

Wireless Test Report- 391430-1TRFWL

376463-1TRFWL

Date of issue: April 30, 2020

Applicant:

Blinq Wireless, Inc

Product:

Base station

Model:

X3I-35

FCC ID:

ROR0000007

Specifications:

◆ **FCC 47 CFR Part 96**

Citizens Broadband Radio Service

Test location

Company name	Nemko Canada Inc.	
Facilities	Cambridge site: 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811	
Test site registration	Organization	Recognition numbers and location
	FCC/ISED	CA2040 (Ottawa/Almonte); CA2041 (Montreal); CA0101 (Cambridge)
Website	www.nemko.com	

Tested by	Fahar Abdul Sukkoor
Reviewed by	Mark Libbrecht
Date	April 30, 2020
Signature of reviewer	

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. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Bling Wireless, Inc.
Address	140 Renfrew Drive Suite 200
City	Markham
Province/State	ON
Postal/Zip code	L3R 6B3
Country	Canada

1.2 Test specifications

FCC 47 CFR Part 96	Citizens Broadband Radio Service
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1.3 Test method

ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
940660 D01 Part 96 CBRS Eqpt v01	Certification and test procedures for citizens broadband radio service devices authorized under Part 96
662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Exclusions

This test report covers only general requirements of Part 96. For SAS and functionality please refer to the WINNF test report.

1.6 Test report revision history

Revision #	Date report issued	Details of changes made to test report
TRF	April 30, 2020	Original report issued



Section 2. Summary of test results

2.1 FCC Part 96 test results

Part	Test description	Verdict
\$96.41(e)(3)	Emission and occupied bandwidth	Pass
\$96.41(b)	Power limits	Pass
\$96.41(e)(1)	3.5 GHz Emissions and Interference Limits	Pass
\$96.41(e)(2)	Additional protection levels	Pass
\$96.41(g)	The peak-to-average power ratio (PAPR)	Pass
\$2.1055	Frequency stability	Pass

Notes: None

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	March 6, 2020
Nemko sample ID number	1

3.2 EUT information

Product name	Base station
Model	X3I-35
Serial number	60101C5-19510005
Revision number	A01

3.3 Technical information

Operating band	3550–3700 MHz
Operating frequencies	3550–3700 MHz
Modulation type	OFDM using QPSK and 64 QAM modulations
Channel bandwidth	10 MHz, 20 MHz
Occupied bandwidth (99 %)	9.06 MHz, 17.90 MHz
Emission designator	W7D
Power requirements	48 V _{DC} via 120Vac power adaptor
MIMO type	2 × 2 with completely uncorrelated type of signal
Antenna information	BLiNQ Antenna, cross-polarized, 12 dBi gain

3.4 Product description and theory of operation

The BLiNQ X-300i system is a tri-sector Long-Term Evolution (LTE) Evolved Node B (eNB) with the capability to operate in the following bands: 42, 43, 46 and 48 (Citizens Broadband Radio Service (CBRS)). It combines high baseband capability with AAS concepts to provide a true SDR solution. With the aggregate capacity of 500 Mbps and covering up to 360° of azimuth, the X-300i is the most cost efficient small cell solution.

3.5 EUT exercise details

The EUT was controlled from laptop via Ethernet using Tera term. Link Power settings:

Power settings for all sectors is 18 dBm for 10 and 20 MHz channel bandwidth.

3.6 EUT setup diagram

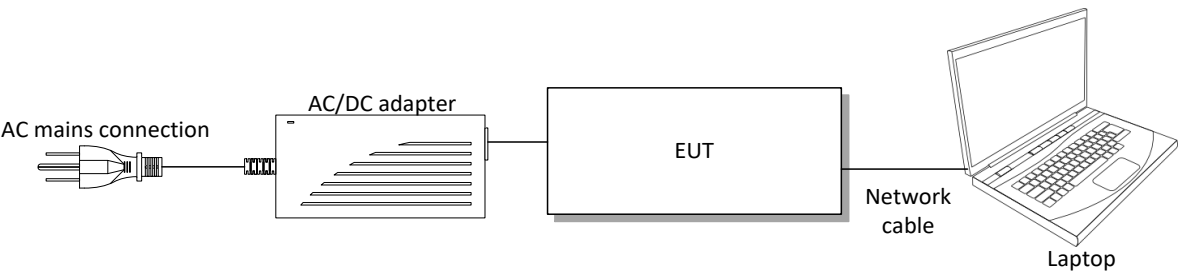


Figure 3.6-1: Setup diagram

3.7 EUT sub assemblies

Table 3.7-1: EUT support equipment

Description	Brand name	Model/Part number	Serial number
Power adaptor	Mean Well	HLG-240H-48	HB81K11319
laptop	Dell Latitude	E6440	FA002914

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

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.

5.2 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 $\pm 5\%$, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	Oct 10, 2020
Flush mount turntable	SUNAR	FM2022	FA003006	—	NCR
Controller	SUNAR	SC110V	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
AC Power source	Chroma	0	FA003020	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	Jun 4, 2020
Spectrum analyzer	Rohde & Schwarz	FSW43	FA002971	1 year	Jun 21, 2020
Horn antenna (1–18 GHz)	ETS Lindgren	3117	FA002911	1 year	Sep 11, 2020
Preamplifier (1–18 GHz)	ETS Lindgren	124334	FA002956	1 year	Sep 26, 2020
Horn antenna (18–40 GHz)	EMCO	3116B	FA002948	1 year	July 9, 2020
Bilog antenna (30–2000 MHz)	SUNAR	JB1	FA003010	1 year	Sep 17, 2020
Temperature chamber	Espec	EPX-4H	FA003033	—	NCR

Note: NCR - no calibration required

Section 8. Testing data

8.1 FCC 96.41(b) Output power and PSD

8.1.1 Definitions and limits

Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) and maximum Power Spectral Density (PSD) of any CBSD and End User Device must comply with the limits shown in the following table below

Table 8.1-1: Output power and PSD limits

Device	Maximum EIRP, dBm/10 MHz	Maximum PSD, dBm/MHz
End User Device	23	N/A
Category A CBSD	30	20
Category B CBSD	47	37

8.1.2 Test summary

Test date March 13, 2020

8.1.3 Observations, settings and special notes

Based on the maximum RF power listed in this report, considerations pertaining to the maximum allowed EIRP and antenna type should be considered for each installation. As per manufacturer declaration: EUT doesn't transmit more than one channel bandwidth simultaneously.

The test was performed using RMS detector of the spectrum analyzer with RBW of 1 MHz and VBW of 10 MHz and 10 MHz RBW integrated over channel bandwidth.

Total transmission power measurement results for 20 MHz BW are provided (in dBm units), at the end of the test data, and are for the information purposes only. There is no requirement in section §96.41 for total transmission power, and has been included as a request from the applicant. These values are measured across the entire 20 MHz channel BW using the channel power integration method (i.e. dBm/20 MHz).

Test results are taken with EUT transmitting using QPSK modulation. The measured power spectral density for QPSK modulation is the worst case for available modulations. The transmitter output signals are completely uncorrelated as defined in Attachment 662911 D01, therefore each antenna port EIRP and ERP (total or spectral density) must individually be below the limit.

8.1.4 Test data

Table 8.1-2: EIRP in 10 MHz measurement result for sector 0 MIMO operation of CBRs Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Output power, dBm/10 MHz	Antenna gain, dBi	EIRP, dBm / 10 MHz	Limit, , dBm / 10 MHz	Margin, dB
3555	10(low)	0	17.50	12	29.5	47	17.5
		1	17.75	12	29.75	47	17.25
3625	10(mid)	0	17.47	12	29.47	47	17.53
		1	17.69	12	29.69	47	17.31
3695	10(high)	0	17.27	12	29.27	47	17.73
		1	17.62	12	29.62	47	17.38
3560	20(low)	0	15.41	12	27.41	47	19.59
		1	16.08	12	28.08	47	18.92
3625	20(mid)	0	16.21	12	28.21	47	18.79
		1	16.20	12	28.20	47	18.80
3690	20(high)	0	15.56	12	27.56	47	19.44
		1	16.36	12	28.36	47	18.64

Table 8.1-3: EIRP in 10 MHz measurement result for sector 1 MIMO operation of CBRs Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Output power, dBm/10 MHz	Antenna gain, dBi	EIRP, dBm / 10 MHz	Limit, , dBm / 10 MHz	Margin, dB
3555	10(low)	0	17.55	12	29.55	47	17.45
		1	17.90	12	29.9	47	17.1
3625	10(mid)	0	17.47	12	29.47	47	17.53
		1	17.82	12	29.82	47	17.18
3695	10(high)	0	17.40	12	29.4	47	17.6
		1	17.84	12	29.84	47	17.16
3560	20(low)	0	15.75	12	27.75	47	19.25
		1	15.50	12	27.53	47	19.47
3625	20(mid)	0	15.75	12	27.75	47	19.25
		1	16.13	12	28.13	47	18.87
3690	20(high)	0	15.64	12	27.64	47	19.36
		1	16.06	12	28.06	47	18.94

Table 8.1-4: EIRP in 10 MHz measurement result for sector 2 MIMO operation of CBRs Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Output power, dBm/10 MHz	Antenna gain, dBi	EIRP, dBm / 10 MHz	Limit, , dBm / 10 MHz	Margin, dB
3555	10(low)	0	17.22	12	29.22	47	17.78
		1	17.94	12	29.94	47	17.06
3625	10(mid)	0	17.45	12	29.45	47	17.55
		1	17.98	12	29.98	47	17.02
3695	10(high)	0	17.20	12	29.2	47	17.8
		1	17.77	12	29.77	47	17.23
3560	20(low)	0	15.80	12	27.80	47	19.20
		1	16.01	12	28.01	47	18.99
3625	20(mid)	0	15.82	12	27.82	47	19.18
		1	16.33	12	28.33	47	18.67
3690	20(high)	0	15.54	12	27.54	47	19.46
		1	15.80	12	27.80	47	19.20

8.1.5 Test data, continued

Table 8.1-5: PSD in 1 MHz measurement result for sector 0 CBSD Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	PSD , dBm/MHz	Antenna gain, dBi	PSD with antenna gain dBm/MHz	PSD Limit, dBm/MHz	Margin, dB
3555	10(low)	0	8.59	12	20.59	37	16.41
		1	8.47	12	20.47	37	16.53
3625	10(mid)	0	8.66	12	20.66	37	16.34
		1	8.80	12	20.80	37	16.20
3695	10(high)	0	7.91	12	19.91	37	17.09
		1	8.62	12	20.62	37	16.38
3560	20(low)	0	5.80	12	17.80	37	19.20
		1	5.96	12	17.96	37	19.04
3625	20(mid)	0	6.39	12	18.39	37	18.61
		1	6.92	12	18.92	37	18.08
3690	20(high)	0	5.95	12	17.95	37	19.05
		1	6.80	12	18.80	37	18.20

Table 8.1-6: PSD in 1 MHz measurement result for sector 1 CBSD Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	PSD , dBm/MHz	Antenna gain, dBi	PSD with antenna gain dBm/MHz	PSD Limit, dBm/MHz	Margin, dB
3555	10(low)	0	8.47	12	20.47	37	16.53
		1	8.67	12	20.67	37	16.33
3625	10(mid)	0	8.44	12	20.44	37	16.56
		1	8.39	12	20.39	37	16.61
3695	10(high)	0	8.28	12	20.28	37	16.72
		1	8.45	12	20.45	37	16.55
3560	20(low)	0	5.69	12	17.69	37	19.31
		1	6.49	12	18.49	37	18.51
3625	20(mid)	0	6.04	12	18.04	37	18.96
		1	6.70	12	18.70	37	18.30
3690	20(high)	0	5.84	12	17.84	37	19.16
		1	6.32	12	18.32	37	18.68

