

Test Report

of

JLT6012A
FCC ID: VGX6012A

according to

FCC 47 CFR, Part 15 Subpart C
15.225 Operation within the band 13.110 – 14.010 MHz

Performed by



David Busk
Lab. Manager, M. Sc. EE.

Examined by



Søren Søltøft
Senior EMC Engineer



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FCC ID: VGX6012A

Date
2021-01-14

Reference
P20-0146-3

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Report no.:	P20-0146-3	Report date:	2021-01-14
Test started:	2020-12-08	Test ended:	2020-12-16
Test laboratory:	EKTOS TRS A/S Peter Bangs Vej 17 7600 Struer Denmark	Client:	JLT Mobile Computers Isbjörnsvägen 3 352 45 Växjö Sweden
Contact person:	David Busk	Contact person:	Johan Elfström
Facility reg. no.	FCC Designation number: DK0003		
Test specimen:	JLT6012A		
Test specification:	<p>FCC 47 CFR Part 15 Subpart C 15.225 Operation within the band 13.11 – 14.01 MHz.</p> <p>The tests relevant for the test specimens are listed in <i>section 1.1</i>.</p>		
Documentation:	<p>This test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory.</p> <p>The complete test documentation is archived for 10 years at the testing laboratory.</p>		
Test results:	<p>The test specimen complies with relevant parts of the test specifications.</p> <p>The test results relate only to the specimen tested.</p>		
Test personnel:	Søren Søltøft	David Busk	

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Appendix issued in separate report

1 Photos of test setups and equipment.

1 SUMMARY

See Appendix 1 for photos.

1.1 Test plan

Standard	Name of the test	Results
FCC 47 CFR Part 15C	15.225 Operation within the band 13.110 – 14.010 MHz	PASSED
15.225 (a)	Field strength of fundamental emission	PASSED
15.225 (b), (c)	Field strength of in band emission	PASSED
15.225 (d)	Emission outside frequency band	PASSED
15.225 (e)	Frequency stability	PASSED
15.203	Antenna requirement	PASSED
15.207 (a)	AC conducted emission	NR ¹
15.215 (c)	Occupied bandwidth	PASSED

PASSED The test was performed and the test specimen complies with the essential requirements in the standard.
 FAILED The test was performed and the test specimen does not comply with the essential requirements in the standard.
 REF The test is covered by a test in another report and/or on a similar test specimen.
 NR The test is not relevant for the test specimen or has been waived by the manufacturer.

Note 1: The test specimen is powered by DC power and installed in a vehicular environment. The product will not be directly nor indirectly connected to a public mains network.

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1.2 Test specimen

Manufacturer	JLT Mobile
Name	JLT6012A
Model	JLT6012A
Serial number	6012A-000017
Part number	102200
Firmware	MCU: 109
Software	mage: 20200904.1599193220_sierra_userdebug
Revision	-
Supply voltage	12 - 60 VDC
Carrier frequency	13.56 MHz
Antenna	Internal Fixed
Test duty cycle	100%

During test a special firmware enabling the control of radio parameters was used.

The RF ID reader is built into a computer intended for installation in vehicle.

See photo in appendix 1.

2 TESTS

2.1 Field strength of fundamental emission

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (a)
Test method	ANSI C63.10:2013 sec. 6.4
Comments	None
Temperature / Humidity	8°C / 92%RH
Dates of measurements	2020-12-16
Test personnel	Søren Søltøft, Peter Baastrup

2.1.1 Test setup

The test specimen was placed 0.8 m above ground at an open area test site without ground plan. The measurements were performed at a distance of 30 m. The test specimen was rotated for maximal level.

The measurement was performed with the antenna in parallel (V), perpendicular (V-90) and ground-parallel (H) orientations.

See photo of test set up in appendix 1.

2.1.2 Test result

Field strength in the band 13.553 to 13.567 MHz shall not exceed 15848 $\mu\text{V/m}$ at 30 m. The level is converted to dB $\mu\text{V/m}$.

Frequency [MHz]	QP [dB $\mu\text{V/m}$]	BW [kHz]	Corr. Fac. [dB]	Ant Pol.	F.S. [dB $\mu\text{V/m}$]	Margin [dB]	Limit [dB $\mu\text{V/m}$]	Result
13.5600	21.1	9.000	18.64	V	39.7	44.3	84.0	PASSED
13.5600	11.2	9.000	18.64	V-90	29.8	54.2	84.0	PASSED
13.5600	16.1	9.000	18.64	H	34.7	49.3	84.0	PASSED

Table 1. Field strength of fundamental emissions test results.

The field strength of fundamental emissions test results were close to the noise floor.

For result of field strength of fundamental as function of supply voltage see section 2.6 Frequency stability versus supply voltage.

2.1.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Antenna Magnetic Loop 9 kHz - 30 MHz	Rohde & Schwarz	HFH2-Z2	30119966	2022-02-25
Receiver EMI Test 9KHz-2750MHz	Rohde & Schwarz	ESCS30	30114993	2021-08-03

Table 2. Radiated emission test equipment.

2.2 Field strength of in band emission

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (a), (b), (c)
Test method	ANSI C63.10:2013 sec. 6.4
Comments	None
Temperature / Humidity	23°C / 36%RH
Dates of measurements	2020-12-08
Test personnel	David Busk

2.2.1 Test setup

Due to high ambient noise level at open area test site the measurements were performed in a semi anechoic chamber.

The test specimen was placed in vertical position 0.8 m above ground, and rotated 0 to 360 deg. during measurement. The measurement distance was 3 meters and the antenna height was 1 meter. The measurement was performed with the antenna in parallel (V), perpendicular (V-90) and ground-parallel (H) orientations.

See photo of test set up in appendix 1.

The limits below 30 MHz was recalculated to a 3 m. distance, using the method described in ANSI C63.10-2013 clause 6.4.4.2 Extrapolation from the measurement of a single point.

The largest test specimen, for which this applies, is 0.625 times the wavelength. The smallest wavelength is 10 m. at 30 MHz, which gives a maximal test specimen size of 6.25 meters.

Frequency range	$d_{\text{nearfield}}$ [m]	d_{limit} [m]	d_{measure} [m]	Recalculation formula
9 kHz to 159 kHz	>300	300	3	$-40 \log(d_{\text{limit}} / d_{\text{measure}})$
159 kHz to 490 kHz	97.49 to 300	300	3	$-40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}})$
490 kHz to 1.592 MHz	30 to 97.49	30	3	$-40 \log(d_{\text{limit}} / d_{\text{measure}})$
1.592 MHz to 15.923 MHz	3 to 30	30	3	$-40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}})$
15.923 MHz to 30 MHz	< 3	30	3	$-20 \log(d_{\text{limit}} / d_{\text{measure}})$

Table 3. Formulas used for Limit Recalculation to 3 m distance.

2.2.2 Test result

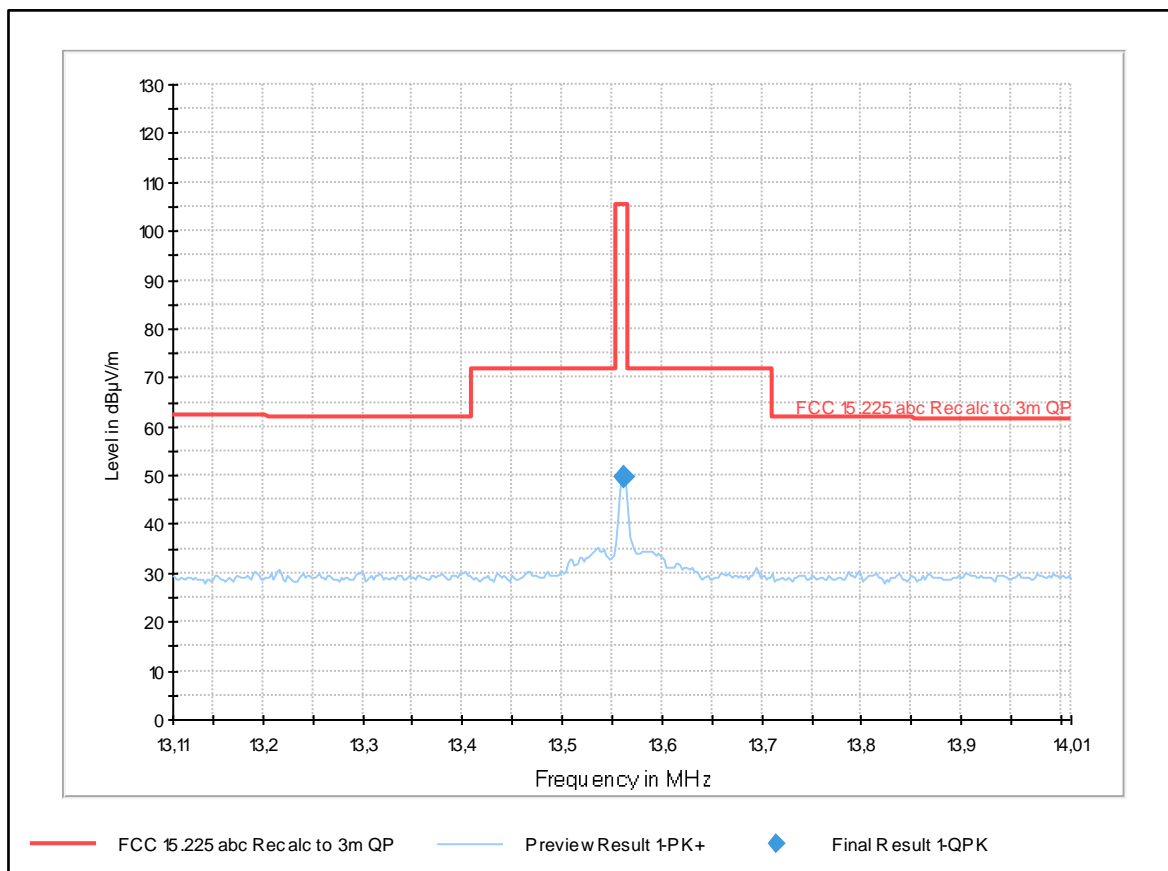


Figure 1. Field strength of fundamental emissions test results. EUT vertical. Antenna vertical.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	49.7	9.000	V	18.0	55.70	105.40	PASSED

Table 4. Field strength of fundamental emissions test results. EUT vertical. Antenna vertical.

