Annex 1: Measurement diagrams 17-1-0202201T01a-A1

Number of pages:	14	**Date of Report:**	2021-Mar-04
Testing company:	CETECOM GmbH Im Teelbruch 116 45219 Essen Germany Tel. + 49 (0) 20 54 / 95 19-0 Fax: + 49 (0) 20 54 / 95 19-150	**Applicant:**	Ovesco Endoscopy AG
Product:	**HemoPill acute / HemoPill Receiver / HemoPill Printer (no wireless communication)**		
Type:	**medical swallowable capsule / Medical device to receiving and displaying values measured by the HemoPill acute / HemoPill Printer**		
Model:	**HemoPill acute / HemoPill Receiver / HemoPill Printer (no wireless communication)**		
FCC ID:	2AYFH-OVE-HP	**IC:**	-
Testing has been carried out in accordance with:	**FCC Regulations: Title 47, Subpart 15.231(e)** **ISED Regulations: RSS-210, Issue 10 (2019-12), chapter A1.4; RSS-Gen, Issue 5 (2018-04)** Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		

Table of Contents

1 Measurement diagrams

1.1 Fundamental field strength (15.231(e))

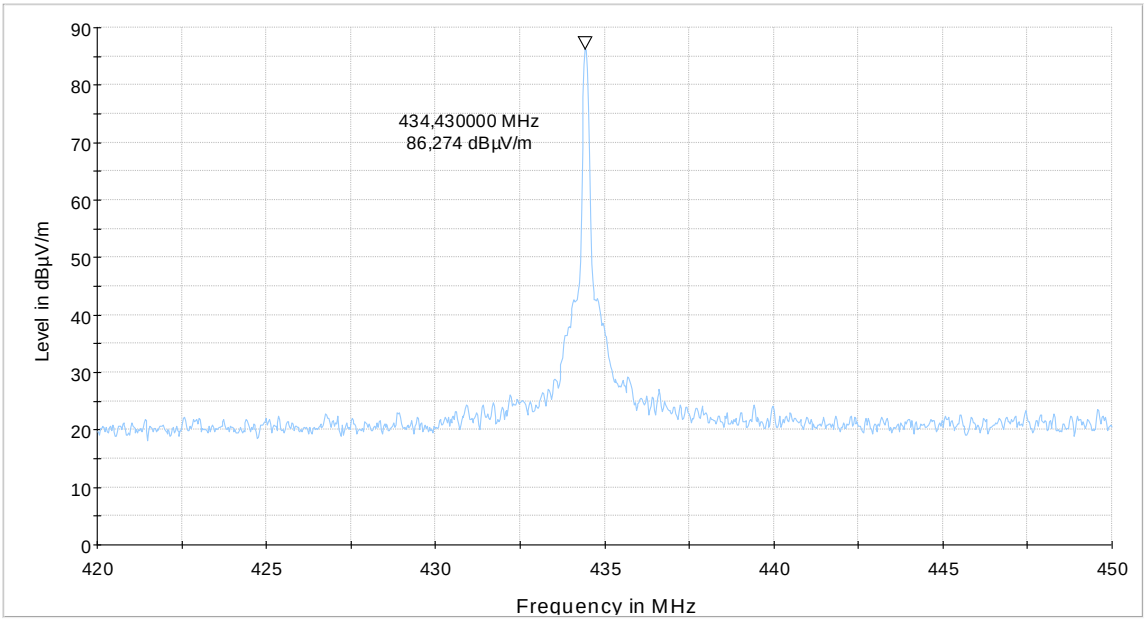


Diagram 3.02: EUT at lying position (see limit in the main test report)
AV-Value: 86.27 – 25.27 dB (Timing) = 61 dBµV/m@3m
Limit of FCC15.231(e) for fundamental emission at 434.43 MHz = 72.88 dBµV/m
Verdict: Passed.

