

TEST REPORT

Test report no.: 1-9991-25-01-02_TR1-R01



Deutsche
Akkreditierungsstelle
D-PL-12047-01-00

Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS).

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number:

D-PL-12047-01-00.

ISED Testing Laboratory Recognized Listing Number: DE0001

FCC designation number: DE0002

Applicant

WANDERCRAFT

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75004 Paris / FRANCE

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Manufacturer

WANDERCRAFT

88 RUE DE RIVOLI

75004 Paris / FRANCE

Test standard/s

FCC - Title 47 CFR Part 22 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

FCC - Title 47 CFR Part 24 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services

FCC - Title 47 CFR Part 27 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: **Powered Exoskeleton**
Model name: **Eve**
FCC ID: **2BPBM-EVE**
ISED certification number: **-/-**
Frequency: LTE bands 2, 4, 5, 12, 13, 71
Technology tested: LTE
Antenna: Integrated antenna
Power supply: 40.0 V to 58.8 V DC by battery
Temperature range: 0°C to +35°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:



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On behalf of
René Oelmann
Lab Manager
Radio Labs

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2025-06-16
Date of receipt of test item:	2025-10-07
Start of test:*	2025-10-07
End of test:*	2025-10-10
Person(s) present during the test:	Théo MARTIN

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

None

3 Test standard/s, references and accreditations

Test standard	Date	Description
FCC - Title 47 CFR Part 22		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services
FCC - Title 47 CFR Part 24		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
FCC - Title 47 CFR Part 27		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services
FCC - Title 47 CFR Part 90		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 90 - Private Land Mobile Radio Services

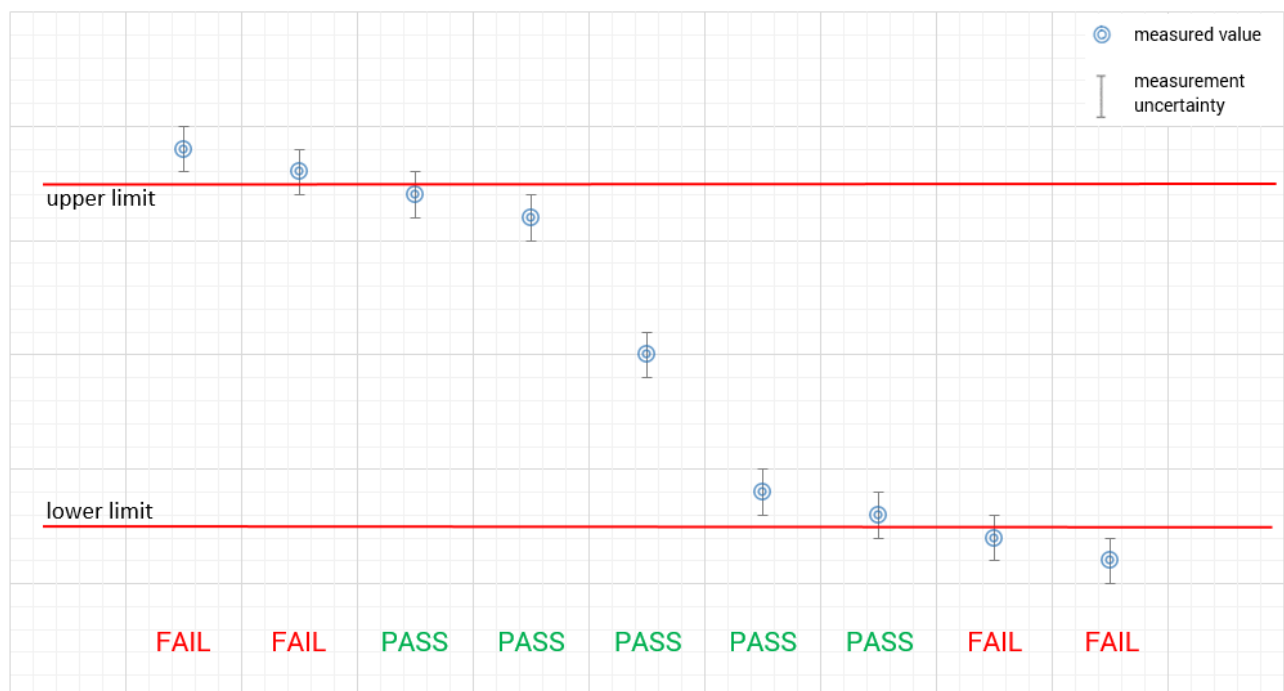
Guidance	Version	Description
ANSI C63.4a-2017	-/-	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.26-2015	-/-	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
Power Meas License Systems: KDB 971168 D01	v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."

measured value, measurement uncertainty, verdict



5 Test environment

Temperature :	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +35 °C during high temperature tests 0 °C during low temperature tests
Relative humidity content :		48 %
Barometric pressure :		1021 hpa
Power supply :	V_{nom} V_{max} V_{min}	51.8 V DC by battery 58.8 V 40.0 V

6 Test item

6.1 General description

Kind of test item :	Powered Exoskeleton
Model name :	Eve
HMN :	Eve
PMN :	Eve
HVIN :	DMR-PEP-HW3.0
FVIN :	eve-1.0-rc4
S/N serial number :	BDTRF_001
Hardware status :	DMR-PEP-HW3.0
Software status :	eve-1.0-rc4
Firmware status :	eve-1.0-rc4
Frequency band :	LTE bands 2, 4, 5, 12, 13, 71
Type of radio transmission :	OFDM
Use of frequency spectrum :	
Type of modulation :	QPSK, 16 – QAM
Antenna :	Integrated antenna
Power supply :	40.0 V to 58.8 V DC by battery
Temperature range :	0°C to +35°C

6.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report:

1-9991-25-01-01_TR1-A101-R01
1-9991-25-01-01_TR1-A102-R01
1-9991-25-01-01_TR1-A103-R01

7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

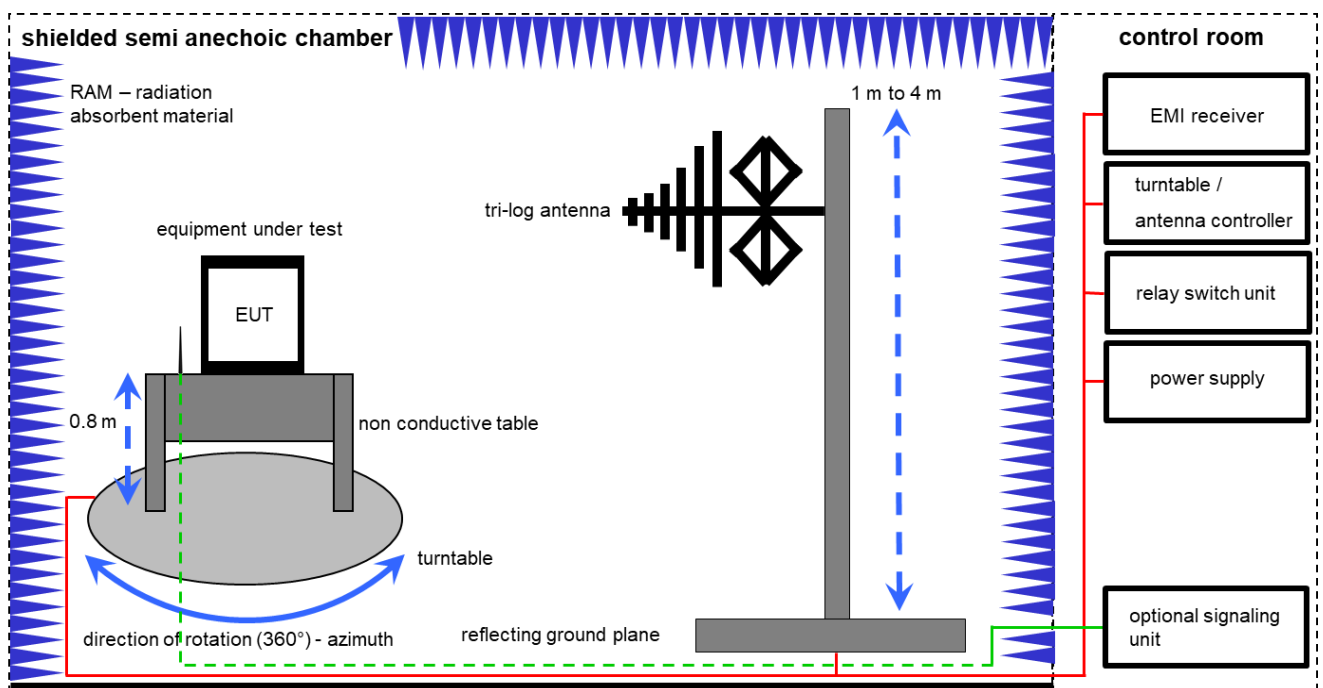
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

k/cal	calibration / calibrated	EK	limited calibration
Ne/cnn	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
Ev/chk	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlk!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress
cpu	check prior usage		

7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter
EMC32 software version: 10.59.00

FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

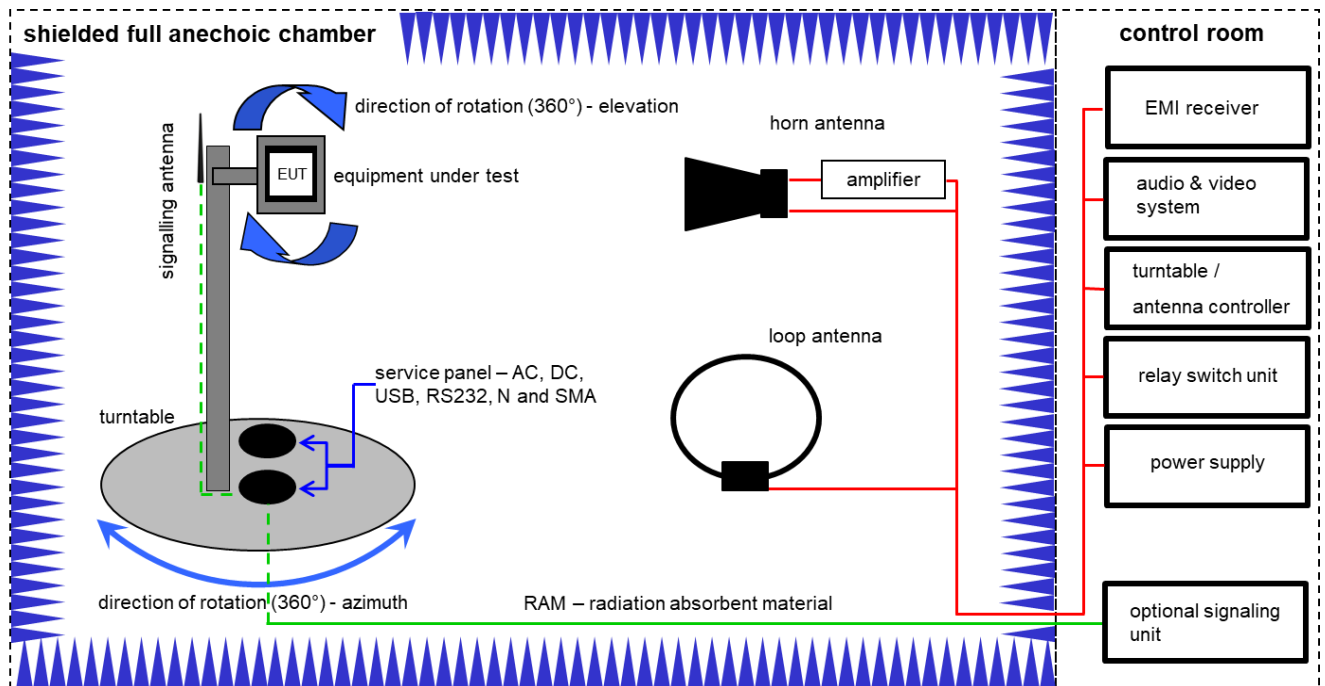
Example calculation:

FS [dB μ V/m] = 12.35 [dB μ V] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB μ V/m] (35.69 μ V/m) @ distance

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	Semi anechoic chamber	3000023	MWB AG	-/-	300000551	ne	-/-	-/-
3	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
4	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
5	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
6	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vIKI!	11.07.2024	11.07.2026
7	A	Turntable	2089-4.0	EMCO	-/-	300004394	ne	-/-	-/-
8	A	PC	TecLine	F+W	-/-	300004388	ne	-/-	-/-
9	A	EMI Test Receiver	ESR3	Rohde & Schwarz	102587	300005771	k	05.12.2024	05.12.2025
10	A	Wideband radio communication tester	Wideband radio communication tester CMW500	Rohde & Schwarz Messgerätebau GmbH / Memmingen	166977	40313	cal	13.12.2023	31.12.2025

7.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

$$OP = AV + D - G + CA$$

(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

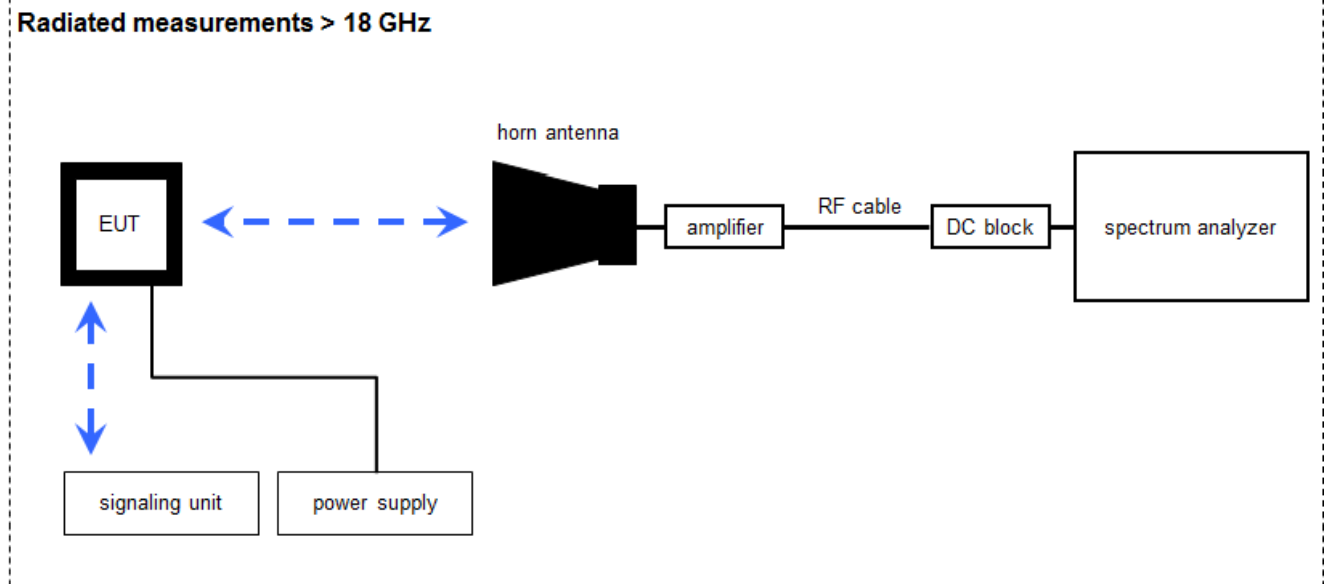
Example calculation:

$$OP \text{ [dBm]} = -39.0 \text{ [dBm]} + 57.0 \text{ [dB]} - 12.0 \text{ [dBi]} + (-36.0) \text{ [dB]} = -30 \text{ [dBm]} (1 \mu\text{W})$$

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Double-Ridged Waveguide Horn Antenna	Double-Ridged Waveguide Horn Antenna 3115	EMCO Elektronik GmbH / Gilching	8812-3088	40341	cal	10.10.2023	31.10.2025
2	A	Switch / Control Unit	Switch / Control Unit 3488A	Hewlett Packard	*	40350	cnn	-/-	-/-
3	A	Band Reject filter	Band Reject filter WRCG1850/1910-1835/1925-40/8SS	Wainwright Instruments GmbH / Andechs	7	40355	cpu	-/-	-/-
4	A	Highpass Filter	Highpass Filter WHK1.1/15G-10SS	Wainwright Instruments GmbH / Andechs	3	40361	cpu	-/-	-/-
5	A	Highpass Filter	Highpass Filter WHKX7.0/18G-8SS	Wainwright Instruments GmbH / Andechs	19	40365	cnn	-/-	-/-
6	A	High Pass Filter	High Pass Filter VHF-3500+	Mini-Circuits / Brooklyn	-/-	40369	cnn	-/-	-/-
7	A	Broadband Amplifier 0.5-18 GHz	Broadband Amplifier 0.5-18 GHz CBLU5184540	MEC Import: CERNEX	22049	40373	cpu	-/-	-/-
8	A	Power Supply	Power Supply HMP2020	Rohde & Schwarz Messgerätebau GmbH / Memmingen	120579	40408	cal	02.05.2023	31.05.2026
9	A	Active Loop Antenna	Active Loop Antenna 6502	EMCO Elektronik GmbH / Gilching	2210	50044	cal	07.07.2025	07.07.2027
10	A	EMI Test Receiver	EMI Test Receiver ESU26	Rohde & Schwarz Messgerätebau GmbH / Memmingen	100037	50254	cal	10.12.2024	10.12.2025
11	A	Wideband radio communication tester	Wideband radio communication tester CMW500	Rohde & Schwarz Messgerätebau GmbH / Memmingen	166977	40313	cal	13.12.2023	31.12.2025

7.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

FS = UR + CA + AF

(FS-field strength; UR-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

Example calculation:

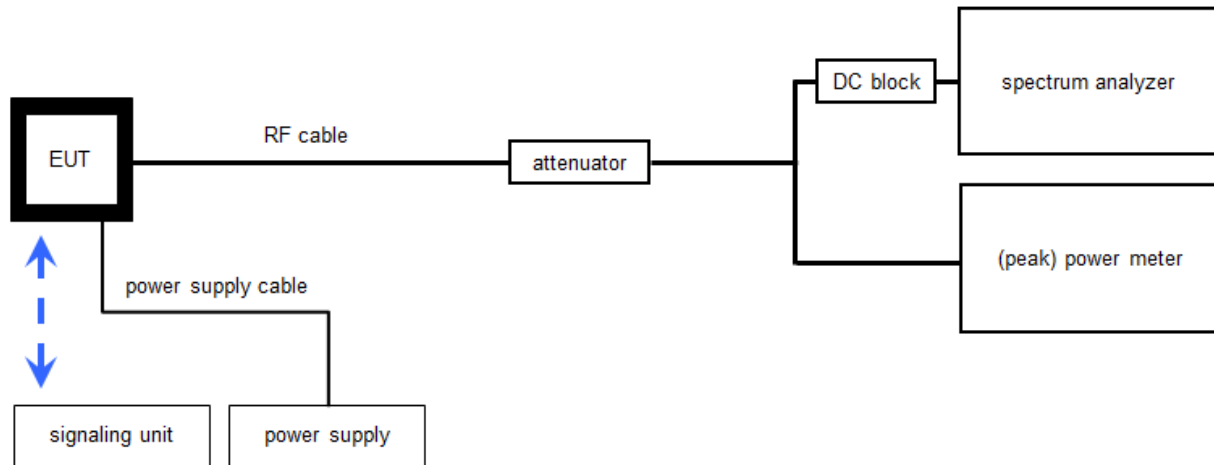
FS [dBμV/m] = 40.0 [dBμV] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBμV/m] (6.79 μV/m) @ distance

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev	-/-	-/-
2	A	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda	8205	300002442	k	24.01.2024	23.01.2026
3	A	Signal analyzer	FSV40	Rohde&Schwarz	101042	300004517	k	09.12.2024	09.12.2025
4	A	RF-Cable	ST18/SMAM/SMAM/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
5	A	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
6	A	Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273	ev	-/-	-/-
7	A	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	82-16	300000510	vKI!	24.01.2024	23.01.2026
8	A	Wideband radio communication tester	Wideband radio communication tester CMW500	Rohde & Schwarz Messgerätebau GmbH / Memmingen	166977	40313	cal	13.12.2023	31.12.2025

7.4 Conducted measurements with peak power meter & spectrum analyzer

Conducted measurements normal conditions



WLAN tester version: 1.1.13; LabView2015

OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:

OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Signal analyzer	Signal analyzer FSV40	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101042	40292	cal	09.12.2024	09.12.2025
2	A	DC Power Supply	DC Power Supply HMP2020	Rohde & Schwarz Messgerätebau GmbH / Memmingen	102850 / 101699	40306	cal	07.12.2023	31.12.2025
3	A	Relais Matrix	Switch Matrix USM	cetecom advanced GmbH / Saarbrücken	C001	40340	cnn	-/-	-/-
4	A	RF-Cable	RF-Cable ST18/SMAM/SMAM /60	Huber & Suhner GmbH / Unterhaching	Batch no. 606844	40386	cpu	-/-	-/-
5	A	DC-Blocker 0.1-40 GHz	DC-Blocker 0.1-40 GHz 8141A	MEC Import: Inmet		40390	cpu	-/-	-/-
6	A	Wideband radio communication tester	Wideband radio communication tester CMW500	Rohde & Schwarz Messgerätebau GmbH / Memmingen	166977	40313	cal	13.12.2023	31.12.2025

8 Sequence of testing

8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, it is placed on a table with 0.8 m height.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement*

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

*)Note: The sequence will be repeated three times with different EUT orientations.

8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position $\pm 45^\circ$ and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.4 Sequence of testing radiated spurious above 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

9 Measurement uncertainty

Measurement uncertainty		
Test case	Uncertainty	
Antenna gain	± 3 dB	
99 % bandwidth	$\pm$ RBW	
-26 dB bandwidth	$\pm$ RBW	
Frequency stability	10^{-6}	
Maximum output power conducted	± 1.56 dB	
Block edge compliance	± 1.56 dB	
Spurious emissions conducted	> 3.6 GHz	± 1.56 dB
	> 7 GHz	± 1.56 dB
	> 18 GHz	± 2.31 dB
	≥ 40 GHz	± 2.97 dB
Spurious emissions radiated below 30 MHz	± 3 dB	
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB	
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB	
Spurious emissions radiated above 12.75 GHz	± 4.5 dB	

10 Additional information and comments

Reference documents: 1005460F0; antenna data sheet Part No. 1005460F0

Special test descriptions: None

Configuration descriptions: None

EUT selection:

- ☒ Only one device available
- ☐ Devices selected by the customer
- ☐ Devices selected by the laboratory (Randomly)

11 Summary of measurement results

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC: CFR Part 2 & Part 22	See table!	2025-10-30	-/-

11.1 Part 22: LTE band 5

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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12 RF measurements

12.1 Description of test setup

For the spurious measurements, we use the substitution method according TIA/EIA 603.

12.2 Results LTE band 5

The EUT was set to transmit the maximum power.

12.2.1 RF output power

Description:

This paragraph contains conducted average power, ERP and Peak-to-Average Power Ratio measurements for the mobile station.

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.1 setup A & 7.4 setup A
Measurement uncertainty:	see chapter 9
Measurement procedure:	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
§ 22.913(a)(5) & (d)	RSS-132, 5.4
(a)(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 W. (d) The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.	The EIRP power for mobile equipment shall not exceed 11.5 W. The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB [...].
Power: 38.45 dBm ERP PAPR: 13 dB	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
1.4	824.7	1 RB low	22.2	4.2	21.5	5.0
		1 RB high	21.8	4.0	21.5	4.8
		50% RB mid	22.3	4.1	21.0	5.0
		100% RB	20.9	4.8	19.9	5.7
	836.5	1 RB low	21.4	4.9	20.6	5.7
		1 RB high	21.4	4.8	20.6	5.6
		50% RB mid	21.8	5.0	20.6	5.7
		100% RB	20.4	5.4	19.4	6.3
	848.3	1 RB low	21.9	4.0	21.2	4.9
		1 RB high	22.1	3.3	21.2	4.3
		50% RB mid	22.1	3.9	21.2	4.8
		100% RB	21.1	4.6	20.2	5.5
3	825.5	1 RB low	21.9	4.0	21.0	4.9
		1 RB high	21.8	3.6	21.0	4.5
		50% RB mid	20.9	4.6	20.0	5.5
		100% RB	21.0	4.6	19.9	5.6
	836.5	1 RB low	21.6	4.8	20.7	5.7
		1 RB high	21.7	4.6	20.9	5.4
		50% RB mid	20.6	5.3	19.6	6.2
		100% RB	20.6	5.4	19.7	6.2
	847.5	1 RB low	22.0	4.1	21.3	4.9
		1 RB high	22.1	3.3	21.3	4.2
		50% RB mid	21.1	4.9	20.2	5.7
		100% RB	21.2	4.8	20.1	5.7
5	826.5	1 RB low	21.7	4.0	20.9	4.8
		1 RB high	22.0	3.5	21.0	4.4
		50% RB mid	20.9	4.5	20.0	5.3
		100% RB	20.9	4.6	19.9	5.5
	836.5	1 RB low	21.6	4.7	20.7	5.5
		1 RB high	21.9	4.5	21.1	5.3
		50% RB mid	20.8	5.3	19.8	6.1
		100% RB	20.7	5.4	19.8	6.2
	846.5	1 RB low	21.9	3.6	21.2	4.4
		1 RB high	22.3	3.9	21.5	4.6
		50% RB mid	21.1	4.9	20.2	5.7
		100% RB	21.1	4.9	20.1	5.7

10	829	1 RB low	21.7	3.9	20.8	4.8
		1 RB high	21.6	4.5	20.8	5.3
		50% RB mid	21.0	4.4	20.0	5.3
		100% RB	20.9	4.8	19.9	5.6
	836.5	1 RB low	22.2	4.2	20.8	5.0
		1 RB high	21.8	3.7	20.9	4.6
		50% RB mid	21.5	5.2	20.6	6.1
		100% RB	21.4	5.1	20.4	6.0
	844	1 RB low	22.5	4.0	21.7	4.8
		1 RB high	22.7	3.6	21.9	4.6
		50% RB mid	21.9	4.5	21.0	5.4
		100% RB	21.8	5.0	20.8	5.8

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
1.4	824.7	25.8	24.9
	836.5	25.2	24.0
	848.3	25.6	24.6
3	825.5	25.4	24.5
	836.5	25.1	24.3
	847.5	25.7	24.9
5	826.5	25.4	24.5
	836.5	25.3	24.5
	846.5	25.7	24.9
10	829.0	25.1	24.3
	836.5	25.6	24.5
	844.0	26.3	25.4

12.2.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 844 MHz. Measurement made up to 9 GHz. The resolution bandwidth is set as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to lowest, middle and highest channels of the LTE band V.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 s
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.1 setup A & 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure:	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

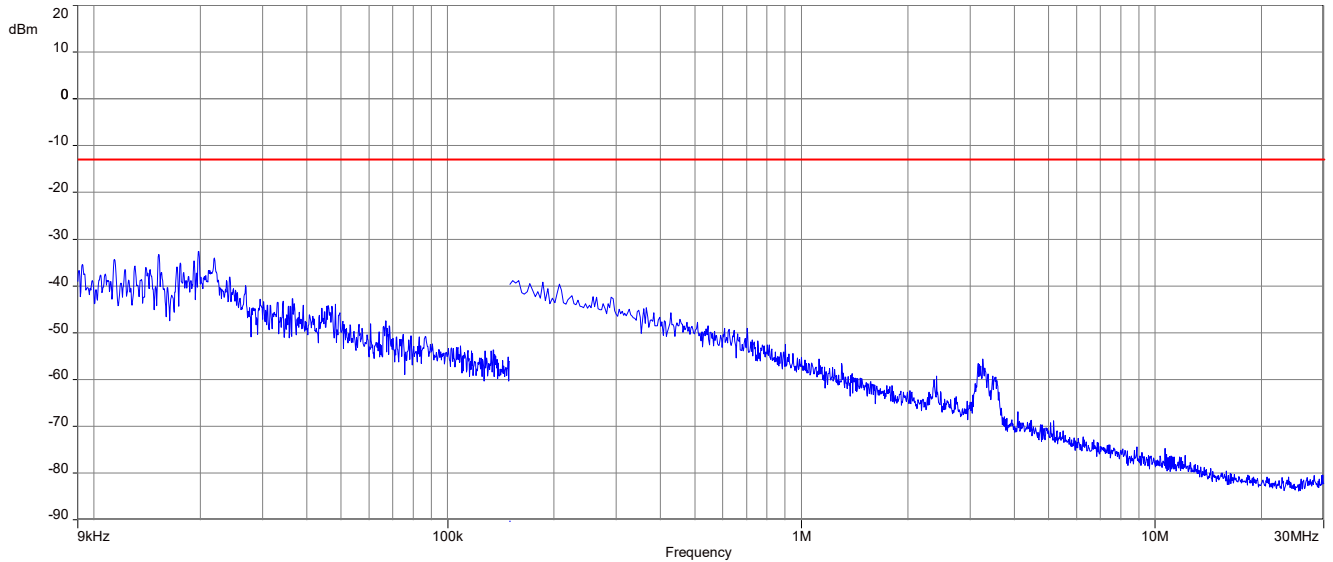
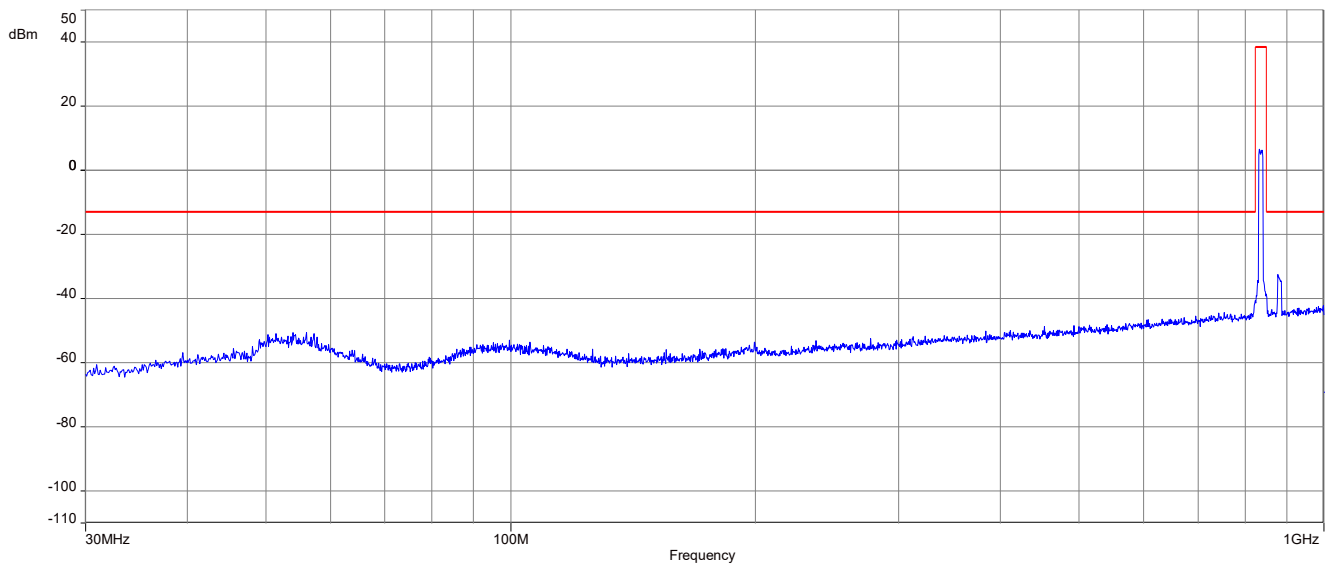
FCC	ISED
§ 22.917(a) & (b)	RSS-132, 5.5
(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. (b)(1) In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a RBW of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz 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. (b)(2) In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.	i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10}(P)$ (watts). ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10}(P)$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.
-13 dBm	