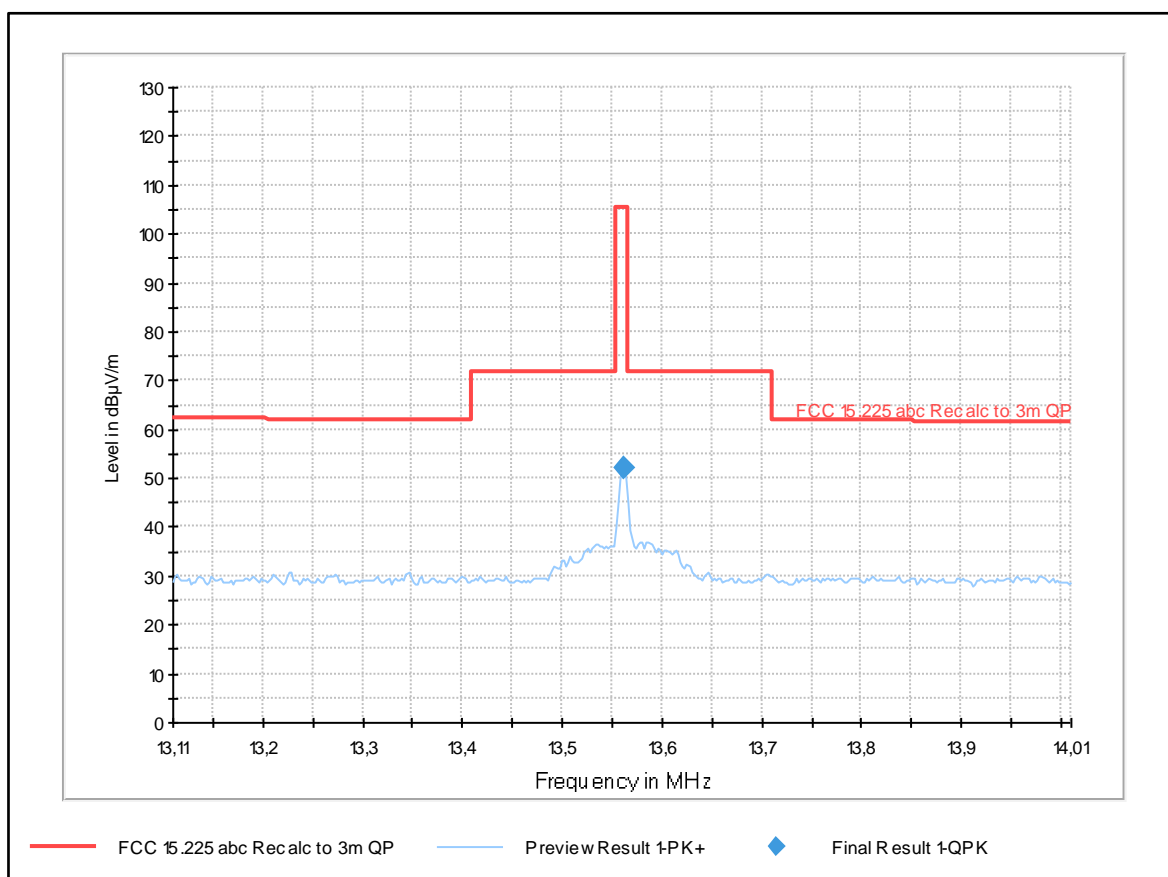


Figure 2. Field strength of fundamental emissions test results. EUT vertical. Antenna vertical-90.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	52.3	9.000	V-90	272.0	53.10	105.40	PASSED

Table 5. Field strength of fundamental emissions test results. EUT vertical. Antenna vertical-90.

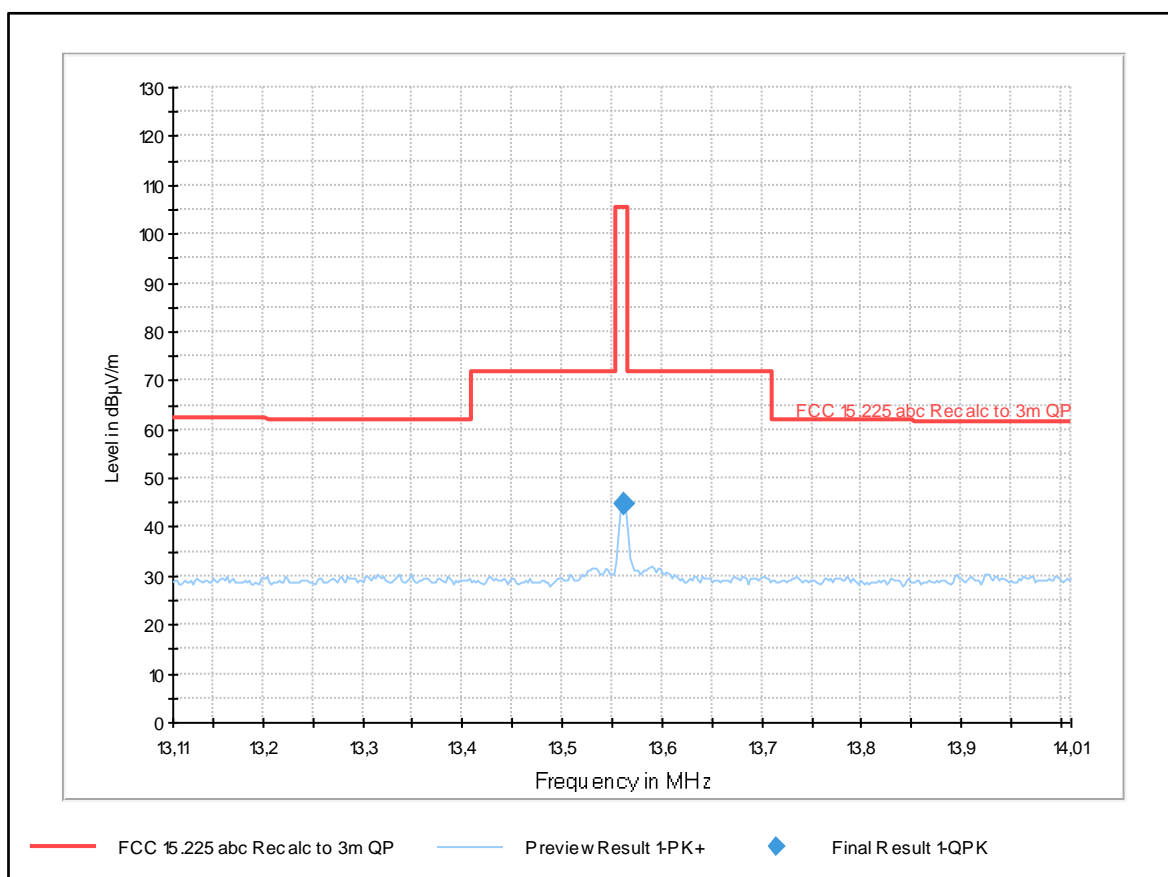


Figure 3. Field strength of fundamental emissions test results. EUT vertical. Antenna horizontal.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	44.8	9.000	H	10.0	60.60	105.40	PASSED

Table 6. Field strength of fundamental emissions test results. EUT vertical. Antenna horizontal.

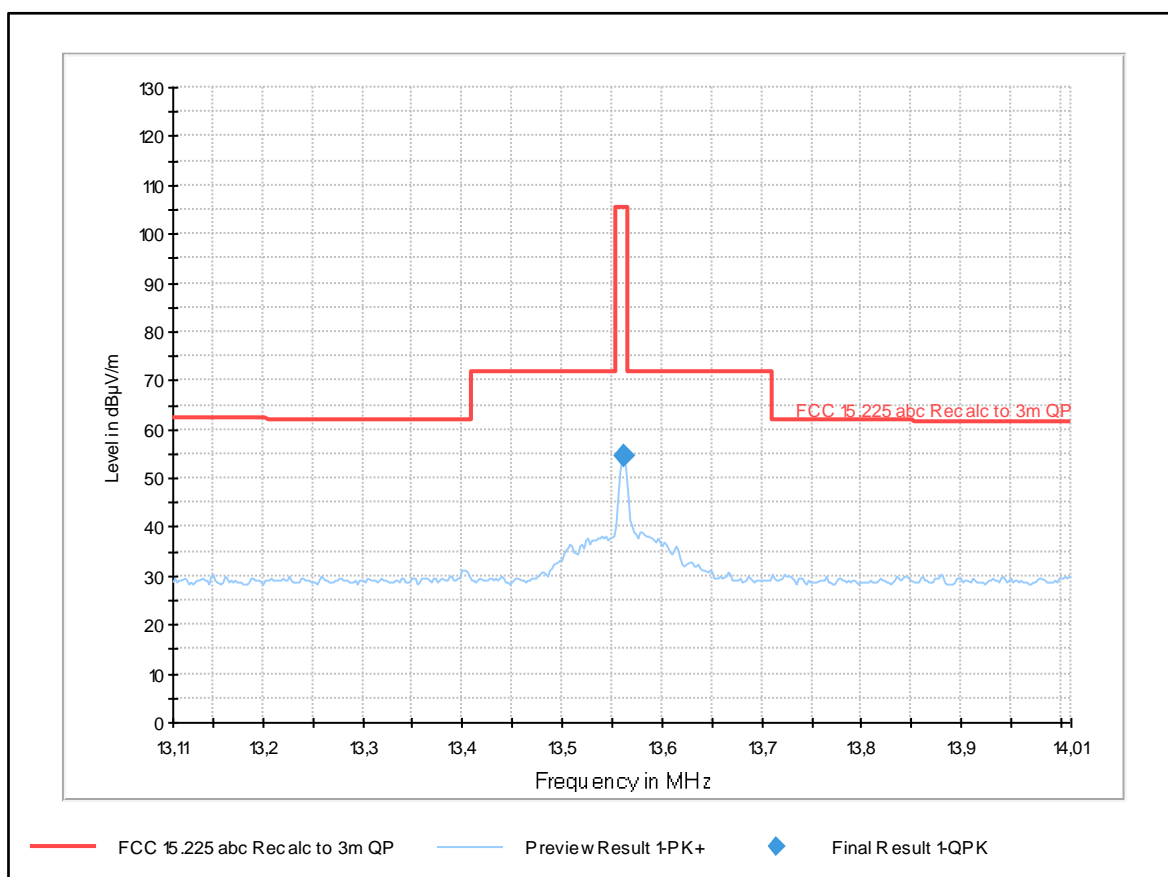


Figure 4. Field strength of fundamental emissions test results. EUT horizontal. Antenna vertical.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	54.4	9.000	V	11.0	51.00	105.40	PASSED

