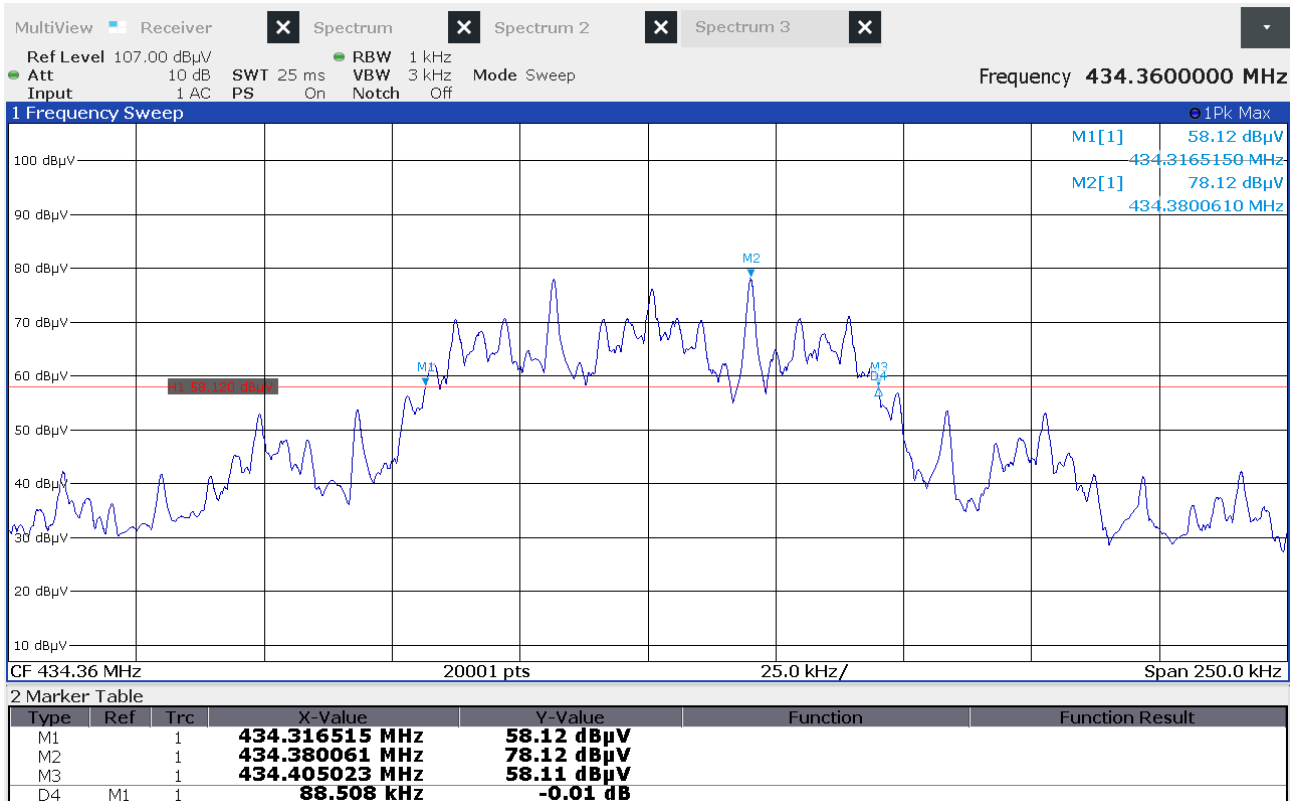
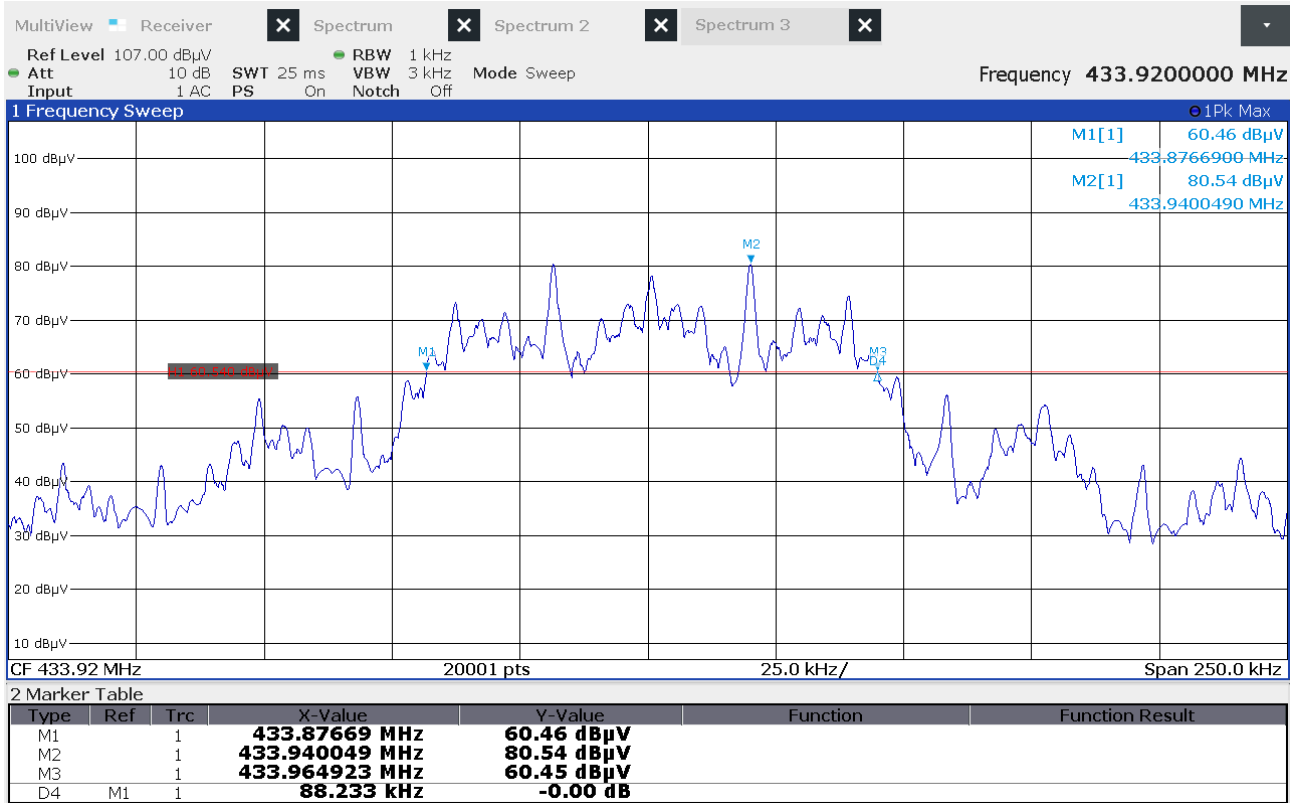
The requirements are **FULFILLED**.

