



RF - TEST REPORT

- FCC Part 15.247, RSS-247 -

Type / Model Name : RC66

Product Description : Receiver unit for measuring probe

Applicant : Blum-Novotest GmbH

Address : Kaufstrasse 14

88287 Grünkraut, Germany

Manufacturer : Blum-Novotest GmbH

Address : Kaufstrasse 14

88287 Grünkraut, Germany

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

POSITIVE

Test Report No. : **80087508-04 Rev_1**

06. October 2021

Date of issue



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

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2020)

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 (September 2020)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
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 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
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
KDB 558074 D01 v05	Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.

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 General remarks

None.

2.4 Photo documentation of the EUT – Detailed photos see Attachment A

2.5 Equipment category

Proprietary transceiver

2.6 Short description of the equipment under test (EUT)

Receiver unit for measuring probe.

Number of tested samples:	1 radiated	1 conducted
Serial number:	300112219	300112400

EUT configuration:

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

2.7 Variants of the EUT

There are no variants.

2.8 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

The EUT provides only 3 Channels:

CH A	2412 MHz
CH B	2437 MHz
CH C	2462 MHz

2.9 Transmit operating modes

The EUT has two identical transmitters and two identical antennas. Active transmitter and active antenna can be set by software. However, if both transmitters are active, they can only transmit on the same antenna.

Every transmitter can send independently on 3 different channels and power can be set to half or a maximum value.

2.10 Antennas

The following antennas shall be used with the EUT:

Antenna	Characteristic	Frequency Range (GHz)	Peak Gain
A	Omni	2.4 – 2.5	+2 dBi typ.
B	Omni	2.4 – 2.5	+2 dBi typ.

2.11 Power supply system utilised

Power supply voltage : 24 V DC (over IF20)

All tests were carried out with a supply voltage of 24 V DC unless otherwise stated.
Exceptions are described in the detailed test conditions.

2.12 Extreme test conditions

The extreme temperature range for the EUT is defined by the manufacturer:
+5 °C to +50 °C, $T_{nom} = 20\text{ °C}$;

2.13 Peripheral devices and interface cables

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

- Test jig _____ Model : IF20 _____

2.14 Determination of worst case conditions for final measurement

Transmitter #1 is tested fully with both antennas (A and B) on all three available channels
Transmitter #2 is tested in combination with transmitter #1.

For the final test the following channels and test modes are selected:

Transmitter	Antenna	Tested channels	Power setting
#1	A	A, B, C	P63
#1	B	A, B, C	P63
#1 & #2	A	A, B, C	P63
#1 & #2	B	A, B, C	P63
RX	A	-	-

Transmitter sets a TX continuous, modulated signal.
Both transmitter off sets RX continuous mode.

2.14.1 Test jig

To set testmodes the IF20 is used to power and control the EUT.

2.14.2 Test software

RC66 Gen2 SendingMode - Control

IF20 COM8

Verbinden & Start "SendMode"

Trennen

Diversity

☒ Position A

☐ Position B

Chip #1

Frequenz

☒ CH A (2,412GHz)

☐ CH B (2,437GHz)

☐ CH C (2,462GHz)

☐ TX An / Aus

RF Power

Max Pwr (63 | +1dBm)

Red Pwr (35 | -10dBm)

63

Schreiben

Chip #2

Frequenz

☒ CH A (2,412GHz)

☐ CH B (2,437GHz)

☐ CH C (2,462GHz)

☐ TX An / Aus

RF Power

Max Pwr (63 | +1dBm)

Red Pwr (35 | -10dBm)

63

Schreiben

Diversity Switch auf A

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.

3 TEST RESULT SUMMARY

WLAN device using digital modulation:

Operating in the 2400 MHz – 2483.5 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS Gen, 8.8	AC power line conducted emissions	not applicable
15.247(a)(2)	RSS-247, 5.2(1)	6 dB EBW	passed
15.247(b)(3)	RSS-247, 5.4(4)	Peak power	passed
15.247(d)	RSS-247, 5.5	Unwanted emission, radiated	passed
15.247(d)	RSS-Gen, 8.10	Emissions in restricted bands	passed
15.247(e)	RSS-247, 5.2(2)	PSD	passed
15.35(c)	RSS-Gen, 6.10	Pulsed operation	passed
15.247(b)(4)	-	Antenna requirement	passed
	RSS-Gen, 6.11	Transmitter frequency stability	passed
	RSS-Gen, 6.6	99 % Bandwidth	passed

AC power line conducted emissions are not applicable because the device is used only in industrial environment and therefore not connected to the public utility (AC) power line.

The mentioned RSS Rule Parts in the above table are related to:

RSS-Gen, Issue 5 + Amendment 1, March 2019

RSS-247, Issue 2, February 2017

3.1 Final assessment

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

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

Testing commenced on : 26 July 2021

Testing concluded on : 17 August 2021

Checked by:

Tested by:

Jürgen Pessinger
Radio Team

Lukas Scheuermann
Radio Team

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.

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.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	± 2.5 x 10 ⁻⁷
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

4.5 Measurement protocol for FCC and ISED

4.5.1 General information

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

FCC: DE 0011
ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

4.5.2.1 Justification

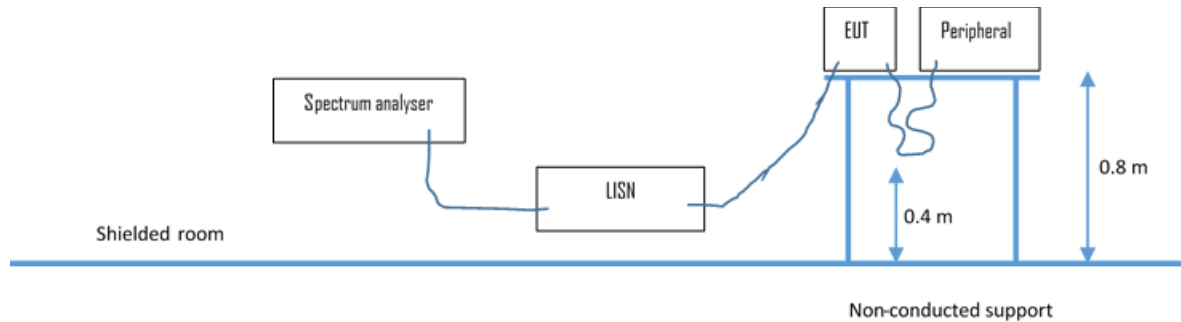
The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

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.

4.5.3 Details of test procedures

4.5.3.1 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:

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

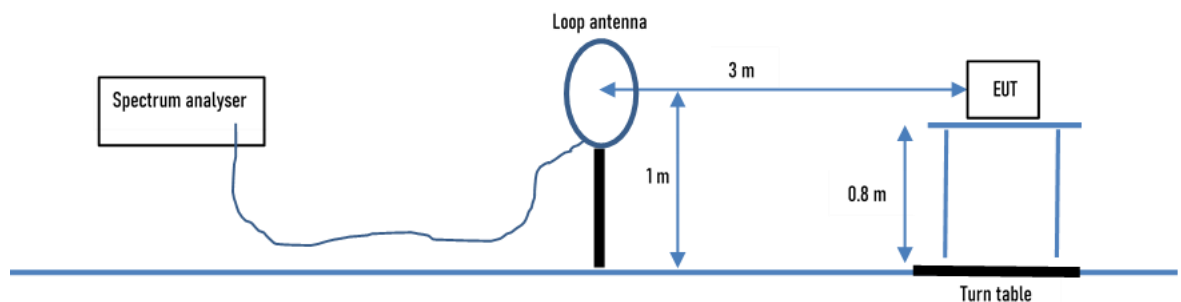
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

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.

4.5.3.2 Radiated emission

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

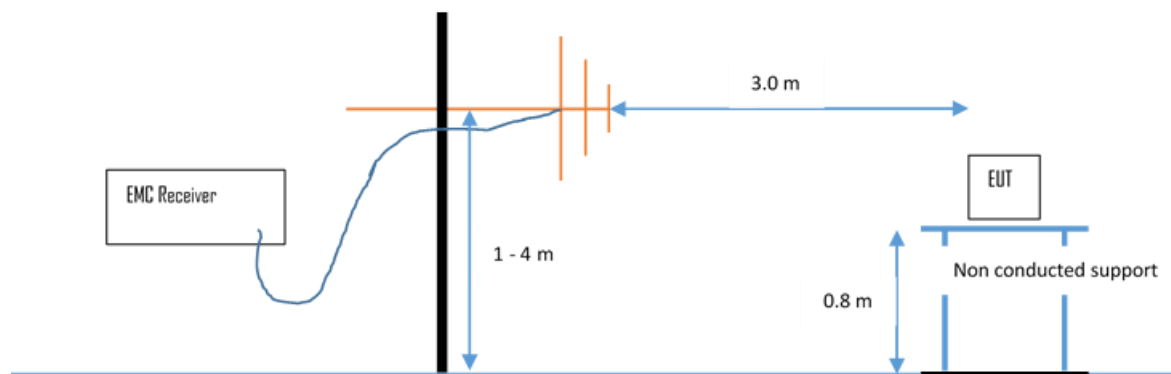
Test setup according ANSI C63.10



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.

4.5.3.2.2 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:

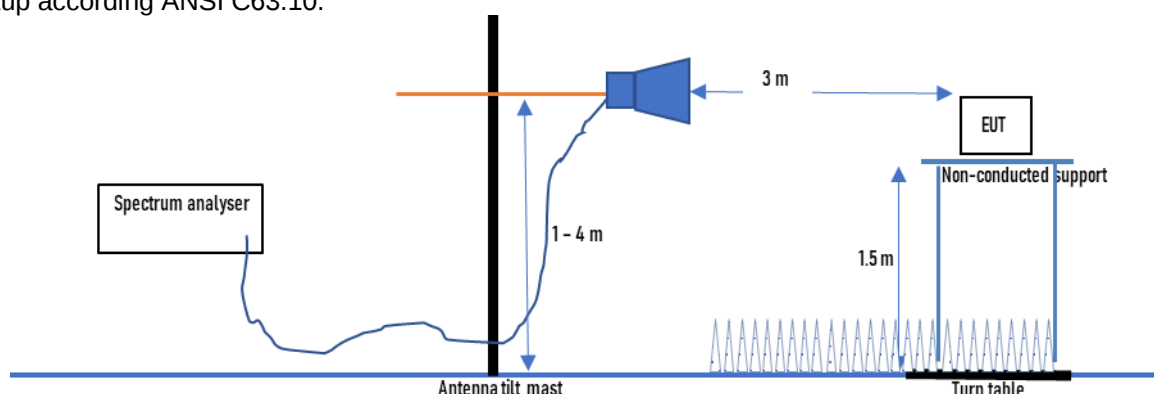
30 MHz – 1000 MHz: RBW: 120 kHz

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

4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

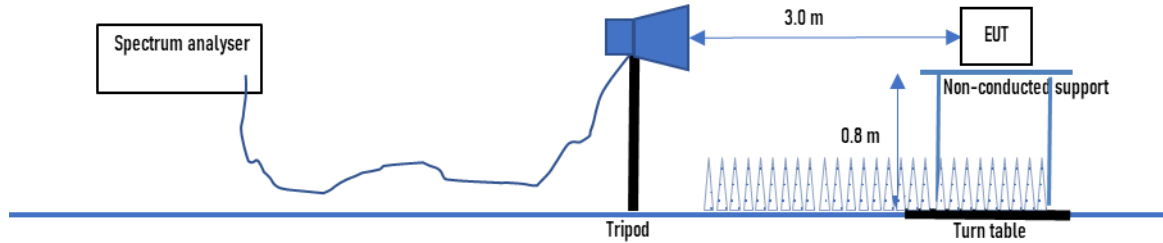
Test setup according ANSI C63.10.



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 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.

4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 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, 0.8 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. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit are adopted.

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.

5 TEST CONDITIONS AND RESULTS

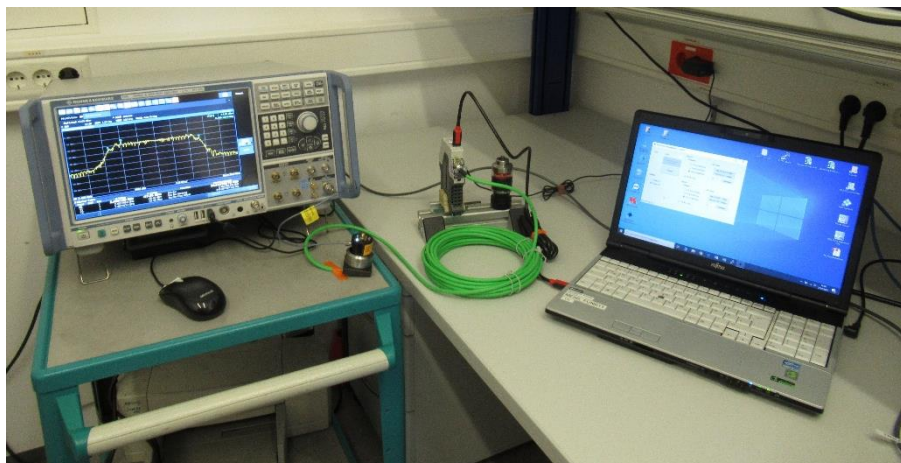
5.1 Emission bandwidth and occupied bandwidth

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

5.1.1 Description of the test location

Test location: AREA4

5.1.2 Photo documentation of the test set-up



5.1.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(2):

Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.1.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at the transmitter at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyser.