Results:**QPSK:**

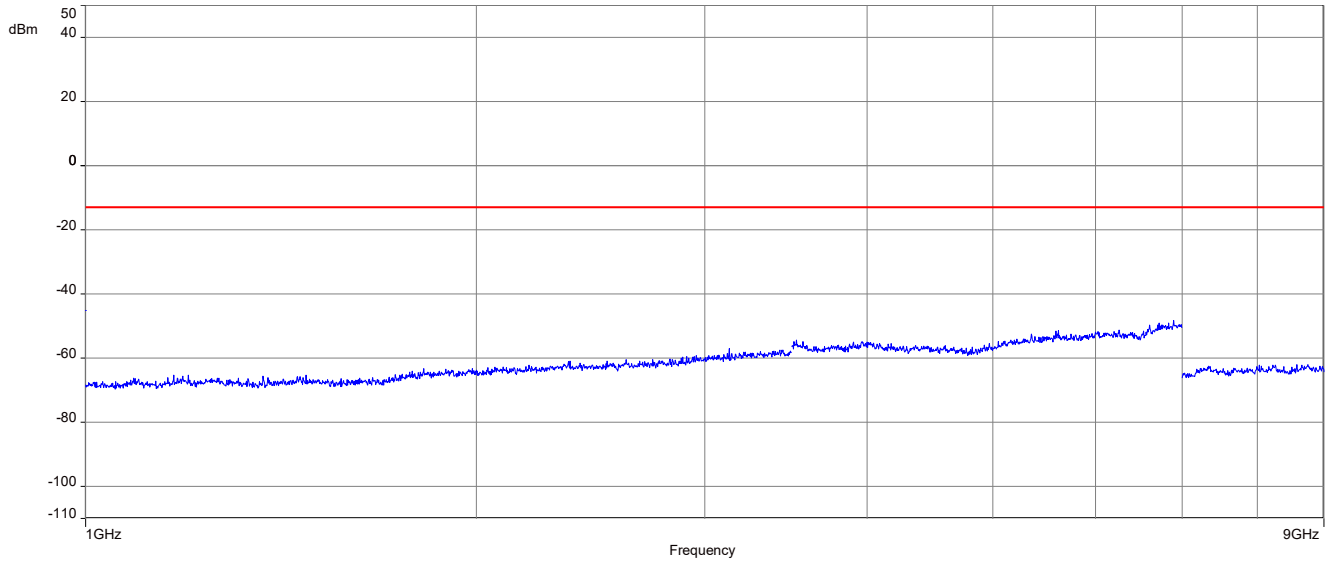
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

16-QAM:

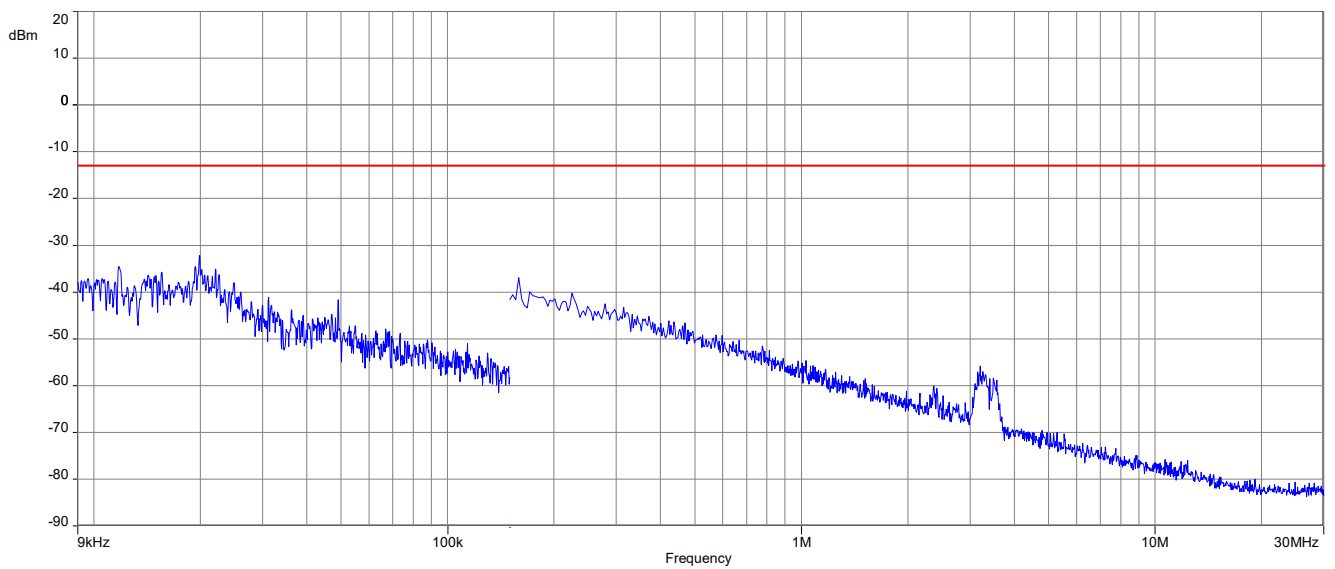
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

Plots DUT horizontal:**Plot 1:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 2:** QPSK - Middle channel (30 MHz – 1 GHz)

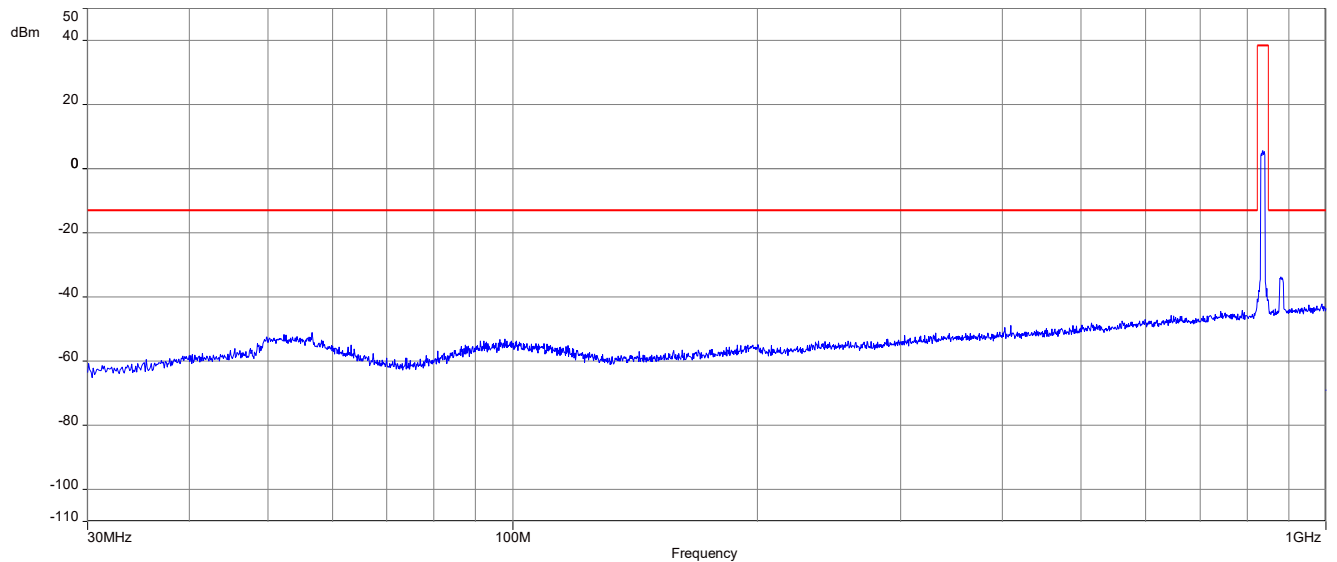
Plot 3: QPSK - Middle channel (1 GHz – 9 GHz)



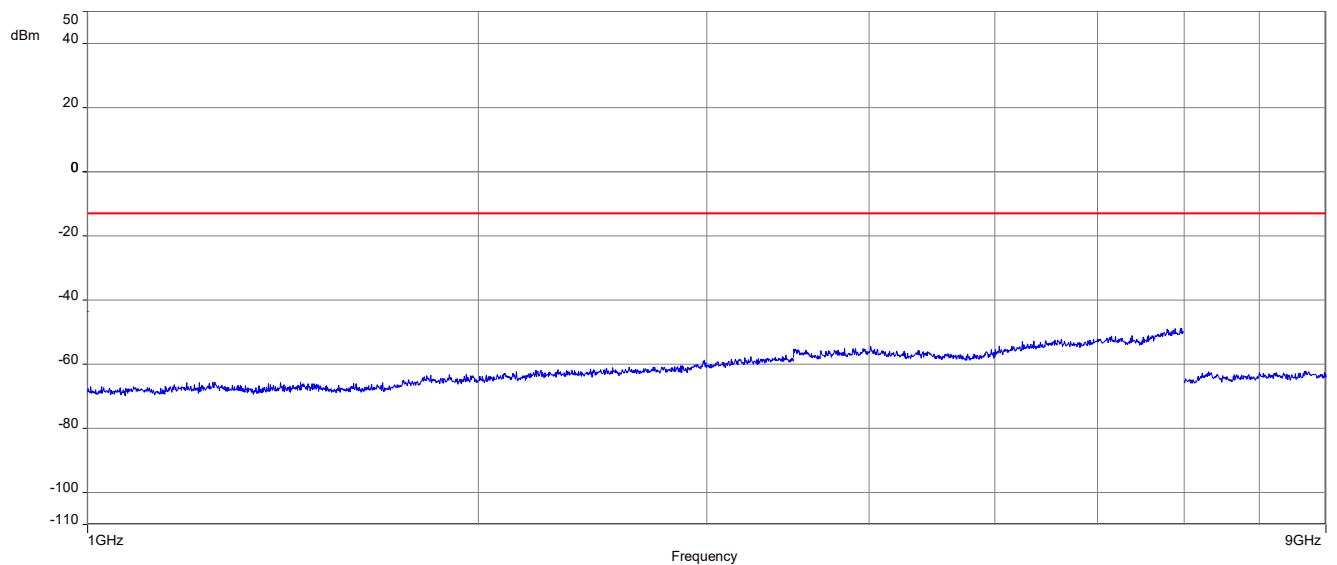
Plot 4: 16-QAM - Middle channel (9 kHz - 30 MHz)

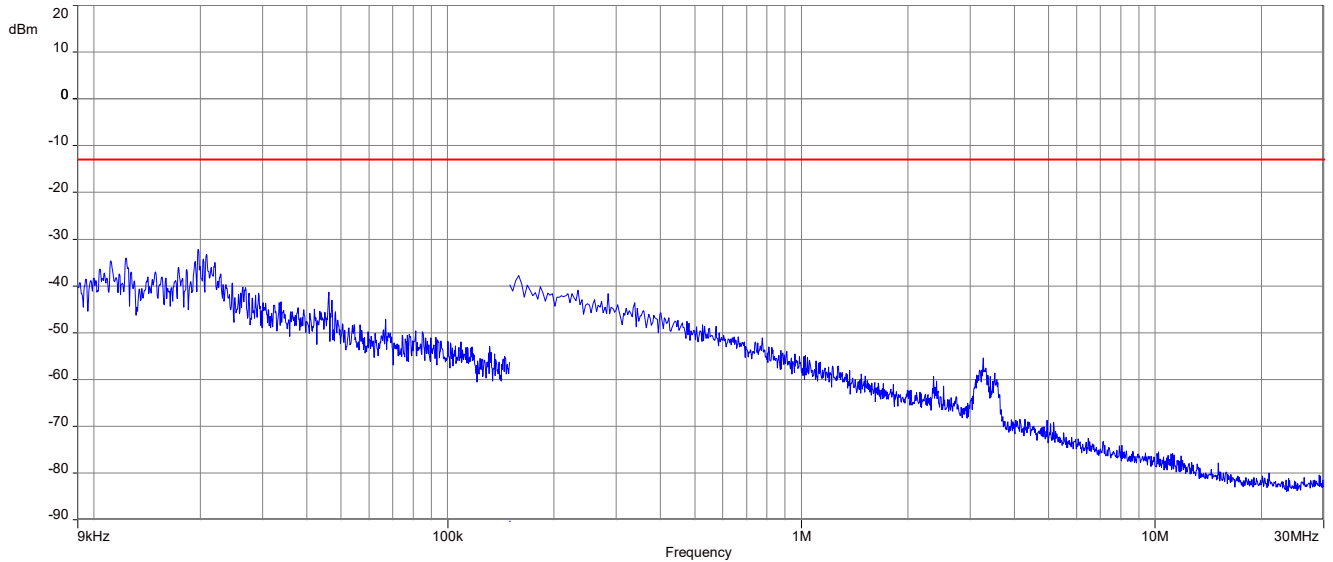
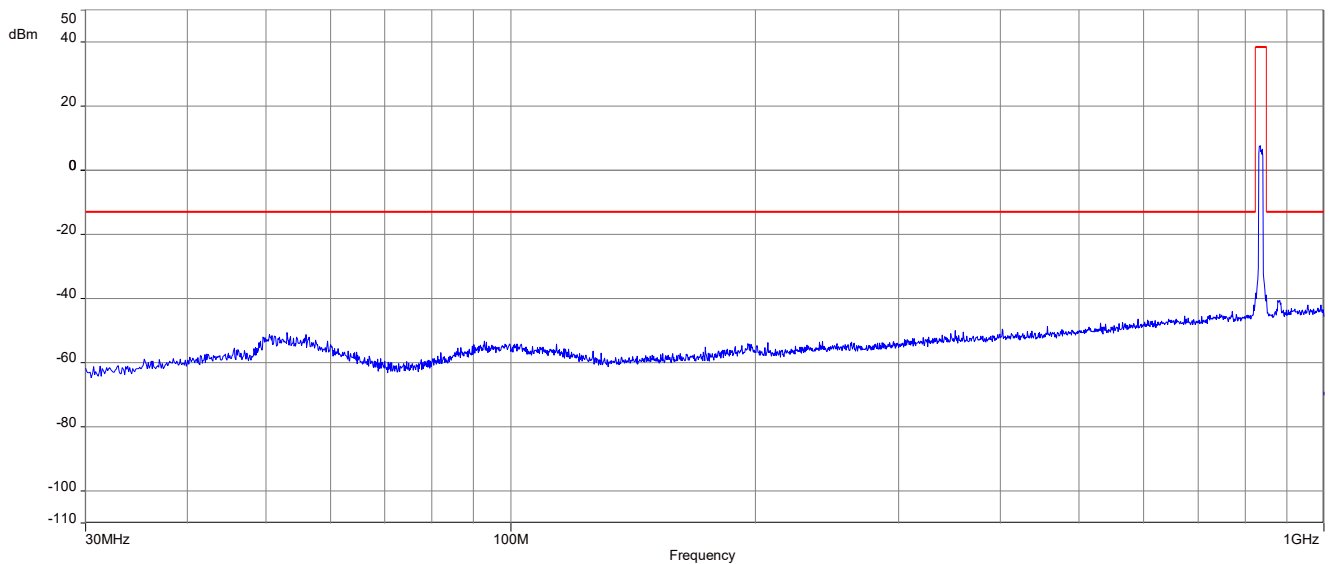


Plot 5: 16-QAM - Middle channel (30 MHz – 1 GHz)

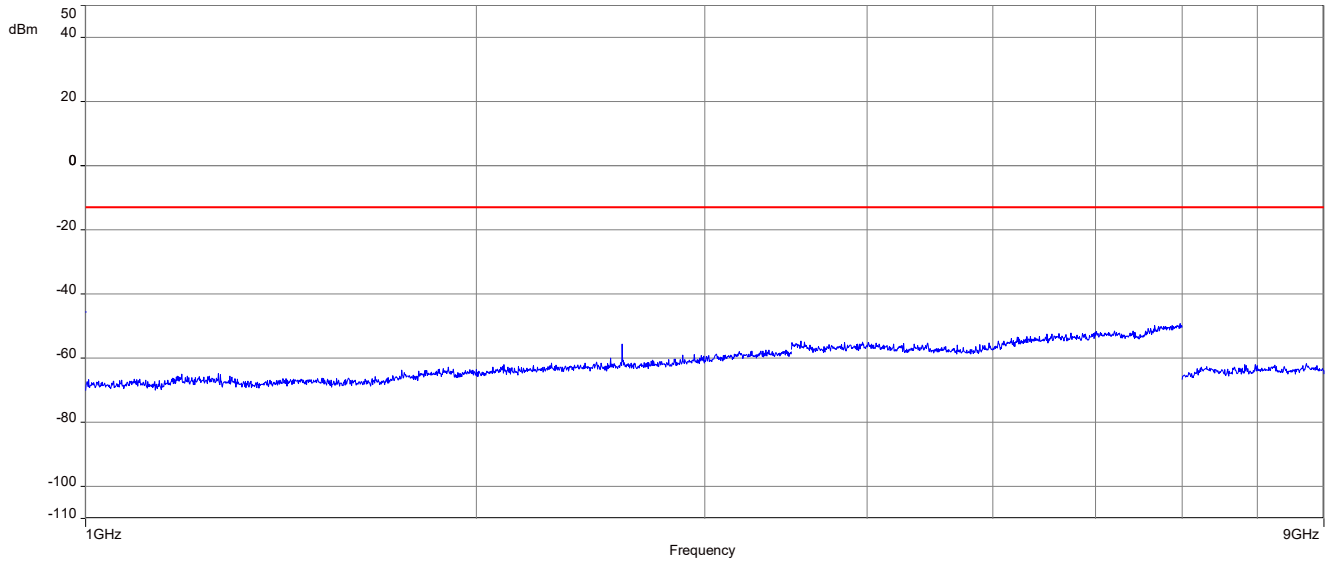


Plot 6: 16-QAM - Middle channel (1 GHz – 9 GHz)

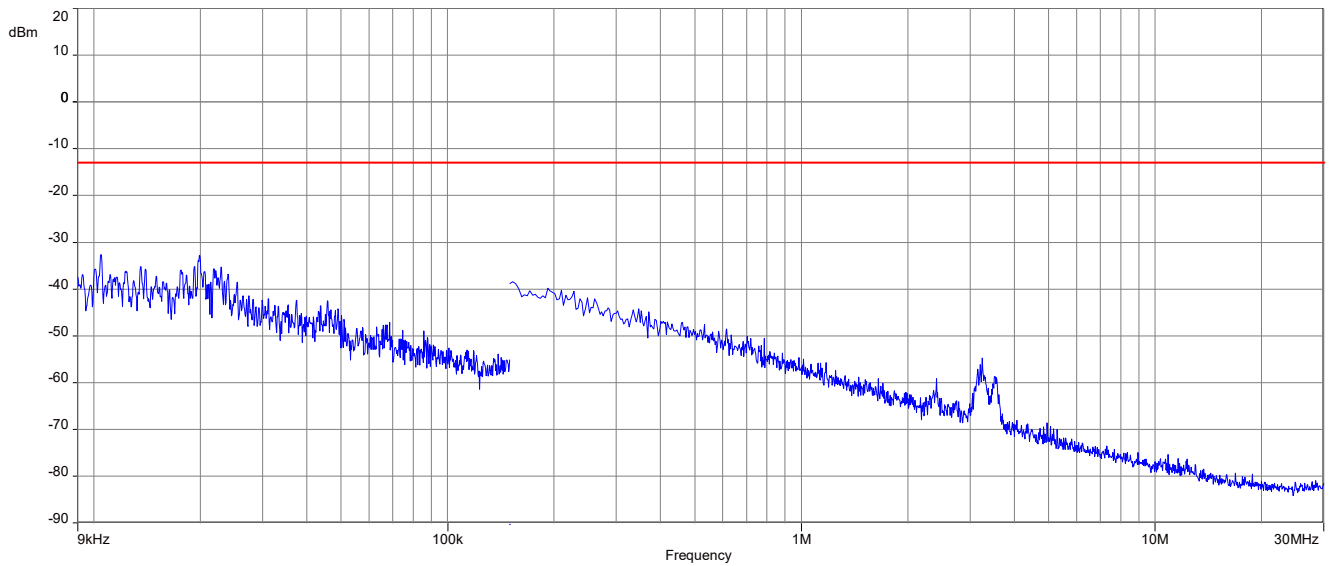


Plots DUT vertical:**Plot 7:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 8:** QPSK - Middle channel (30 MHz – 1 GHz)

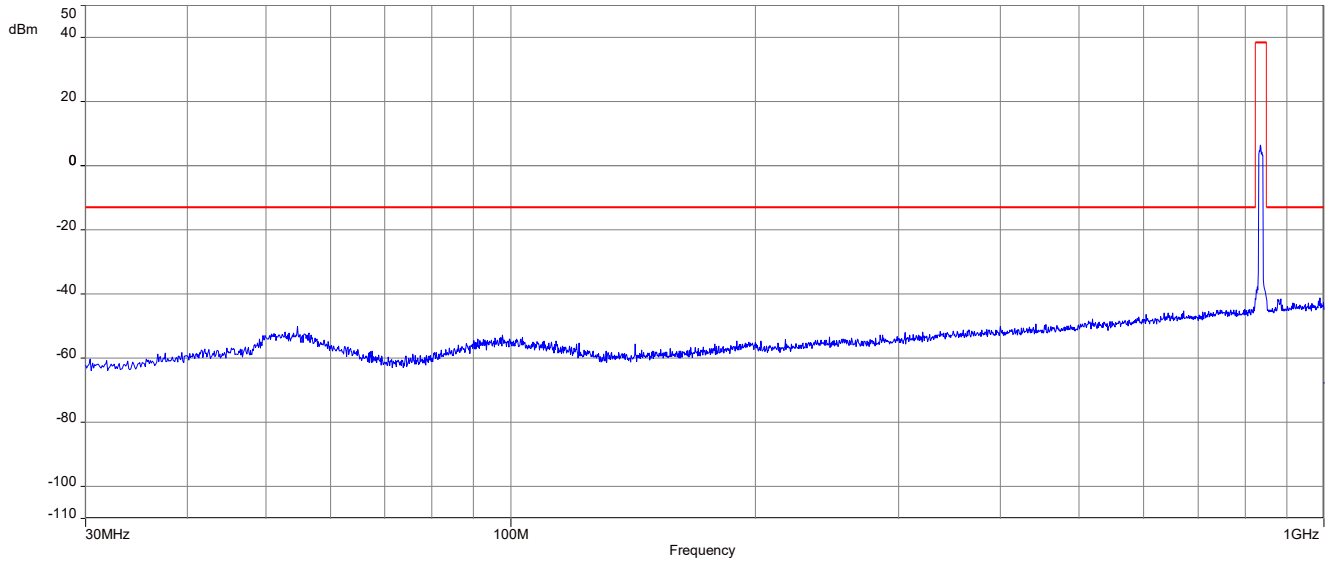
Plot 9: QPSK - Middle channel (1 GHz – 9 GHz)



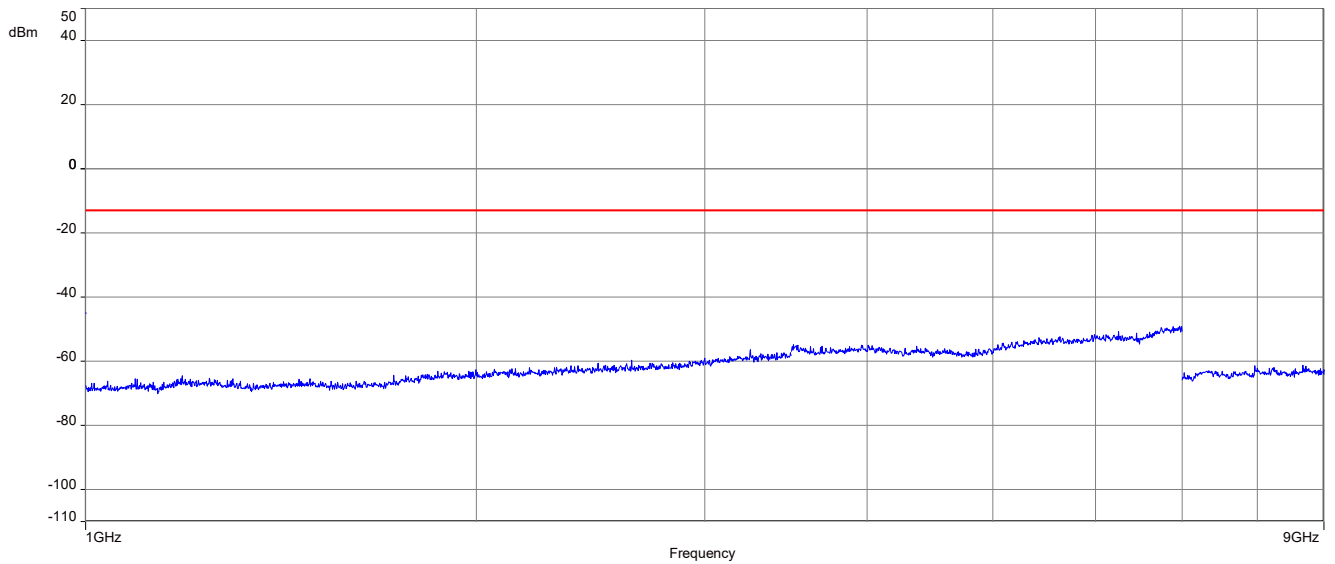
Plot 10: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 11: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 12: 16-QAM - Middle channel (1 GHz – 9 GHz)



13 Summary of measurement results

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC: CFR Part 2 & Part 24	See table!	2025-10-30	-/-

13.1 Part 24: LTE band 2

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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14 RF measurements

14.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

14.2 Results LTE band 2

The EUT was set to transmit the maximum power.