Remarks: For detailed test results please see the following test protocols.

FCC ID: KR5BCM37WBL

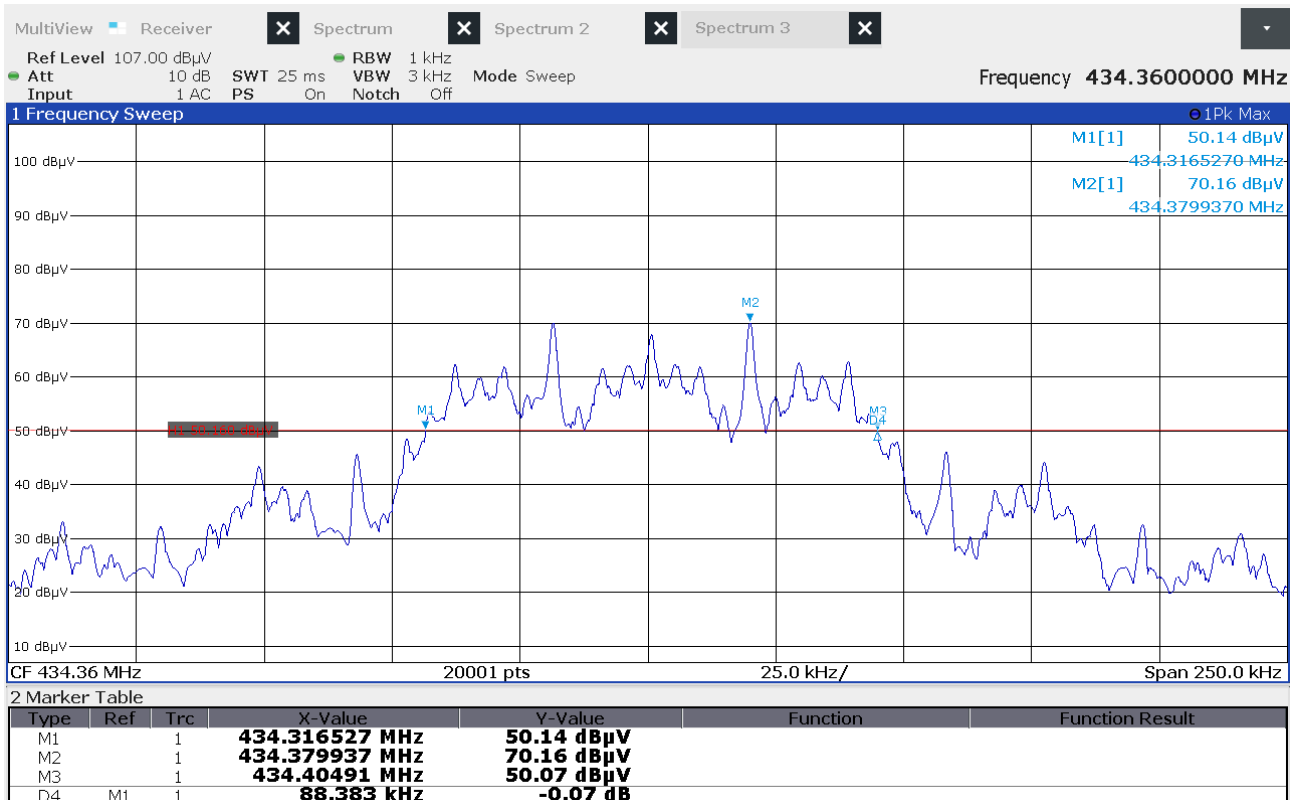
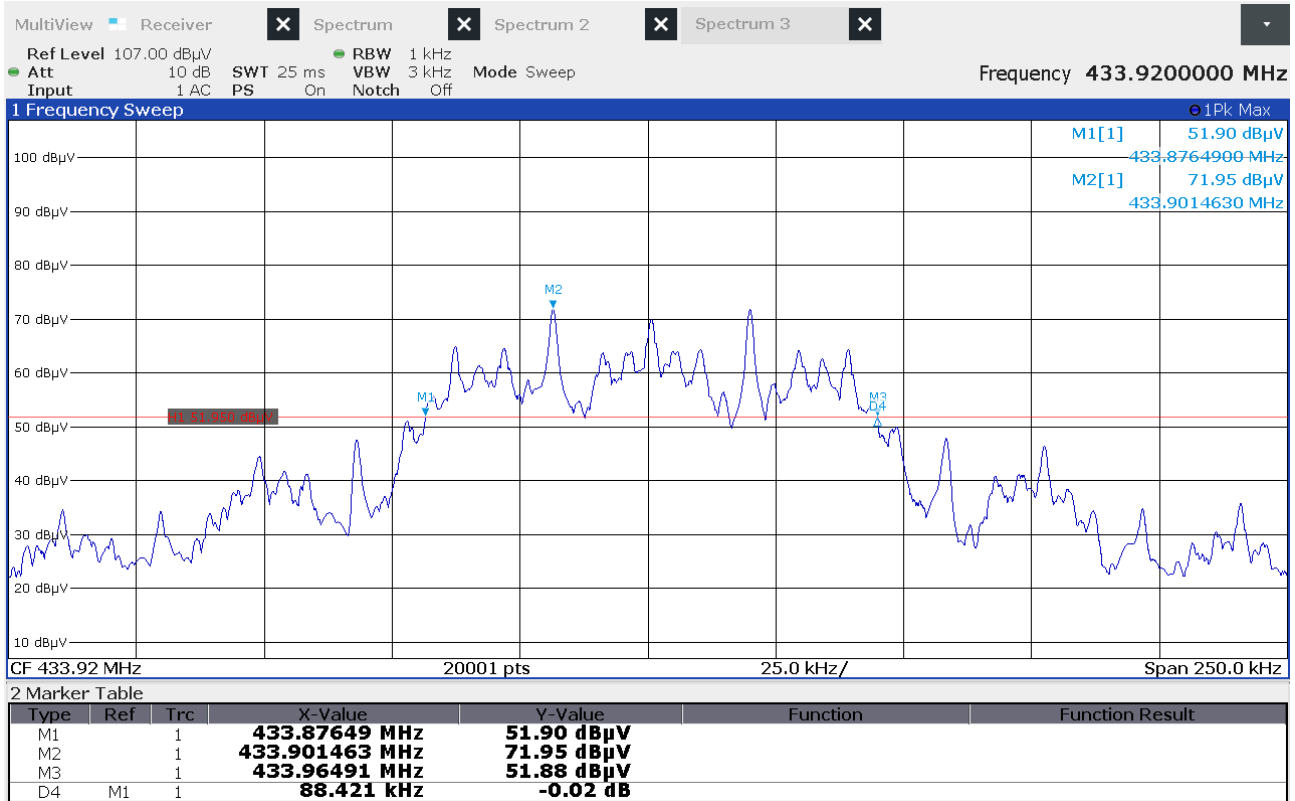
5.6.7 Test protocol – KESSY