Spectrum analyser settings:

RBW: 100 kHz VBW: 300 kHz, Detector: Peak, Trace mode: max hold;

5.1.5 Test result

Channel	Centre frequency	6 dB bandwidth	99% OBW	Minimum limit
	(MHz)	(MHz)	(MHz)	(MHz)
A	2412	14.166	16.138	0.5
B	2437	14.201	16.139	0.5
C	2462	14.146	16.117	0.5

Note: There is no limit for the OBW 99 %.

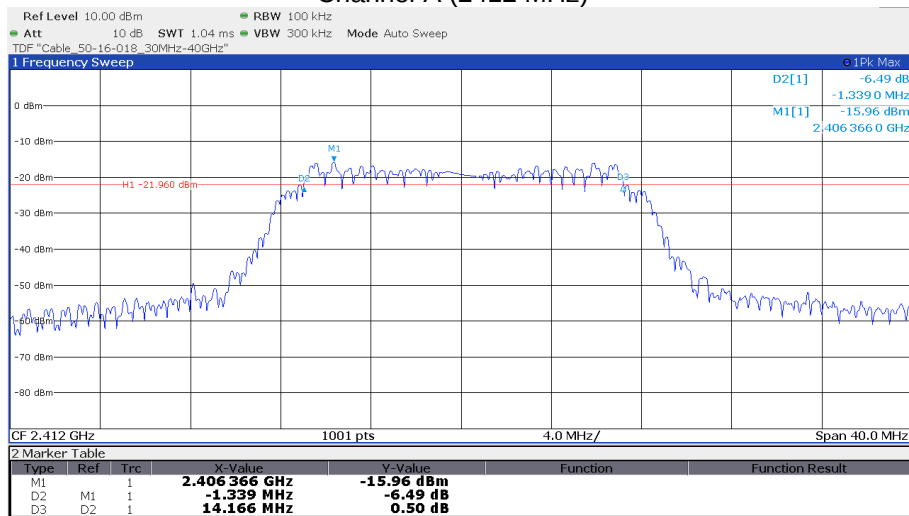
5.1.6 Limit

The requirements are **FULFILLED**.

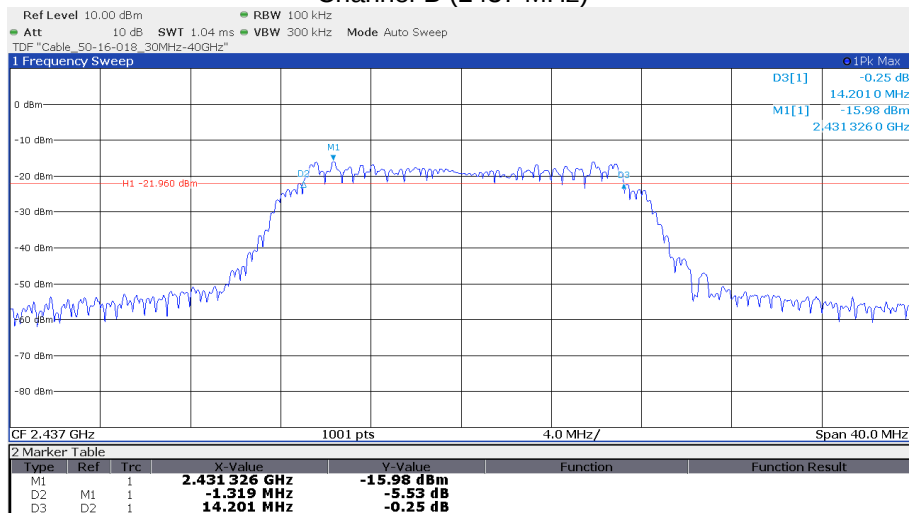
Remarks: For detailed test results please refer to following test protocols.

5.1.7 Test protocols emission bandwidth 6 dB

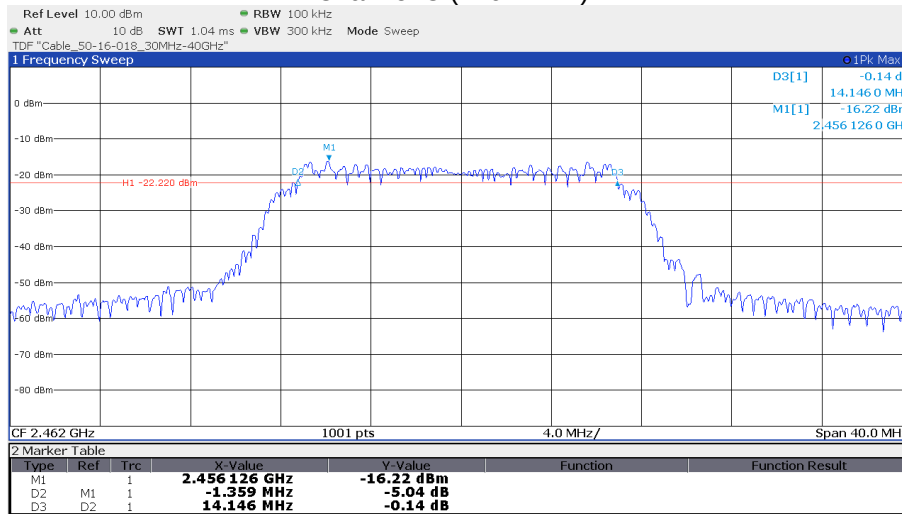
Channel A (2412 MHz)



Channel B (2437 MHz)

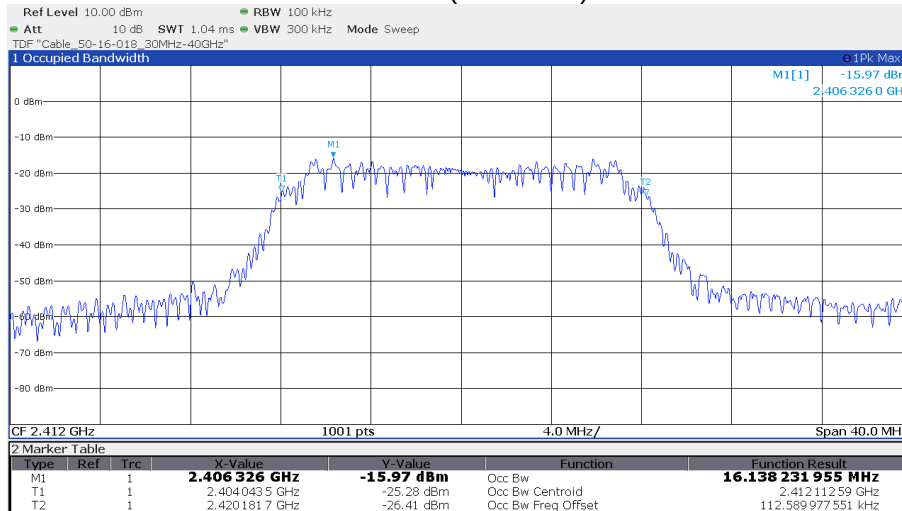


Channel C (2462 MHz)

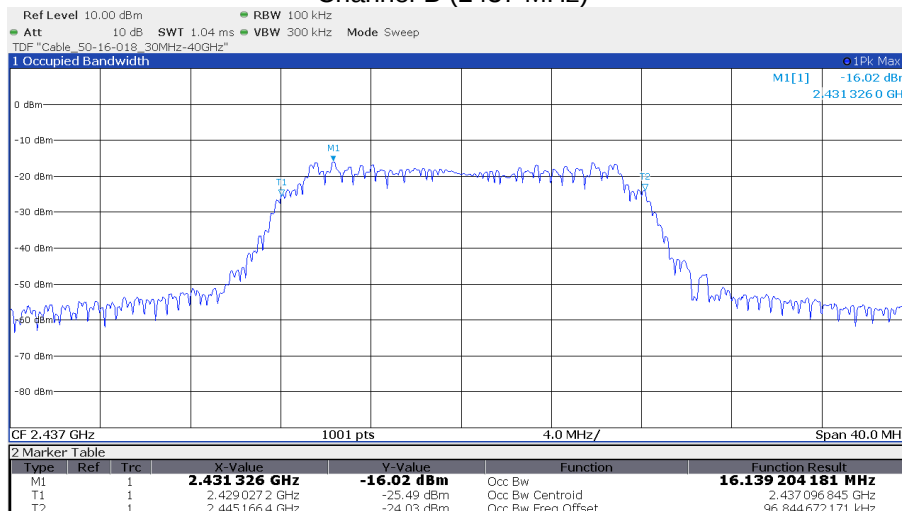


5.1.8 Test protocols OBW 99 %

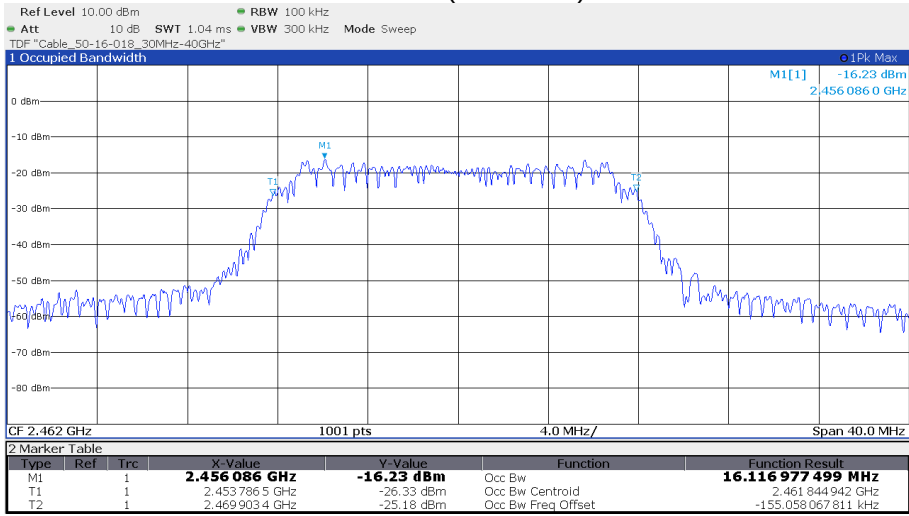
Channel A (2412 MHz)



Channel B (2437 MHz)



Channel C (2462 MHz)



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.

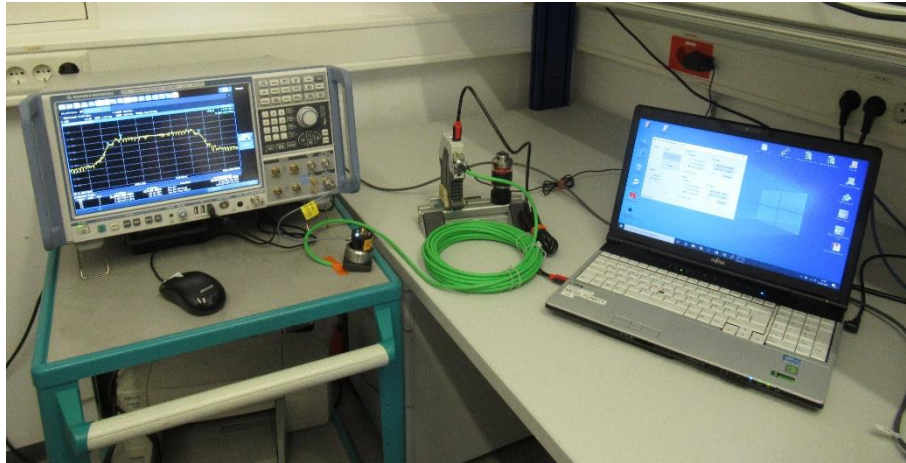
5.2 Maximum peak conducted output power

For test instruments and accessories used see section 6 Part **CPC 3**.

5.2.1 Description of the test location

Test location: Shielded Room S6

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3):

For systems using digital modulation in the 2400-2483.5 MHz and 5725 – 5850 MHz bands, the maximum peak output power of the transmitter shall not exceed 1 Watt. The limit is based on transmitting antennas of directional gain that do not exceed 6 dBi.

5.2.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser following the procedure set out in ANSI C64.10, item 11.9.1.1. The EUT is set in TX continuous mode while measuring.

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.