14.2.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.2 setup C & 7.4 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure:	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
\$ 24.232(c)	RSS-133, 6.4 (referring to: SRSP-510, Issue 5)
(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications. (d) In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	SRSP-510, 5.1: Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. RSS-133, 6.4: In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.
Power: 33 dBm EIRP PAPR: 13 dB	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
1.4	1850.7	1 RB low	21.8	4.5	21.2	5.3
		1 RB high	22.0	4.5	21.2	5.3
		50% RB mid	22.1	4.5	21.1	5.2
		100% RB	20.8	5.1	19.8	6.1
	1880.0	1 RB low	21.4	4.3	20.5	5.1
		1 RB high	21.4	4.4	20.7	5.2
		50% RB mid	21.5	4.4	20.7	5.2
		100% RB	20.6	5.1	19.6	6.0
	1909.3	1 RB low	21.0	4.6	20.2	5.4
		1 RB high	21.2	4.8	20.4	5.5
		50% RB mid	21.3	4.7	20.3	5.6
		100% RB	20.2	5.3	19.2	6.2
3	1851.5	1 RB low	21.8	4.4	21.1	5.2
		1 RB high	22.0	4.3	21.1	5.1
		50% RB mid	21.0	5.0	20.1	5.9
		100% RB	21.1	5.0	20.1	6.0
	1880.0	1 RB low	21.6	4.1	20.7	5.0
		1 RB high	21.7	4.4	20.9	5.2
		50% RB mid	20.8	4.9	19.8	5.9
		100% RB	20.8	5.0	19.9	5.9
	1908.5	1 RB low	21.5	4.1	20.6	5.0
		1 RB high	21.6	4.6	20.7	5.5
		50% RB mid	20.5	5.0	19.6	5.9
		100% RB	20.4	5.3	19.5	6.1
5	1852.5	1 RB low	22.1	4.3	21.4	5.1
		1 RB high	22.4	4.2	21.7	4.9
		50% RB mid	21.2	5.0	20.3	5.8
		100% RB	21.2	5.0	20.3	5.9
	1880.0	1 RB low	21.8	3.9	21.0	4.8
		1 RB high	22.0	4.3	21.3	5.1
		50% RB mid	20.9	4.9	19.9	5.7
		100% RB	20.8	5.0	19.9	5.8
	1907.5	1 RB low	21.4	3.7	20.6	4.6
		1 RB high	21.6	4.4	21.0	5.1
		50% RB mid	20.5	4.9	19.5	5.8
		100% RB	20.4	5.0	19.5	5.8

10	1855	1 RB low	22.0	4.3	21.3	5.1
		1 RB high	22.1	4.7	21.3	5.5
		50% RB mid	21.2	5.0	20.3	5.9
		100% RB	21.2	5.1	20.3	5.9
	1880	1 RB low	21.7	3.9	20.8	4.7
		1 RB high	21.9	4.7	21.0	5.5
		50% RB mid	20.9	4.9	19.9	5.8
		100% RB	20.9	5.0	19.9	5.9
	1905	1 RB low	21.4	4.0	20.5	4.8
		1 RB high	21.4	4.6	20.6	5.4
		50% RB mid	20.5	4.6	19.6	5.5
		100% RB	20.5	4.9	19.5	5.7
15	1857.5	1 RB low	21.8	4.3	21.2	5.0
		1 RB high	21.8	4.9	21.1	5.7
		50% RB mid	21.3	5.1	20.3	6.0
		100% RB	21.1	5.4	20.2	6.1
	1880.0	1 RB low	21.4	3.9	20.7	4.8
		1 RB high	21.7	4.8	20.9	5.6
		50% RB mid	21.0	4.8	20.0	5.8
		100% RB	20.8	5.1	19.8	5.9
	1902.5	1 RB low	21.2	4.6	20.5	5.5
		1 RB high	21.3	4.5	20.5	5.4
		50% RB mid	20.7	4.5	19.7	5.5
		100% RB	20.6	5.1	19.6	5.9
20	1860	1 RB low	21.4	4.3	20.9	5.0
		1 RB high	21.5	4.4	20.9	5.2
		50% RB mid	21.2	5.3	20.3	6.1
		100% RB	20.9	5.3	20.0	6.1
	1880	1 RB low	21.0	4.2	20.4	4.9
		1 RB high	21.6	4.8	20.9	5.5
		50% RB mid	20.9	4.9	20.0	5.8
		100% RB	20.7	5.1	19.8	5.9
	1900	1 RB low	20.9	4.8	20.3	5.6
		1 RB high	21.2	4.5	20.4	5.3
		50% RB mid	20.7	4.8	19.8	5.7
		100% RB	20.5	5.1	19.5	6.0

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
1.4	1850.7	26.1	25.3
	1880.0	25.6	24.7
	1909.3	25.3	24.4
3	1851.5	26.1	25.3
	1880.0	25.8	25.0
	1908.5	25.6	24.9
5	1852.5	26.4	25.7
	1880.0	26.0	25.3
	1907.5	25.6	25.0
10	1855.0	26.2	25.5
	1880.0	25.9	25.1
	1905.0	25.6	24.8
15	1857.5	26.3	25.5
	1880.0	26.0	25.1
	1902.5	25.7	24.8
20	1860.0	26.3	25.3
	1880.0	26.0	25.3
	1900.0	25.8	25.1

14.2.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, middle and highest channels of the LTE band II.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.1 setup A & 7.2 setup B
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

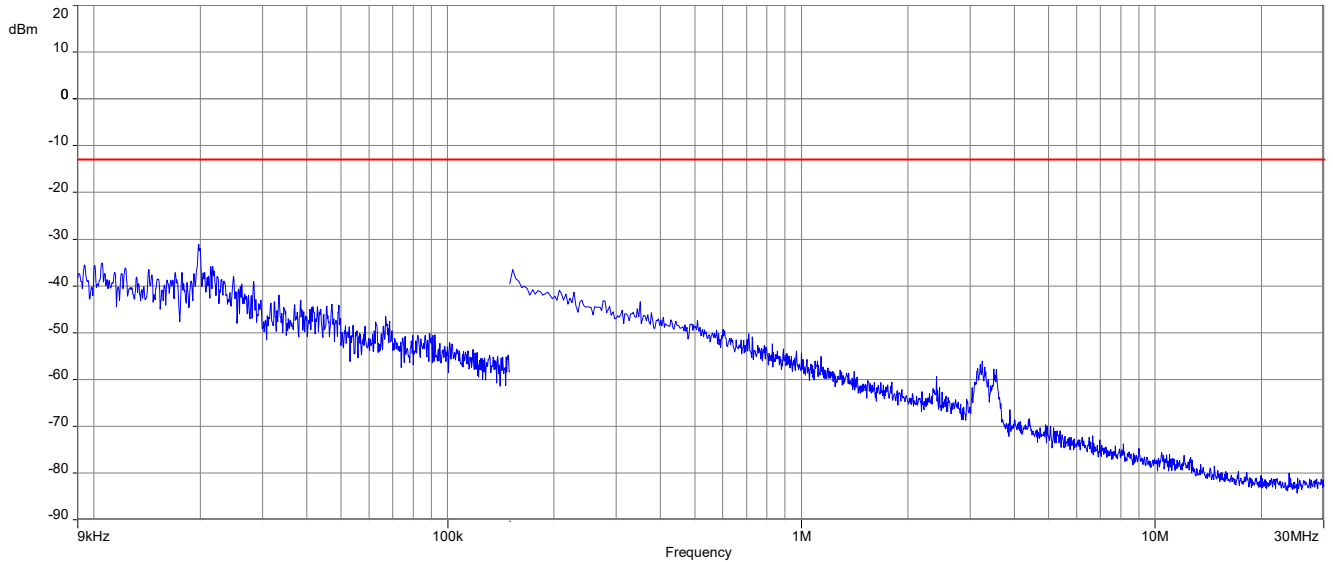
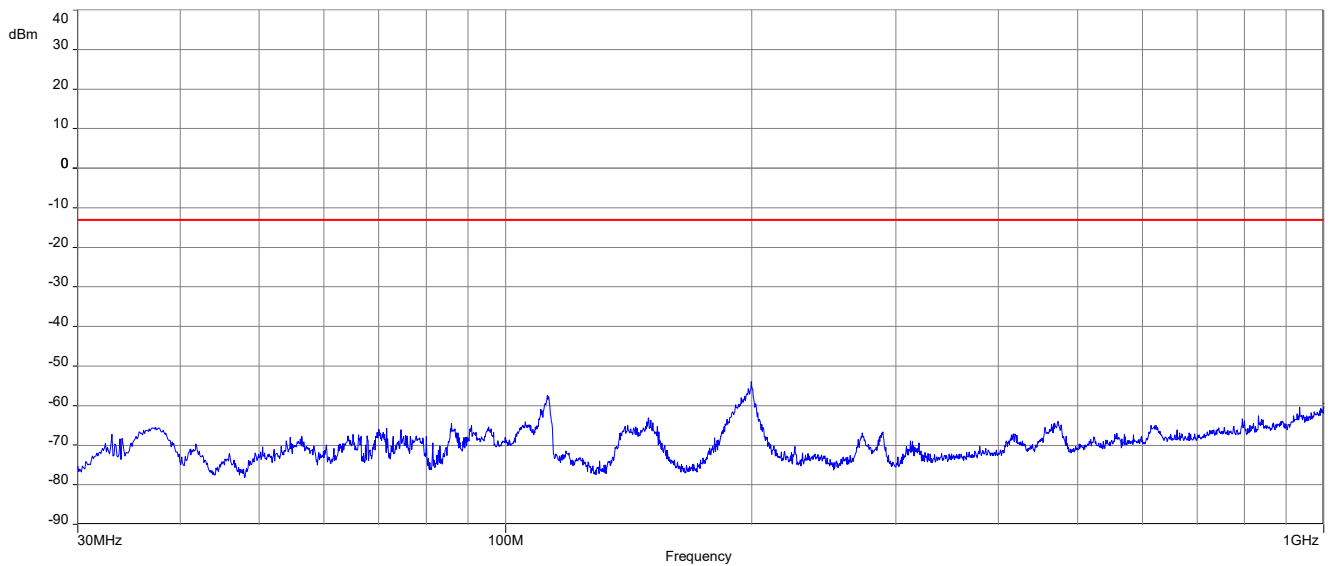
FCC	ISED
§ 24.238 (a) & (b)	RSS-133, 6.5
(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. (b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter 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 required measurement 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.	In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log(P)$ (watts). After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log(P)$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.
-13 dBm	

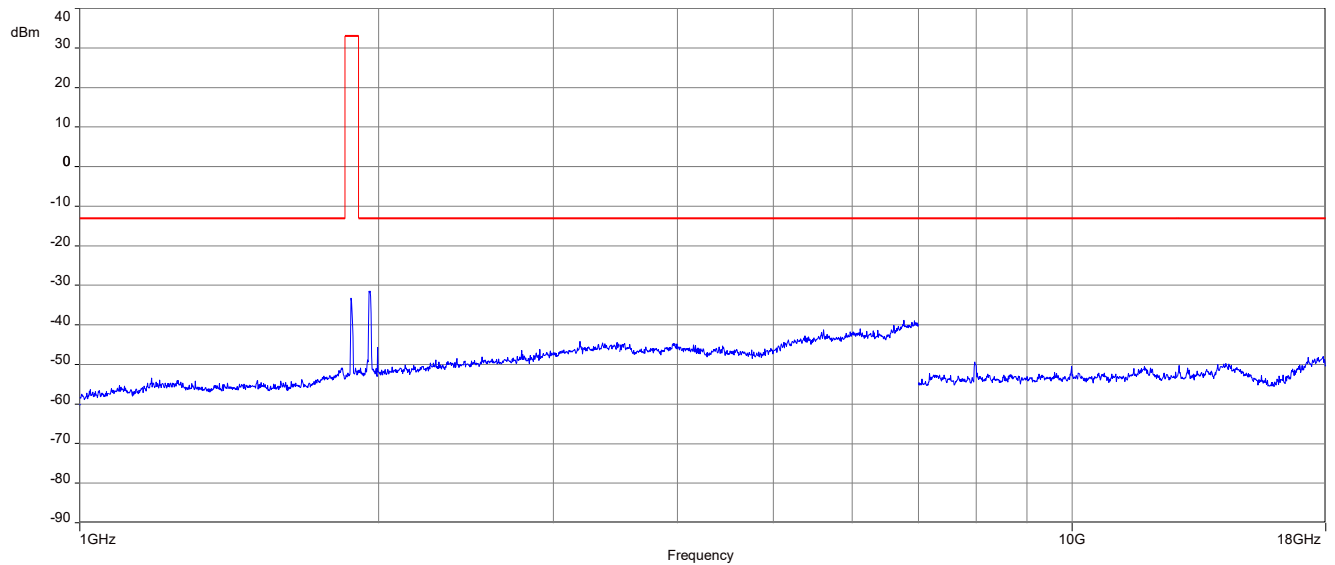
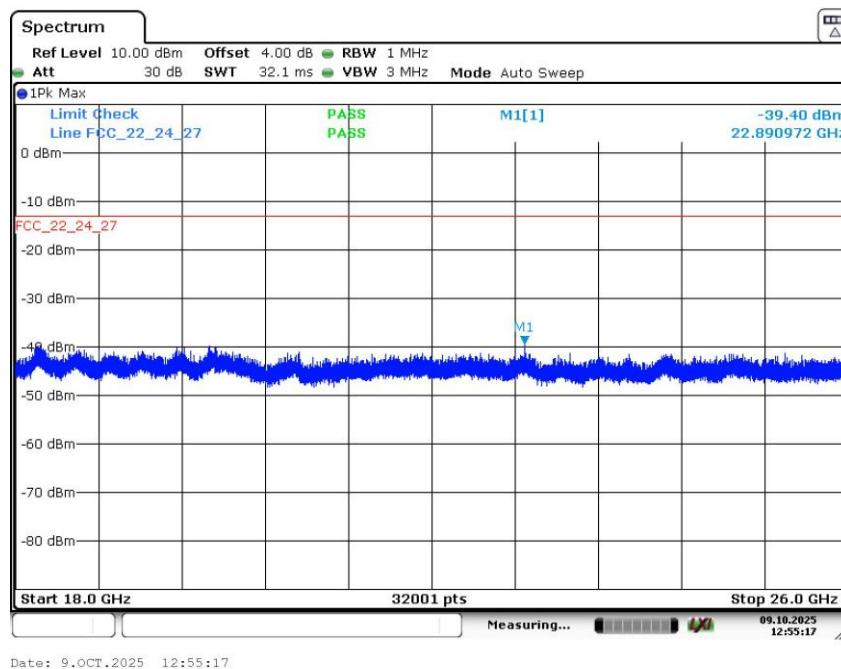
Results:**QPSK:**

SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

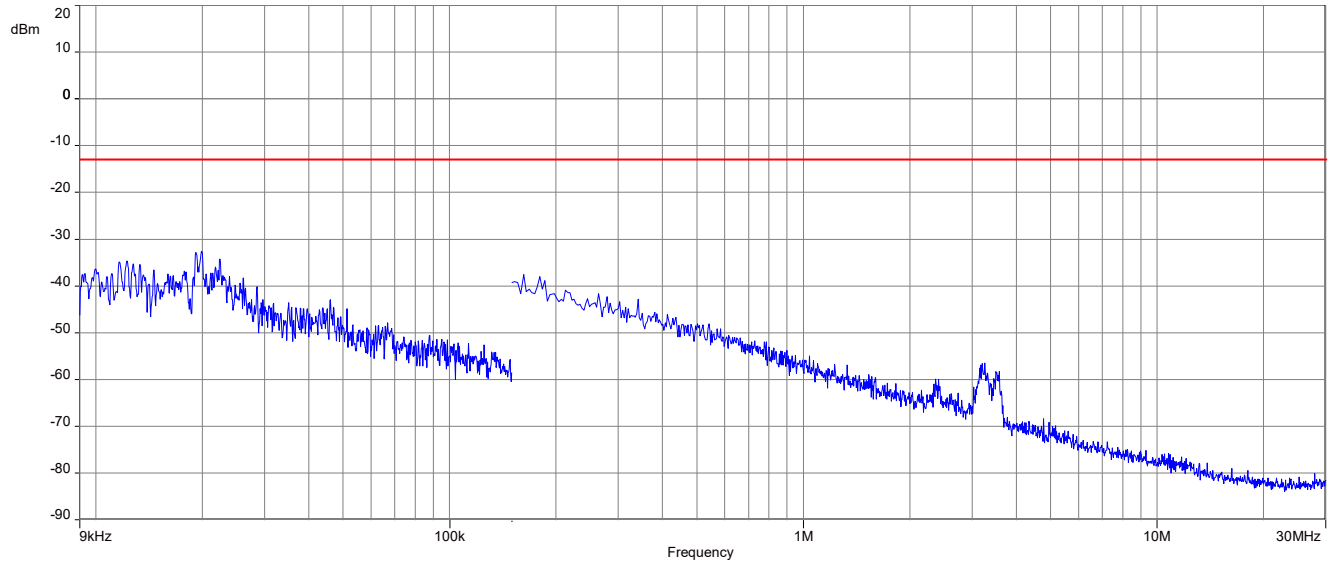
16-QAM:

SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

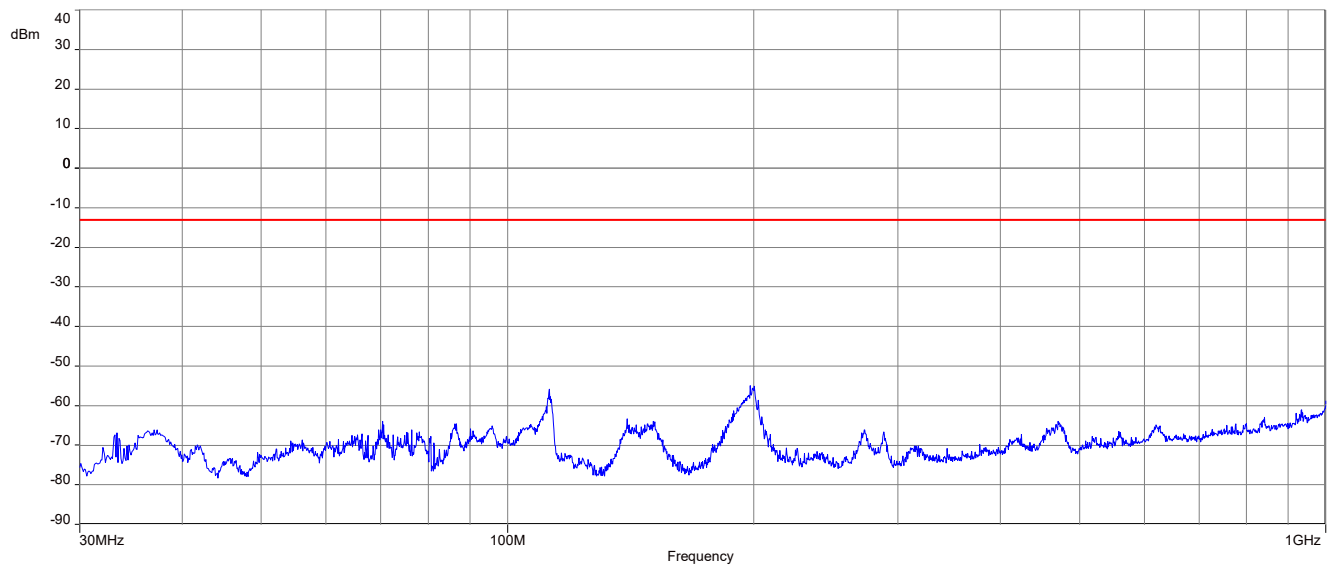
Plots DUT horizontal:**Plot 1:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 2:** QPSK - Middle channel (30 MHz – 1 GHz)

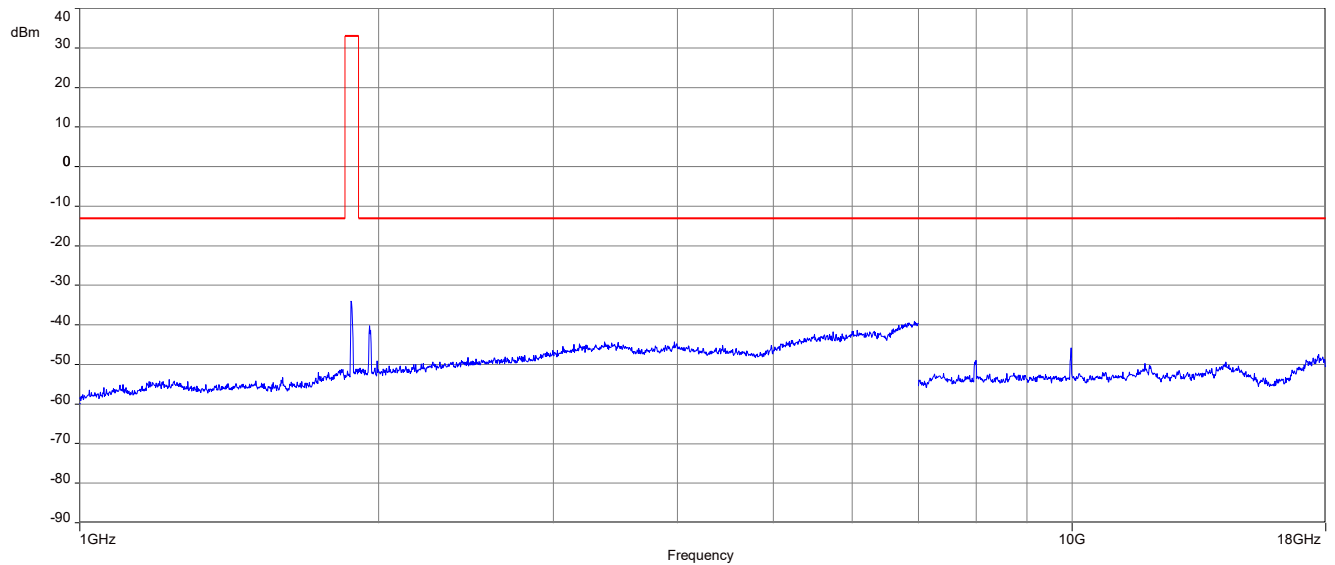
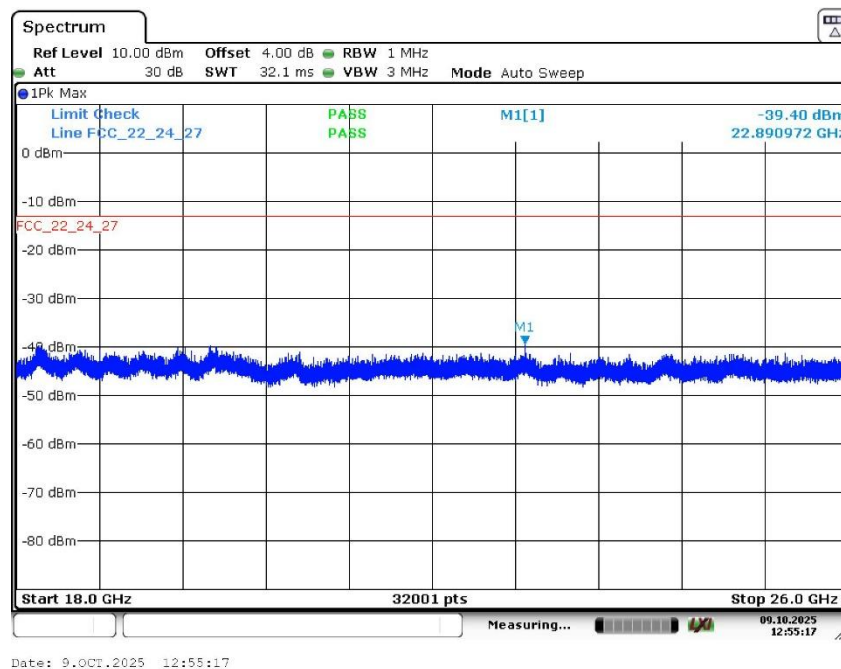
Plot 3: QPSK - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.9 GHz rejection filter***Plot 4:** QPSK - Middle channel (18 GHz – 26 GHz)

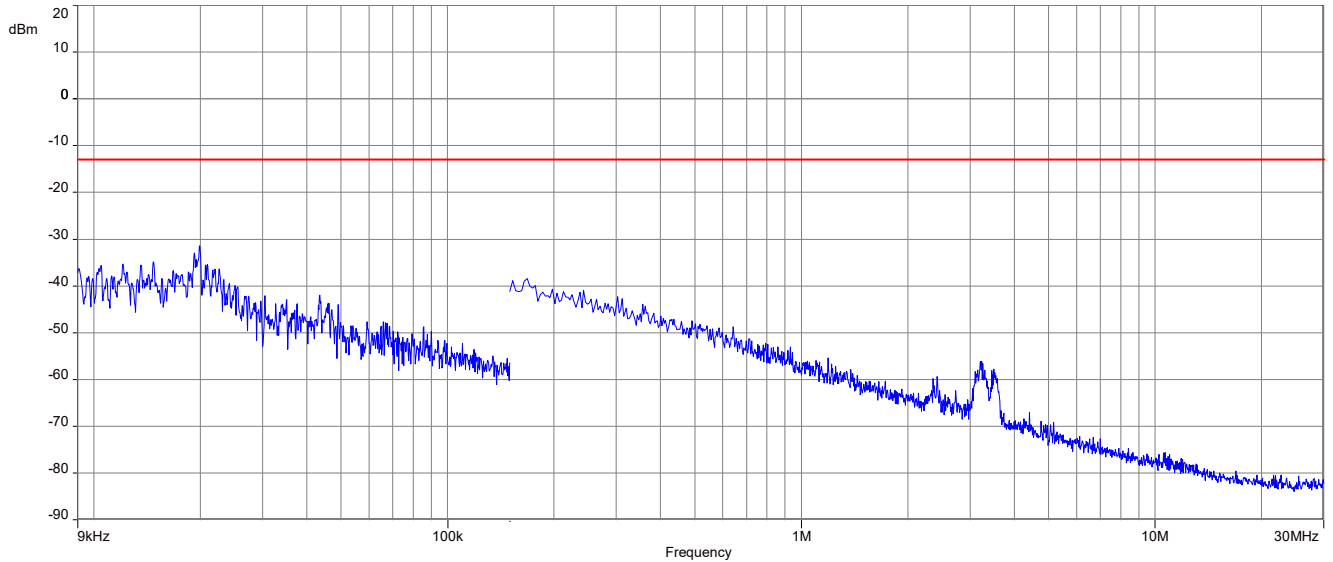
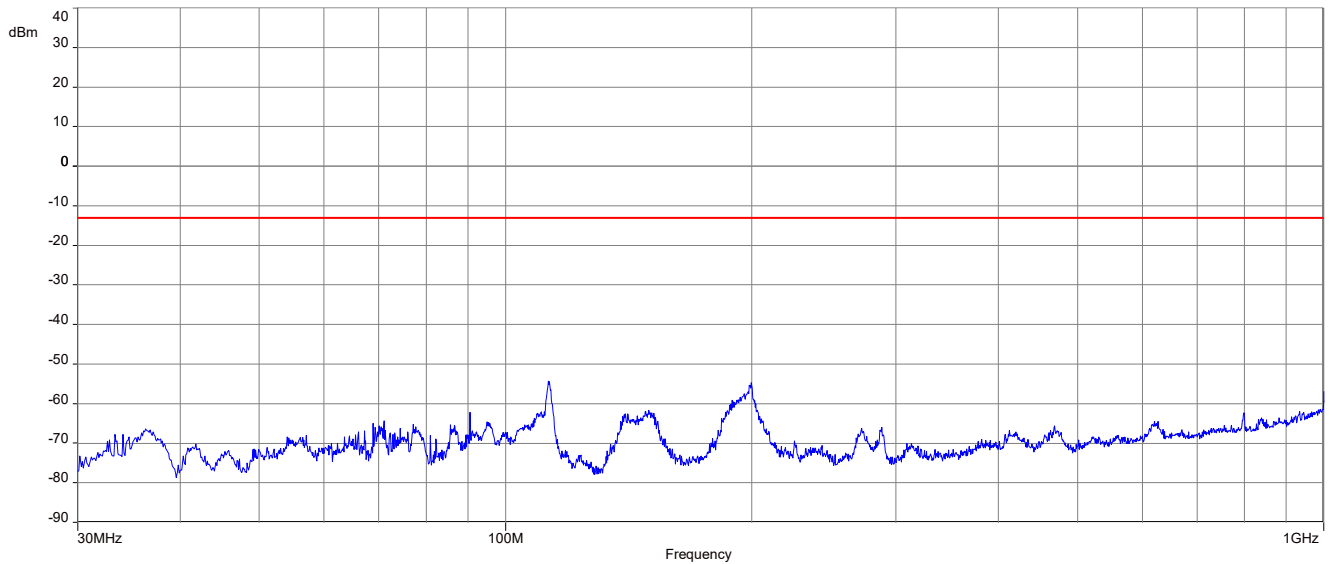
Plot 5: 16-QAM - Middle channel (9 kHz - 30 MHz)

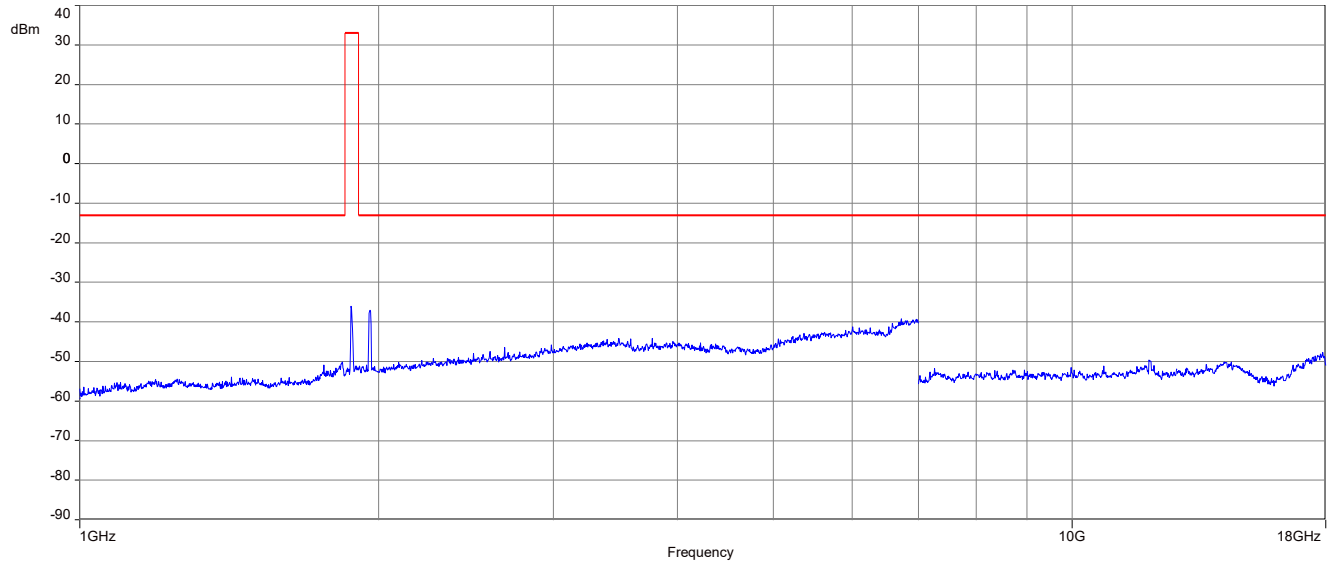
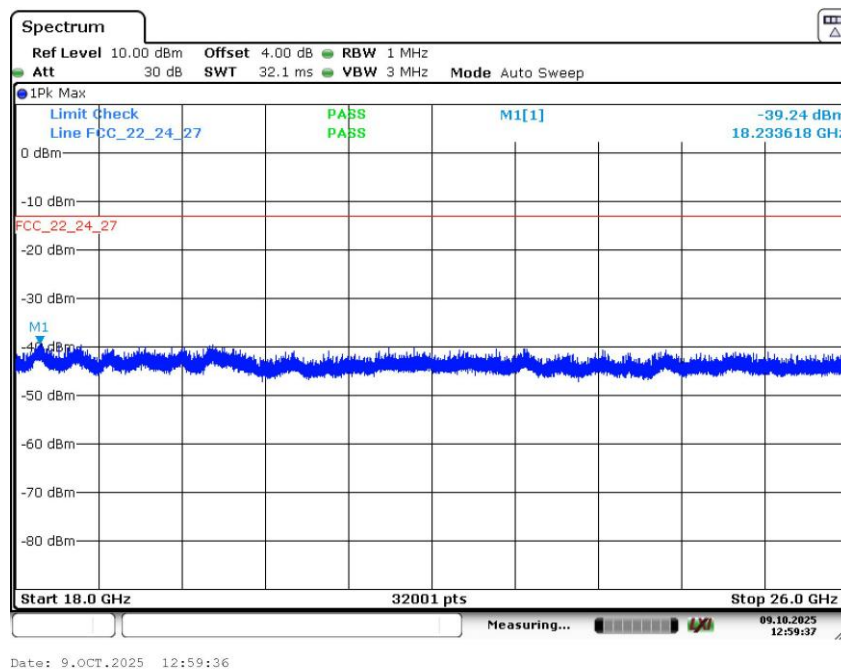


Plot 6: 16-QAM - Middle channel (30 MHz – 1 GHz)

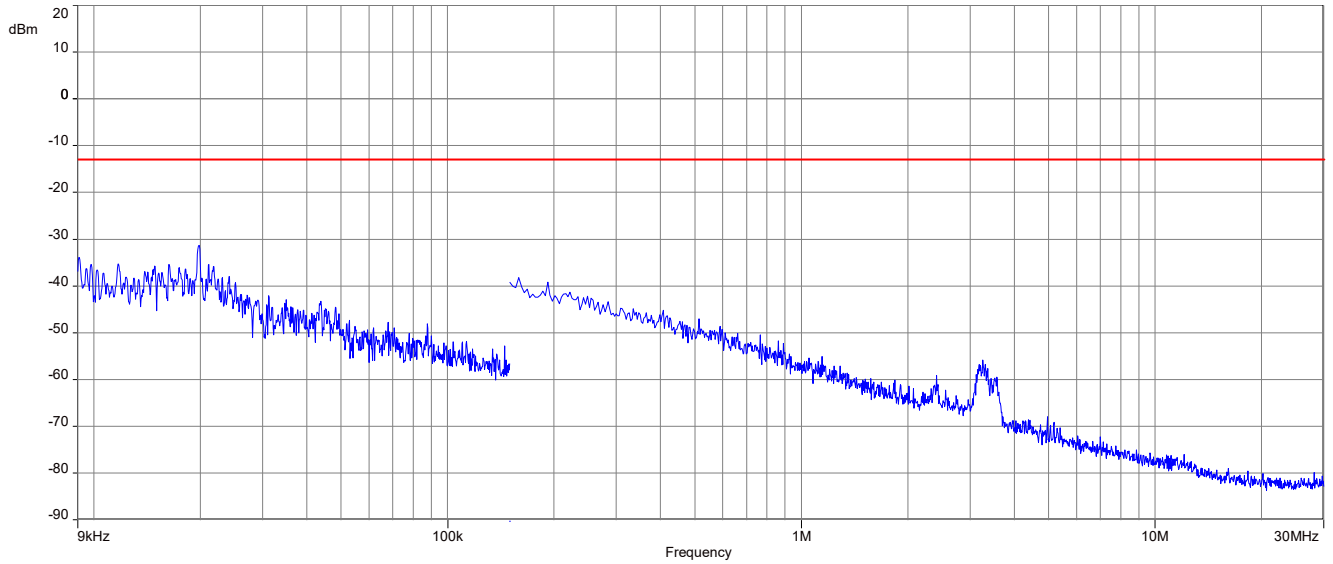


Plot 7: 16-QAM - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.9 GHz rejection filter***Plot 8:** 16-QAM - Middle channel (18 GHz – 26 GHz)