Table 8.1-7: PSD in 1 MHz measurement result for sector 2 CBSD Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	PSD , dBm/MHz	Antenna gain, dBi	PSD with antenna gain dBm/MHz	PSD Limit, dBm/MHz	Margin, dB
3555	10(low)	0	8.12	12	20.12	37	16.88
		1	8.74	12	20.74	37	16.26
3625	10(mid)	0	8.10	12	20.10	37	16.90
		1	8.52	12	20.52	37	16.48
3695	10(high)	0	7.74	12	19.74	37	17.26
		1	8.46	12	20.46	37	16.54
3560	20(low)	0	6.23	12	18.23	37	18.77
		1	6.56	12	18.56	37	18.44
3625	20(mid)	0	5.67	12	17.67	37	19.33
		1	6.30	12	18.30	37	18.70
3690	20(high)	0	5.57	12	17.57	37	19.43
		1	5.45	12	17.45	37	19.55

8.1.6 Test data, continued (Information only)

Table 8.1-8: Maximum total channel transmission power and EIRP result for sector 0 MIMO operation of CBRS Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Tx power, dBm/20 MHz	Antenna gain, dBi	EIRP, dBm
3560	20(low)	0	17.72	12	29.72
		1	18.00	12	30.00
3625	20(mid)	0	18.41	12	30.41
		1	18.29	12	30.29
3690	20(high)	0	17.90	12	29.90
		1	18.36	12	30.36

Note: Table for information purposes only, as there is no requirement for transmission power dBm/ 20 MHz

Table 8.1-9: Maximum total channel transmission power and EIRP result for sector 1 MIMO operation of CBRS Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Tx power, dBm/20 MHz	Antenna gain, dBi	EIRP, dBm
3560	20(low)	0	17.92	12	29.92
		1	18.35	12	30.35
3625	20(mid)	0	17.74	12	29.74
		1	18.48	12	30.48
3690	20(high)	0	17.91	12	29.91
		1	18.14	12	30.14

Note: Table for information purposes only, as there is no requirement for transmission power dBm/ 20 MHz

Table 8.1-10: Maximum total channel transmission power and EIRP result for sector 2 MIMO operation of CBRS Category B

Frequency, MHz	Bandwidth, MHz	Ch 0/1	Tx power, dBm/20 MHz	Antenna gain, dBi	EIRP, dBm
3560	20(low)	0	17.95	12	29.95
		1	18.24	12	30.24
3625	20(mid)	0	17.65	12	29.65
		1	18.53	12	30.53
3690	20(high)	0	17.55	12	29.55
		1	18.19	12	30.19

Note: Table for information purposes only, as there is no requirement for transmission power dBm/ 20 MHz

Section 8
Test name
Specification

Testing data
FCC 96.41(b) Output power and PSD
FCC Part 96

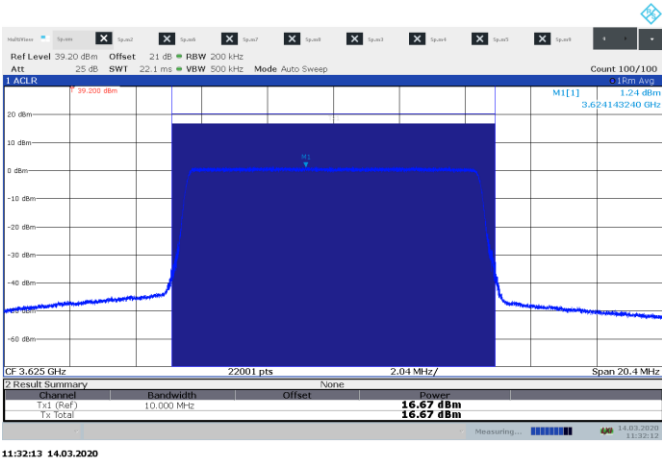


Figure 8.1-1: Output power, dBm/10 MHz sample plot, 10 MHz channel

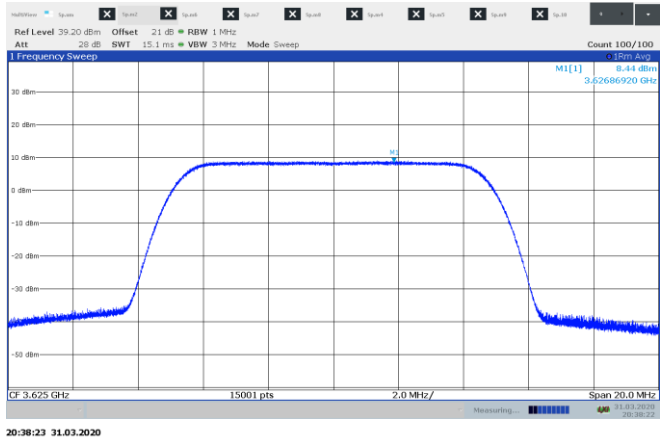


Figure 8.1-3: Power spectral density sample plot 10 MHz channel

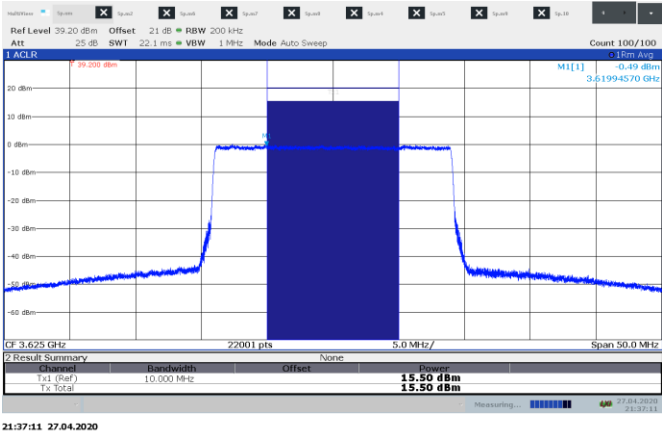


Figure 8.1-2: Output power, dBm/10 MHz sample plot, 20 MHz channel

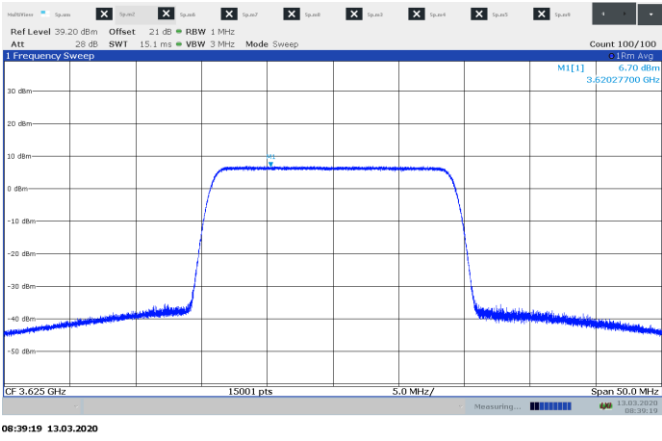


Figure 8.1-4: Power spectral density sample plot, 20 MHz channel

8.2 FCC 96.41(g) The peak-to-average power ratio (PAPR)

8.2.1 Definitions and limits

The peak-to-average power ratio (PAPR) of any CBSD transmitter output power must not exceed 13 dB. PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities or another Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

8.2.2 Test summary

Test date March 13, 2020

8.2.3 Observations, settings and special notes

The test was performed using spectrum analyzer signal statistics Complimentary Cumulative Distribution Function. The measurement time for the CCDF function is automatically calculated based on the RBW and number of samples required to stabilize the trace.

8.2.4 Test data

Table 8.2-1: PAPR measurement results sector 0

Channel BW, MHz	Frequency, MHz	Antenna port	CCDF at 0.1%, dB	Limit, dB	Margin, dB
10(low)	3555	0	8.10	13	4.90
		1	8.10	13	4.90
10(mid)	3625	0	8.16	13	4.84
		1	8.12	13	4.88
10(high)	3695	0	8.16	13	4.84
		1	8.08	13	4.92
20(low)	3560	0	8.36	13	4.64
		1	8.32	13	4.68
20(mid)	3625	0	8.30	13	4.70
		1	8.32	13	4.68
20(high)	3690	0	8.36	13	4.64
		1	8.24	13	4.76

Table 8.2-2: PAPR measurement results sector 1

Channel BW, MHz	Frequency, MHz	Antenna port	CCDF at 0.1%, dB	Limit, dB	Margin, dB
10(low)	3555	0	8.38	13	4.62
		1	8.36	13	4.64
10(mid)	3625	0	8.38	13	4.62
		1	8.40	13	4.60
10(high)	3695	0	8.34	13	4.66
		1	8.36	13	4.64
20(low)	3560	0	8.34	13	4.66
		1	8.34	13	4.66
20(mid)	3625	0	8.36	13	4.64
		1	8.32	13	4.68
20(high)	3690	0	8.36	13	4.64
		1	8.36	13	4.64

Table 8.2-3: PAPR measurement results sector 2

Channel BW, MHz	Frequency, MHz	Antenna port	CCDF at 0.1%, dB	Limit, dB	Margin, dB
10(low)	3555	0	8.16	13	4.84
		1	8.08	13	4.92
10(mid)	3625	0	8.14	13	4.86
		1	8.12	13	4.88
10(high)	3695	0	8.22	13	4.78
		1	8.14	13	4.86
20(low)	3560	0	8.40	13	4.60
		1	8.34	13	4.66
20(mid)	3625	0	8.40	13	4.60
		1	8.34	13	4.66
20(high)	3690	0	8.40	13	4.60
		1	8.34	13	4.66

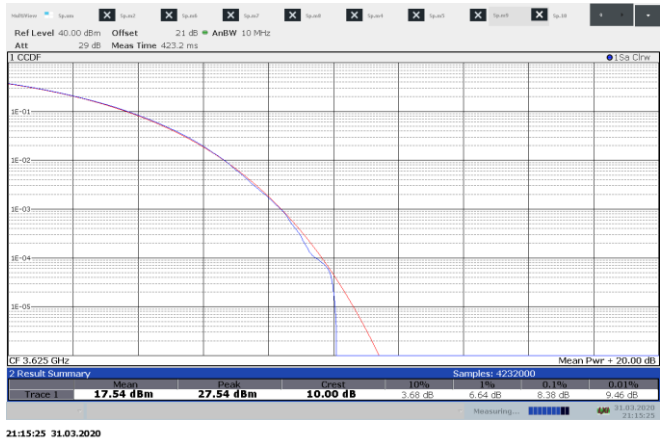


Figure 8.2-1: CCDF sample plot 10 MHz channel

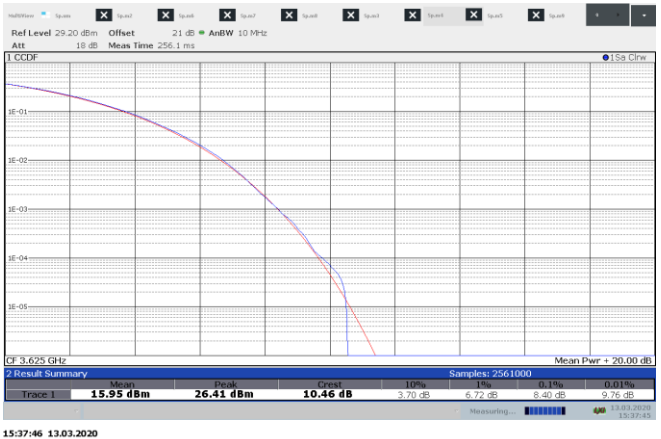


Figure 8.2-2: CCDF sample plot 20 MHz channel

8.3 FCC 96.41(e)(3) Emission bandwidth and occupied bandwidth

8.3.1 Definitions and limits

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC 2.1049 The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