20 dB Emission bandwidth
FCC Part 15C, Section 15.231(c)



FCC ID: KR5BCM37WBL
5.6.8 Test protocol – Service key

20 dB Emission bandwidth
FCC Part 15C, Section 15.231(c)



FCC ID: KR5BCM37WBL**5.7 Signal deactivation**

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

5.7.1 Description of the test location

Test location: Shielded Room S4

5.7.2 Photo documentation of the test set-up

See ATTACHMENT C to this test report.

5.7.3 Applicable standard

According to FCC Part 15C, Section 15.231(a)(1):

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter not exceeding the defined on time limit.

5.7.4 Description of Measurement

The duration of transmission is measured with the spectrum analyser. The sweep points were set to maximum for higher the time resolution. The signal is modulated; the marker of the analyser is set to maximum amplitude at normal temperature and zero span. The analyser is set to single sweep and triggered on the button; the marker was set to the edges in order to measure the duration time and than recorded.

5.7.5 Test result

	Duration of transmission after activation (ms)
KESY 433.92 MHz	11.4
KESY 434.36 MHz	11.4
Service key 433.92 MHz	120.46
Service key 434.36 MHz	120.50

Note: The BCM (EuT) could be activated manually(Kessy) and automatically(Kessy,Service Key).
This BCM (EuT) fulfills the requirements accd. FCC Part 15 Subpart 15.231(a).
After activation within the time limit of 5 seconds the BCM(EuT) stops transmitting.

Limit according to FCC Part 15C, Section 15.231(a):

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released and a transmitter activated automatically shall cease transmission within 5 seconds after activation.

