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LP-009

Test report

Number	**T251-0151/25**	Project file: C20242272 Date: 2025-07-24 Pages: 37

Product:	**Charger System Wireless** **(CS WPB STD 3300W 1AC and CS WPP STD 3300W)**
Type reference:	**EOE16010870, EOE16010952**
Ratings:	Input: 200 - 240 V a.c.; 50/60 Hz; 16A Output: Pairing with WPP
Trademark:	
Applicant:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstrasse 21, DE-79331 Teningen, Germany**
Manufacturer:	Delta Energy Systems (Germany) GmbH Tscheulinstrasse 21, DE-79331 Teningen, Germany
Place of manufacture:	Delta Energy Systems (Germany) GmbH Tscheulinstrasse 21, DE-79331 Teningen, Germany

Summary of testing

Testing method:	47 CFR Part 15, Subpart C RSS-Gen (Issue 5), RSS-210 (Issue 11) last amended 2024-08-08 in conjunction with ANSI C63.10:2013
Testing location:	SIQ Ljubljana Mašera-Spasićeva ulica 10, SI-1000 Ljubljana, Slovenia
Remarks:	Date of receipt of test items: 2024-12-18 Number of items tested: 1 Date of performance of tests: 2025-01-15 – 2025-02-19 The test results presented in this report relate only to the items tested. The test items were tested in the condition as received. The product complies with the requirements of the testing methods.

Tested by: Luka Cvajnar

Approved by: Marjan Mak

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1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2025-07-24	T251-0151/25	Initial Test Report issued.	--

Environmental conditions:
Ambient temperature: 15°C to 35°C
Relative humidity: 30% to 60%
Atmospheric pressure: 860 mbar to 1060 mbar

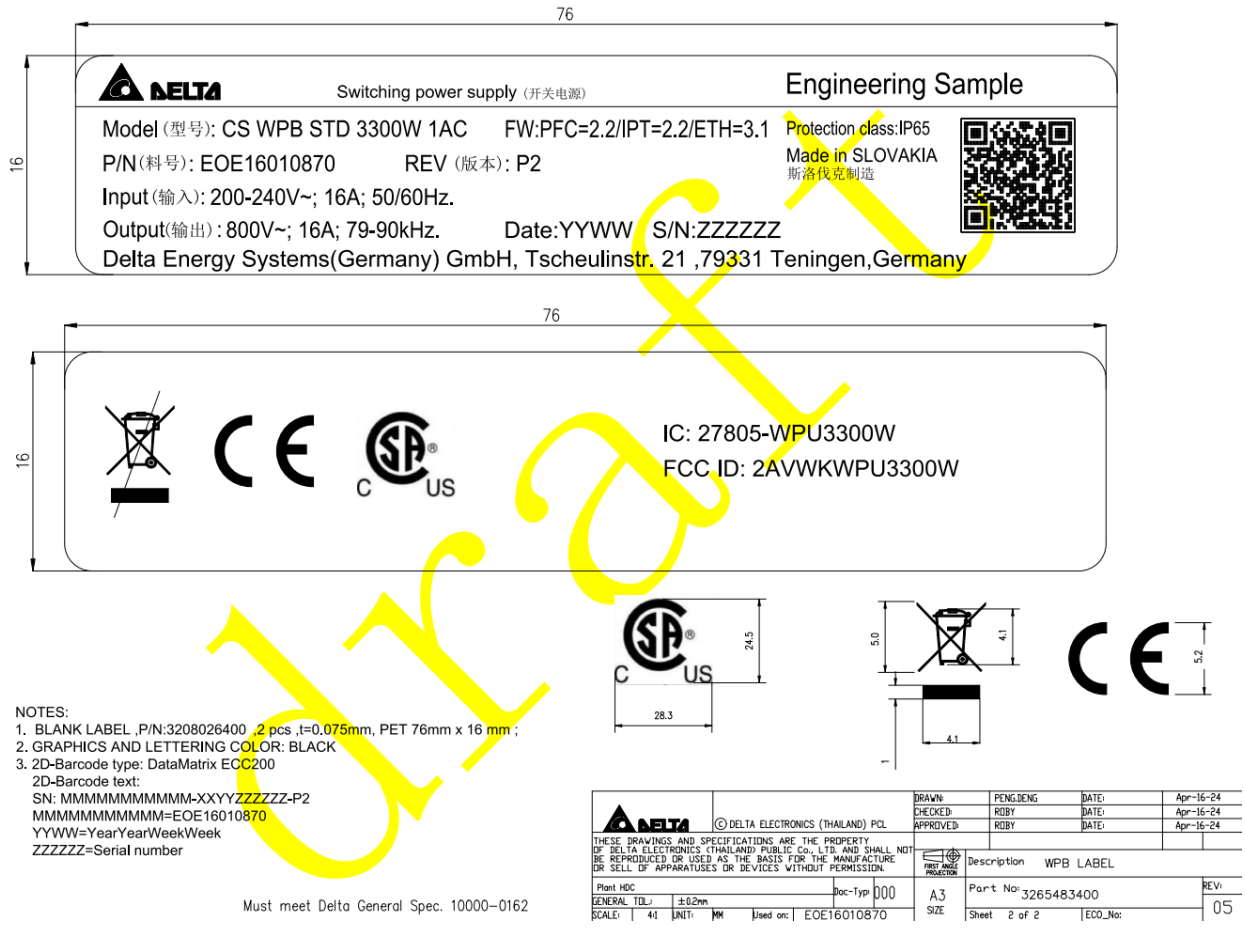
1.1 Equipment under test

Charger System Wireless
(CS WPB STD 3300W 1AC and CS WPP STD 3300W)
Type: **EOE16010870, EOE16010952**
FCC ID: **2AVWKWPU3300W**
IC: **27805-WPU3300W**