Table 7. Field strength of fundamental emissions test results. EUT horizontal. Antenna vertical.

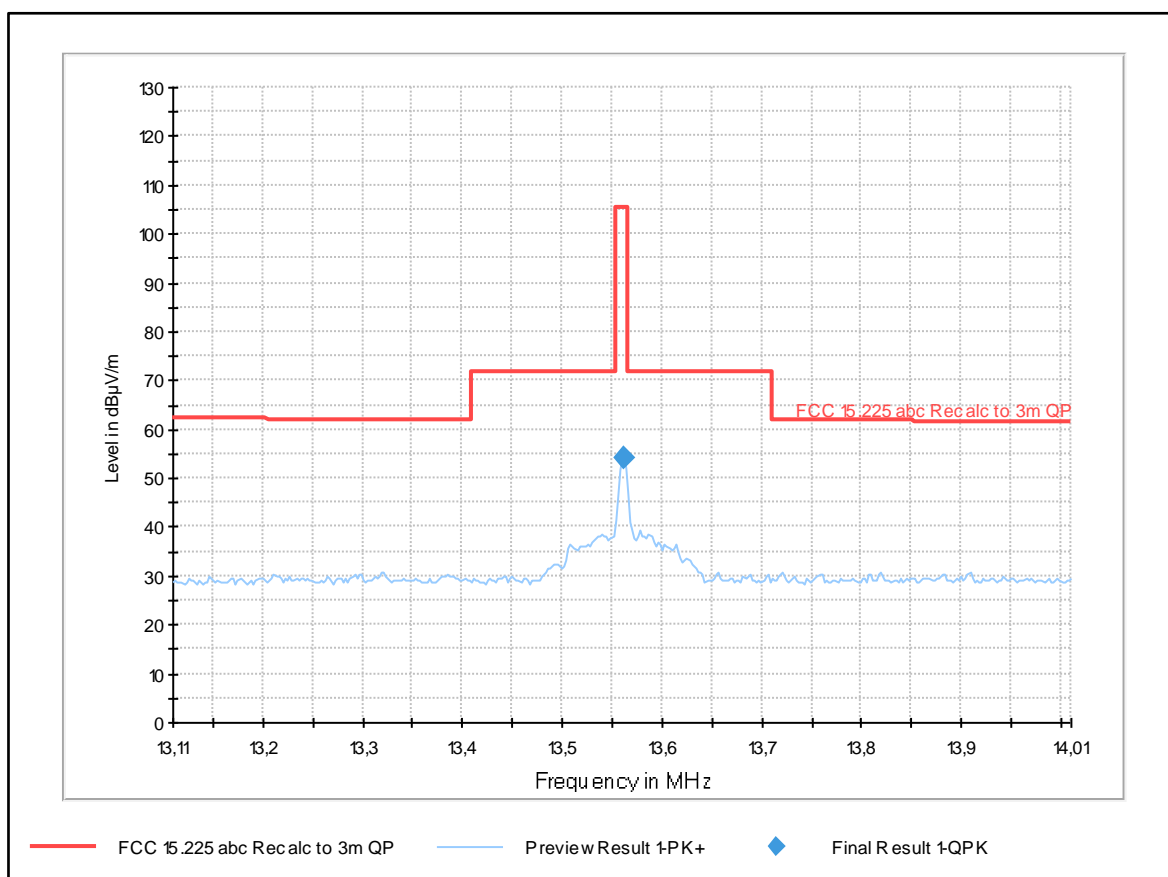


Figure 5. Field strength of fundamental emissions test results. EUT horizontal. Antenna vertical-90.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	54.1	9.000	V-90	92.0	51.30	105.40	PASSED

Table 8. Field strength of fundamental emissions test results. EUT horizontal. Antenna vertical-90.

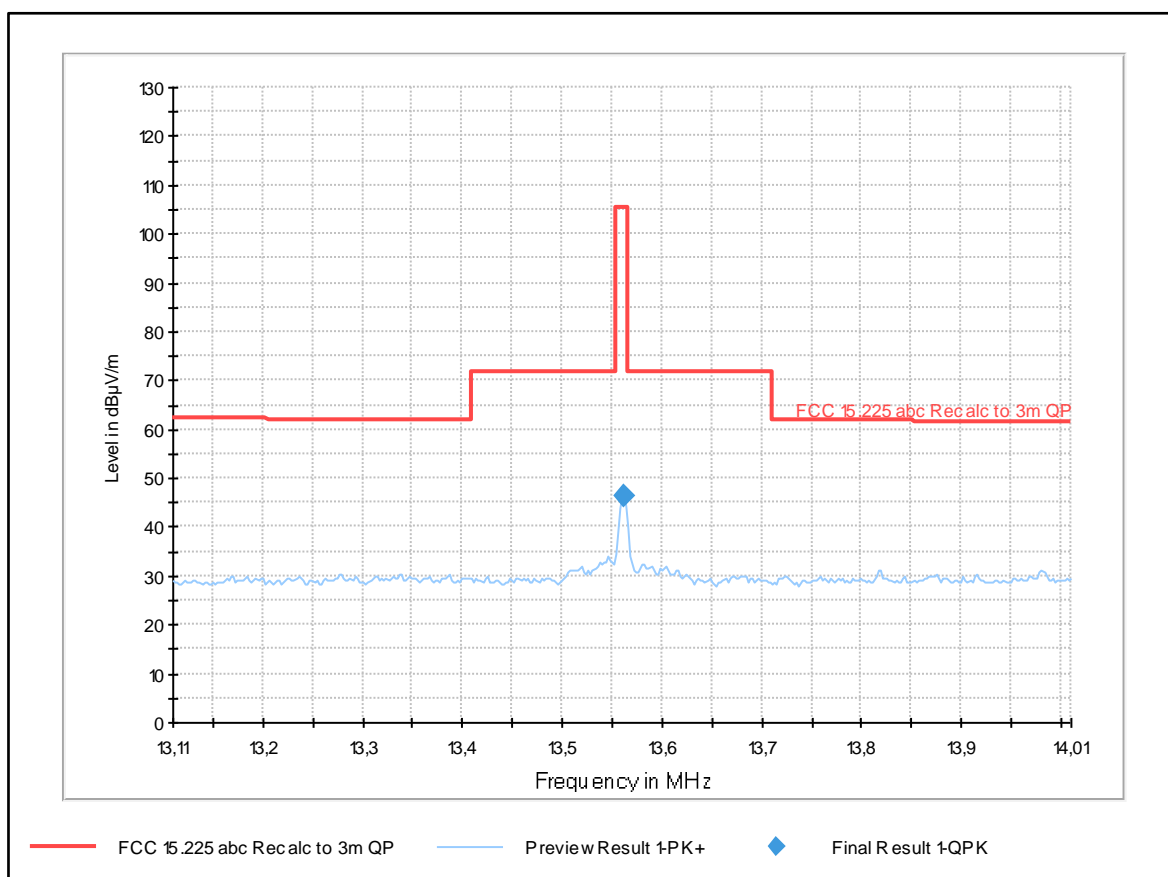


Figure 6. Field strength of fundamental emissions test results. EUT horizontal. Antenna horizontal.

Frequency [MHz]	QuasiPeak [dBμV/m]	BW [kHz]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
13.562250	46.4	9.000	H	20.0	58.90	105.40	PASSED

Table 9. Field strength of fundamental emissions test results. EUT horizontal. Antenna horizontal.

2.2.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Antenna Magnetic Loop 9 kHz - 30 MHz	Rohde & Schwarz	HFH2-Z2	30119966	2022-02-25
EMI Test Receiver 20 Hz-26.5 GHz	Rohde & Schwarz	ESU26	30090172	2021-10-30

Table 10. Radiated emission test equipment.

2.3 Emission outside the 13.110-14.010 MHz band (below 30 MHz)

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (d)
Test method	ANSI C63.10:2013 sec 6.4
Frequency range	9 kHz – 30 MHz
Limits	FCC 47 CFR Part 15.209 (a)
Comments	None
Temperature / Humidity	23°C / 36%RH
Dates of measurements	2020-12-08
Test personnel	David Busk

2.3.1 Test setup

Due to high ambient noise level at open area test site the measurements were performed in a semi anechoic chamber.

