Report Reference ID:	438701TRFWL

Test specification:	Title 47-Telecommunication Chapter I - Federal Communications Commission **Part 90** – Private Land Mobile Radio Services **Subpart F** – Radiolocation Service **RSS-Gen Issue 5 April 2018 - Amendment 1 March 2019 – Amendment 2 February 2021** General Requirements for Compliance of Radio Apparatus **RSS-210 Issue 10 December 2019 - Amendment (April 2020)** Licence-Exempt Radio Apparatus: Category I Equipment

Applicant:	IDS GeoRadar Srl – Via A. Righi, 6-6A-8 – 56121 Pisa (PI) – Italy
Apparatus:	Ku-band radar sensor
Model:	IBIS-KU-ETH2
FCC ID:	UFW-IBIS-KU-ETH2
IC Registration number	8991A-IBISKUETH2

Testing laboratory:	**Nemko Spa** Via del Carroccio, 4 – 20853 Biassono (MB) – Italy

	Name, function and signature	**Date**
Tested by:	Tessa S.  (project handler)	2021-07-05
Reviewed by:	P. Barbieri  (verifier)	2021-07-15

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Section 1: Report summary

1.1 Test specification

Specifications	**Part 90** – Private Land Mobile Radio Services **Subpart F** – Radiolocation Service **RSS-Gen Issue 5 April 2018 - Amendment 1 March 2019 – Amendment 2 February 2021** General Requirements for Compliance of Radio Apparatus **RSS-210 Issue 10 December 2019 - Amendment (April 2020)** Licence-Exempt Radio Apparatus: Category I Equipment

1.2 Statement of compliance

Compliance	In the configuration tested the EUT was found compliant Yes ☒ No ☐ This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Spa. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90 Subpart F. The tests were conducted in accordance with ANSI C63.26.

1.3 Exclusions

Exclusions	None

1.4 Registration number

Test site:	FCC ID number 682159 ISED ID number 9109A

1.5 Test report revision history

Revision #	Details of changes made to test report
1	Original report issued

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. Nemko Spa authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Section 2: Summary of test results

2.1 FCest results

Test Specification Clause	Methods	Test description	Verdict
FCC 47 CFR §2.1046 §90.205(r) RSS-210 B.11	ANSI C63.26	RF power output	Pass
FCC 47 CFR §2.1049 §90.209 RSS-Gen § 6.7	ANSI C63.26	Occupied Bandwidth	Pass
FCC 47 CFR §2.1051 §90.210(b) RSS-Gen § 6.13	ANSI C63.26	Emission mask	Pass
FCC 47 CFR §2.1051 §90.210(b) RSS-Gen § 6.13	ANSI C63.26	Spurious emissions at antenna terminals	Pass
FCC 47 CFR §2.1051 §90.210(b) RSS-Gen § 6.13	ANSI C63.26	Field strength of spurious radiation	Pass
§90.213 §21055 RSS-Gen § 6.11	ANSI C63.26	Frequency stability	Pass

Notes:
Possible test case verdicts:
test case does not apply to the test object: N/A (Not applicable)
test object does meet the requirement: P (Pass)
test object does not meet the requirement: F (Fail)

Section 3: Equipment under test (EUT) and application details

3.1 Applicant details

Applicant	Name:	IDS GeoRadar Srl
	Address:	Via A. Righi 6-6A-8
	City:	Pisa
	Province/State:	Pisa
	Post code:	56121
	Country:	Italy
Manufacturer	Name:	IDS GeoRadar Srl
	Address:	Via A. Righi 6-6A-8
	City:	Pisa
	Province/State:	Pisa
	Post code:	56121
	Country:	Italy
Canadian representative	Name:	Leica Geosystems Ltd
	Address:	1-3761 Victoria Park Ave
	City:	Scarborough
	Province/State:	Ontario
	Post code:	M1W3S2
	Country:	Canada
	IC company number:	3177B

3.2 Modular equipment

a) Single modular approval	Single modular approval Yes ☐ No ☒
b) Limited single modular approval	Limited single modular approval Yes ☐ No ☒

3.3 Product details

FCC ID	Grantee code:	UFW
	Product code:	-IBIS-KU-ETH2
IC Registration number	8991A-IBISKUETH2	
Equipment class	TNB – Licensed Non-Broadcast Station Transmitter	
Equipment category	Field Disturbance Sensor	
Description of product as it is marketed	Ku-band radar sensor	
	Model name:	IBIS-KU-ETH2
	Serial number:	RF 2.0 PROT. 02
Product	The EUT is also classified as Terminal Equipment subject to IC CS-03 No ☒ Yes ☐	

3.4 Application purpose

Type of application	☒ Original certification ☐ Change in identification of presently authorized equipment Original FCC ID: Grant date: ☐ Class II permissive change or modification of presently authorized equipment

3.5 Certification details

Services requested Type of assessment	☒ New certification ☐ New family ☐ Re-assessment ☐ Existing family ☐ Multiple listing

3.6 Composite/related equipment

a) Composite equipment	The EUT is a composite device subject to an additional equipment authorization Yes ☐ No ☒
b) Related equipment	The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes ☐ No ☒

3.7 Sample information

Receipt date:	2021-06-23
Nemko sample ID:	43870100002

3.8 EUT technical specifications

Operating band:	17.1 GHz – 17.3 GHz
Operating frequency:	17.2 GHz
Modulation type:	FMCW
Occupied bandwidth:	199.1 MHz
Channel spacing:	--
Emission designator:	199MN0N
RF Conducted Output:	19.7 dBm (FCC) and 11.2 dBm (ISED)
Antenna type:	External Antenna - IBIS-ANT7-H50V31 (Gain 13.5 dBi)
Power source:	9-36 VDC

3.9 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

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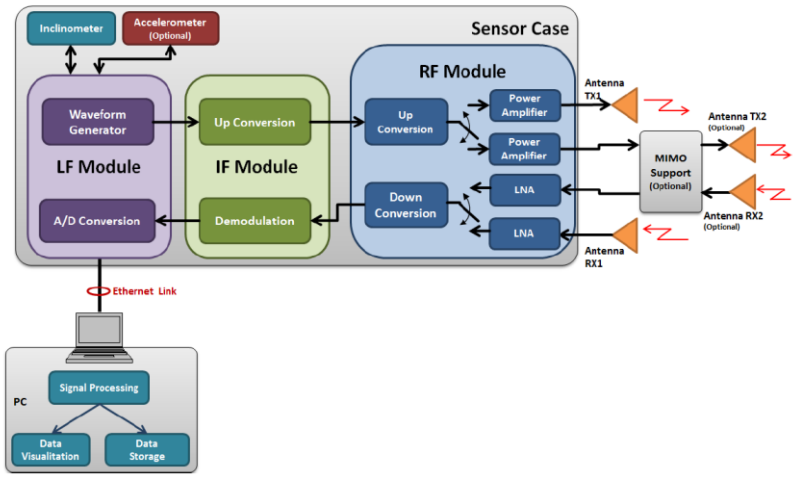
3.10 Operation of the EUT during testing

Details:	Transmitting at max gain with max RF power output.

3.11 EUT setup diagram



3.12 Software and Firmware version used during tests

Details:	**SW:** IBIS Test - Version: ArcSAR 1.0.34 **FW-uControllore:** IBIS versione: 2.33 **FW-FPGA:** ibis versione:2.12

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT

Modifications	Modifications performed to the EUT during this assessment None ☒ Yes ☐, performed by Client ☐ or Nemko ☐ Details:

4.2 Deviations from laboratory tests procedures

Deviations	Deviations from laboratory test procedures None ☒ Yes ☐ - details are listed below:

4.3 Technical judgment

Judgment	None

Section 5: Test conditions

5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

5.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	Unless different values are declared in the test case, following ambient conditions apply for the tests: Temperature: 18 ÷ 33 °C Relative humidity: 30 ÷ 60 % Air pressure: 980 ÷ 1060 hPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Equipment	Manufacturer	Model	Serial N°
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703
Barometer	Castle	GPB 3300	072015

5.3 Measurement uncertainty

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.
The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.
F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
Receiver	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	Conducted	Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)

NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %

5.4 Test equipment

Equipment	Manufacturer	Model	Serial N°	Cal Date	Due Date
Trilog Broadband Antenna	Schwarzbeck	VULB 9162	9162-025	2018-07	2021-07
EMI receiver (20 Hz ÷ 8 GHz)	Rohde & Schwarz	ESU8	100202	2020-08	2021-08
EMI receiver (2 Hz ÷ 44 GHz)	Rohde & Schwarz	ESW44	101620	2020-09	2021-09
EMI receiver (2 Hz ÷ 43.5 GHz)	Rohde & Schwarz	FSW43	101767	2021-01	2022-01
Controller	Maturo	FCU3.0	10041	NSC	--
Tilt antenna mast	Maturo	TAM4.0-E	10042	NSC	--
Turntable	Maturo	TT4.0-5T	2.527	NSC	--
Bilog Antenna (1 ÷ 18 GHz)	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2018-09	2021-09
Preamplifier (1 ÷ 18 GHz)	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2021-01	2022-01
Double Ridge Horn Antenna (18 ÷ 40 GHz)	RFSpin	DRH40	061106A40	2020-04	2023-04
Preamplifier (18 ÷ 40 GHz)	Sage	STB-1834034030-KFKF-L1	18490-01	2021-04	2022-04
Pyramidal Horn Antenna (40 ÷ 60 GHz)	Sage	SAR-2507-19VF-R2	15715-01	2021-06	2031-06
Pyramidal Horn Antenna (60 ÷ 90 GHz)	Sage	SAR-2013-121F-E2	1738301	NSC	-
Harmonic Mixer (40 ÷ 60 GHz)	Radiometer Physics	RPG FS Z60	100988	2021-01	2024-01
Harmonic Mixer (60 ÷ 90 GHz)	Radiometer Physics	RPG FS Z90	101670	2021-01	2024-01
Semi-anechoic chamber	Nemko	10 m semi-anechoic chamber	530	2018-09	2021-09
Shielded room	Siemens	10 m control room	1947	NSC	--

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use

Section 6: Test results

6.1 RF power output

FCC 47 CFR § 90.205 (r)
Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized to applicants whose license applications for new stations are filed after August 18, 1995 is as follows:

(r) *All other frequency bands.* Requested transmitter power will be considered and authorized on a case by case basis.

RSS 210 Annex B.11
The following carrier frequencies are available for use by radar and other mobile devices:

a. 17.15 GHz: 0.3 W e.i.r.p.
b. 94 GHz: 0.4 W e.i.r.p.

Parameters, such as occupied bandwidth and permissible out-of-band emissions, will be evaluated on a case-by-case basis.

Test date: 2021-06-30

Test results: Pass

Note: In order to comply with RSS 210 Annex B.11 limits, the output power should be adjusted depending on antenna gain.

EIRP: 300 mW = 24.7 dBm
Conducted output power: 24.7 dBm – 13.5 dBi = 11.2 dBm

Special notes

Signal stimulation: CW

Result:

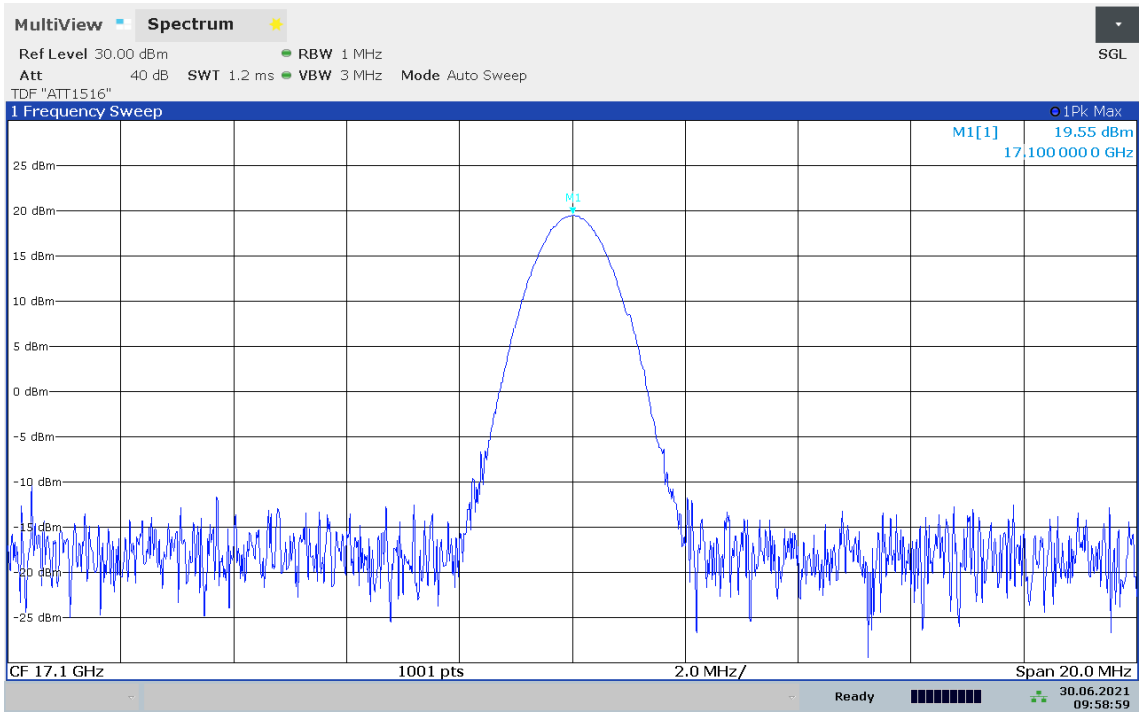
TX1

Frequency (channel)	Conducted output power
17.1. GHz (low)	19.6 dBm
17.2 GHz (mid)	19.7 dBm
17.3 GHz (high)	19.3 dBm

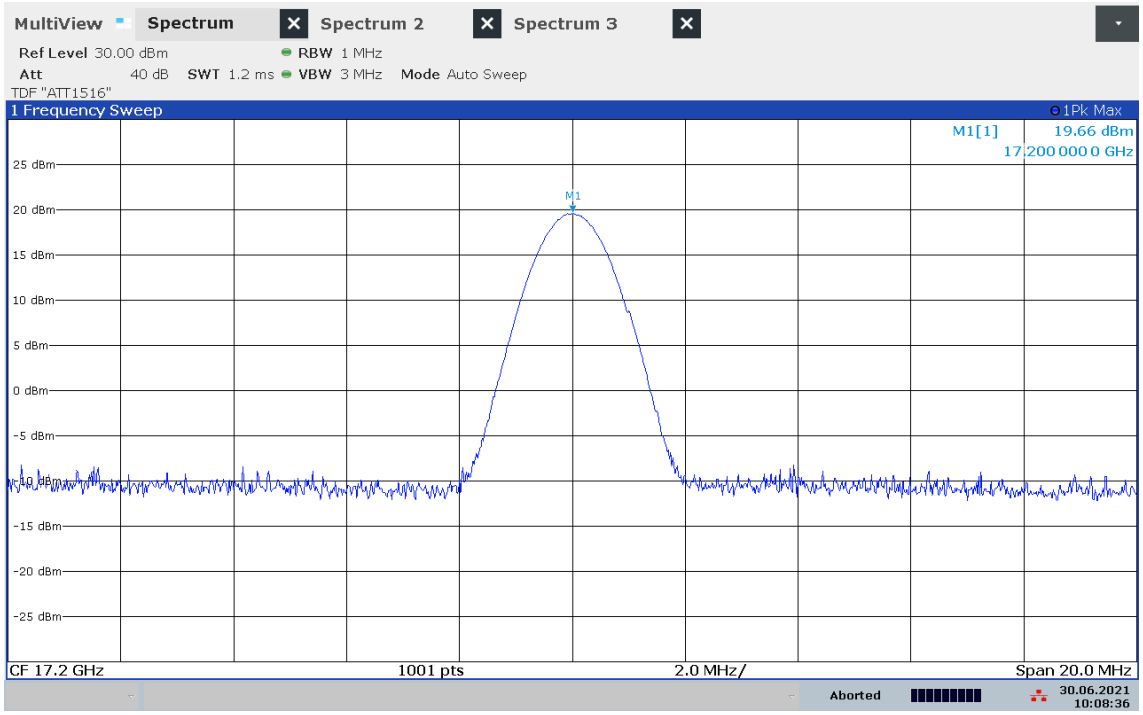
TX2

Frequency (channel)	Conducted output power
17.1. GHz (low)	18.4 dBm
17.2 GHz (mid)	17.1 dBm
17.3 GHz (high)	18.7 dBm

Test data

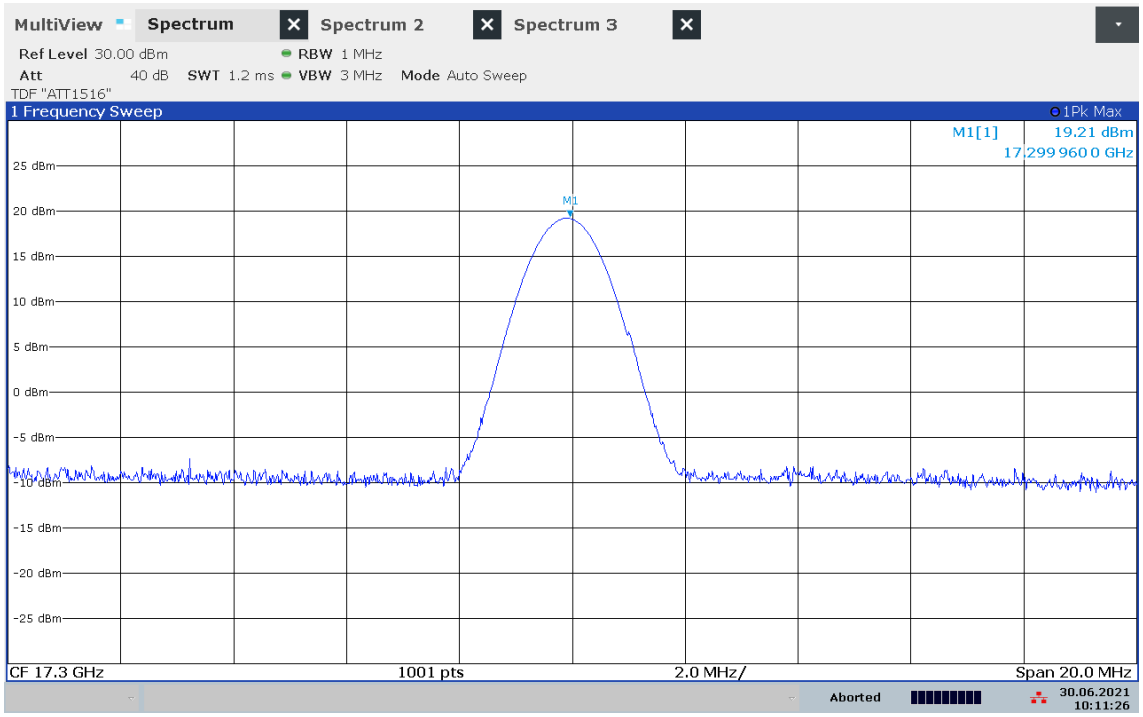


Channel Low – TX1

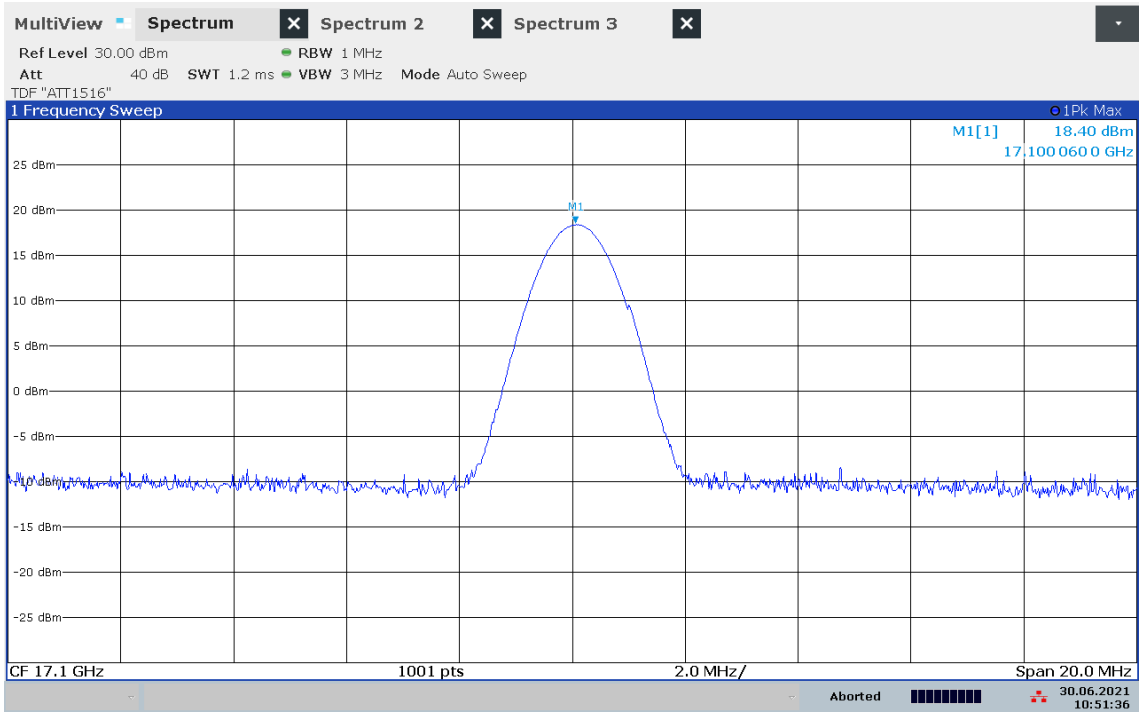


Channel Mid – TX1

Test data

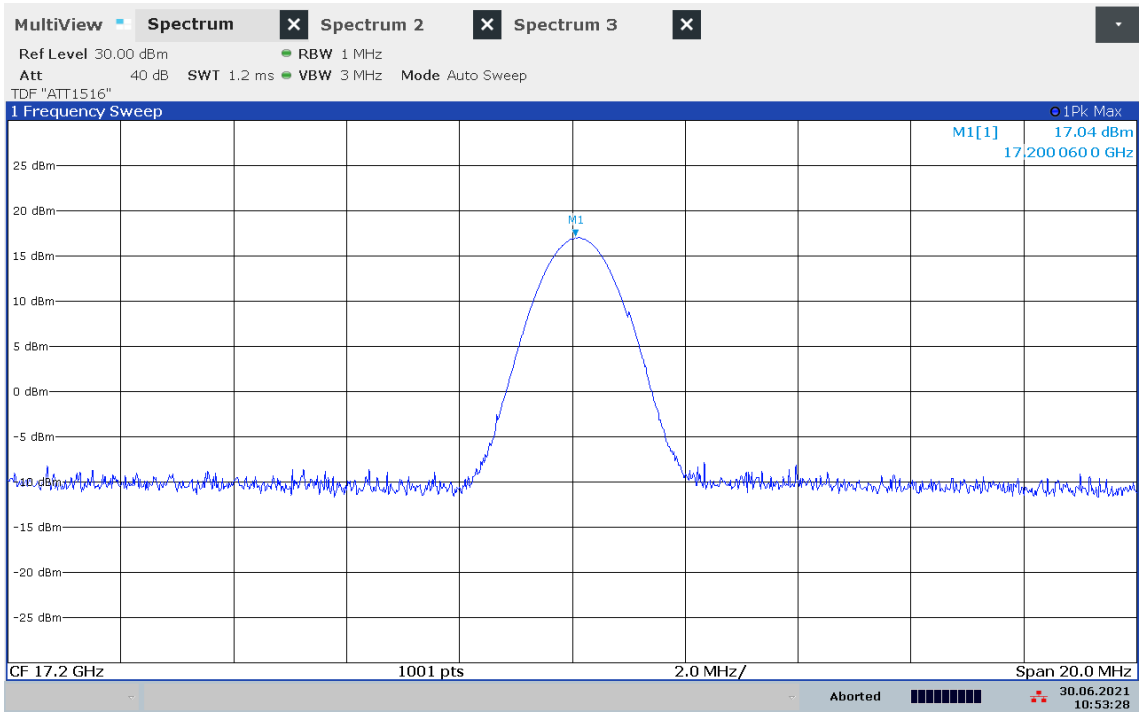


Channel High – TX1

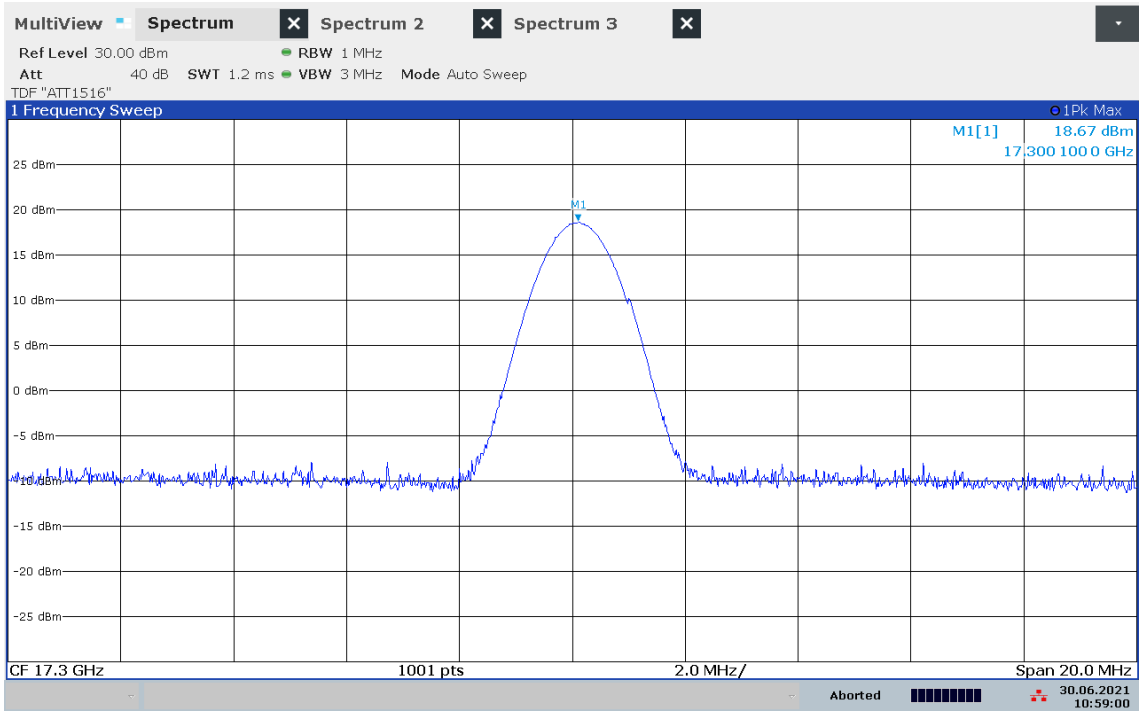


Channel Low – TX2

Test data



Channel Mid – TX2



Channel High – TX2

6.2 Occupied Bandwidth

FCC 47 CFR § 90.209

(a) Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant. In those cases where §2.202 of this chapter does not provide a formula for the computation of necessary bandwidth, the occupied bandwidth, as defined in part 2 of this chapter, may be used in lieu of the necessary bandwidth.