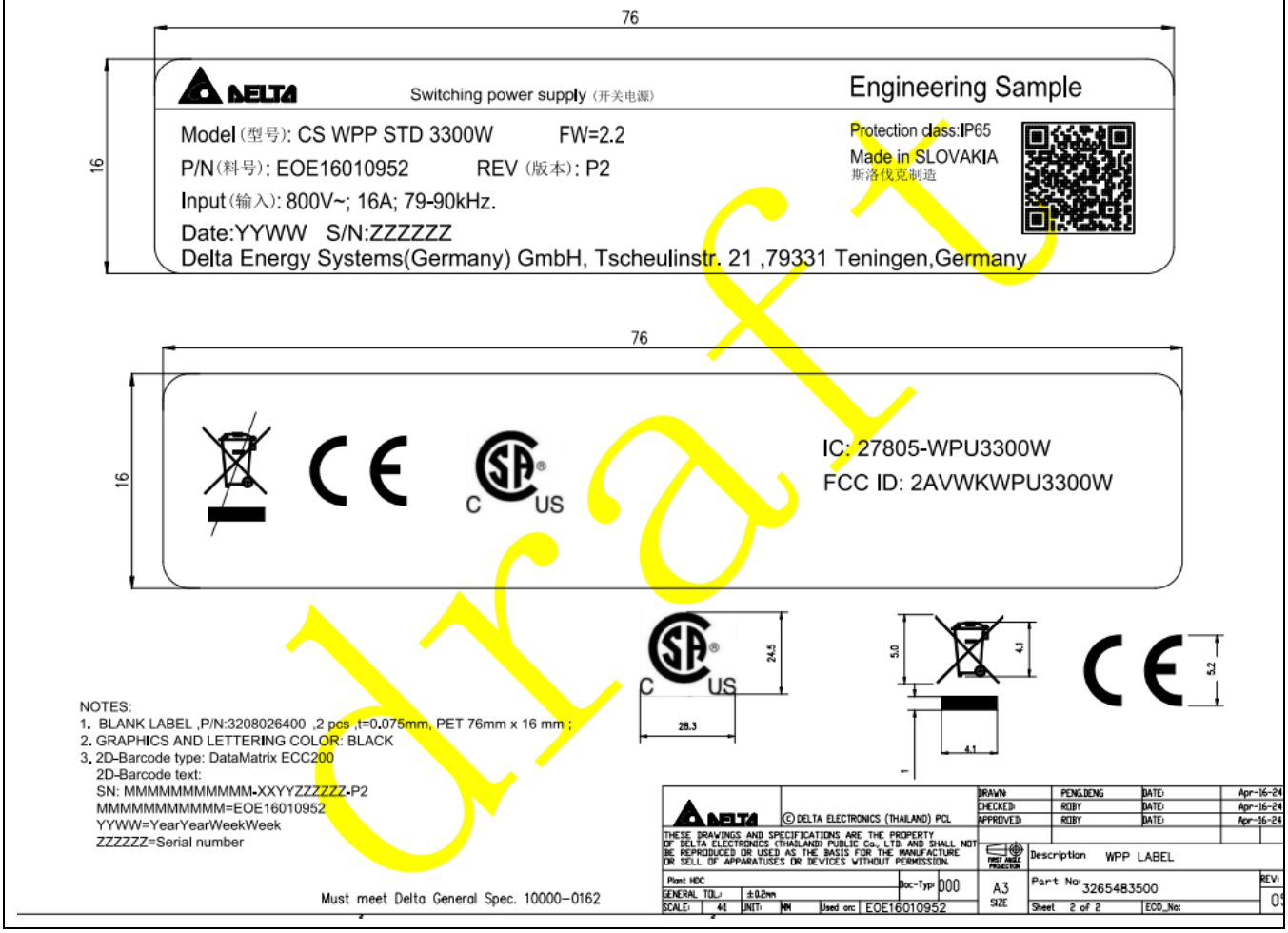
Equipment marking plates

(The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.)

WPB:



WPP:


76
16
Switching power supply (开关电源)
Engineering Sample
Model (型号): CS WPP STD 3300W FW=2.2
P/N(料号): EOE16010952 REV (版本): P2
Input(输入): 800V~; 16A; 79-90kHz.
Date:YYWW S/N:ZZZZZZ
Protection class:IP65
Made in SLOVAKIA
斯洛伐克制造
Delta Energy Systems(Germany) GmbH, Tscheulinstr. 21 ,79331 Teningen,Germany
76
16
IC: 27805-WPU3300W
FCC ID: 2AVWKWPU3300W
24.5
28.3
5.0
4.1
4.1
5.2
1
NOTES:
1. BLANK LABEL ,P/N:3208026400 ,2 pcs ,t=0.075mm, PET 76mm x 16 mm ;
2. GRAPHICS AND LETTERING COLOR: BLACK
3. 2D-Barcode type: DataMatrix ECC200
2D-Barcode text:
SN: MMMMMMMMMMM-XXYYZZZZZZ-P2
MMMMMMMMMMM=EOE16010952
YYWW=YearYearWeekWeek
ZZZZZZ=Serial number
Must meet Delta General Spec. 10000-0162
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DRAWN PENG,DENG DATE: Apr-16-24
CHECKED: ROBY DATE: Apr-16-24
APPROVED: ROBY DATE: Apr-16-24
Description WPP LABEL
Part No: 3265483500
Plant HDC
Doc-Type 000
GENERAL TOL: ±0.2mm
SCALE: 4:1 UNIT: MM Used on: EOE16010952
A3 SIZE
Sheet 2 of 2
ECO_No:
REV: 0

1.1.1 General product information

Product	Charger System Wireless
Type / Model	WPB: Primary box WPP: Primary pad
Supply voltage of transmitter	5 V d.c.
Operating frequency	13.56 MHz
Number of channels	1
Antenna type	Rectangular planar antenna
Modulation type	ASK Modulation (100%)
Hardware version	Primary box: P2.1; Primary pad: P2.1
Software version	Primary box: PFC - 2.2, IPT - 2.2 and ETH - 3.1 Primary pad: 2.2

General description of test item:

Device is a wireless charger for charging of batteries with BMS.
Device consists of 4 parts:
- Wireless Primary Box (EOE16010870): In short marked as »WPB«
- Wireless Primary Pad (EOE16010952). In short marked as »WPP«
- Wireless Secondary Pad (EOE16010953). In short marked as »WSP«
- Wireless Secondary Box that can be one of the following:
• 24 Vdc output (EOE16011067) in short marked as »WSB 24V«
• 36 Vdc output (EOE16011066) in short marked as »WSB 36V«
• 48 Vdc output (EOE16010871) in short marked as »WSB 48V«
Wireless charging is being transmitted at frequency of 79-90 kHz. Primary and secondary pad are communicating at frequency of 13,56 MHz

Test mode	Description
1	Primary pad was activated and waiting for communication with secondary pad
2	Communication between primary pad and secondary pad was established. The secondary pad was set to declared distance to the primary pad.

1.2 Measurement uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the product, as specified in ETSI TR 100 028-2 and C63.23. This represents an expanded uncertainty expressed at 95% confidence level using a coverage factor k=2.

Measurements	U_{LAB}	$U_{ETSI\ TR\ 100\ 028\text{-}2}$	$U_{C63.23}$
AC Line Conducted Emission	3.2 dB	/	±4,13
Spurious emission 30 – 300 MHz	4.2 dB	±6	/
Spurious emission 300 – 1000 MHz	4.4 dB	±6	/
Occupied bandwidth (99% emission bandwidth)	< 2%	±5%	/

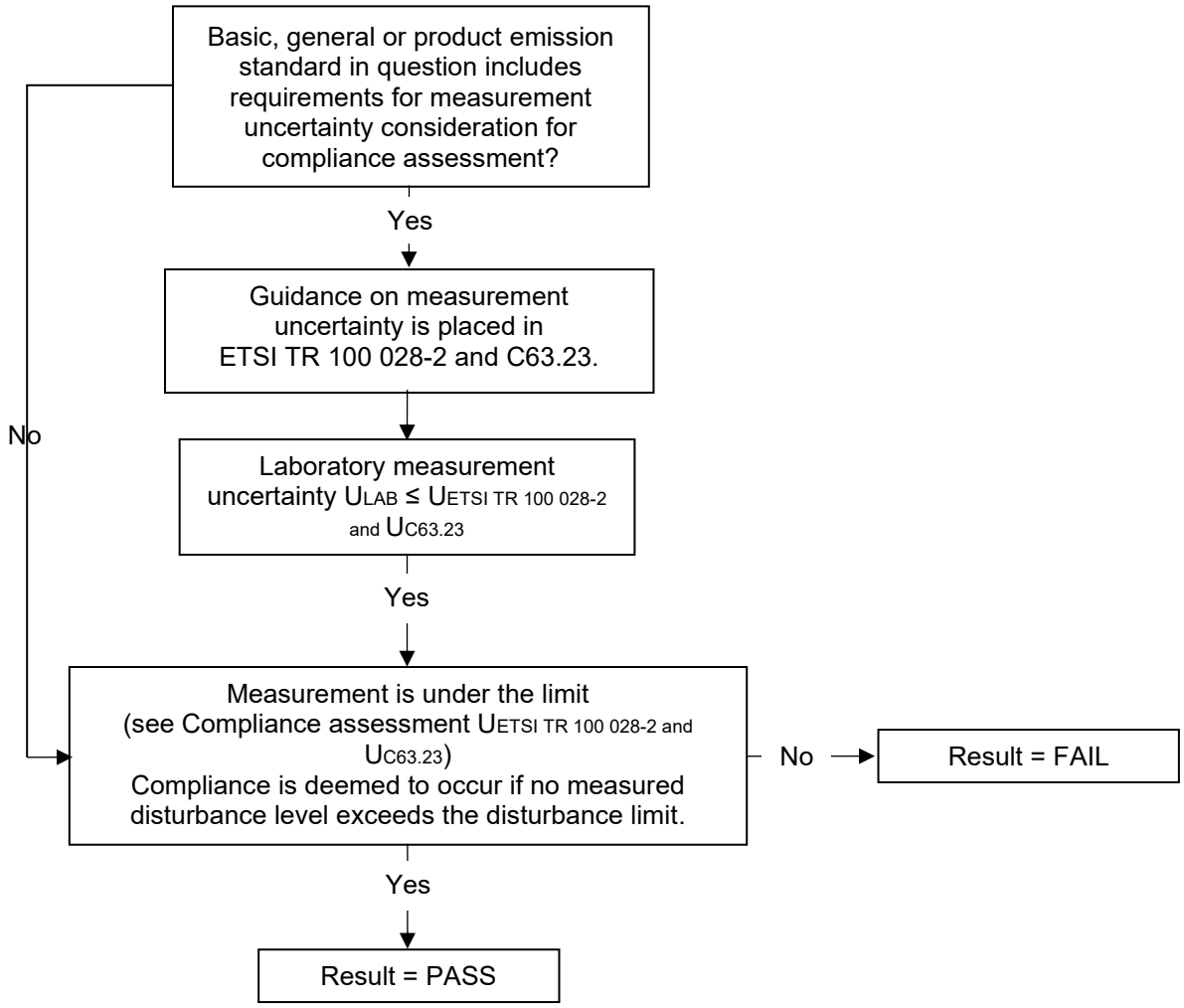
Note: Measurement uncertainty calculated in accordance with ETSI TR 100 028-2 and C63.23.