The test specimen was placed in vertical position 0.8 m above ground, and rotated 0 to 360 deg. during measurement. The measurement distance was 3 meters and the antenna height was 1 meter. The measurement was performed with the antenna in parallel (V), perpendicular (V-90) and ground-parallel (H) orientations.

See photo of test set up in appendix 1.

The limits below 30 MHz was recalculated to a 3 m. distance, using the method described in ANSI C63.10-2013 clause 6.4.4.2 Extrapolation from the measurement of a single point.

The largest test specimen, for which this applies, is 0.625 times the wavelength. The smallest wavelength is 10 m. at 30 MHz, which gives a maximal test specimen size of 6.25 meters.

Frequency range	$d_{\text{nearfield}}$ [m]	d_{limit} [m]	d_{measure} [m]	Recalculation formula
9 kHz to 159 kHz	>300	300	3	$-40 \log(d_{\text{limit}} / d_{\text{measure}})$
159 kHz to 490 kHz	97.49 to 300	300	3	$-40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}})$
490 kHz to 1.592 MHz	30 to 97.49	30	3	$-40 \log(d_{\text{limit}} / d_{\text{measure}})$
1.592 MHz to 15.923 MHz	3 to 30	30	3	$-40 \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \log(d_{\text{limit}} / d_{\text{near field}})$
15.923 MHz to 30 MHz	< 3	30	3	$-20 \log(d_{\text{limit}} / d_{\text{measure}})$

Table 11. Formulas used for Limit Recalculation to 3 m distance.

2.3.2 Test results

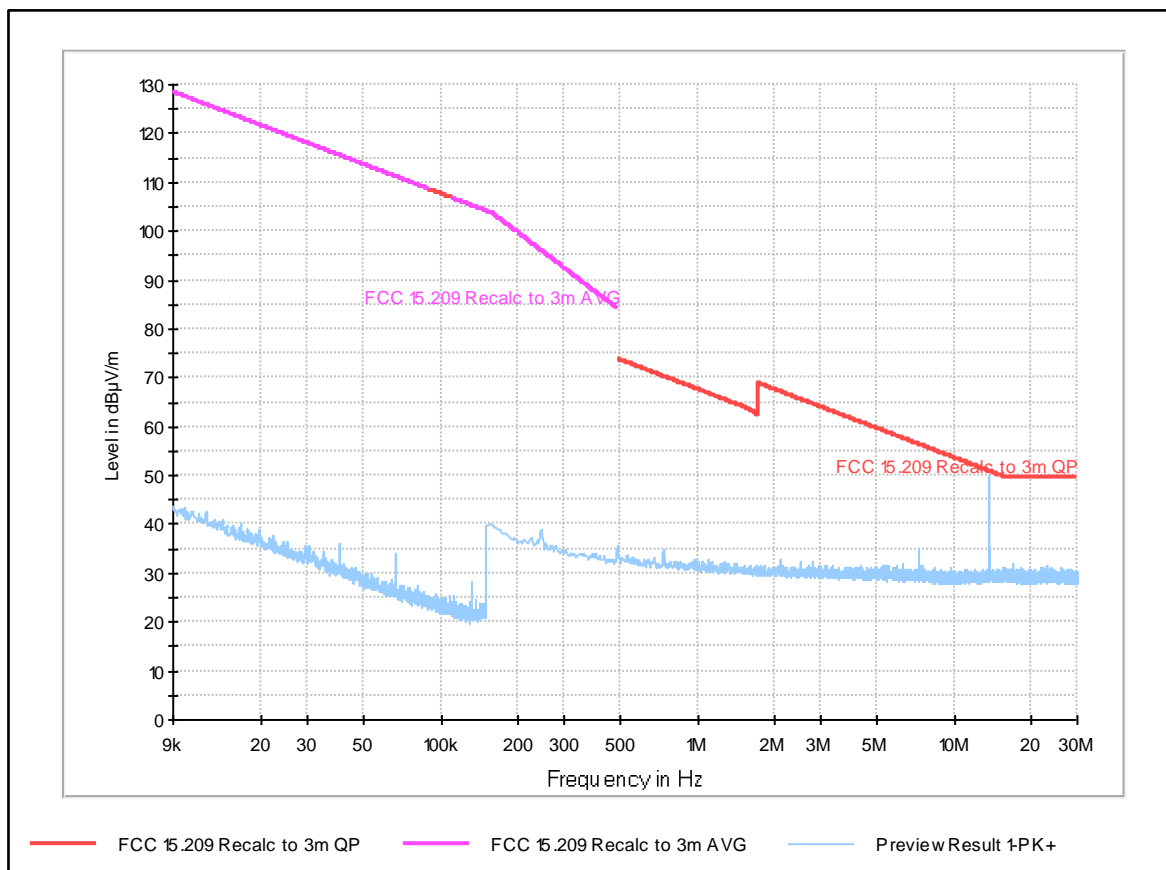


Figure 7. Emission outside the frequency band, below 30 MHz. EUT vertical. Antenna vertical.
Emissions in the band 13.553 – 13.567 MHz are ignored.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Ant. Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	V	-	-	-	PASSED

Table 12. Emission outside the frequency band test results, below 30 MHz. EUT vertical.
Antenna vertical.

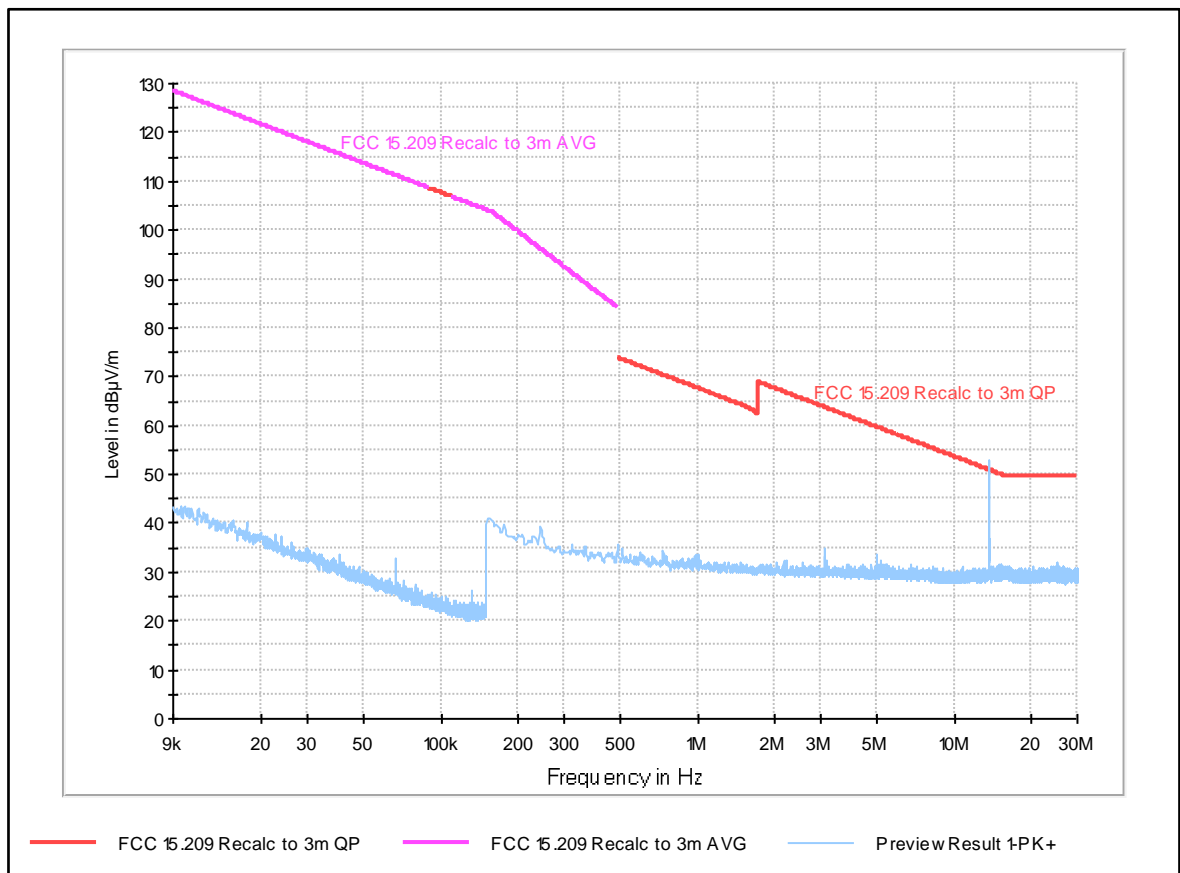


Figure 8. Emission outside the frequency band, below 30 MHz. EUT vertical. Antenna vertical - 90°.

Emissions in the band 13.553 – 13.567 MHz are ignored.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Ant. Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	V-90	-	-	-	PASSED

Table 13. Emission outside the frequency band test results, below 30 MHz. EUT vertical. Antenna vertical -90°.