5.2.5 Test result

Conducted Measurement Pos.A				
CH	Transmitter #1 Pos.A (dBm)	Transmitter #2 Pos.A (dBm)	Calculated Transmitter #1 Pos.A (dBm)	Limit (dBm)
2412	-2.73	-1.56	0.90	30
2437	-2.73	-1.56	0.90	
2462	-2.70	-1.67	0.86	

Conducted Measurement Pos.B				
CH	Transmitter #1 Pos.B (dBm)	Transmitter #2 Pos.B (dBm)	Calculated Transmitter #1 Pos.B (dBm)	Limit (dBm)
2412	-0.78	-2.31	1.53	30
2437	-0.86	-2.35	1.47	
2462	-1.14	-2.61	1.20	

Radiated Measurement					
CH	Measured Transmitter #1 Pos.A (dBμV/m)	EIRP Transmitter #1 Pos.A (dBm)	Measured Transmitter #1 Pos.B (dBμV/m)	EIRP Transmitter #1 Pos.B (dBm)	Limit (dBm)
2412	96.46	1.30	98.36	3.20	36
2437	99.16	4.00	99.04	3.88	
2462	98.48	3.32	98.27	3.11	

EIRP in dBm was calculated by following formula:

$$\frac{EIRP}{dBm} = \frac{E}{dB\mu V/m} + 20 \lg(d) - 104.7$$

5.2.6 Limit

Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

Frequency (MHz)	Peak power limit	
	(dBm)	(Watt)
902 - 928	30	1.0
2400 - 2483.5	30	1.0
5725 - 5850	30	1.0

The requirements are **FULFILLED**.

Remarks:

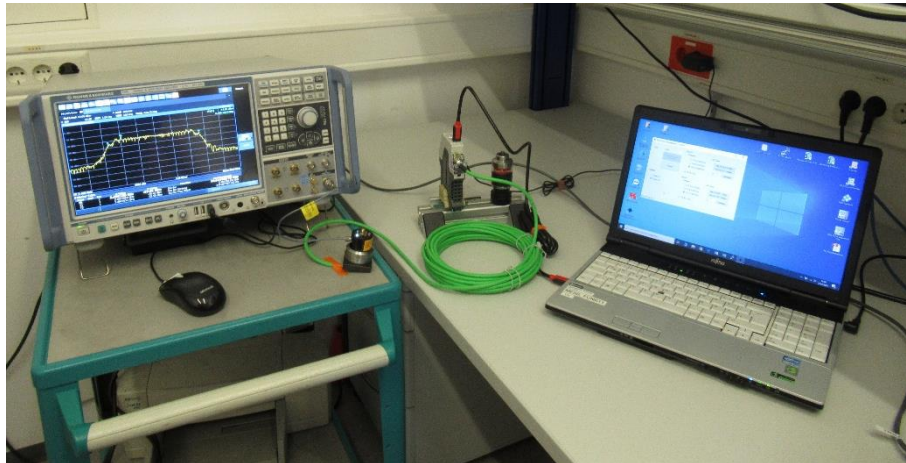
5.3 Power spectral density

For test instruments and accessories used see section 6 Part CPC 3.

5.3.1 Description of the test location

Test location: Shielded Room S6

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

According to FCC Part 15, Section 15.247(e):

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.3.4 Description of Measurement

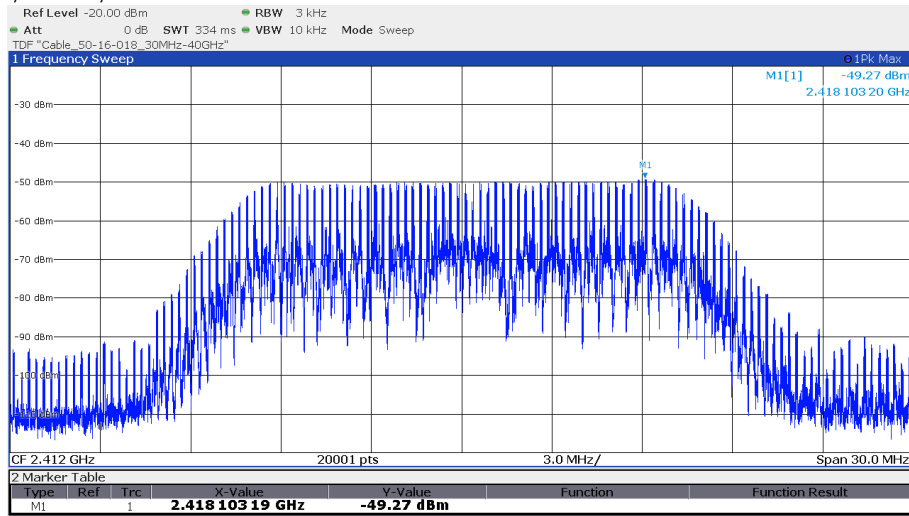
The measurement is performed using the procedure set out in ANSI C64.10, item 11.10.21. The power measurement was done as peak power measurement. Therefore, the PKPSD is measured. The max peak was located and with the spectrum analyser and a marker set to peak.

Spectrum analyser settings:

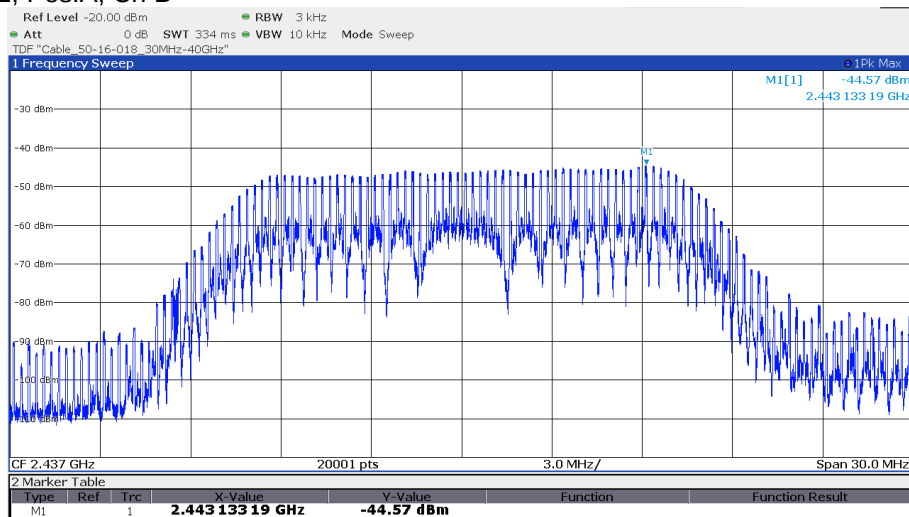
RBW: 3 kHz, VBW: 10 kHz, Detector: Peak, Sweep time: 10 s,

5.3.5 Test protocols

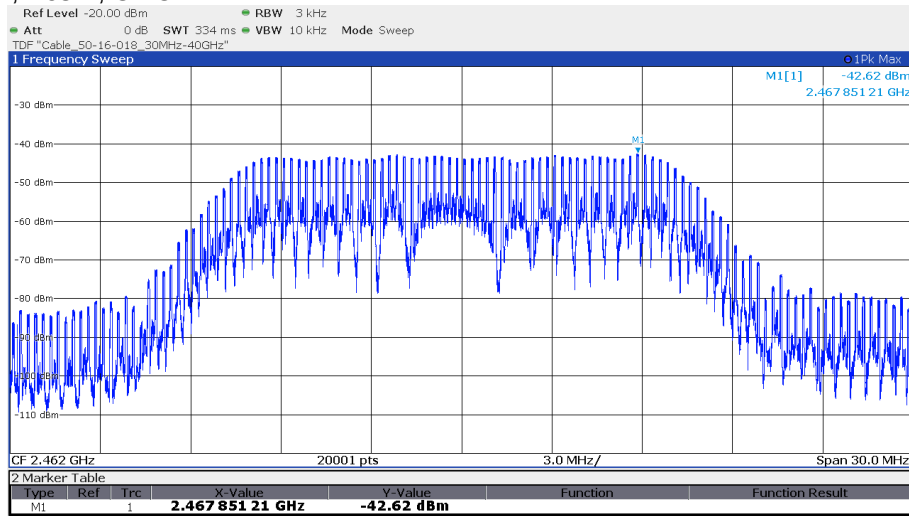
Transmitter #1 & #2, Pos.A, Ch A



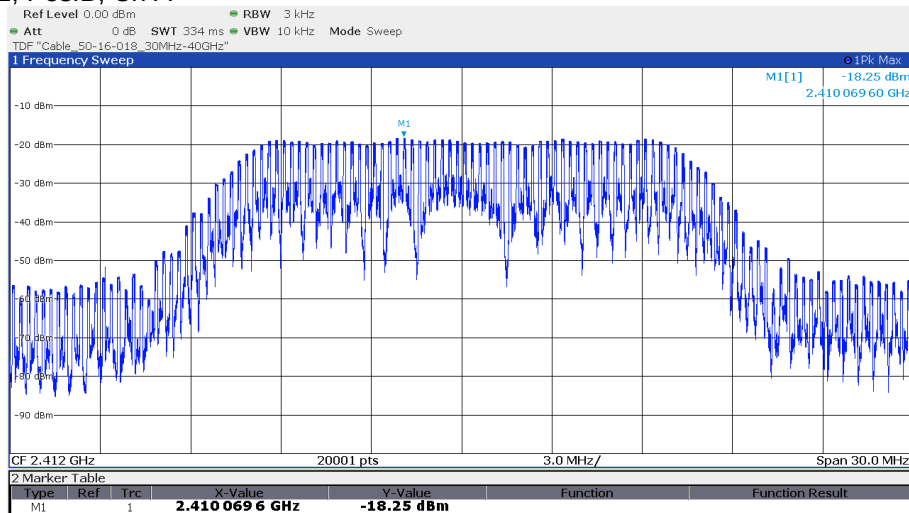
Transmitter #1 & #2, Pos.A, Ch B



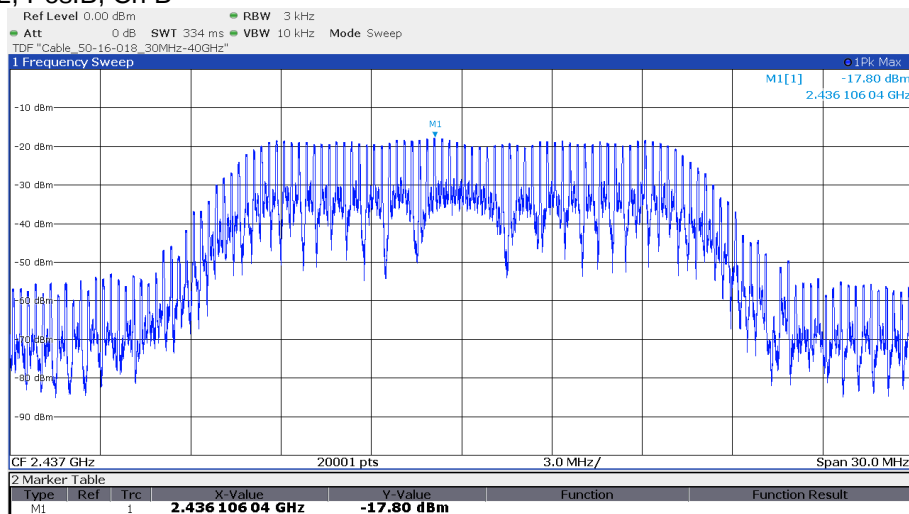
Transmitter #1 & #2, Pos.A, Ch C



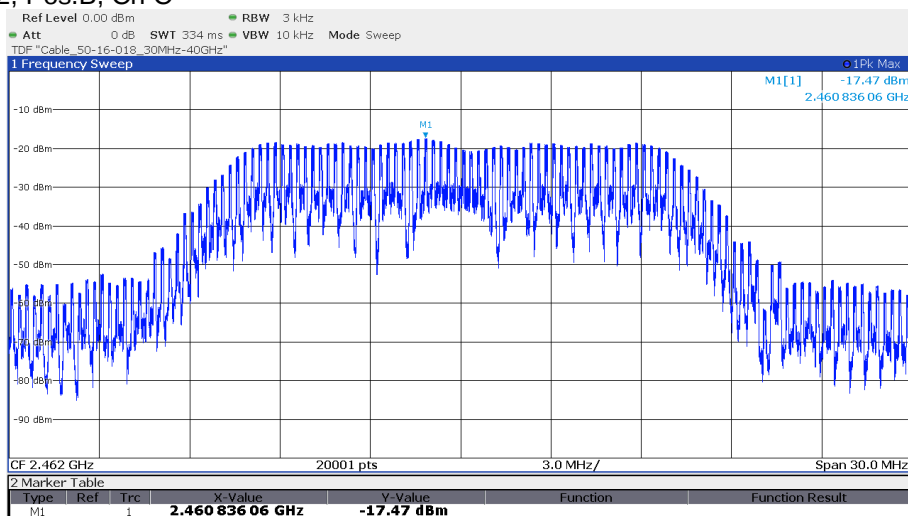
Transmitter #1 & #2, Pos.B, Ch A



Transmitter #1 & #2, Pos.B, Ch B



Transmitter #1 & #2, Pos.B, Ch C



Maximum measured PSD: -17.47 dBm

5.3.6 Limit

Power spectral density limit according to FCC Part 15, Section 15.247(e):

Frequency (MHz)	Power spectral density limit	
	(dBm/3 kHz)	
2400 – 2483.5	8	
5725 - 5850	8	

The requirements are **FULFILLED**.