1.3 Application of decision rule

Application of decision rule and statement of conformity is defined in document TN023 Decision rule and measurement uncertainty.

As a general rule Pass/Fail decisions are based on simple acceptance rule and acceptance limits chosen based on simple acceptance (w = 0, AL = TL) except if a decision rule is governed by particular standard or guidance document.

Decision rule:



2 TEST EQUIPMENT

Equipment used					
Conducted measurements					
Equipment	**Type**	**Inventory number**	**Manufacturer**	**Last calibration**	**Calibration due date**
Spectrum analyser	FSV40	101848	Rohde & Schwarz	2024-11-08	2026-11-08
Temperature chamber	I-190 CK	/	Kambič	N/A	N/A
Radiated measurements					
EMI test receiver	ESW 44		R&S	2024-09-26	2026-03-26
Semi-anechoic chamber	SAC 3m	109071	Comtest engineering	2022-04-14	2025-04-14
Ultra-Broadband Antenna	HL562E	/	Rohde & Schwarz	2023-09-26	2026-09-26
Horn Antenna	HF907	102508	Rohde & Schwarz	2023-08-22	2026-08-22
Active loop antenna	FMZB 1519		Schwarzbeck	2024-09-18	2026-03-18
Turn table (2 m diameter)	TT 2.0 SI	/	Maturo	N/A	
Bore-sight antenna mast	BAM-4.0-P	/	Maturo	N/A	
Multi-channel positioning equipment	Maturo NCD	/	Maturo	N/A	

2.1 Conversion factors and all other formulas

Unit	Conversion unit	Formula of conversion
dBµV	dBµV/m	dBµV/m = dBµV + AF
µV/m	dBµV/m	dBµV/m = 20log(X(µV/m)/1µV)

Test distance stated in standard	Test distance of measurement	Conversion factor
3 m	3 m	/
10 m	3 m	20dB/decade (over 30 MHz)
		40dB/decade (under 30 MHz)

3 TEST SUMMARY

STANDARDS (details on first page)	Tested yes	Tested no	Sample pass	Sample not pass
ANSI C63.10-2013; 47 CFR Part 15, Subpart C	☑	☐	☑	☐

Test	47 CFR Part 15 section	Section within the report	Conclusion
Antenna requirements	15.203	5.1	PASS
Restricted bands of operation	15.205	5.2	PASS
Conducted emission	15.207	5.3	PASS
Radiated emission	15.209	5.4	PASS
Bandwidth of the emission	15.215	5.5	PASS
Spectrum mask	15.225	5.6	PASS
Frequency tolerance of the carrier signal	15.225	5.7	PASS

3.1 Operating voltages/frequencies used for testing

Section	Test	Operating conditions
6.1	Restricted bands of operation	240 Vac 60 Hz
6.2	Conducted emission	240 Vac 60 Hz
6.3	Radiated emission	240 Vac 60 Hz
6.4	Bandwidth of the emission	240 Vac 60 Hz
6.5	Spectrum mask	240 Vac 60 Hz
6.6	Frequency tolerance of the carrier signal	240 Vac 60 Hz

4 TESTS RESULTS

4.1 Antenna requirements (§15.203)

Requirement
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion:
PASS; EUT has internal PCB antenna.

4.2 Restricted bands of operation (§15.205&RSS-Gen)

4.2.1 Requirement

Except as shown in paragraph (d) of §15.205 only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6

RSS Gen Restricted frequency bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	1435-1626.5	9.0-9.2
0.495-0.505	16.69475-16.69525	1645.5-1646.5	9.3-9.5
2.1735-2.1905	16.80425-16.80475	1660-1710	10.6-12.7
3.020 - 3.026	25.5-25.67	1718.8-1722.2	13.25-13.4
4.125-4.128	37.5-38.25	2200-2300	14.47-14.5
4.17725-4.17775	73-74.6	2310-2390	15.35-16.2
4.20725-4.20775	74.8-75.2	2483.5-2500	17.7-21.4
6.215-6.218	108-138	2655-2900	22.01-23.12
6.26775-6.26825	149.9-150.05	3260-3267	23.6-24.0
6.31175-6.31225	156.52475-156.52525	3332-3339	31.2-31.8
8.291-8.294	156.7-156.9	3345.8-3358	36.43-36.5
8.362-8.366	162.0125-167.17	3500-4400	Above 38.6
8.37625-8.38675	167.72-173.2	4500-5150	
8.41425-8.41475	240-285	5350-5460	
12.29-12.293	322-335.4	7250-7750	
12.51975-12.52025	399.9-410	8025-8500	
12.57675-12.57725	608-614		(2)
13.36-13.41	960-1427		

4.2.2 Test results

See Radiated emission results under 5.4 Radiated emission and 5.6 Spectrum mask.

4.3 Conducted emission measurement (§15.207)

4.3.1 Requirement

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 – 56*	56 – 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

The shown limits in table shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

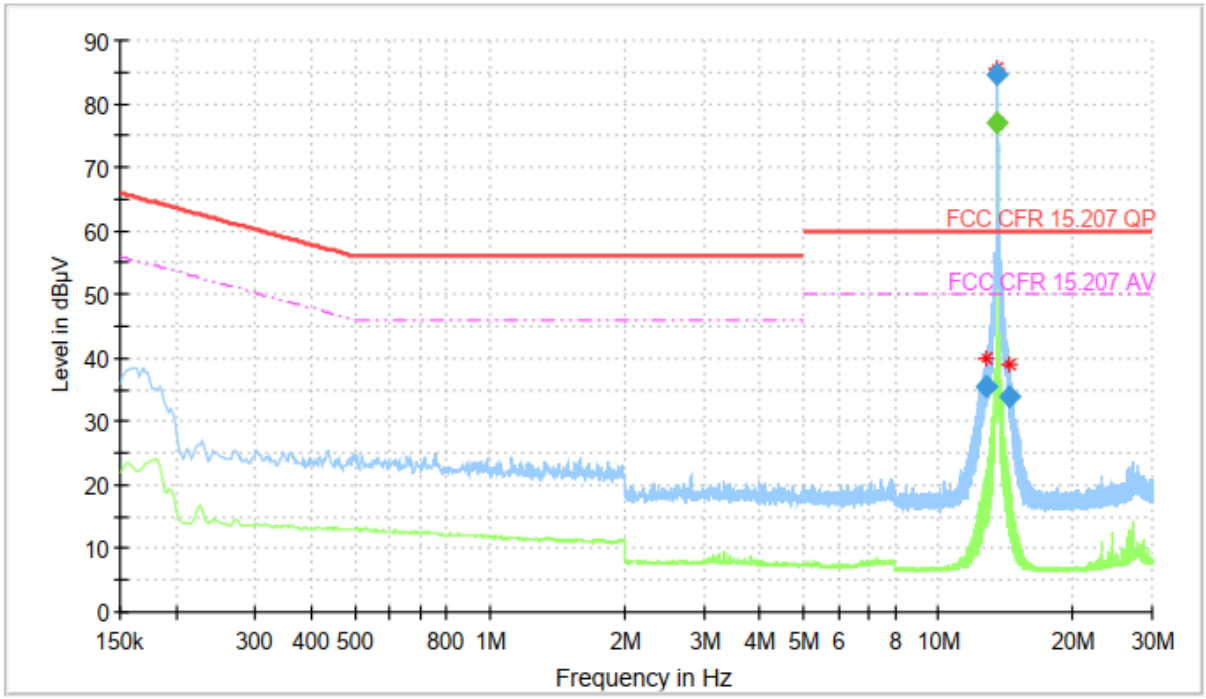
4.3.2 Test procedure

- As per clause 6.2 from ANSI C63.10-2013.
- The EUT is placed on a non-conductive 0.8 meters high table, 0.4 meters from the vertical conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). LISN provide 50 Ohm / 50 µH + 5 Ohm of coupling impedance for the measuring instrument.
- Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
- AC power lines of EUT are checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz is searched using PEAK, QUASI-PEAK and AVERAGE function of the receiver to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band. Bandwidth is set to 9 kHz.
- Measurement repeated with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band.