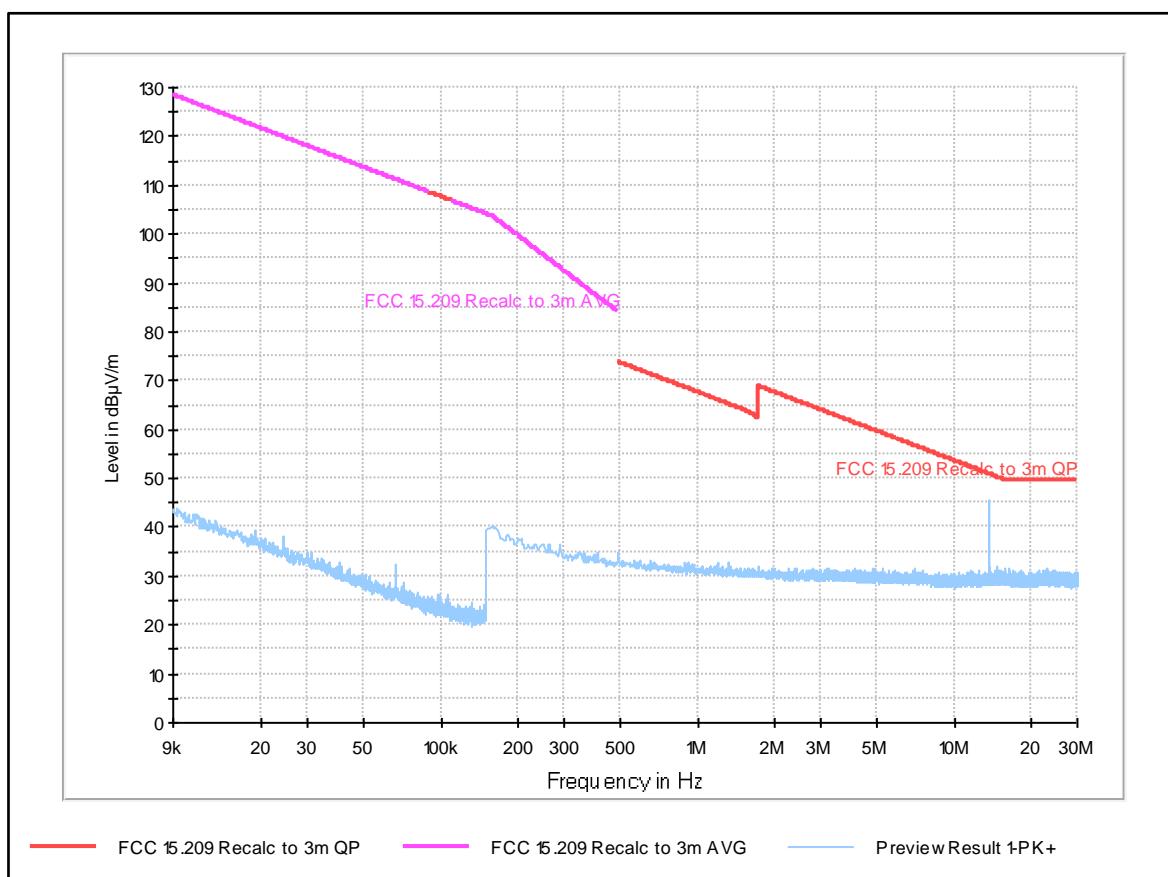


Figure 9. Emission outside the frequency band, below 30 MHz. EUT vertical. Antenna horizontal.

Emissions in the band 13.553 – 13.567 MHz are ignored.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	H	-	-	-	PASSED

Table 14. Emission outside the frequency band test results, below 30 MHz. EUT vertical. Antenna horizontal.

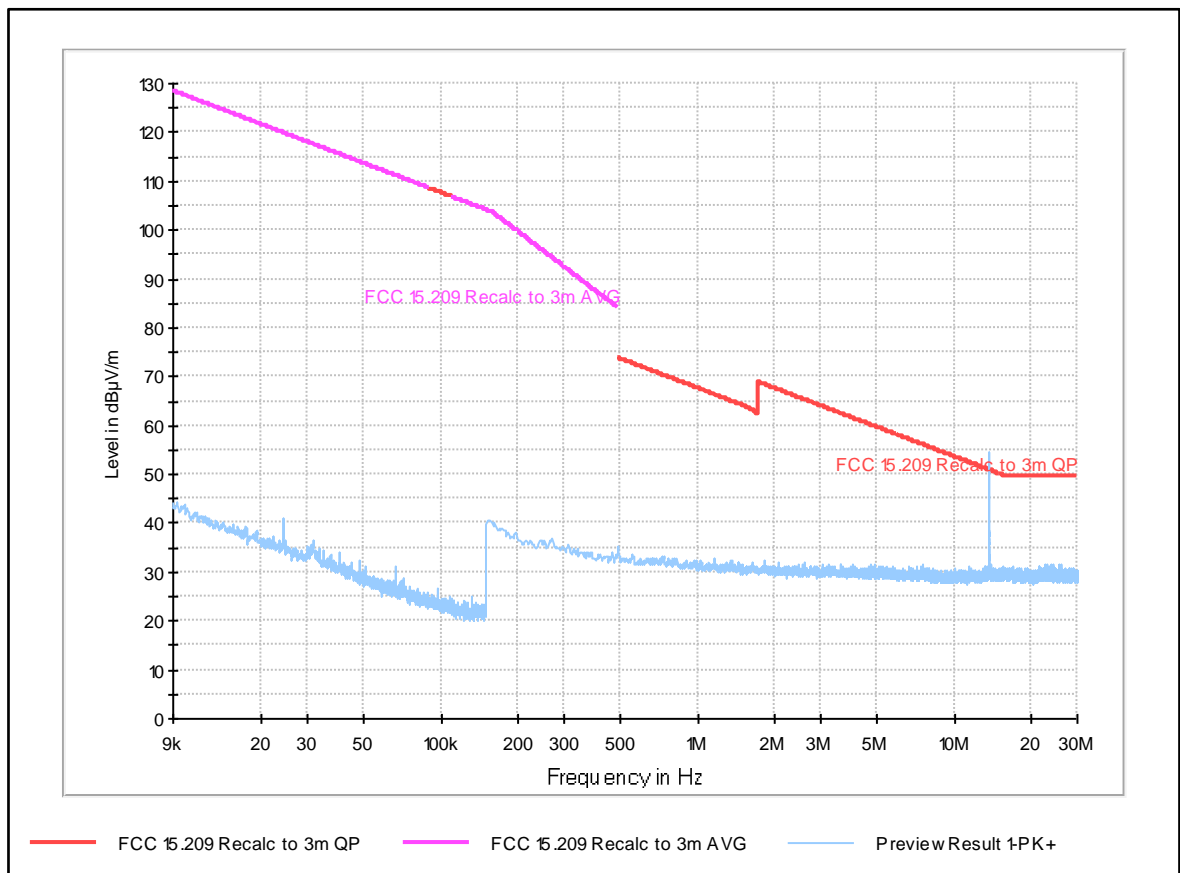


Figure 10. Emission outside the frequency band, below 30 MHz. EUT horizontal. Antenna vertical.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Ant. Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	V	-	-	-	PASSED

Table 15. Emission outside the frequency band test results, below 30 MHz. EUT vertical. Antenna vertical.

Emissions in the band 13.553 – 13.567 MHz are ignored.

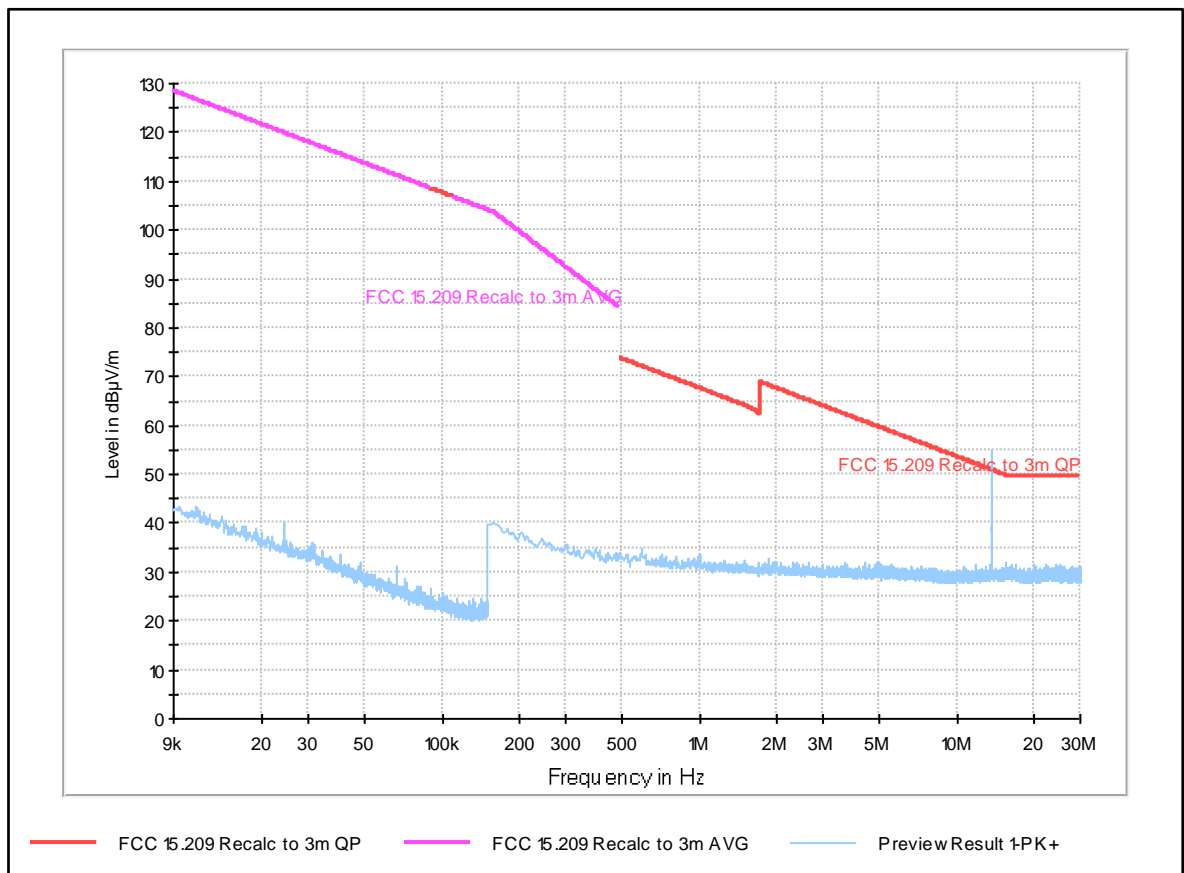


Figure 11. Emission outside the frequency band, below 30 MHz. EUT horizontal. Antenna vertical -90°.