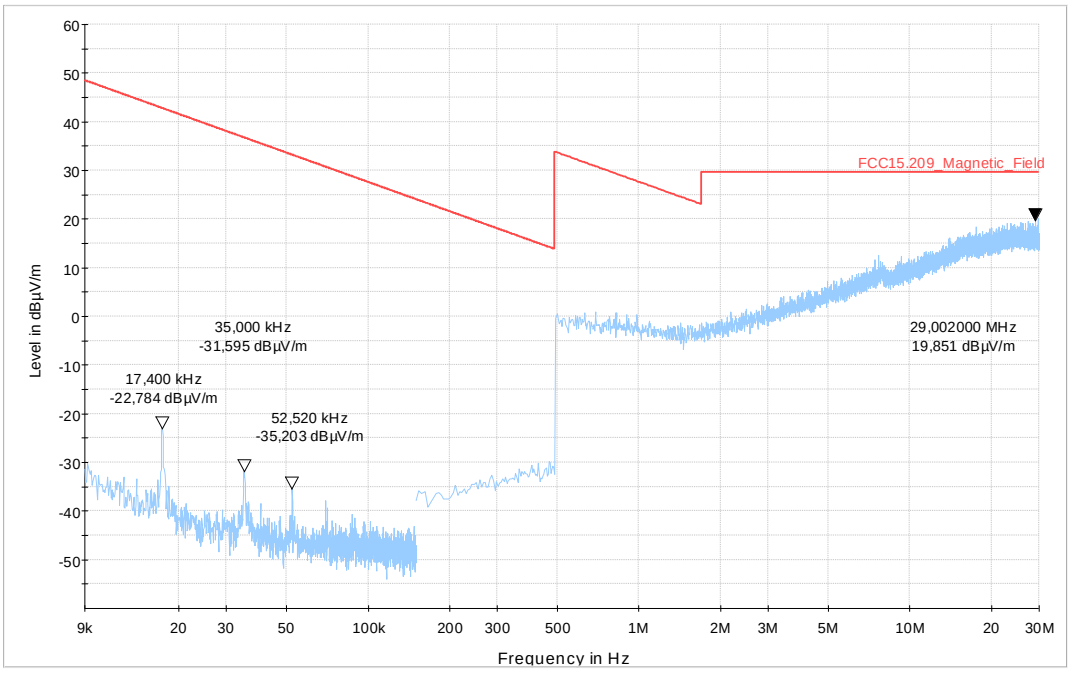
Remark: EUT has only been tested at lying position due to its small size.

1.2 Radiated magnetic field strength measurements (f < 30 MHz)

2.01_RSE_TX_CW_mode_EUT_standing

Common Information

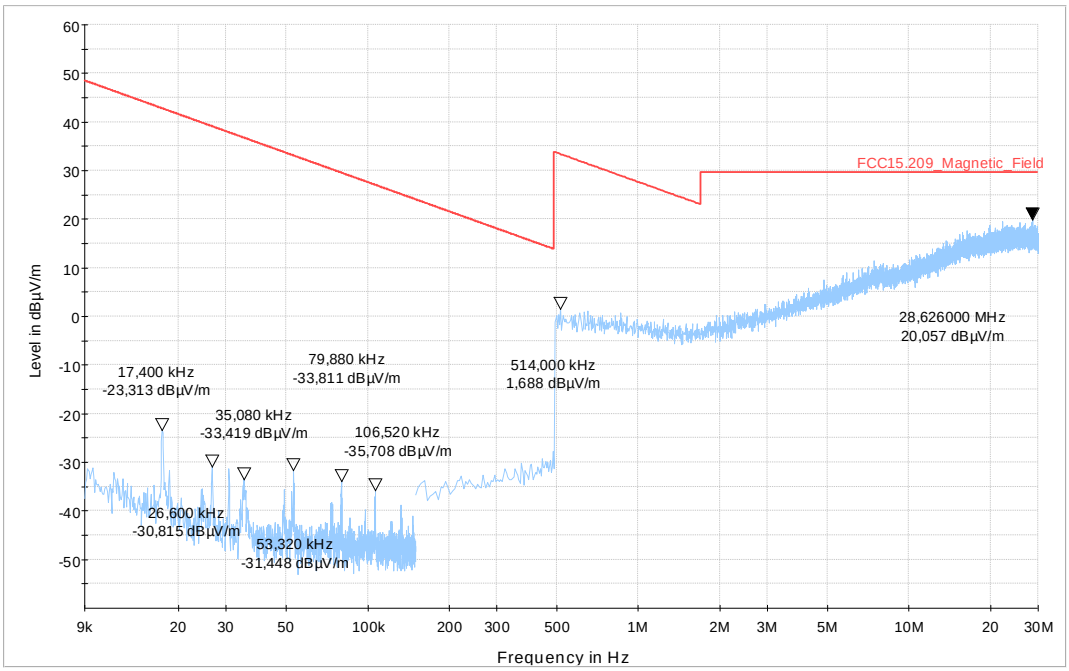
Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Used filter:	bypass
Test specification:	FCC 15.209/RSS-Gen, Issue 5
Operator:	GHu
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
EUT:	17-1-02022S17_C01
Operating Mode:	TX CW
Power during tests:	4.65 V external battery
EUT Setup:	EUT lying (EUT has only been tested at lying position due to its small size)
Verdict:	Passed