4.3.3 Test results

EUT Information

EUT:	WPB + WPP, 24 V
Operating mode:	Uin 240 V / 60 Hz, PPL Mode, Primary module turned on
Line:	L + N

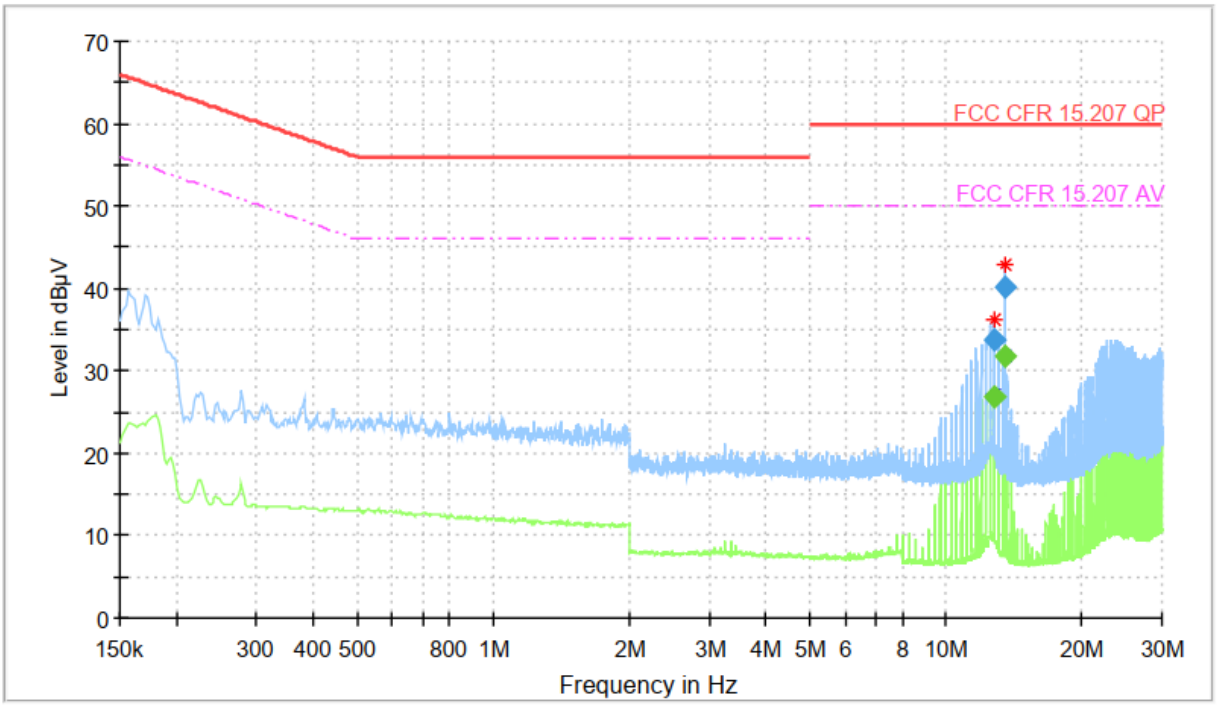


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
13.560000	---	77.14	50.00	-27.14	3000.0	9.000	L1	ON	9.8
13.560000	84.75	---	60.00	-24.75	3000.0	9.000	L1	ON	9.8
12.846750	35.54	---	60.00	24.46	3000.0	9.000	L1	ON	9.8
14.331750	33.84	---	60.00	26.16	3000.0	9.000	L1	ON	9.9

EUT Information

EUT:	WPB + WPP, 24 V
Operating mode:	Uin 240 V / 60 Hz, PPL Mode, Primary module turned on, antenna output terminated with 50 ohm
Line:	L + N

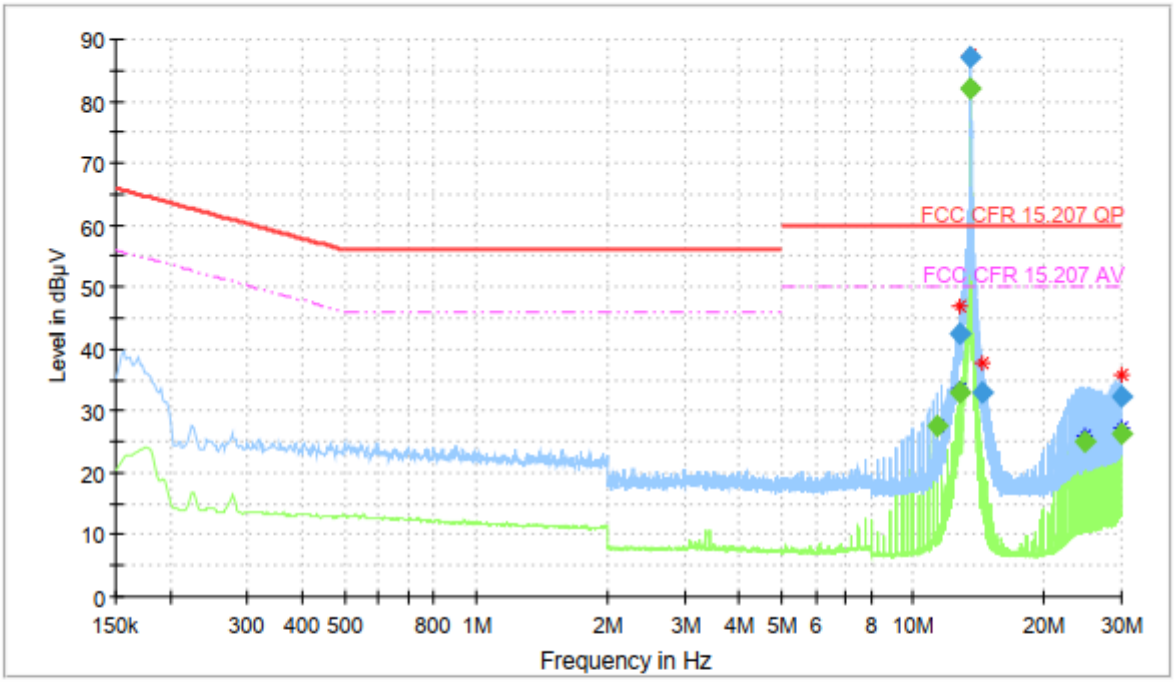


Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
13.560000	---	31.87	50.00	18.13	3000.0	9.000	L1	ON	9.8
13.560000	40.25	---	60.00	19.75	3000.0	9.000	L1	ON	9.8
12.772500	---	26.94	50.00	23.06	3000.0	9.000	L1	ON	9.8
12.774750	33.75	---	60.00	26.25	3000.0	9.000	L1	ON	9.8

EUT Information

EUT:	WPB + WPP, WSP + WSB 24V
Operating mode:	Uin 240 V / 60 Hz, PPL Mode, Communication established
Line:	L + N