Emissions in the band 13.553 – 13.567 MHz are ignored.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Ant. Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	V-90	-	-	-	PASSED

Table 16. Emission outside the frequency band test results, below 30 MHz. EUT vertical. Antenna vertical -90°.

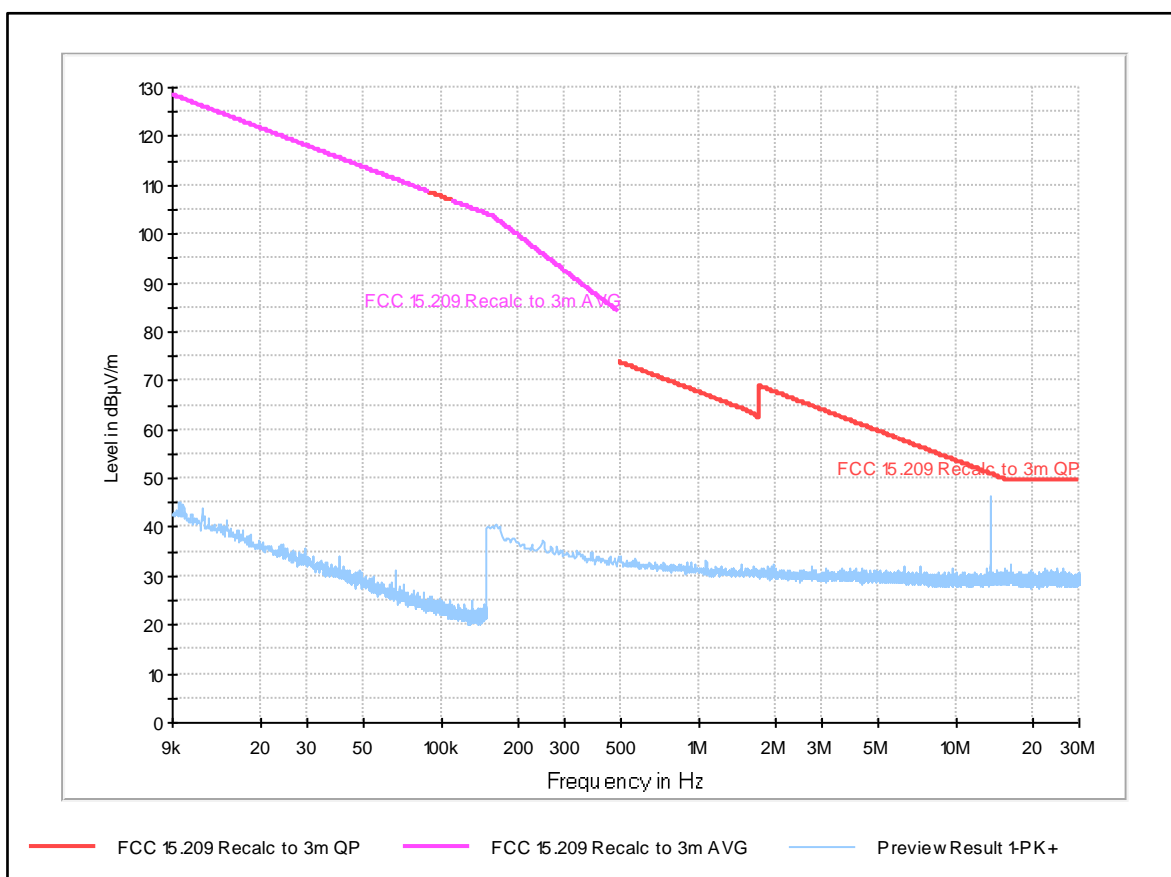


Figure 12. Emission outside the frequency band, below 30 MHz. EUT horizontal. Antenna horizontal.

Emissions in the band 13.553 – 13.567 MHz are ignored.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
-	-	-	-	H	-	-	-	PASSED

Table 17. Emission outside the frequency band test results, below 30 MHz. EUT vertical. Antenna horizontal.

2.3.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Antenna Magnetic Loop 9 kHz - 30 MHz	Rohde & Schwarz	HFH2-Z2	30119966	2022-02-25
EMI Test Receiver 20 Hz-26.5 GHz	Rohde & Schwarz	ESU26	30090172	2021-10-30

Table 18. Radiated emission test equipment.

2.4 Emission outside the 13.110-14.010 MHz band (above 30 MHz)

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (d)
Test method	ANSI C63.10:2013 sec 6.4
Frequency range	30 MHz – 1000 MHz
Limits	FCC 47 CFR Part 15.209 (a)
Comments	None
Temperature / Humidity	24°C / 46%RH
Dates of measurements	2020-12-15
Test personnel	David Busk

2.4.1 Test setup

The test of radiated emission was performed in a semi anechoic chamber. The measurements were performed with both horizontal and vertical antenna polarization.

The measuring distance was 3 m.

The test specimen was placed in vertical and horizontal position 0.8 m above ground, and rotated 0 to 360 deg. during measurement.

A pre-measurement is performed with peak detector. The test object is measured in eight directions with the antenna in the frequency range 30-1000 MHz, with the antenna at three heights, 1.0 m, 2.0 m and 3.0 m.

If the emission is close to or above the limit during the pre-measurement, the test object is scanned 360 degrees and the antenna height scanned from 1 to 4 m for maximum response. Then the emission is measured with a quasi-peak detector.

See appendix 1 for photo of test set up

2.4.2 Test result

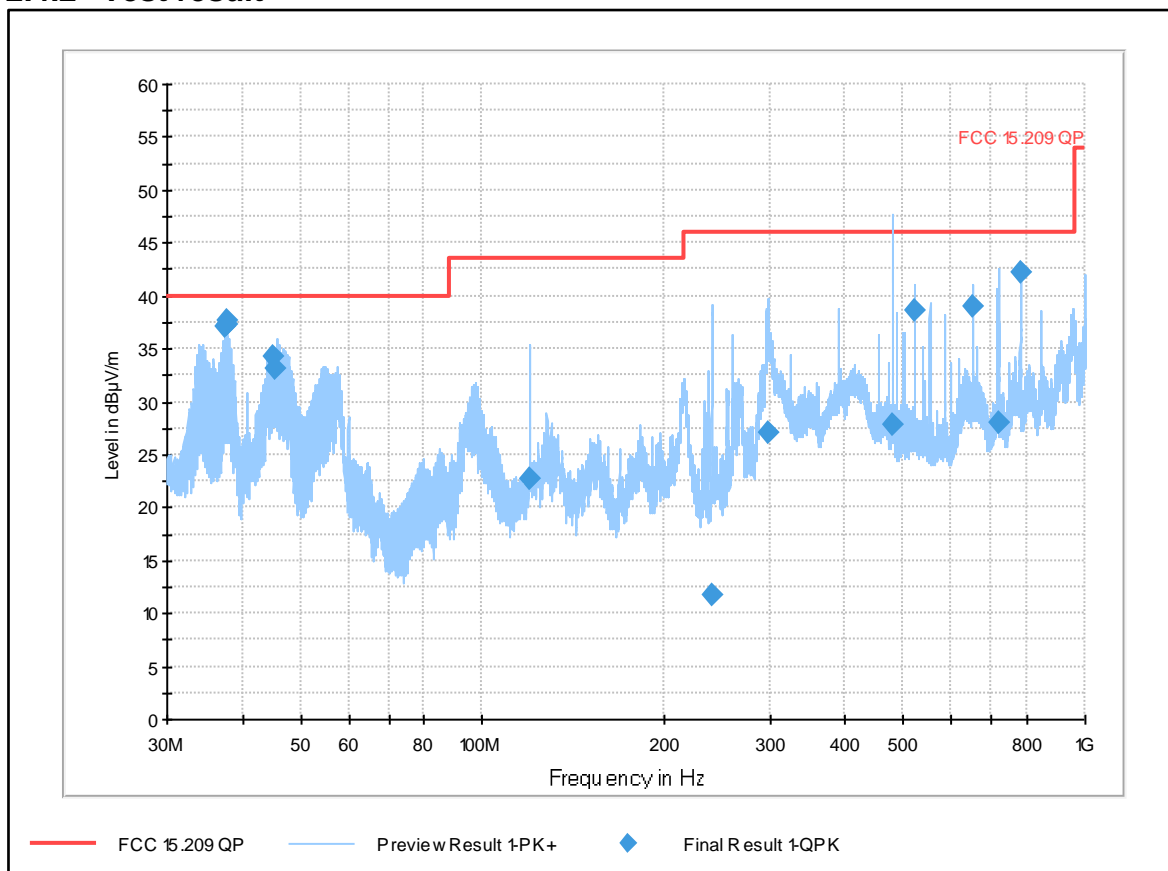


Figure 13. Emission outside the frequency band, 30 - 1000 MHz. EUT vertical.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
37.530000	37.1	120.0	100.0	V	-18.0	2.9	40.0	PASSED
37.770000	37.6	120.0	100.0	V	26.0	2.4	40.0	PASSED
37.780000	37.3	120.0	100.0	V	-19.0	2.7	40.0	PASSED
44.990000	34.3	120.0	100.0	V	10.0	5.7	40.0	PASSED
45.480000	33.2	120.0	100.0	V	180.0	6.8	40.0	PASSED
120.020000	22.7	120.0	100.0	V	278.0	20.8	43.5	PASSED
240.020000	11.7	120.0	100.0	V	90.0	34.3	46.0	PASSED
298.420000	27.0	120.0	100.0	H	90.0	19.0	46.0	PASSED
480.070000	27.8	120.0	100.0	H	279.0	18.2	46.0	PASSED
519.970000	38.6	120.0	100.0	V	-3.0	7.4	46.0	PASSED
649.980000	39.1	120.0	100.0	H	133.0	6.9	46.0	PASSED
720.060000	28.1	120.0	128.0	H	127.0	17.9	46.0	PASSED
779.980000	42.2	120.0	100.0	H	60.0	3.8	46.0	PASSED

Table 19. Emission outside frequency band test results. 30 - 1000 MHz. EUT vertical.