8.3.2 Test summary

Test date April 23, 2020

8.3.3 Observations, settings and special notes

Spectrum analyser settings for OBW measurements:

Resolution bandwidth	1% OBW
Video bandwidth	3 x RBW
Detector mode	Peak
Trace mode	Max Hold

8.3.4 Test data

Table 8.3-1: Occupied bandwidth measurement results for sector 0

Bandwidth, MHz	Frequency, MHz	Antenna port	99% OBW, MHz	26 dB BW, MHz
10(low)	3555	0	9.01	9.94
		1	9.00	9.88
10(mid)	3625	0	9.00	9.94
		1	9.01	9.91
10(high)	3695	0	9.00	9.94
		1	9.01	9.88
20(low)	3560	0	17.90	19.71
		1	17.90	19.69
20(mid)	3625	0	17.90	19.75
		1	17.90	19.75
20(high)	3690	0	17.90	19.71
		1	17.90	19.67

Table 8.3-2: Occupied bandwidth measurement results for sector 1

Bandwidth, MHz	Frequency, MHz	Antenna port	99% OBW, MHz	26 dB BW, MHz
10(low)	3555	0	9.01	9.89
		1	9.01	9.94
10(mid)	3625	0	9.01	9.94
		1	9.02	9.97
10(high)	3695	0	9.01	9.99
		1	9.00	9.89
20(low)	3560	0	17.89	19.67
		1	17.90	19.77
20(mid)	3625	0	17.88	19.41
		1	17.90	19.63
20(high)	3690	0	17.90	19.63
		1	17.90	19.67

Table 8.3-3: Occupied bandwidth measurement results for sector 2

Bandwidth, MHz	Frequency, MHz	Antenna port	99% OBW, MHz	26 dB BW, MHz
10(low)	3555	0	9.06	10.05
		1	9.06	10.10
10(mid)	3625	0	9.01	9.94
		1	9.01	9.91
10(high)	3695	0	9.01	9.94
		1	9.01	9.89
20(low)	3560	0	17.90	19.59
		1	17.90	19.75
20(mid)	3625	0	17.89	19.71
		1	17.89	19.59
20(high)	3690	0	17.90	19.71
		1	17.90	19.69

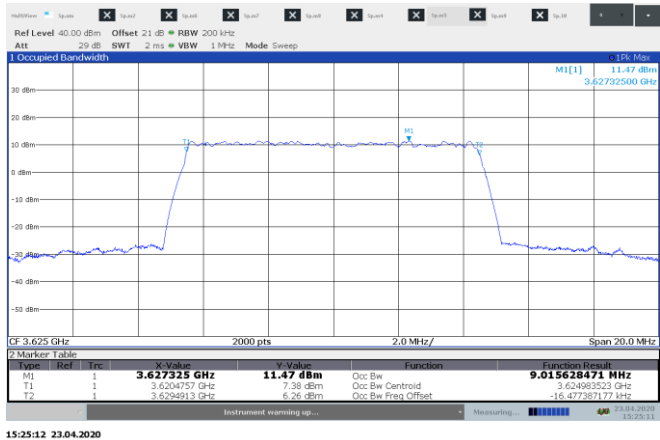


Figure 8.3-1: Occupied bandwidth sample plot for 10 MHz channel

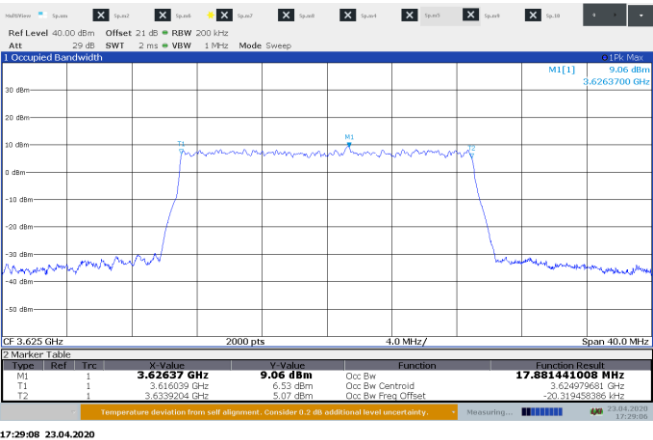


Figure 8.3-2: Occupied bandwidth sample plot for 20 MHz channel

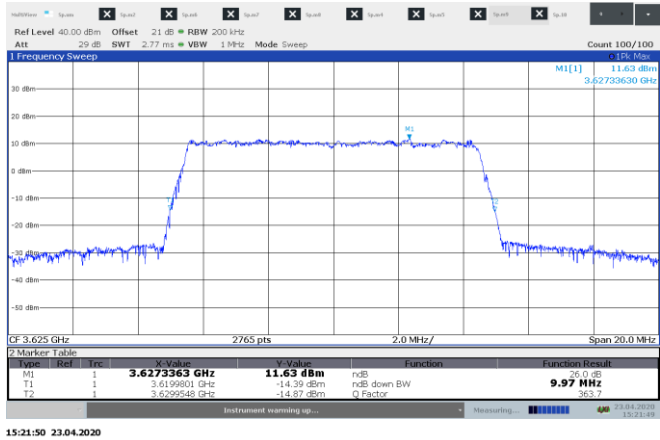


Figure 8.3-3: 26 dB bandwidth sample plot for 10 MHz channel

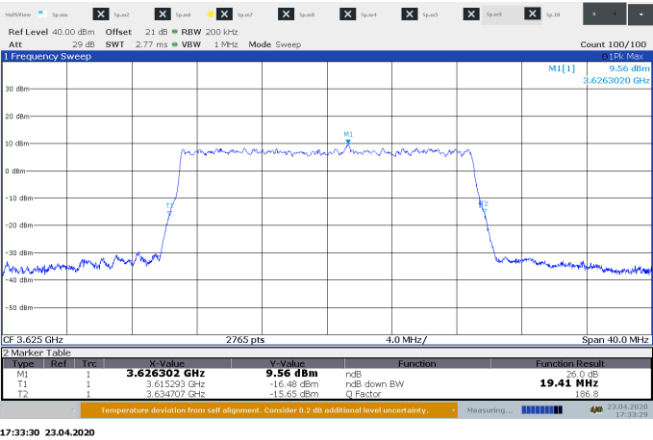


Figure 8.3-4: 26 dB bandwidth sample plot for 20 MHz channel

8.4 FCC 96.41(e)(1) 3.5 GHz emissions and interference limits

8.4.1 Definitions and limits

General protection levels. Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0–10 MHz above the upper SAS-assigned channel edge and within 0–10 MHz below the lower SAS-assigned channel edge. At all frequencies greater than 10 MHz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(3) Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full reference bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.4.2 Test summary

Test date	March 13, 2020
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8.4.3 Observations, settings and special notes

This test was performed at the antenna ports and radiated with both antennas terminated with 50 Ohm load.
EUT was transmitting from both antenna connectors at the maximum power settings.
Emission results for both QPSK and 64 QAM -60 modulation are shown in table below
Spectrum analyser settings for measurements within 1 MHz from the SAS assigned channel edges:

Resolution bandwidth	1 % of occupied Bandwidth
Video bandwidth	3 × RBW
Detector mode	RMS
Trace mode	Power averaging

Spectrum analyser settings for measurements outside 1 MHz from the SAS assigned channel edges:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	RMS
Trace mode	Power averaging

8.4.4 Test data

Table 8.4-1: Emission mask measurements for sector 0 QPSK modulation

Antenna port	Channel & Bandwidth,MHz	Offset from the SAS assigned channel edges, MHz	Frequency of max emission, MHz	Emission level, dBm	Limit ¹ , dBm	Margin, dB
0	10(low)	>10	3540	-52.7	-28.0	24.7
1	10(low)	>10	3540	-52.2	-28.0	24.2
0	10(low)	0-1	3550	-41.2	-16.0	25.2
1	10(low)	0-1	3550	-42.2	-16.0	26.2
0	10(low)	0-1	3560	-38.6	-16.0	22.6
1	10(low)	0-1	3560	-42.1	-16.0	26.1
0	10(low)	>10	3570	-53.6	-28.0	25.6
1	10(low)	>10	3570	-52.3	-28.0	24.3
0	10(mid)	>10	3610	-52.8	-28.0	24.8
1	10(mid)	>10	3610	-51.6	-28.0	23.6
0	10(mid)	0-1	3620	-40.4	-16.0	24.4
1	10(mid)	0-1	3620	-41.1	-16.0	25.1
0	10(mid)	0-1	3630	-40.4	-16.0	24.4
1	10(mid)	0-1	3630	-38.9	-16.0	22.9
0	10(mid)	>10	3640	-52.6	-28.0	24.6
1	10(mid)	>10	3640	-51.4	-28.0	23.4
0	10(high)	>10	3680	-52.3	-28.0	24.3
1	10(high)	>10	3680	-52.3	-28.0	24.3
0	10(high)	0-1	3690	-42.6	-16.0	26.6
1	10(high)	0-1	3690	-41.8	-16.0	25.8
0	10(high)	0-1	3700	-43.2	-16.0	27.2
1	10(high)	0-1	3700	-38.4	-16.0	22.4
0	10(high)	>10	3710	-52.9	-28.0	24.9
1	10(high)	>10	3710	-51.8	-28.0	23.8
0	20(low)	>10	3540	-42.5	-28.0	14.5
1	20(low)	>10	3540	-41.3	-28.0	13.3
0	20(low)	0-1	3550	-39.6	-16.0	23.6
1	20(low)	0-1	3550	-40.4	-16.0	24.4
0	20(low)	0-1	3570	-39.6	-16.0	23.6
1	20(low)	0-1	3570	-40.2	-16.0	24.2
0	20(low)	>10	3580	-47.4	-28.0	19.4
1	20(low)	>10	3580	-41.0	-28.0	13.0
0	20(mid)	>10	3605	-41.4	-28.0	13.4
1	20(mid)	>10	3605	-43.1	-28.0	15.1
0	20(mid)	0-1	3615	-41.0	-16.0	25.0
1	20(mid)	0-1	3615	-39.3	-16.0	23.3
0	20(mid)	0-1	3635	-42.1	-16.0	26.1
1	20(mid)	0-1	3635	-38.1	-16.0	22.1
0	20(mid)	>10	3645	-41.4	-28.0	13.4
1	20(mid)	>10	3645	-40.0	-28.0	12.0
0	20(high)	>10	3670	-44.6	-28.0	16.6
1	20(high)	>10	3670	-41.0	-28.0	13.0
0	20(high)	0-1	3680	-40.6	-16.0	24.6
1	20(high)	0-1	3680	-35.5	-16.0	19.5
0	20(high)	0-1	3700	-39.9	-16.0	23.9
1	20(high)	0-1	3700	-38.3	-16.0	22.3
0	20(high)	>10	3710	-42.1	-28.0	14.1
1	20(high)	>10	3710	-37.1	-28.0	9.1