2.02_RSE_TX_normal_mode_EUT_lying

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Used filter:	bypass
Test specification:	FCC 15.209/RSS-Gen, Issue 5
Operator:	GHu
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
EUT:	17-1-02022S15_C01 + 17-1-02022S02_C01
Operating Mode:	TX normal mode
Power during tests:	4.65 V internal battery
EUT Setup:	EUT lying (EUT has only been tested at lying position due to its small size)
Verdict:	Passed

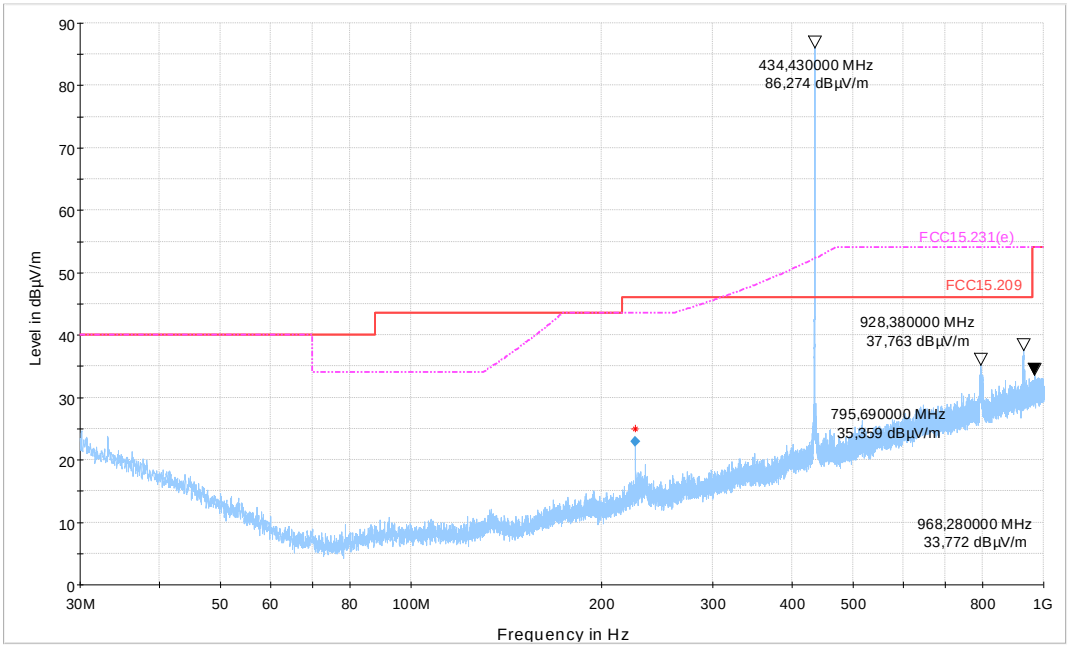


1.3 Radiated emissions in the frequency range 30 to 1000 MHz

3.11_RSE_TX_CW_mode_EUT_lying

Common Information

Test description:	Electric Field Strength Measurement
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	not used
Used filter:	not used
Test specification:	FCC §15.209/§15.231 / RSS-210, Issue10 / RSS-Gen, Issue 5
Operator:	GHu
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
EUT:	17-1-02022S17_C01
Operating Mode:	TX CW
Power during tests:	4.65 V external battery
EUT Setup:	EUT lying (EUT has only been tested at lying position due to its small size)
Verdict:	Passed