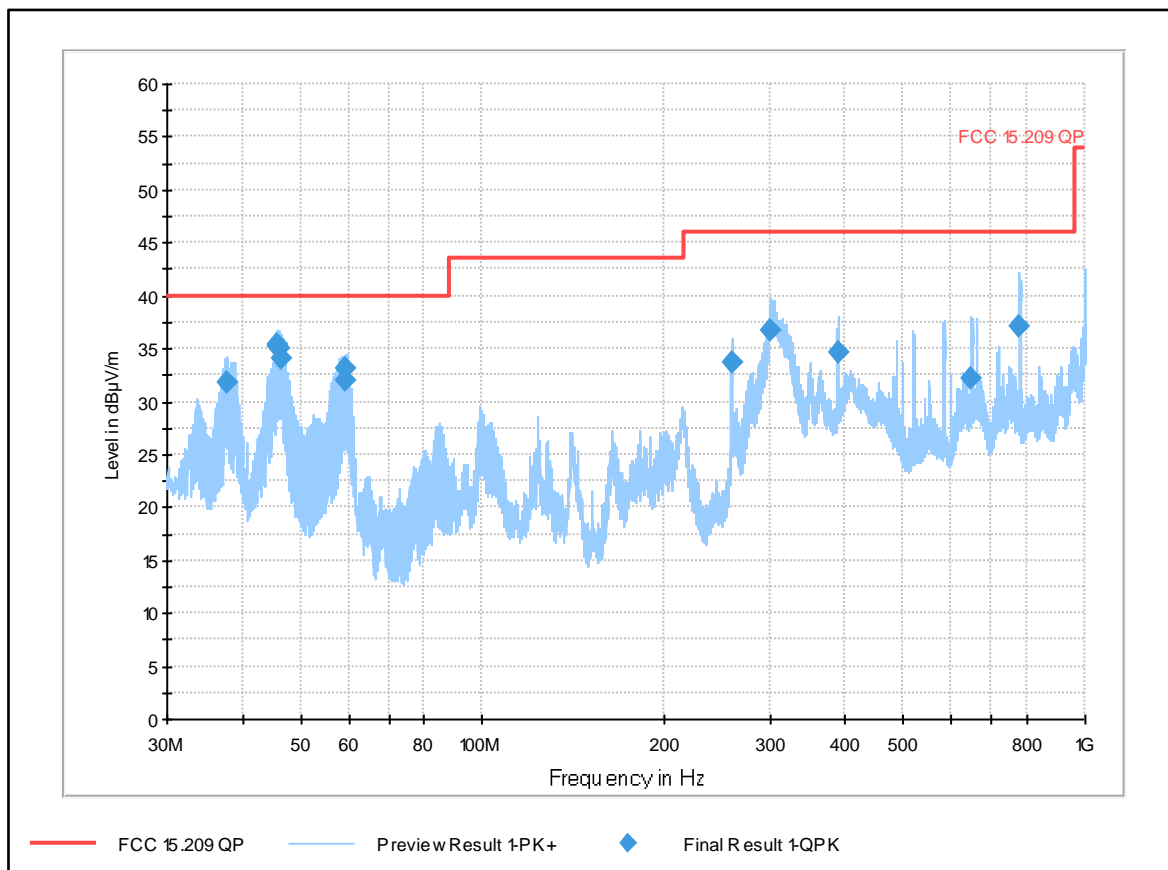


Figure 14. Emission outside the frequency band, 30 - 1000 MHz. EUT horizontal.

Frequency [MHz]	QP [dBμV/m]	BW [kHz]	Height [cm]	Pol.	Azimuth [deg]	Margin [dB]	Limit [dBμV/m]	Result
37.670000	31.8	120.0	100.0	V	100.0	8.2	40.0	PASSED
45.640000	35.3	120.0	100.0	V	76.0	4.7	40.0	PASSED
45.880000	35.5	120.0	100.0	V	81.0	4.5	40.0	PASSED
46.120000	35.1	120.0	100.0	V	135.0	4.9	40.0	PASSED
46.350000	34.0	120.0	100.0	V	125.0	6.0	40.0	PASSED
59.160000	33.1	120.0	100.0	V	357.0	6.9	40.0	PASSED
59.390000	32.1	120.0	100.0	V	313.0	7.9	40.0	PASSED
259.870000	33.7	120.0	119.0	H	26.0	12.3	46.0	PASSED
301.390000	36.7	120.0	119.0	H	195.0	9.3	46.0	PASSED
389.860000	34.6	120.0	126.0	V	0.0	11.4	46.0	PASSED
646.890000	32.2	120.0	100.0	V	156.0	13.8	46.0	PASSED
776.570000	37.1	120.0	100.0	H	302.0	8.9	46.0	PASSED

Table 20. Emission outside frequency band test results. 30 - 1000 MHz. EUT horizontal.

2.4.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due
Antenna Bilog 30MHz - 2GHz	Chase	CBL6112B	30114397	2022-11-25
EMI Test Receiver 20 Hz-26.5 GHz	Rohde & Schwarz	ESU26	30090172	2021-10-30

Table 21. Radiated emission test equipment.

2.5 Frequency stability versus temperature

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (e)
Test method	ANSI C63.10:2013 sec. 6.8
Frequency range	13.110 - 14.010 MHz
Limits	47 CFR 15.225 (e)
Comments	None
Temperature / Humidity	
Dates of measurements	2020-12-10
Test personnel	Søren Søltøft

2.5.1 Test setup

The test specimen was placed in a shielded climatic chamber together with a loop antenna in a fixed position. The antenna was connected to a spectrum analyzer via a feedthrough in the chamber wall. The frequency count function on the spectrum analyzer was used to improve accuracy. The temperature variation was performed between 50°C and -20°C

See appendix 1 for photo of test set up

2.5.2 Test result

Temperature [°C]	Dev. at power on [%]	Dev. after 2 min. [%]	Dev. after 5 min. [%]	Dev. after 10 min. [%]	Limit [%]	Result
50	0.0003539	0.0003318	0.0003171	0.0003171	0.01	PASSED
40	0.0003171	0.0003245	0.0003392	0.0003392	0.01	PASSED
30	0.0000516	0.0001401	0.0001843	0.0001770	0.01	PASSED
20	-0.0001032	-0.0000369	-0.0000074	0.0000000	0.01	PASSED
10	-0.0003834	-0.0002876	-0.0002728	-0.0002655	0.01	PASSED
0	-0.0006710	-0.0005678	-0.0005457	-0.0005457	0.01	PASSED
-10	-0.0008480	-0.0007964	-0.0007816	-0.0007669	0.01	PASSED
-20	-0.0007005	-0.0007743	-0.0007964	-0.0008111	0.01	PASSED

Table 22. Frequency deviation as function of temperature.

2.5.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Climatic chamber	ESPEC Corp.	PL-3KPH	30090011	2021-02-06
Analyzer 20Hz-26.5GHz	Rohde & Schwarz	ES126	30120763	2020-12-17
Multimeter	HP	34401A	30114885	2021-11-19
Power supply	-	DF1730SB3A	30091044	.

Table 23. Frequency stability test equipment.

2.6 Frequency stability versus supply voltage

Test specimen	JLT6012A
Test specification	47 CFR 15.225 (e), 47 CFR 15.31 (e)
Test method	ANSI C63.10:2013 sec. 6.8
Frequency range	13.110 - 14.010 MHz
Limits	47 CFR 15.225 (e)
Comments	None
Temperature / Humidity	20°C / 50%RH
Dates of measurements	2020-12-16
Test personnel	Søren Søltøft

2.6.1 Test setup

The voltage range for the test specimen is specified to 12 VDC – 60 VDC.

The voltage level of 85% was calculated from 12 V. The 115% level were calculated from 60 V.

The nominal voltage for deviations is calculated for 24 VDC.

The test specimen was placed on a table together with a loop antenna in a fixed position. The antenna was connected to a spectrum analyzer.

Peak power levels are only analyzer reading not corrected for antenna factor and path attenuation.

See appendix 1 for photo of test set up.

2.6.2 Test result

Voltage [VDC]	Frequency [MHz]	Frequency deviation		Limit [%]	Result
		[MHz]	[%]		
10.2	13.561276	0.000000	0.000000	0.01	PASSED
24.0	13.561276	-	-	-	-
69.0	13.561276	0.000000	0.000000	0.01	PASSED

Table 24. Frequency deviation as function of supply voltage.

Voltage [VDC]	Peak power [dBμV]	Level deviation [dBμV]	Result
10.2	106.44	0.01	PASSED
24.0	106.43	-	-
69.0	106.45	0.02	PASSED

Table 25. RF power deviation as function of supply voltage.

2.6.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Analyzer 20Hz-26.5GHz	Rohde & Schwarz	ESI26	30120763	2020-12-17
Multimeter	HP	34401A	30114885	2021-11-19
Power supply	-	DF1730SB3A	30091044	.

Table 26. Radiated emission test equipment.

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2.7 Antenna requirement

Test specimen	JLT6012A
Test specification	47 CFR 15.203
Test method	None
Comments	None
Dates of measurements	2020-12-16
Test personnel	Søren Søltoft

2.7.1 Test result

The test specimen has an internal antenna not accessible during normal use.
No connection for external antenna is available.

Requirement	Result
47 CFR 15.203	PASSED

Table 27. Antenna requirements test results.