Remarks:

5.4 Unwanted emissions in restricted bands, radiated

For test instruments and accessories used see section 6 Part **SER 2** and **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

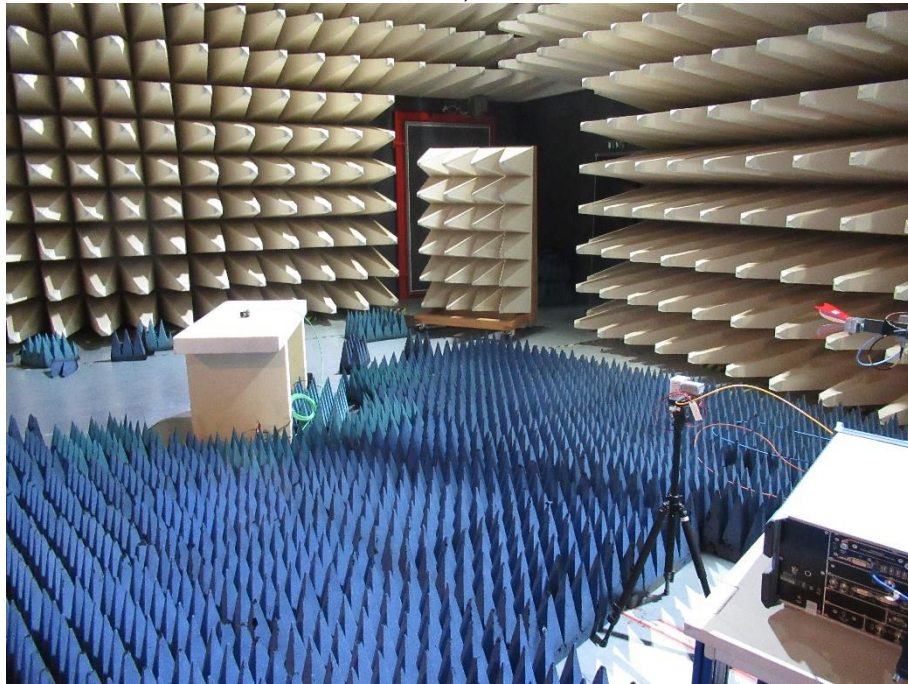
Open area test site, 30 MHz - 1000 MHz



Anechoic chamber, 1 GHz - 18 GHz



Anechoic chamber, 18 GHz - 40 GHz



5.4.3 Applicable standard

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

5.4.4 Description of measurement

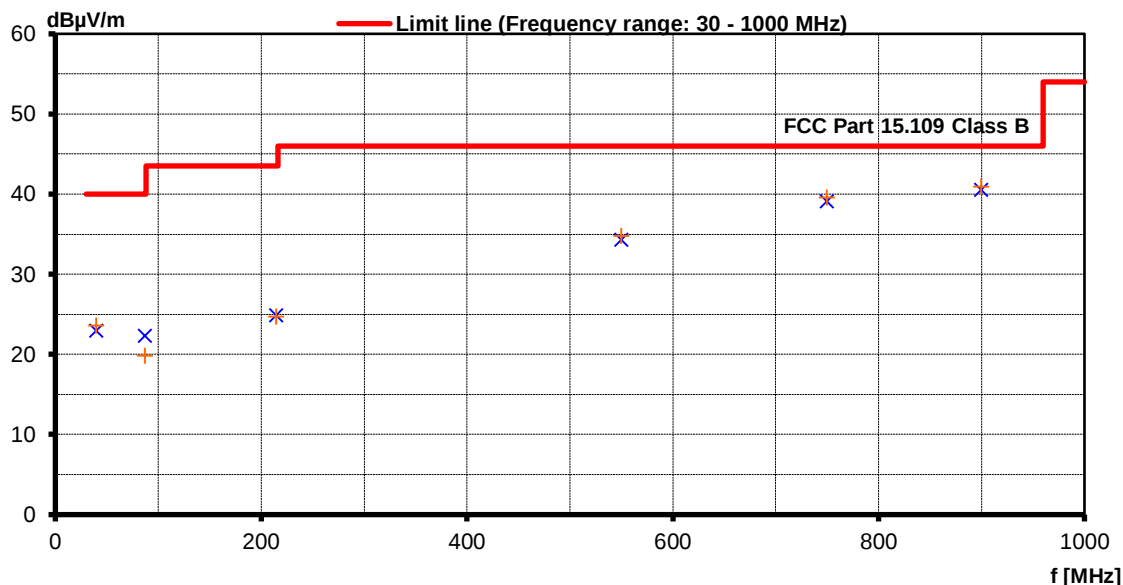
The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

Spectrum analyser settings:

30 MHz – 1000 MHz:	RBW: 120 kHz	Detector function: Quasi Peak
1000 MHz – 25 GHz:	RBW: 1 MHz, VBW: 3 MHz, Sweep: Auto,	Detector function: Peak

5.4.5 Test protocols

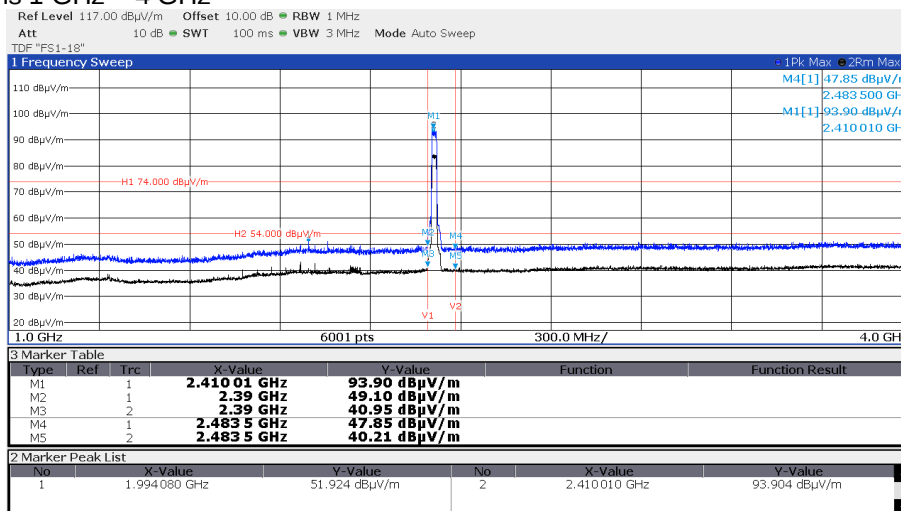
Unwanted emissions 30 MHz – 1 GHz



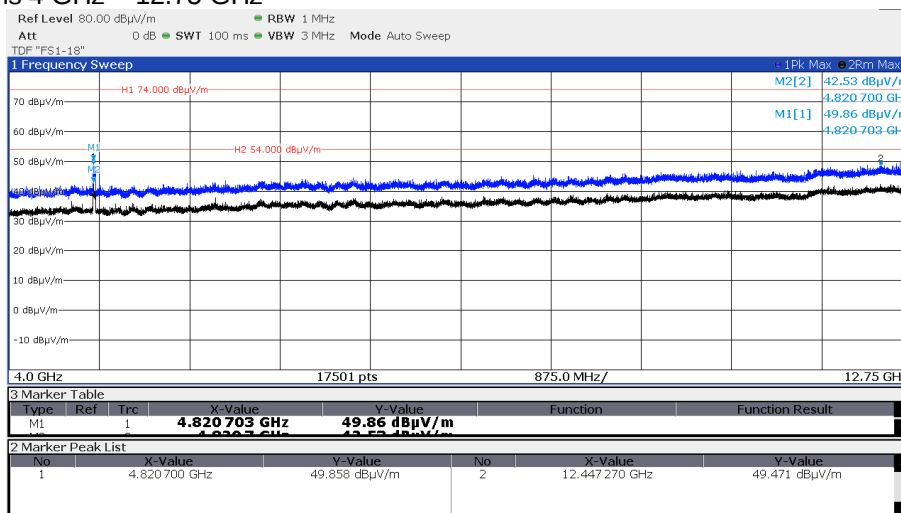
Frequency (MHz)	Reading Vert. (dBμV)	Reading Hor. (dBμV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBμV/m)	Level Hor. (dBμV/m)	Limit (dBμV/m)	Dlimit (dB)
40.00	6.0	5.5	17.0	18.0	23.0	23.5	40.0	-16.5
87.00	8.5	6.7	13.8	13.1	22.3	19.8	40.0	-17.7
215.00	7.4	7.7	17.5	17.0	24.9	24.7	43.5	-18.6
550.00	7.3	7.5	26.9	27.3	34.2	34.8	46.0	-11.2
750.00	8.5	8.5	30.6	31.1	39.1	39.6	46.0	-6.4
900.00	7.7	7.7	32.8	33.2	40.5	40.9	46.0	-5.1