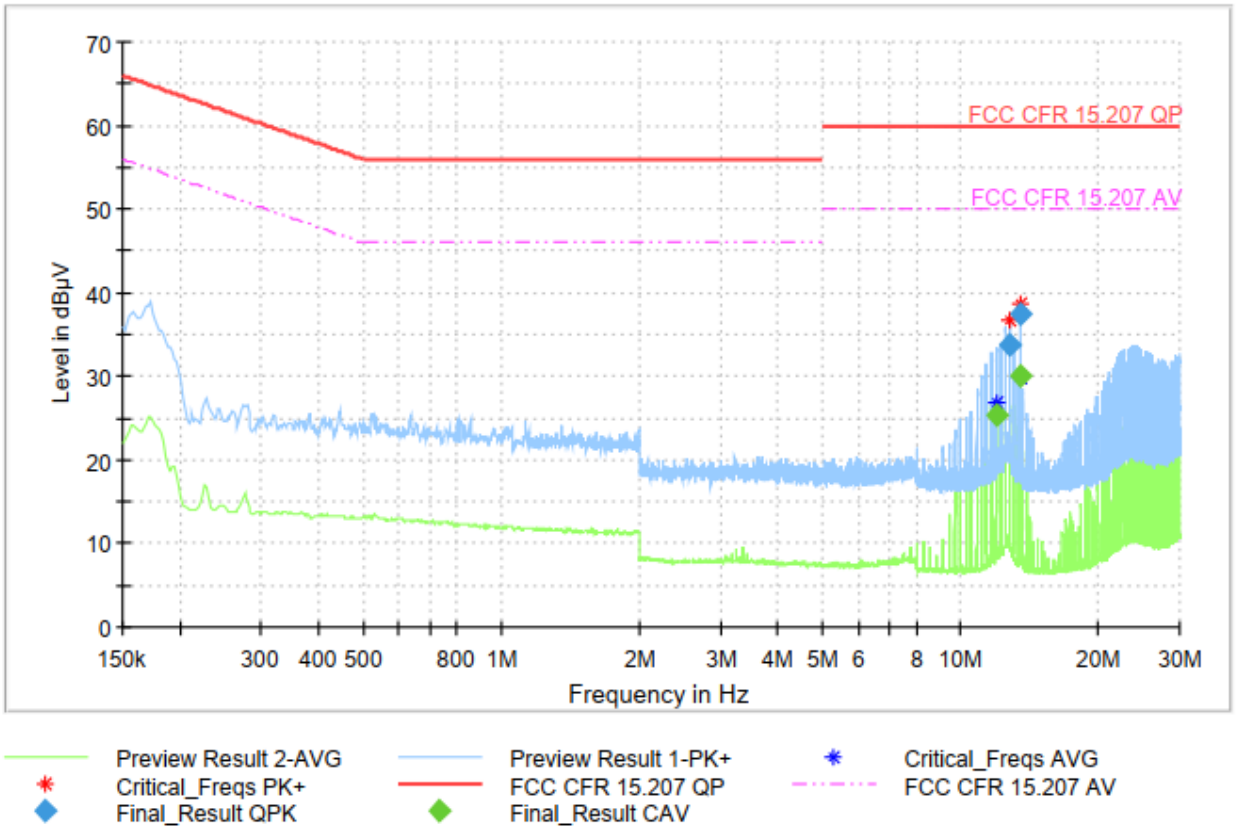
Preview Result 2-AVG
Critical_Freqs PK+
Final_Result QPK
Preview Result 1-PK+
FCC CFR 15.207 QP
Final_Result CAV
Critical_Freqs AVG
FCC CFR 15.207 AV

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
13.560000	---	82.05	50.00	-32.05	3000.0	9.000	L1	ON	9.8
13.560000	87.03	---	60.00	-27.03	3000.0	9.000	L1	ON	9.8
12.770250	---	33.08	50.00	16.92	3000.0	9.000	L1	ON	9.8
12.840000	42.39	---	60.00	17.61	3000.0	9.000	L1	ON	9.8
11.382000	---	27.51	50.00	22.49	3000.0	9.000	L1	ON	9.8
29.982750	---	26.34	50.00	23.66	3000.0	9.000	L1	ON	10.1
24.708750	---	25.16	50.00	24.84	3000.0	9.000	L1	ON	10.0
14.338500	32.83	---	60.00	27.17	3000.0	9.000	L1	ON	9.9
29.978250	32.45	---	60.00	27.55	3000.0	9.000	L1	ON	10.1

EUT Information

EUT:	WPB + WPP, WSP + WSB 24V
Operating mode:	Uin 240 V / 60 Hz, PPL Mode, Communication established, antenna output terminated with 50 ohm
Line:	L + N



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
13.560000	---	30.10	50.00	19.90	3000.0	9.000	L1	ON	9.8
13.560000	37.55	---	60.00	22.45	3000.0	9.000	L1	ON	9.8
11.940000	---	25.32	50.00	24.68	3000.0	9.000	L1	ON	9.8
12.777000	33.70	---	60.00	26.30	3000.0	9.000	L1	ON	9.8

4.4 Radiated emission measurement (§15.209)

4.4.1 Requirement

Frequency Range (MHz)	Limits (dBµV/m)	Test distance (m)
0.009 to 0.490	20*log(2400/F(kHz))	300
0.490 to 1.705	20*log(24000/F(kHz))	30
1.705 to 30.0	30	30
30 to 88	40**	3
88 to 216	43.5**	3
216 to 960	46**	3
Above 960	54	3

** Except as provided in paragraph below, fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications

4.4.2 Test procedure
Measurements from 9 kHz to 30 MHz

1. As per clause 6.4 from ANSI C63.10-2013
2. Radiated emission in the frequency range 9 kHz to 30 MHz are measured Active loop Antenna.
3. First preliminary measurements were performed in Semi-anechoic chamber at a distance of 3 m using active loop antenna.
4. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table and antenna was rotated 360 degrees to determine the position of the highest radiation.
5. Final measurements were done at a distance of 10 m at Open Area Test Site due to low emissions measured during preliminary measurements acc. to the clauses from Part 15, Sections 15.31(d) and 15.31(f)(2). Test results were extrapolated by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Measurements from 30 MHz to 1 GHz

1. As per clause 6.5 from ANSI C63.10-2013
2. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
3. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
4. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
6. The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The highest points would be re-tested one by one using the quasi-peak method.

4.4.3 Test results

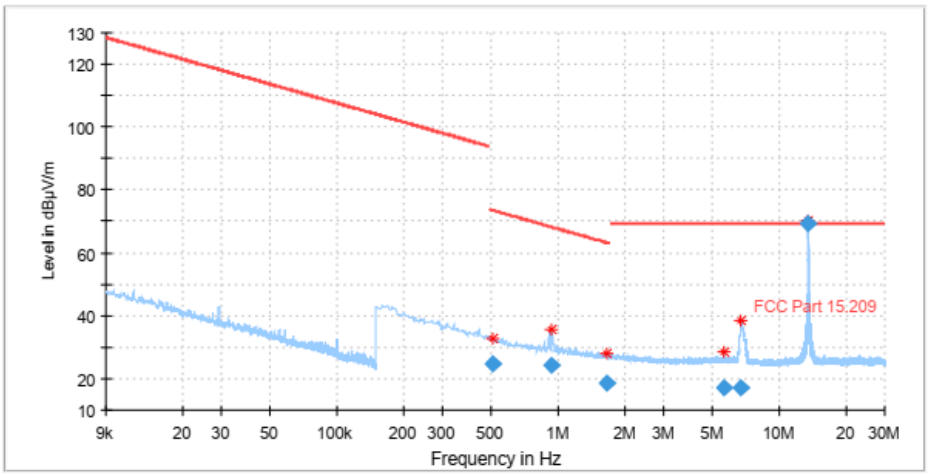
Device passed the requirements stated in 47 CFR Part 15, Subpart C, Section 15.209
Preliminary measurements at 3 m:

Only primary pad active, antenna in X orientation:

EUT Information

EUT:	WPB + WPP;
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Module turned on
Antenna polarization:	X