(b) The maximum authorized single channel bandwidth of emission corresponding to the type of emission specified in §90.207 is as follows:

(1) For A1A or A1B emissions, the maximum authorized bandwidth is 0.25 kHz. The maximum authorized bandwidth for type A3E emission is 8 kHz.

(2) For operations below 25 MHz utilizing J3E emission, the bandwidth occupied by the emission shall not exceed 3000 Hz. The assigned frequency will be specified in the authorization. The authorized carrier frequency will be 1400 Hz lower in frequency than the assigned frequency. Only upper sideband emission may be used. In the case of regularly available double sideband radiotelephone channels, an assigned frequency for J3E emissions is available either 1600 Hz below or 1400 Hz above the double sideband radiotelephone assigned frequency.

(3) For all other types of emissions, the maximum authorized bandwidth shall not be more than that normally authorized for voice operations.

(4) Where a frequency is assigned exclusively to a single licensee, more than a single emission may be used within the authorized bandwidth. In such cases, the frequency stability requirements of §90.213 must be met for each emission.

(5) Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table.

TABLE 1 TO §90.209(b)(5)—STANDARD CHANNEL SPACING/BANDWIDTH

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 25[2]		
25-50	20	20
72-76	20	20
150-174	[1]7.5	[1 3]20/11.25/6
216-220[5]	6.25	20/11.25/6
220-222	5	4
406-512[2]	[1]6.25	[1 3 6]20/11.25/6
806-809/851-854	12.5	20
809-817/854-862	12.5	[6]20/11.25
817-824/862-869	25	[6]20
896-901/935-940	12.5	13.6
902-928[4]		
929-930	25	20
1427-1432[5]	12.5	12.5
[3]2450-2483.5[2]		
Above 2500[2]		

[2]Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

RSS-Gen - Clause 6.7

Test date: 2021-06-30
Test results: Pass

Special notes
Signal stimulation: CW and FMCW

Result:

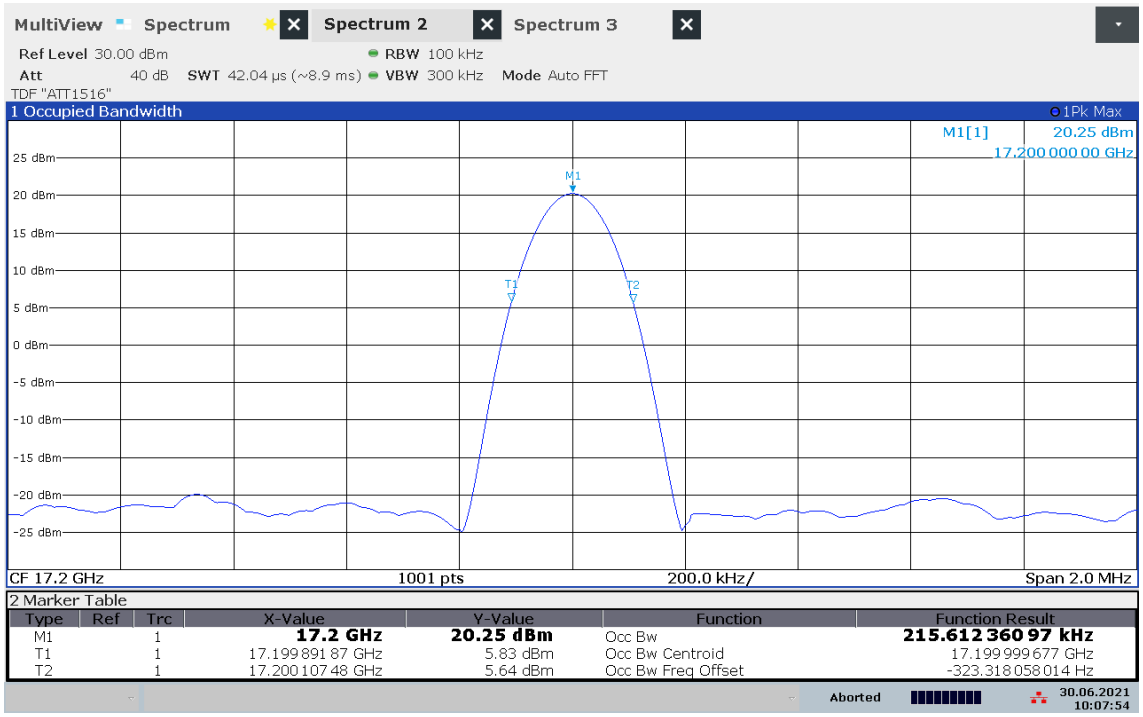
TX1

Frequency (channel)	Bandwidth
17.2 GHz (mid)	215.7 kHz
17.1GHz -17.3 GHz (sweep)	199.1 MHz

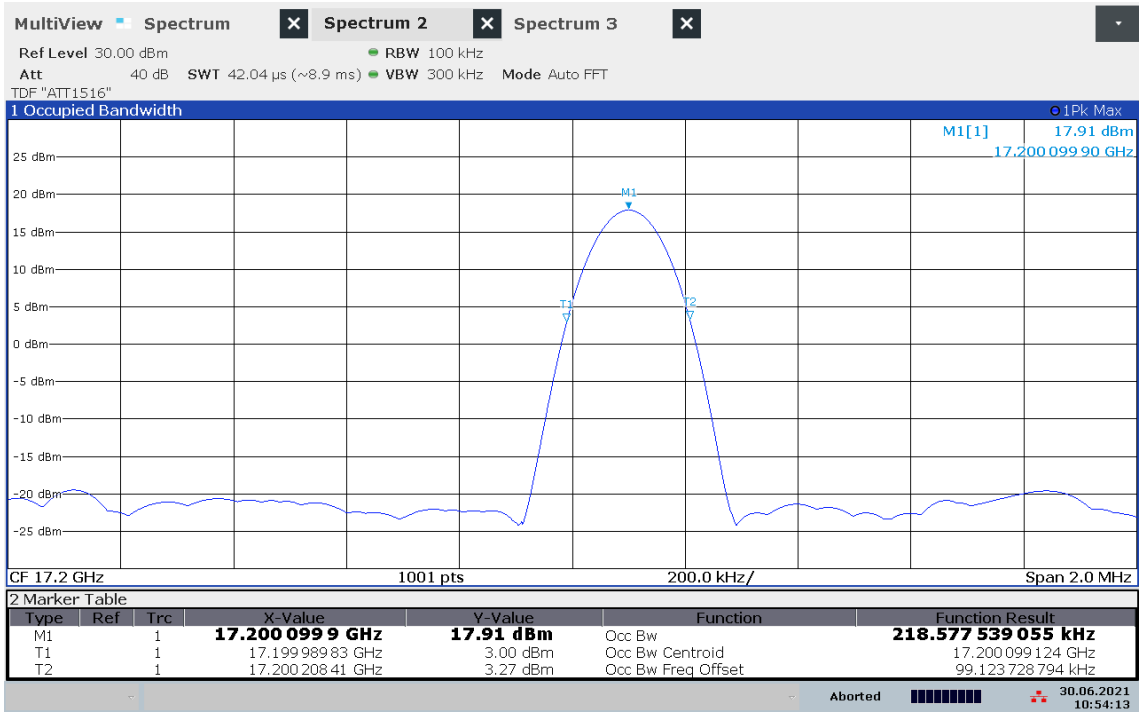
TX2

Frequency (channel)	Bandwidth
17.2 GHz (mid)	218.6 kHz
17.1GHz -17.3 GHz (sweep)	199.1 MHz

Test data

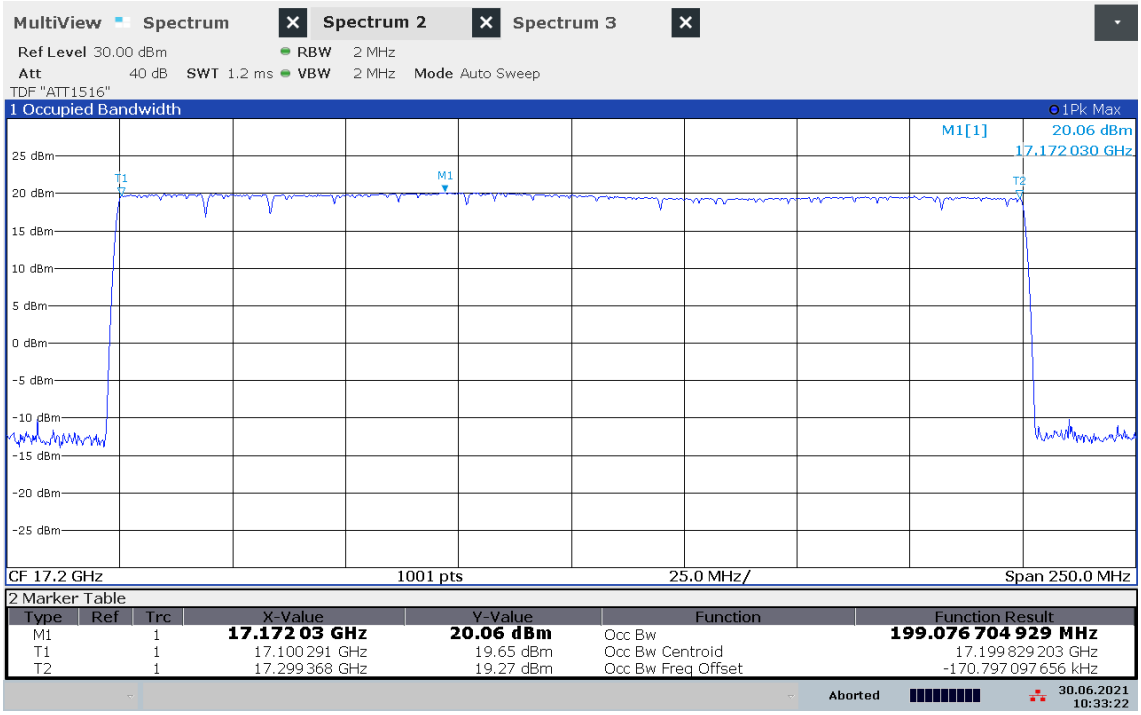


Channel Mid – TX1

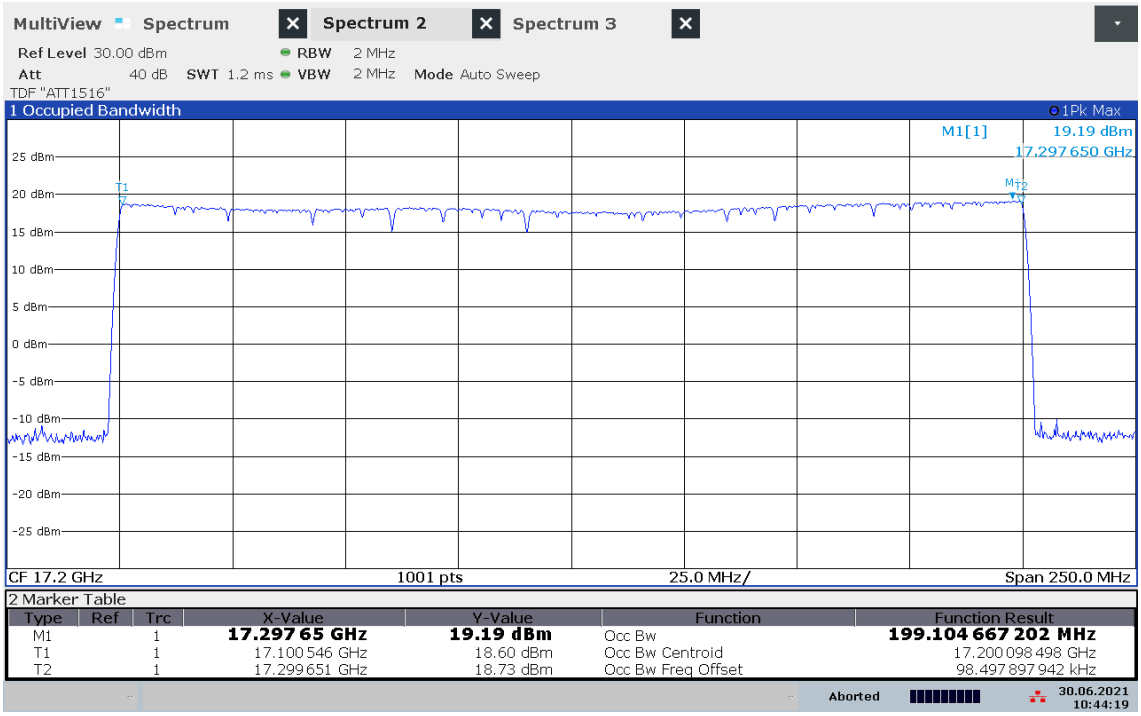


Channel mid – TX2

Test data



Sweep – TX1



Sweep – TX2

6.8 Clause 90.213 Frequency stability measurements

FCC 47 CFR § 90.213
RSS Gen Clause 6.11

There are no limits specified

Test date: 2021-06-30

Test results: Pass

Special notes

Signal stimulation: CW

Test conditions	Frequency, GHz
+50 °C, Nominal	17.200 000 081
+40 °C, Nominal	17.200 000 070
+30 °C, Nominal	17.200 000 089
+20 °C, +15 %	17.200 000 060
+20 °C, Nominal	17.200 000 000
+20 °C, −15 %	17.200 000 010
+10 °C, Nominal	17.199 999 998
0 °C, Nominal	17.200 000 005
−10 °C, Nominal	17.199 999 986
−20 °C, Nominal	17. 199 999 986
−30 °C, Nominal	17.200 000 001

Field Strength of spurious radiation

FCC 47 CFR § 90.210

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (o) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating under this part.

APPLICABLE EMISSION MASKS

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25[1]	A or B	A or C
25-50	B	C
72-76	B	C
150-174[2]	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512[2 5]	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925[4]		
All other bands	B	C

(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

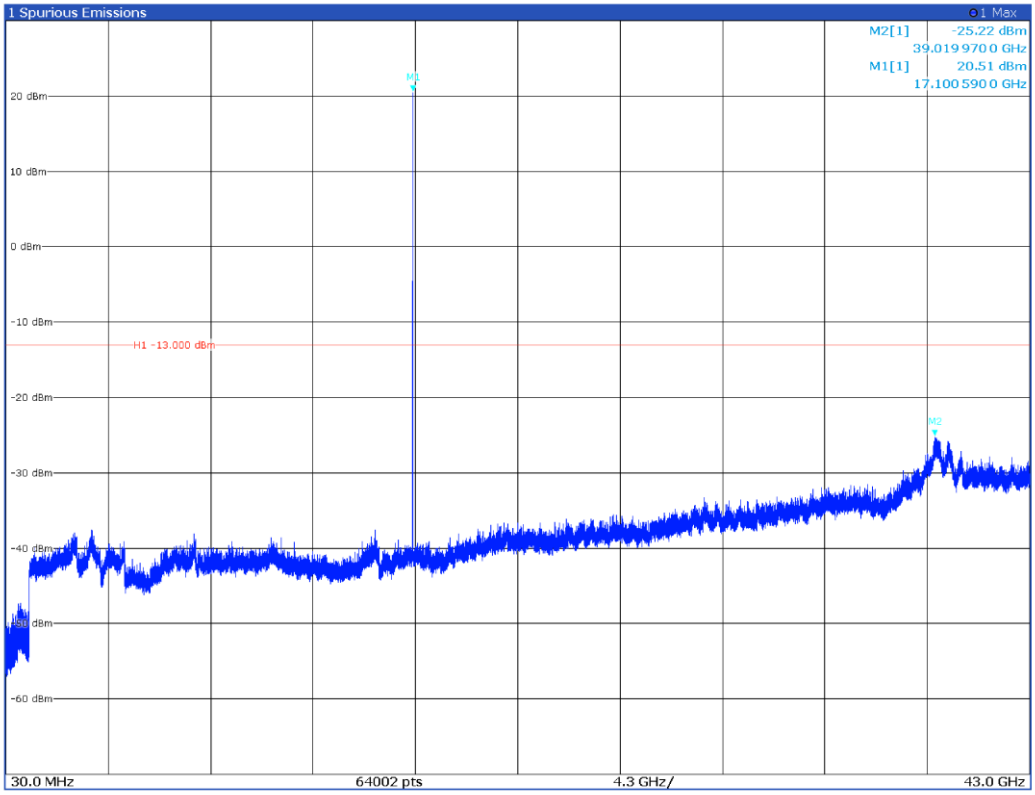
RSS Gen Clause 6.11

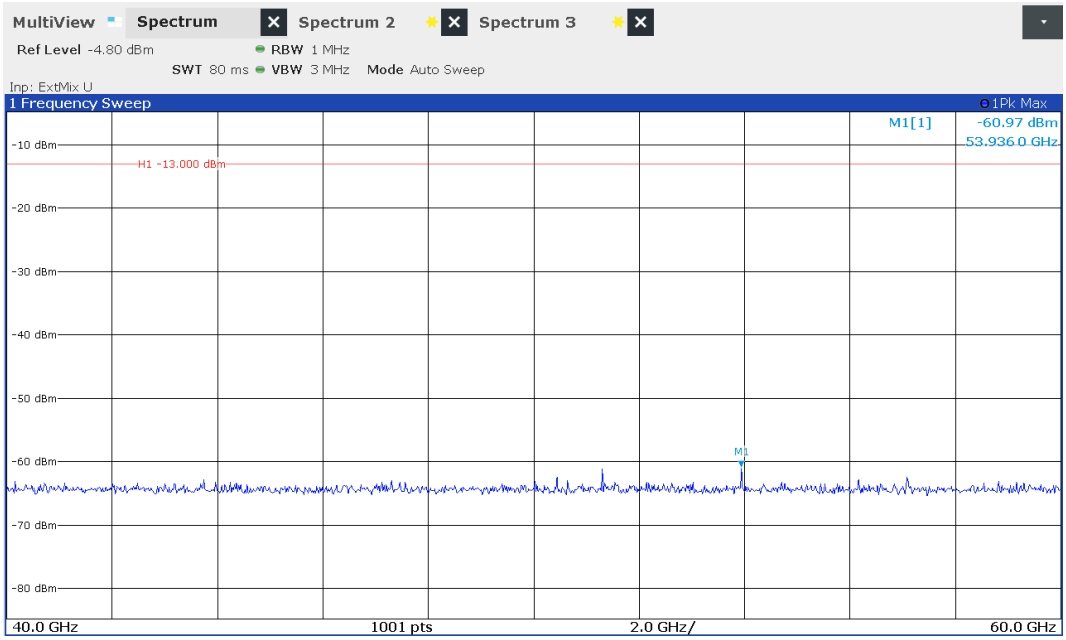
Test date: From 2021-06-25 to 2020-06-29