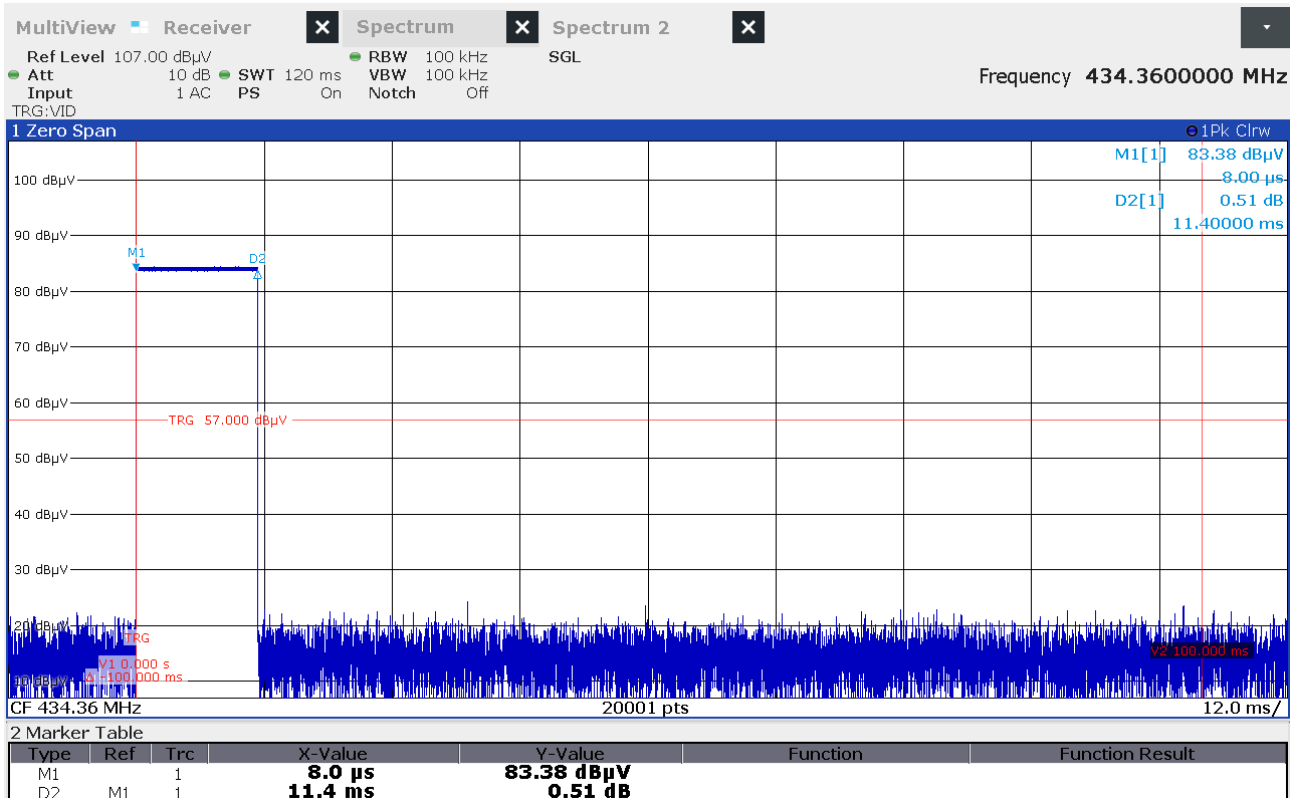
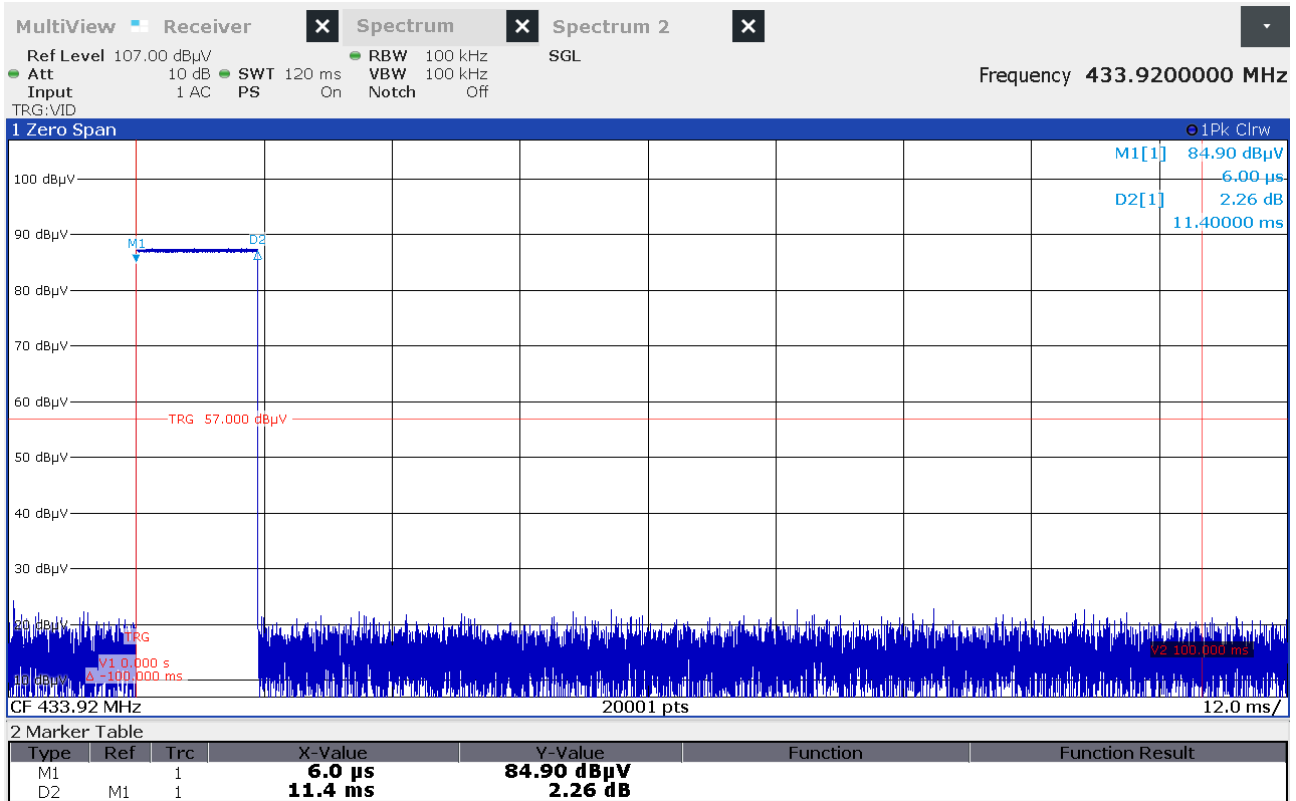
The requirements are **FULFILLED**.