Full Spectrum



Final Result

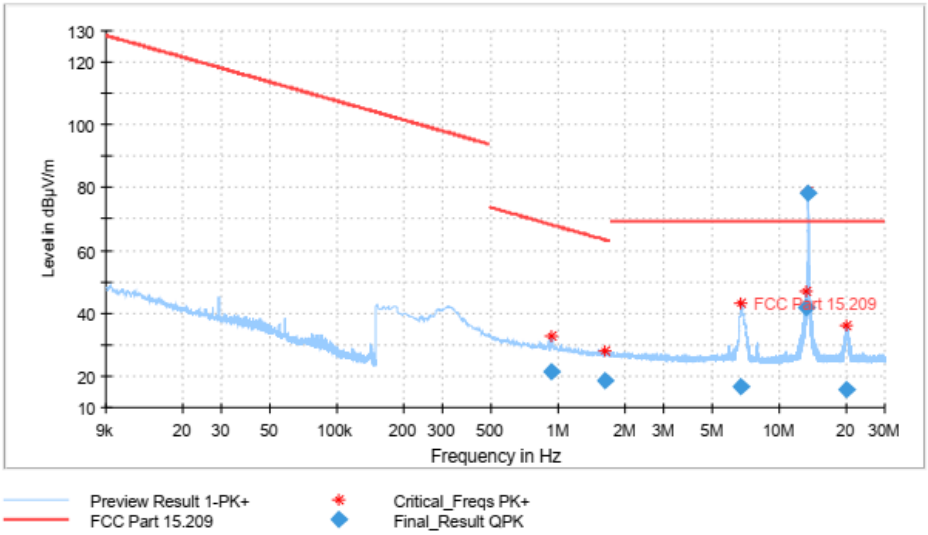
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.505500	24.47	73.53	49.06	1000.0	9.000	100.0	H	139.0	16.8
0.935250	24.19	68.20	44.01	1000.0	9.000	100.0	H	0.0	16.9
1.662000	18.69	63.22	44.53	1000.0	9.000	100.0	H	67.0	16.9
5.599500	16.97	69.50	52.53	1000.0	9.000	100.0	H	246.0	17.0
6.729000	16.97	69.50	52.53	1000.0	9.000	100.0	H	56.0	16.9
13.560000	69.45	69.50	0.05	1000.0	9.000	100.0	H	358.0	17.1

Only primary pad active, antenna in Y orientation:

EUT Information

EUT:	WPB + WPP;
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Module turned on
Antenna polarization:	Y

Full Spectrum



Final Result

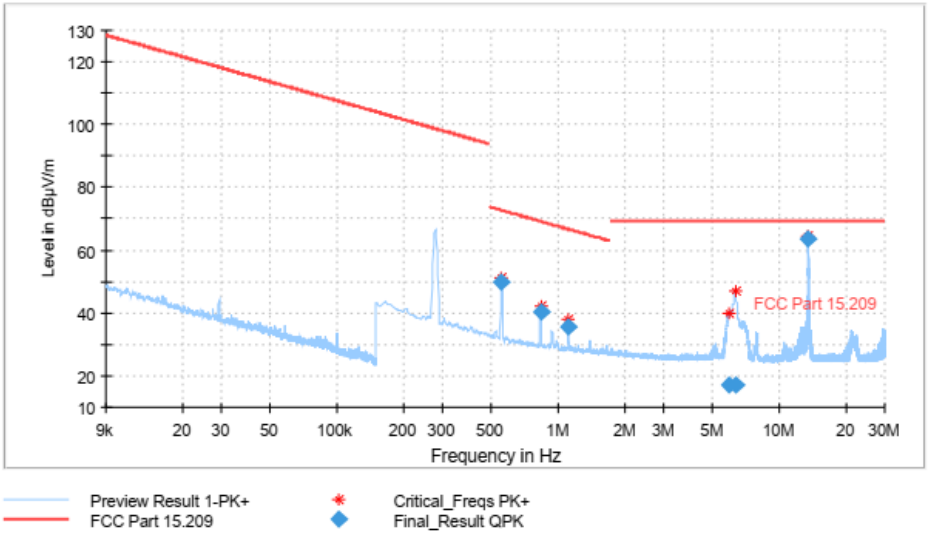
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.935250	21.33	68.20	46.88	1000.0	9.000	100.0	H	86.0	16.9
1.639500	18.52	63.34	44.82	1000.0	9.000	100.0	H	192.0	16.9
6.713250	16.74	69.50	52.76	1000.0	9.000	100.0	H	298.0	16.9
13.305750	41.75	69.50	27.75	1000.0	9.000	100.0	H	86.0	17.1
13.560000	78.16	69.50	-8.66	1000.0	9.000	100.0	H	74.0	17.1
20.206500	15.87	69.50	53.63	1000.0	9.000	100.0	H	358.0	17.4

Primary and secondary pad active, antenna in X orientation:

EUT Information

EUT:	WPB + WPP; WSP+ WSB 24V
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Communication established
Antenna polarization:	X

Full Spectrum



Final Result

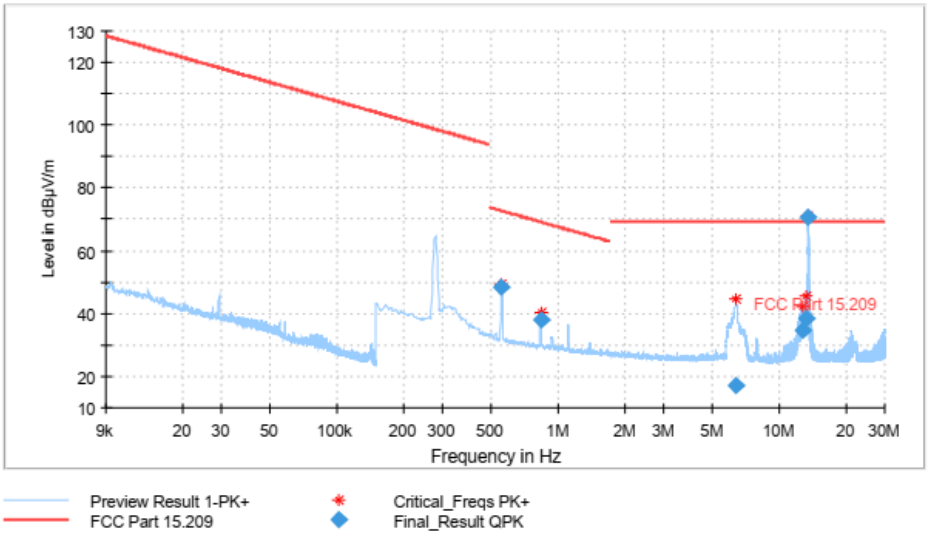
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
13.560000	63.56	69.50	5.94	1000.0	9.000	100.0	H	321.0	17.1
0.555000	49.69	72.72	23.03	1000.0	9.000	100.0	H	321.0	16.9
0.834000	40.27	69.19	28.92	1000.0	9.000	100.0	H	334.0	16.9
1.110750	35.50	66.71	31.21	1000.0	9.000	100.0	H	334.0	16.9
5.912250	17.28	69.50	52.22	1000.0	9.000	100.0	H	158.0	16.9
6.310500	17.13	69.50	52.37	1000.0	9.000	100.0	H	158.0	16.9

Primary and secondary pad active, antenna in Y orientation:

EUT Information

EUT:	WPB + WPP; WSP+ WSB 24V
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Communication established
Antenna polarization:	Y

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
13.560000	70.56	69.50	-1.06	1000.0	9.000	100.0	H	51.0	17.1
0.555000	48.46	72.72	24.26	1000.0	9.000	100.0	H	29.0	16.9
13.301250	38.33	69.50	31.17	1000.0	9.000	100.0	H	51.0	17.1
0.834000	37.99	69.19	31.20	1000.0	9.000	100.0	H	19.0	16.9
12.781500	34.71	69.50	34.79	1000.0	9.000	100.0	H	229.0	17.1
6.369000	17.10	69.50	52.40	1000.0	9.000	100.0	H	310.0	16.9

Final measurement at 10 m on OATS:

Results with measuring distance of 10 m				
Operating Mode	**Frequency (MHz)**	**Measured value (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Primary pad	13.56	55.68	103	47.32
Primary + secondary pad	13.56	46.00	103	57.00

Calculated value from 10 m to 30 m						
Operating Mode	**Frequency (MHz)**	**Measured value at 10 m (dBµV/m)**	**Correction factor from 10 m to 30 m (dB)**	**Calculated value at 30 m (dBµV/m)**	**Limit at 30 m (dBµV/m)**	**Margin (dB)**
Primary pad	13.56	55.68	19	36.68	84.00	47.32
Primary + secondary pad	13.56	46.00	19	27.00	84.00	57.00