5.4.5.1 Transmitter #1 & #2, Pos. A, CH A, 2412 MHz

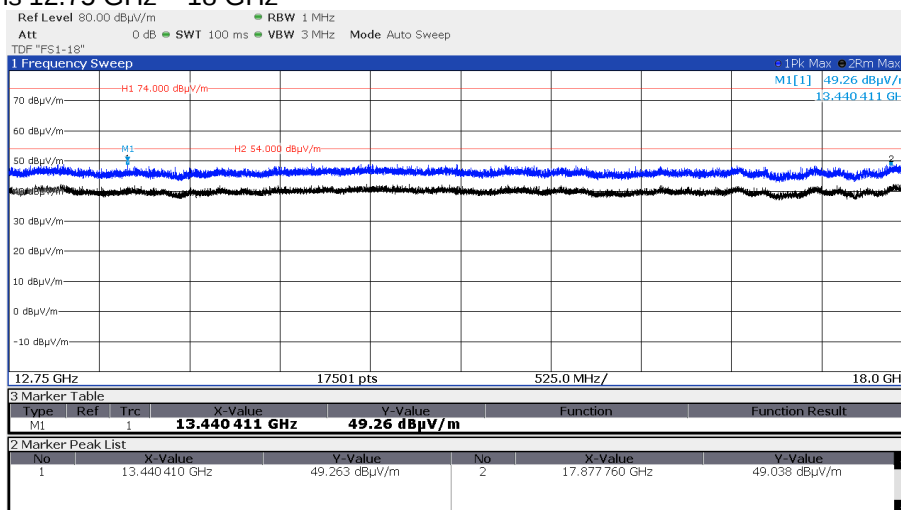
Unwanted emissions 1 GHz – 4 GHz



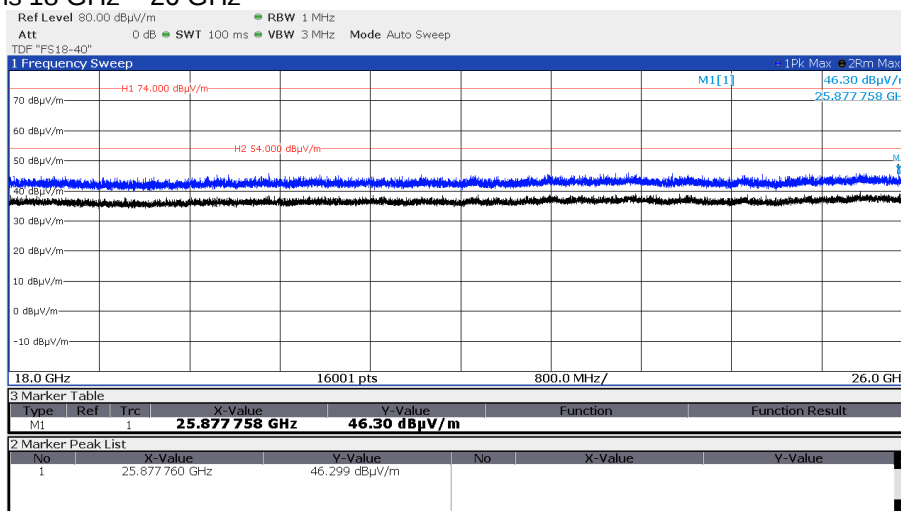
Unwanted emissions 4 GHz – 12.75 GHz



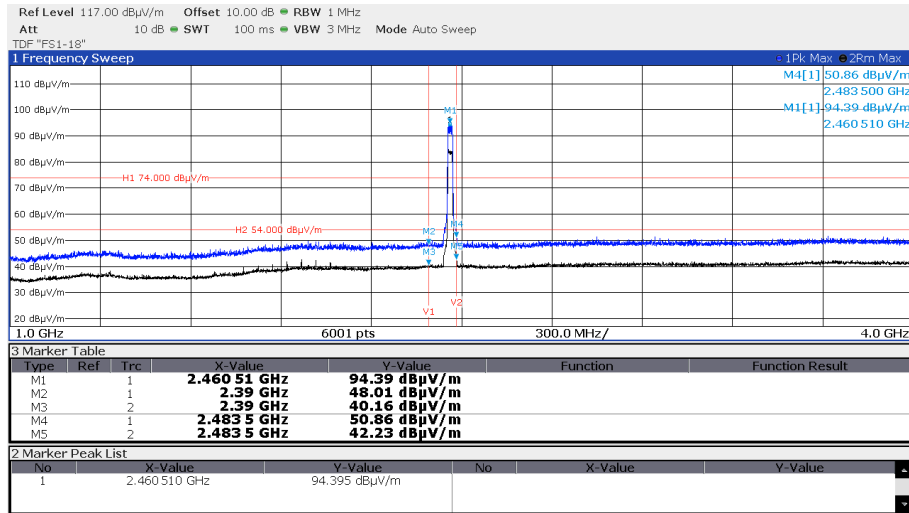
Unwanted emissions 12.75 GHz – 18 GHz



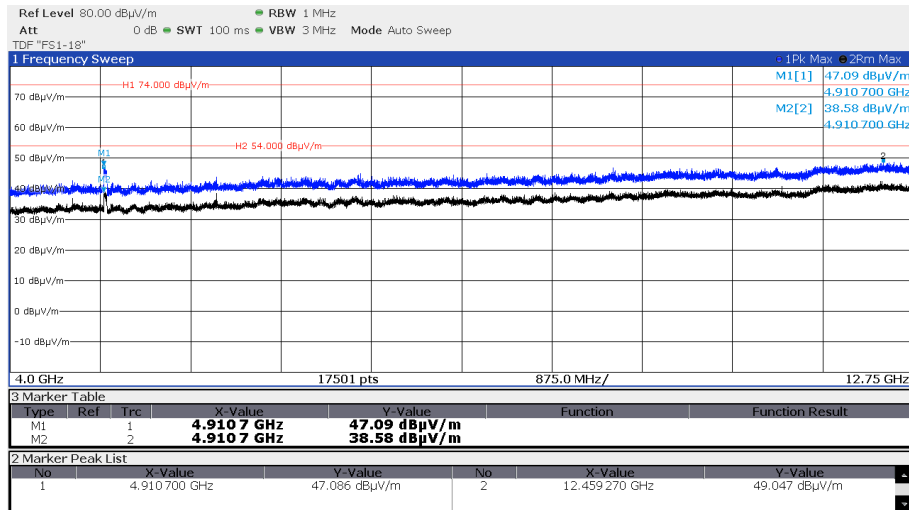
Unwanted emissions 18 GHz – 26 GHz



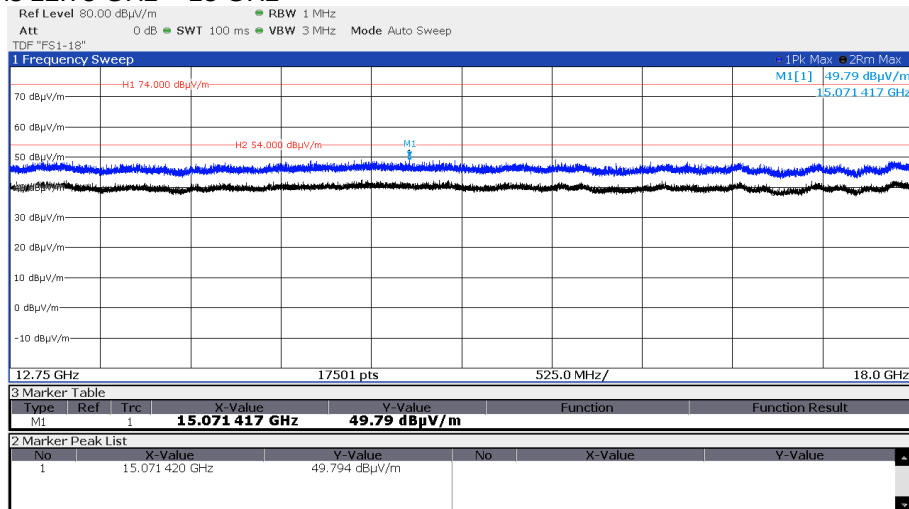
5.4.5.1 Transmitter #1 & #2, Pos. A, CH C, 2462 MHz Unwanted emissions 1 GHz – 4 GHz