Final_Result

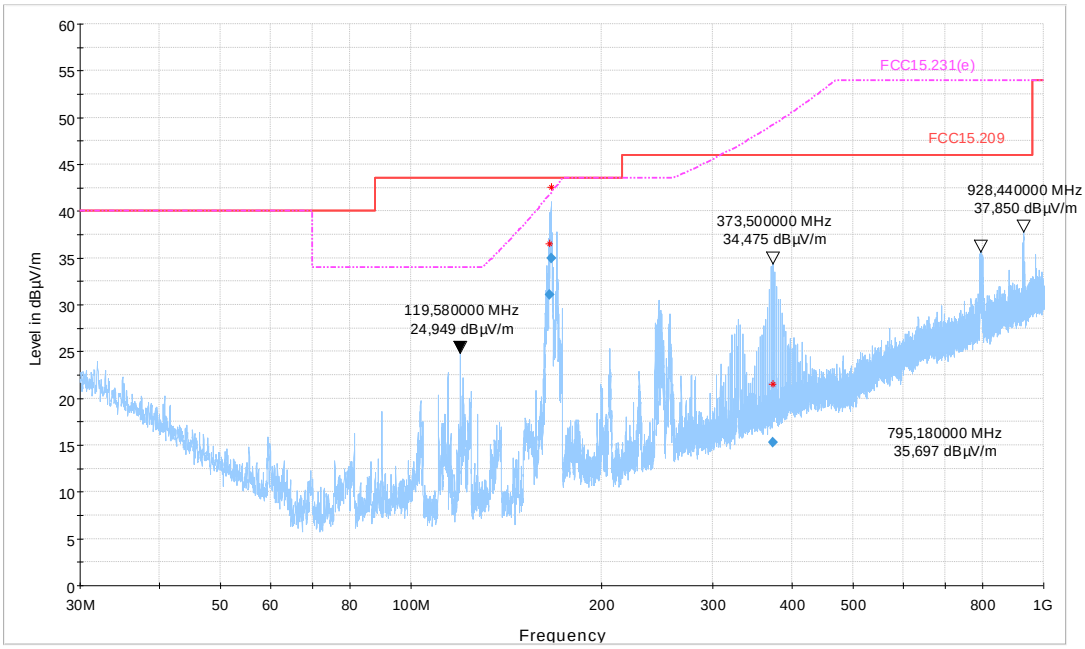
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
226.452000	22.90	46.00	23.10	1000.0	120.000	135.0	H	214.0	12.7

Remark 1: The marked emissions at 795 MHz and 928 MHz are external emissions, which are irrelevant to the limit.
Remark 2: The carrier at 434 MHz is visible in the diagram, which is irrelevant to the limit.

3.12_RSE_TX_normal_mode_EUT_lying

Common Information

Test description:	Electric Field Strength Measurement
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	not used
Used filter:	not used
Test specification:	FCC §15.209/§15.231 / RSS-210, Issue10 / RSS-Gen, Issue 5
Operator:	GHu
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
EUT:	17-1-02022S15_C01 + 17-1-02022S02_C01
Operating Mode:	TX normal mode
Power during tests:	4.65 V internal battery
EUT Setup:	EUT lying (EUT has only been tested at lying position due to its small size)
Verdict:	Passed



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
165.556000	31.09	43.50	12.41	1000.0	120.000	210.0	H	7.0	9.8
166.500000	34.97	43.50	8.53	1000.0	120.000	203.0	H	173.0	9.9
373.448000	15.31	46.00	30.69	1000.0	120.000	138.0	H	322.0	16.9

Remark: The marked emissions at 795 MHz and 928 MHz are external, which are irrelevant to the limit.