2.8 Occupied bandwidth

Test specimen	JLT6012A
Test specification	47 CFR 15.215 (c)
Test method	ANSI C63.10:2013 sec. 6.9.2
Comments	None
Temperature / Humidity	20°C / 50%RH
Dates of measurements	2020-12-16
Test personnel	Søren Søltøft

2.8.1 Test setup

The test specimen was placed on a table together with a loop antenna in a fixed position. The antenna was connected to a spectrum analyzer.

See photo of test set up in appendix 1.

2.8.2 Test results

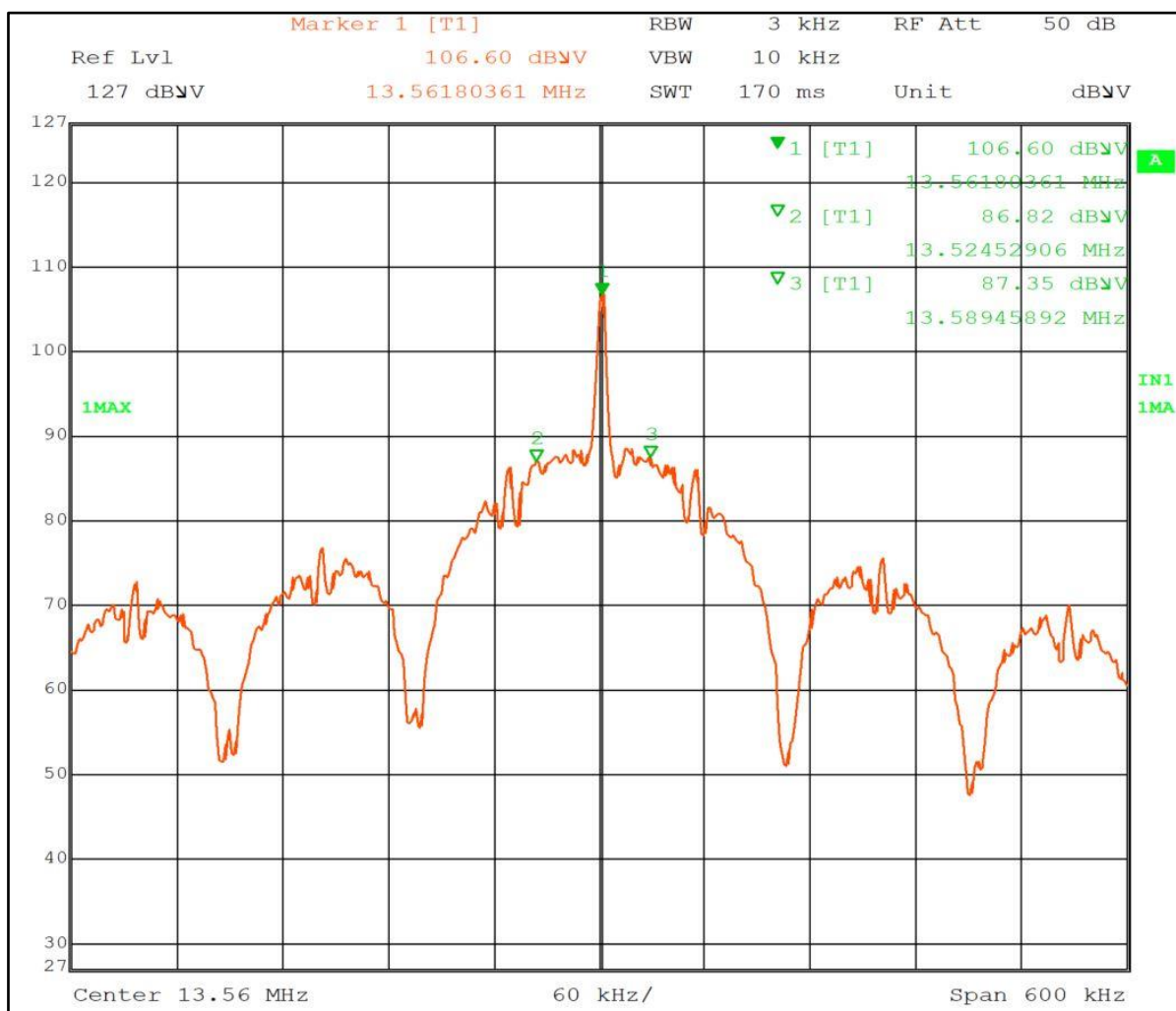


Figure 15. 20 dB Occupied bandwidth.

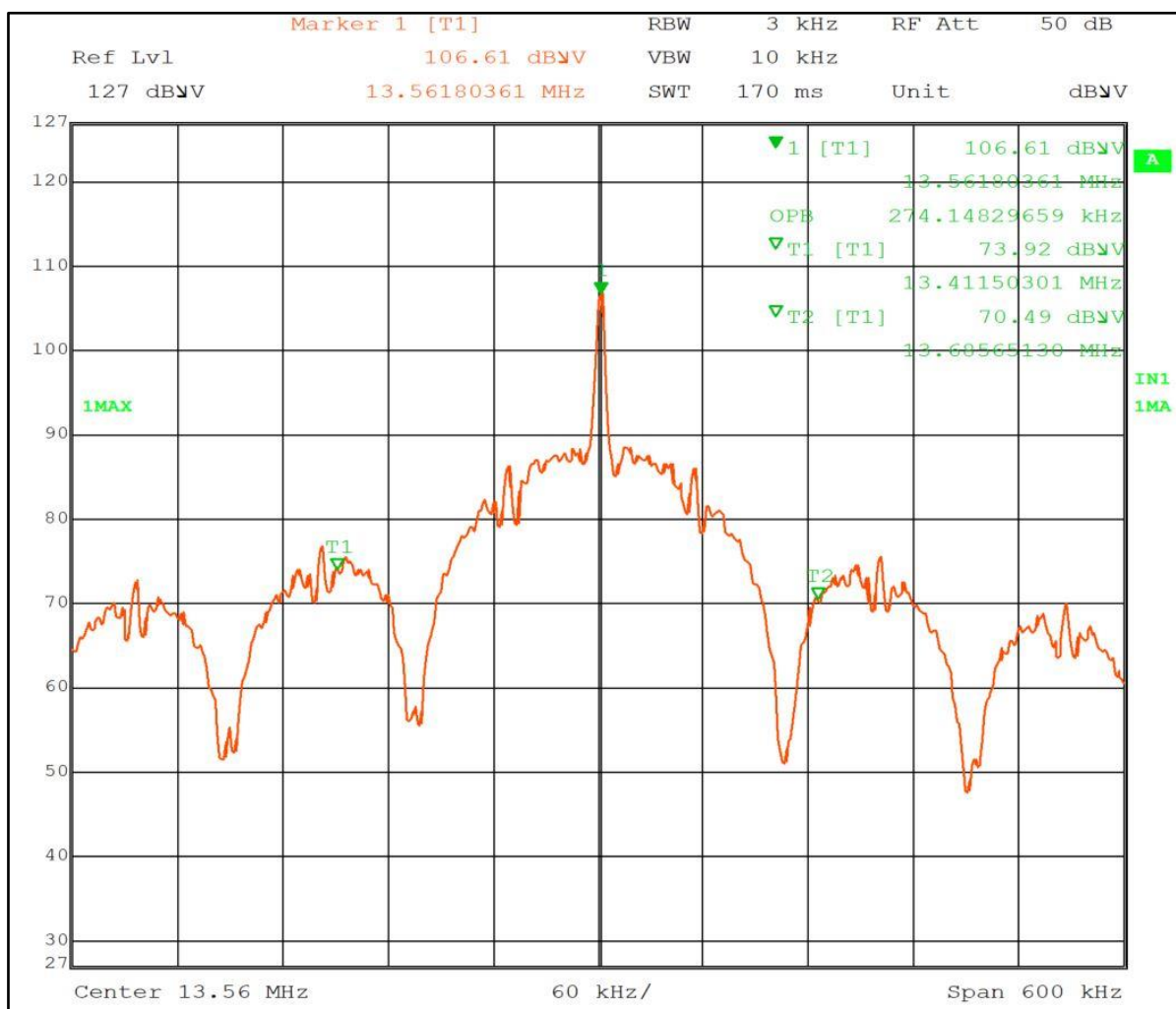


Figure 16. 99% Occupied bandwidth.

Highest frequency deviation detected during frequency stability test was +48 Hz and -115 Hz.

	-20 dB freq. [MHz]	Freq.Stab [MHz]	-20 dB w. Freq. Stab. [MHz]	Band limit [MHz]	Margin [MHz]	Result
Low freq	13.524529	-0.000115	13.524414	13.110	0.414414	PASSED
High freq	13.589459	0.000048	13.589517	14.010	0.420483	PASSED

Table 28. 20 dB Occupied bandwidth results.

99% freq. [MHz]	Occupied bandwidth 99% [kHz]	Result
13.56	274.148460	PASSED

Table 29. 99% Occupied bandwidth results.

2.8.3 Test equipment

Description	Supplier	Model	Tag no.	Cal. due date
Analyzer 20Hz-26.5GHz	Rohde & Schwarz	ES126	30120763	2020-12-17

Table 30. Occupied bandwidth 20 dB test equipment.

3 MEASURING UNCERTAINTIES

Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

	Frequency [MHz]	Polarization	Expanded Uncertainty [dB] (k=2)
Radiated emission (HFH2-Z2)	0.009 - 30		3.60 dB
Radiated emission (BiCon – LogPer)	30 - 200	Vertical	4.59 dB
	200 - 1000	Vertical	4.77 dB
	30 - 200	Horizontal	4.57 dB
	200 - 1000	Horizontal	4.86 dB
Conducted emission (CISPR 16-4)	0.009 - 30	-	3.44 dB
Conducted emission (ESIB 26)	<1000	-	2.58 dB
Frequency Error (ESIB)	13.56	-	0.39 ppm