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

Table 8.4-2: Emission mask measurements for sector 1 QPSK modulation

Antenna port	Channel & Bandwidth,MHz	Offset from the SAS assigned channel edges, MHz	Frequency of max emission, MHz	Emission level, dBm	Limit ¹ , dBm	Margin, dB
0	10(low)	>10	3540	-53.3	-28.0	25.3
1	10(low)	>10	3540	-52.9	-28.0	24.9
0	10(low)	0-1	3550	-40.1	-16.0	24.1
1	10(low)	0-1	3550	-41.5	-16.0	25.5
0	10(low)	0-1	3560	-40.3	-16.0	24.3
1	10(low)	0-1	3560	-42.7	-16.0	26.7
0	10(low)	>10	3570	-53.9	-28.0	25.9
1	10(low)	>10	3570	-53.1	-28.0	25.1
0	10(mid)	>10	3610	-54.1	-28.0	26.1
1	10(mid)	>10	3610	-52.9	-28.0	24.9
0	10(mid)	0-1	3620	-42.5	-16.0	26.5
1	10(mid)	0-1	3620	-38.9	-16.0	22.9
0	10(mid)	0-1	3630	-39.5	-16.0	23.5
1	10(mid)	0-1	3630	-40.0	-16.0	24.0
0	10(mid)	>10	3640	-53.4	-28.0	25.4
1	10(mid)	>10	3640	-52.8	-28.0	24.8
0	10(high)	>10	3680	-53.4	-28.0	25.4
1	10(high)	>10	3680	-53.1	-28.0	25.1
0	10(high)	0-1	3690	-40.8	-16.0	24.8
1	10(high)	0-1	3690	-39.6	-16.0	23.6
0	10(high)	0-1	3700	-39.8	-16.0	23.8
1	10(high)	0-1	3700	-40.7	-16.0	24.7
0	10(high)	>10	3710	-53.4	-28.0	25.4
1	10(high)	>10	3710	-53.3	-28.0	25.3
0	20(low)	>10	3540	-42.9	-28.0	14.9
1	20(low)	>10	3540	-42.6	-28.0	14.6
0	20(low)	0-1	3550	-38.6	-16.0	22.6
1	20(low)	0-1	3550	-38.3	-16.0	22.3
0	20(low)	0-1	3570	-43.1	-16.0	27.1
1	20(low)	0-1	3570	-39.9	-16.0	23.9
0	20(low)	>10	3580	-47.9	-28.0	19.9
1	20(low)	>10	3580	-45.7	-28.0	17.7
0	20(mid)	>10	3605	-44.3	-28.0	16.3
1	20(mid)	>10	3605	-43.5	-28.0	15.5
0	20(mid)	0-1	3615	-40.5	-16.0	24.5
1	20(mid)	0-1	3615	-37.8	-16.0	21.8
0	20(mid)	0-1	3635	-41.1	-16.0	25.1
1	20(mid)	0-1	3635	-40.3	-16.0	24.3
0	20(mid)	>10	3645	-47.9	-28.0	19.9
1	20(mid)	>10	3645	-43.4	-28.0	15.4
0	20(high)	>10	3670	-45.8	-28.0	17.8
1	20(high)	>10	3670	-45.2	-28.0	17.2
0	20(high)	0-1	3680	-40.4	-16.0	24.4
1	20(high)	0-1	3680	-40.3	-16.0	24.3
0	20(high)	0-1	3700	-40.4	-16.0	24.4
1	20(high)	0-1	3700	-39.3	-16.0	23.3
0	20(high)	>10	3710	-45.8	-28.0	17.8
1	20(high)	>10	3710	-43.5	-28.0	15.5

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above

Table 8.4-3: Emission mask measurements for sector 2 QPSK modulation results

Antenna port	Channel & Bandwidth,MHz	Offset from the SAS assigned channel edges, MHz	Frequency of max emission, MHz	Emission level, dBm	Limit ¹ , dBm	Margin, dB
0	10(low)	>10	3540	-52.1	-28.0	24.1
1	10(low)	>10	3540	-51.1	-28.0	23.1
0	10(low)	0-1	3550	-41.7	-16.0	25.7
1	10(low)	0-1	3550	-39.3	-16.0	23.3
0	10(low)	0-1	3560	-40.4	-16.0	24.4
1	10(low)	0-1	3560	-40.8	-16.0	24.8
0	10(low)	>10	3570	-52.2	-28.0	24.2
1	10(low)	>10	3570	-50.1	-28.0	22.1
0	10(mid)	>10	3610	-51.6	-28.0	23.6
1	10(mid)	>10	3610	-48.2	-28.0	20.2
0	10(mid)	0-1	3620	-40.9	-16.0	24.9
1	10(mid)	0-1	3620	-40.9	-16.0	24.9
0	10(mid)	0-1	3630	-40.7	-16.0	24.7
1	10(mid)	0-1	3630	-40.7	-16.0	24.7
0	10(mid)	>10	3640	-50.6	-28.0	22.6
1	10(mid)	>10	3640	-48.2	-28.0	20.2
0	10(high)	>10	3680	-51.5	-28.0	23.5
1	10(high)	>10	3680	-48.9	-28.0	20.9
0	10(high)	0-1	3690	-44.5	-16.0	28.5
1	10(high)	0-1	3690	-40.5	-16.0	24.5
0	10(high)	0-1	3700	-41.4	-16.0	25.4
1	10(high)	0-1	3700	-40.5	-16.0	24.5
0	10(high)	>10	3710	-49.3	-28.0	21.3
1	10(high)	>10	3710	-49.5	-28.0	21.5
0	20(low)	>10	3540	-44.0	-28.0	16.0
1	20(low)	>10	3540	-40.8	-28.0	12.8
0	20(low)	0-1	3550	-40.0	-16.0	24.0
1	20(low)	0-1	3550	-40.3	-16.0	24.3
0	20(low)	0-1	3570	-41.7	-16.0	25.7
1	20(low)	0-1	3570	-45.9	-16.0	29.9
0	20(low)	>10	3580	-48.1	-28.0	20.1
1	20(low)	>10	3580	-44.2	-28.0	16.2
0	20(mid)	>10	3605	-44.9	-28.0	16.9
1	20(mid)	>10	3605	-41.2	-28.0	13.2
0	20(mid)	0-1	3615	-39.0	-16.0	23.0
1	20(mid)	0-1	3615	-39.1	-16.0	23.1
0	20(mid)	0-1	3635	-40.8	-16.0	24.8
1	20(mid)	0-1	3635	-42.1	-16.0	26.1
0	20(mid)	>10	3645	-44.7	-28.0	16.7
1	20(mid)	>10	3645	-39.9	-28.0	11.9
0	20(high)	>10	3670	-44.5	-28.0	16.5
1	20(high)	>10	3670	-43.6	-28.0	15.6
0	20(high)	0-1	3680	-42.3	-16.0	26.3
1	20(high)	0-1	3680	-41.3	-16.0	25.3
0	20(high)	0-1	3700	-42.4	-16.0	26.4
1	20(high)	0-1	3700	-39.7	-16.0	23.7
0	20(high)	>10	3710	-44.5	-28.0	16.5
1	20(high)	>10	3710	-39.2	-28.0	11.2

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

Table 8.4-4: Emission mask measurements for sector 1 64 QAM modulation results

Antenna port	No of carriers	Channel & Bandwidth,MHz	Offset from the SAS assigned channel edges, MHz	Frequency of max emission, MHz	Emission level, dBm	Limit ¹ , dBm	Margin, dB
0	1	10(low)	>10	3540	-53.5	-28.0	25.5
1	1	10(low)	>10	3540	-51.9	-28.0	23.9
0	1	10(low)	0-1	3550	-38.4	-16.0	22.4
1	1	10(low)	0-1	3550	-36.1	-16.0	20.1
0	1	10(low)	0-1	3560	-41.1	-16.0	25.1
1	1	10(low)	0-1	3560	-38.5	-16.0	22.5
0	1	10(low)	>10	3570	-53.4	-28.0	25.4
1	1	10(low)	>10	3570	-52.9	-28.0	24.9
0	1	10(mid)	>10	3610	-53.3	-28.0	25.3
1	1	10(mid)	>10	3610	-52.7	-28.0	24.7
0	1	10(mid)	0-1	3620	-39.6	-16.0	23.6
1	1	10(mid)	0-1	3620	-38.1	-16.0	22.1
0	1	10(mid)	0-1	3630	-41.1	-16.0	25.1
1	1	10(mid)	0-1	3630	-39.3	-16.0	23.3
0	1	10(mid)	>10	3640	-52.1	-28.0	24.1
1	1	10(mid)	>10	3640	-51.1	-28.0	23.1
0	1	10(high)	>10	3680	-53.4	-28.0	25.4
1	1	10(high)	>10	3680	-53.5	-28.0	25.5
0	1	10(high)	0-1	3690	-38.2	-16.0	22.2
1	1	10(high)	0-1	3690	-38.4	-16.0	22.4
0	1	10(high)	0-1	3700	-40.5	-16.0	24.5
1	1	10(high)	0-1	3700	-37.3	-16.0	21.3
0	1	10(high)	>10	3710	-54.0	-28.0	26.0
1	1	10(high)	>10	3710	-52.3	-28.0	24.3
0	1	20(low)	>10	3540	-42.4	-28.0	14.4
1	1	20(low)	>10	3540	-41.8	-28.0	13.8
0	1	20(low)	0-1	3550	-44.2	-16.0	28.2
1	1	20(low)	0-1	3550	-42.5	-16.0	26.5
0	1	20(low)	0-1	3570	-44.9	-16.0	28.9
1	1	20(low)	0-1	3570	-44.3	-16.0	28.3
0	1	20(low)	>10	3580	-47.2	-28.0	19.2
1	1	20(low)	>10	3580	-44.9	-28.0	16.9
0	1	20(mid)	>10	3605	-43.8	-28.0	15.8
1	1	20(mid)	>10	3605	-41.7	-28.0	13.7
0	1	20(mid)	0-1	3615	-42.6	-16.0	26.6
1	1	20(mid)	0-1	3615	-42.8	-16.0	26.8
0	1	20(mid)	0-1	3635	-47.2	-16.0	31.2
1	1	20(mid)	0-1	3635	-44.7	-16.0	28.7
0	1	20(mid)	>10	3645	-46.4	-28.0	18.4
1	1	20(mid)	>10	3645	-41.4	-28.0	13.4
0	1	20(high)	>10	3670	-43.9	-28.0	15.9
1	1	20(high)	>10	3670	-43.5	-28.0	15.5
0	1	20(high)	0-1	3680	-43.5	-16.0	27.5
1	1	20(high)	0-1	3680	-44.5	-16.0	28.5
0	1	20(high)	0-1	3700	-43.9	-16.0	27.9
1	1	20(high)	0-1	3700	-45.7	-16.0	29.7
0	1	20(high)	>10	3710	-44.4	-28.0	16.4
1	1	20(high)	>10	3710	-42.5	-28.0	14.5

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above. For this modulation results are shown only sector1 since other sector results are repetitive and further investigated to be well within limits..