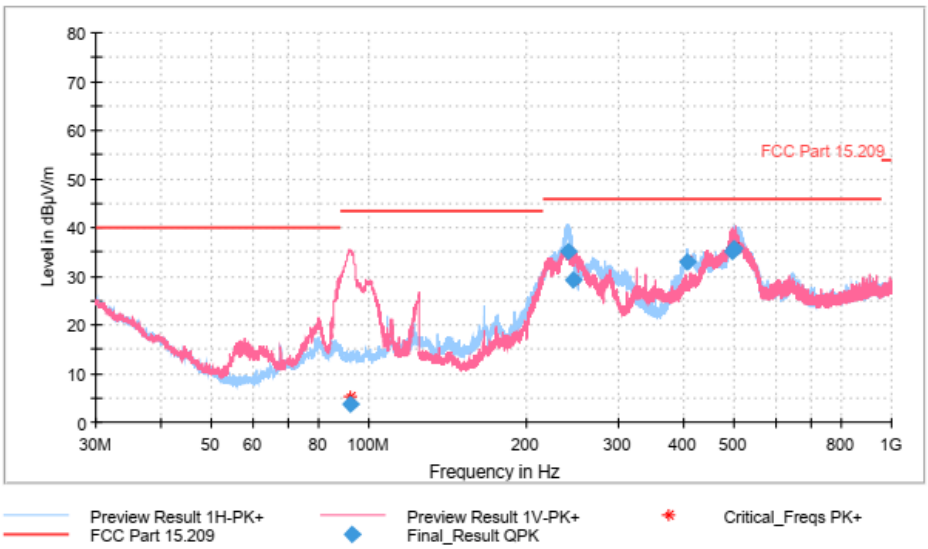
NOTE: Antenna factor and cable loss are included in measurement correction.

Only primary pad active:

EUT Information

EUT:	WPB + WPP;
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Module turned on

Full Spectrum



Final Result

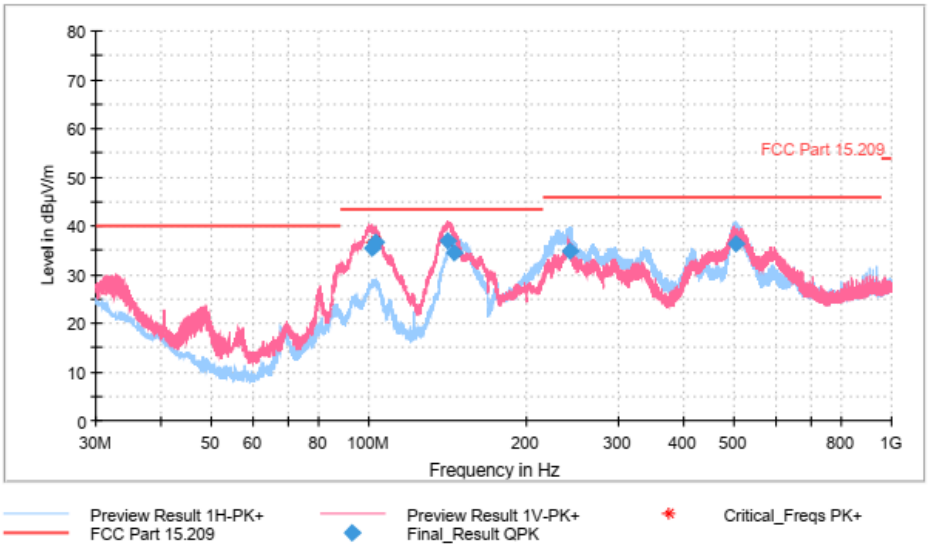
Frequency (MHz)	QuasiPeak (dBµV/m)	DET 2 (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
500.010000	35.70	---	46.00	10.30	141.0	H	306.0
240.360000	35.15	---	46.00	10.85	100.0	H	193.0
495.810000	35.14	---	46.00	10.86	100.0	V	321.0
406.800000	33.06	---	46.00	12.94	100.0	H	314.0
246.600000	29.24	---	46.00	16.76	100.0	H	167.0
92.100000	3.68	---	43.50	39.83	200.0	V	294.0

Primary and secondary pad active:

EUT Information

EUT:	WPB + WPP; WSP+ WSB 24V
Operating conditions:	Uin: 240 V, 60 Hz
Operating mode:	PPL Mode; Communication established

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	DET 2 (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
141.450000	36.77	---	43.50	6.73	100.0	V	0.0
102.750000	36.49	---	43.50	7.01	147.0	V	353.0
101.190000	35.32	---	43.50	8.18	143.0	V	353.0
145.620000	34.41	---	43.50	9.09	100.0	V	0.0
503.520000	36.34	---	46.00	9.66	141.0	H	308.0
241.500000	34.67	---	46.00	11.33	100.0	H	175.0

4.5 Bandwidth of the emission (§15.215)

4.5.1 Requirements

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through 15.257 and in subpart E of FCC Part 15, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

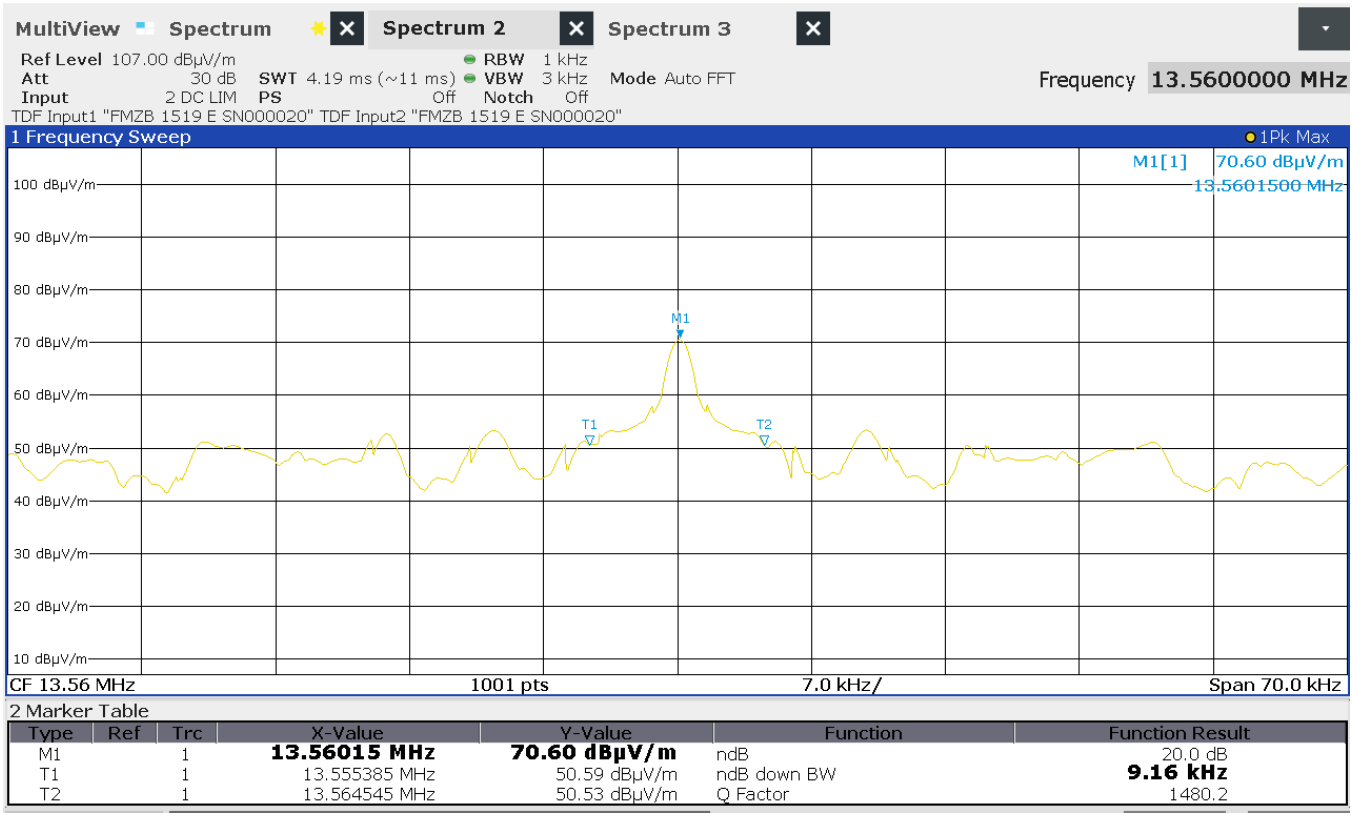
4.5.2 Test procedure

1. As per Clause 6.9.2 from ANSI C63.10-2013
2. The EUT is placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
3. The EUT is set 3 m away from the interference-receiving antenna.
4. Resolution bandwidth is set to a value greater than 5% of the allowed bandwidth.