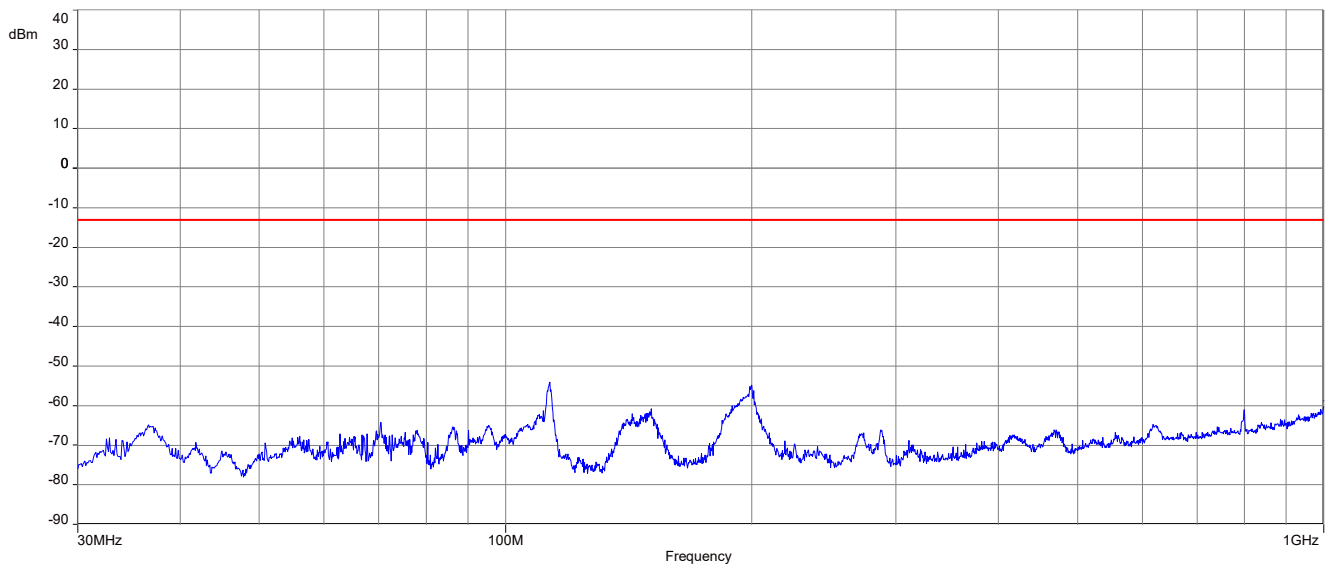
Plots DUT vertical:**Plot 9:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 10:** QPSK - Middle channel (30 MHz - 1 GHz)

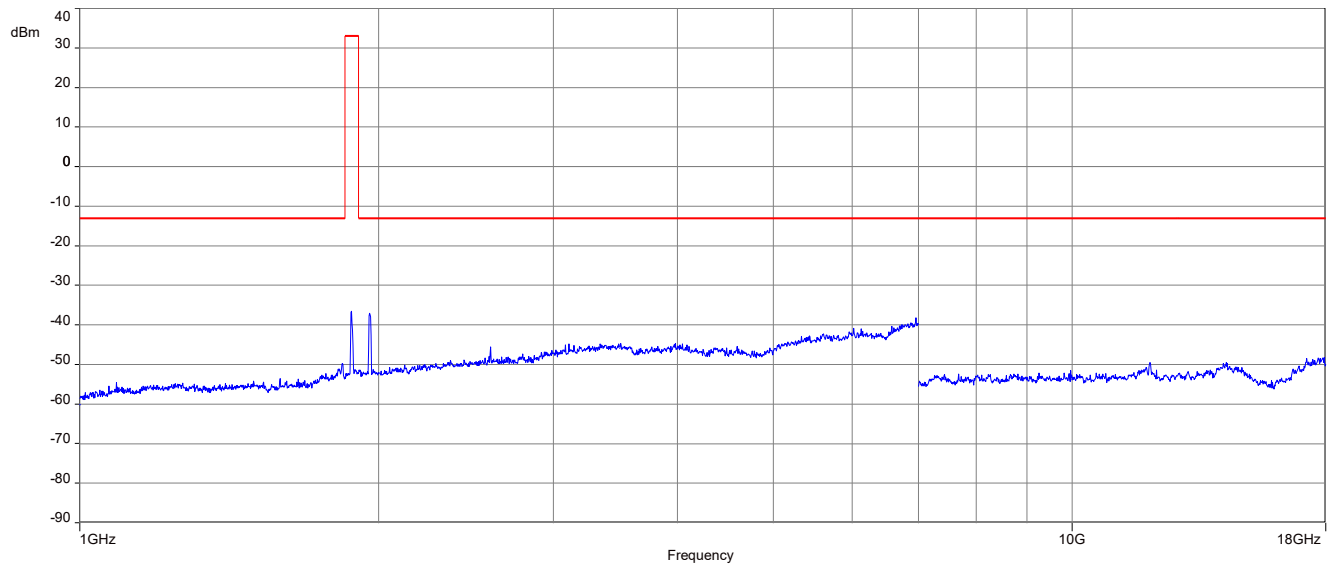
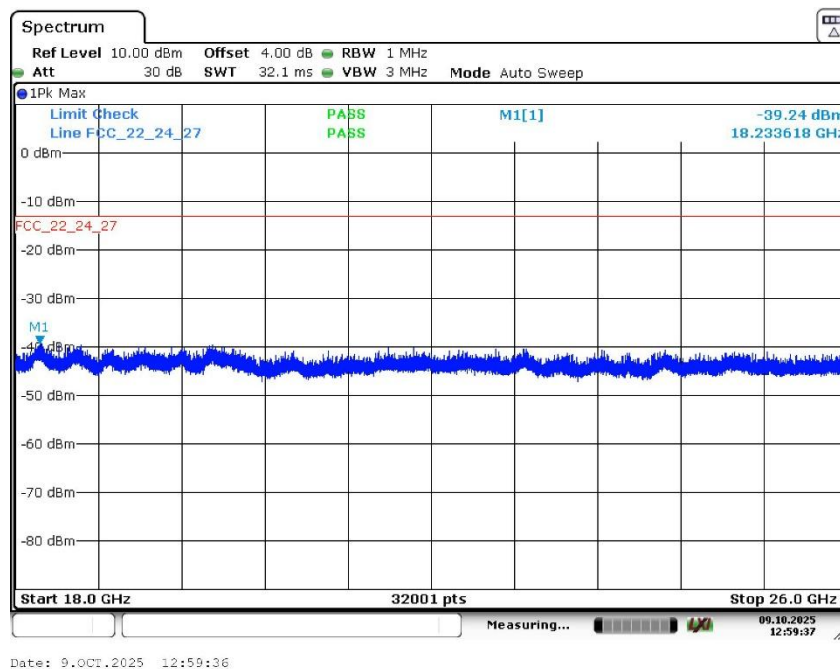
Plot 11: QPSK - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.9 GHz rejection filter***Plot 12:** QPSK - Middle channel (18 GHz – 26 GHz)

Plot 13: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 14: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 15: 16-QAM - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.9 GHz rejection filter***Plot 16:** 16-QAM - Middle channel (18 GHz – 26 GHz)

15 Summary of measurement results

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC: CFR Part 2 & Part 27	See table!	2025-10-30	-/-

15.1 Part 27: LTE band 4

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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15.2 Part 27: LTE band 12

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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15.3 Part 27: LTE band 13

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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15.4 Part 27: LTE band 71

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Notes:

C	Compliant	NC	Not compliant	NA	Not applicable	NP	Not performed
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16 RF measurements

16.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

16.2 LTE technologies supported by EUT

Channel bandwidth

	Band 4	Band 12	Band 13	Band 71
[MHz]				
1.4	☒	☒	☐	☐
3	☒	☒	☐	☐
5	☒	☒	☒	☒
10	☒	☒	☒	☒
15	☒	☐	☐	☒
20	☒	☐	☐	☒

16.3 Results LTE band 4

The EUT was set to transmit the maximum power.

16.3.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.4 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
§ 27.50(d)(4) & (5)	RSS-139, 6.5
(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. (5) In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.
Power: 30 dBm EIRP PAPR: 13 dB	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
1.4	1710.7	1 RB low	21.7	5.4	21.0	6.3
		1 RB high	22.0	5.4	21.2	6.2
		50% RB mid	22.1	5.5	21.3	6.2
		100% RB	20.8	5.9	19.9	6.8
	1732.5	1 RB low	22.4	4.6	21.6	5.4
		1 RB high	22.4	4.7	21.7	5.5
		50% RB mid	22.6	4.7	21.7	5.6
		100% RB	21.5	5.3	20.4	6.2
	1754.3	1 RB low	22.2	5.3	21.5	6.0
		1 RB high	22.3	5.3	21.5	6.0
		50% RB mid	22.4	5.3	21.6	6.1
		100% RB	21.1	5.7	20.2	6.6
3	1711.5	1 RB low	22.0	5.3	21.2	6.1
		1 RB high	22.1	5.3	21.4	6.1
		50% RB mid	20.9	5.7	20.1	6.6
		100% RB	21.0	5.9	20.0	6.8
	1732.5	1 RB low	22.5	4.6	21.6	5.4
		1 RB high	22.6	4.6	21.8	5.4
		50% RB mid	21.4	5.2	20.6	6.1
		100% RB	21.4	5.3	20.5	6.1
	1753.5	1 RB low	22.2	5.4	21.5	6.1
		1 RB high	22.4	5.1	21.6	5.9
		50% RB mid	21.2	5.7	20.3	6.6
		100% RB	21.3	5.8	20.4	6.6
5	1712.5	1 RB low	21.9	5.3	21.3	6.0
		1 RB high	22.2	5.1	21.5	5.9
		50% RB mid	21.0	5.7	20.1	6.6
		100% RB	21.0	5.8	20.1	6.6
	1732.5	1 RB low	22.4	4.6	21.6	5.3
		1 RB high	22.7	4.5	21.8	5.3
		50% RB mid	21.5	5.1	20.7	6.0
		100% RB	21.5	5.3	20.6	6.1
	1752.5	1 RB low	22.2	5.4	21.4	6.2
		1 RB high	22.5	5.1	21.9	5.8
		50% RB mid	21.3	5.7	20.4	6.6
		100% RB	21.3	5.8	20.3	6.6

10	1715.0	1 RB low	21.9	5.3	21.3	6.1
		1 RB high	22.0	4.6	21.2	5.4
		50% RB mid	21.1	5.6	20.2	6.5
		100% RB	21.0	5.5	20.1	6.4
	1732.5	1 RB low	22.3	4.5	21.4	5.3
		1 RB high	22.3	4.6	21.5	5.4
		50% RB mid	21.5	5.1	20.6	6.0
		100% RB	21.4	5.2	20.5	6.0
	1750.0	1 RB low	22.0	5.1	21.5	5.9
		1 RB high	22.0	5.2	21.3	5.9
		50% RB mid	21.4	5.7	20.5	6.6
		100% RB	21.3	5.7	20.4	6.6
15	1717.5	1 RB low	21.7	5.3	20.9	6.1
		1 RB high	21.8	4.5	21.0	5.3
		50% RB mid	21.2	5.4	20.2	6.3
		100% RB	21.1	5.6	20.1	6.4
	1732.5	1 RB low	21.9	4.4	21.1	5.3
		1 RB high	21.8	4.6	21.1	5.5
		50% RB mid	21.2	5.1	20.3	6.0
		100% RB	21.1	5.3	20.1	6.1
	1747.5	1 RB low	21.7	4.8	21.1	5.6
		1 RB high	21.9	5.1	21.2	5.9
		50% RB mid	21.4	5.6	20.5	6.6
		100% RB	21.3	5.8	20.3	6.6
20	1720.0	1 RB low	21.3	5.3	20.6	6.0
		1 RB high	21.6	4.5	20.9	5.3
		50% RB mid	21.2	5.2	20.3	6.1
		100% RB	21.0	5.3	20.1	6.2
	1732.5	1 RB low	21.4	4.4	20.7	5.2
		1 RB high	21.7	4.8	20.9	5.5
		50% RB mid	21.4	5.1	20.4	6.0
		100% RB	21.1	5.2	20.2	6.1
	1745.0	1 RB low	21.6	4.6	20.8	5.3
		1 RB high	21.6	5.1	21.0	5.9
		50% RB mid	21.4	5.6	20.4	6.4
		100% RB	21.2	5.5	20.2	6.4

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
1.4	1710.7	26.1	25.3
	1732.5	26.6	25.7
	1754.3	26.4	25.7
3	1711.5	26.3	25.5
	1732.5	26.6	25.9
	1753.5	26.5	25.7
5	1712.5	26.4	25.6
	1732.5	26.2	25.6
	1752.5	26.7	25.8
10	1715.0	26.5	25.9
	1732.5	26.2	25.5
	1750.0	26.5	25.7
15	1717.5	26.3	25.5
	1732.5	26.2	25.4
	1747.5	25.9	25.1
20	1720.0	26.4	25.3
	1732.5	26.4	25.7
	1745.0	26.1	25.4

16.3.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1750 MHz. Measurement made up to 18 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 4.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

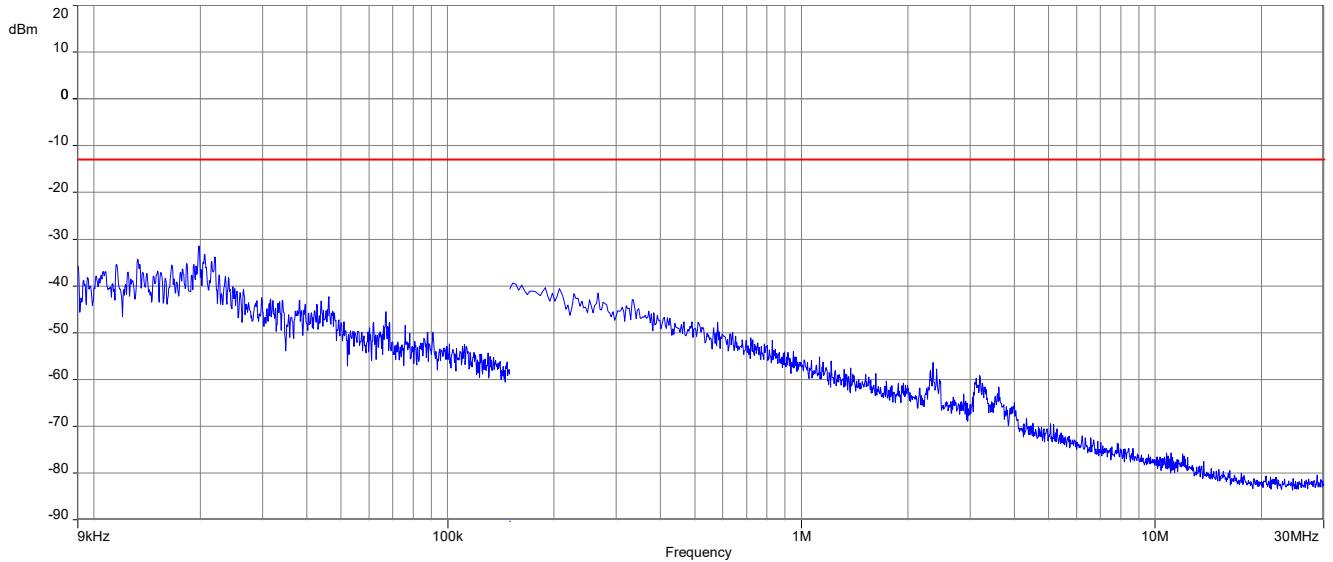
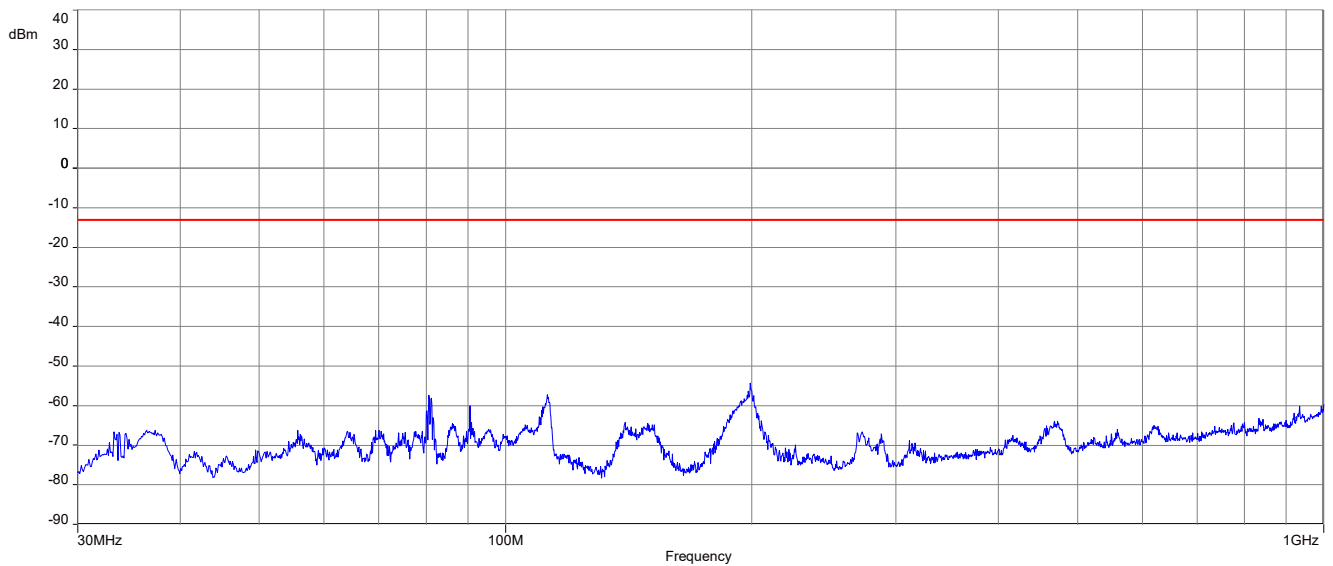
FCC	ISED
§ 27.53(h)(1) & (3)	RSS-139, 6.6
(1) Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. (3) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.	i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10}(P)$ (watts) dB. ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10}(P)$ (watts) dB.
-13 dBm	

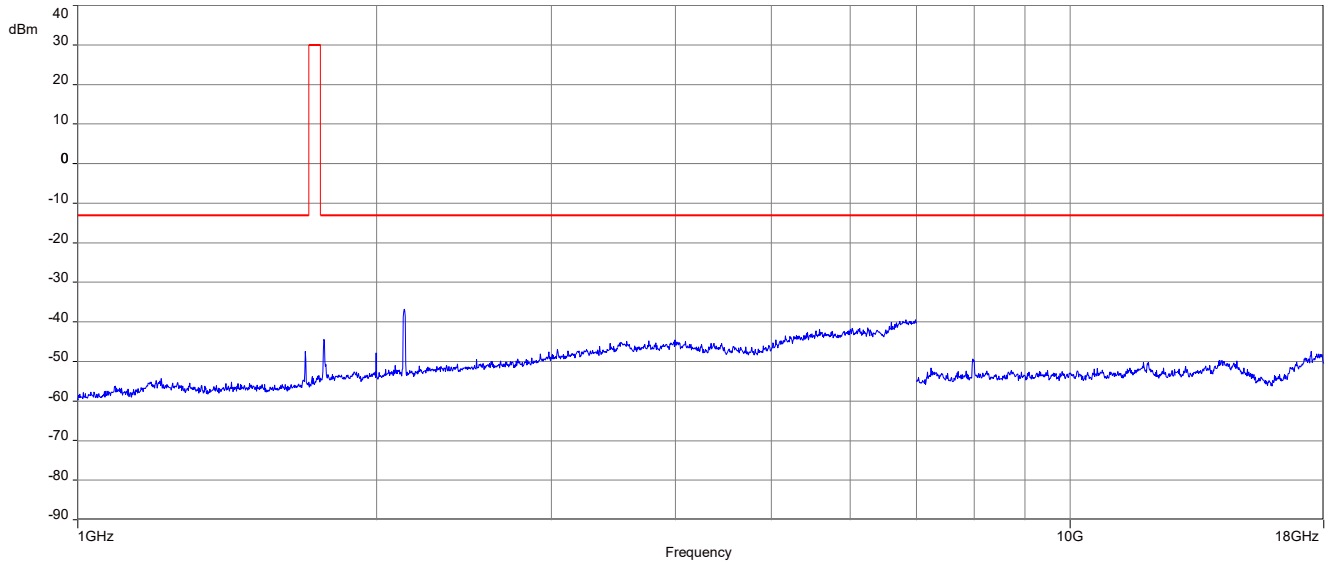
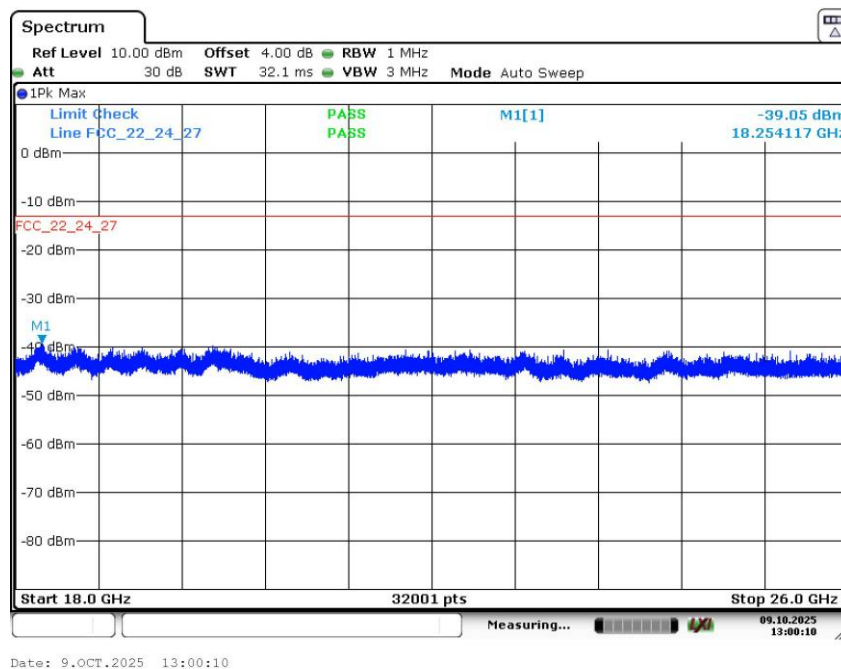
Results:**QPSK:**

SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

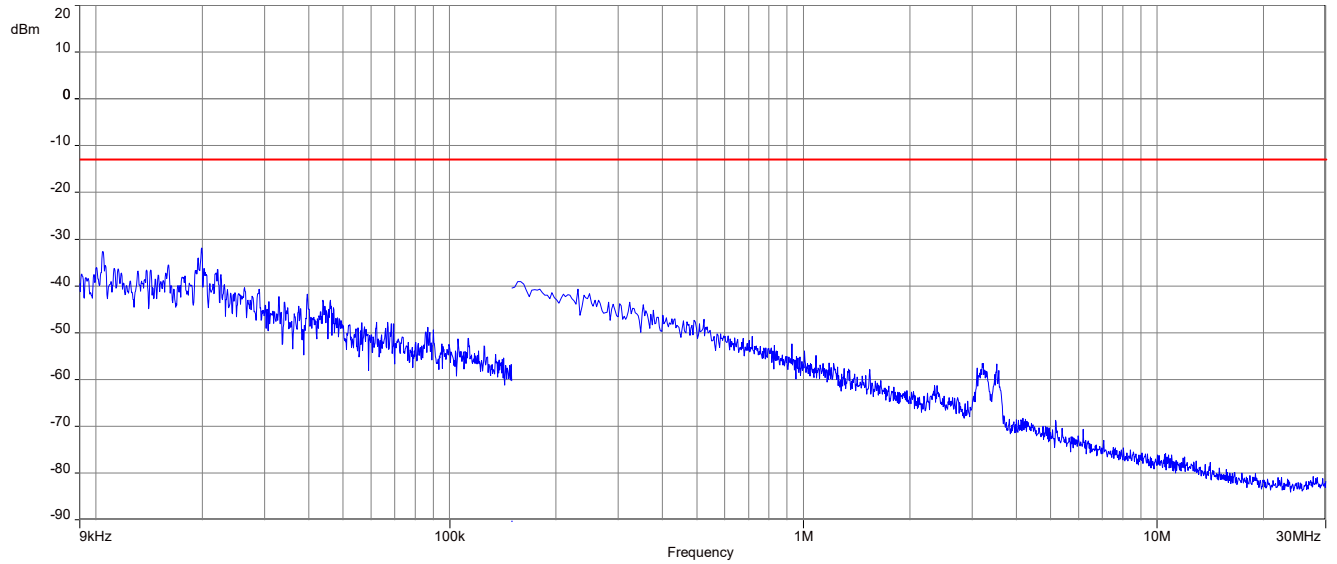
16-QAM:

SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

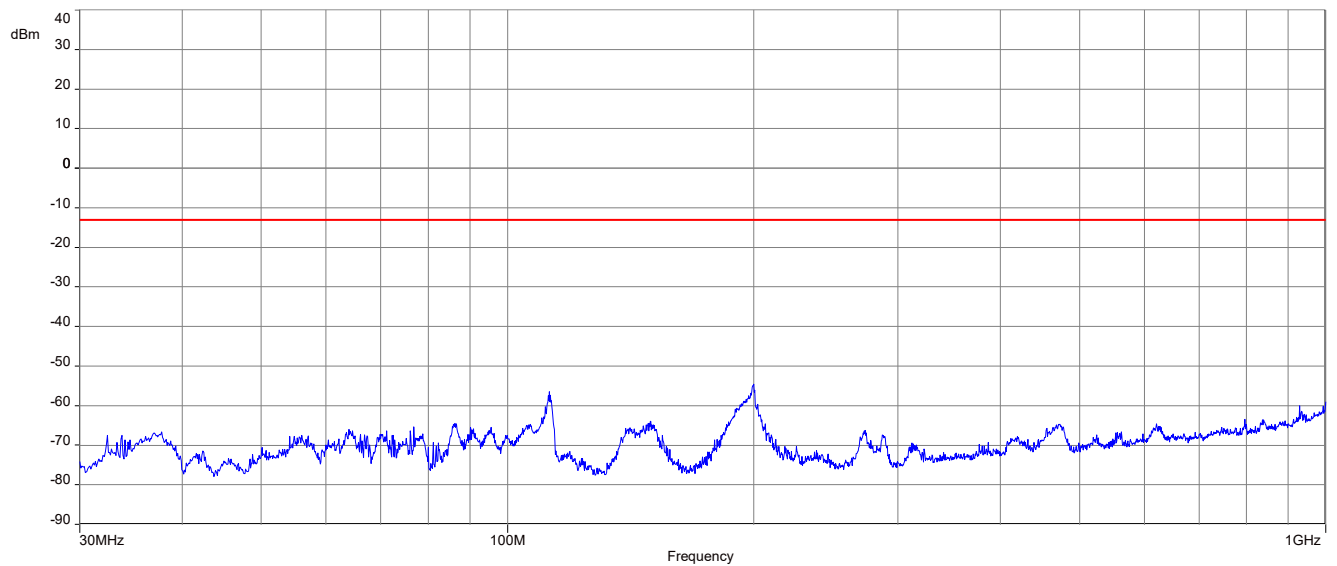
Plots DUT horizontal:**Plot 1:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 2:** QPSK - Middle channel (30 MHz – 1 GHz)

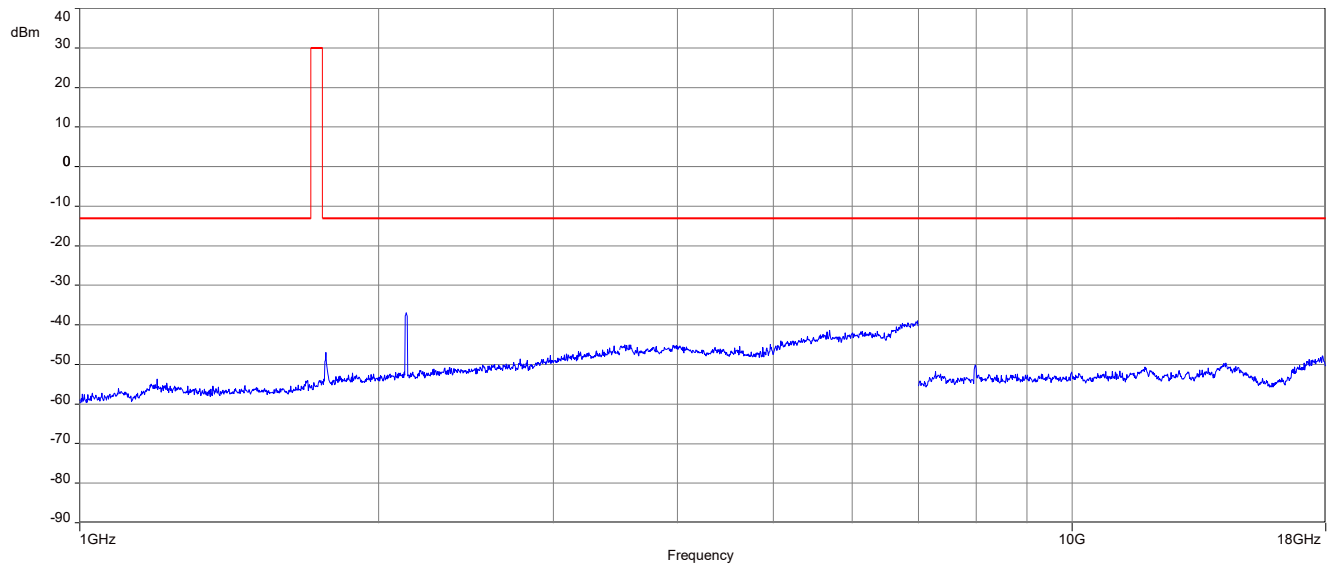
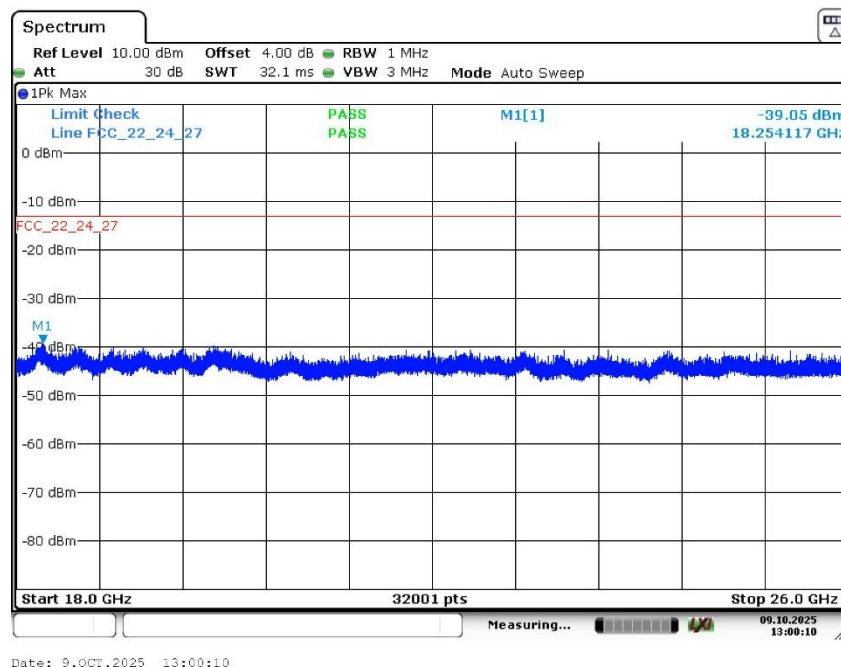
Plot 3: QPSK - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.73 GHz rejection filter***Plot 4:** QPSK - Middle channel (18 GHz – 26 GHz)