Section 8
Test name
Specification

Testing data
FCC 96.41(e)(1) 3.5 GHz emissions and interference limits
FCC Part 96, FCC Part 2.1051 and FCC Part 2.1053

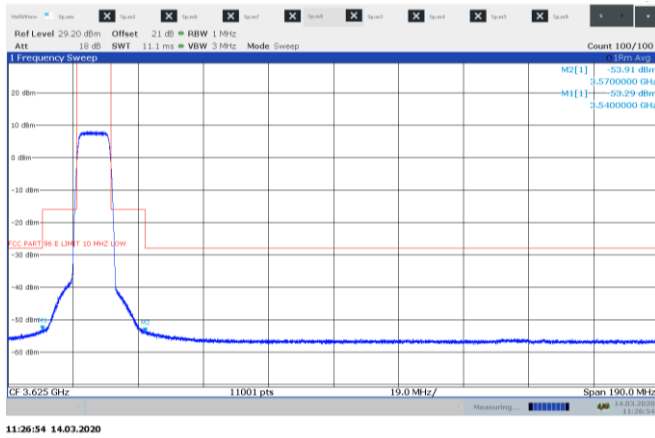


Figure 8.4-1: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 10 MHz low channel

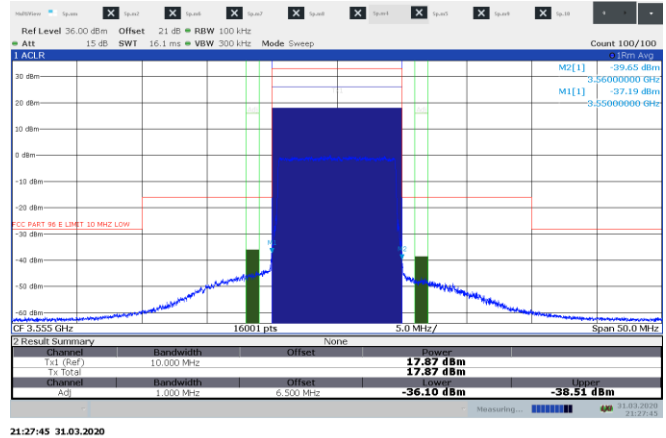


Figure 8.4-2: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 10 MHz low channel

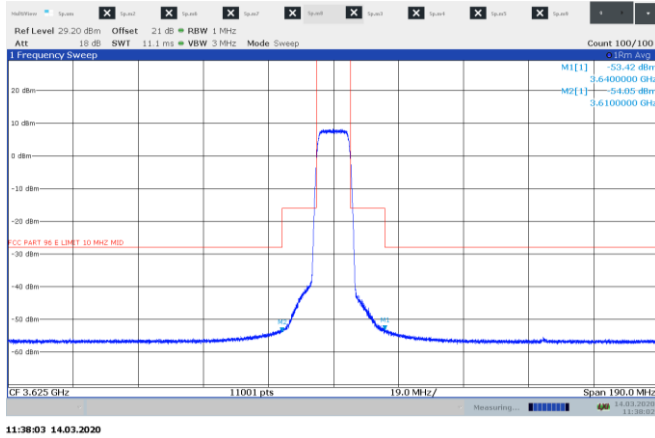


Figure 8.4-3: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 10 MHz mid channel

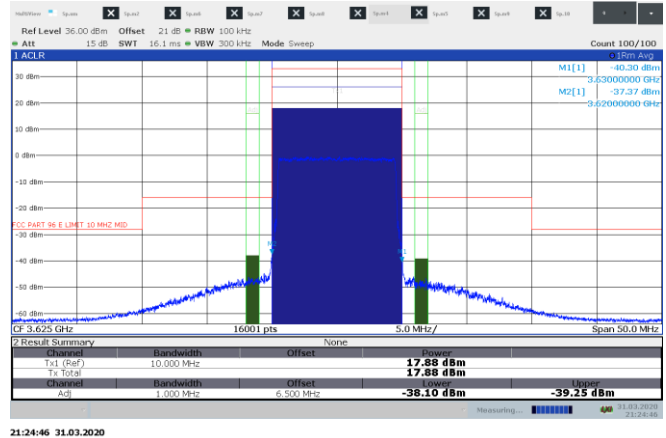


Figure 8.4-4: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 10 MHz mid channel

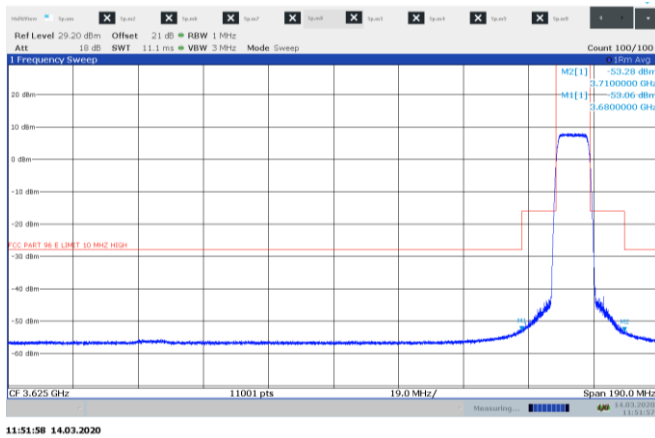


Figure 8.4-5: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 10 MHz high channel

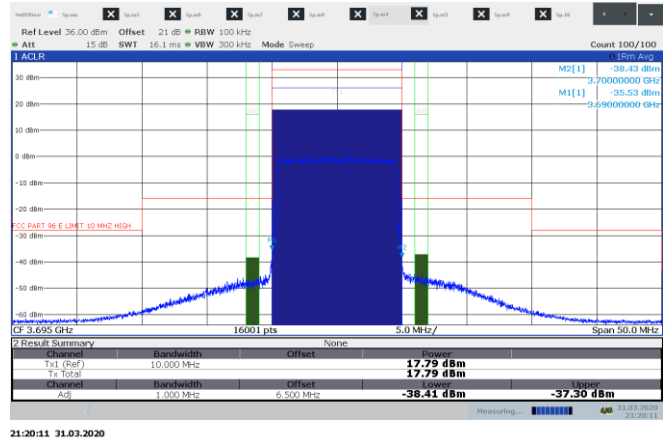


Figure 8.4-6: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 10 MHz high channel

Section 8
Test name
Specification

Testing data
FCC 96.41(e)(1) 3.5 GHz emissions and interference limits
FCC Part 96, FCC Part 2.1051 and FCC Part 2.1053

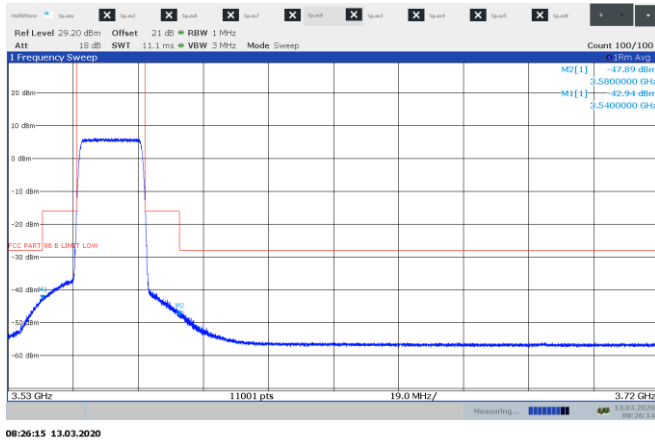


Figure 8.4-7: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 20 MHz low channel

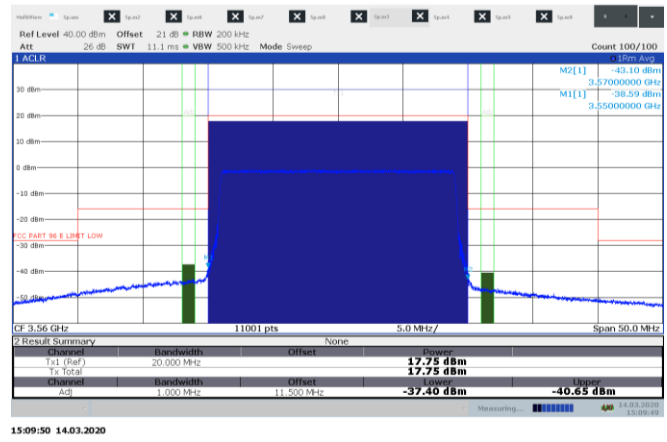


Figure 8.4-8: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 20 MHz low channel

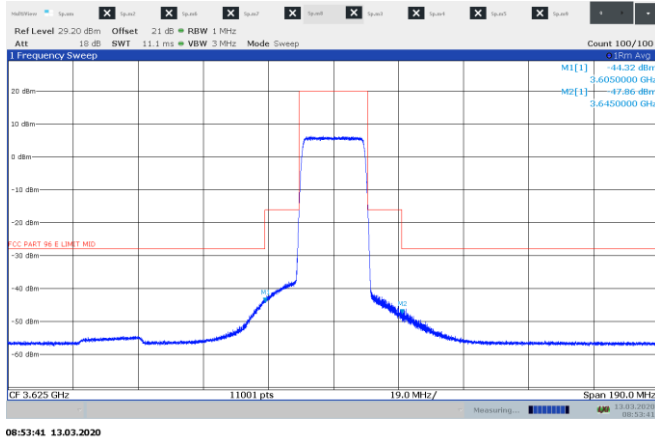


Figure 8.4-9: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 20 MHz mid channel

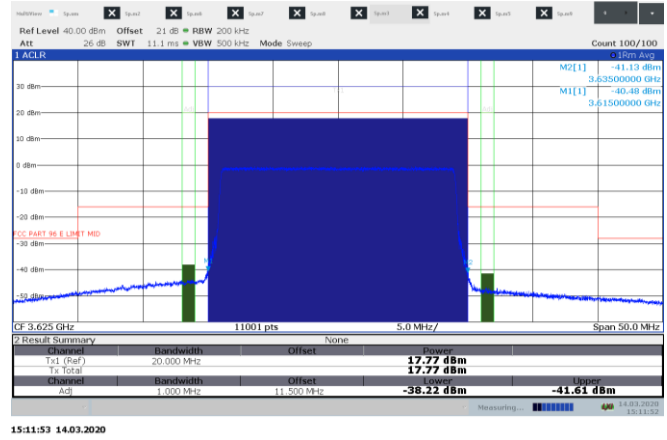


Figure 8.4-10: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 20 MHz mid channel

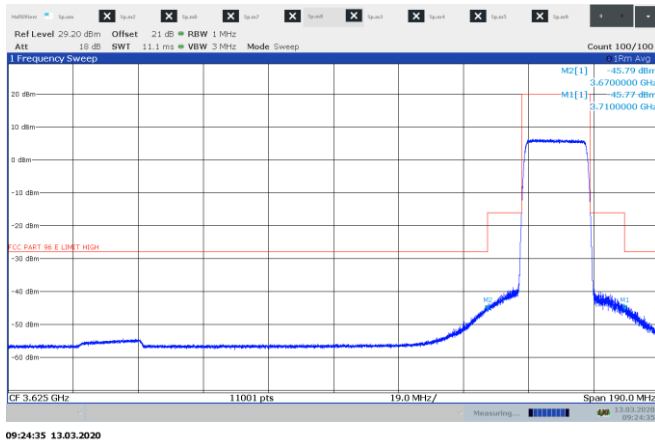


Figure 8.4-11: Emission measurement outside 10 MHz from the SAS assigned channel edge, sample plot for 20 MHz high channel

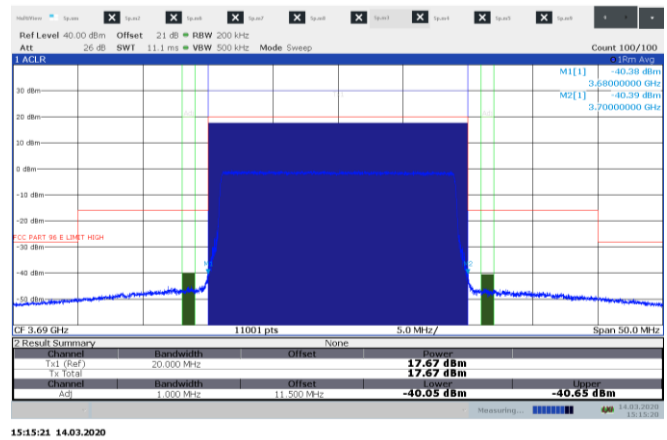


Figure 8.4-12: Emission measurement within 0-10 MHz from the SAS assigned channel edge, sample plot for 20 MHz high channel

8.5 FCC 96.41(e)(2) Additional protection levels

8.5.1 Definitions and limits

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

8.5.2 Test summary

Test date July 30, 2019

8.5.3 Observations, settings and special notes

The testing was performed conducted on each antenna port as well as radiated with both ports operating simultaneously in MIMO mode and terminated with 50 Ohm loads. Spurious emissions were tested from 30 MHz to the 10th harmonic. Only critical plots provided in test data below. Spectrum analyser settings:

Resolution bandwidth	100 kHz (below 1 GHz) 1 MHz (conducted)
Video bandwidth	3 × RBW
Detector and trace mode	RMS Power averaging (conducted), Peak Max-hold (radiated)

8.5.4 Test data

Table 8.5-1: Additional emission measurements at 3530 and 3720 MHz sector 0 QPSK modulation results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10(low)	3530	-60.1	-43.0	17.1
1	10(low)	3530	-59.8	-43.0	16.8
0	10(high)	3720	-60.9	-43.0	17.9
1	10(high)	3720	-60.1	-43.0	17.1
0	20(low)	3530	-56.2	-43.0	13.2
1	20(low)	3530	-52.3	-43.0	9.3
0	20(high)	3720	-53.5	-43.0	10.5
1	20(high)	3720	-50.1	-43.0	7.1

Note: ¹Margin of SISO operation. For MIMO 2×2 operation 3 dB is subtracted from the limit in the table above.