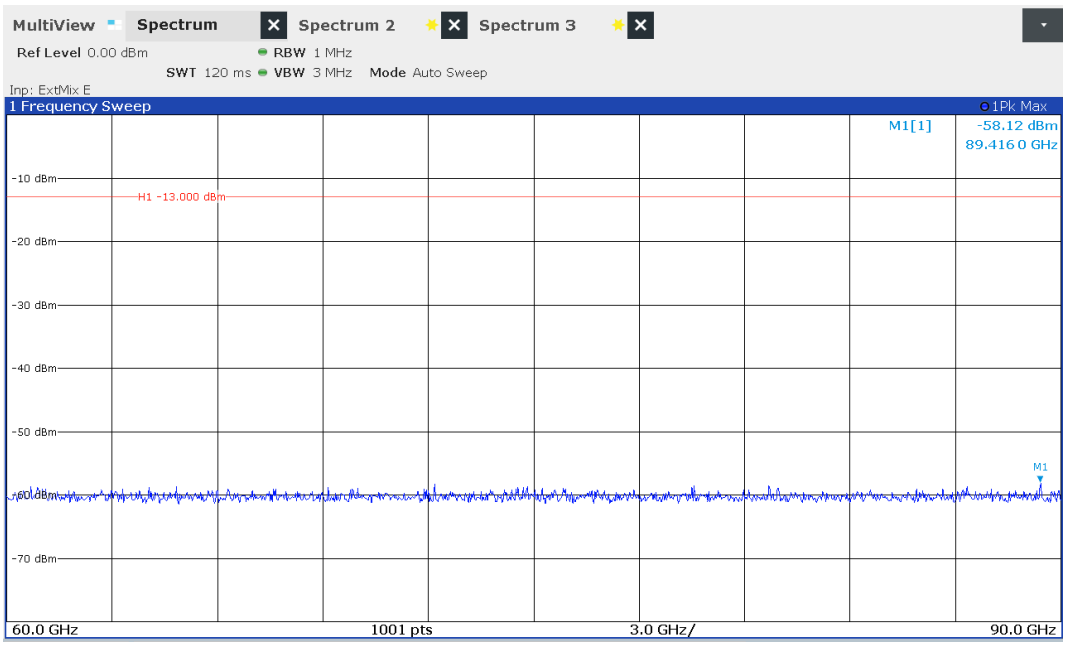
Test results: Pass

Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Low channel, TX 1

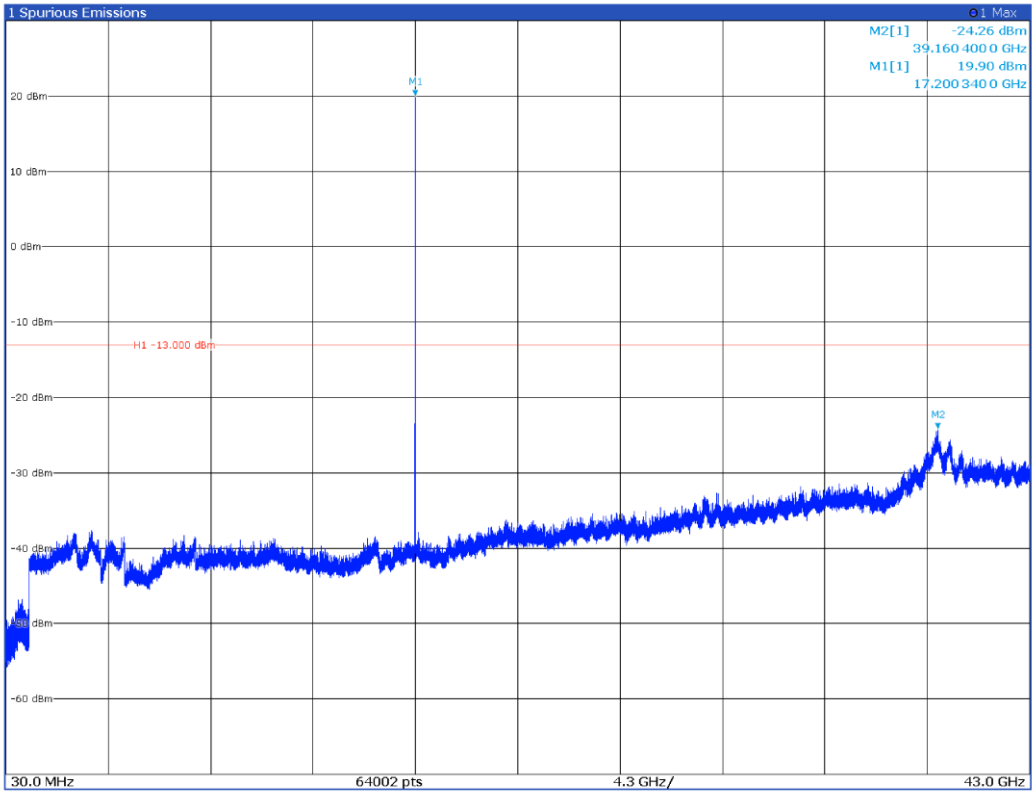


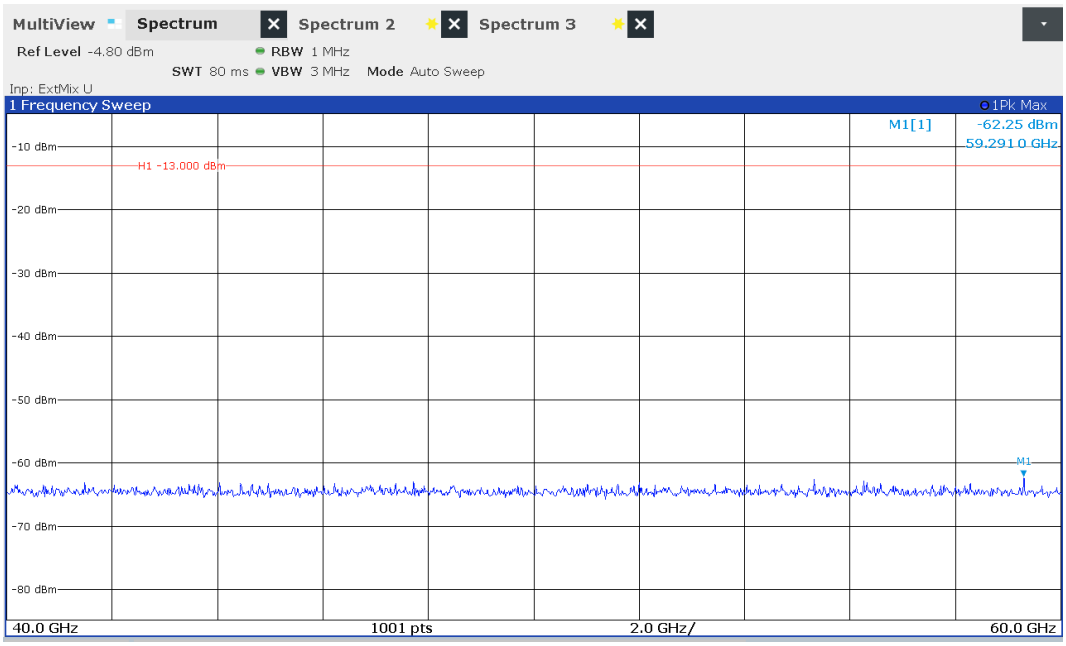


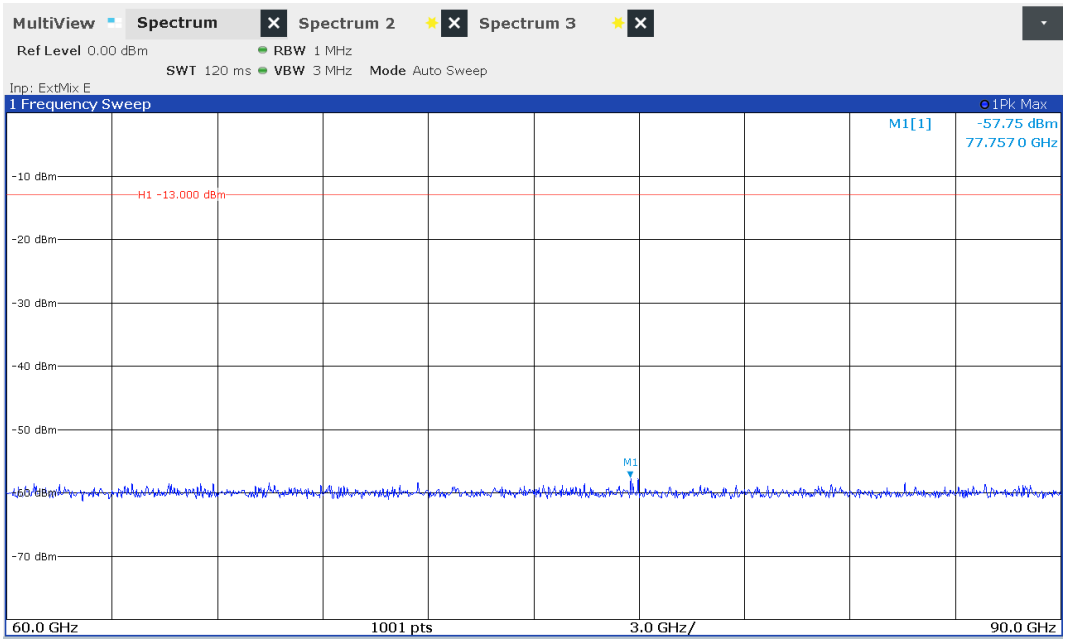


Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Mid channel, TX 1

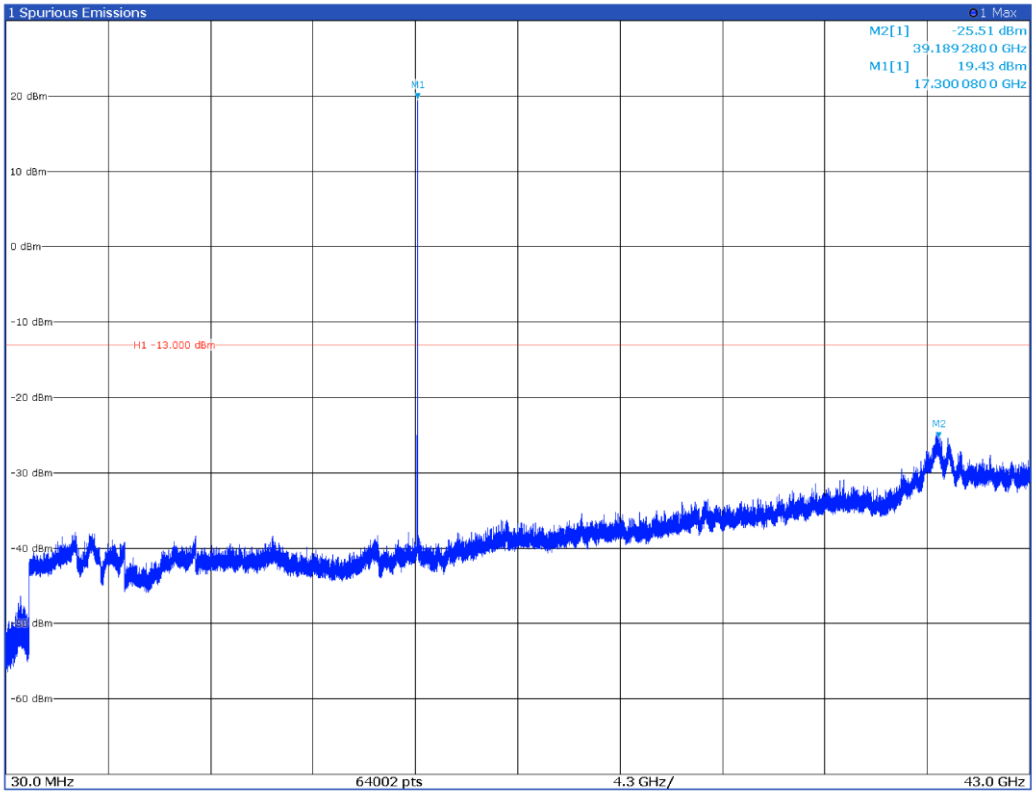


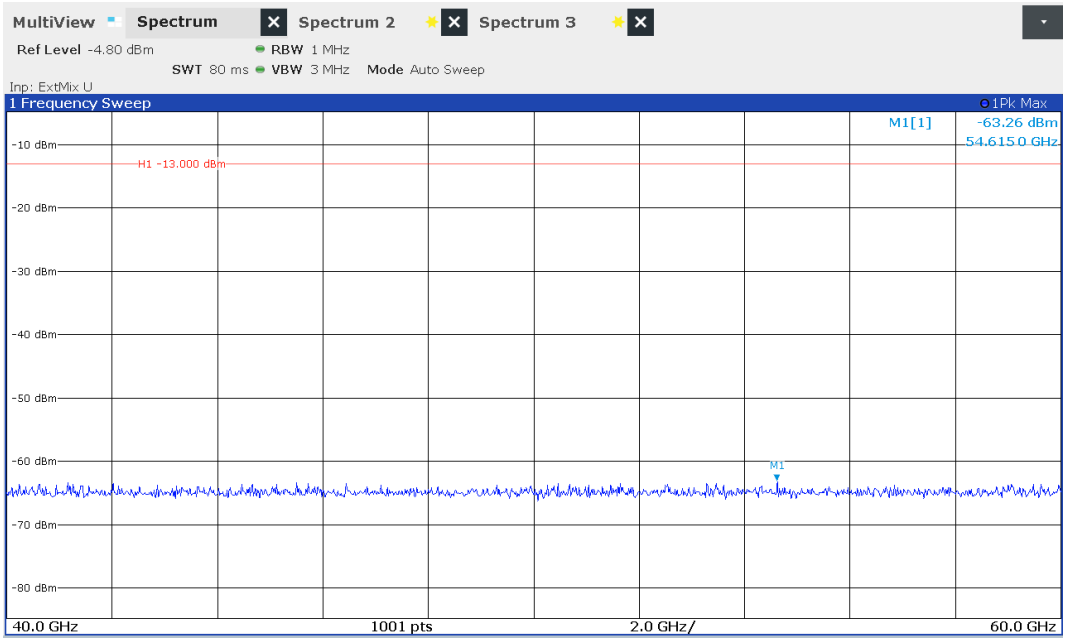

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level -4.80 dBm
RBW 1 MHz
SWT 80 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix U
1 Frequency Sweep
1Pk Max
M1[1]
-62.25 dBm
59.291 0 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
40.0 GHz
1001 pts
2.0 GHz/
60.0 GHz

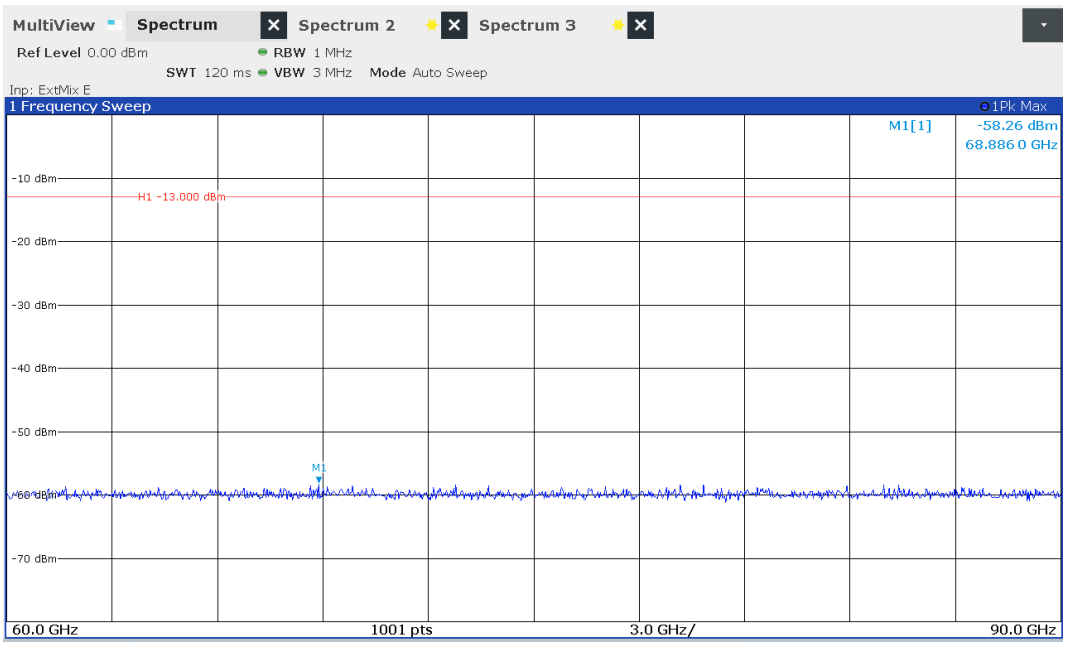

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level 0.00 dBm
RBW 1 MHz
SWT 120 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix E
1 Frequency Sweep
1Pk Max
M1[1]
-57.75 dBm
77.757 0 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
60.0 GHz
1001 pts
3.0 GHz/
90.0 GHz

Test data

Conducted spurious emissions from 30 MHz to 90 GHz
High channel, TX 1

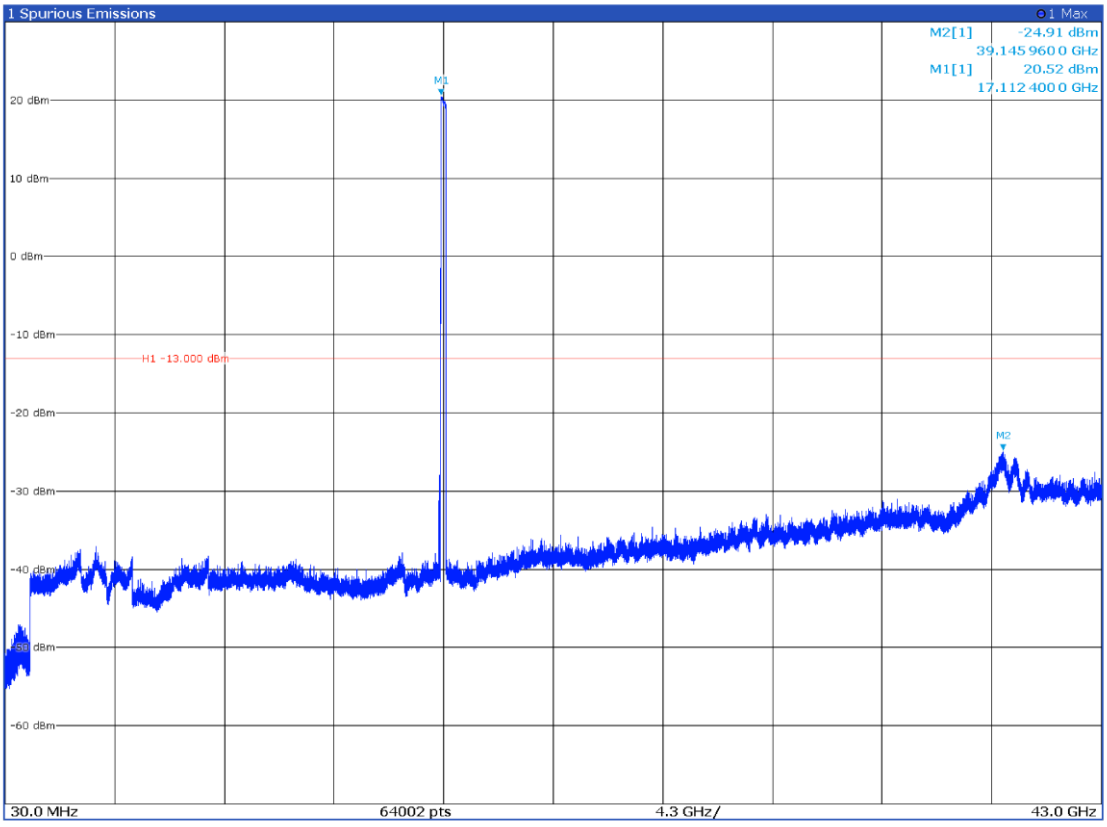


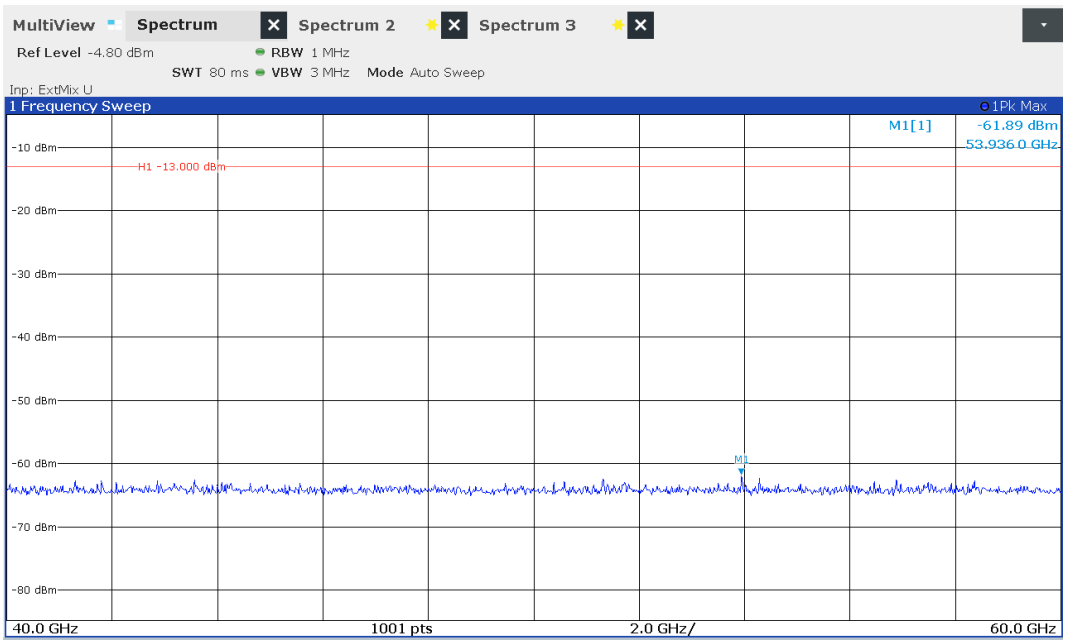


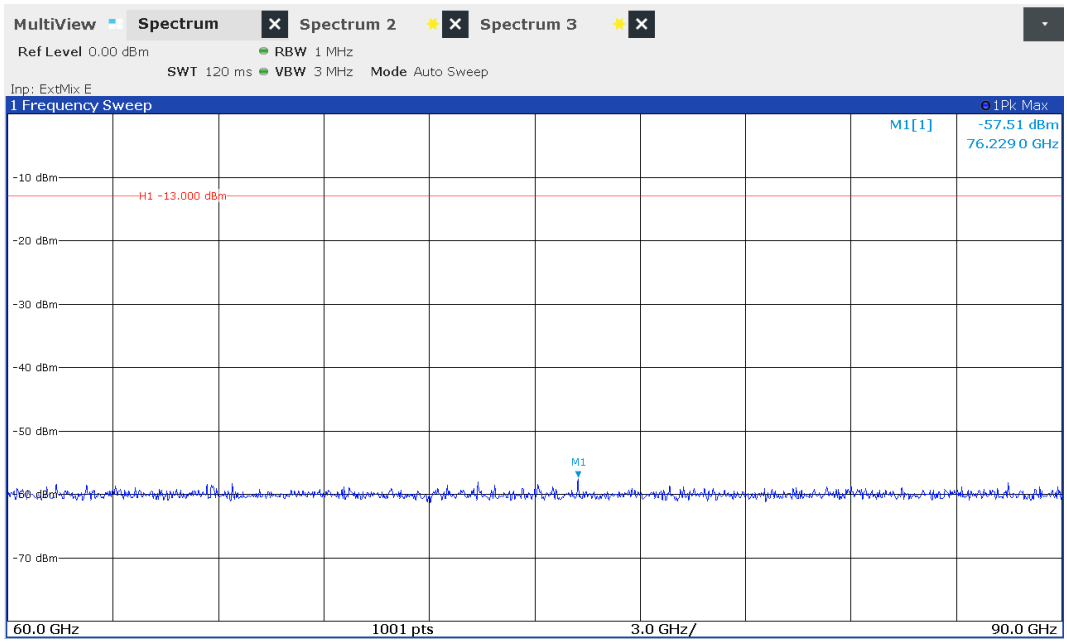


Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Sweep, TX 1

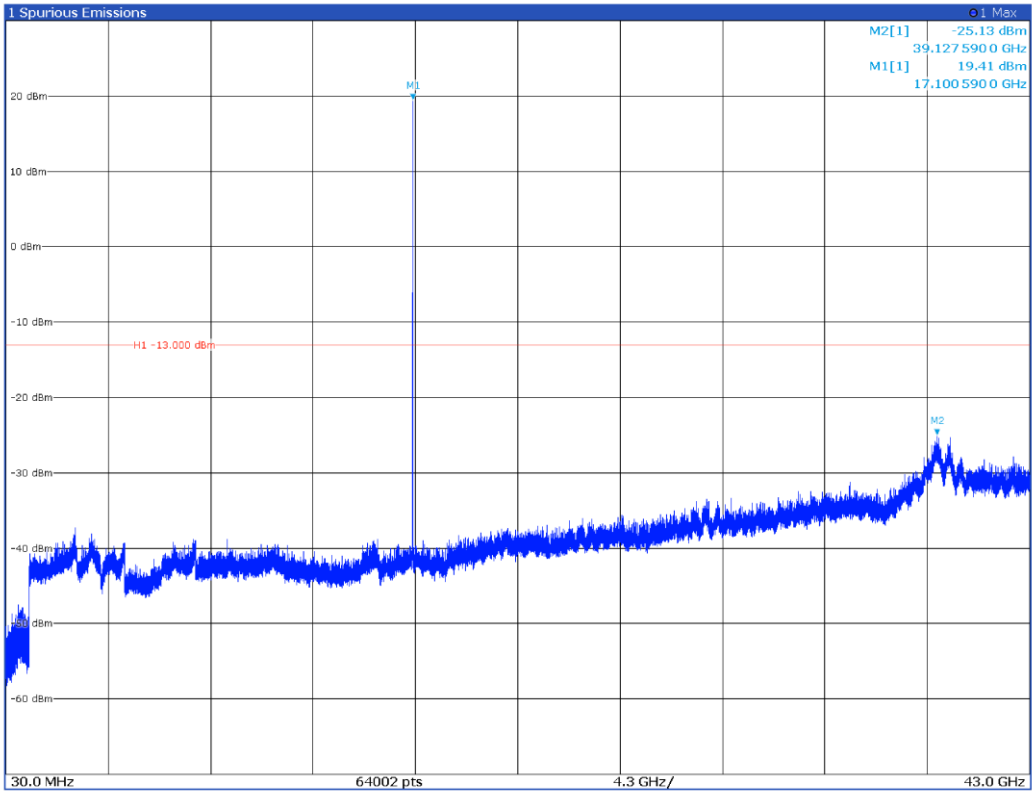


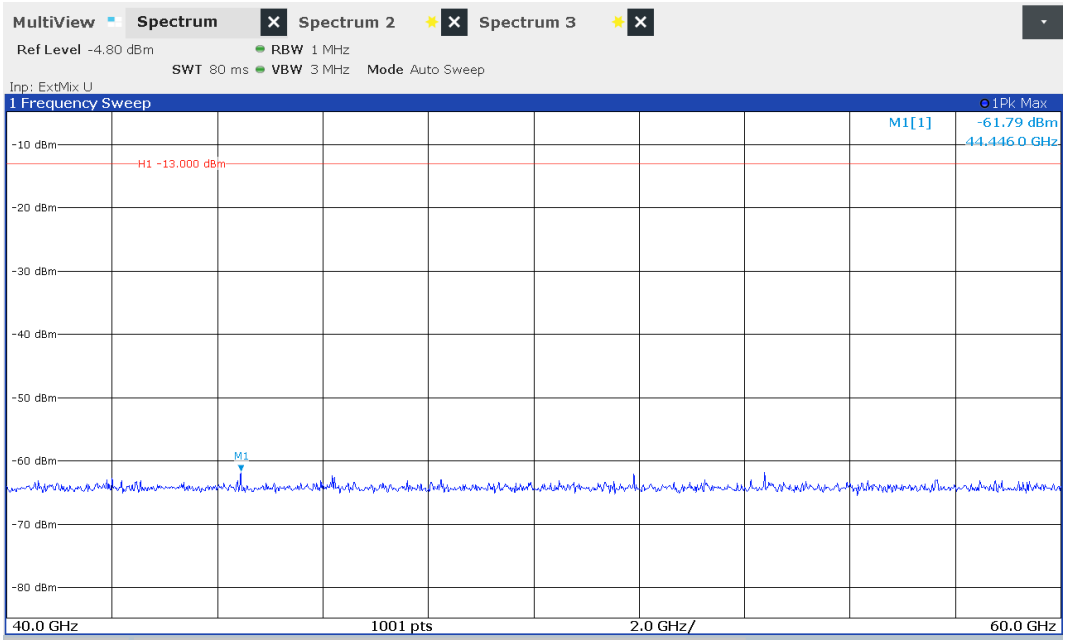

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level -4.80 dBm
RBW 1 MHz
SWT 80 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix U
1 Frequency Sweep
1Pk Max
M1[1]
-61.89 dBm
53.936 0 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
40.0 GHz
1001 pts
2.0 GHz/
60.0 GHz