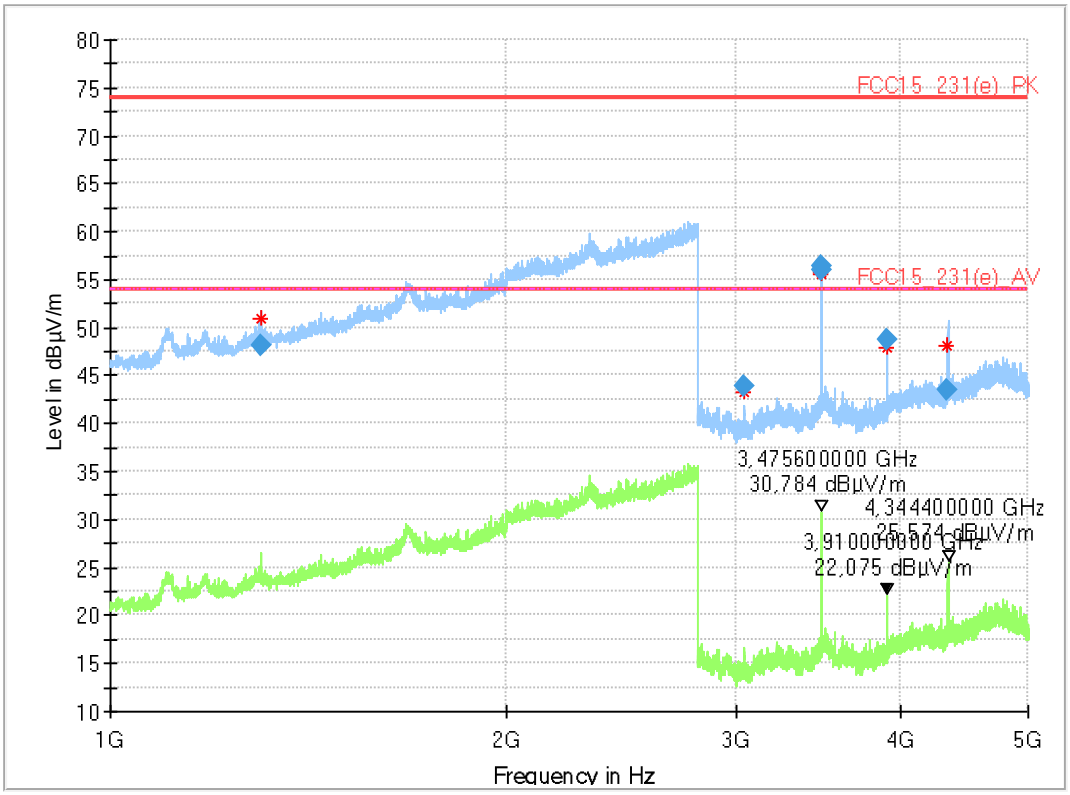
1.4 Radiated emissions in the frequency range above 1000 MHz

4.01_RSE_TX_CW_mode

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.231
Antenna polarization:	horizontal/vertical
Test specification:	FCC §15.209/§15.231 / RSS-210, Issue10 / RSS-Gen, Issue 5
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
Operator:	GHu
EUT:	S17_C01
Operating Mode:	TX CW
EUT Setup:	EUT set up on the elevation table
Verdict:	Pass

Full Spectrum



Remark: the green trace (AV value) is calculated from the blue trace (PK detector) + duty cycle correction factor (-25.27 dB).