Table 8.5-2: Additional emission measurements at 3530 and 3720 MHz sector 1 QPSK modulation results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10(low)	3530	-60.3	-43.0	17.3
1	10(low)	3530	-60.0	-43.0	17.0
0	10(high)	3720	-60.0	-43.0	17.0
1	10(high)	3720	-60.4	-43.0	17.4
0	20(low)	3530	-56.8	-43.0	13.8
1	20(low)	3530	-55.6	-43.0	12.6
0	20(high)	3720	-53.7	-43.0	10.7
1	20(high)	3720	-54.8	-43.0	11.8

Note: ¹Margin of SISO operation. For MIMO 2×2 operation 3 dB is subtracted from the limit in the table above.

Table 8.5-3: Additional emission measurements at 3530 and 3720 MHz sector 2 QPSK modulation results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10(low)	3530	-59.2	-43.0	16.2
1	10(low)	3530	-59.5	-43.0	16.5
0	10(high)	3720	-59.7	-43.0	16.7
1	10(high)	3720	-59.9	-43.0	16.9
0	20(low)	3530	-55.9	-43.0	12.9
1	20(low)	3530	-53.2	-43.0	10.2
0	20(high)	3720	-53.6	-43.0	10.6
1	20(high)	3720	-51.1	-43.0	8.1

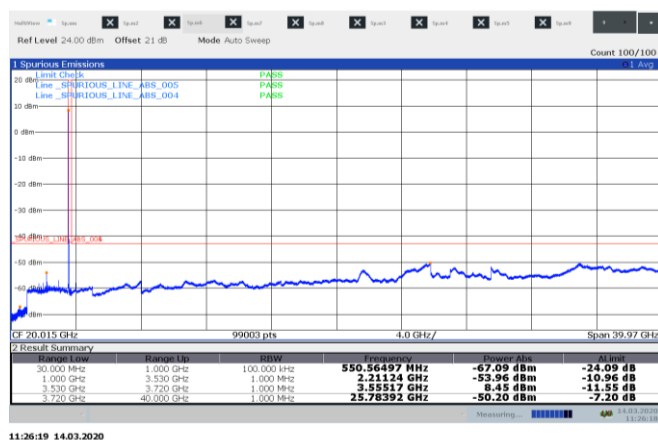
Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

Table 8.5-4: Additional emission measurements at 3530 and 3720 MHz sector 1 64 QAM modulation results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10(low)	3530	-60.1	-43.0	17.1
1	10(low)	3530	-59.7	-43.0	16.7
0	10(high)	3720	-60.6	-43.0	17.6
1	10(high)	3720	-60.3	-43.0	17.3
0	20(low)	3530	-56.3	-43.0	13.3
1	20(low)	3530	-54.3	-43.0	11.3
0	20(high)	3720	-53.6	-43.0	10.6
1	20(high)	3720	-55.1	-43.0	12.1

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above. . For this modulation results for sector 1 is only shown since other sector results are repetitive and further investigated to be well within limits

Testing data
FCC 96.41(e)(2) Additional protection levels
FCC Part 96, FCC Part 2.1051 and FCC Part 2.1053



Ref Level 24.00 dBm Offset 21 dB Mode Auto Sweep Count 100/100

1 Spurious Emissions

20 dBm

Line_Spurious_Line_Abs_005 PASS

Line_Spurious_Line_Abs_004 PASS

10 dBm

0 dBm

-10 dBm

-20 dBm

-30 dBm

-40 dBm

-50 dBm

20.015 GHz 99000 pts 4.0 GHz/ Span 39.97 GHz

2 Result Summary

Range Line	Range Up	RDW	Frequency	Power Abs	At Init
30.000 MHz	1.000 GHz	100.000 kHz	550.14928 MHz	-67.20 dBm	-24.20 dBm
1.000 GHz	3.530 GHz	1.000 MHz	2.11124 GHz	-53.95 dBm	-10.95 dBm
3.530 GHz	3.720 GHz	1.000 MHz	3.62424 GHz	8.50 dBm	-11.50 dBm
40.000 GHz	40.000 GHz	1.000 MHz	25.78475 GHz	-49.97 dBm	-6.97 dBm

Measuring: [Progress Bar] 4dB 14.03.2020 11:37:38

Ref Level 24.00 dBm Offset 21 dB Mode Auto Sweep Count 100/100 1 Avg

Spectrum Emissions

Line: SHORIOUS_LINE_ABS_005 PASS
Line: SHORIOUS_LINE_ABS_004 PASS

20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm

CF 20.015 GHz 99000 pts 4.0 GHz/ Span 39.97 GHz

2 Result Summary

Range/Lb	RBW	Frequency	Power Abs	Alt
30.000 MHz	1.000 MHz	859.42598 MHz	-67.04 dBm	-24.04 dB
1.000 GHz	3.530 GHz	2.21124 GHz	-82.91 dBm	-39.91 dB
3.530 GHz	3.720 GHz	3.69796 GHz	8.10 dBm	-11.82 dB
3.720 GHz	40.000 GHz	25.78145 GHz	-50.03 dBm	-7.03 dB

Measuring... 14.03.2020 11:39:27

Ref Level 26.00 dBm Offset 21 dB RBW 1 MHz Att 5 dB BW 15.1 MHz VSW 3 MHz Mode Sweep Count 100/100

Frequency Sweep

20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm

M[1] 3.55129590 GHz
M[2] 3.53920000 GHz

CC: FREQ 36 E LIMIT 10 MHz LOW

3.53 GHz 15001 pts 5.0 MHz Span 50.0 MHz

Temperature deviation from self alignment. Consider 0.2 dB additional level uncertainty.

Measuring...

15:55:06 23.04.2020

Ref Level 26.00 dBm Offset 21 dB RBW 1 MHz
 ATT 5 dB SWT 15.1 ms VBW 3 kHz Mode Sweep

Frequency Sweep
 3.72 GHz to 3.73 GHz 5.0 MHz Span

Count 100/100

M1[1] 40.01 dB
 M2[1] 7.92 dB

3.72000000 GHz
 3.73000000 GHz

20 dBm
 10 dBm
 0 dBm
 -10 dBm
 -20 dBm
 -30 dBm
 -40 dBm
 -50 dBm
 -60 dBm

3.72 GHz 3.73 GHz 5.0 MHz

15001 pts

Temperature deviation from self alignment. Consider 0.2 dB additional level uncertainty.

Measuring...

16.04.05 23.04.2020

Figure 8.5-5: High Bandedge for 10 MHz channel at 3720 MHz sample plot

Section 8
Test name
Specification

Testing data
FCC 96.41(e)(2) Additional protection levels
FCC Part 96, FCC Part 2.1051 and FCC Part 2.1053

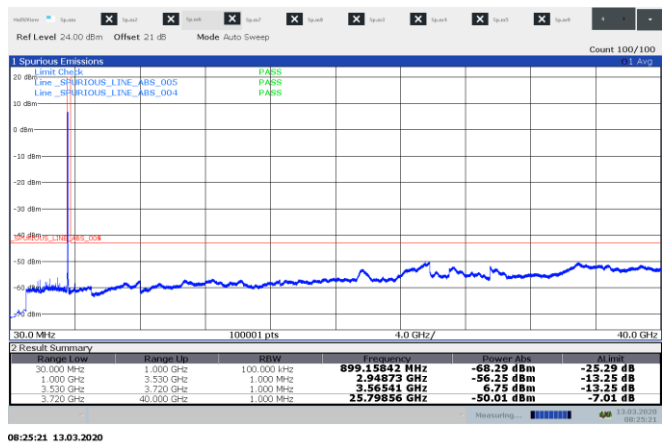


Figure 8.5-6: : Conducted spurious emissions for 20 MHz low channel sample plot 30 MHz – 40 GHz

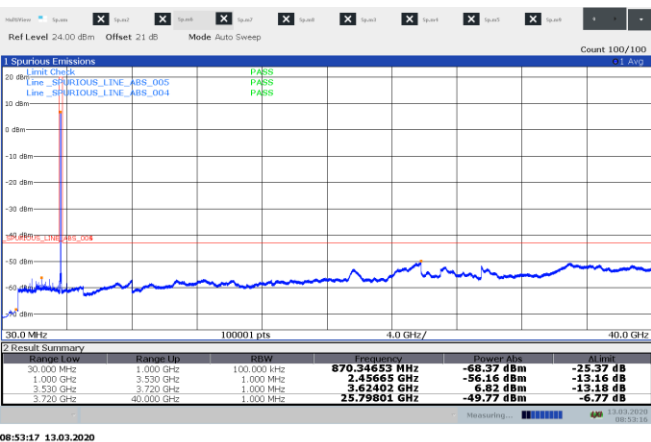


Figure 8.5-7: : Conducted spurious emissions for 20 MHz mid channel sample plot 1 GHz – 3.53 GHz

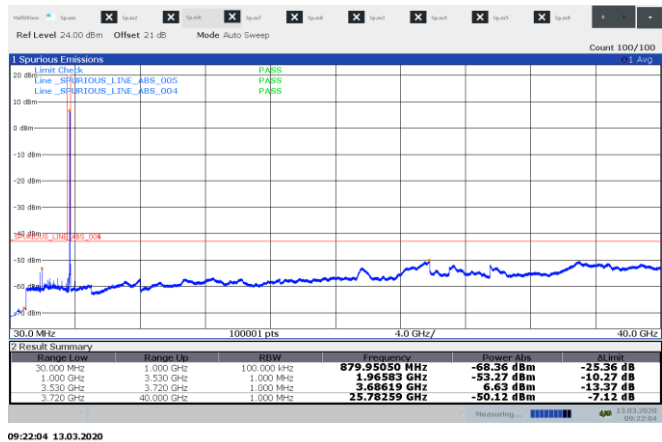


Figure 8.5-8: Conducted spurious emissions for 20 MHz high channel sample plot 3.72 GHz – 37 GHz