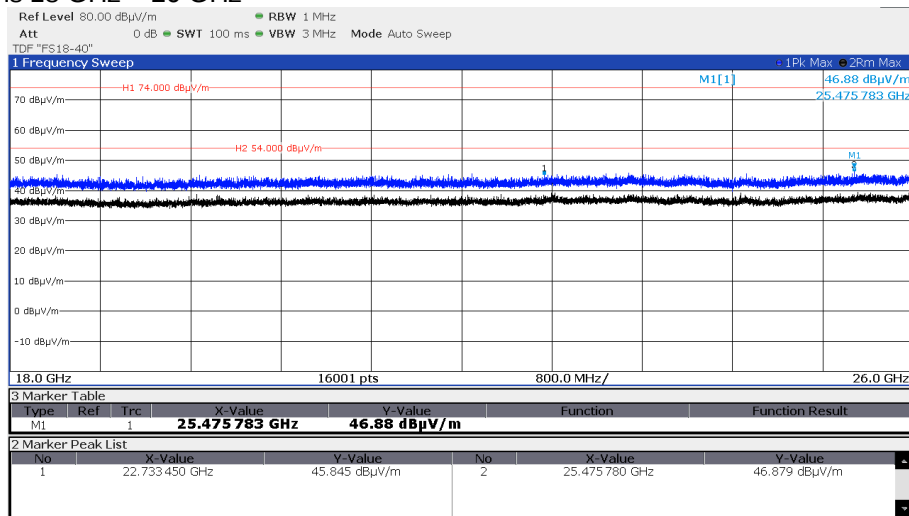
Unwanted emissions 4 GHz – 12.75 GHz



Unwanted emissions 12.75 GHz – 18 GHz

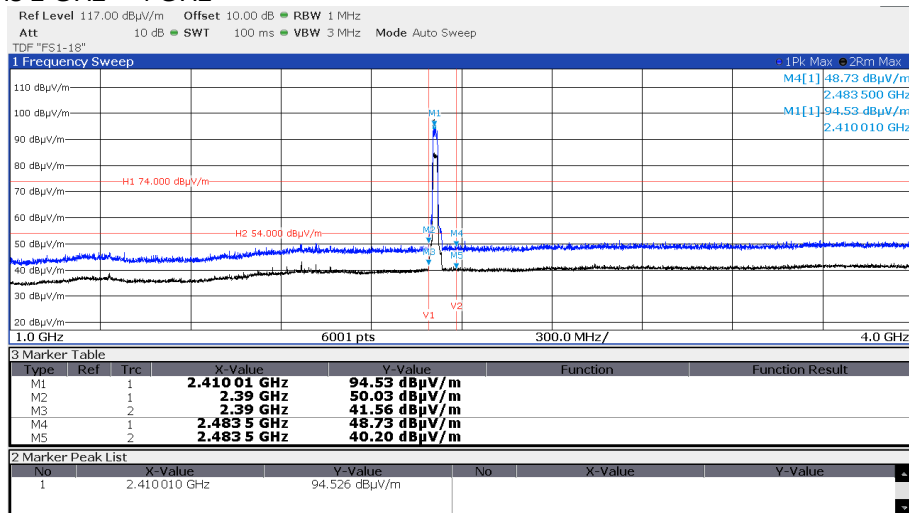


Unwanted emissions 18 GHz – 26 GHz

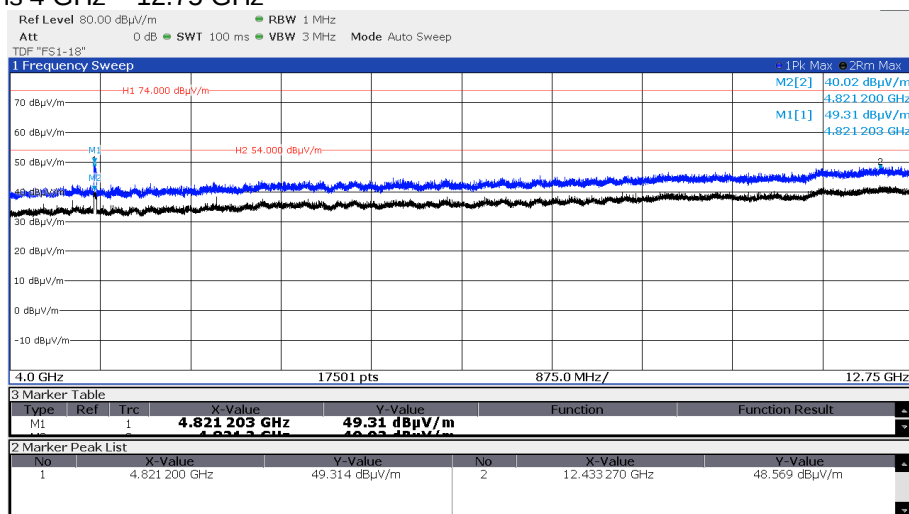


5.4.5.2 Transmitter #1 & #2, Pos. B, CH A, 2412 MHz

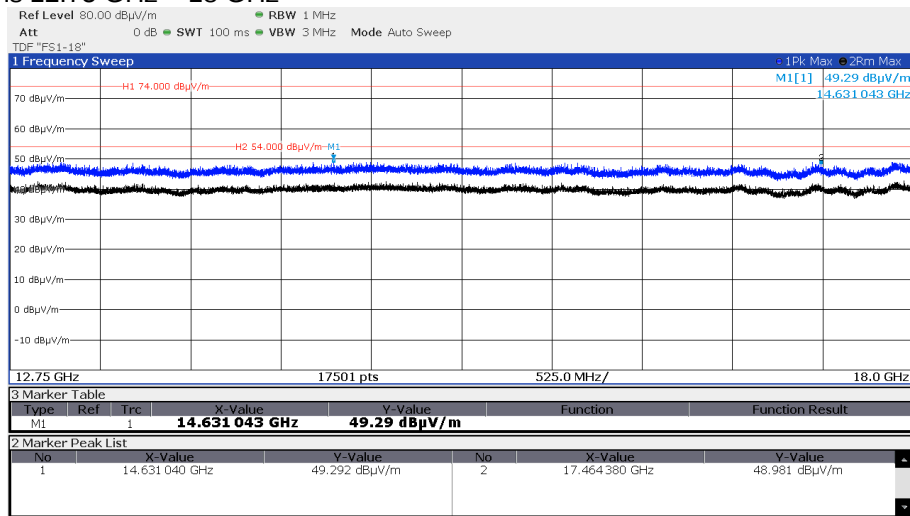
Unwanted emissions 1 GHz – 4 GHz



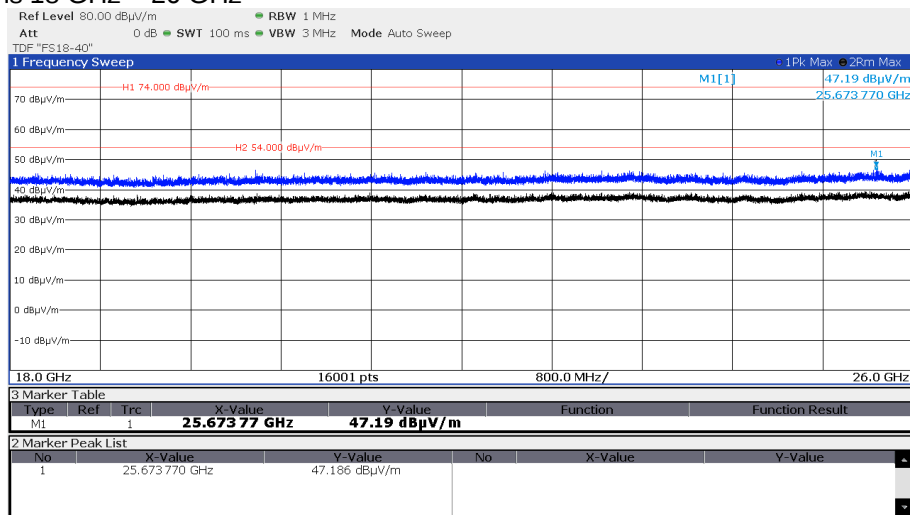
Unwanted emissions 4 GHz – 12.75 GHz



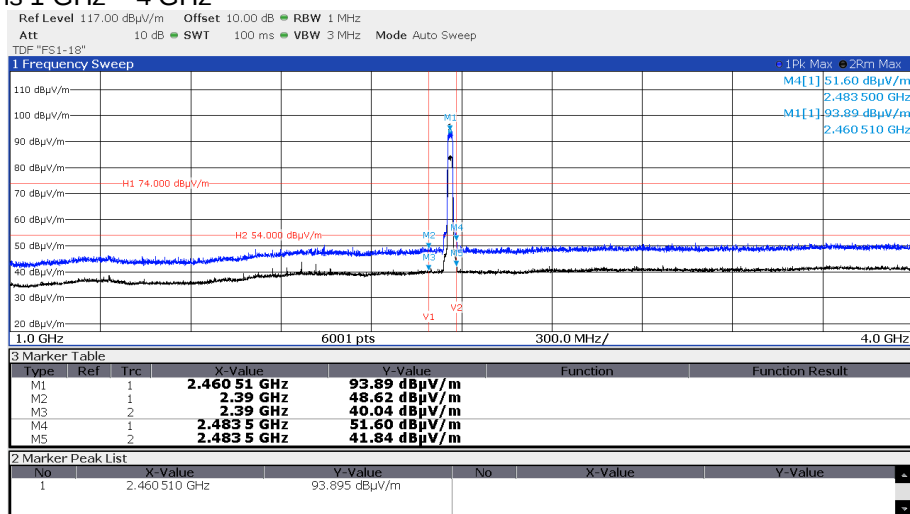
Unwanted emissions 12.75 GHz – 18 GHz



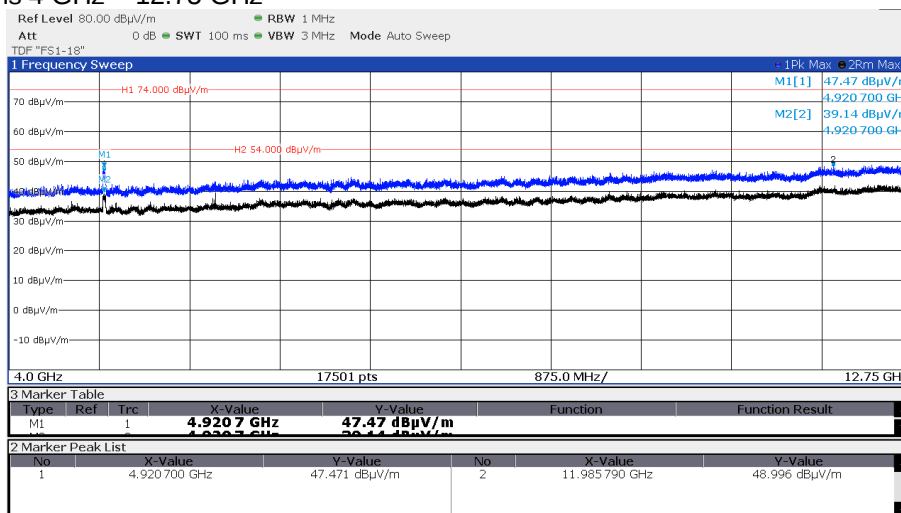
Unwanted emissions 18 GHz – 26 GHz



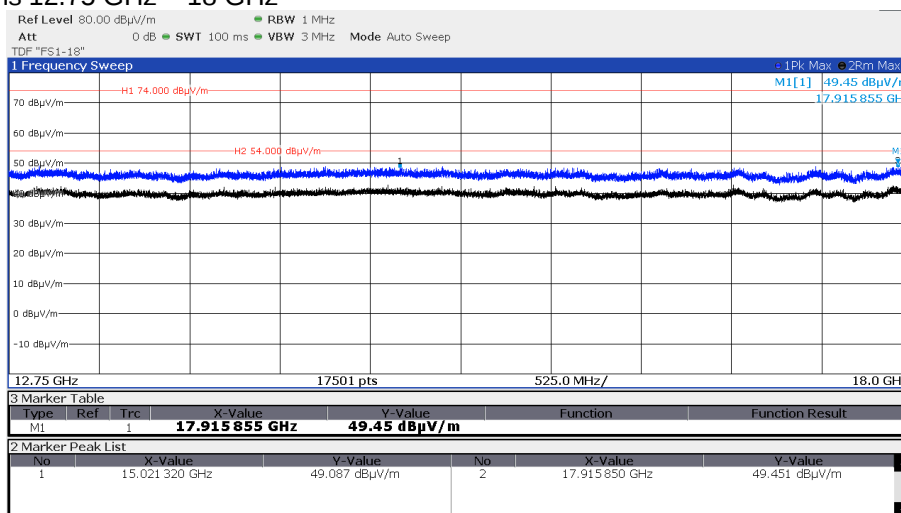
5.4.5.3 Transmitter #1 & #2, Pos. B, CH C, 2462 MHz Unwanted emissions 1 GHz – 4 GHz



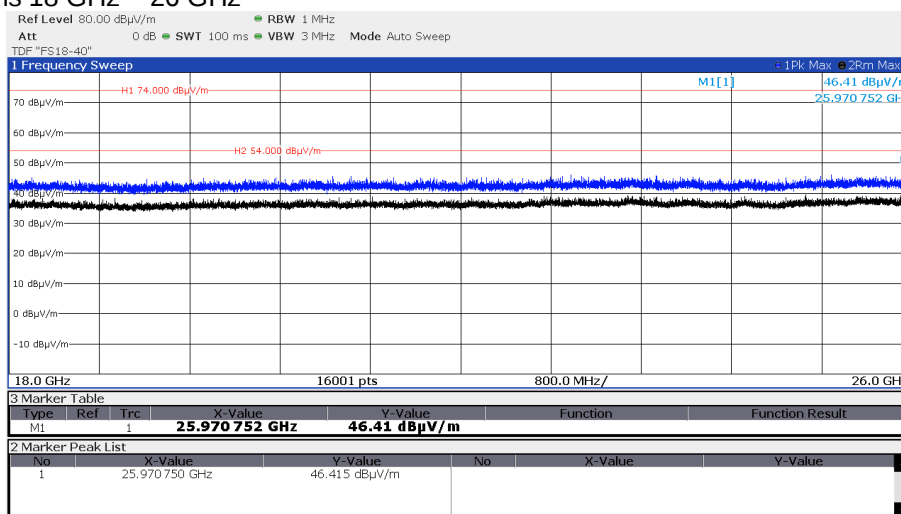
Unwanted emissions 4 GHz – 12.75 GHz



Unwanted emissions 12.75 GHz – 18 GHz



Unwanted emissions 18 GHz – 26 GHz



5.4.6 Limit

Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	($\mu\text{V/m}$)	$\text{dB}(\mu\text{V/m})$	
0.009-0.490	2400/F (kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30	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

Restricted bands of operation:

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

RSS-Gen, Table 6 – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	12.57675 - 12.57725	399.9 - 410	7.250 - 7.750
0.495 - 0.505	13.36 - 13.41	608 - 614	8.025 - 8.500
2.1735 - 2.1905	16.42 - 16.423	960 - 1427	9.0 - 9.2
3.020 - 3.026	16.69475 - 16.69525	1435 - 1626.5	9.3 - 9.5
4.125 - 4.128	16.80425 - 16.80475	1645.5 - 1646.5	10.6 - 12.7
4.17725 - 4.17775	25.5 - 25.67	1660 - 1710	13.25 - 13.4
4.20725 - 4.20775	37.5 - 38.25	1718.8 - 1722.2	14.47 - 14.5
5.677 - 5.683	73 - 74.6	2200 - 2300	15.35 - 16.2
6.215 - 6.218	74.8 - 75.2	2310 - 2390	17.7 - 21.4
6.26775 - 6.26825	108 - 138	2483.5 - 2500	22.01 - 23.12
6.31175 - 6.31225	149.9 - 150.05	2655 - 2900	23.6 - 24.0
8.291 - 8.294	156.52475 - 156.52525	3260 - 3267	31.2 - 31.8
8.362 - 8.366	156.7 - 156.9	3332 - 3339	36.43 - 36.5
8.37625 - 8.38675	162.0125 - 167.17	3345.8 - 3358	Above 38.6
8.41425 - 8.41475	167.72 - 173.2	3500 - 4400	
12.29 - 12.293	240 - 285	4500 - 5150	
12.51975 - 12.52025	322 - 335.4	5350 - 5460	

The requirements are **FULFILLED**.

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

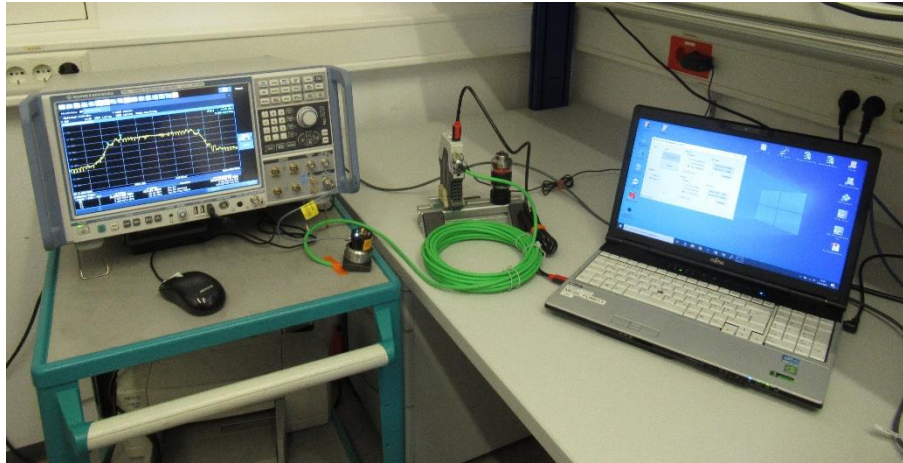
5.5 Unwanted emissions, conducted

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

5.5.1 Description of the test location

Test location: Shielded Room S6

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

5.5.4 Description of Measurement

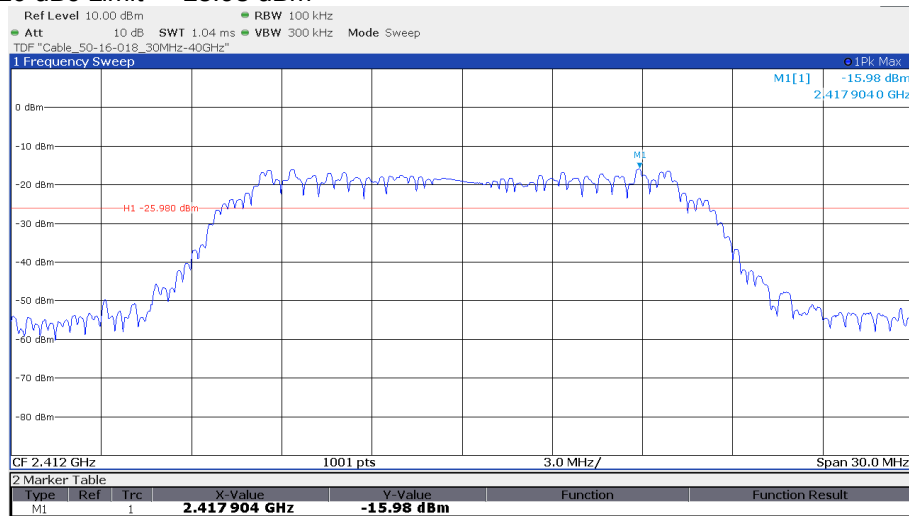
The spurious emissions are measured conducted using a spectrum analyser in a test setup following the procedures set out in ANSI C64.10, item 11.10. The measurement is performed at normal test conditions in modulated TX continuous mode.