Final_Result

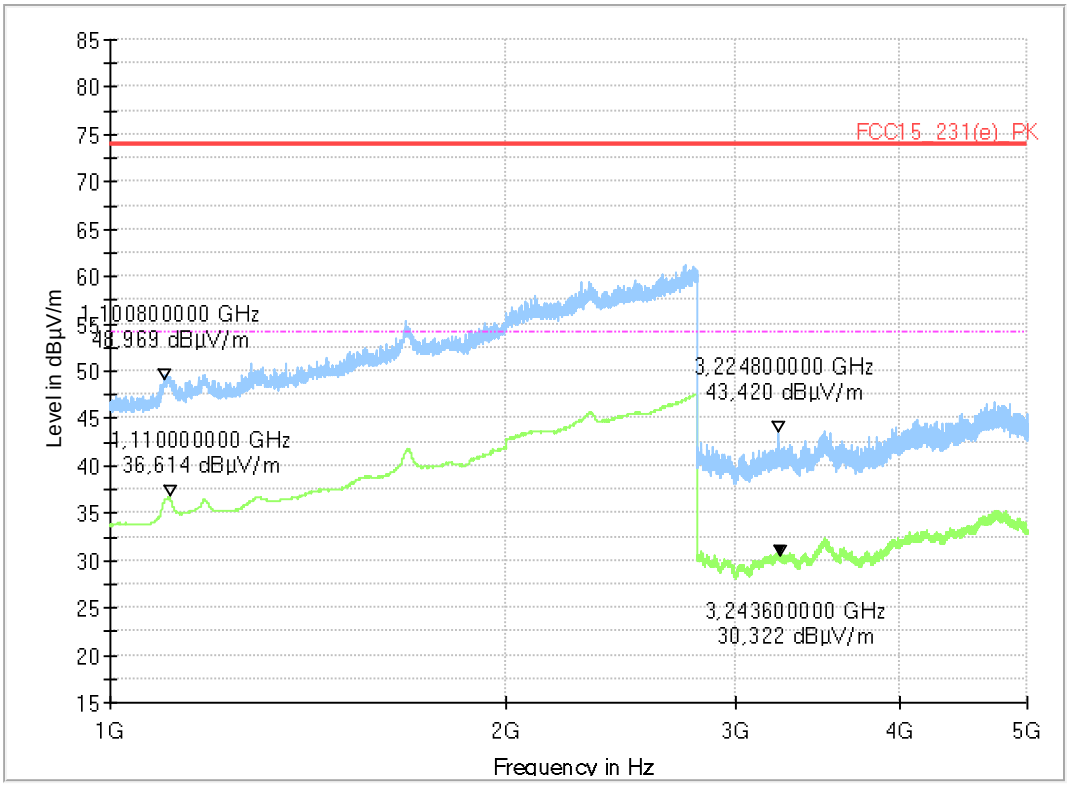
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1303.780000	48.19	74.00	25.81	100.0	1000.000	V	174.0	90.0	30
3041.100000	43.95	74.00	30.05	100.0	1000.000	H	138.0	90.0	1
3475.540000	56.44	74.00	17.56	100.0	1000.000	H	137.0	90.0	3
3475.740000	55.92	74.00	18.08	100.0	1000.000	H	137.0	90.0	3
3909.980000	48.69	74.00	25.31	100.0	1000.000	H	128.0	0.0	3
4343.940000	43.53	74.00	30.47	100.0	1000.000	H	136.0	0.0	4

4.02_RSE_TX_normal_mode

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.231
Antenna polarization:	horizontal/vertical
Test specification:	FCC §15.209/§15.231 / RSS-210, Issue10 / RSS-Gen, Issue 5
Environmental Conditions::	Humidity : 40% rH; Temperature: 21 °C
Operator:	GHu
EUT:	17-1-02022S15_C01 + 17-1-02022S02_C01
Operating Mode:	TX normal mode
EUT Setup:	EUT set up on the elevation table
Verdict:	Pass