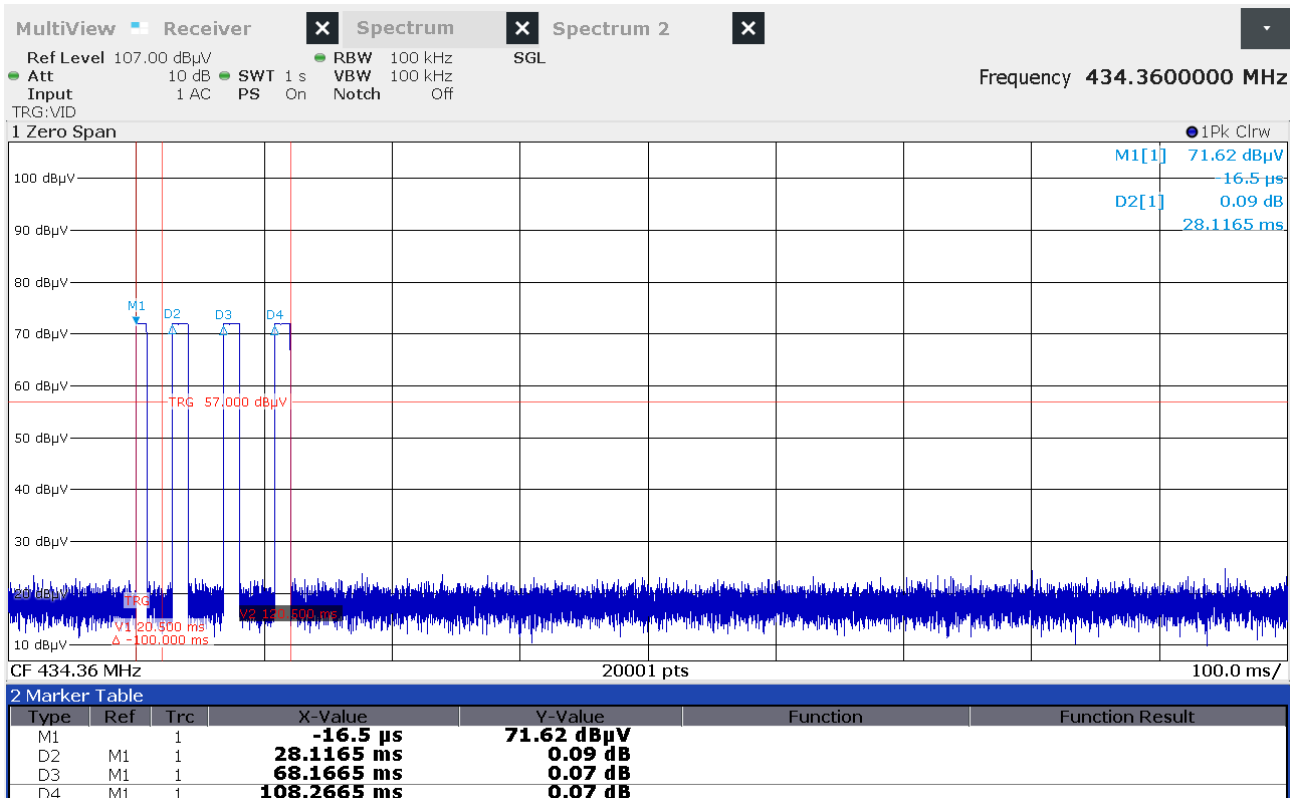
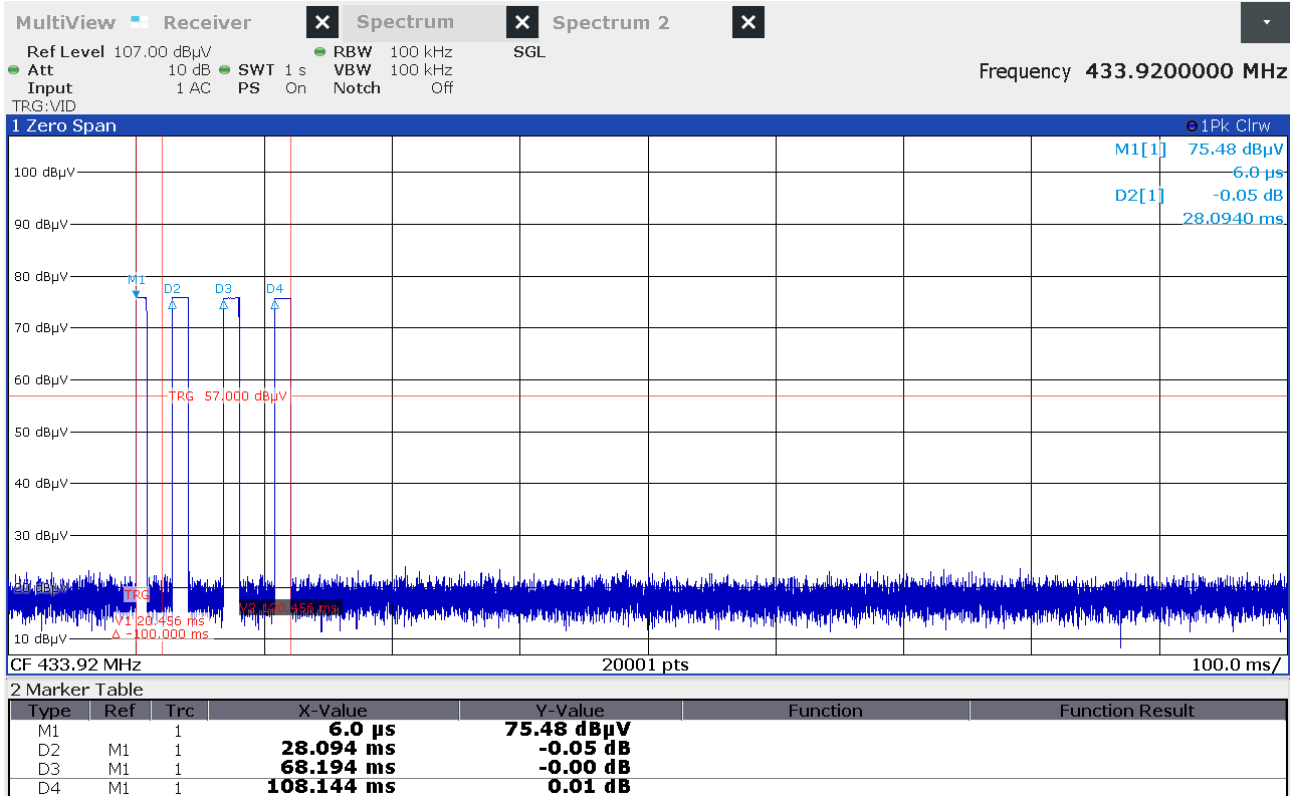
Remarks: For detailed test results please see the following test protocols.