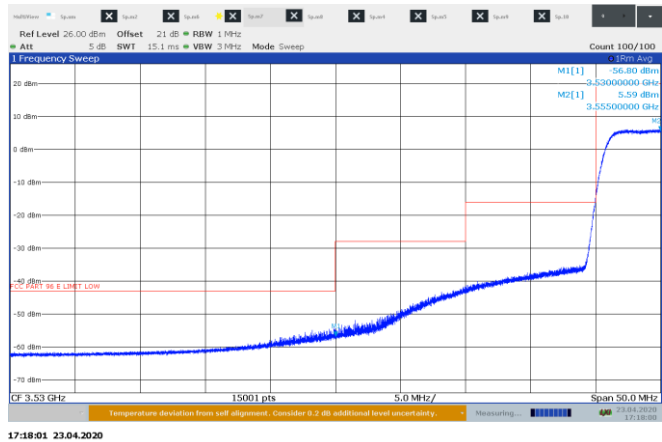


Figure 8.5-9: Low Bandedge for 20 MHz channel at 3530 MHz sample plot

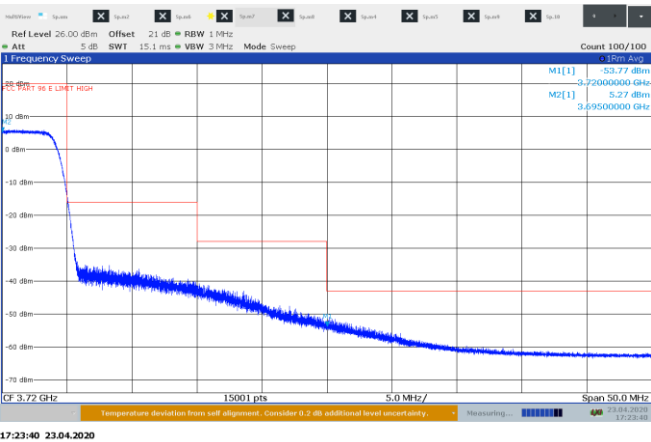
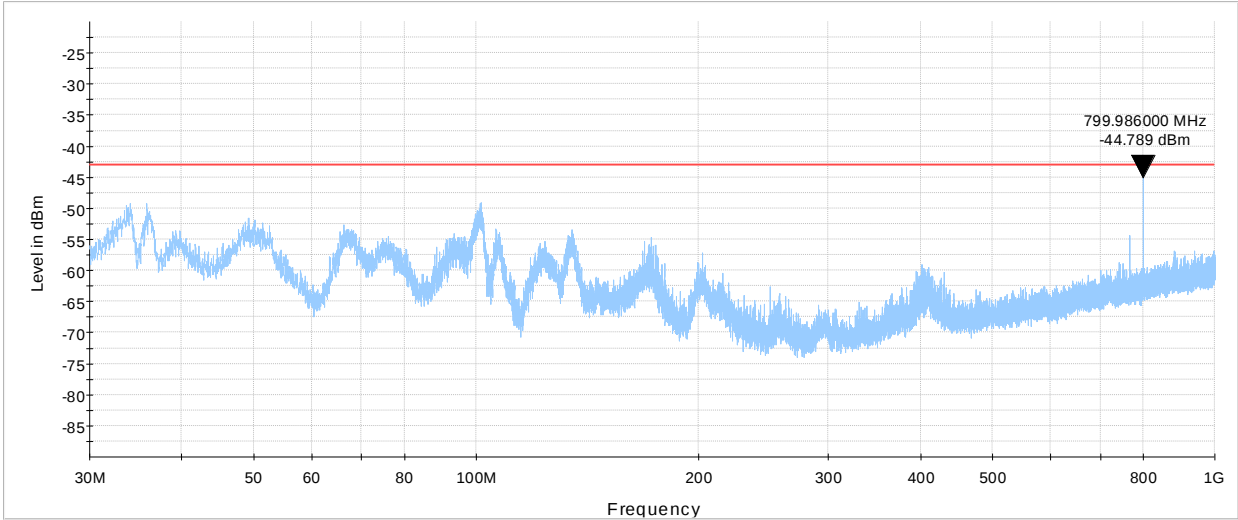


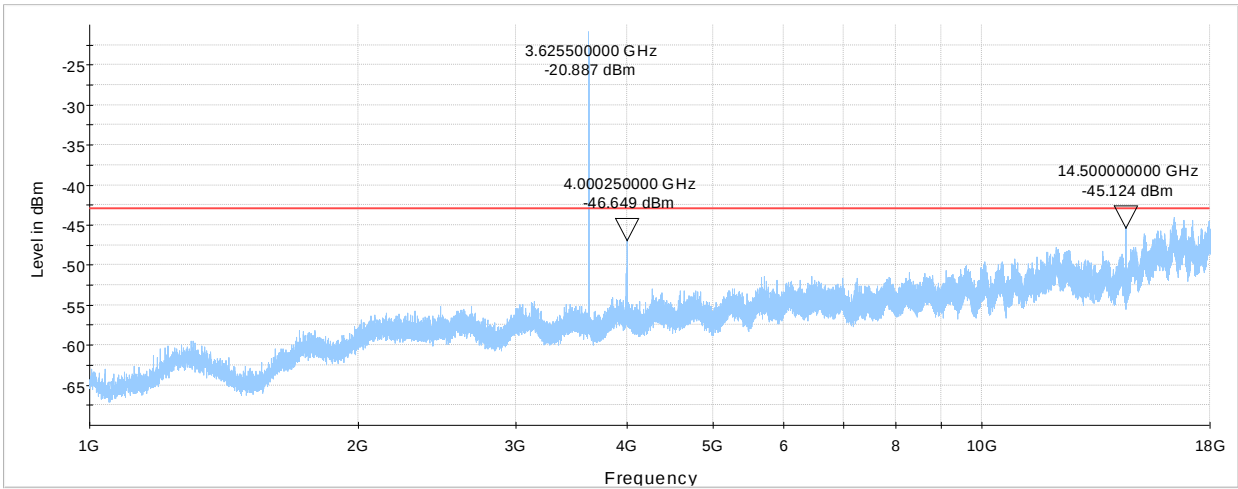
Figure 8.5-10: High Bandedge for 20 MHz channel at 3720 MHz sample plot



NEX-391430 Radiated emissions 30 MHz - 1 GHz

Preview Result 1-PK+
FCC Part 96 Limit Line

Figure 8.5-1: Cabinet spurious emissions sample plot (30 to 1000 MHz)



NEX-391430 Cabinet Spurious 1 - 18 GHz

Preview Result 1-PK+
FCC Part 96 Limit Line

Figure 8.5-2: Cabinet spurious emissions sample plot (1 to 18 GHz)

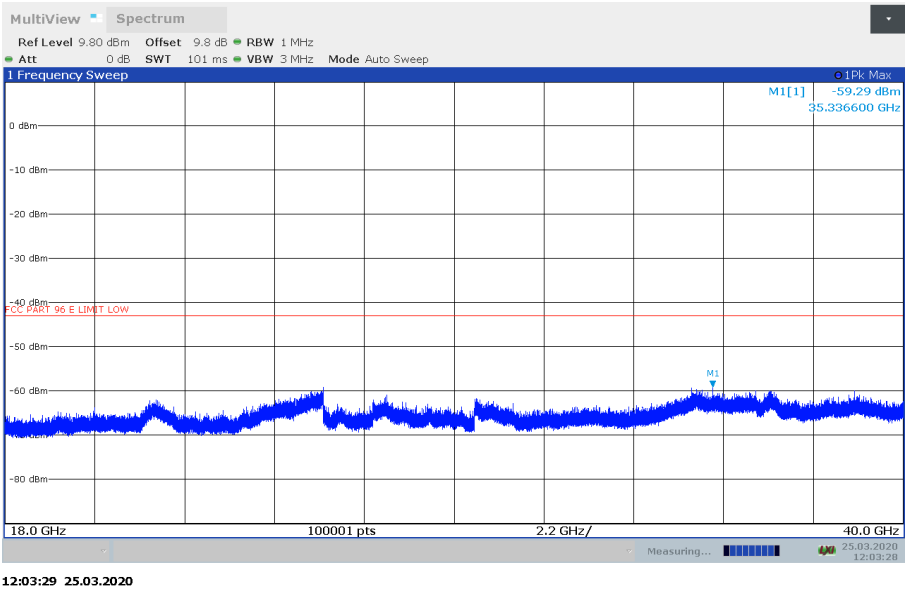


Figure 8.5-3: Cabinet spurious emissions sample plot (18 to 40 GHz)

Table 8.5-5: Conducted spurious emission measurement results QPSK modulation sector 0 results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10 (low)	903.95	-66.8	-43.0	23.8
0	10 (low)	2211.24	-54.8	-43.0	11.81
0	10 (low)	25792.17	-50.3	-43.0	7.3
1	10 (low)	901.18	-67.1	-43.0	24.1
1	10 (low)	1965.83	-58.0	-43.0	15.0
1	10 (low)	25783.92	-50.3	-43.0	7.3
0	10 (mid)	870.23	-66.7	-43.0	23.7
0	10 (mid)	2211.24	-54.9	-43.0	11.9
0	10 (mid)	25771.55	-50.1	-43.0	7.1
1	10 (mid)	944.73	-67.3	-43.0	24.3
1	10 (mid)	1965.83	-57.4	-43.0	14.4
1	10 (mid)	25790.52	-50.2	-43.0	7.2
0	10(high)	942.70	-67.4	-43.0	24.4
0	10(high)	2211.24	-54.4	-43.0	11.4
0	10(high)	25797.94	-50.2	-43.0	7.2
1	10(high)	953.88	-67.3	-43.0	24.3
1	10(high)	1965.83	-56.1	-43.0	13.1
1	10(high)	25798.76	-50.1	-43.0	7.1
0	20 (low)	889.55	-68.3	-43.0	25.3
0	20 (low)	2457.91	-55.1	-43.0	12.1
0	20 (low)	25796.36	-50.0	-43.0	7.0
1	20 (low)	543.88	-68.3	-43.0	25.3
1	20 (low)	3529.37	-52.5	-43.0	9.5
1	20 (low)	25799.66	-50.2	-43.0	7.2
0	20 (mid)	983.02	-65.9	-43.0	22.9
0	20 (mid)	2211.24	-53.9	-43.0	10.9
0	20 (mid)	25780.62	-50.3	-43.0	7.3
1	20 (mid)	983.02	-66.6	-43.0	23.6
1	20 (mid)	2211.24	-54.0	-43.0	11.0
1	20 (mid)	25793.82	-50.3	-43.0	7.3
0	20(high)	550.84	-67.1	-43.0	24.1
0	20(high)	2457.91	-53.7	-43.0	10.7
0	20(high)	25795.47	-49.9	-43.0	6.9
1	20(high)	983.02	-65.0	-43.0	22.0
1	20(high)	2211.24	-52.2	-43.0	9.2
1	20(high)	25794.64	-50.3	-43.0	7.3

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

Table 8.5-6: Conducted spurious emission measurement results QPSK modulation sector 1 results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10 (low)	550.56	-67.1	-43.0	24.1
0	10 (low)	2211.24	-54.0	-43.0	11.0
0	10 (low)	25783.92	-50.2	-43.0	7.2
1	10 (low)	552.32	-67.1	-43.0	24.1
1	10 (low)	1965.83	-54.6	-43.0	11.6
1	10 (low)	25790.52	-50.1	-43.0	7.1
0	10 (mid)	550.14	-67.2	-43.0	24.2
0	10 (mid)	2211.24	-54.0	-43.0	11.0
0	10 (mid)	25784.75	-50.0	-43.0	7.0
1	10 (mid)	914.29	-66.9	-43.0	23.9
1	10 (mid)	1965.83	-54.5	-43.0	11.5
1	10 (mid)	25791.34	-50.1	-43.0	7.1
0	10(high)	859.42	-67.0	-43.0	24.0
0	10(high)	2211.24	-52.9	-43.0	9.9
0	10(high)	25781.45	-50.0	-43.0	7.0
1	10(high)	899.88	-67.2	-43.0	24.2
1	10(high)	1965.83	-53.2	-43.0	10.2
1	10(high)	25798.76	-50.0	-43.0	7.0
0	20 (low)	899.15	-68.3	-43.0	25.3
0	20 (low)	2948.73	-56.3	-43.0	13.3
0	20 (low)	25798.56	-50.0	-43.0	7.0
1	20 (low)	879.95	-68.4	-43.0	25.4
1	20 (low)	1965.83	-53.9	-43.0	10.9
1	20 (low)	25796.91	-49.8	-43.0	6.8
0	20 (mid)	870.34	-68.4	-43.0	25.4
0	20 (mid)	2456.65	-56.2	-43.0	13.2
0	20 (mid)	25798.01	-49.8	-43.0	6.8
1	20 (mid)	908.76	-68.4	-43.0	25.4
1	20 (mid)	1965.83	-53.4	-43.0	10.4
1	20 (mid)	25789.75	-50.2	-43.0	7.2
0	20(high)	879.95	-68.4	-43.0	25.4
0	20(high)	1965.83	-53.3	-43.0	10.3
0	20(high)	25782.59	-50.1	-43.0	7.1
1	20(high)	879.95	-68.3	-43.0	25.3
1	20(high)	1965.83	-49.8	-43.0	6.8
1	20(high)	25796.36	-50.1	-43.0	7.1