Full Spectrum



1.5 20dBc bandwidth & 99% occupied bandwidth

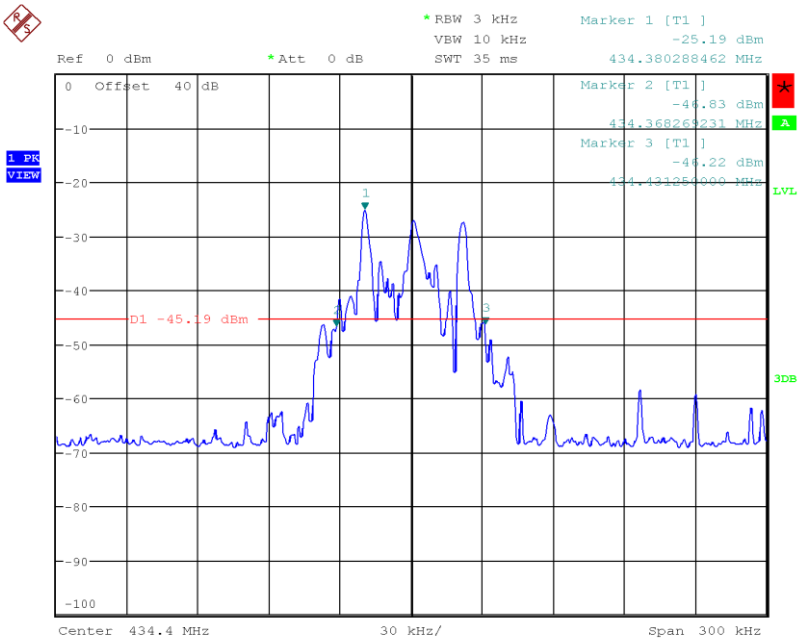


Diagram 1.: 20 dBc bandwidth of the modulated signal

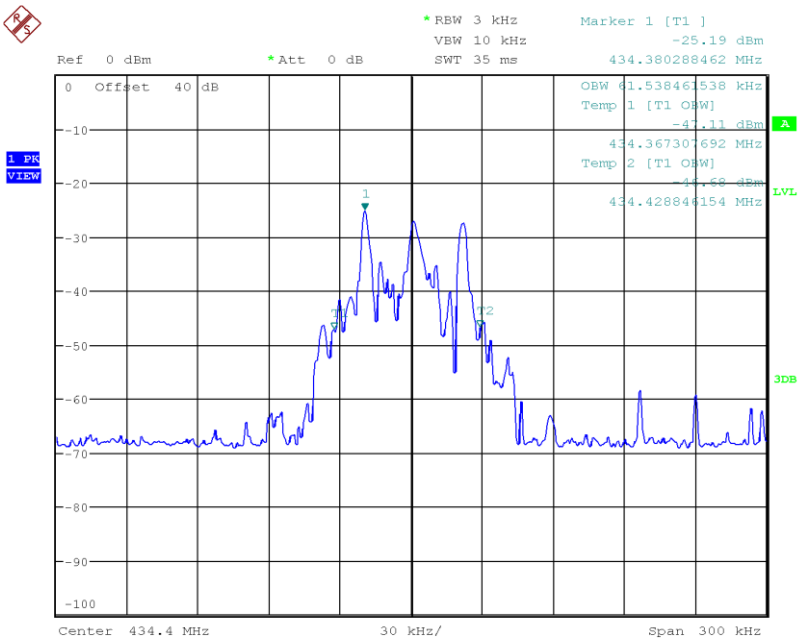


Diagram 2.: 99% occupied bandwidth of the modulated signal

1.6 Duty-Cycle correction

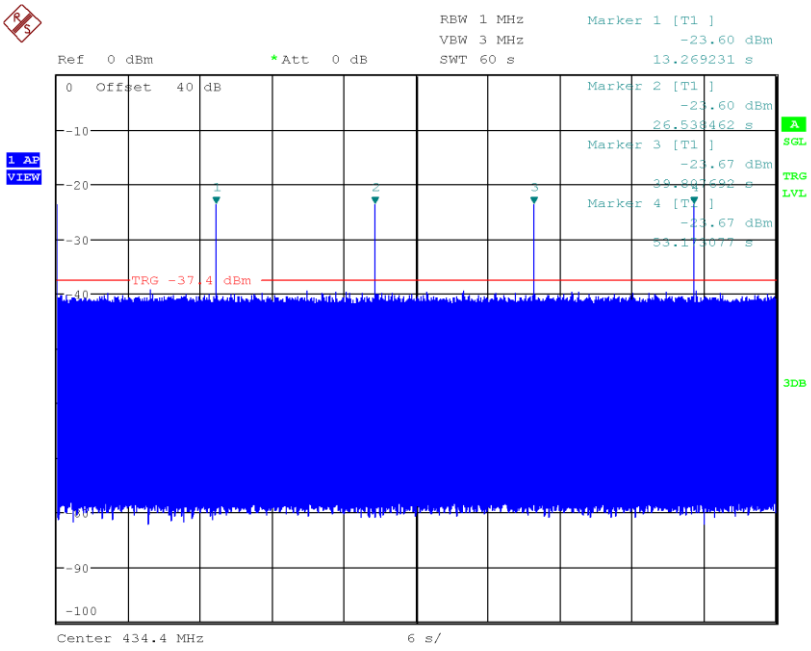
A duty-cycle Peak to AV applies since the transmitter is not 100% on during a 100 ms time unit. Pls. see below diagrams showing the behavior of the pulses and calculations performed