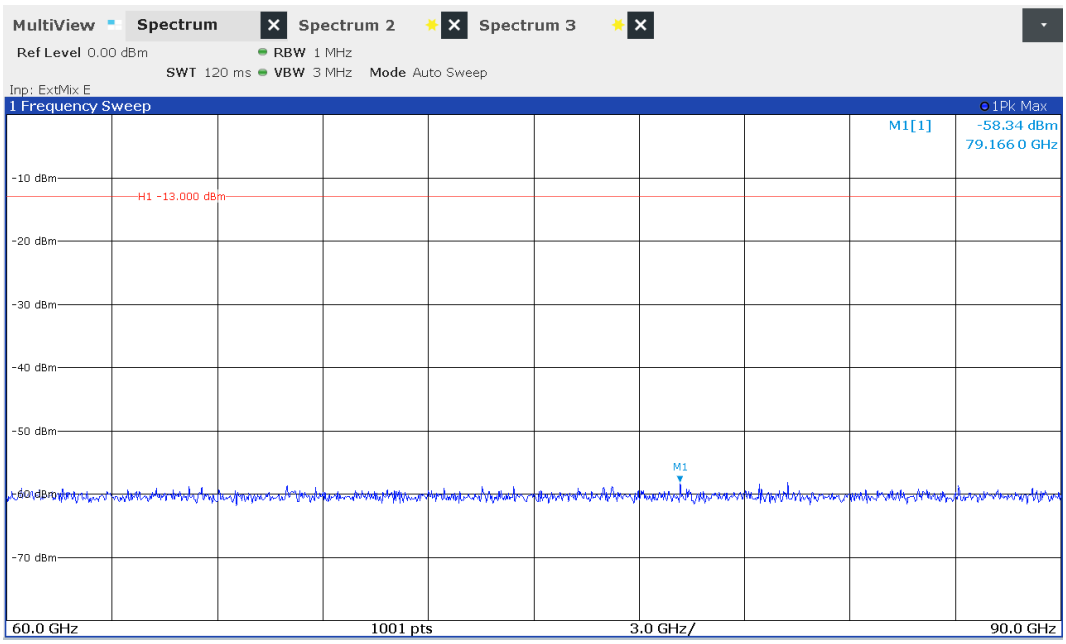

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level 0.00 dBm
RBW 1 MHz
SWT 120 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix E
1 Frequency Sweep
1Pk Max
M1[1]
-57.51 dBm
76.229 0 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
60.0 GHz
1001 pts
3.0 GHz/
90.0 GHz

Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Low channel, TX 2

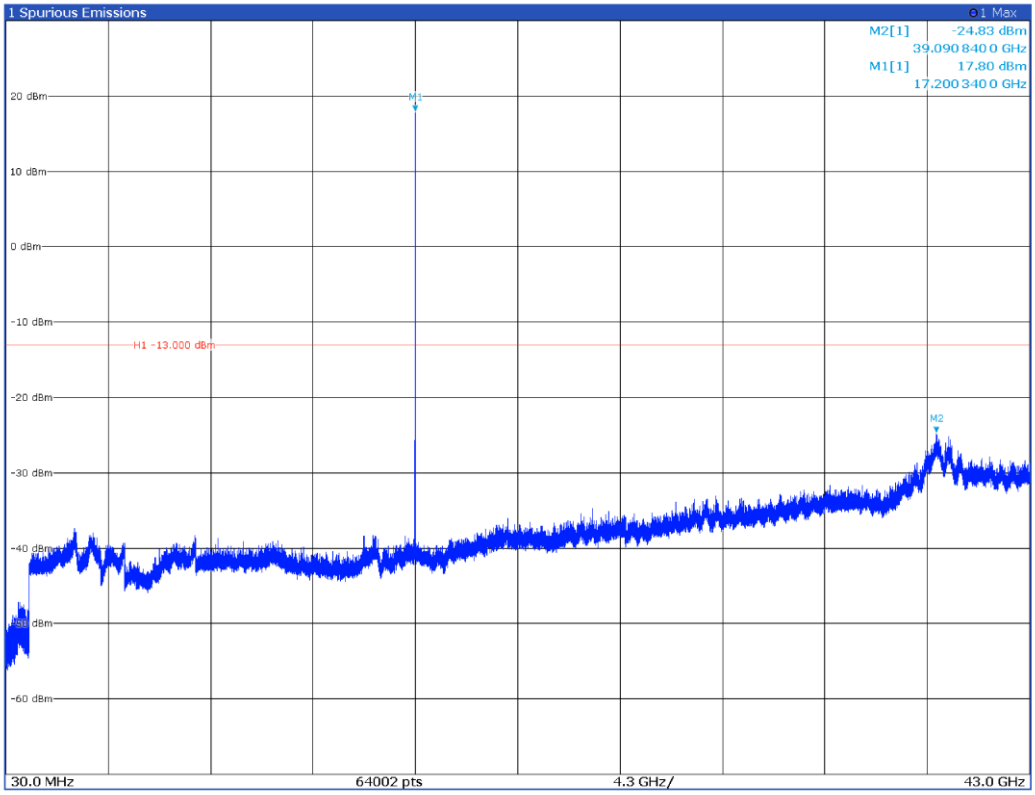


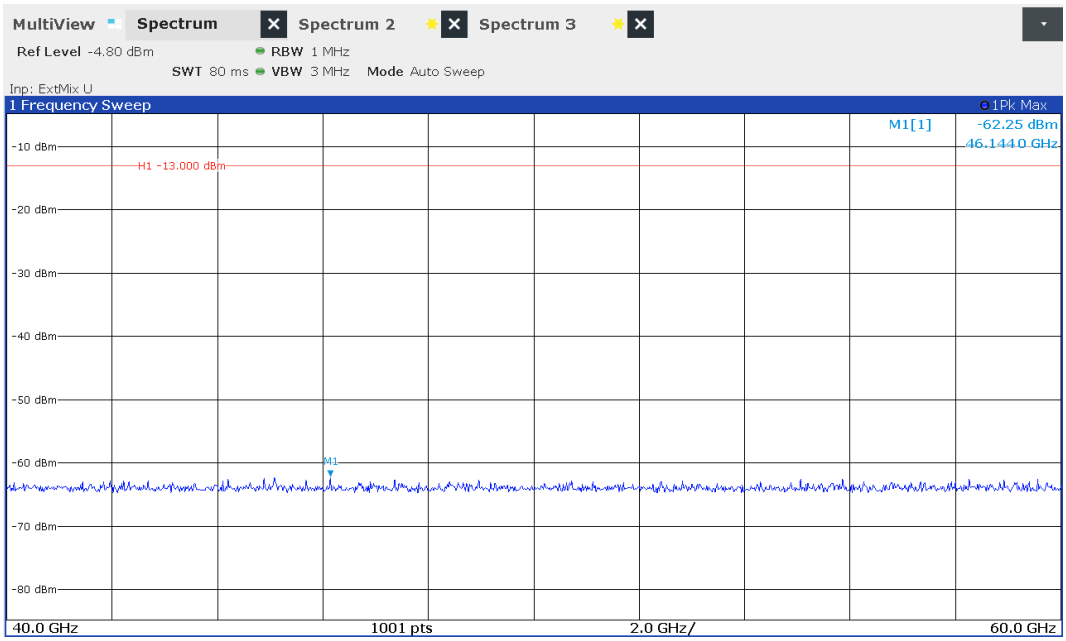


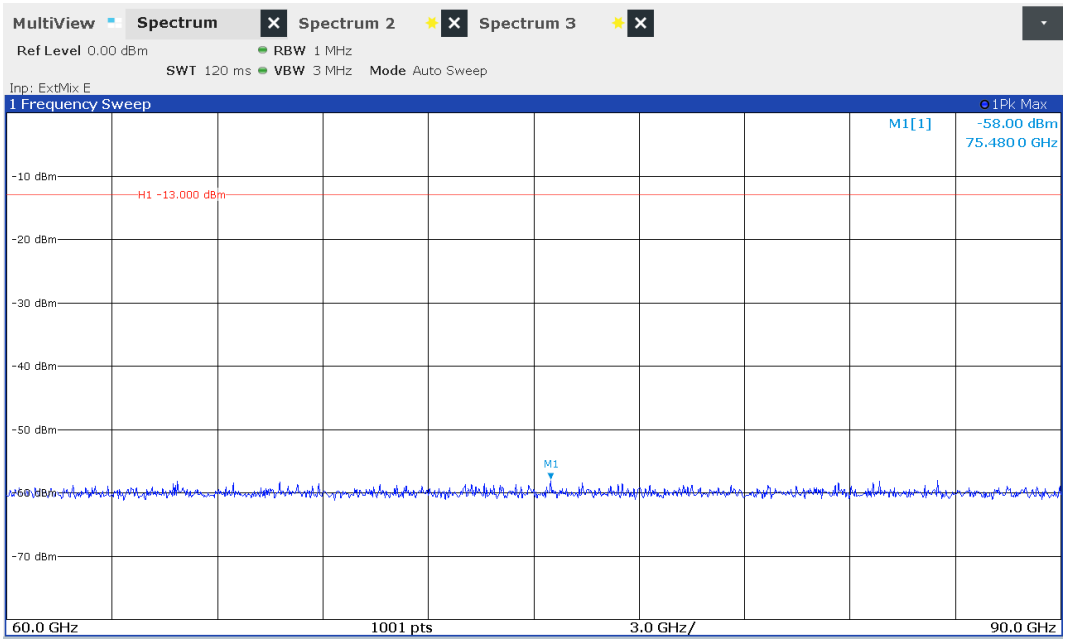


Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Mid channel, TX 2

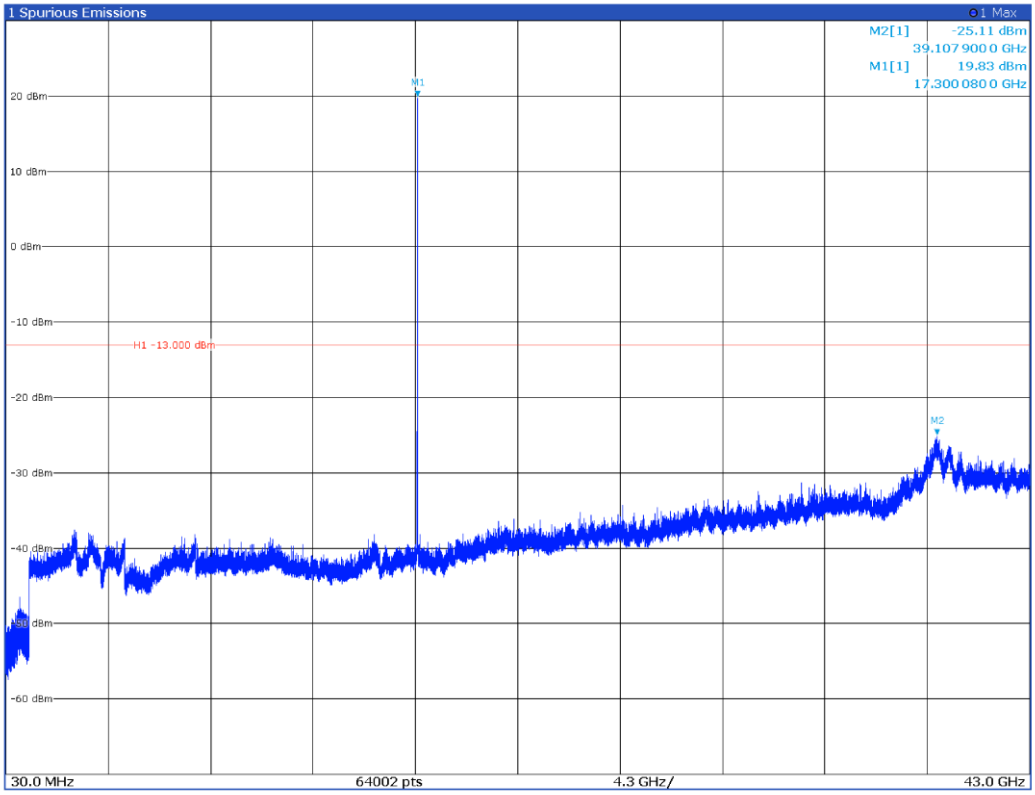


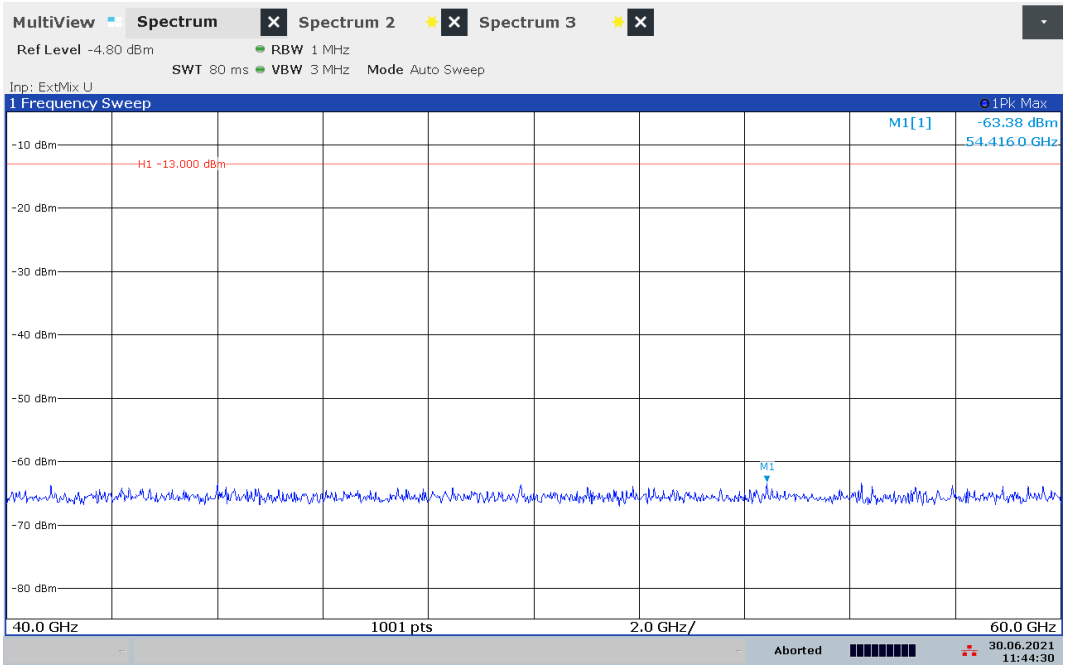

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level -4.80 dBm
RBW 1 MHz
SWT 80 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix U
1 Frequency Sweep
1Pk Max
M1[1]
-62.25 dBm
46.1440 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
40.0 GHz
1001 pts
2.0 GHz/
60.0 GHz

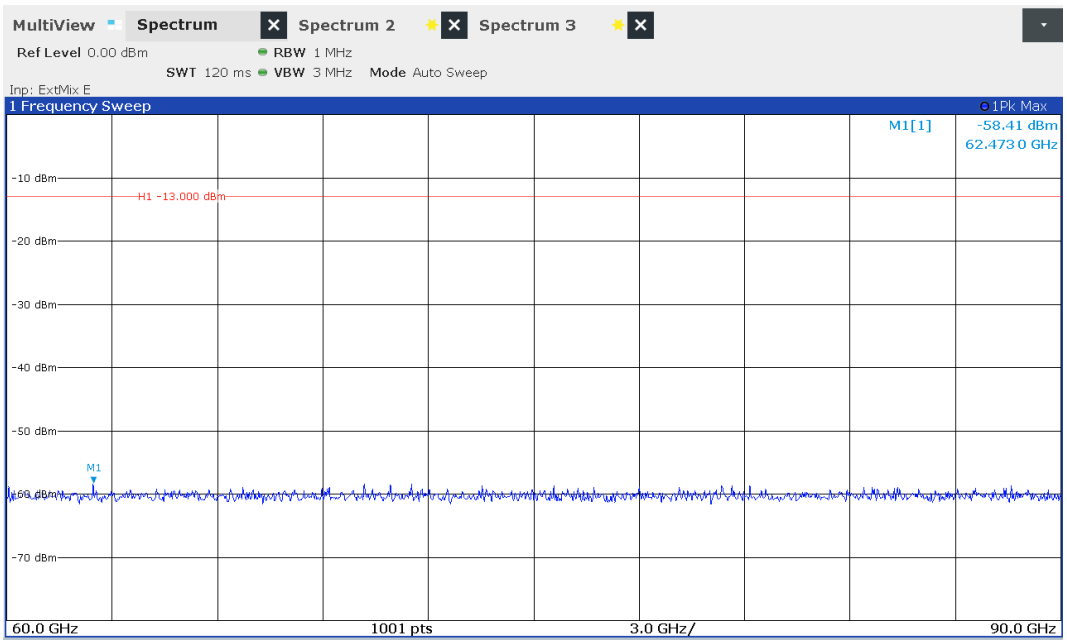

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level 0.00 dBm
RBW 1 MHz
SWT 120 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix E
1 Frequency Sweep
1Pk Max
M1[1]
-58.00 dBm
75.4800 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
60.0 GHz
1001 pts
3.0 GHz/
90.0 GHz

Test data

Conducted spurious emissions from 30 MHz to 90 GHz
High channel, TX 2

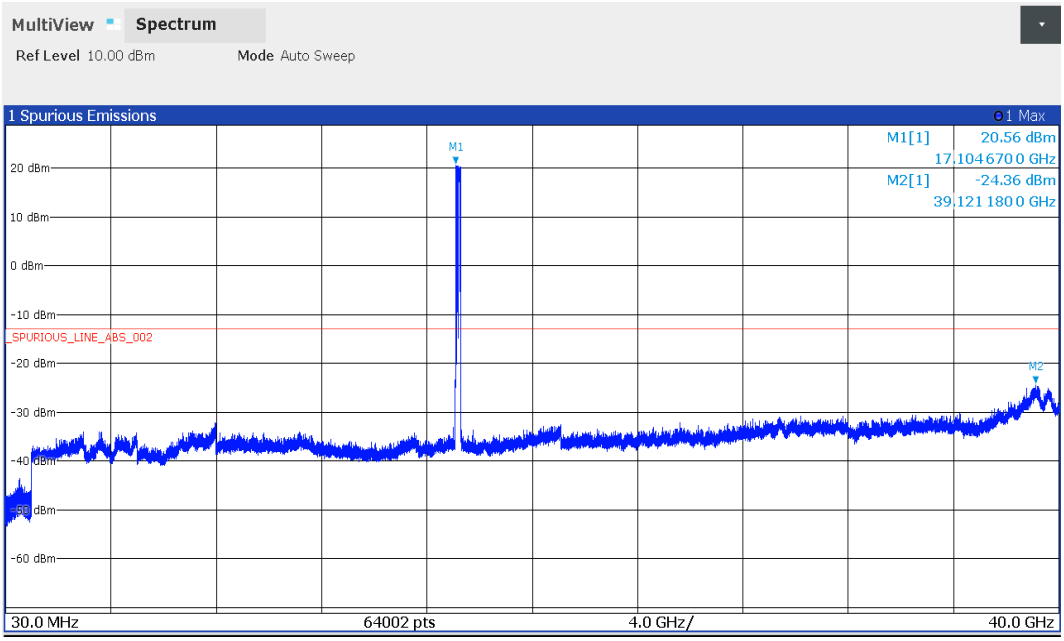


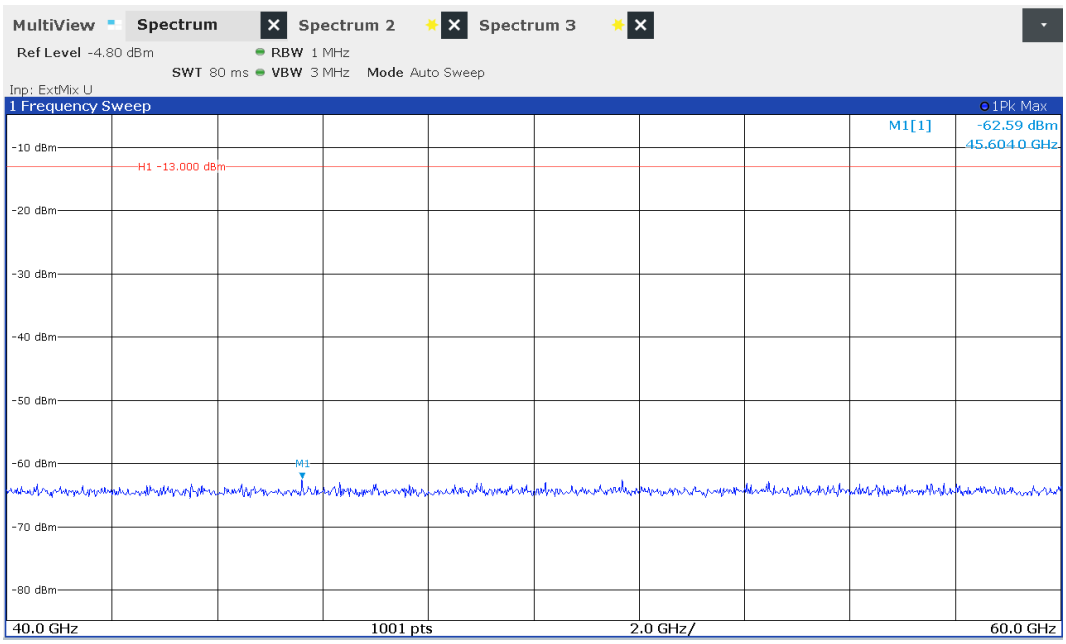


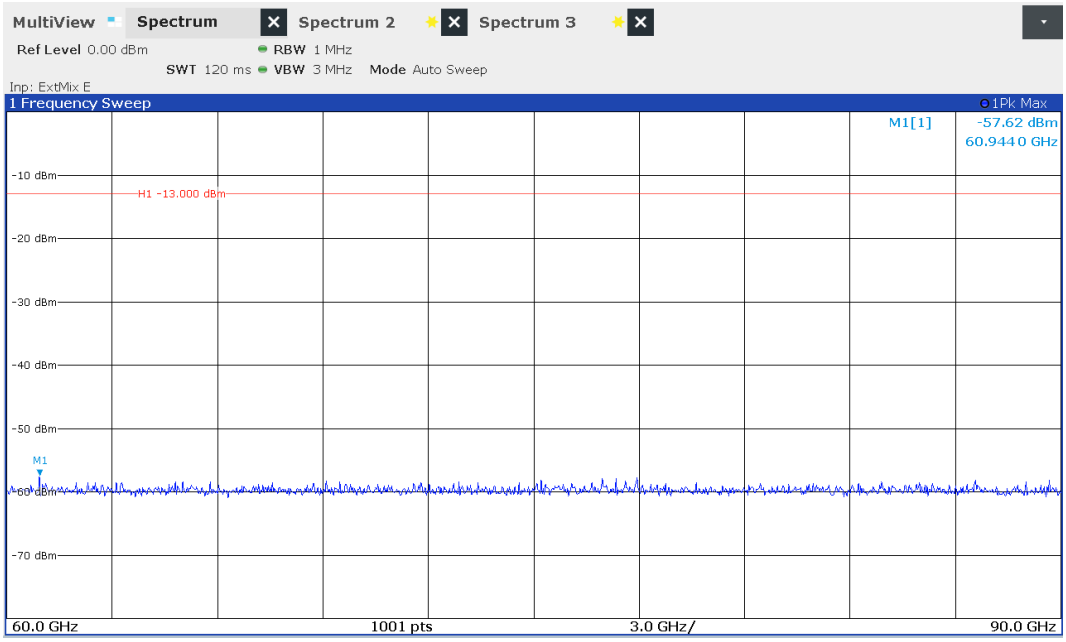


Test data

Conducted spurious emissions from 30 MHz to 90 GHz
Sweep, TX 2

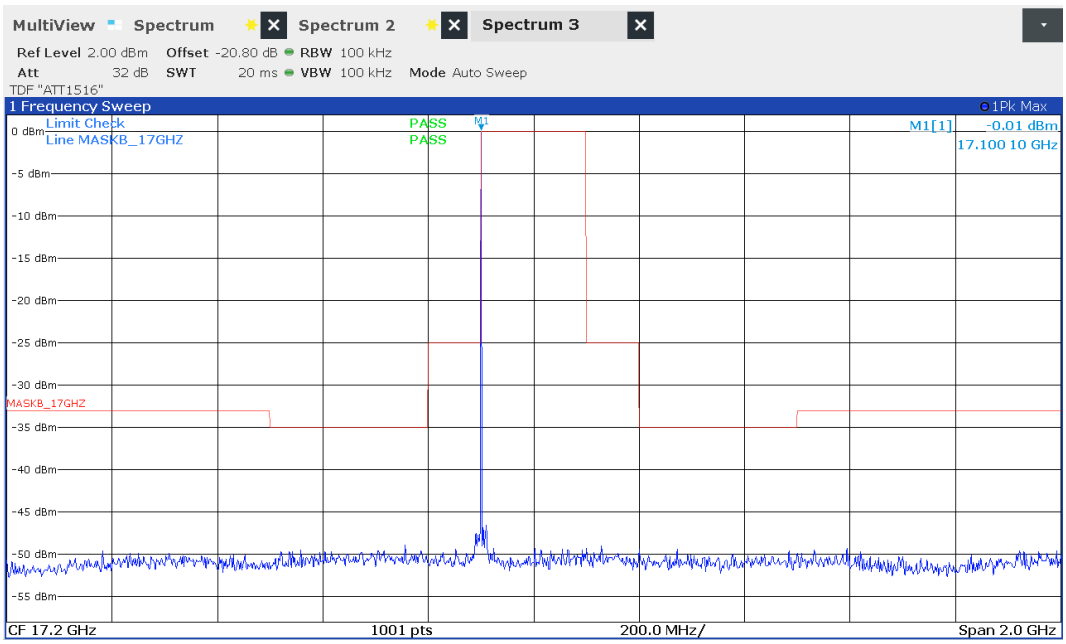



MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level -4.80 dBm
RBW 1 MHz
SWT 80 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix U
1 Frequency Sweep
1Pk Max
M1[1]
-62.59 dBm
45.6040 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
40.0 GHz
1001 pts
2.0 GHz/
60.0 GHz