Spectrum analyser search setting:

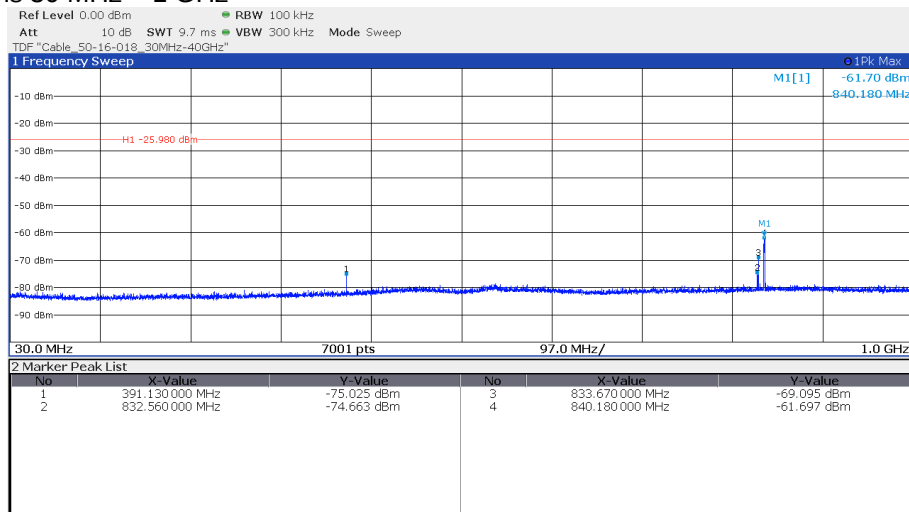
RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace Mode: Max hold, Sweep time: 1 s

5.5.5 Test protocols

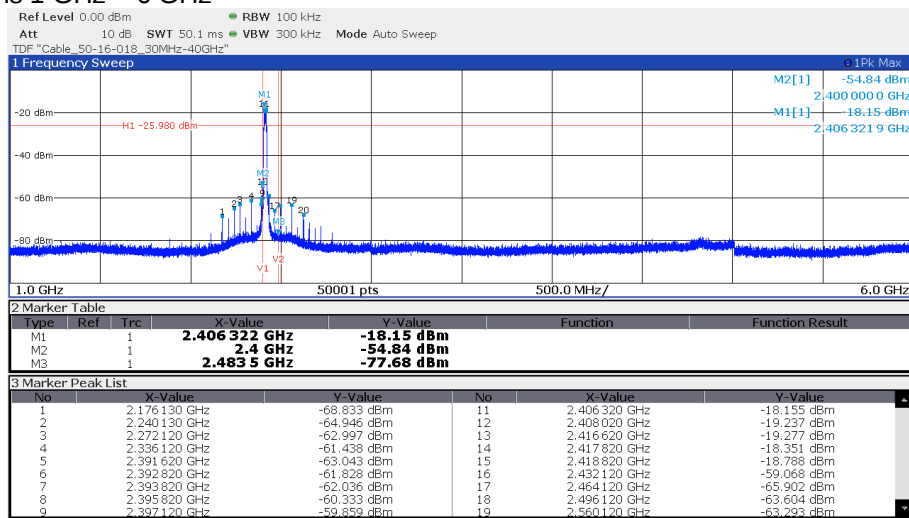
Determining the -20 dBc Limit = -25.98 dBm



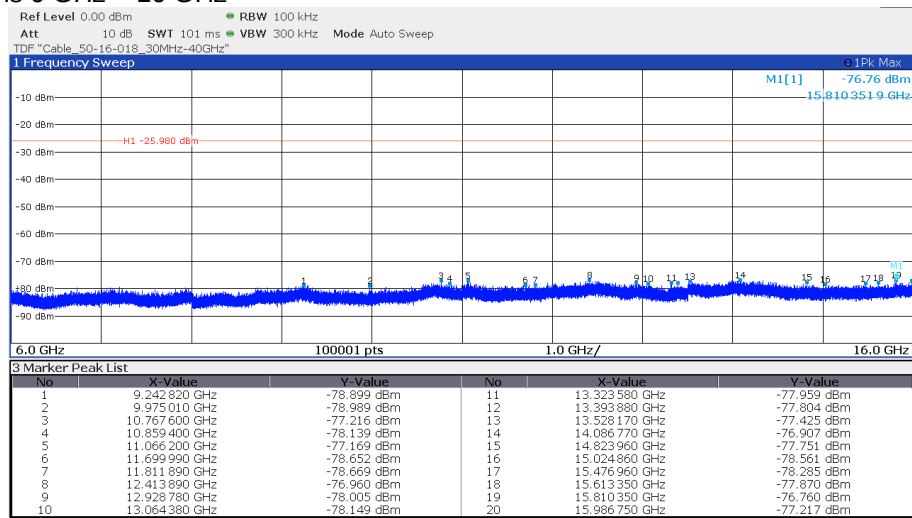
5.5.5.1 Transmitter #1, Pos. A, CH A, 2412 MHz Unwanted emissions 30 MHz – 1 GHz



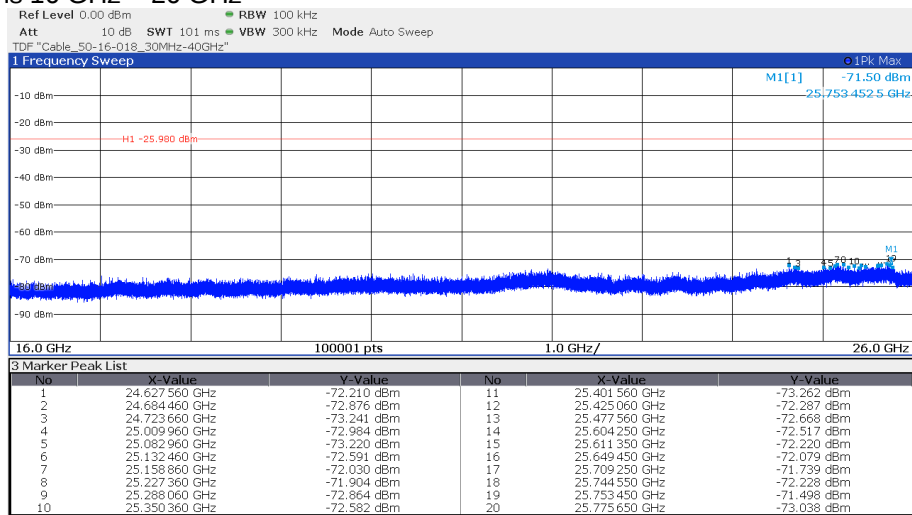
Unwanted emissions 1 GHz – 6 GHz



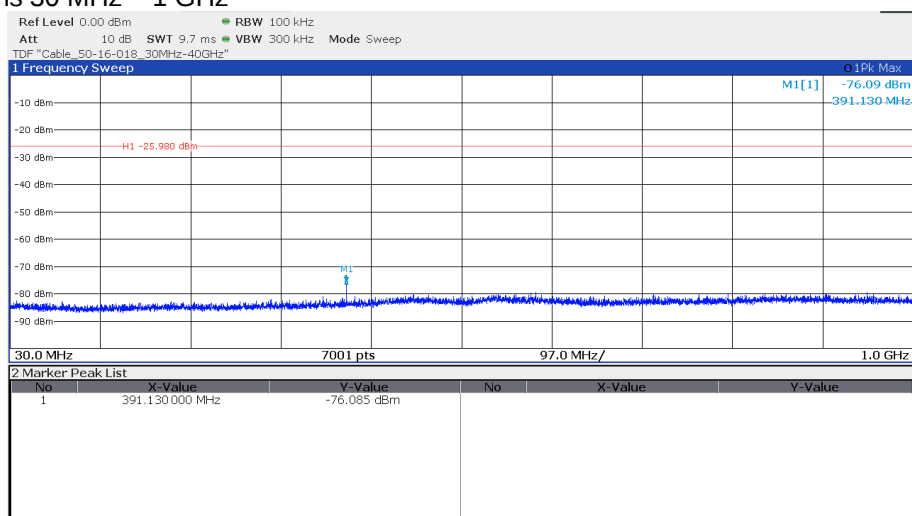
Unwanted emissions 6 GHz – 16 GHz



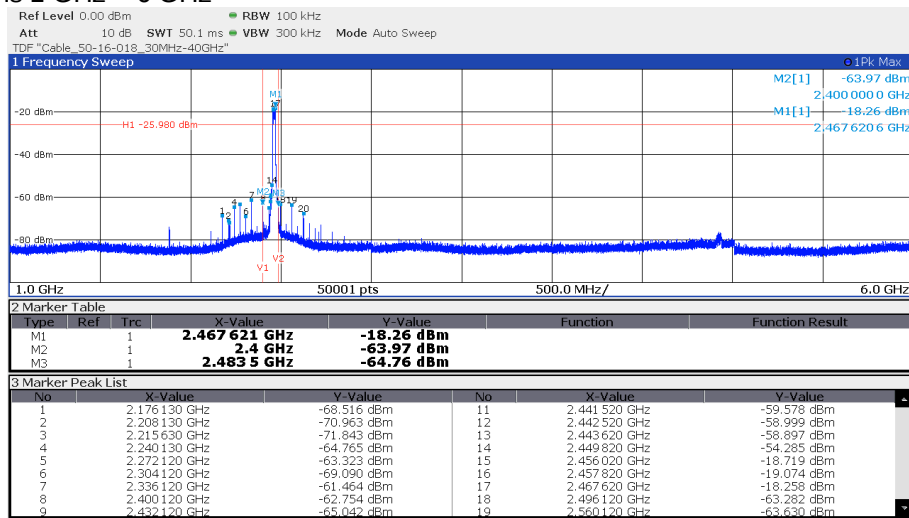
Unwanted emissions 16 GHz – 26 GHz



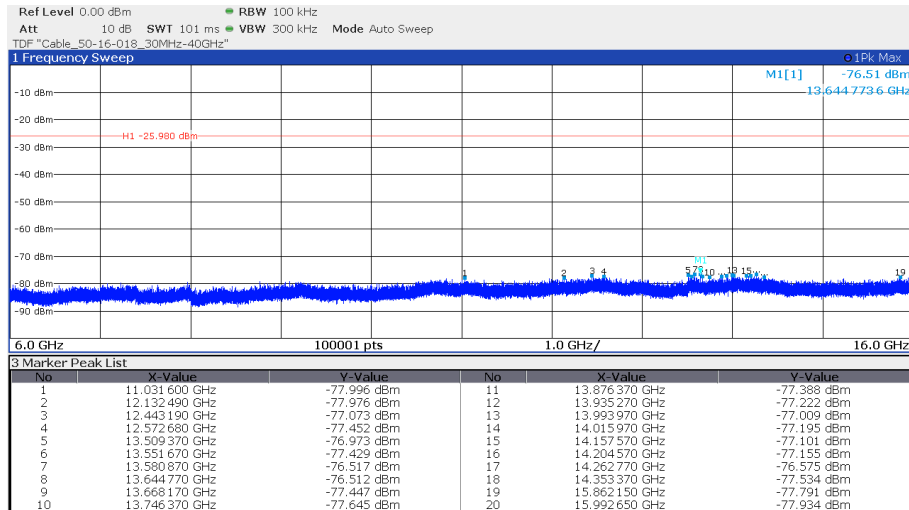
5.5.5.2 Transmitter #1, Pos. A, CH C, 2462 MHz Unwanted emissions 30 MHz – 1 GHz