Worst-Case Duty-Cycle correction = -25.27 dB (Section 1.7.1.1)

1.7 Transmission characteristics

1.7.1 Automatically limiting operation

1.7.1.1 Normal mode



Date: 6.JAN.2021 14:25:16

Diagram 40.01 – Overview with a time span of 60 s.

- ➔ A single pulse repeats every 13 s
- ➔ Transmission does not stop after 5 s --> §15.231(e) applies
- ➔ Silent period between transmission is 13.25 s

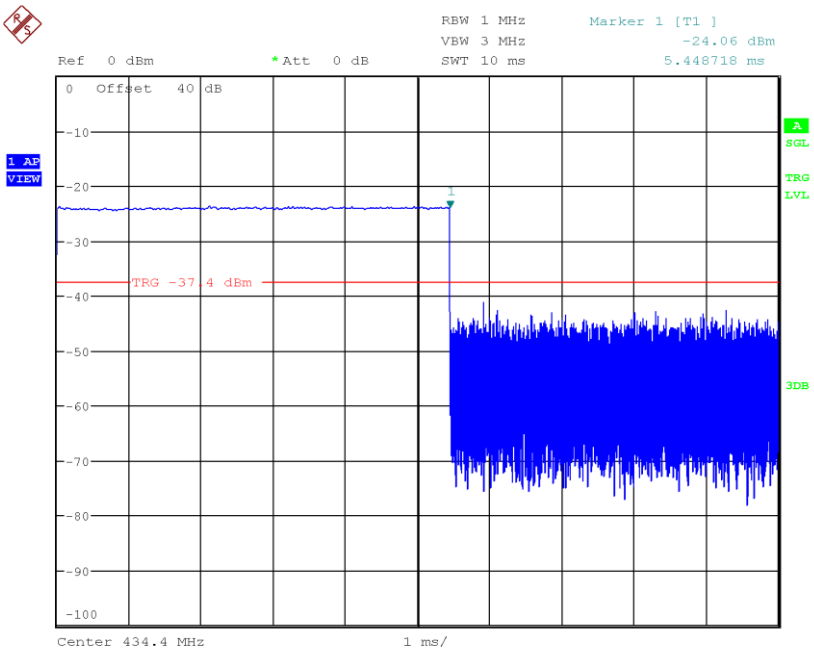


Diagram 40.02 – Closer view of a single pulse (5.45 ms) (Pulse duration)

Criterion 1: each transmission shall not be greater than 1 s

➔ Pulse duration is less than 1 s --> passed

Criterion 2: the silent period between transmissions shall be at least 30 times the duration of the transmission

➔ 30 times pulse duration is 163.5 ms

➔ The silent period (13.25 s) is more than 30 time the pulse duration (0.16 s) --> passed

Criterion 3: the silent period between transmissions shall not be less than 10 s

➔ The silent period (13.25 s) is also more than 10 s --> passed

1.7.2 Evaluation of the average factor (Duty cycle correction)

Cycle Time: TX_{ON}-Pulse1 + TX_{OFF} = 13.25 s (read from marker 1 in diagram 40.01)

Only one Pulse can be observed during a period of 100 ms:

Therefore: Duty-Cycle [dB] related to 100 ms = $20*\log_{10}(5.45\ ms/100\ ms)$= -25.27 dB

➔ Peak to AV correction factor for the measured field strength of the radiated emissions:
–25.27 dB

End of Annex 1