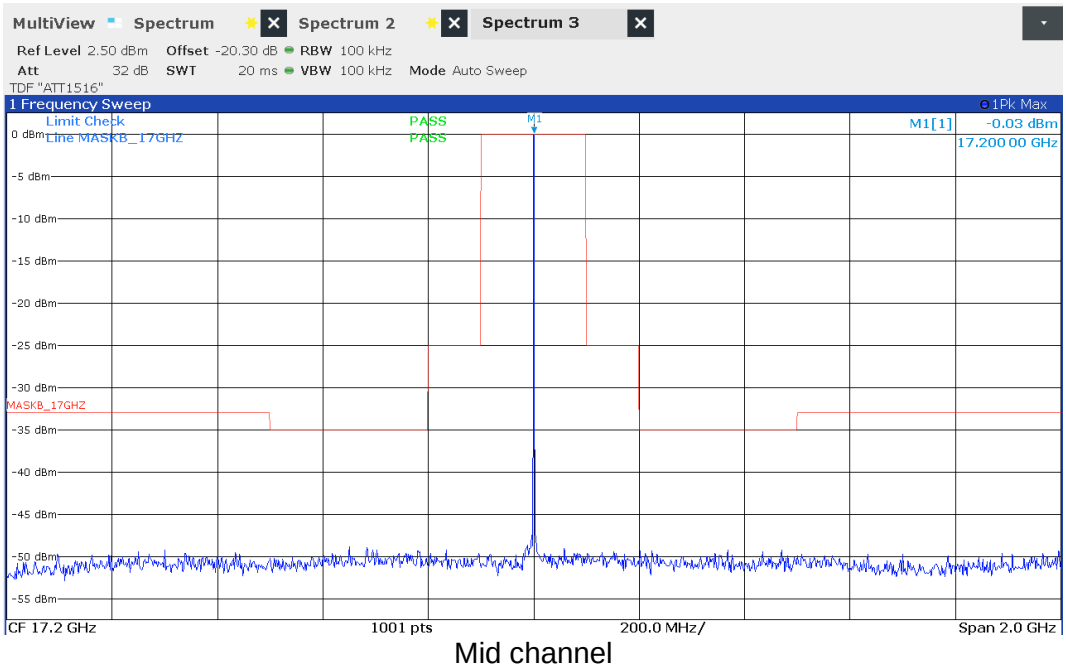

MultiView
Spectrum
Spectrum 2
Spectrum 3
Ref Level 0.00 dBm
RBW 1 MHz
SWT 120 ms
VBW 3 MHz
Mode Auto Sweep
Inp: ExtMix E
1 Frequency Sweep
1Pk Max
M1[1]
-57.62 dBm
60.9440 GHz
H1 -13.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
60.0 GHz
1001 pts
3.0 GHz/
90.0 GHz

Test data

Emission Mask B, TX 1

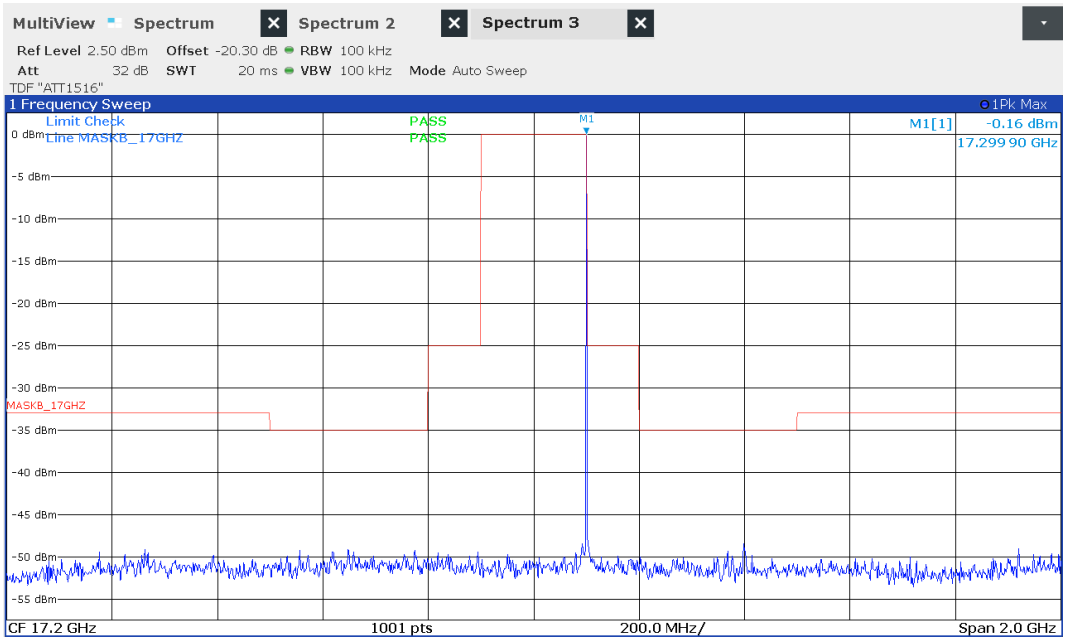


Low channel

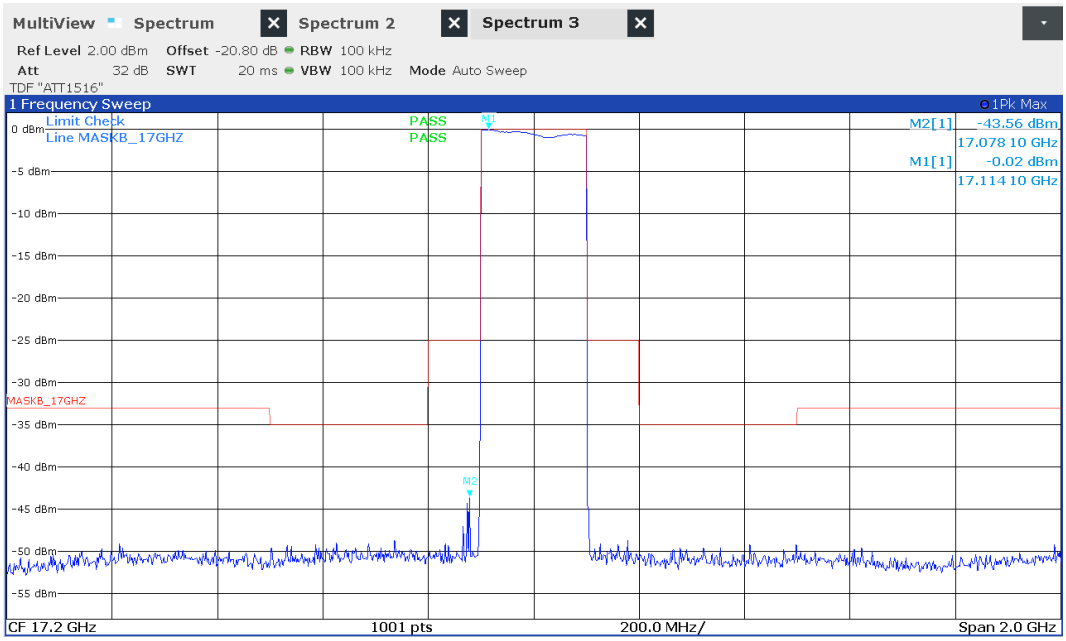


Mid channel

Test data



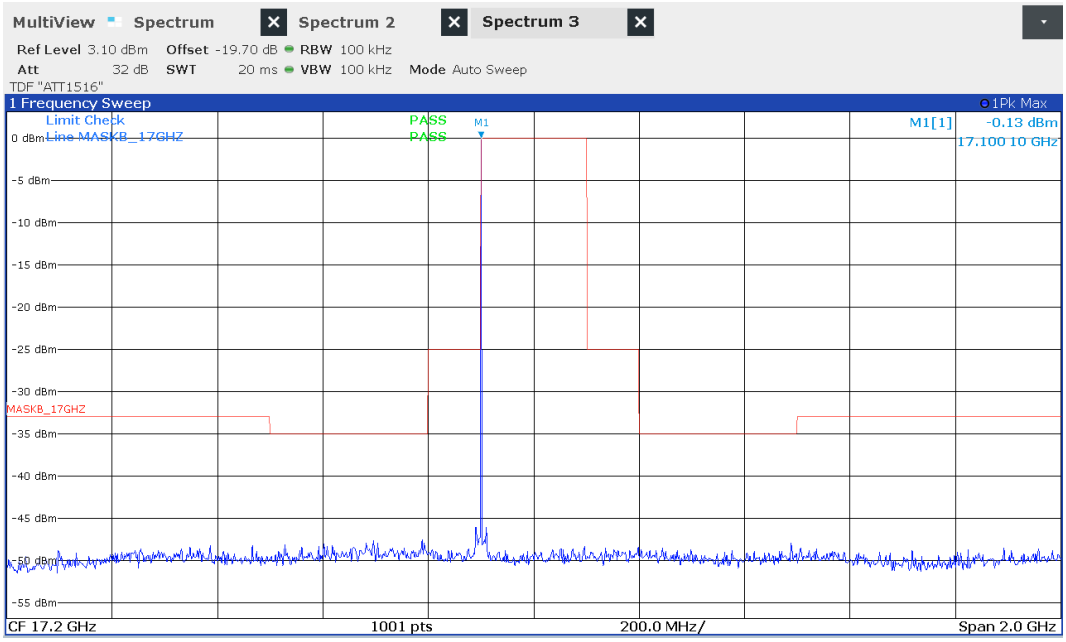
High channel



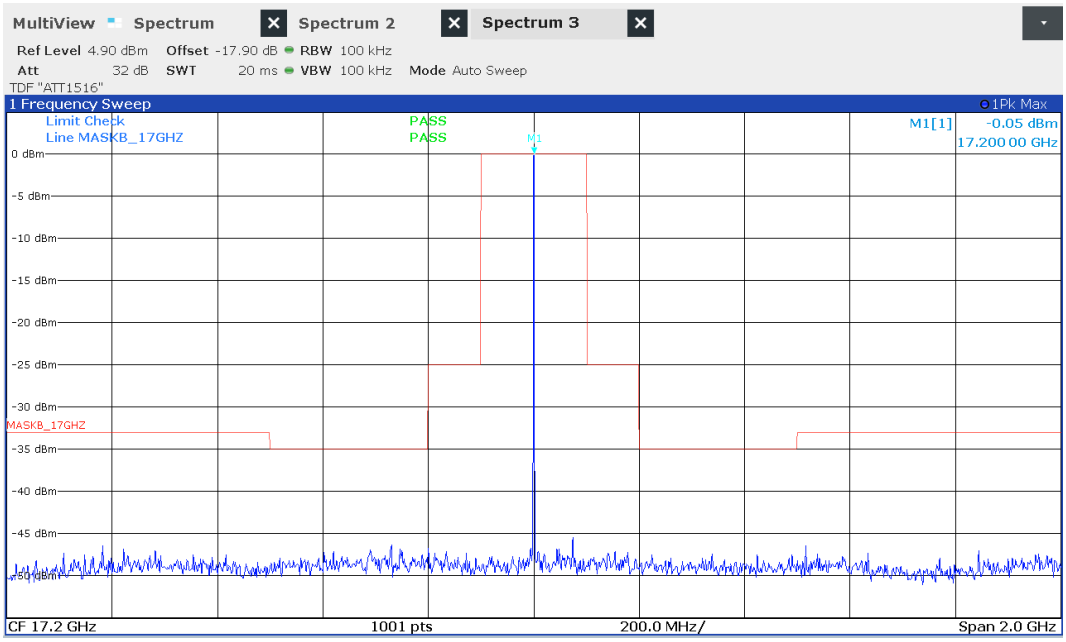
FCMW

Test data

Emission Mask B, TX 2

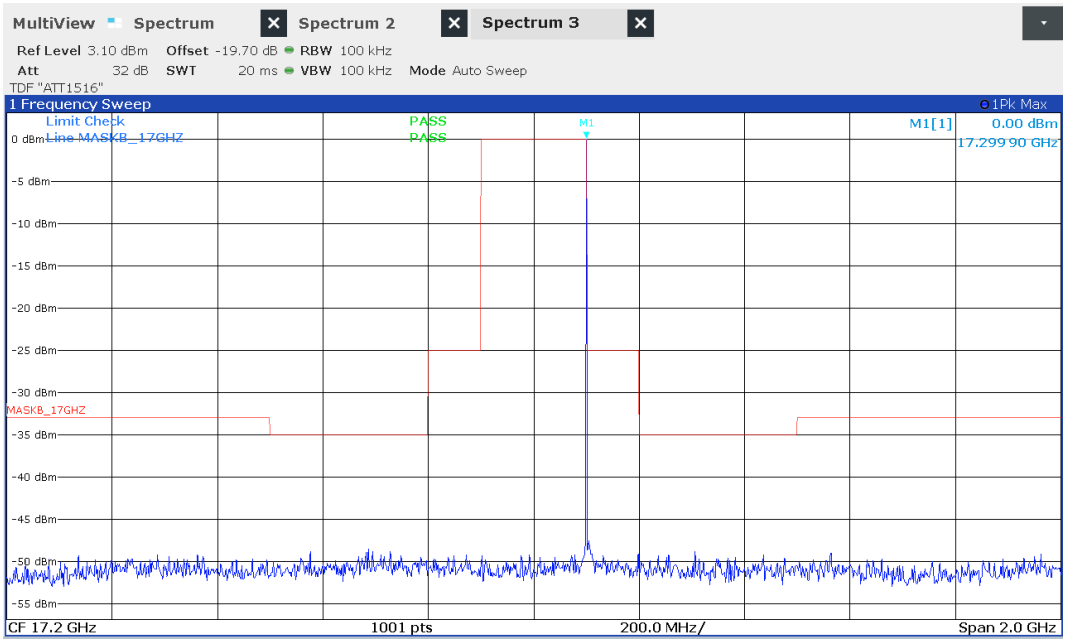


Low channel

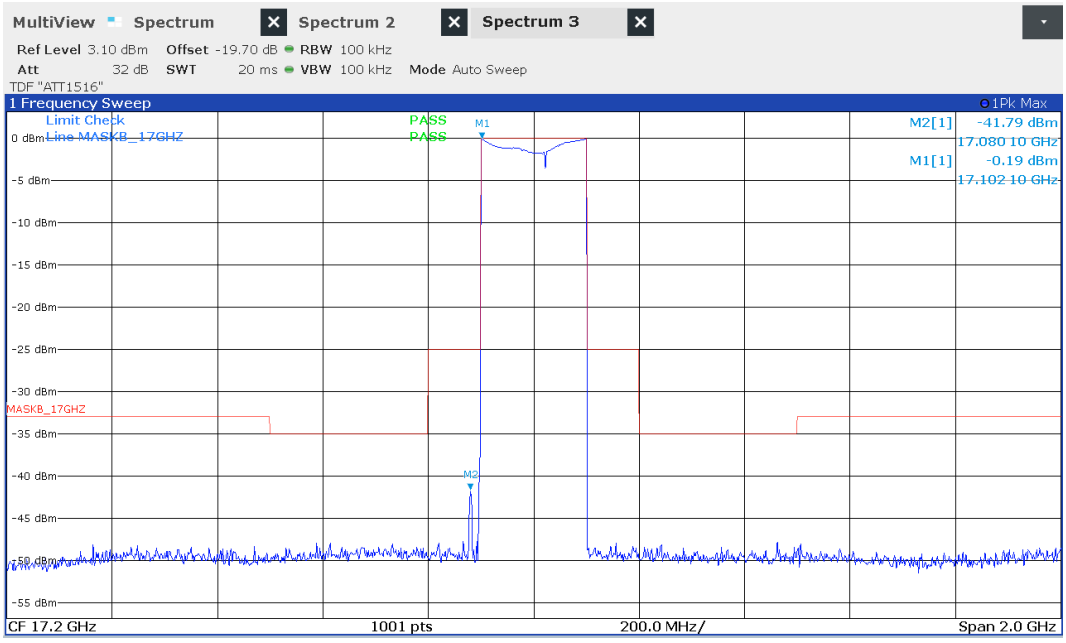


Mid channel

Test data



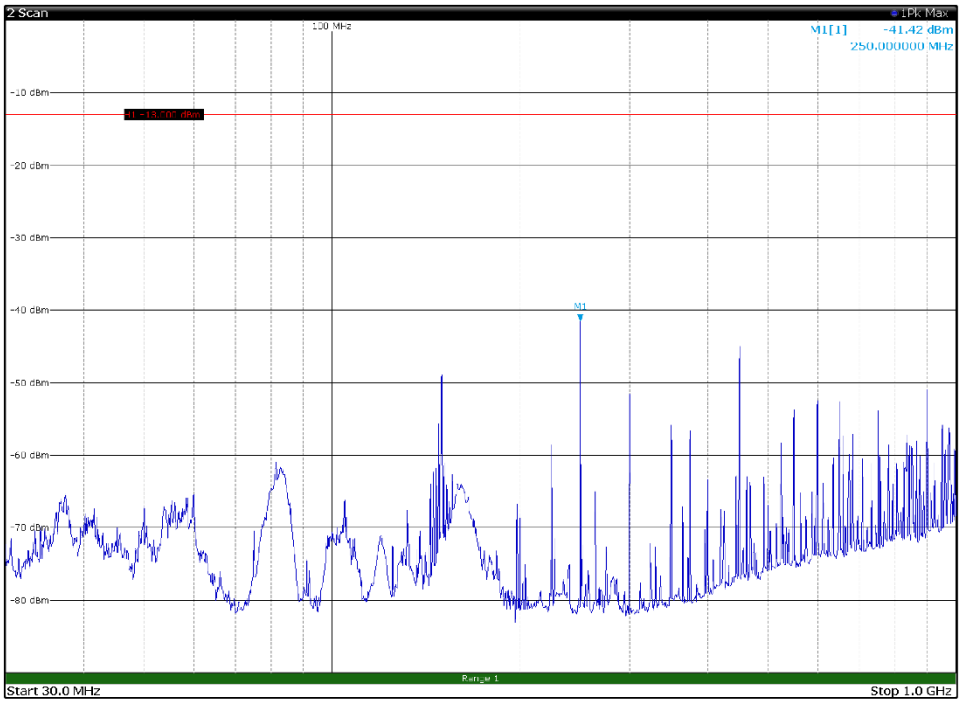
High channel



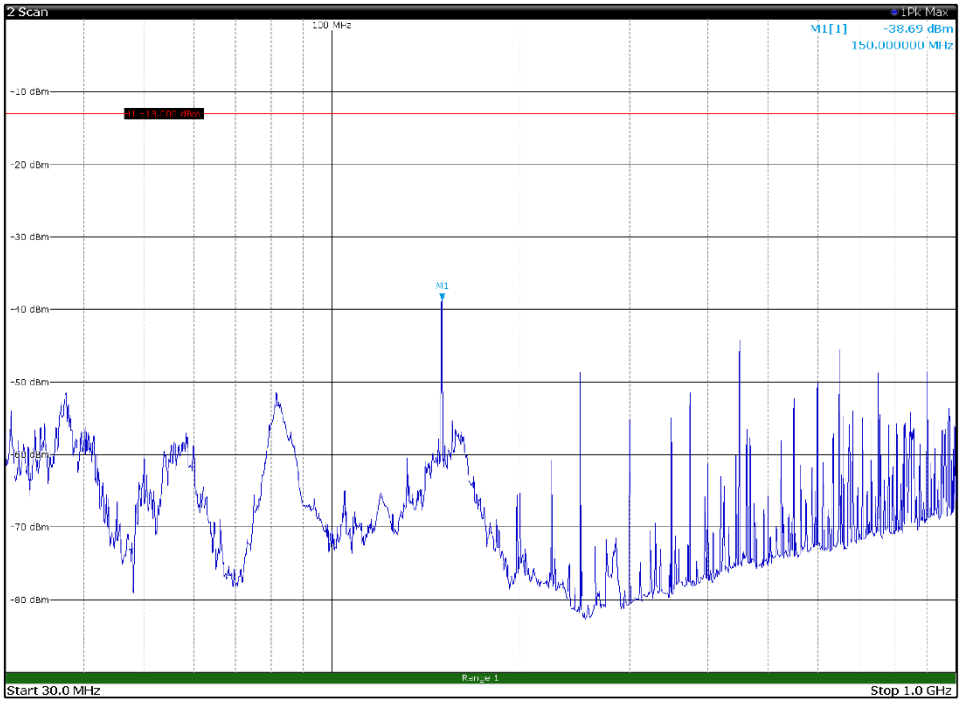
FCMW

Test data

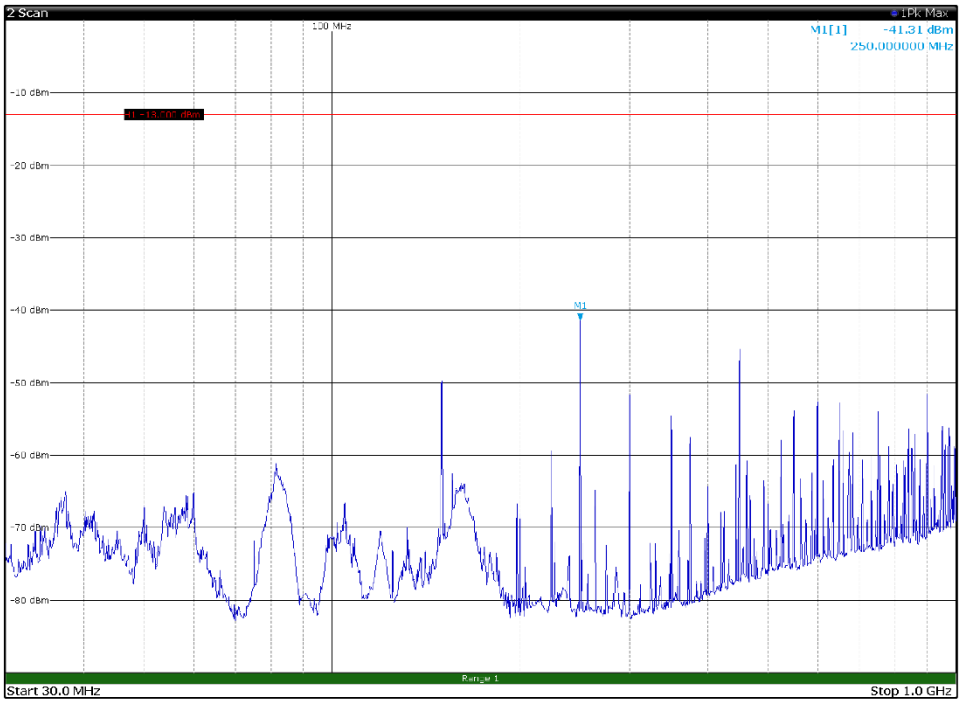
Spurious radiated emissions from 30 MHz to 1 GHz