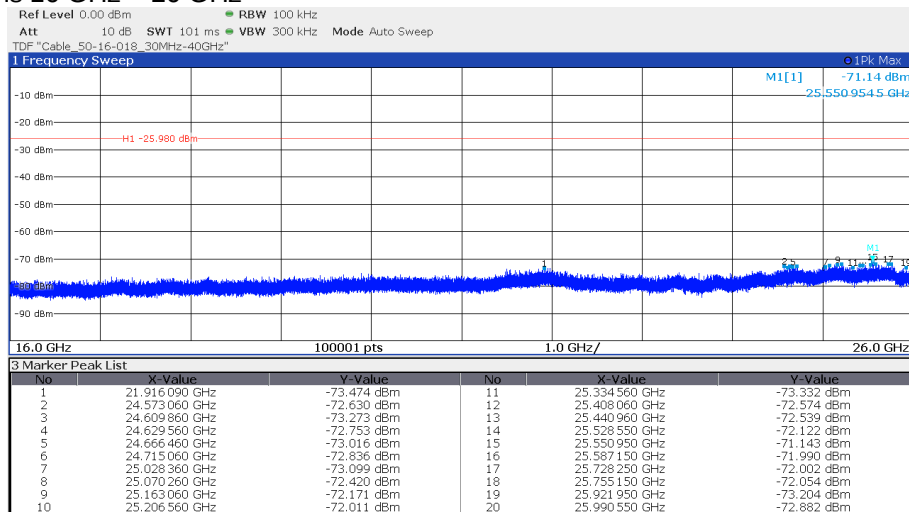
Unwanted emissions 1 GHz – 6 GHz



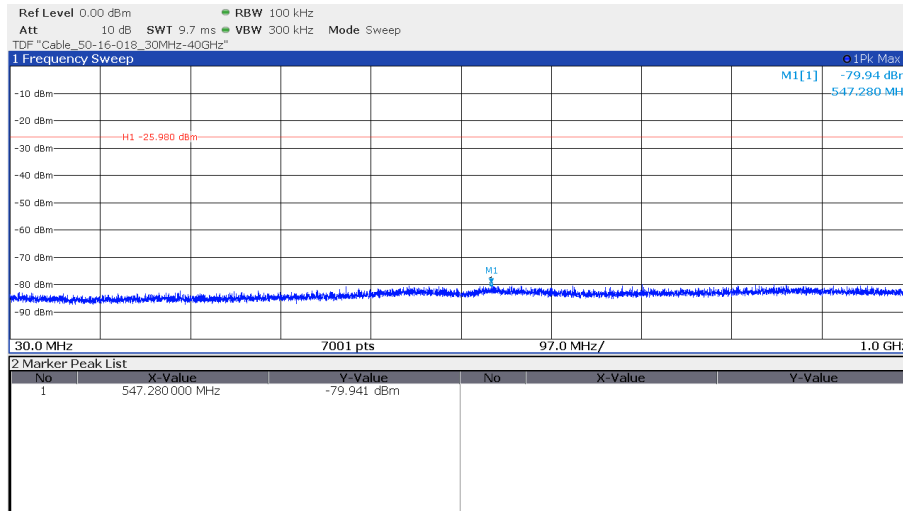
Unwanted emissions 6 GHz – 16 GHz



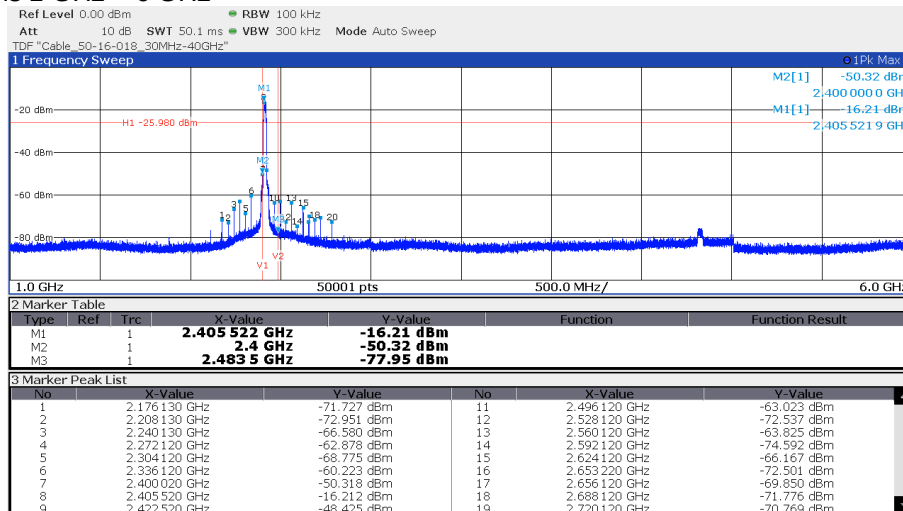
Unwanted emissions 16 GHz – 26 GHz



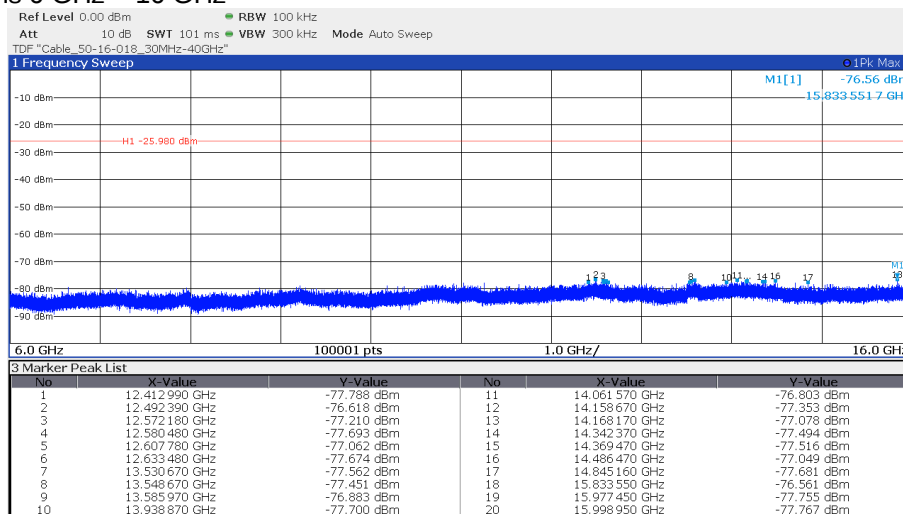
5.5.5.3 Transmitter #1, Pos. B, CH A, 2412 MHz Unwanted emissions 30 MHz – 1 GHz



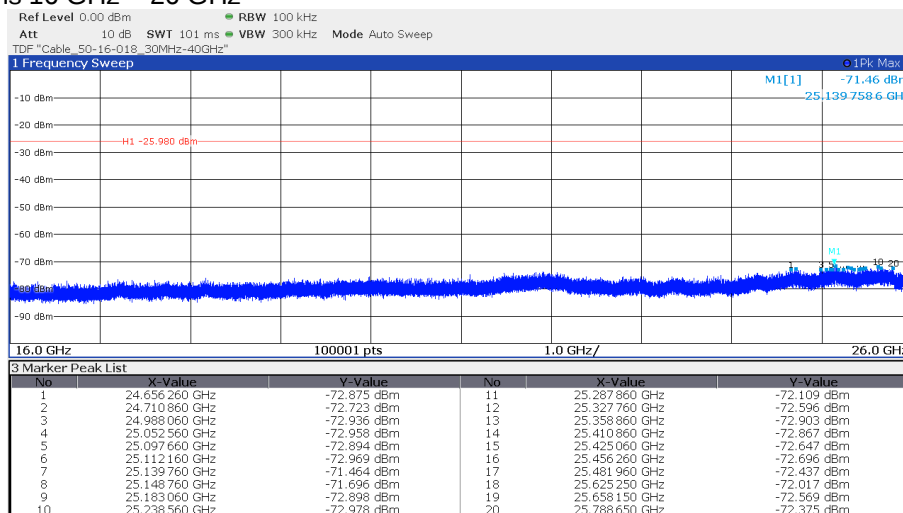
Unwanted emissions 1 GHz – 6 GHz



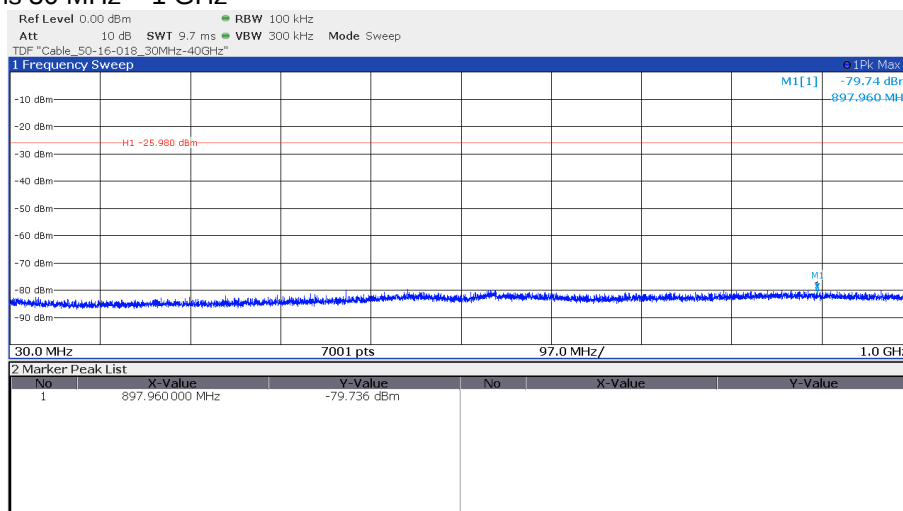
Unwanted emissions 6 GHz – 16 GHz



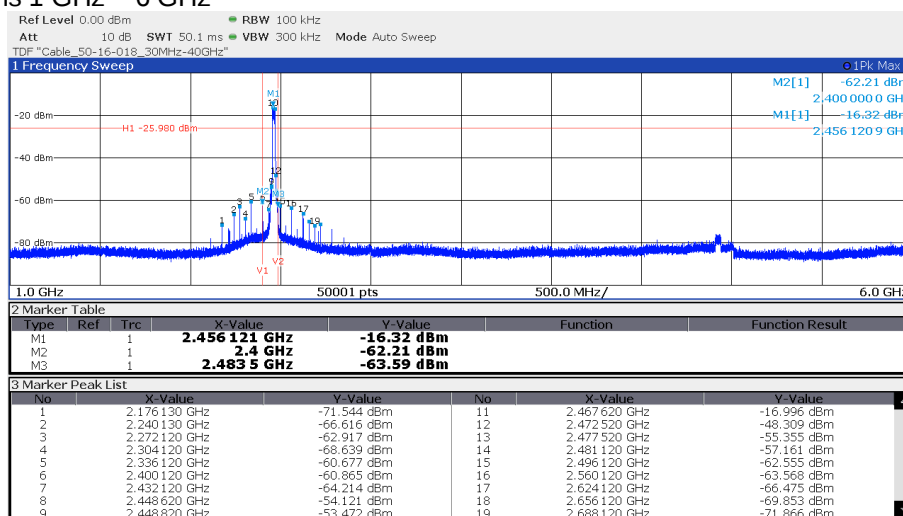
Unwanted emissions 16 GHz – 26 GHz



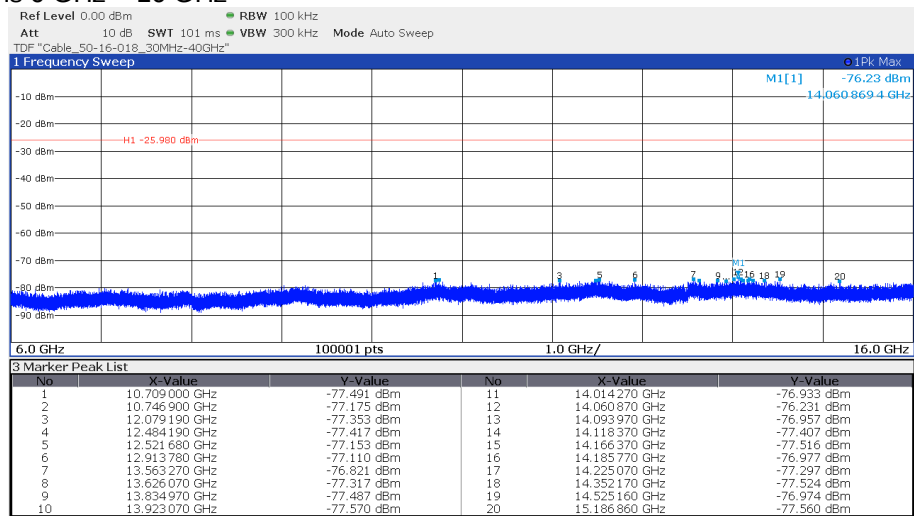
5.5.5.4 Transmitter #1, Pos. B, CH C, 2462 MHz Unwanted emissions 30 MHz – 1 GHz



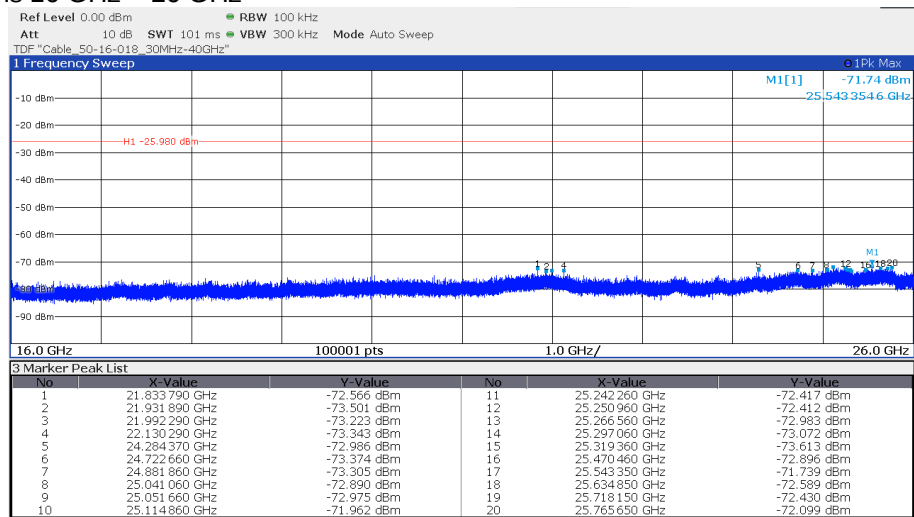
Unwanted emissions 1 GHz – 6 GHz



Unwanted emissions 6 GHz – 16 GHz



Unwanted emissions 16 GHz – 26 GHz



5.5.6 Limit

Limit according to FCC Part 15, Section 15.247(d) for emissions falling not in restricted bands:

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Frequency (MHz)	Spurious emission limit
Below 1000	20 dB below the highest level of the desired power
Above 1000	20 dB below the highest level of the desired power

Radiated emission limits according to FCC Part 15C, Section 15.209(a):

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	($\mu\text{V/m}$)	dB($\mu\text{V/m}$)	
0.009-0.490	2400/F (kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30	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: All emissions not reported are more than 20 dB below the specified limit. For detailed test results
please see the test protocols. Only Transmitter #1 is shown.

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.

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.	Next Verif.
CPR 3	FSW43	02-02/11-15-001	06/04/2022	06/04/2021		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	28/06/2022	28/06/2021		
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				
	BAT-EMC 3.20.0.23	02-02/68-13-001				
SER 3	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	3117	02-02/24-05-009	28/06/2022	28/06/2021		
	BBHA 9170	02-02/24-05-013	19/05/2023	19/05/2020	04/02/2022	04/02/2021
	WLJS 3500-3EF	02-02/50-05-042				
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				
	KMS116-GL140SE-KMS116-	02-02/50-20-026				
	BAT-EMC 3.20.0.23	02-02/68-13-001				

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.