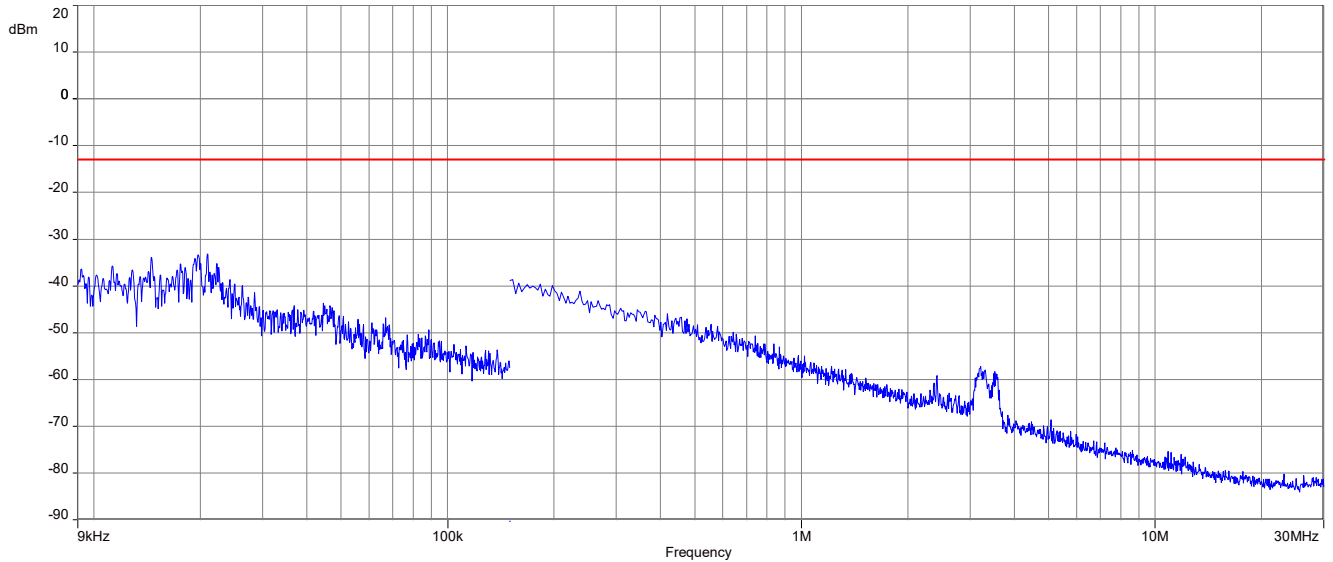
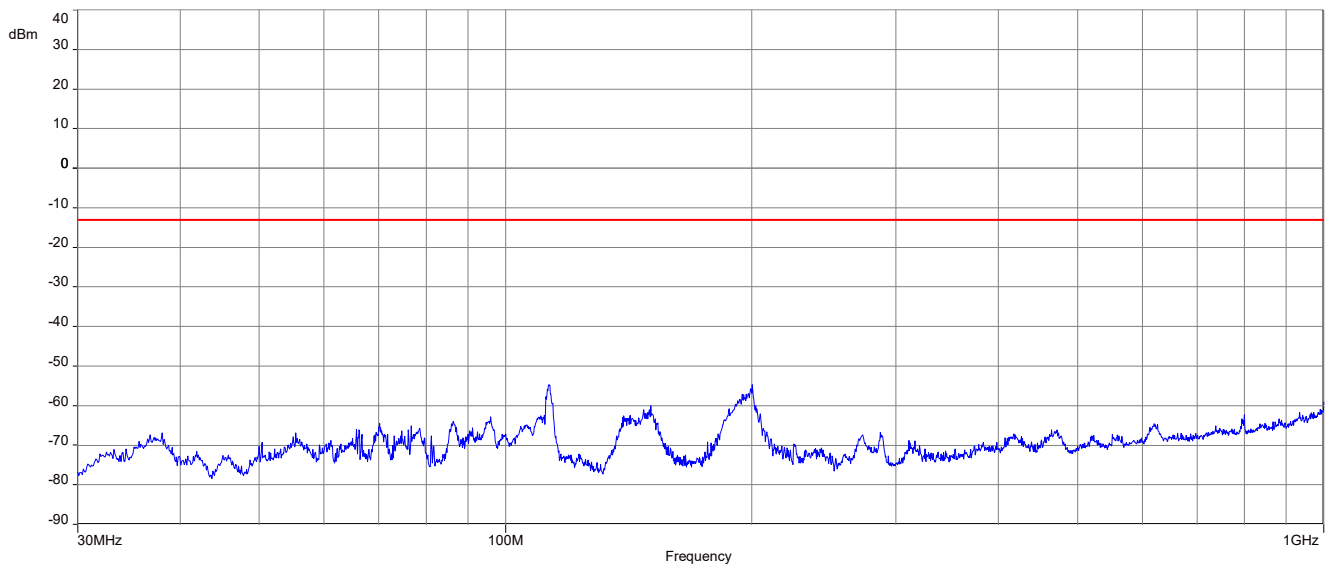
Plot 5: 16-QAM - Middle channel (9 kHz - 30 MHz)

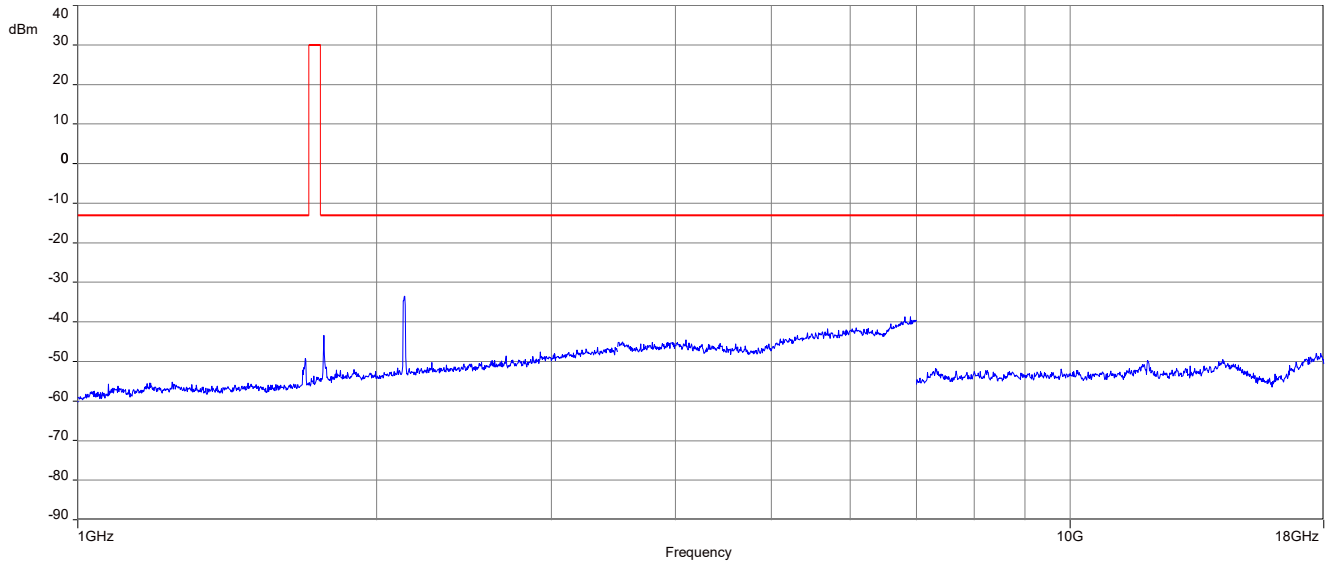
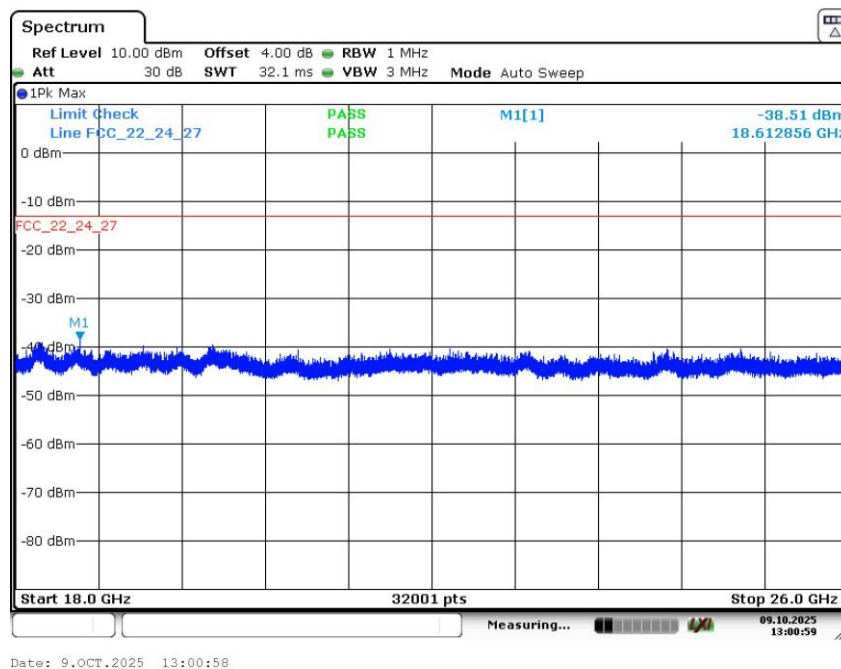


Plot 6: 16-QAM - Middle channel (30 MHz – 1 GHz)

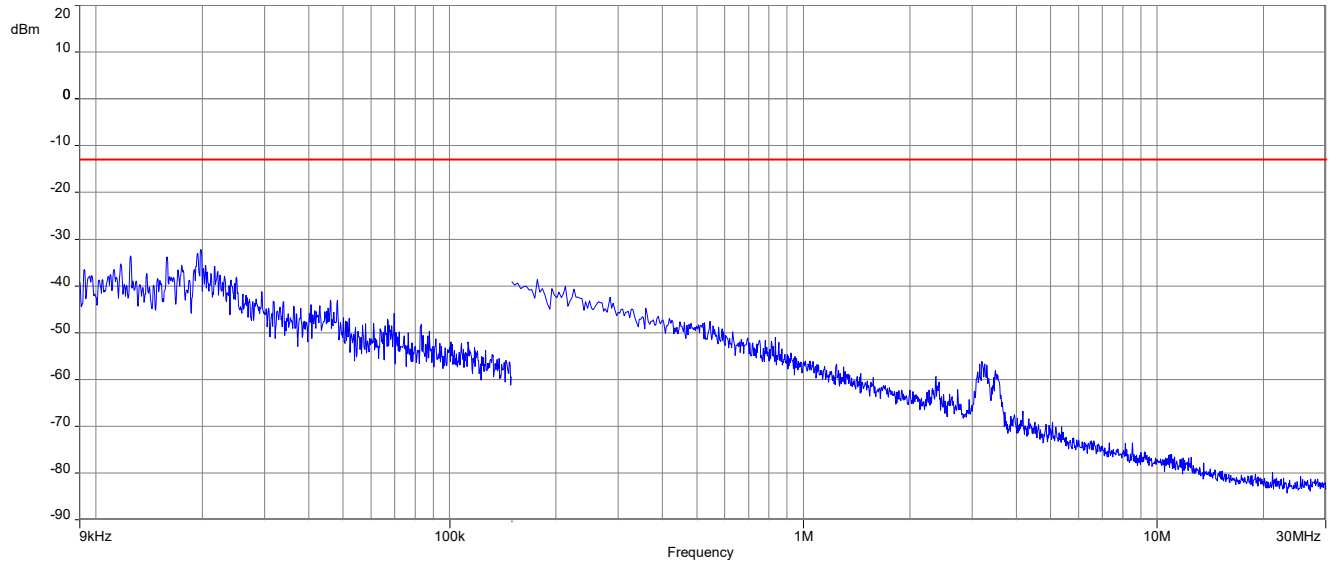


Plot 7: 16-QAM - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.73 GHz rejection filter***Plot 8:** 16-QAM - Middle channel (18 GHz – 26 GHz)

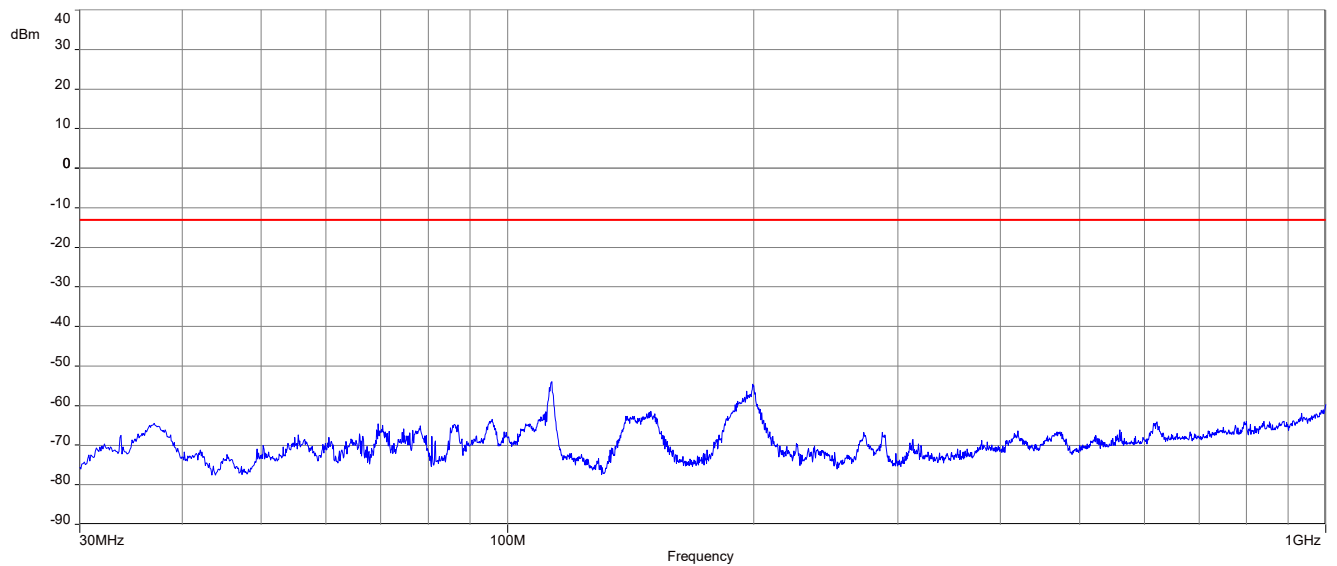
Plots DUT vertical:**Plot 9:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 10:** QPSK - Middle channel (30 MHz - 1 GHz)

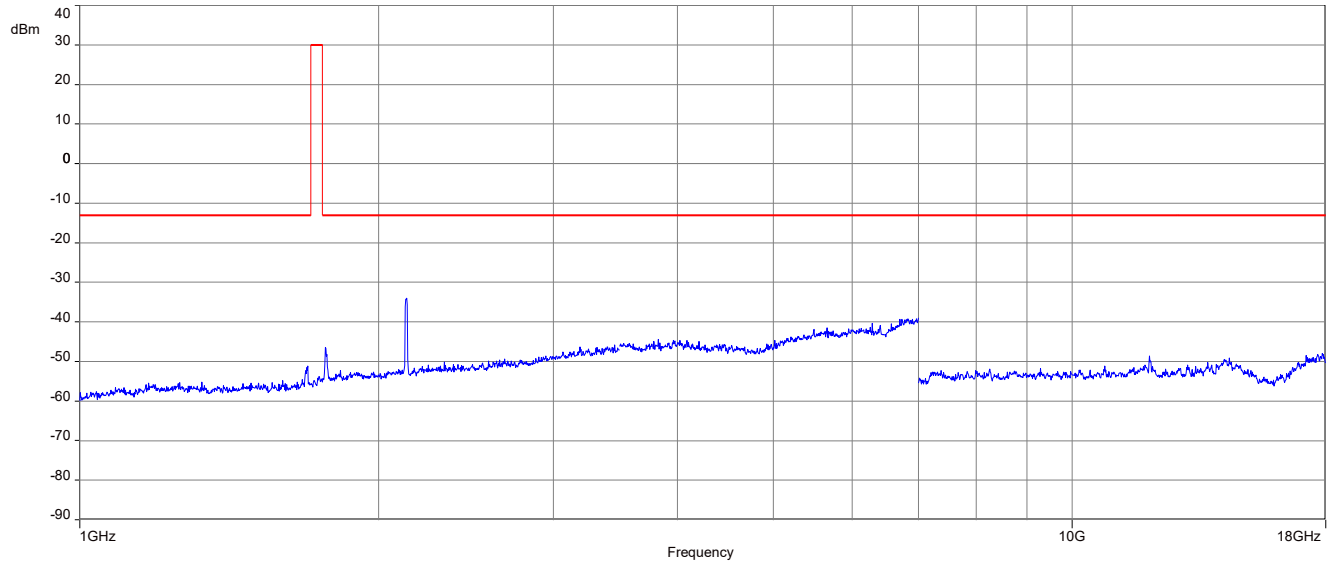
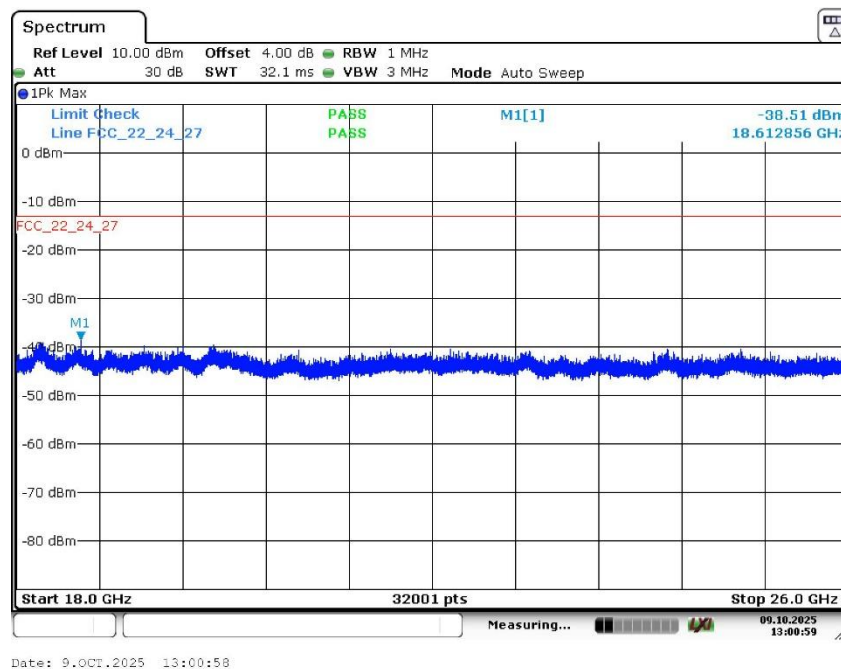
Plot 11: QPSK - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.73 GHz rejection filter***Plot 12:** QPSK - Middle channel (18 GHz – 26 GHz)

Plot 13: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 14: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 15: 16-QAM - Middle channel (1 GHz – 18 GHz)*Carrier notched with 1.73 GHz rejection filter***Plot 16:** 16-QAM - Middle channel (18 GHz – 26 GHz)

16.4 Results LTE band 12

The EUT was set to transmit the maximum power.

16.4.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
47 CFR 27.50(c)(9)	RSS-130, 4.6.1 & 4.6.3
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.	4.6.1: The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission. 4.6.3: The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.
Power: 34.77 dBm ERP PAPR: 13 dB (ISED only)	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
1.4	699.7	1 RB low	22.8	4.8	21.4	5.6
		1 RB high	22.3	4.6	21.6	5.4
		50% RB mid	22.4	4.7	21.4	5.7
		100% RB	21.5	5.3	20.5	6.2
	707.5	1 RB low	22.3	5.0	21.5	5.9
		1 RB high	22.1	5.1	21.7	5.9
		50% RB mid	22.5	5.1	21.7	5.8
		100% RB	21.4	5.7	20.7	6.5
	715.3	1 RB low	22.5	5.1	21.7	5.9
		1 RB high	22.6	4.9	21.7	5.7
		50% RB mid	22.5	5.0	21.6	5.9
		100% RB	21.4	5.5	20.5	6.4
3	700.5	1 RB low	22.4	4.7	21.6	5.5
		1 RB high	22.5	4.3	21.8	5.1
		50% RB mid	21.4	5.1	20.5	6.0
		100% RB	21.5	5.2	20.6	6.1
	707.5	1 RB low	22.3	4.9	21.6	5.7
		1 RB high	22.4	5.2	21.7	5.9
		50% RB mid	21.5	5.6	20.6	6.5
		100% RB	21.5	5.7	20.6	6.6
	714.5	1 RB low	22.4	5.2	21.6	5.9
		1 RB high	22.5	4.8	21.7	5.7
		50% RB mid	21.4	5.5	20.6	6.4
		100% RB	21.4	5.7	20.5	6.5
5	701.5	1 RB low	22.2	4.7	21.5	5.4
		1 RB high	22.5	4.2	21.8	5.0
		50% RB mid	21.6	5.0	20.6	5.9
		100% RB	21.6	5.2	20.7	6.0
	707.5	1 RB low	22.2	4.8	21.4	5.6
		1 RB high	22.5	5.0	21.8	5.8
		50% RB mid	21.7	5.5	20.7	6.4
		100% RB	21.6	5.7	20.7	6.5
	713.5	1 RB low	22.3	5.2	21.6	5.9
		1 RB high	22.7	4.9	22.0	5.6
		50% RB mid	21.6	5.6	20.6	6.4
		100% RB	21.8	5.7	20.8	6.4

10	704.0	1 RB low	22.4	4.6	21.5	5.4
		1 RB high	22.4	5.1	21.6	5.8
		50% RB mid	21.6	5.2	20.8	6.1
		100% RB	21.6	5.4	20.7	6.2
	707.5	1 RB low	22.1	4.3	21.4	5.1
		1 RB high	22.4	5.1	21.6	5.9
		50% RB mid	21.6	5.6	20.8	6.4
		100% RB	21.6	5.6	20.7	6.4
	711.0	1 RB low	22.3	5.0	21.5	5.7
		1 RB high	22.4	4.9	21.6	5.7
		50% RB mid	21.4	5.7	20.4	6.5
		100% RB	21.3	5.7	20.3	6.5

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
1.4	699.7	26.2	25.0
	707.5	25.9	25.1
	715.3	26.0	25.2
3	700.5	25.9	25.2
	707.5	25.9	25.1
	714.5	26.0	25.3
5	701.5	25.9	25.2
	707.5	25.9	25.2
	713.5	26.1	25.4
10	704.0	26.0	25.1
	707.5	25.9	25.1
	711.0	26.0	25.2

16.4.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 711 MHz. Measured up to 8 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 12.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

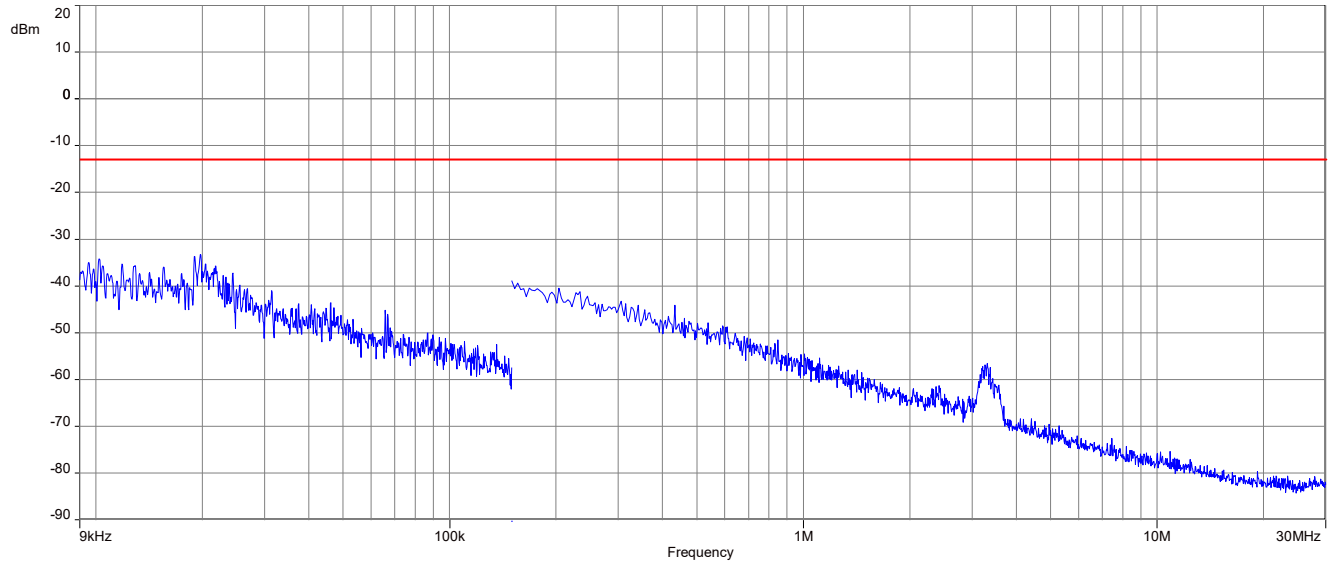
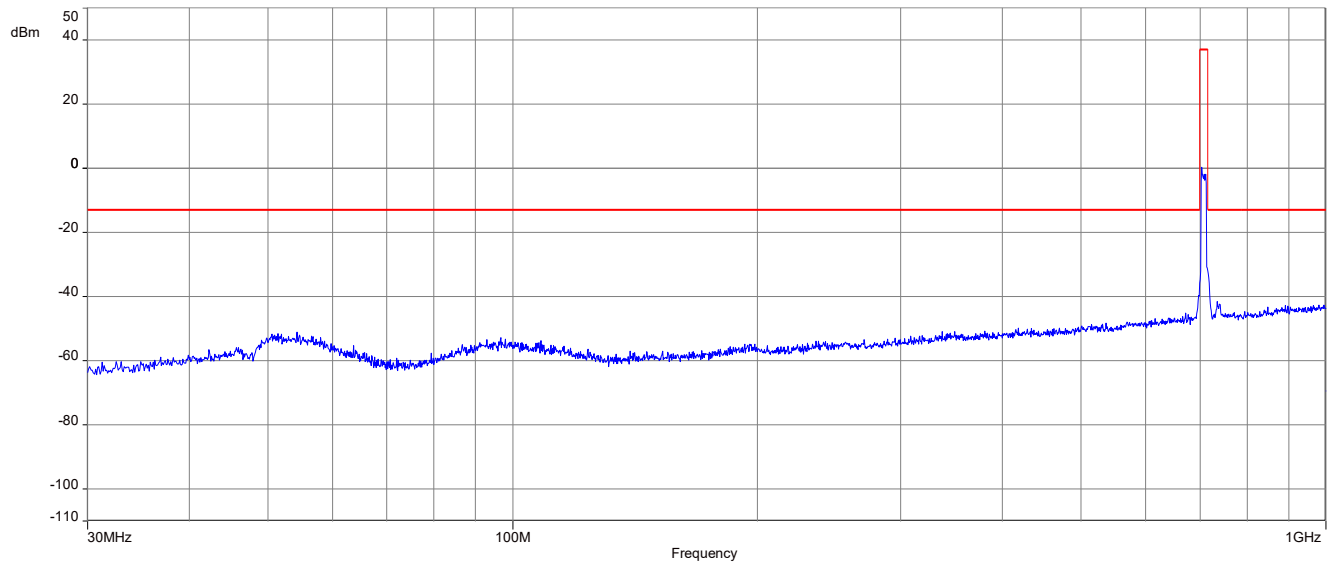
FCC	ISED
§ 27.53(g)	RSS-130, 4.7.1
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.	The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.
-13 dBm	

Results:**QPSK:**

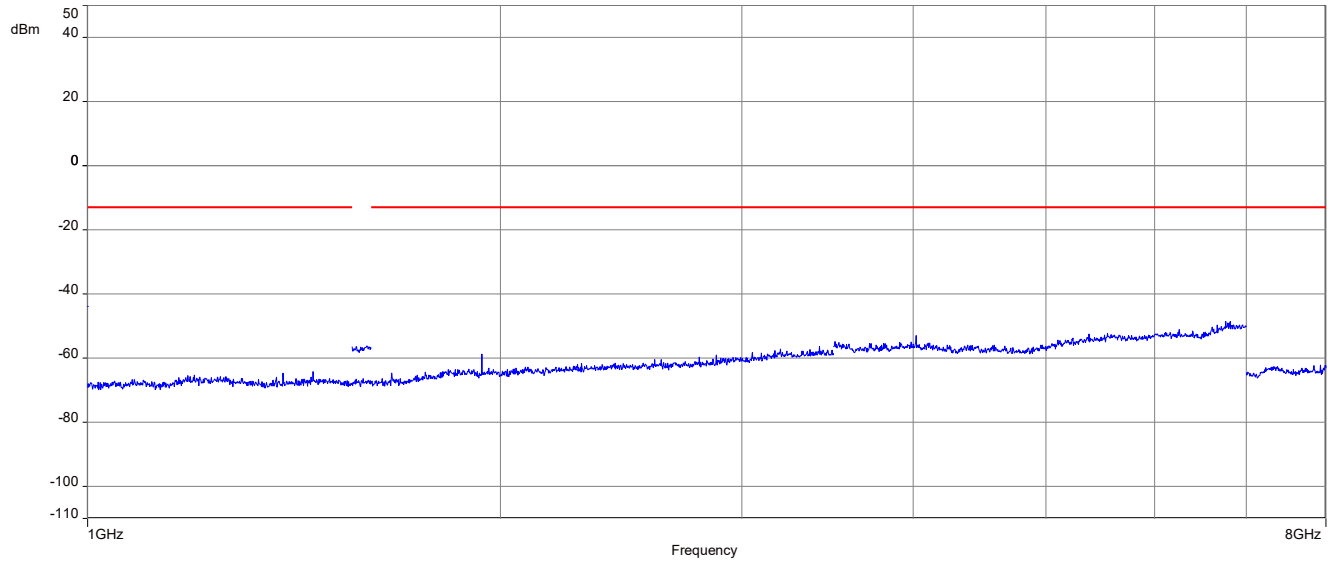
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