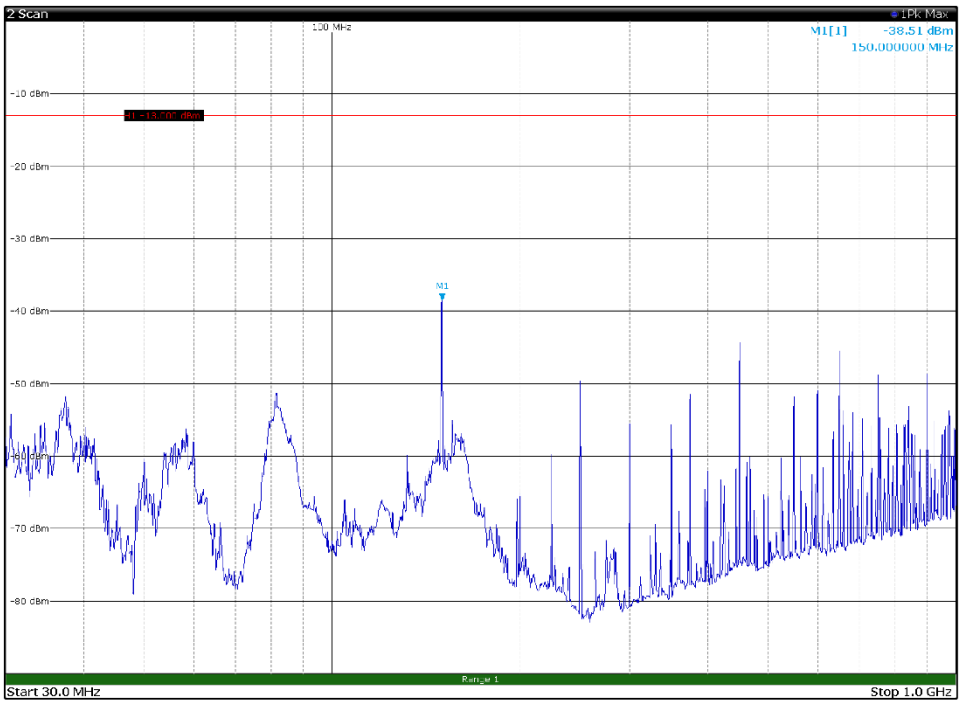
Horizontal polarization – Low channel



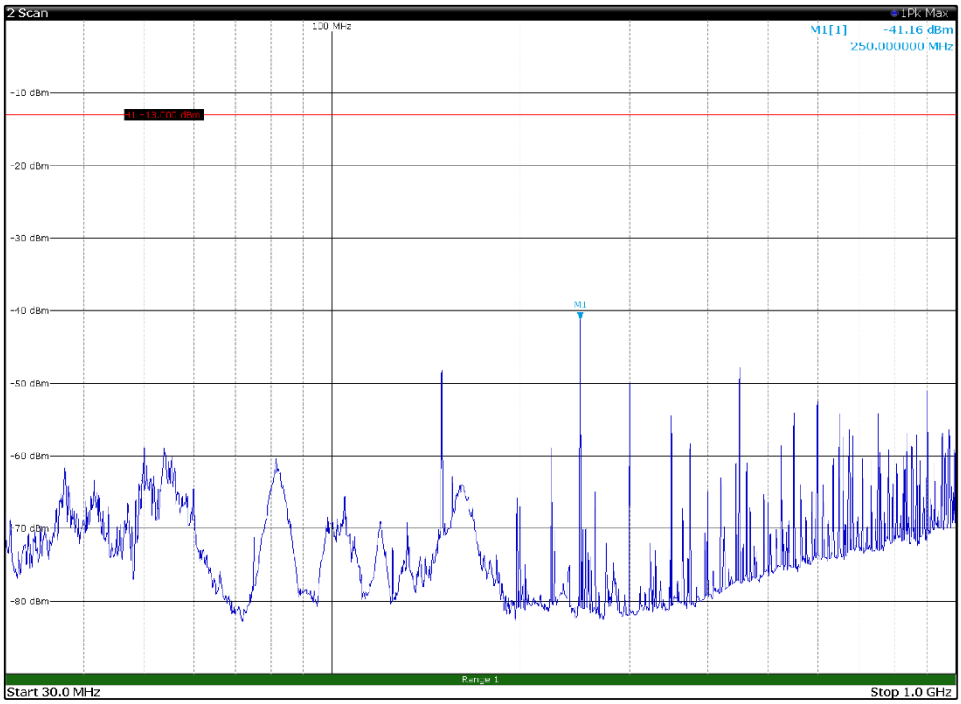
Vertical polarization– Low channel



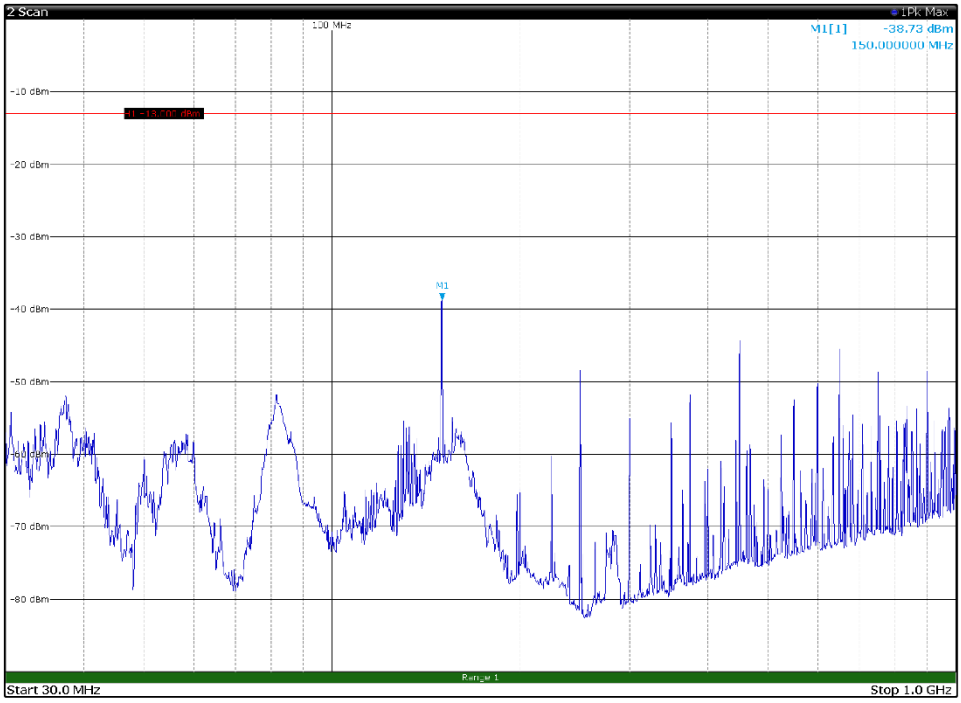
Horizontal polarization – Mid channel



Vertical polarization– Mid channel



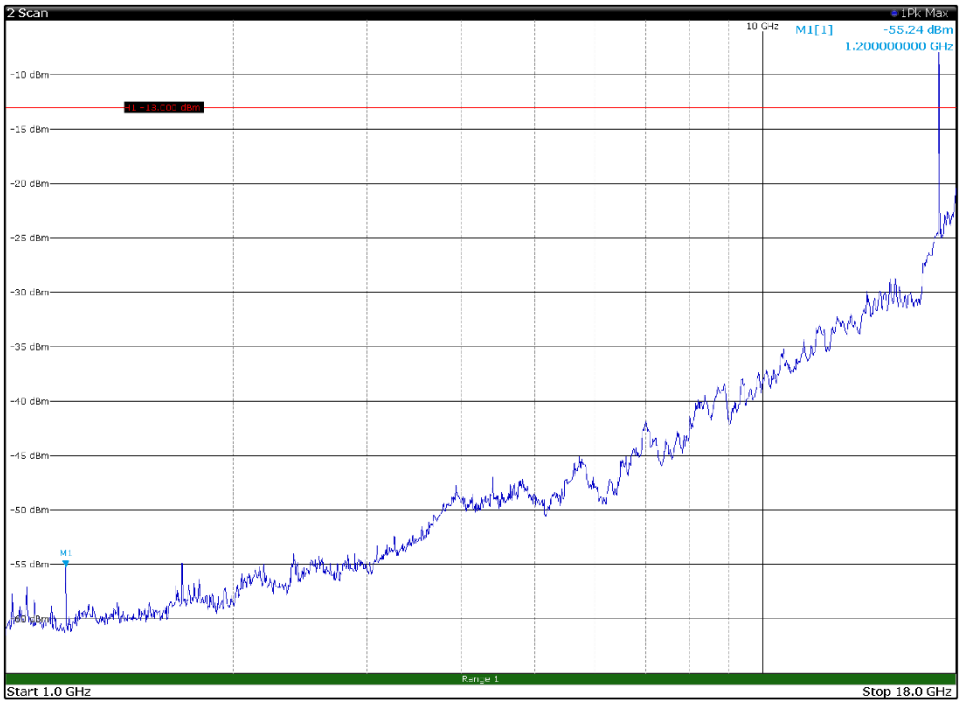
Horizontal polarization – High channel



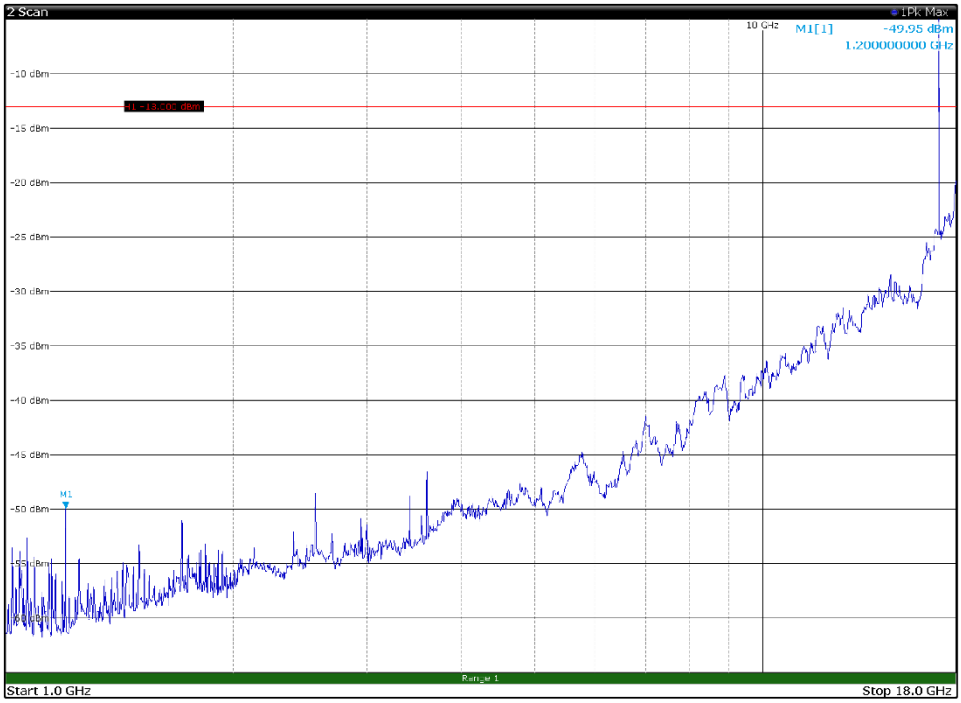
Vertical polarization– High channel

Test data

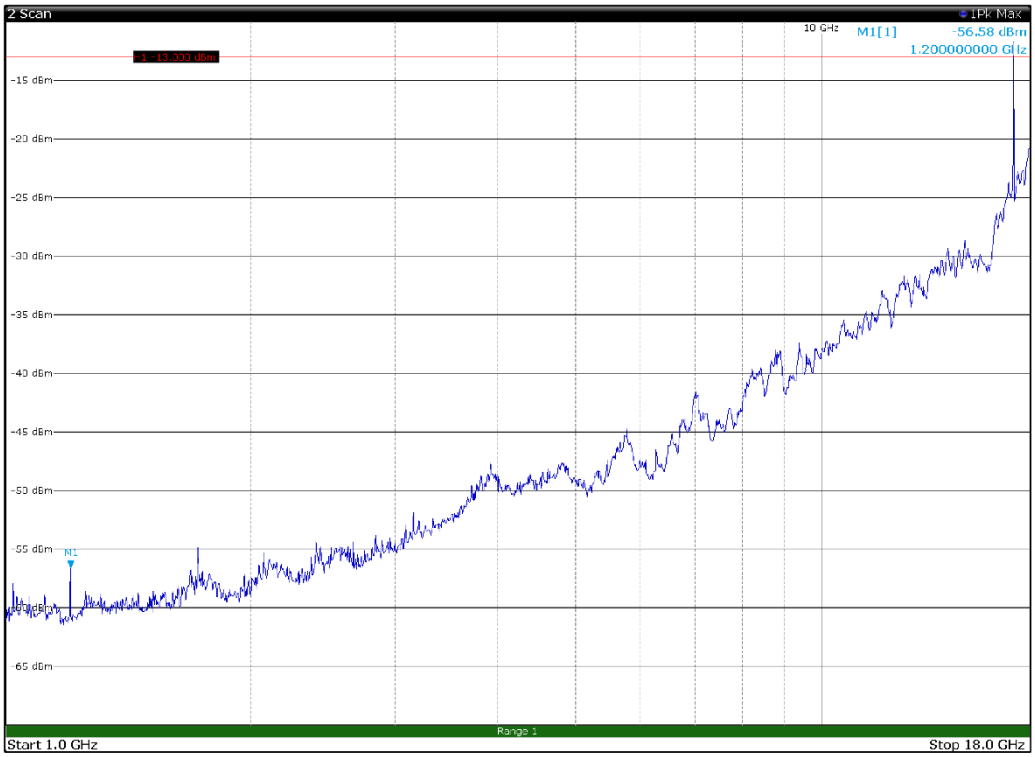
Spurious radiated emissions from 1 GHz to 18 GHz



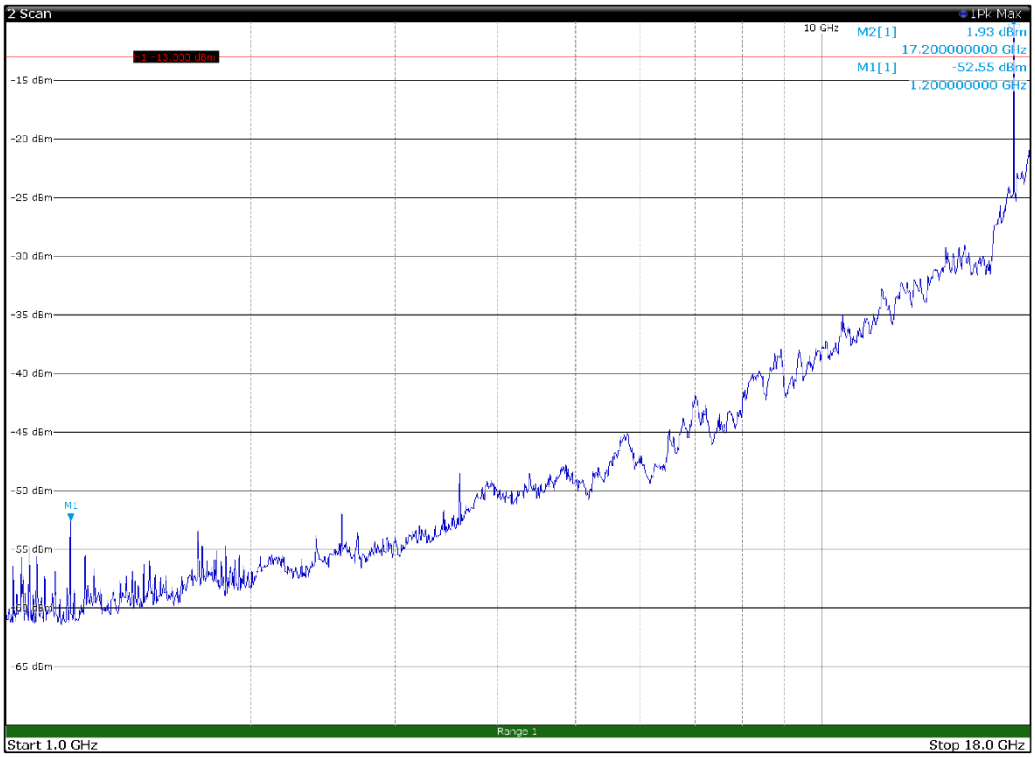
Horizontal polarization – Low channel



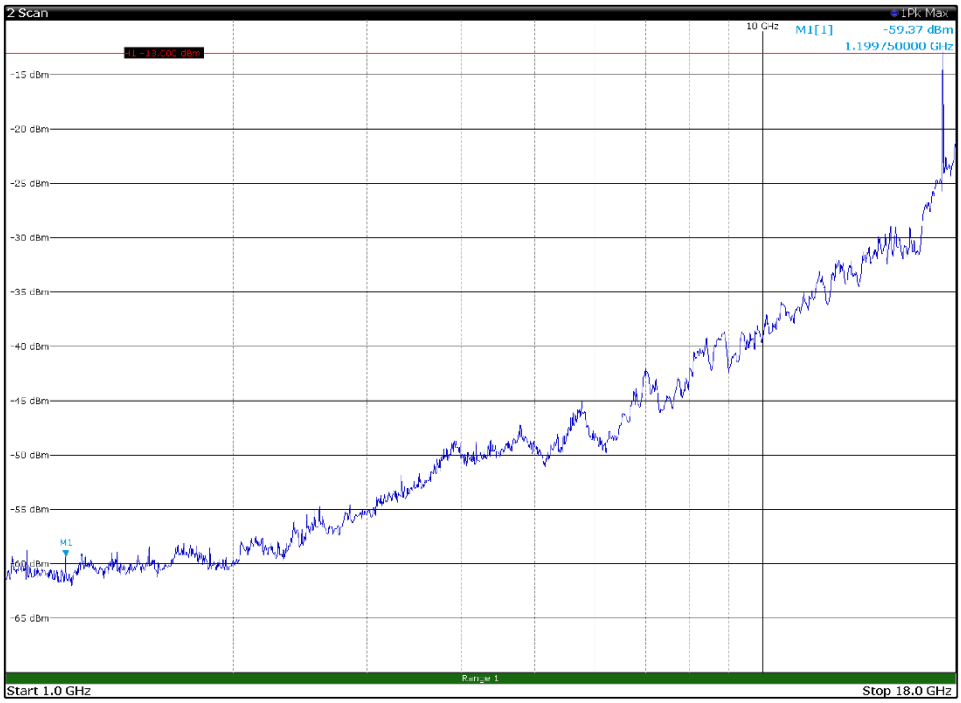
Vertical polarization– Low channel



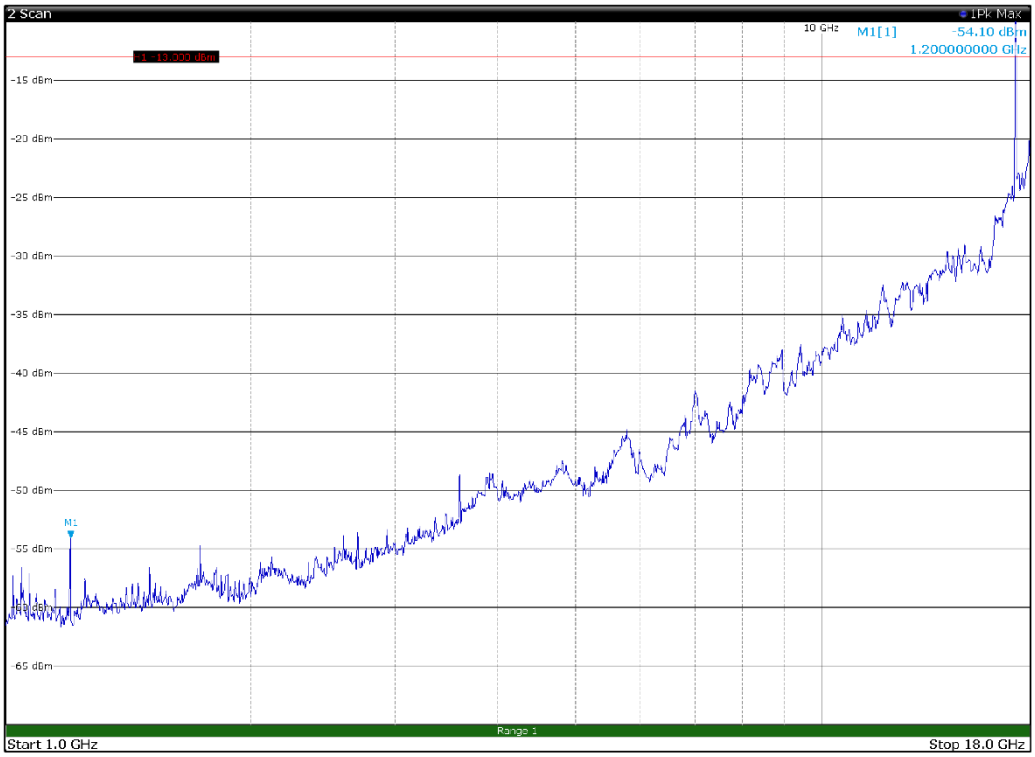
Horizontal polarization – Mid channel



Vertical polarization– Mid channel

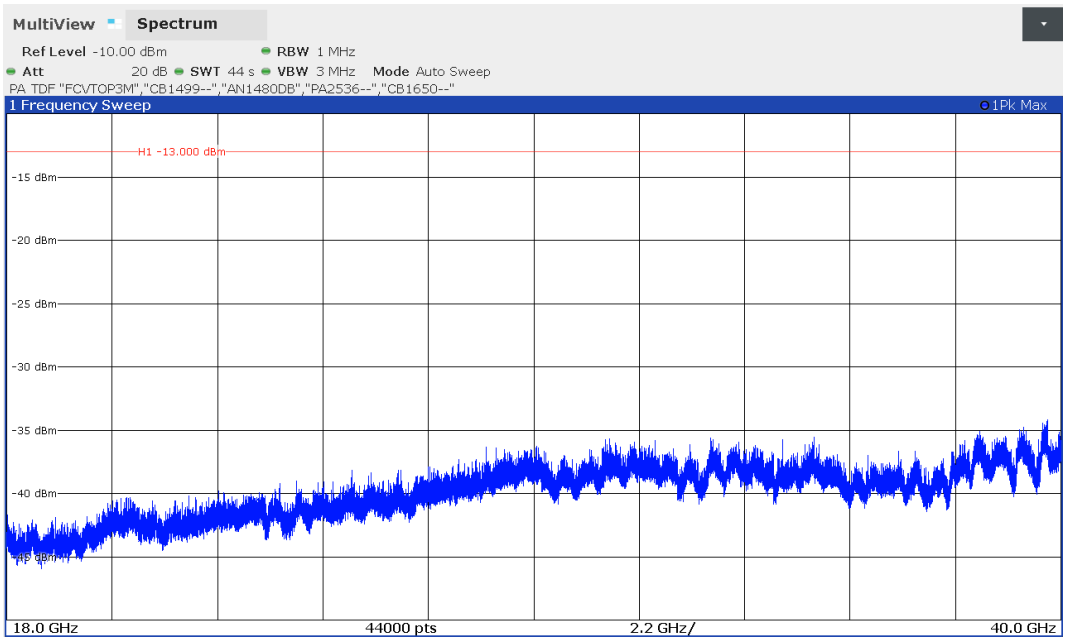


Horizontal polarization – High channel

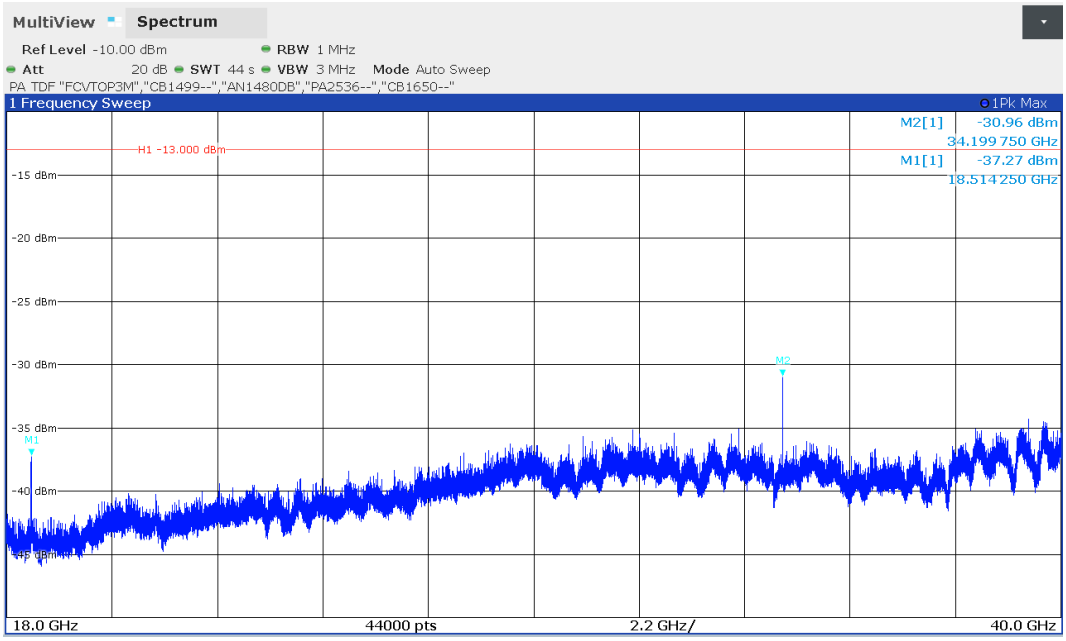


Vertical polarization– High channel

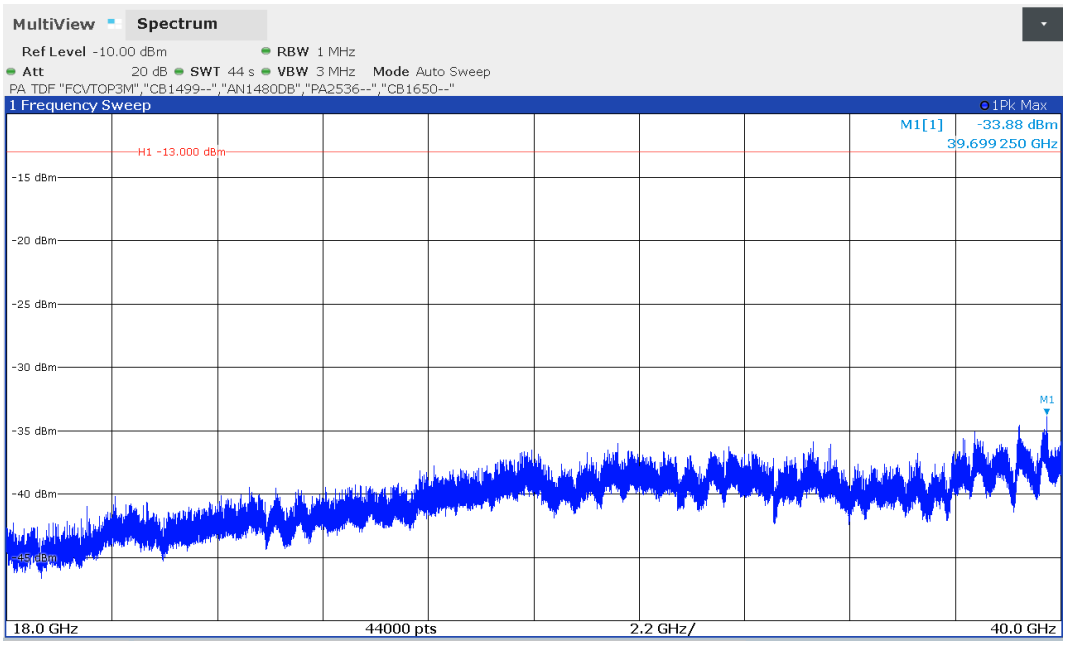
Spurious radiated emissions from 18 GHz to 40 GHz