FCC ID: KR5BCM37WBL

5.7.6 Test protocol – KESSY

Signal deactivation FCC Part 15C, Section 15.231(a)



FCC ID: KR5BCM37WBL
5.7.7 Test protocol – Service key
Signal deactivation
FCC Part 15C, Section 15.231(a)


FCC ID: KR5BCM37WBL

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.
All listed measuring devices were calibrated at the time of use.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPR 2	VULB 9168	01-02/24-20-001	12/02/2025	12/02/2024		
	ESR 7	02-02/03-17-001	01/08/2024	01/08/2023		
	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				
	50F-003 N 3 dB	02-02/50-21-010				
DC	EA-PS 3032-20 B	01-02/50-15-035				
	ESW26	02-02/03-17-002	16/04/2025	16/04/2024		
	RF Antenna	02-02/24-05-032				
MB	EA-PS 3032-20 B	01-02/50-15-035				
	ESW26	02-02/03-17-002	16/04/2025	16/04/2024		
	RF Antenna	02-02/24-05-032				
SER 1	ESR 7	02-02/03-17-001	01/08/2024	01/08/2023		
	HFH 2 - Z 2	02-02/24-05-020	01/06/2025	01/06/2022	05/09/2024	05/09/2023
	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 9168	01-02/24-20-001	12/02/2025	12/02/2024		
	ESR 7	02-02/03-17-001	01/08/2024	01/08/2023		
	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				
	50F-003 N 3 dB	02-02/50-21-010				
SER 3	ESW26	02-02/03-17-002	16/04/2025	16/04/2024		
	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	12/07/2024	12/07/2023		
	Sucoflex N-2000-SMA	02-02/50-05-075				
	WHJS 1000-10EF	02-02/50-13-003				