16-QAM:

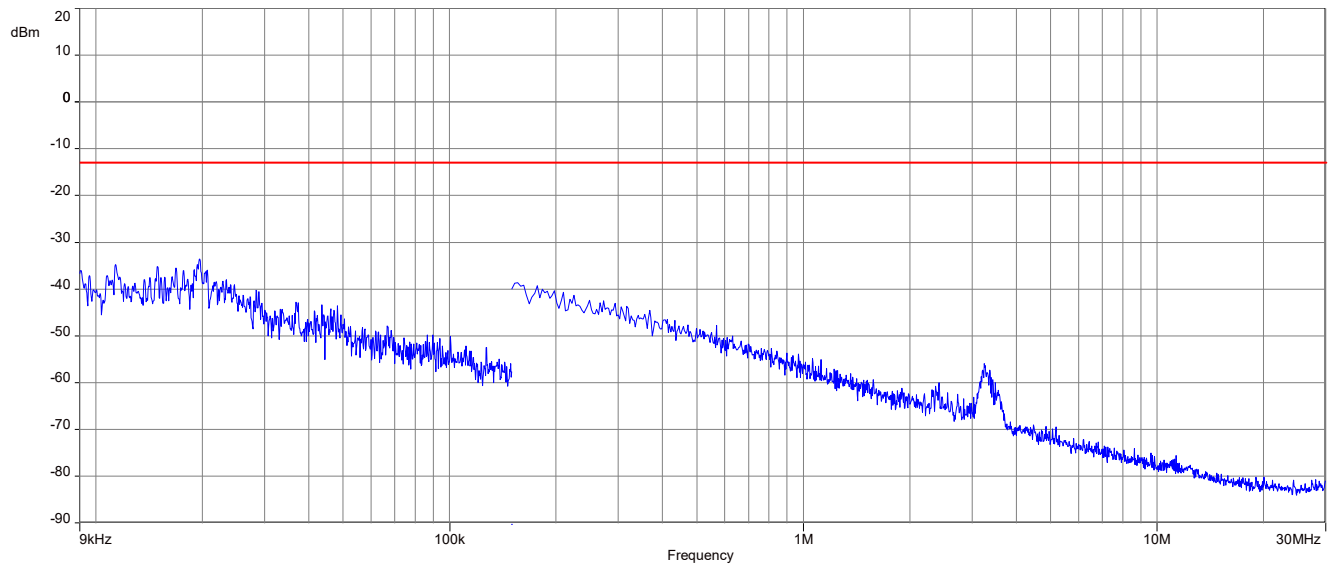
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

Plots DUT horizontal:**Plot 1:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 2:** QPSK - Middle channel (30 MHz – 1 GHz)

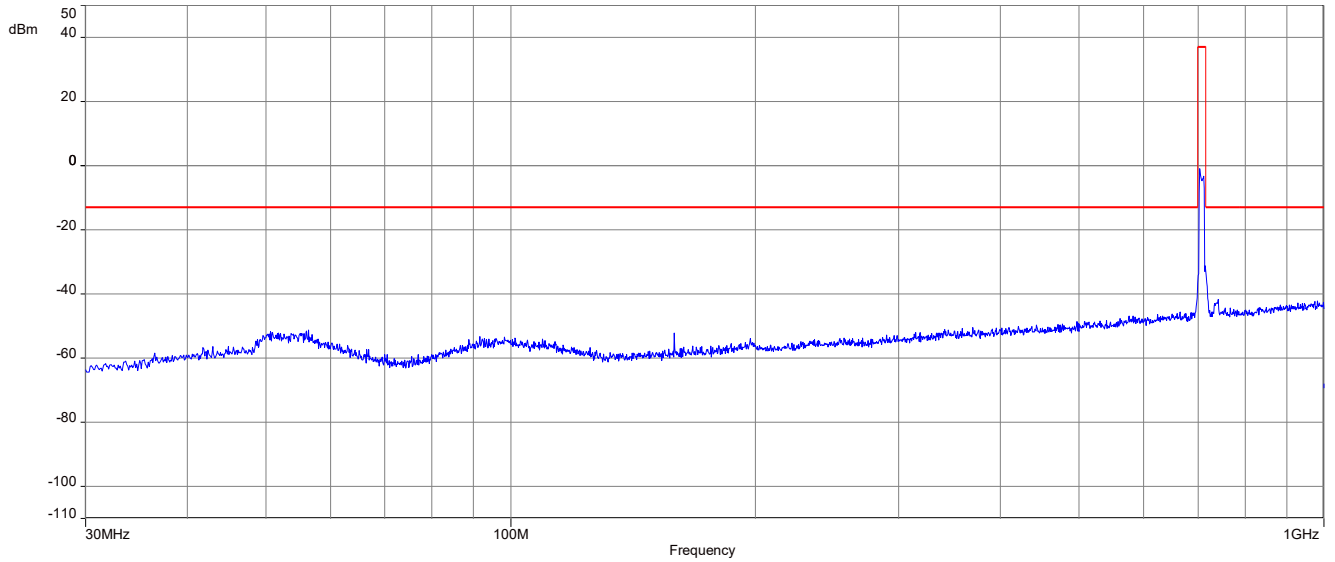
Plot 3: QPSK - Middle channel (1 GHz – 8 GHz)



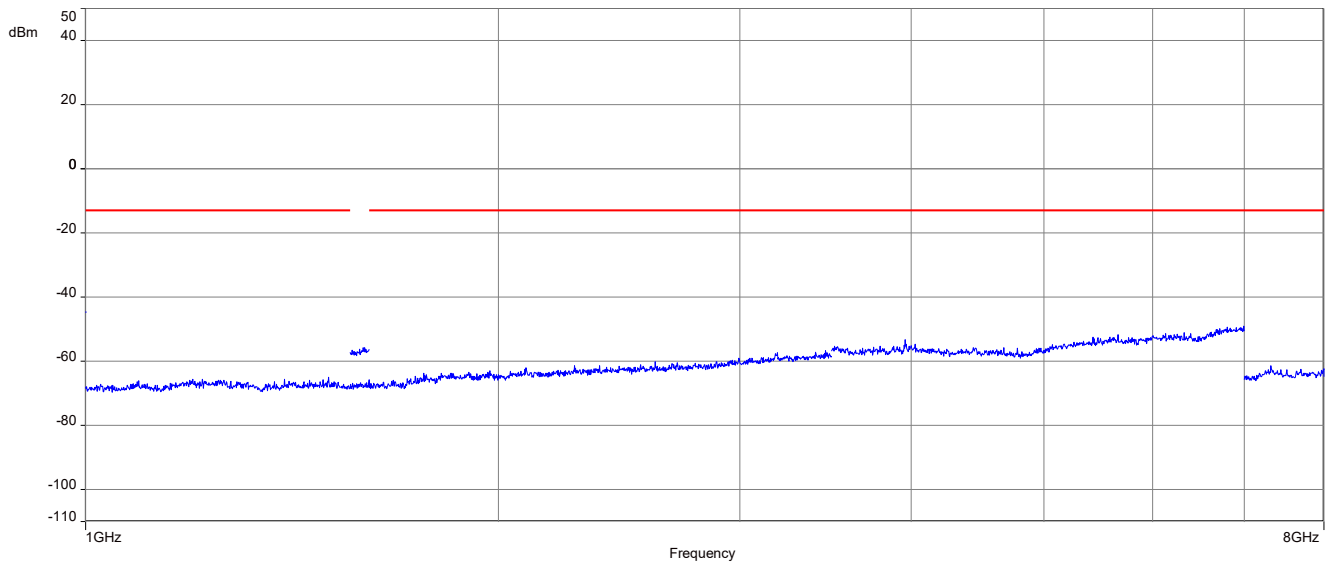
Plot 4: 16-QAM - Middle channel (9 kHz - 30 MHz)

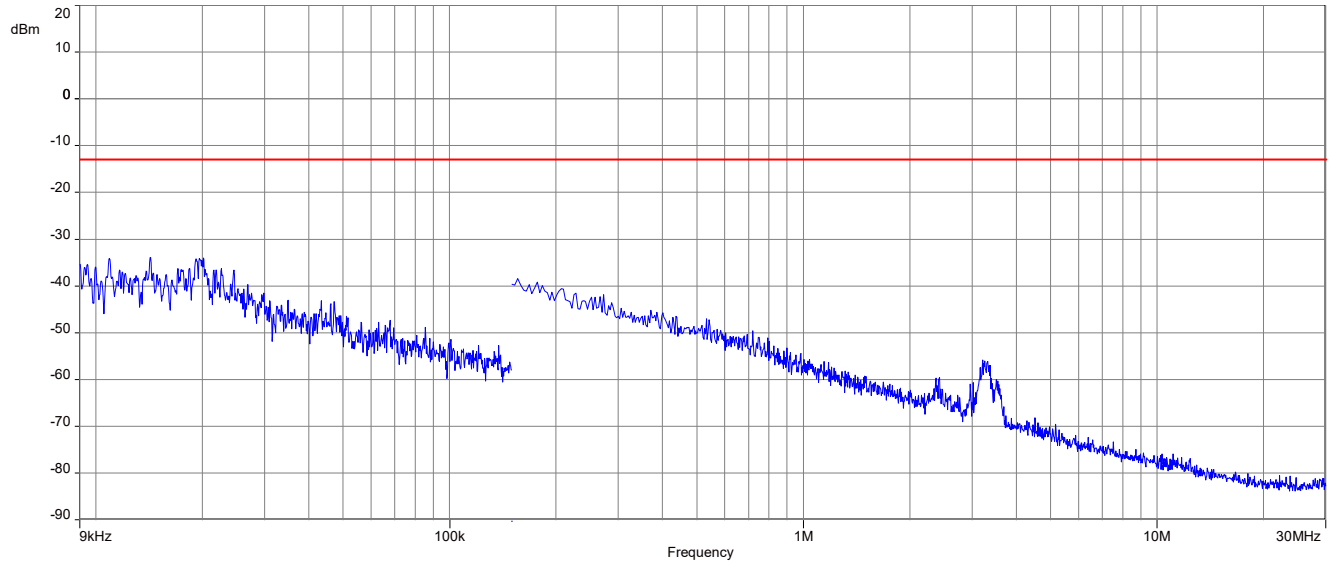
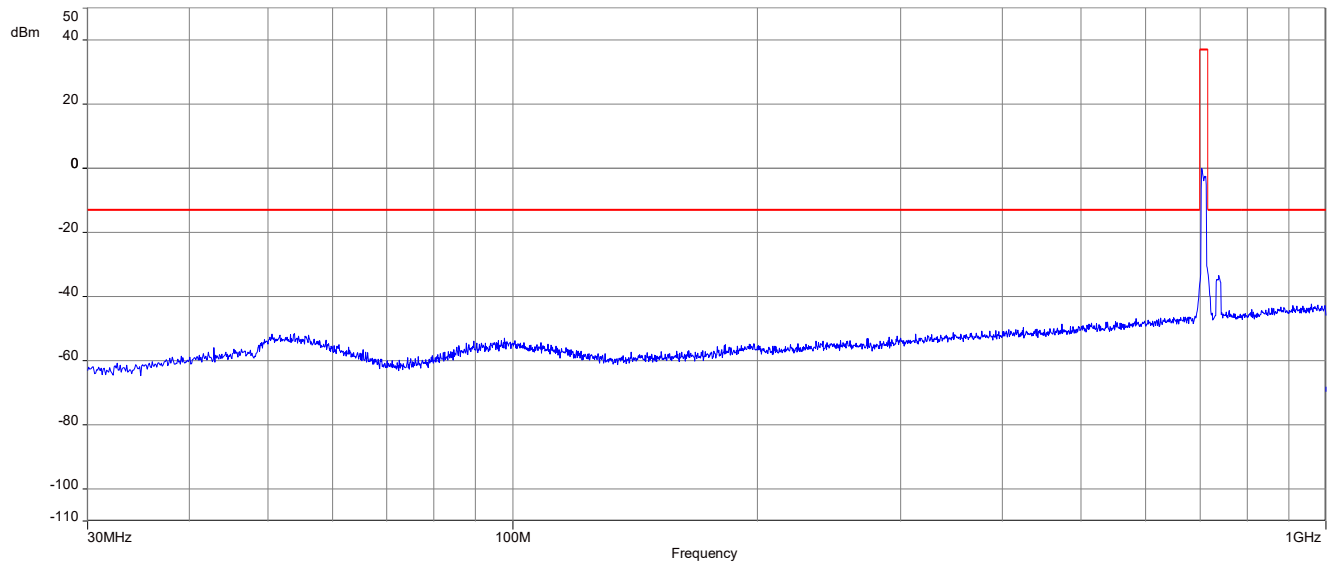


Plot 5: 16-QAM - Middle channel (30 MHz – 1 GHz)

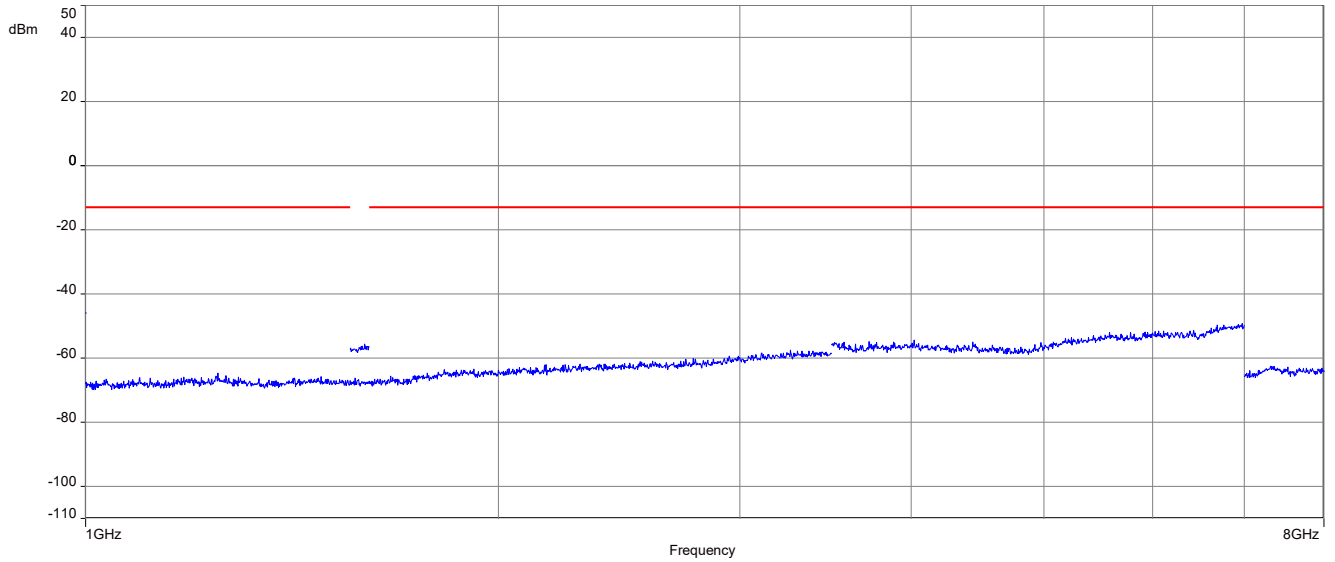


Plot 6: 16-QAM - Middle channel (1 GHz – 8 GHz)

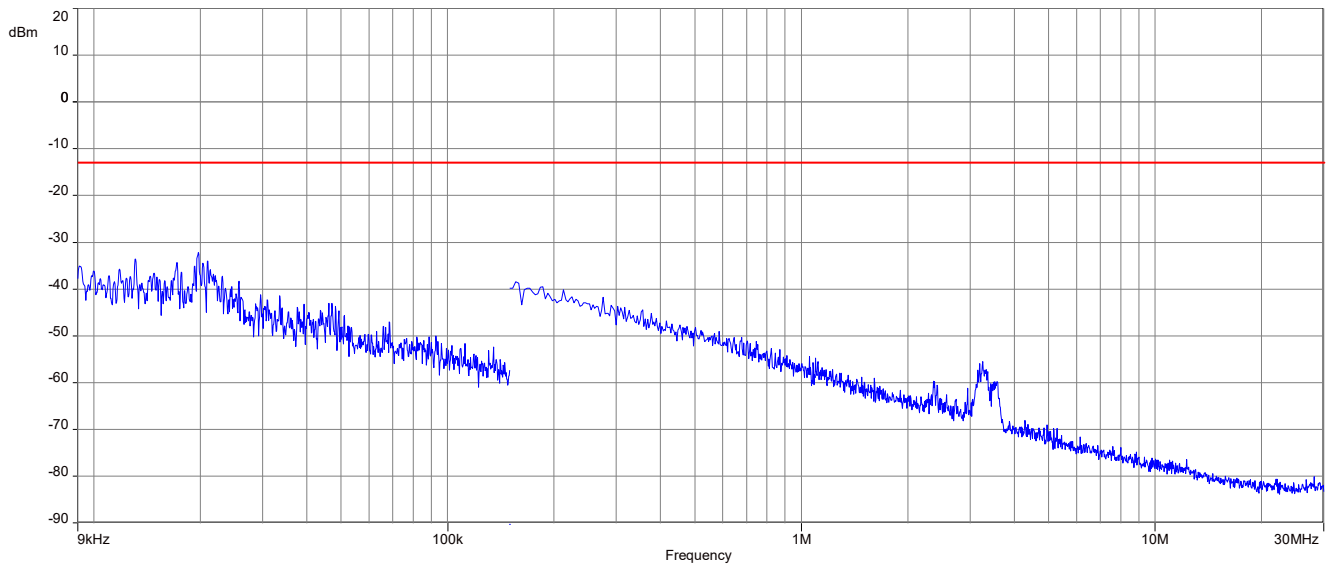


Plots DUT vertical:**Plot 7:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 8:** QPSK - Middle channel (30 MHz – 1 GHz)

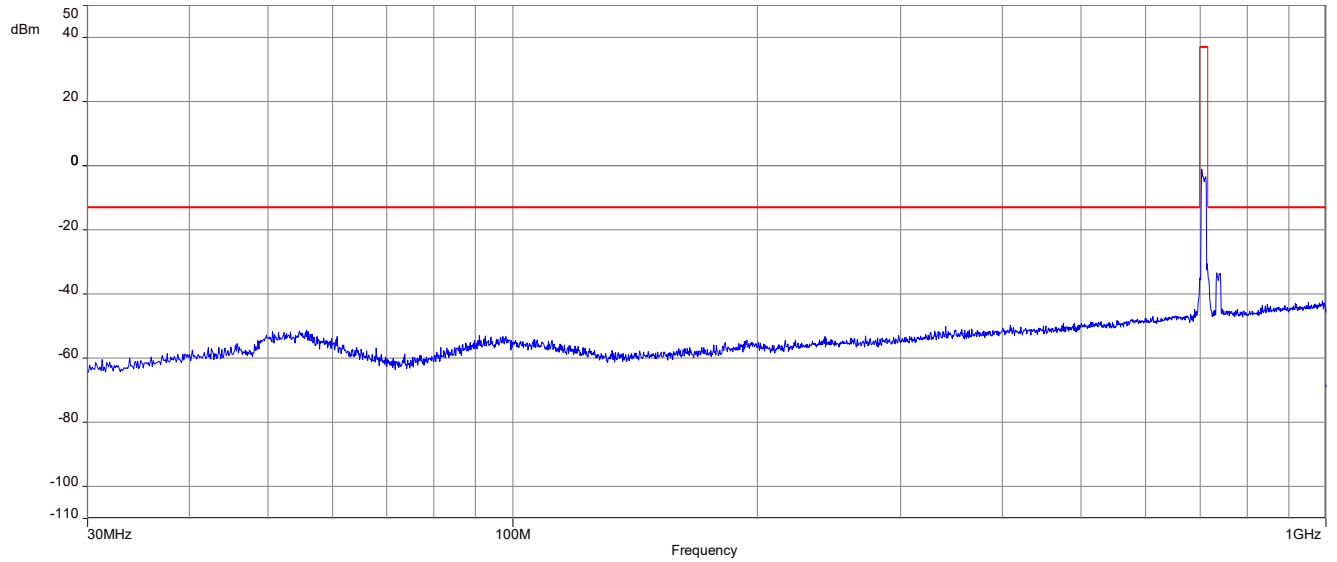
Plot 9: QPSK - Middle channel (1 GHz – 8 GHz)



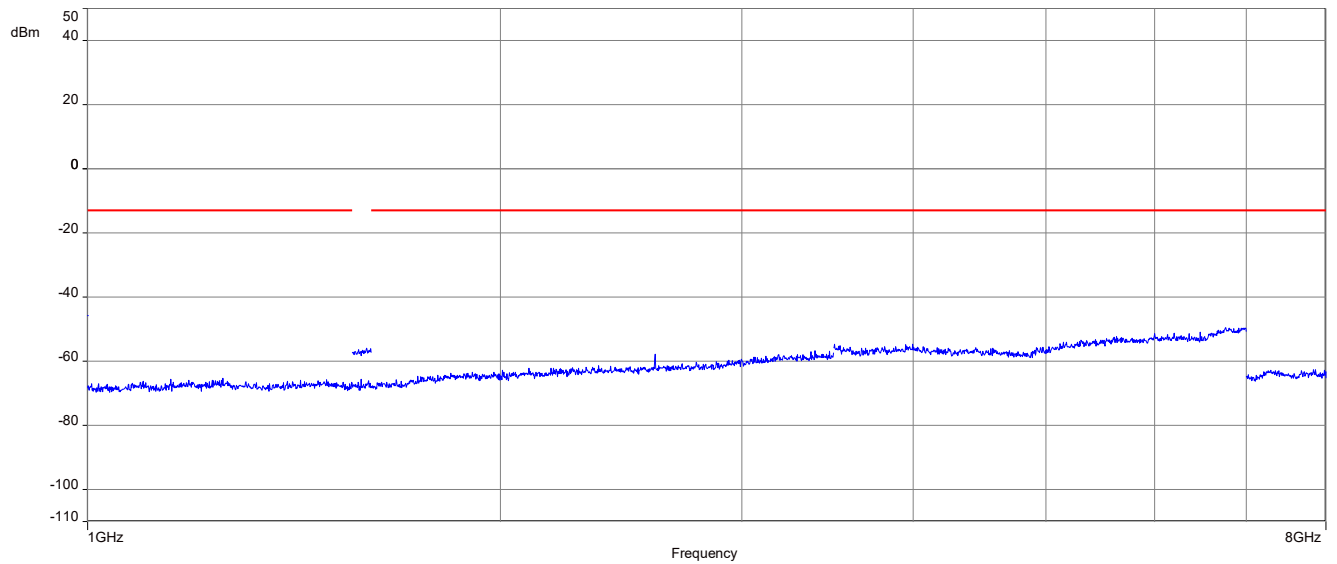
Plot 10: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 11: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 12: 16-QAM - Middle channel (1 GHz – 8 GHz)



16.5 Results LTE band 13

The EUT was set to transmit the maximum power.

16.5.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.4 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
§ 27.50(b)(10)	RSS-130, 4.6.1 & 4.6.3
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.	4.6.1: The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission. 4.6.3: The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.
Power: 34.77 dBm ERP PAPR: 13 dB (ISED only)	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
5	779.5	1 RB low	22.5	3.7	21.9	4.6
		1 RB high	22.6	4.6	21.9	5.4
		50% RB mid	21.6	4.7	20.6	5.6
		100% RB	21.6	5.2	20.6	6.0
	782	1 RB low	23.0	4.5	21.8	5.3
		1 RB high	22.7	4.3	21.9	5.1
		50% RB mid	21.7	5.0	20.8	5.9
		100% RB	21.7	5.2	20.7	6.0
	784.5	1 RB low	22.5	4.4	21.7	5.3
		1 RB high	22.9	4.1	22.1	4.9
		50% RB mid	21.7	4.8	20.7	5.7
		100% RB	21.6	5.0	20.7	5.7
10	782.0	1 RB low	22.5	3.5	21.5	4.4
		1 RB high	22.5	4.4	21.7	5.2
		50% RB mid	21.8	5.0	20.8	5.9
		100% RB	21.6	5.2	20.7	6.0

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
5	779.5	26.4	25.6
	782.0	26.4	25.3
	784.5	26.3	25.5
10	782.0	26.1	25.3

16.5.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 782 MHz. Measured up to 8 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 13.

Measurement:

Measurement parameters	
Detector:	Peak / RMS
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

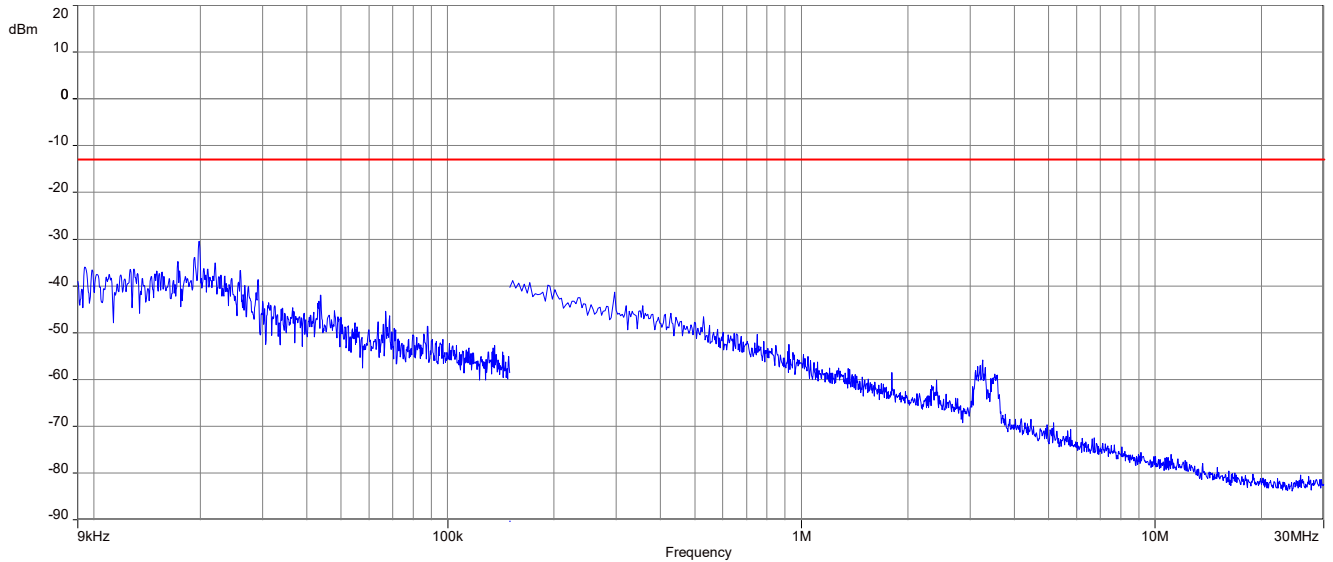
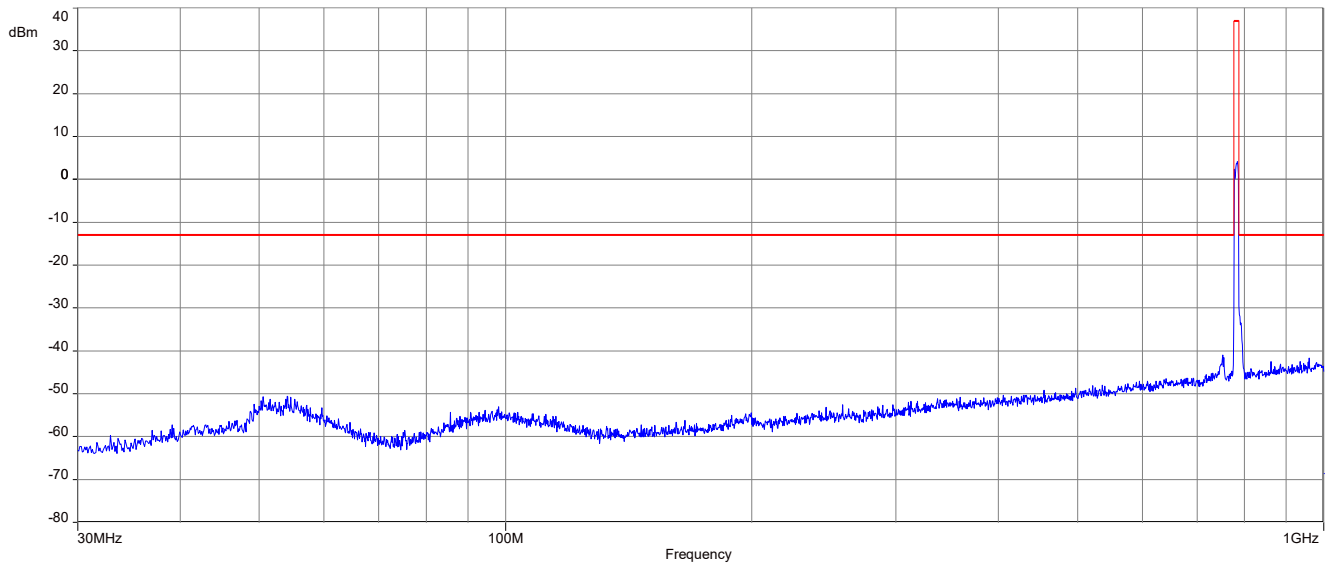
FCC	ISED
§ 27.53(c)	RSS-130, 4.7.1
(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.	The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.
-13 dBm	