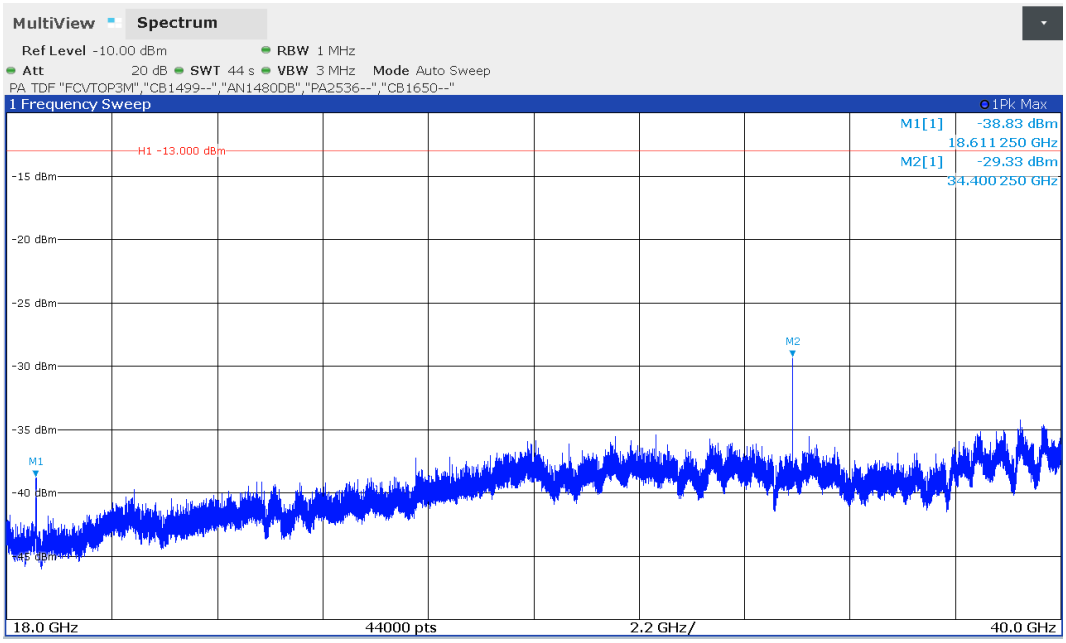
Horizontal polarization – Low channel



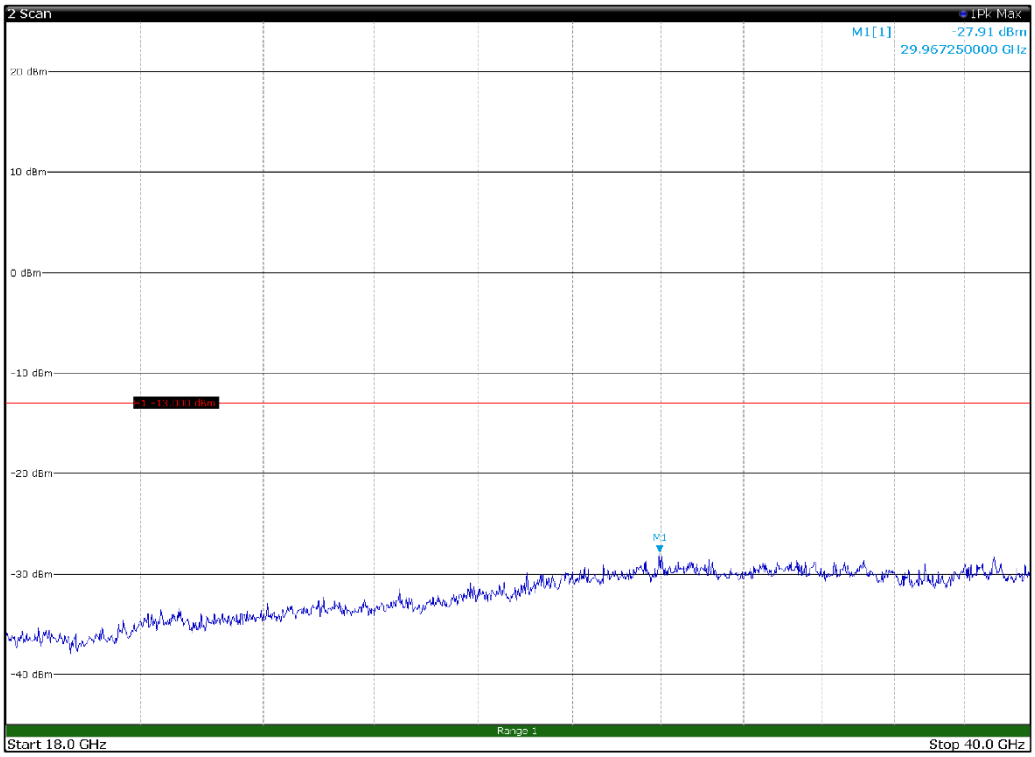
Vertical polarization – Low channel



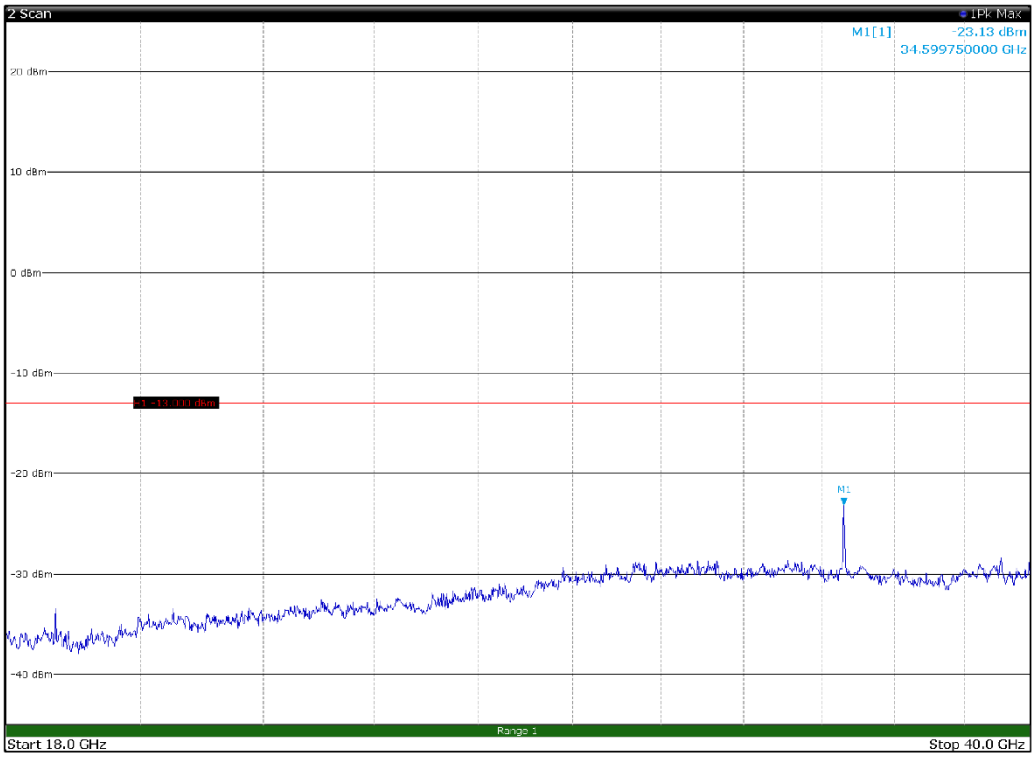
Horizontal polarization – Mid channel



Vertical polarization– Mid channel

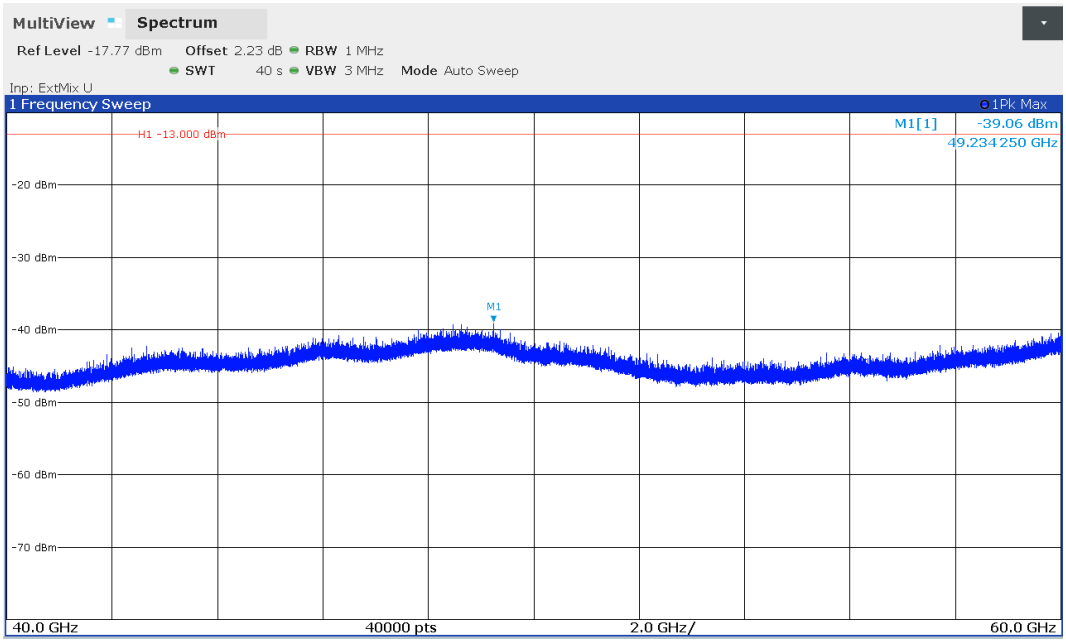


Horizontal polarization – High channel

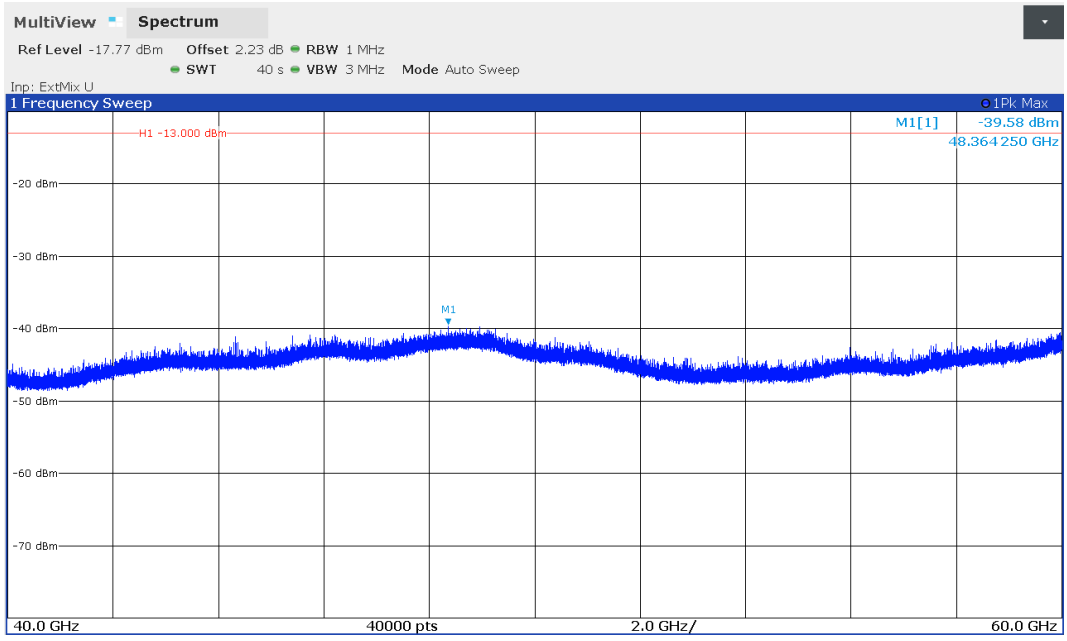


Vertical polarization– High channel

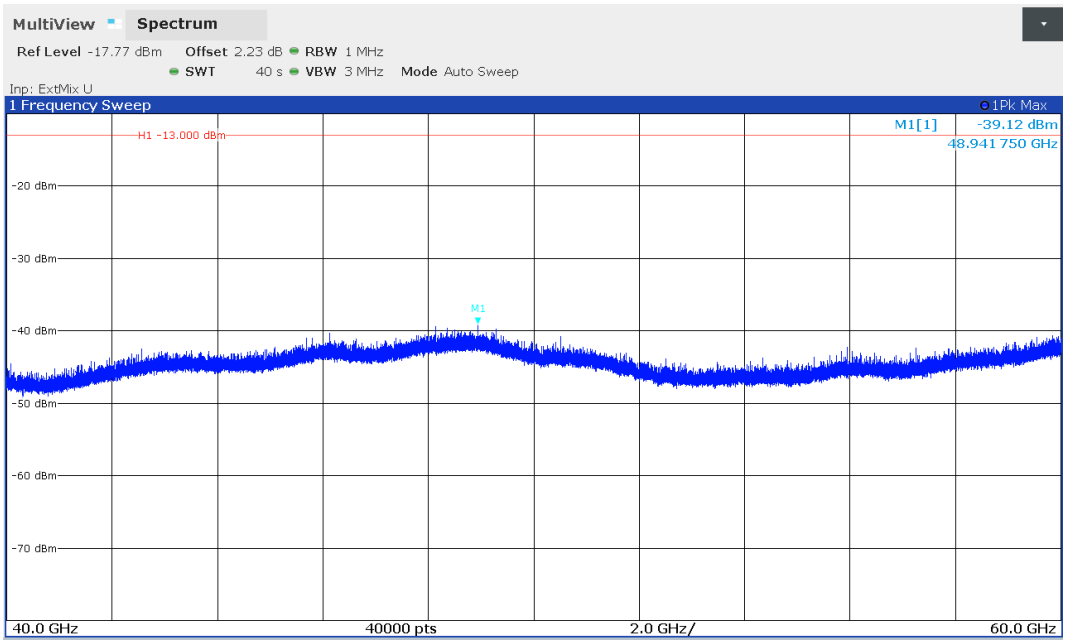
Spurious radiated emissions from 40 GHz to 60 GHz