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

Table 8.5-7: Conducted spurious emission measurement results QPSK modulation sector 2 results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10 (low)	862.84	-67.1	-43.0	24.1
0	10 (low)	2211.24	-55.1	-43.0	12.1
0	10 (low)	25769.91	-50.3	-43.0	7.3
1	10 (low)	951.34	-67.5	-43.0	24.5
1	10 (low)	1965.83	-54.1	-43.0	11.1
1	10 (low)	25790.52	-50.2	-43.0	7.2
0	10 (mid)	942.38	-67.1	-43.0	24.1
0	10 (mid)	2211.24	-54.0	-43.0	11.0
0	10 (mid)	25783.10	-50.2	-43.0	7.2
1	10 (mid)	552.13	-67.4	-43.0	24.4
1	10 (mid)	1965.83	-53.3	-43.0	10.3
1	10 (mid)	25792.17	-50.3	-43.0	7.3
0	10(high)	915.82	-67.0	-43.0	24.0
0	10(high)	2211.24	-53.0	-43.0	10.0
0	10(high)	25797.12	-50.1	-43.0	7.1
1	10(high)	983.02	-66.7	-43.0	23.7
1	10(high)	1965.83	-52.7	-43.0	9.7
1	10(high)	25797.94	-50.3	-43.0	7.3
0	20 (low)	983.02	-67.0	-43.0	24.0
0	20 (low)	1965.83	-55.1	-43.0	12.1
0	20 (low)	25788.05	-50.3	-43.0	7.3
1	20 (low)	983.02	-66.6	-43.0	23.6
1	20 (low)	1965.83	-52.6	-43.0	9.6
1	20 (low)	25789.92	-50.4	-43.0	7.4
0	20 (mid)	552.04	-67.2	-43.0	24.2
0	20 (mid)	1965.83	-55.1	-43.0	12.1
0	20 (mid)	25797.94	-50.3	-43.0	7.3
1	20 (mid)	983.02	-66.9	-43.0	23.9
1	20 (mid)	1965.83	-51.9	-43.0	8.9
1	20 (mid)	25794.64	-50.3	-43.0	7.3
0	20(high)	983.02	-66.5	-43.0	23.5
0	20(high)	1965.83	-55.3	-43.0	12.3
0	20(high)	25787.22	-50.2	-43.0	7.2
1	20(high)	983.02	-66.4	-43.0	23.4
1	20(high)	1965.83	-50.9	-43.0	7.9
1	20(high)	25790.52	-50.2	-43.0	7.2

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above.

. Table 8.5-8: Conducted spurious emission measurement results 64 QAM modulation sector 1 results

Antenna port	Channel BW, MHz	Frequency of max emission, MHz	Emission level, dBm/MHz	Limit ¹ , dBm/MHz	Margin, dB
0	10 (low)	552.33	-67.4	-43.0	24.4
0	10 (low)	2211.24	-53.9	-43.0	10.9
0	10 (low)	25789.83	-50.3	-43.0	7.3
1	10 (low)	982.99	-67.2	-43.0	24.2
1	10 (low)	1965.83	-54.5	-43.0	11.5
1	10 (low)	25785.94	-50.0	-43.0	7.0
0	10 (mid)	983.02	-67.0	-43.0	24.0
0	10 (mid)	2211.24	-53.4	-43.0	10.4
0	10 (mid)	25799.55	-50.2	-43.0	7.2
1	10 (mid)	983.04	-67.2	-43.0	24.2
1	10 (mid)	1965.83	-53.9	-43.0	10.9
1	10 (mid)	25796.96	-50.3	-43.0	7.3
0	10(high)	926.71	-67.2	-43.0	24.2
0	10(high)	2211.24	-52.9	-43.0	9.9
0	10(high)	25797.61	-50.1	-43.0	7.1
1	10(high)	908.35	-67.4	-43.0	24.4
1	10(high)	1965.83	-52.8	-43.0	9.8
1	10(high)	25796.96	-50.3	-43.0	7.3
0	20 (low)	983.04	-65.9	-43.0	22.9
0	20 (low)	1720.42	-56.1	-43.0	13.1
0	20 (low)	25798.90	-50.4	-43.0	7.4
1	20 (low)	983.02	-65.7	-43.0	22.7
1	20 (low)	2457.91	-54.9	-43.0	11.9
1	20 (low)	25793.07	-50.0	-43.0	7.0
0	20 (mid)	983.02	-66.1	-43.0	23.1
0	20 (mid)	1720.42	-56.3	-43.0	13.3
0	20 (mid)	25780.11	-50.3	-43.0	7.3
1	20 (mid)	983.02	-64.8	-43.0	21.8
1	20 (mid)	1965.83	-53.6	-43.0	10.6
1	20 (mid)	25798.90	-50.2	-43.0	7.2
0	20(high)	983.02	-66.1	-43.0	23.1
0	20(high)	1720.42	-54.8	-43.0	11.8
0	20(high)	25790.48	-50.0	-43.0	7.0
1	20(high)	983.02	-64.3	-43.0	21.3
1	20(high)	1965.83	-52.1	-43.0	9.1
1	20(high)	25785.94	-50.3	-43.0	7.3

Note: ¹Margin of SISO operation. For MIMO 2x2 operation 3 dB is subtracted from the limit in the table above. For this modulation results for sector 1 is only shown since other sector results are repetitive and further investigated to be well within limits

8.6 FCC 2.1055 Frequency stability

8.6.1 Definitions and limits

- (a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30°C to +50°C for all equipment except that specified in paragraphs (a)(2) and (3) of this section
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° C through the range.
(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

8.6.2 Test summary

Test date: August 22, 2019

8.6.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	≥ 1 % of emission bandwidth
Video bandwidth	≥ 3 × RBW
Frequency span	Wider than emission bandwidth
Detector mode	Peak

8.6.4 Test data

Table 8.6-1: Frequency drift measurement results

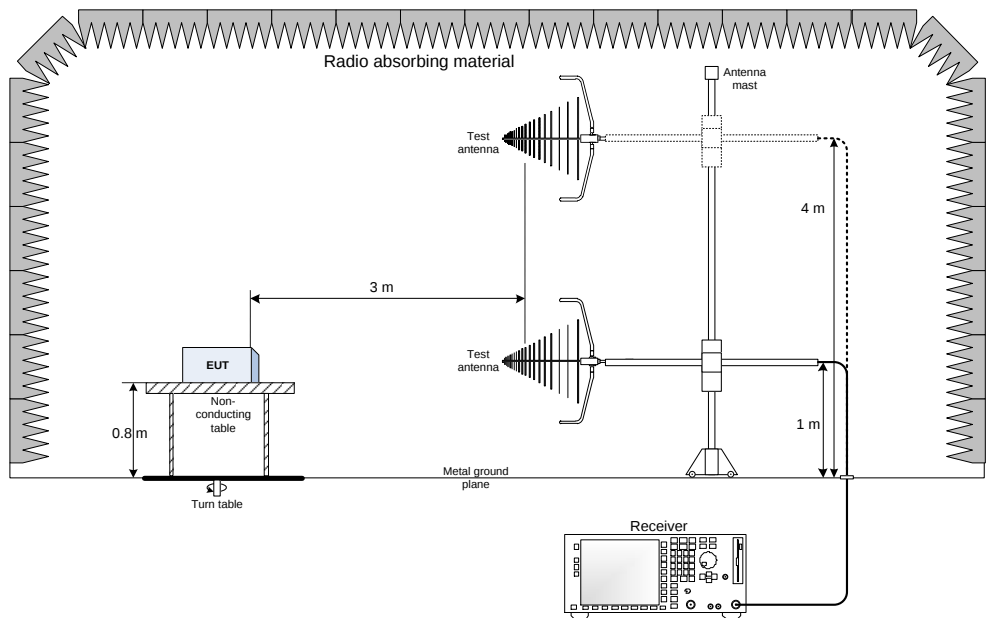
Test conditions	Frequency, Hz	Offset, ppm
+60 °C, Nominal	3624974419	-0.22
+50 °C, Nominal	3624974934	-0.08
+40 °C, Nominal	3624974393	-0.23
+30 °C, Nominal	3624974575	-0.18
+20 °C, +15 %	3624974746	-0.13
+20 °C, Nominal	3624975224	Reference
+20 °C, -15 %	3624974644	-0.16
+10 °C, Nominal	3624975789	0.16
0 °C, Nominal	3624974771	-0.12
-10 °C, Nominal	3624976467	0.34
-20 °C, Nominal	3624977150	0.53
-30 °C, Nominal	3624977458	0.62
-40 °C, Nominal	3624976314	0.30

Note: Offset was calculated as per the following formula:

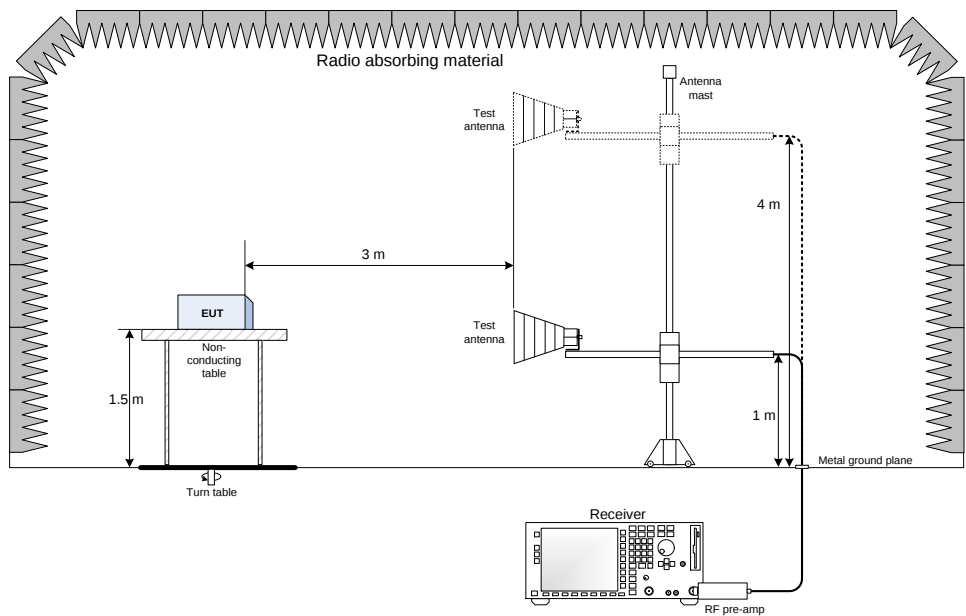
$$\frac{F_{\text{Measured}} - F_{\text{reference}}}{F_{\text{reference}}} \times 1 \cdot 10^6$$

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 Radiated emissions set-up for frequencies above 1 GHz



9.3 Conducted emissions set-up