Results:**QPSK:**

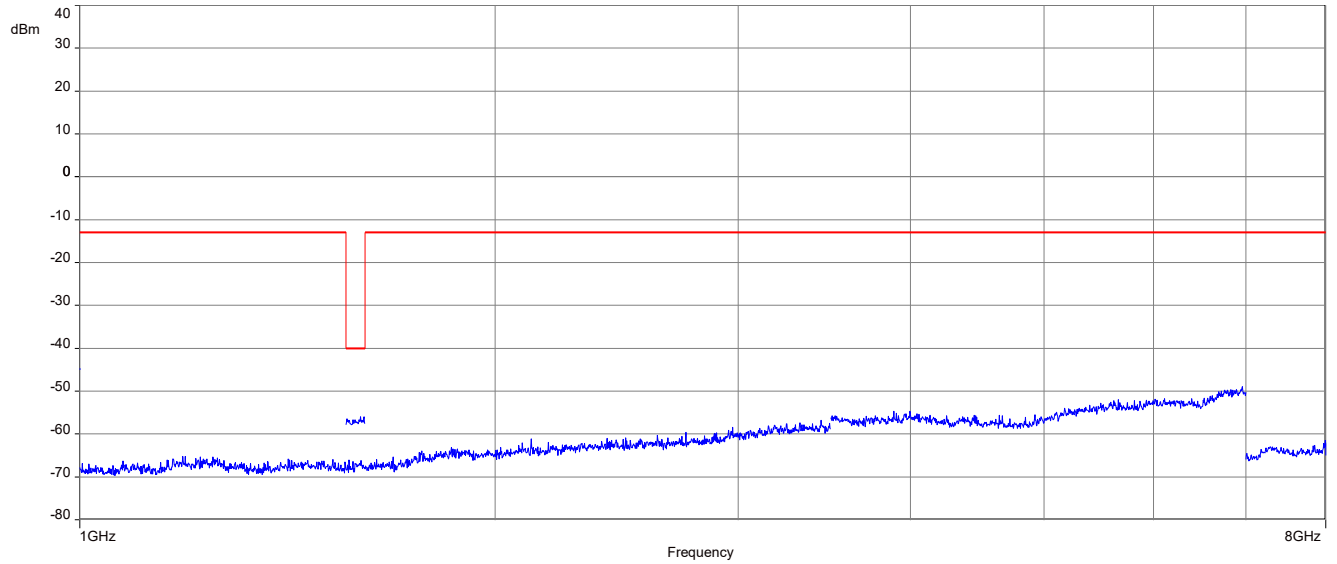
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

16-QAM:

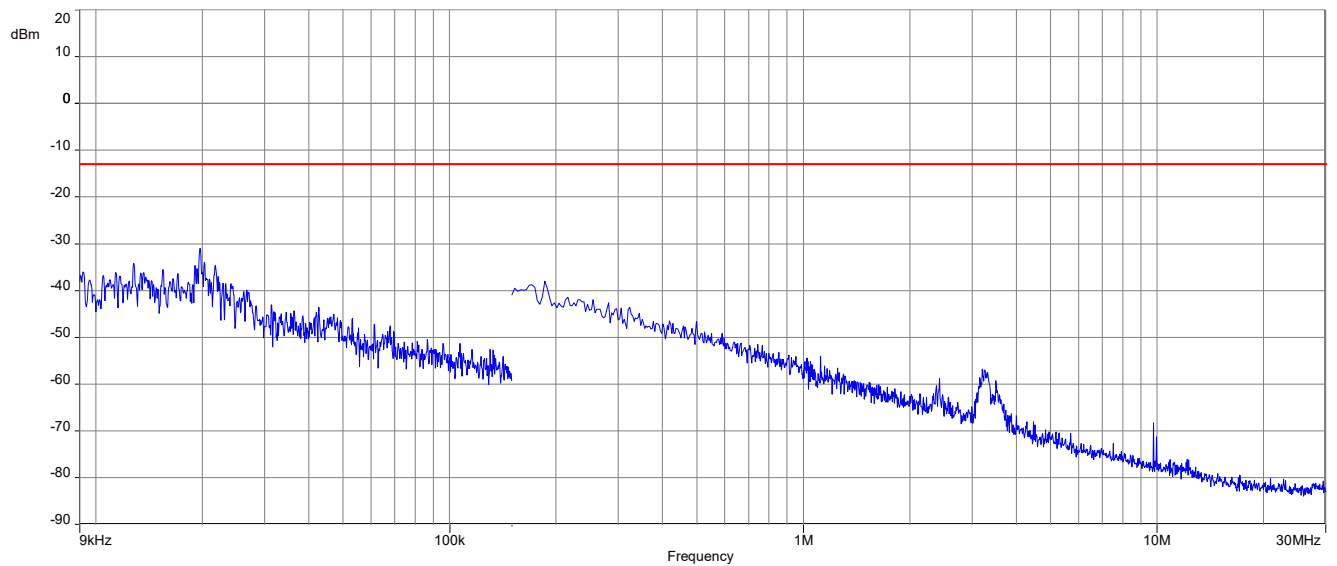
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

Plots DUT horizontal:**Plot 1:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 2:** QPSK - Middle channel (30 MHz – 1 GHz)

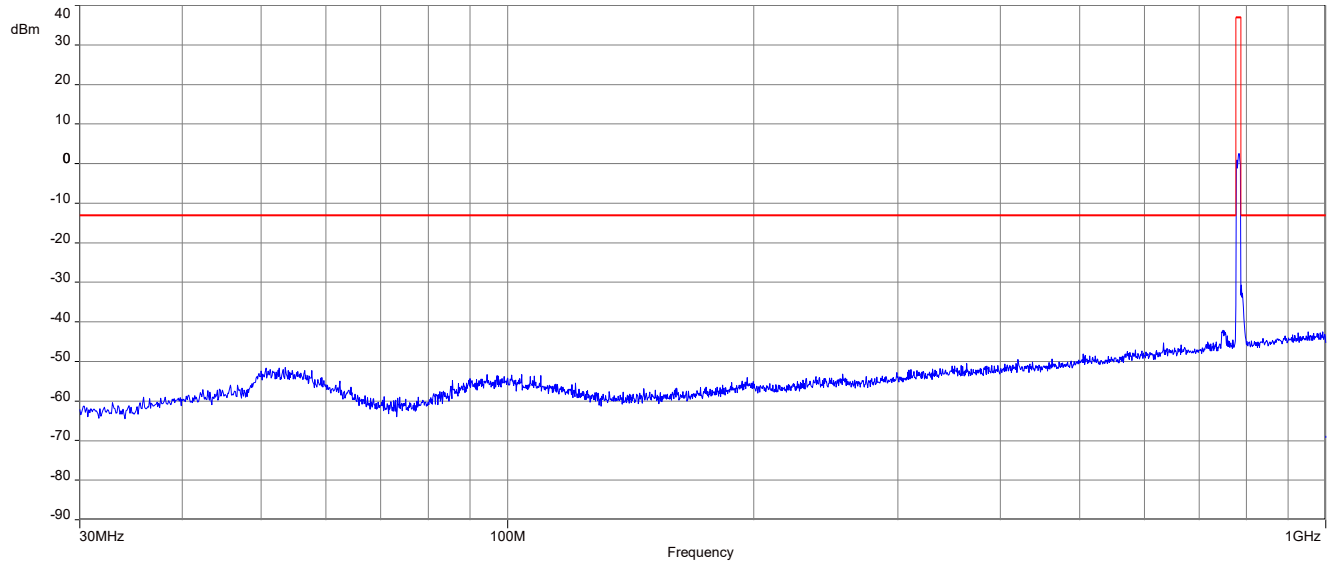
Plot 3: QPSK - Middle channel (1 GHz – 8 GHz)



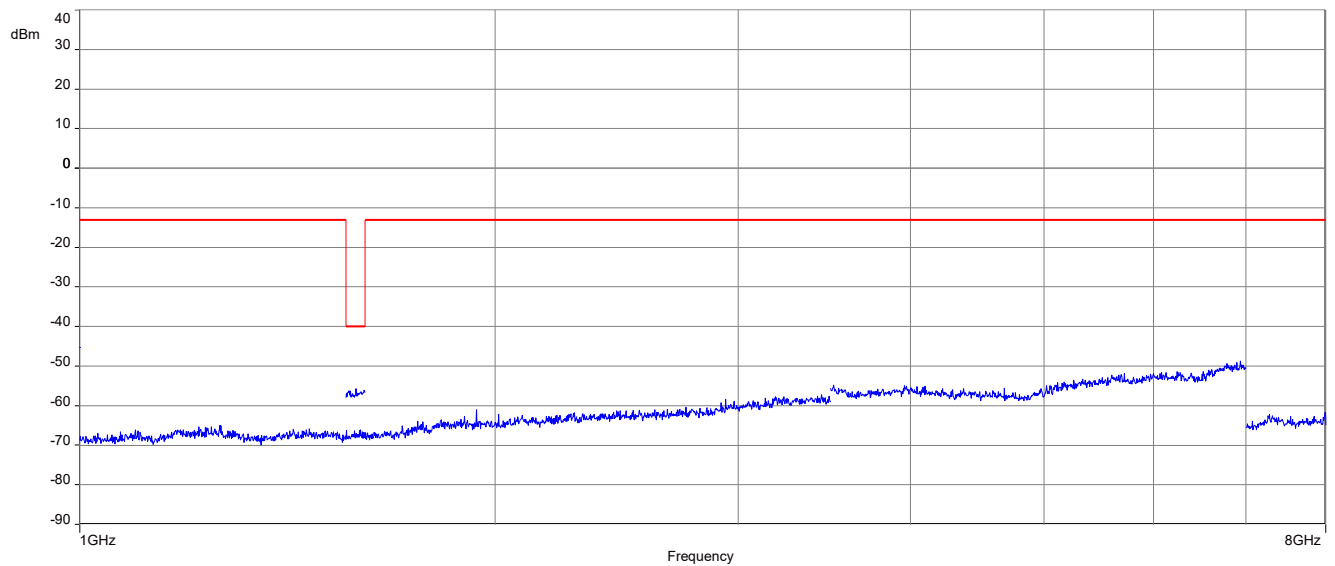
Plot 4: 16-QAM - Middle channel (9 kHz - 30 MHz)

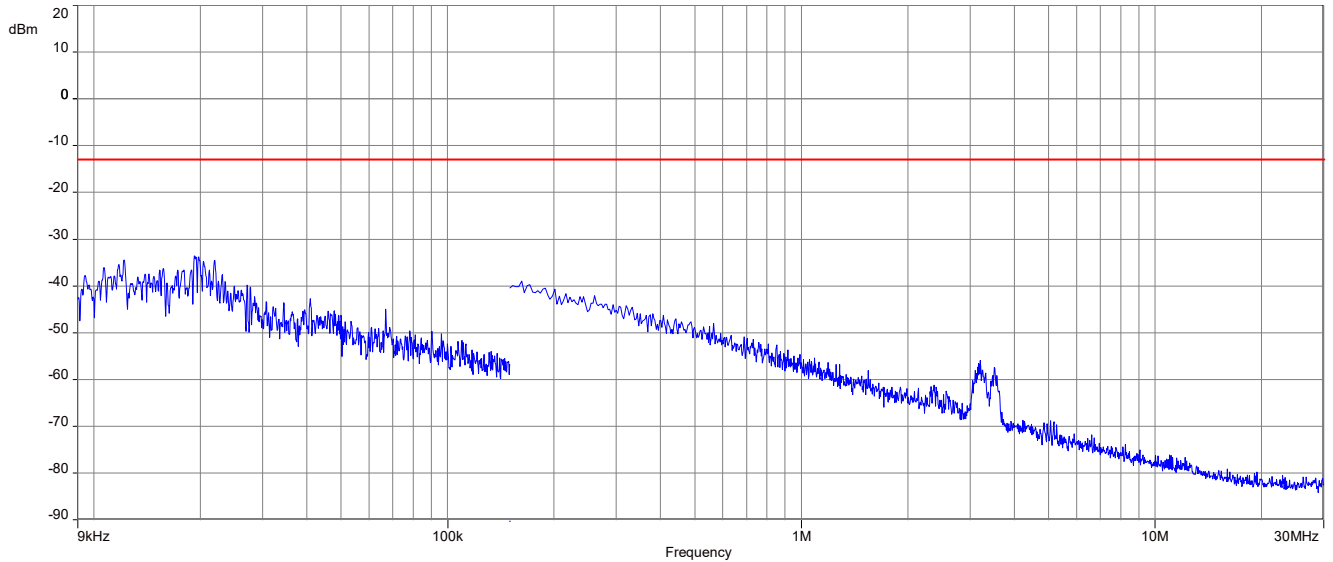
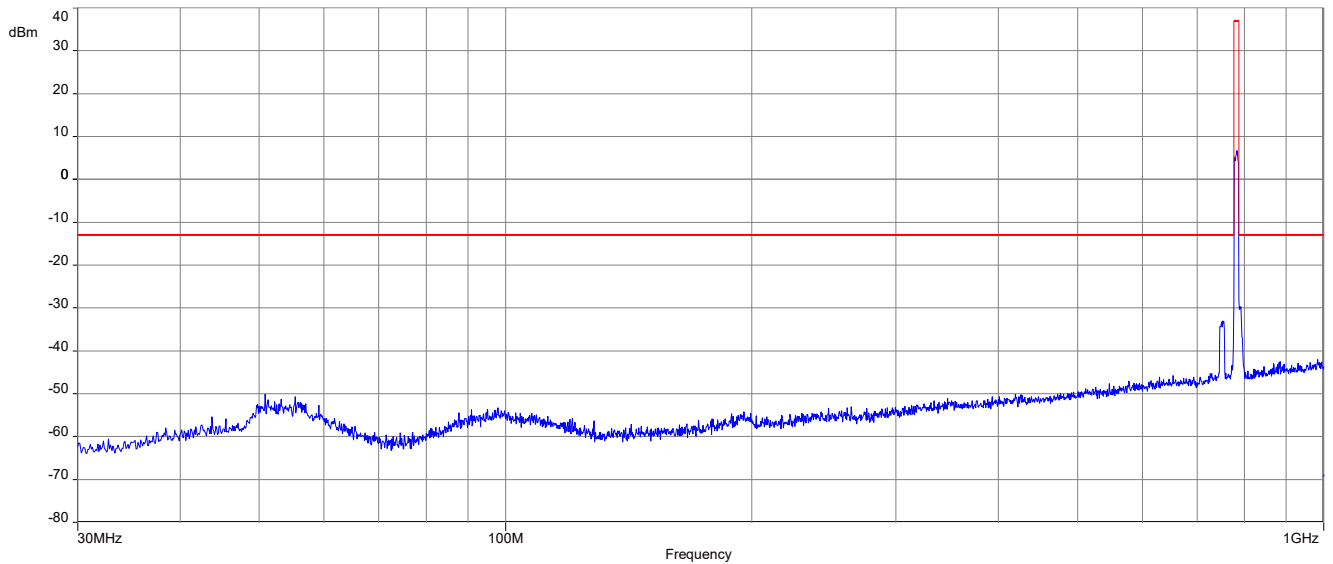


Plot 5: 16-QAM - Middle channel (30 MHz – 1 GHz)

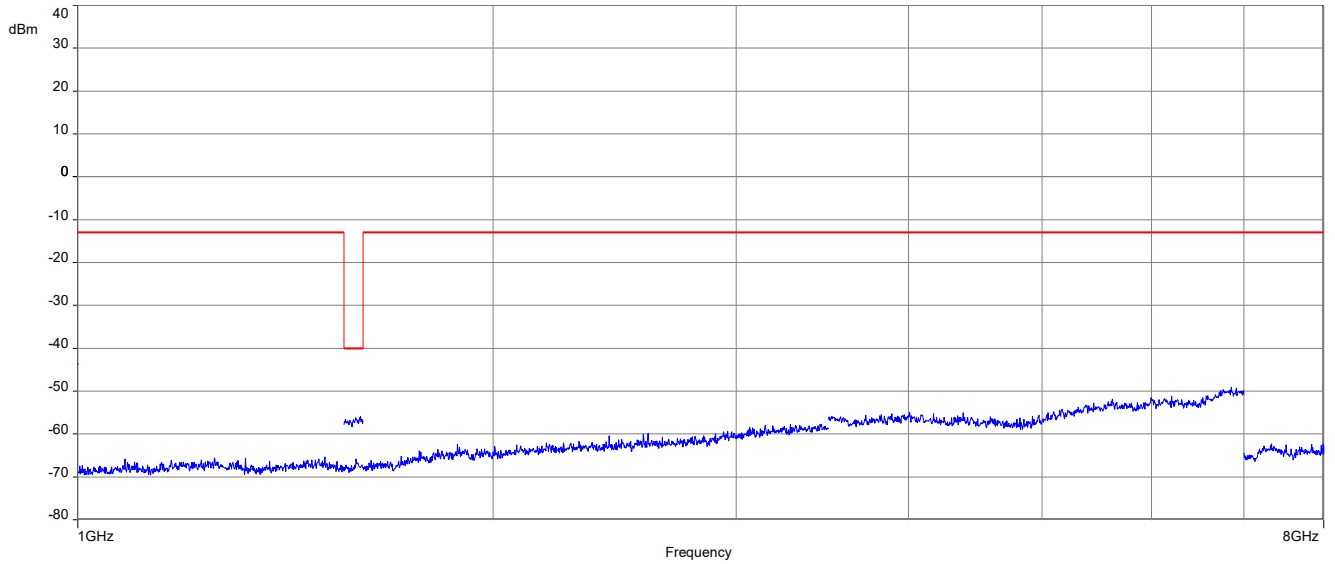


Plot 6: 16-QAM - Middle channel (1 GHz – 8 GHz)

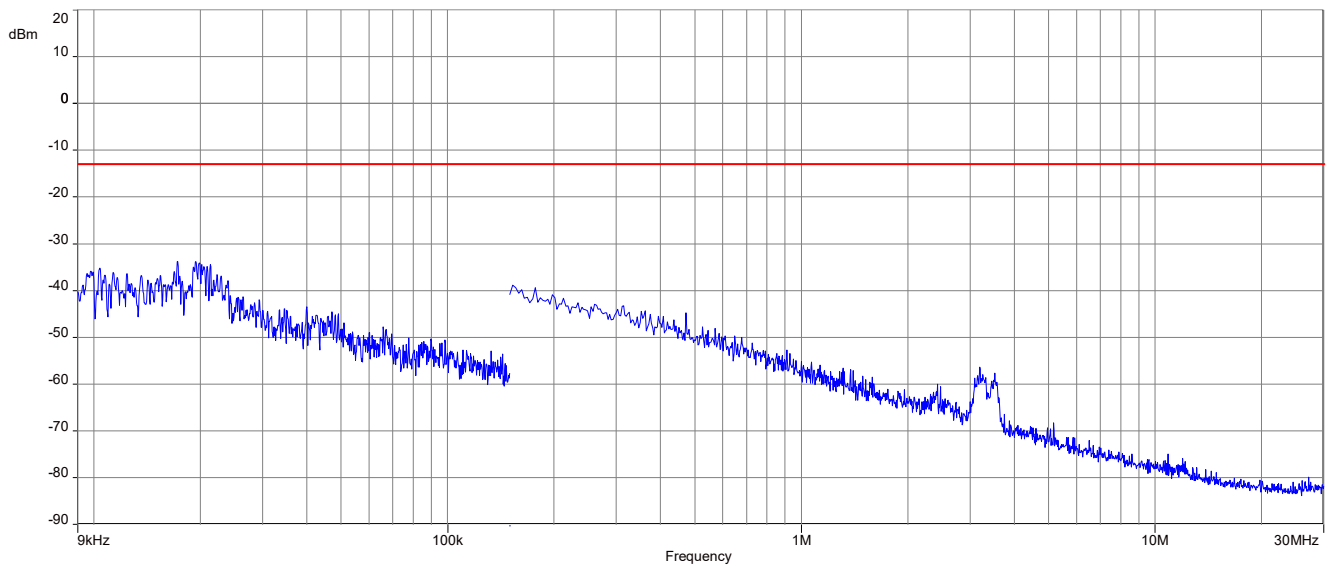


Plots DUT vertical:**Plot 7:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 8:** QPSK - Middle channel (30 MHz – 1 GHz)

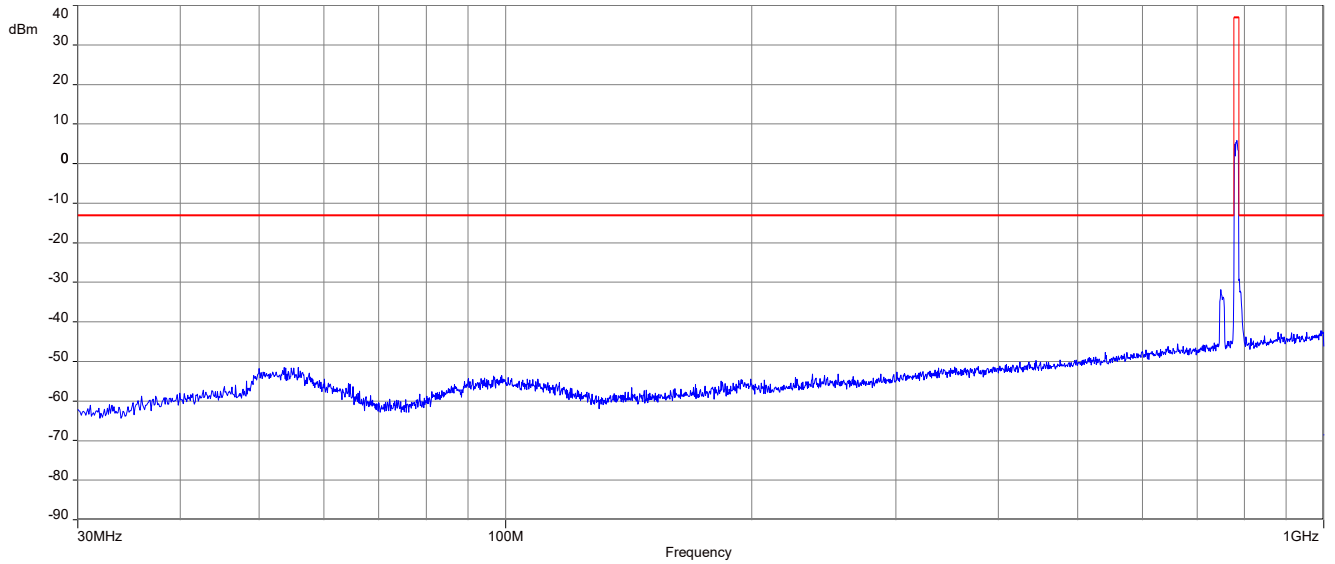
Plot 9: QPSK - Middle channel (1 GHz – 8 GHz)



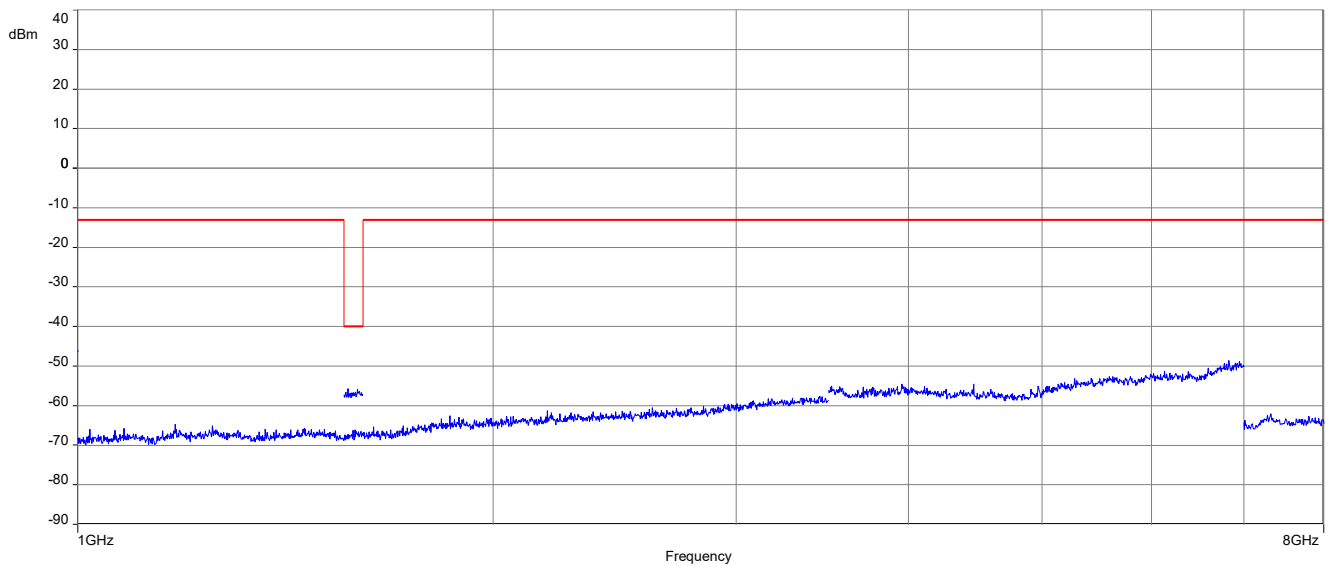
Plot 10: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 11: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 12: 16-QAM - Middle channel (1 GHz – 8 GHz)



16.6 Results LTE band 71

The EUT was set to transmit the maximum power.

16.6.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Sample
AQT:	See plot
Resolution bandwidth:	40 MHz
Used equipment:	See chapter 7.4 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1046 ISED: RSS-Gen, 6.12

Limits:

FCC	ISED
§ 27.50(b)(10)	RSS-130, 4.6.1 & 4.6.3
Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.	4.6.1: The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission. 4.6.3: The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.
Power: 34.77 dBm ERP PAPR: 13 dB (ISED only)	

Results:

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
5	665.5	1 RB low	22.9	4.3	22.1	5.0
		1 RB high	23.5	4.0	22.7	4.9
		50% RB mid	22.4	4.8	21.5	5.7
		100% RB	22.5	4.9	21.5	5.8
	680.5	1 RB low	23.6	4.8	22.9	5.6
		1 RB high	23.7	4.4	22.9	5.2
		50% RB mid	22.7	5.1	21.7	6.0
		100% RB	22.7	5.3	21.7	6.0
	695.5	1 RB low	23.2	4.8	22.4	5.6
		1 RB high	23.4	4.3	22.7	5.0
		50% RB mid	22.1	5.0	21.3	5.9
		100% RB	22.0	5.1	21.3	5.9
10	668.0	1 RB low	23.5	4.3	22.8	5.1
		1 RB high	23.5	4.8	22.7	5.6
		50% RB mid	22.8	4.9	21.8	5.8
		100% RB	22.7	5.1	21.7	6.0
	680.5	1 RB low	23.5	4.9	22.7	5.7
		1 RB high	23.4	4.3	22.6	5.1
		50% RB mid	22.8	5.1	21.8	6.0
		100% RB	22.7	5.1	21.7	5.9
	693.0	1 RB low	23.4	4.6	22.6	5.3
		1 RB high	23.2	4.3	22.4	5.1
		50% RB mid	22.3	5.2	21.6	6.0
		100% RB	22.2	5.1	21.5	5.9
15	670.5	1 RB low	23.5	4.3	22.8	5.0
		1 RB high	23.6	4.8	22.8	5.6
		50% RB mid	23.0	5.1	22.0	6.0
		100% RB	22.9	5.4	22.0	6.1
	680.5	1 RB low	23.6	4.8	22.7	5.7
		1 RB high	23.4	4.2	22.6	5.0
		50% RB mid	23.0	5.0	22.0	5.9
		100% RB	22.8	5.1	21.8	5.9
	690.5	1 RB low	23.3	4.3	22.5	5.1
		1 RB high	23.2	4.2	22.3	5.1
		50% RB mid	22.6	5.1	21.6	5.9
		100% RB	22.1	5.3	21.4	6.0

Output Power (conducted)						
Bandwidth (MHz)	Frequency (MHz)	Resource block allocation	Average Output Power (dBm) QPSK	Peak to Average Ratio (dB)	Average Output Power (dBm) 16-QAM	Peak to Average Ratio (dB)
20	673.0	1 RB low	23.0	4.3	22.5	4.9
		1 RB high	23.4	4.4	22.6	5.1
		50% RB mid	23.0	5.2	22.0	6.1
		100% RB	22.8	5.3	21.8	6.1
	680.5	1 RB low	23.0	4.7	22.4	5.4
		1 RB high	23.2	4.6	22.4	5.4
		50% RB mid	22.9	5.0	21.9	5.9
		100% RB	22.7	5.0	21.7	5.9
	688.0	1 RB low	23.1	4.7	22.4	5.4
		1 RB high	22.9	4.3	22.1	5.1
		50% RB mid	22.6	5.0	21.6	5.8
		100% RB	22.0	5.2	21.3	6.0

The radiated output power is measured in the mode with the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm) QPSK	Average Output Power (dBm) 16-QAM
5	665.5	26.9	26.1
	680.5	27.1	26.3
	695.5	26.8	26.1
10	668.0	27.2	26.4
	680.5	27.1	26.3
	693.0	27.0	26.1
15	670.5	27.3	26.6
	680.5	27.3	26.5
	690.5	27.1	26.3
20	673.0	27.4	26.6
	680.5	27.3	26.5
	688.0	27.1	26.5

16.6.2 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2014 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 680.5 MHz. Measured up to 8 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 13.