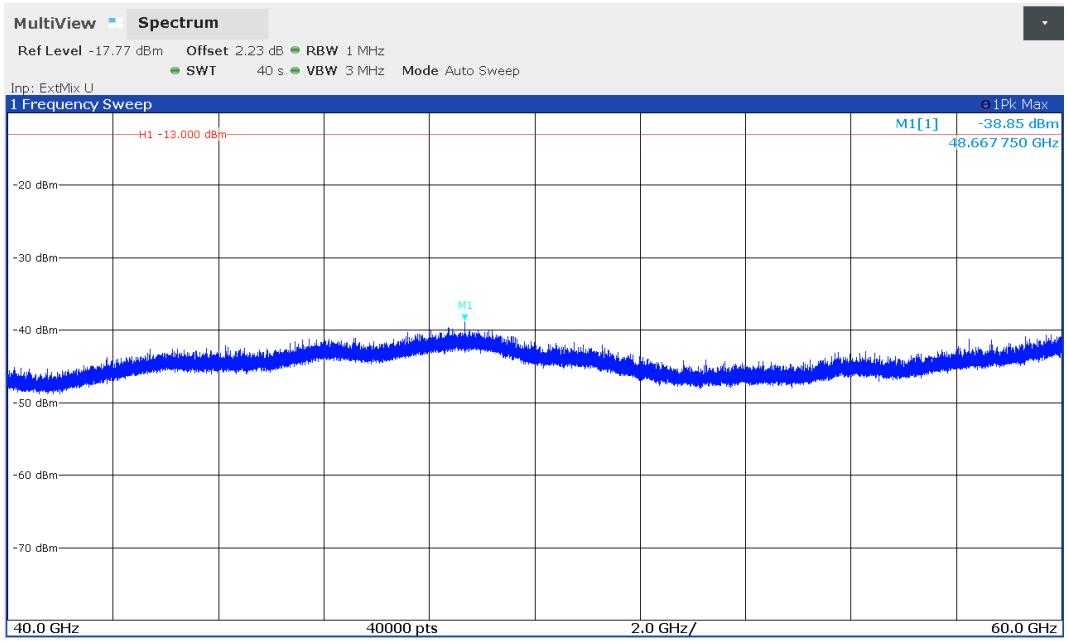
Horizontal polarization – Low channel



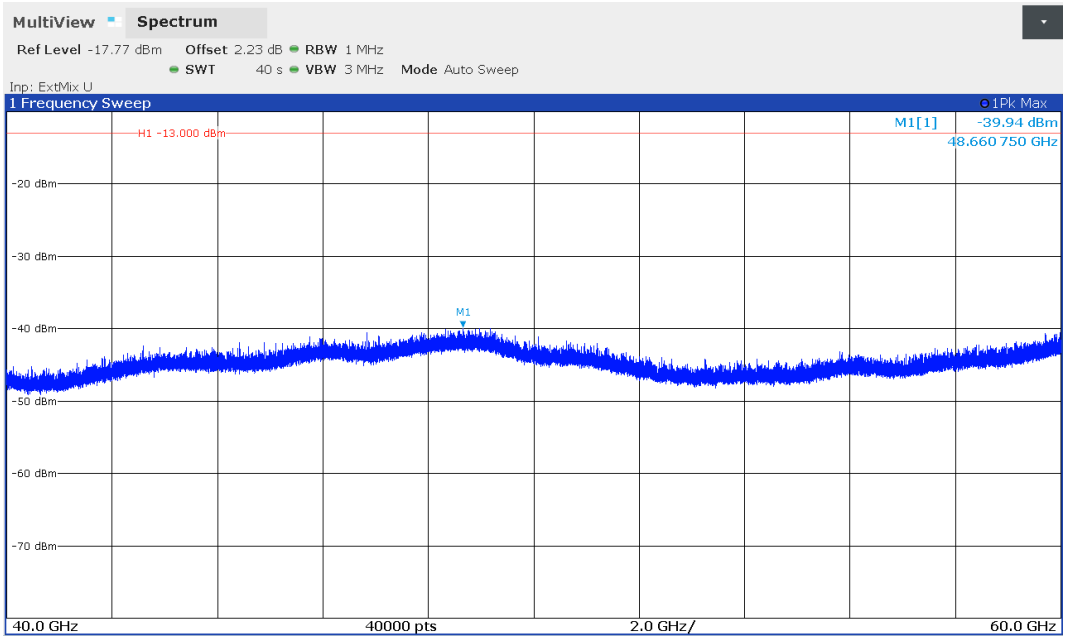
Vertical polarization – Low channel



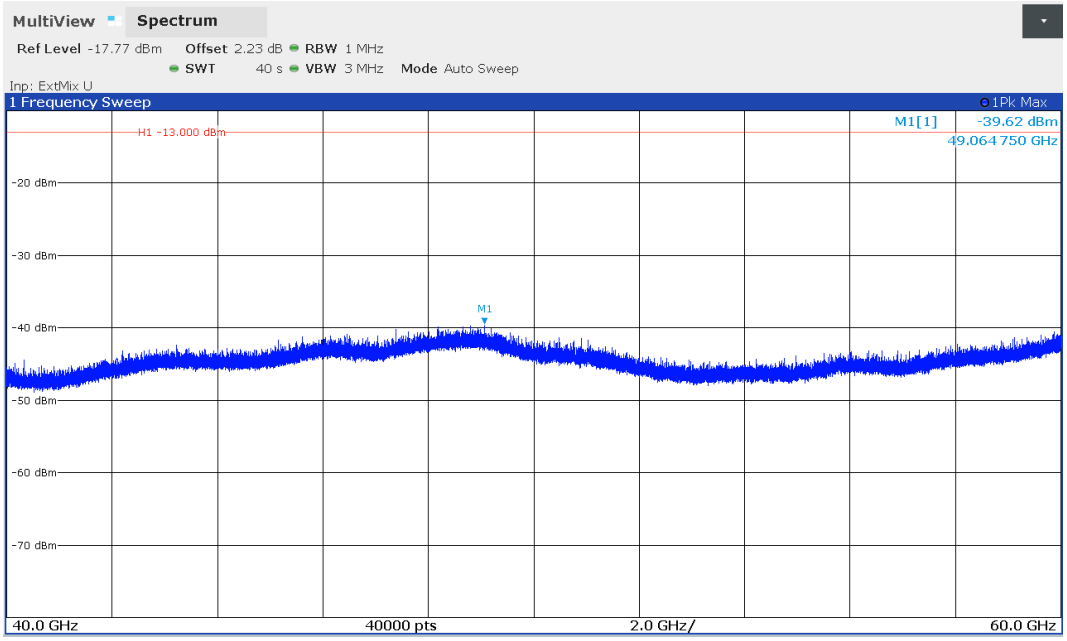
Horizontal polarization – Mid channel



Vertical polarization– Mid channel

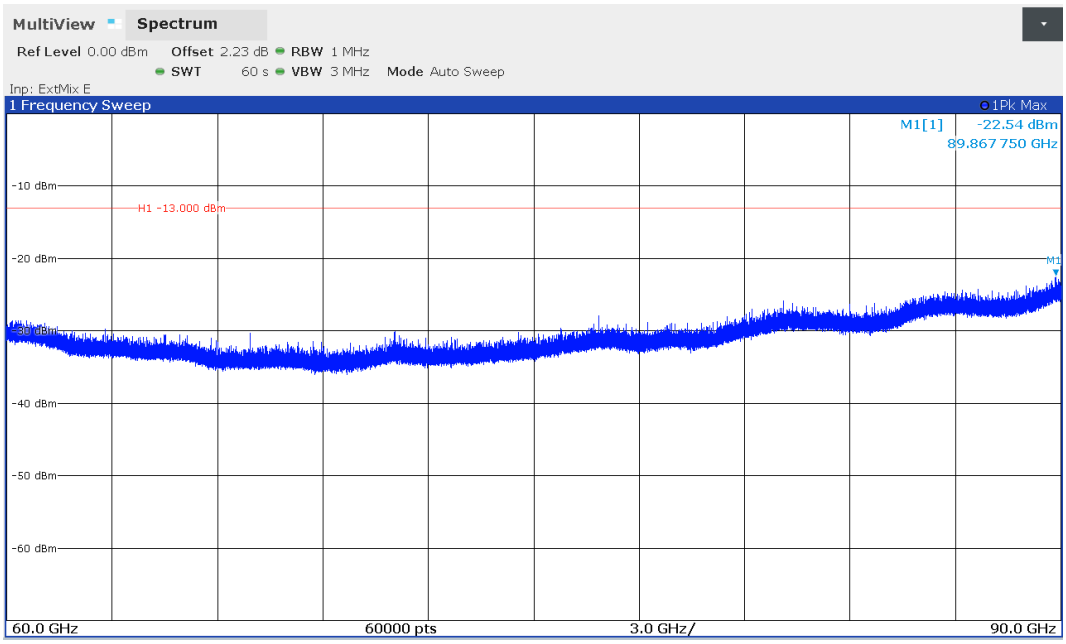


Horizontal polarization – High channel

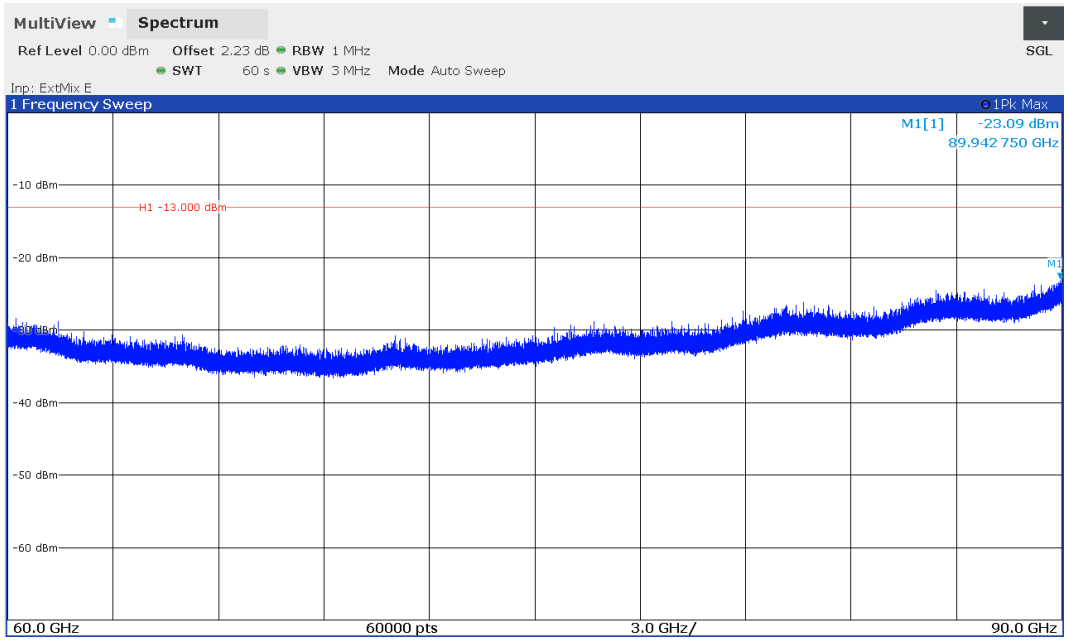


Vertical polarization– High channel

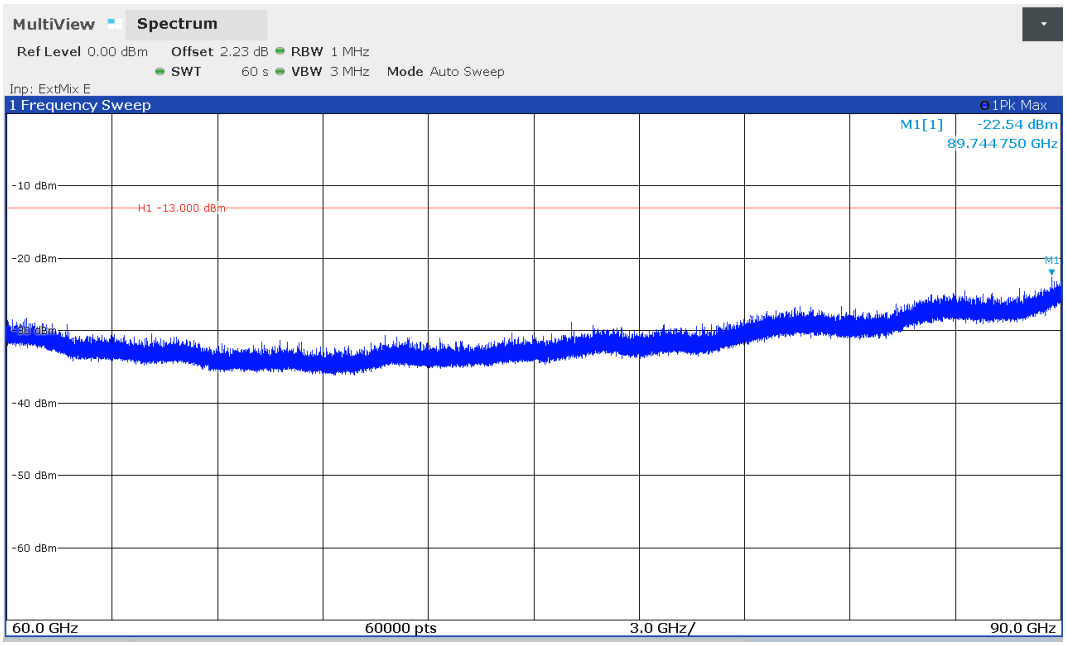
Spurious radiated emissions from 60 GHz to 90 GHz



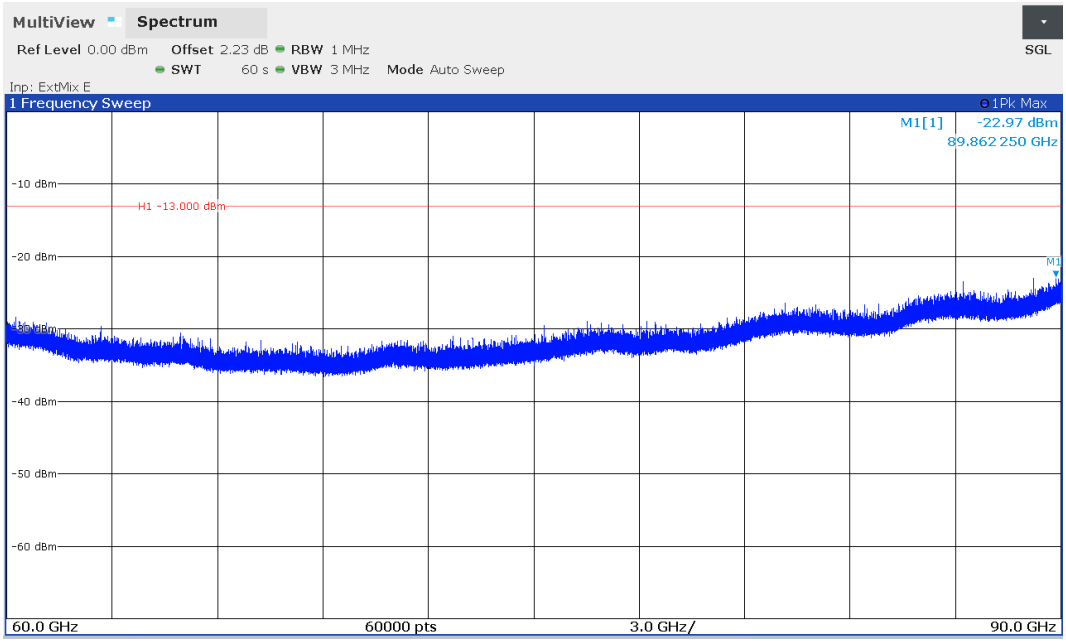
Horizontal polarization – Low channel



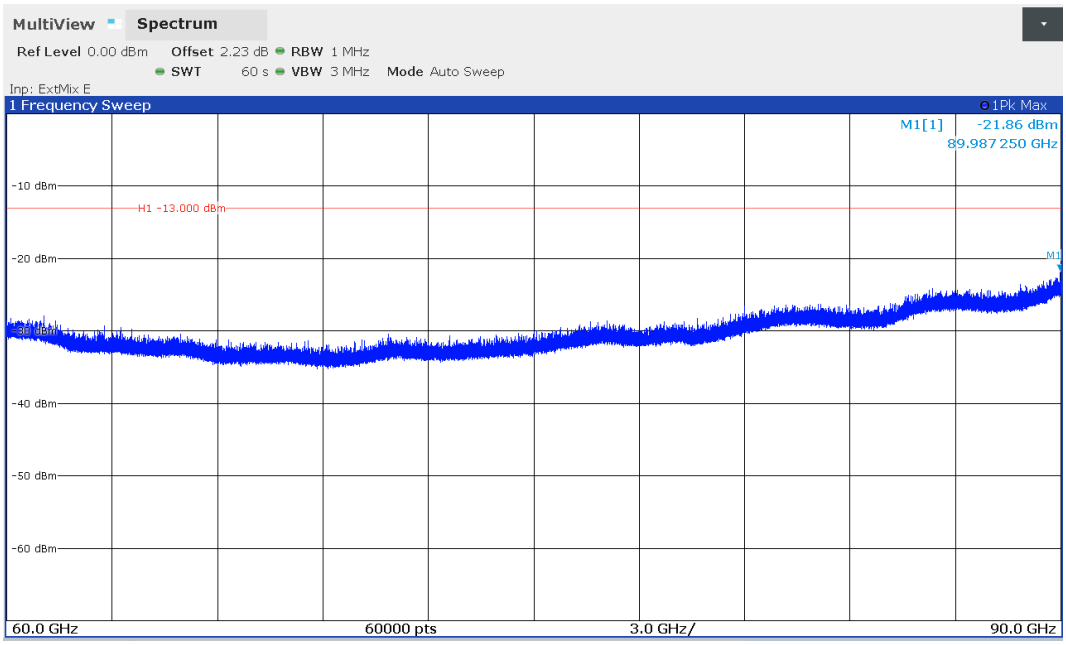
Vertical polarization – Low channel



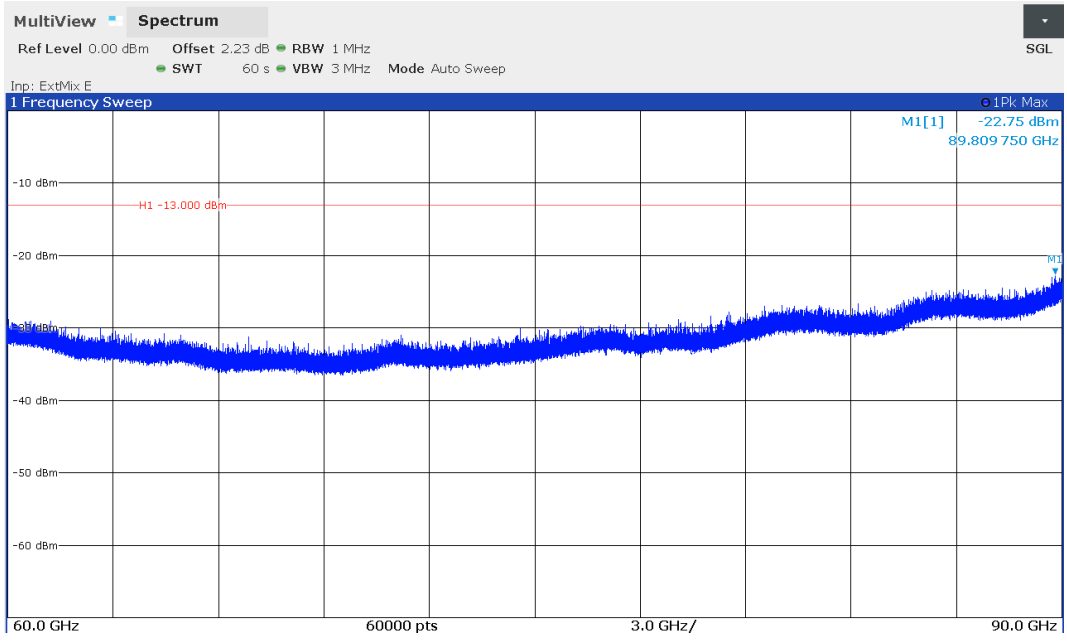
Horizontal polarization – Mid channel



Vertical polarization– Mid channel



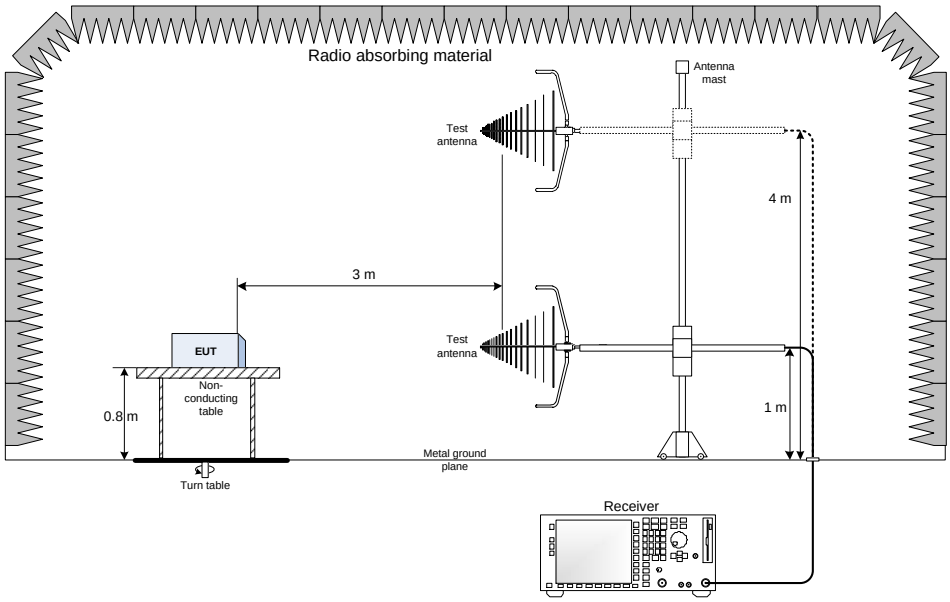
Horizontal polarization – High channel



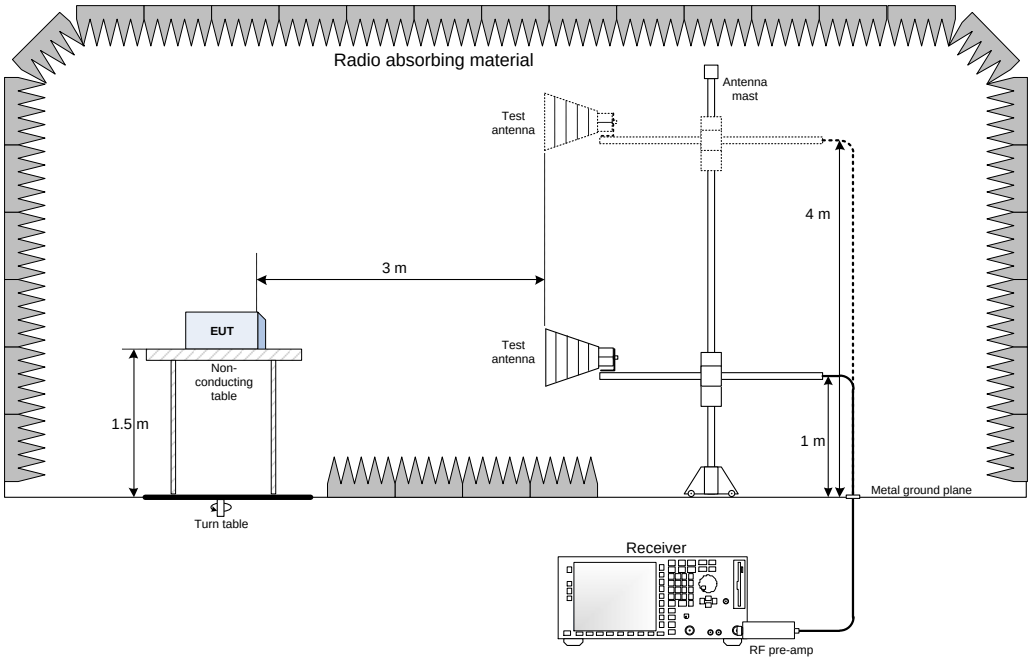
Vertical polarization– High channel

Appendix A: Block diagrams of test set-ups

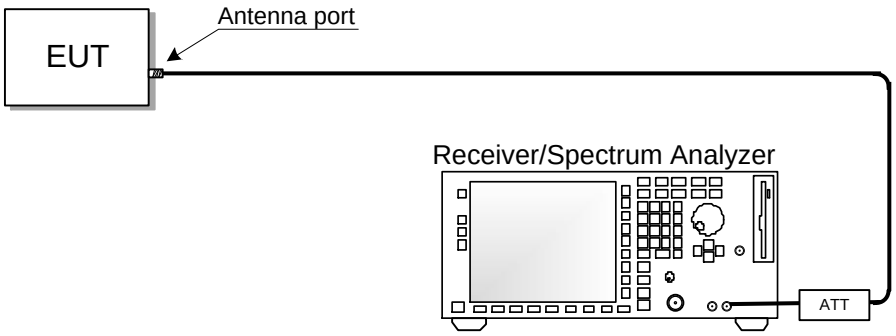
Radiated emissions set-up below 1 GHz



Radiated emissions set-up above 1 GHz



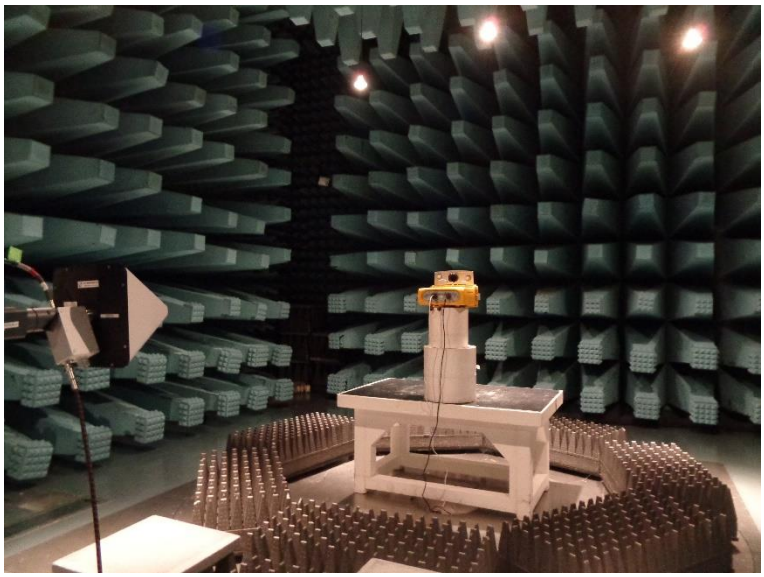
Antenna port setup



Appendix B: Photos

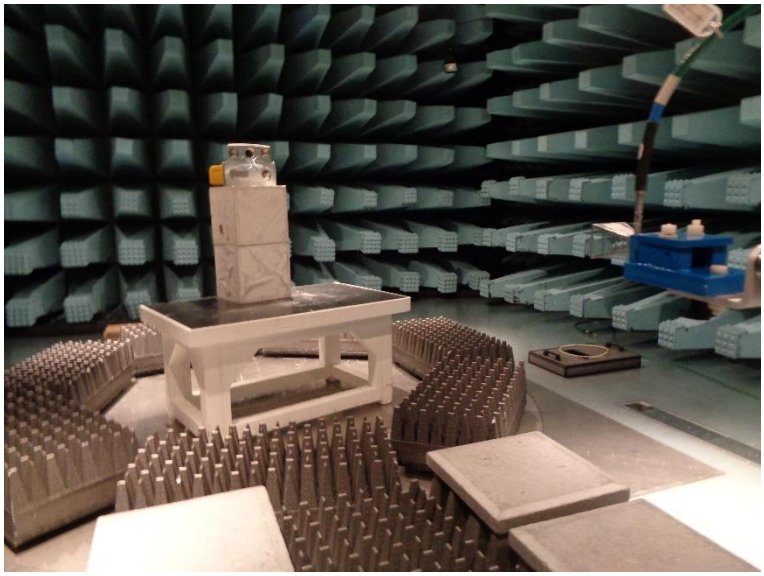
Set-up photos

Radiated emission below 1 GHz

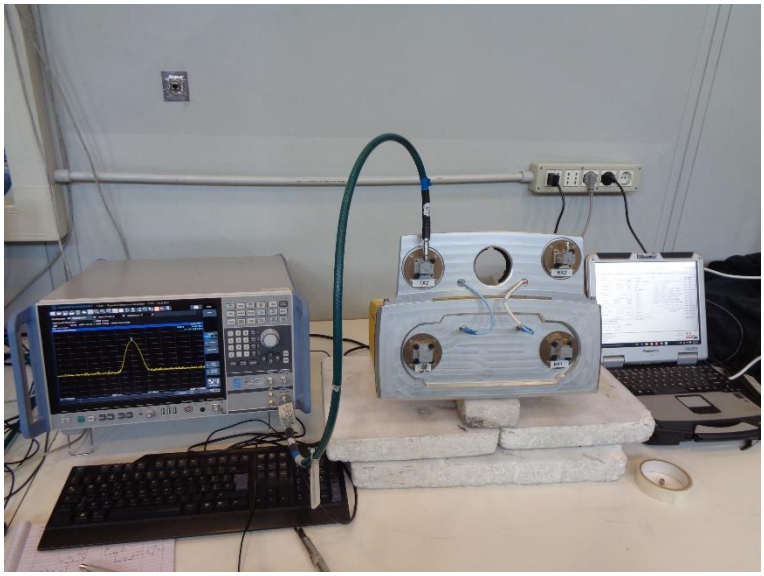


Radiated emission above 1 GHz and below 18 GHz

Set-up photos



Radiated emission above 18 GHz

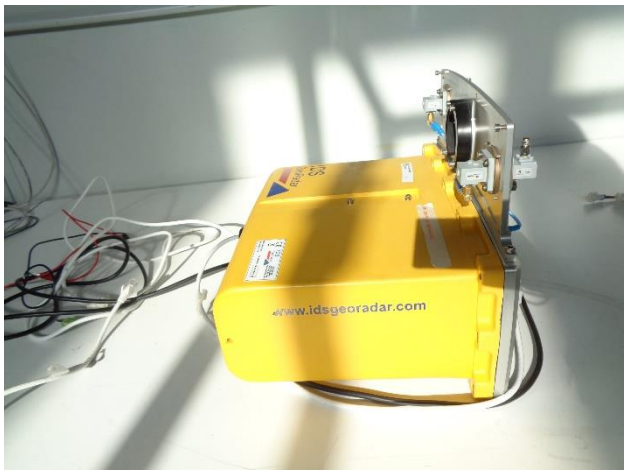


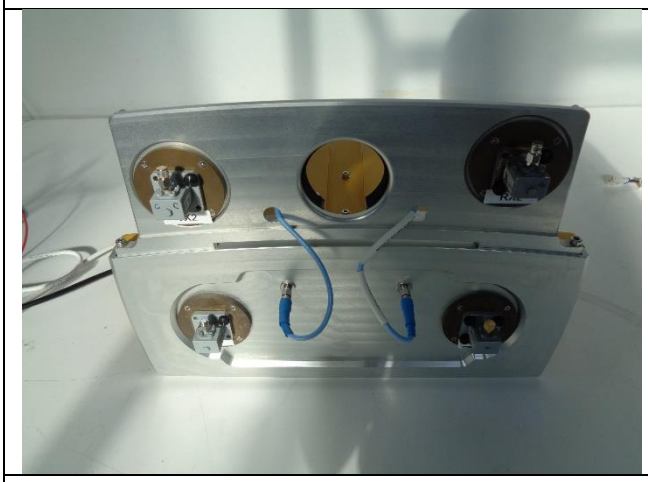
Antenna port measurement

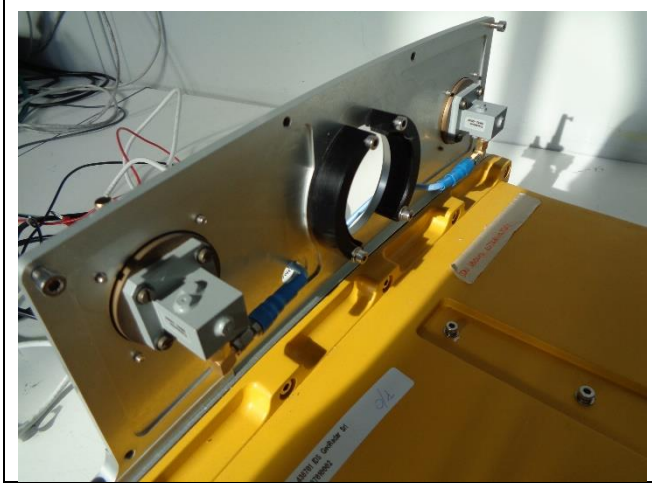
Set-up photos

Frequency stability

EUT photos







End of report