Measurement:

Measurement parameters	
Detector:	Peak / RMS
Sweep time:	2 sec.
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Used equipment:	See chapter 7.2 setup A
Measurement uncertainty:	See chapter 9
Measurement procedure	FCC: § 2.1053 ISED: RSS-Gen, 6.13

Limits:

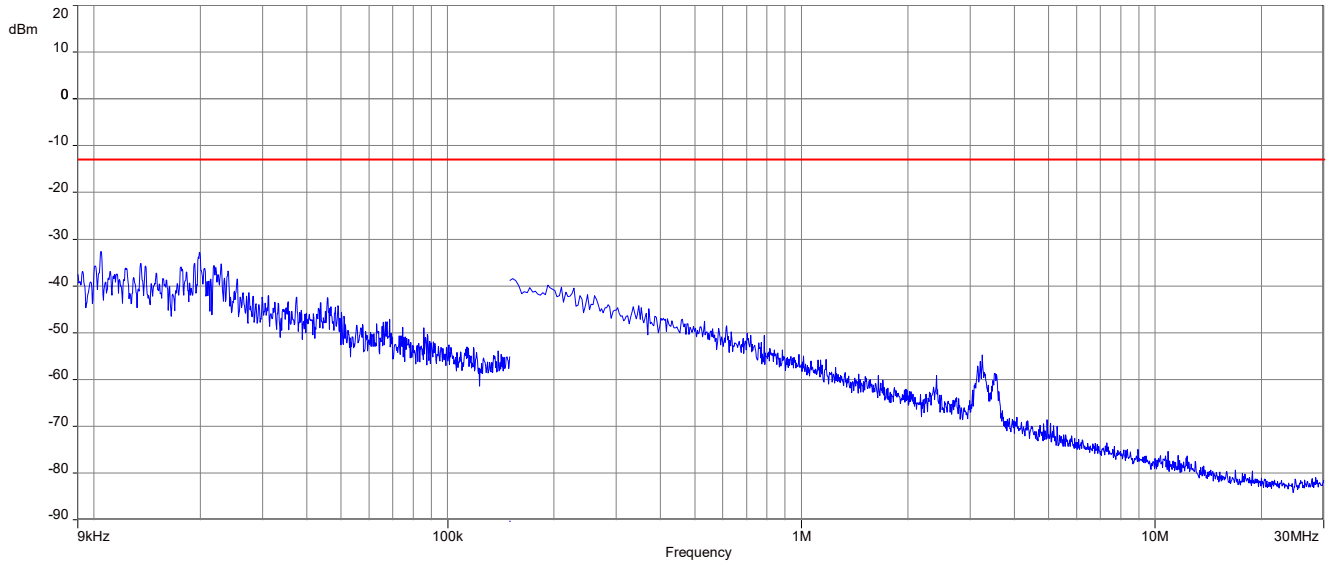
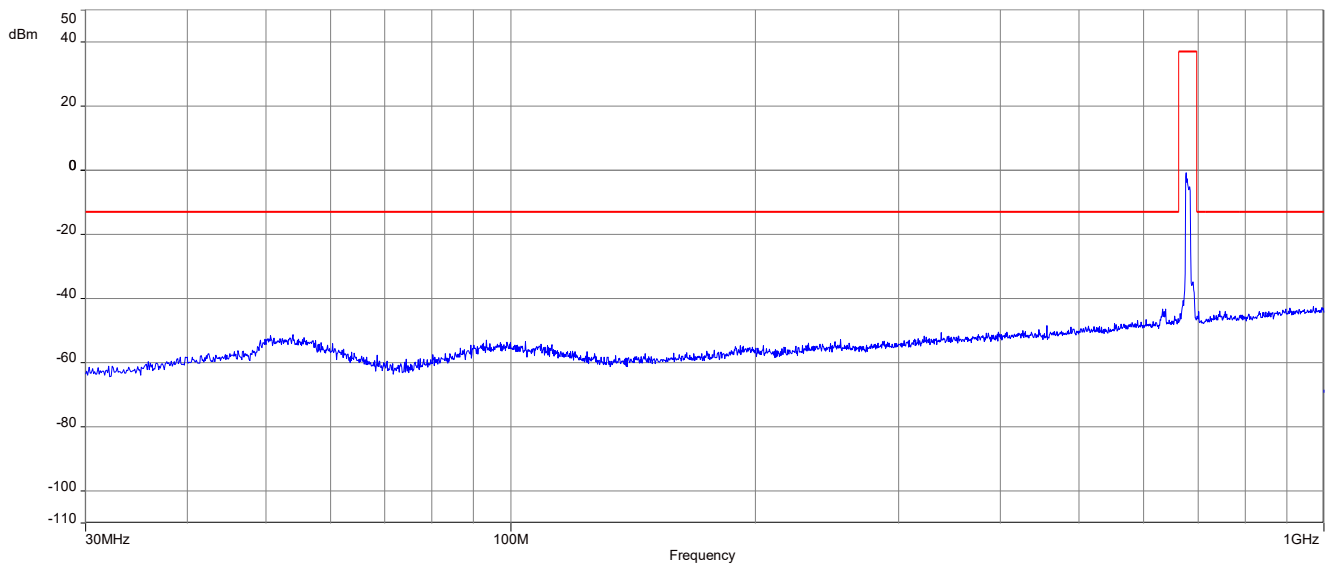
FCC	ISED
§ 27.53(c)	RSS-130, 4.7.1
(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.	The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.
-13 dBm	

Results:**QPSK:**

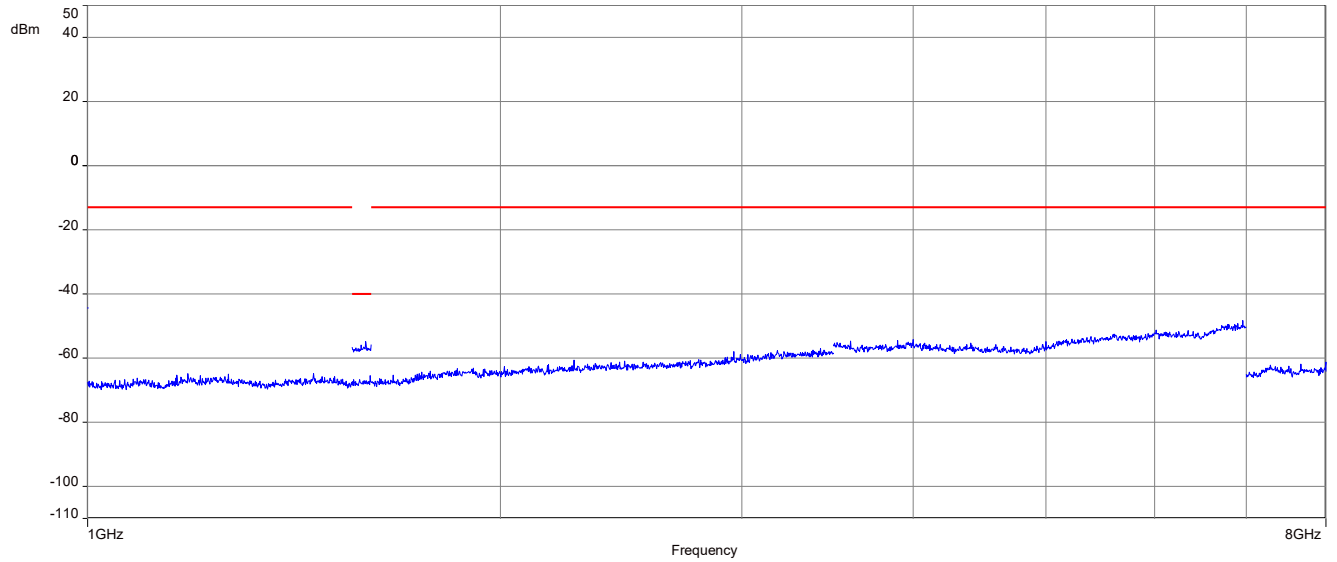
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

16-QAM:

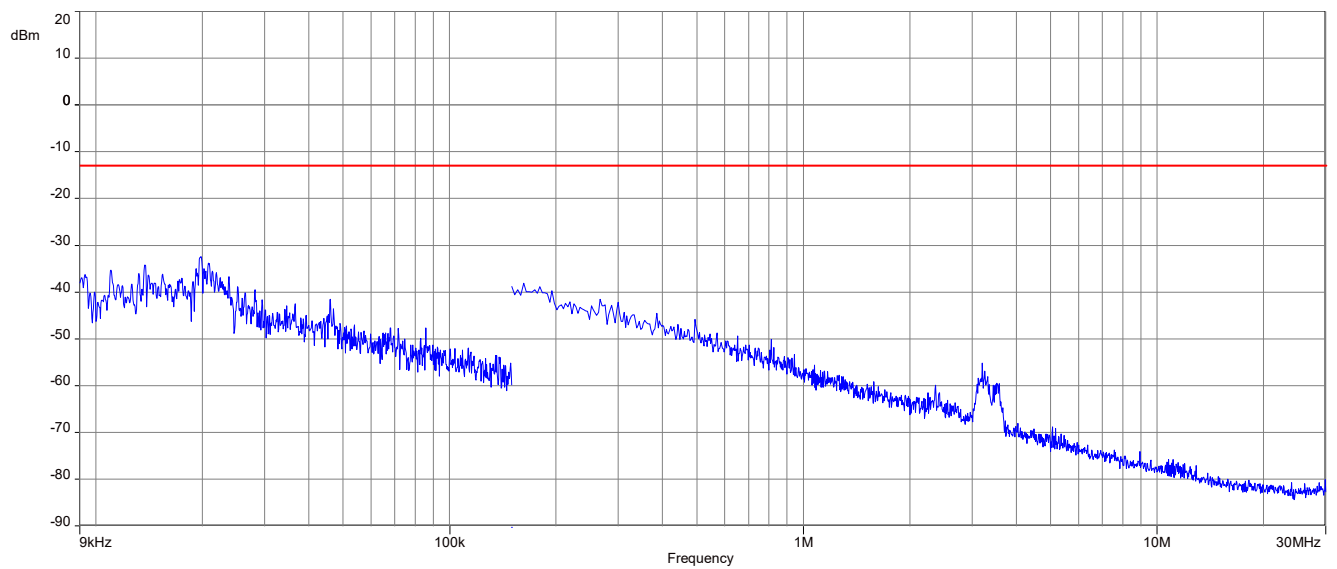
SPURIOUS EMISSION LEVEL					
LOWEST CHANNEL		MIDDLE CHANNEL		HIGHEST CHANNEL	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
-/-		-/-		-/-	

Plots DUT horizontal:**Plot 13:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 14:** QPSK - Middle channel (30 MHz – 1 GHz)

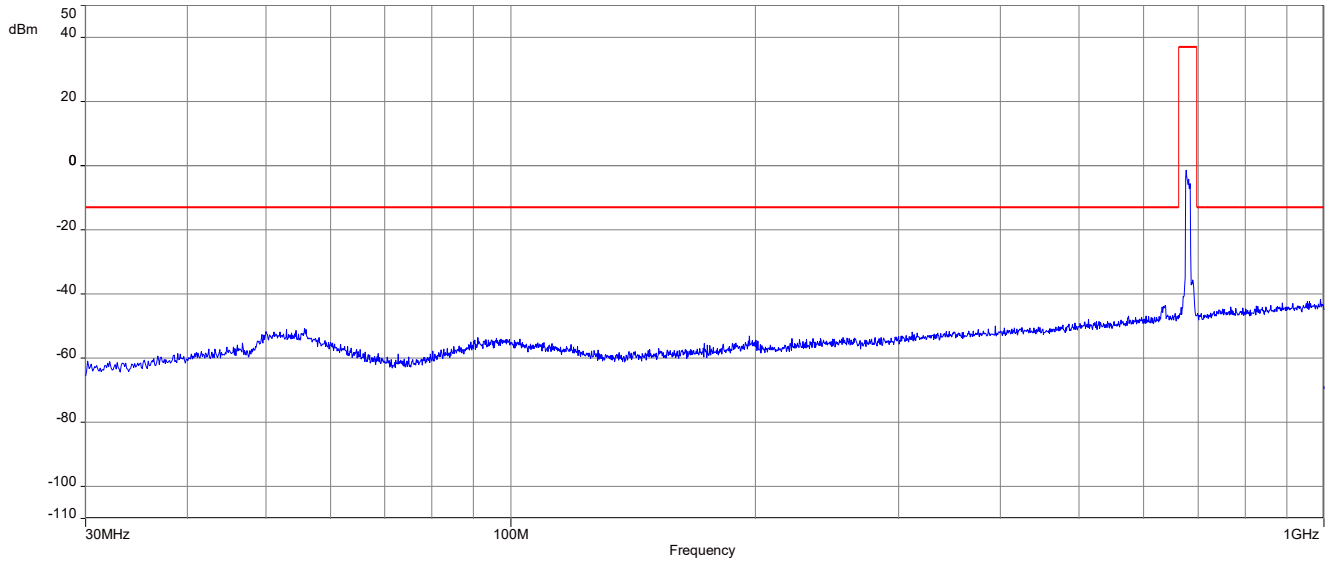
Plot 15: QPSK - Middle channel (1 GHz – 8 GHz)



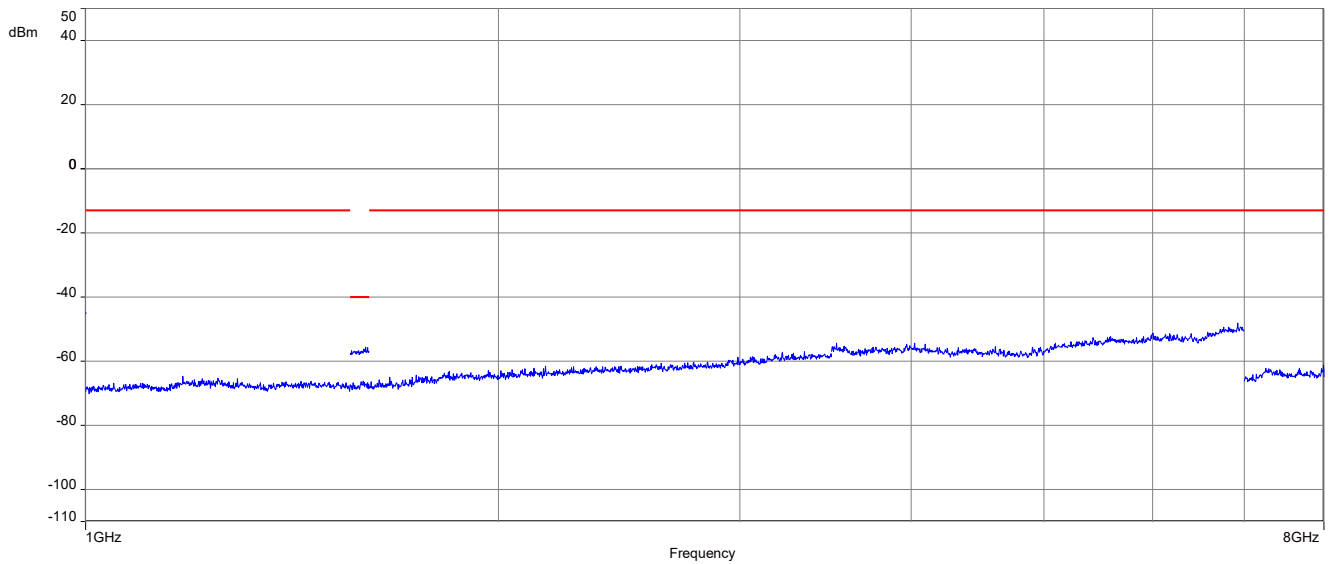
Plot 16: 16-QAM - Middle channel (9 kHz - 30 MHz)

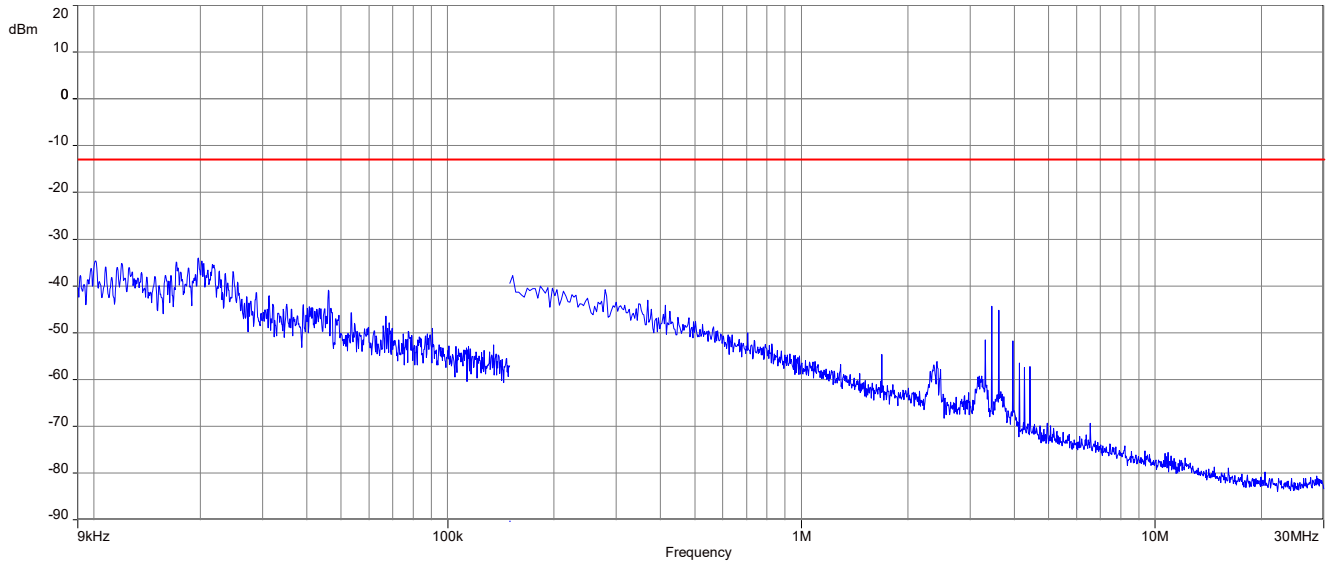
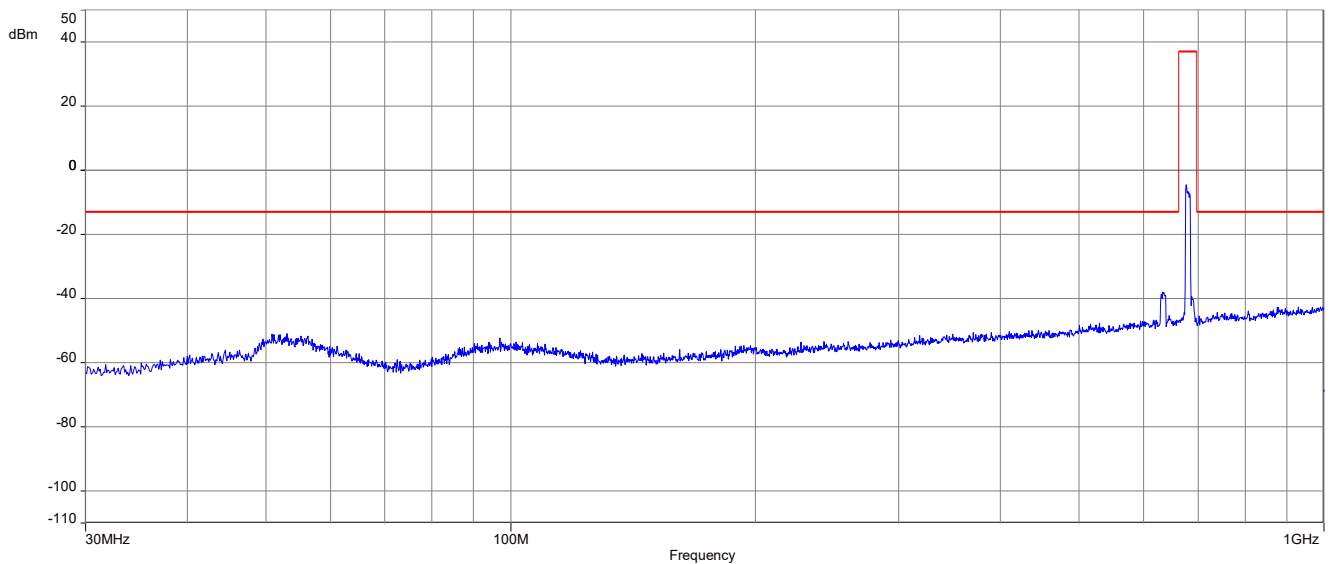


Plot 17: 16-QAM - Middle channel (30 MHz – 1 GHz)

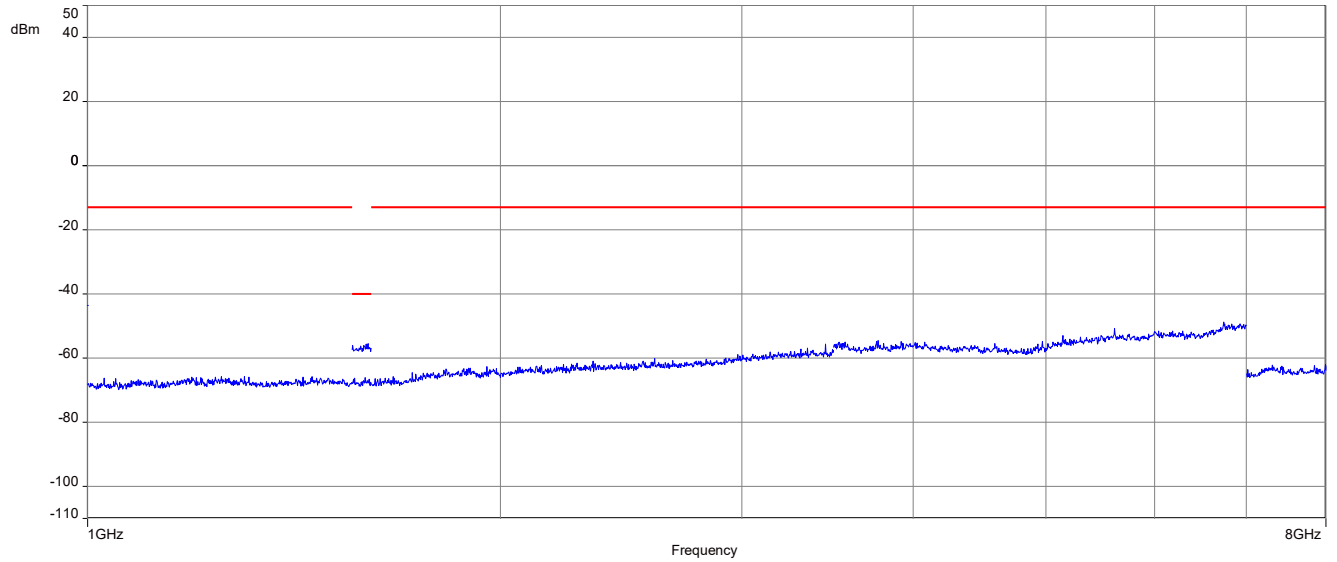


Plot 18: 16-QAM - Middle channel (1 GHz – 8 GHz)

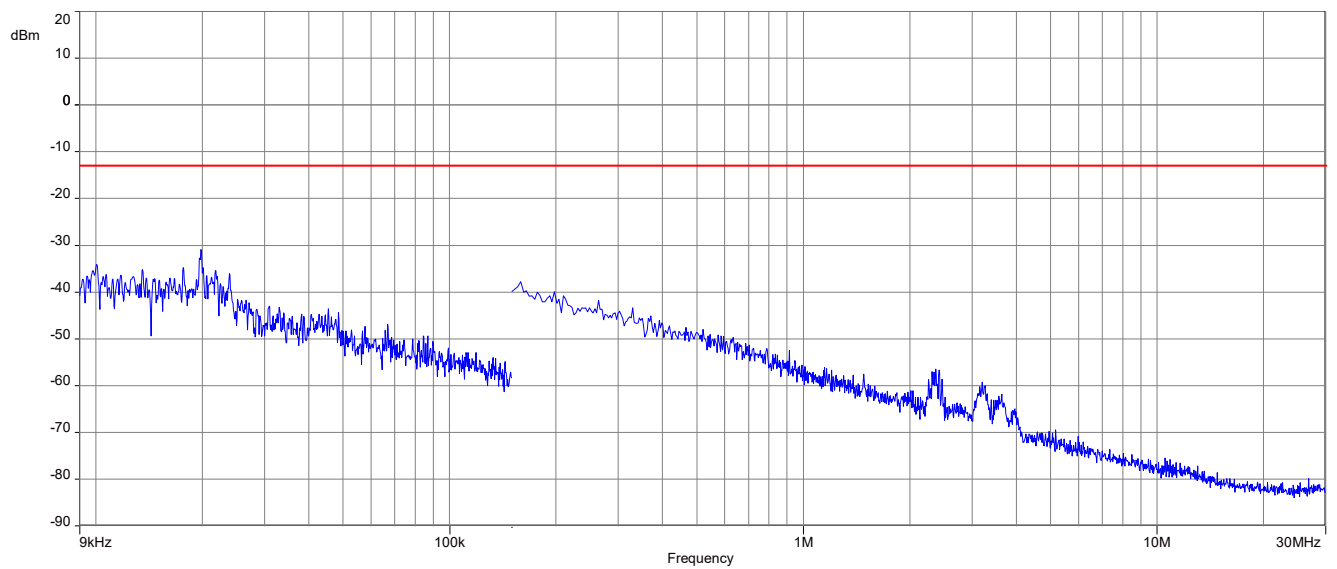


Plots DUT vertical:**Plot 19:** QPSK - Middle channel (9 kHz - 30 MHz)**Plot 20:** QPSK - Middle channel (30 MHz – 1 GHz)

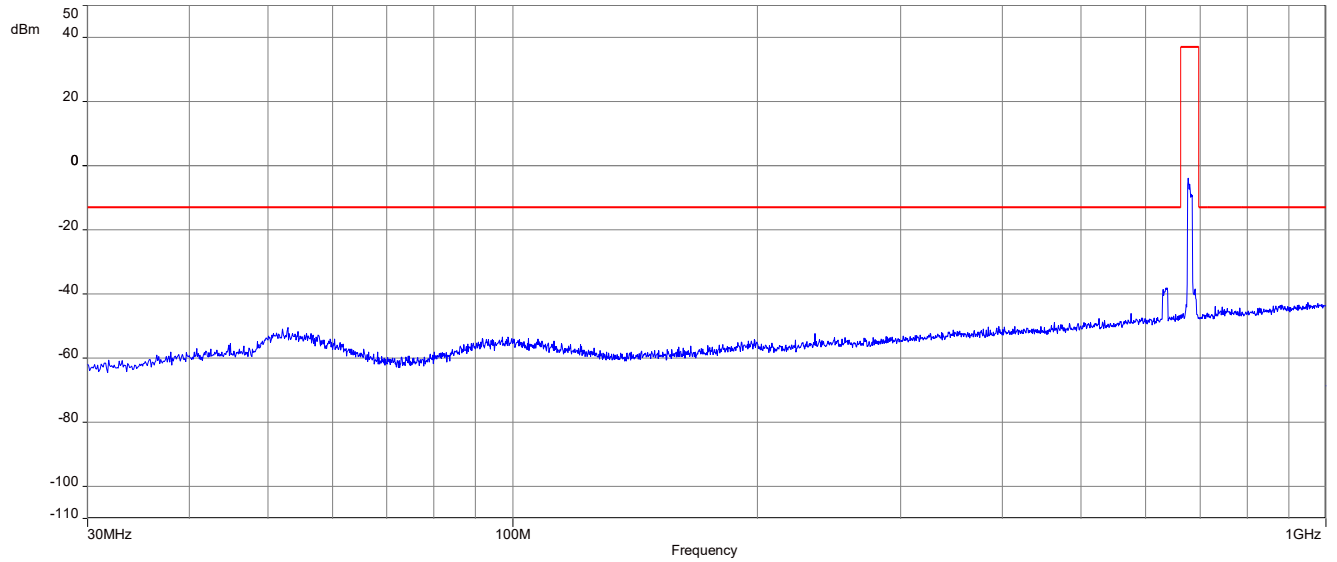
Plot 21: QPSK - Middle channel (1 GHz – 8 GHz)



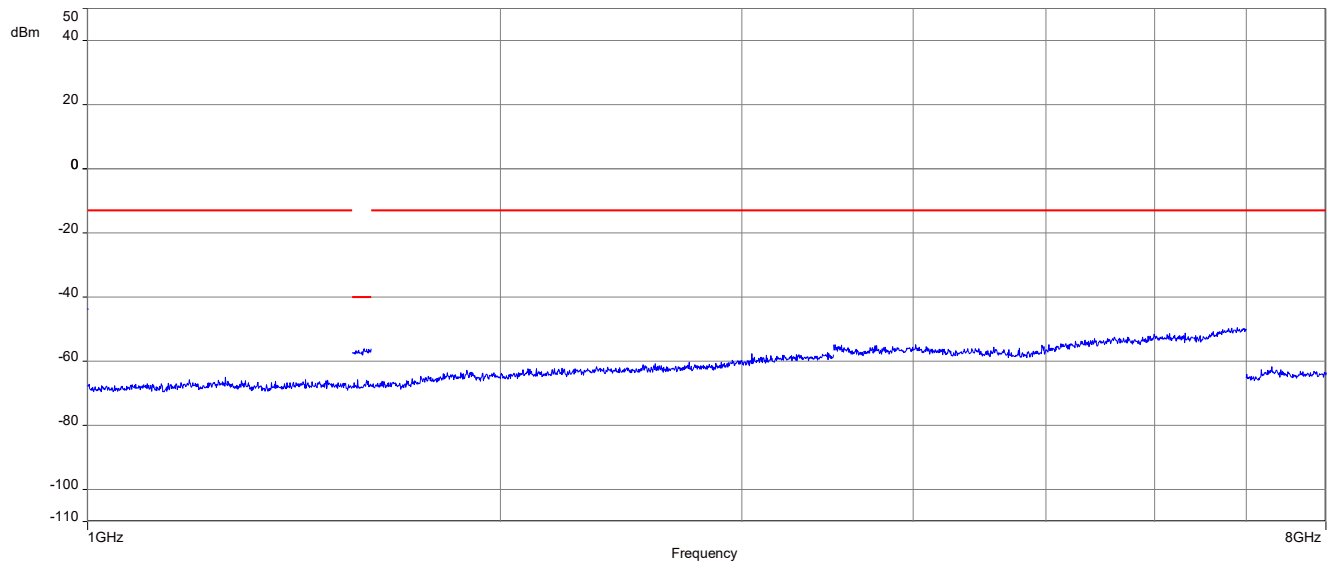
Plot 22: 16-QAM - Middle channel (9 kHz - 30 MHz)



Plot 23: 16-QAM - Middle channel (30 MHz – 1 GHz)



Plot 24: 16-QAM - Middle channel (1 GHz – 8 GHz)



17 Observations

No observations except those reported with the single test cases have been made.

18 Glossary

AVG	Average
C	Compliant
C/N₀	Carrier to noise-density ratio, expressed in dB-Hz
CAC	Channel availability check
CW	Clean wave
DC	Duty cycle
DFS	Dynamic frequency selection
DSSS	Dynamic sequence spread spectrum
DUT	Device under test
EN	European Standard
ETSI	European Telecommunications Standards Institute
EMC	Electromagnetic Compatibility
EUT	Equipment under test
FCC	Federal Communications Commission
FCC ID	Combination of Grantee Code and Equipment Product Code
FHSS	Frequency hopping spread spectrum
FVIN	Firmware version identification number
GNSS	Global Navigation Satellite System
GUE	GNSS User Equipment
HMN	Host marketing name
HVIN	Hardware version identification number
HW	Hardware
ISED	Innovation, Science and Economic Development Canada
Inv. No.	Inventory number
MC	Modulated carrier
NA	Not applicable
NC	Not compliant
NOP	Non occupancy period
NP	Not performed
OBW	Occupied bandwidth
OC	Operating channel
OCW	Operating channel bandwidth
OFDM	Orthogonal frequency division multiplexing
OOB	Out of band
OP	Occupancy period
PER	Packet error rate
PMN	Product marketing name
PP	Positive peak
QP	Quasi peak
RLAN	Radio local area network
S/N or SN	Serial number
SW	Software
UUT	Unit under test
WLAN	Wireless local area network

19 Document history

Version	Applied changes	Date of release
R01	Initial release	2025-10-30

END OF TEST REPORT