4.5.3 Test results

Device passed the requirements stated in 47 CFR Part 15, Subpart C, Section 15.215

Only primary pad active, antenna at 0 deg:

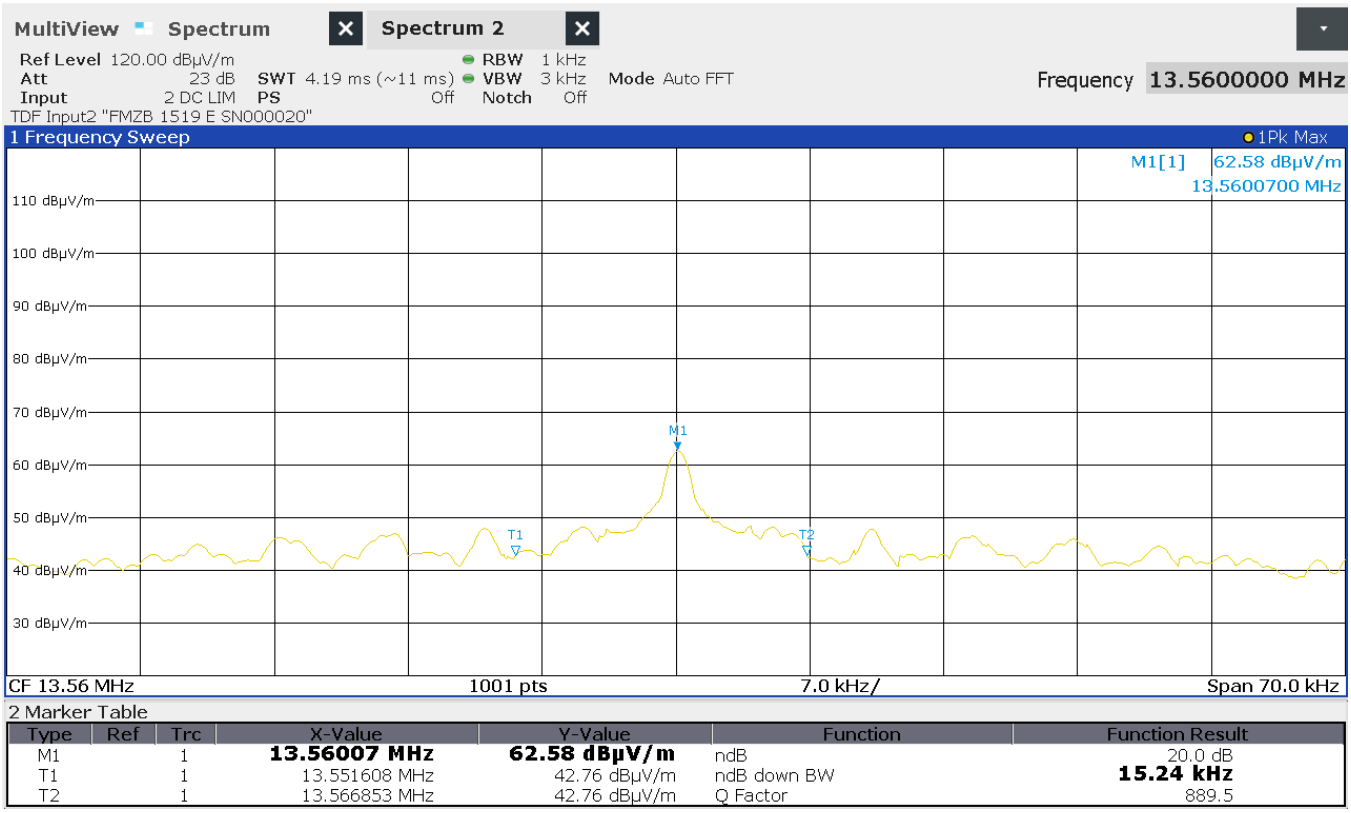


2 Marker Table

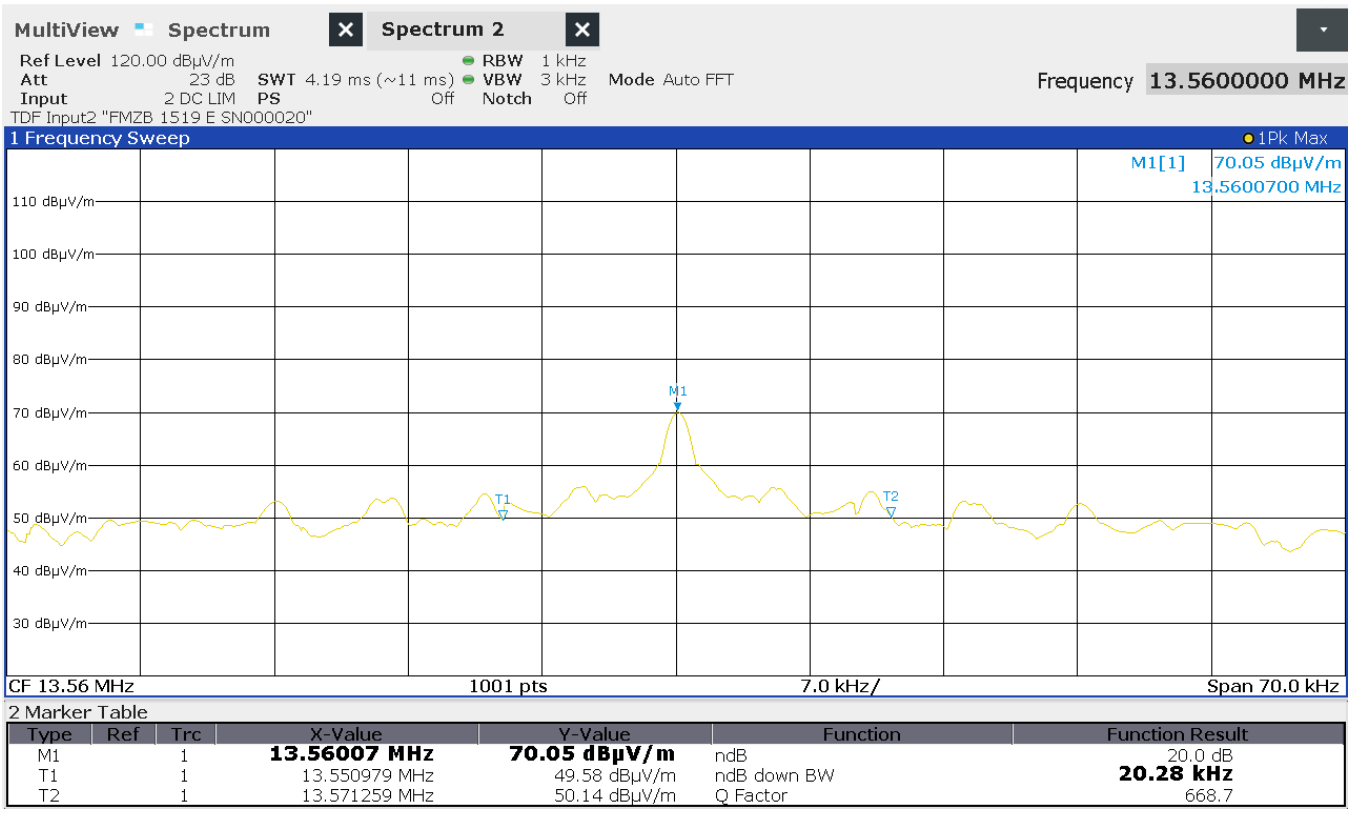
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**13.56015 MHz**	**70.60 dBµV/m**	ndB	20.0 dB
T1		1	13.555385 MHz	50.59 dBµV/m	ndB down BW	**9.16 kHz**
T2		1	13.564545 MHz	50.53 dBµV/m	Q Factor	1480.2

Only primary pad active, antenna at 90 deg:

Primary and secondary pad active, antenna at 0 deg:



Primary and secondary pad active, antenna at 90 deg:



Frequency (MHz)	Permitted frequency band (MHz)	20 dB bandwidth (kHz)	PASS/FAIL
13.56	13.110 – 14.010	8.46	PASS

4.6 Spectrum mask (§15.225 (a)-(d))

4.6.1 Requirements

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

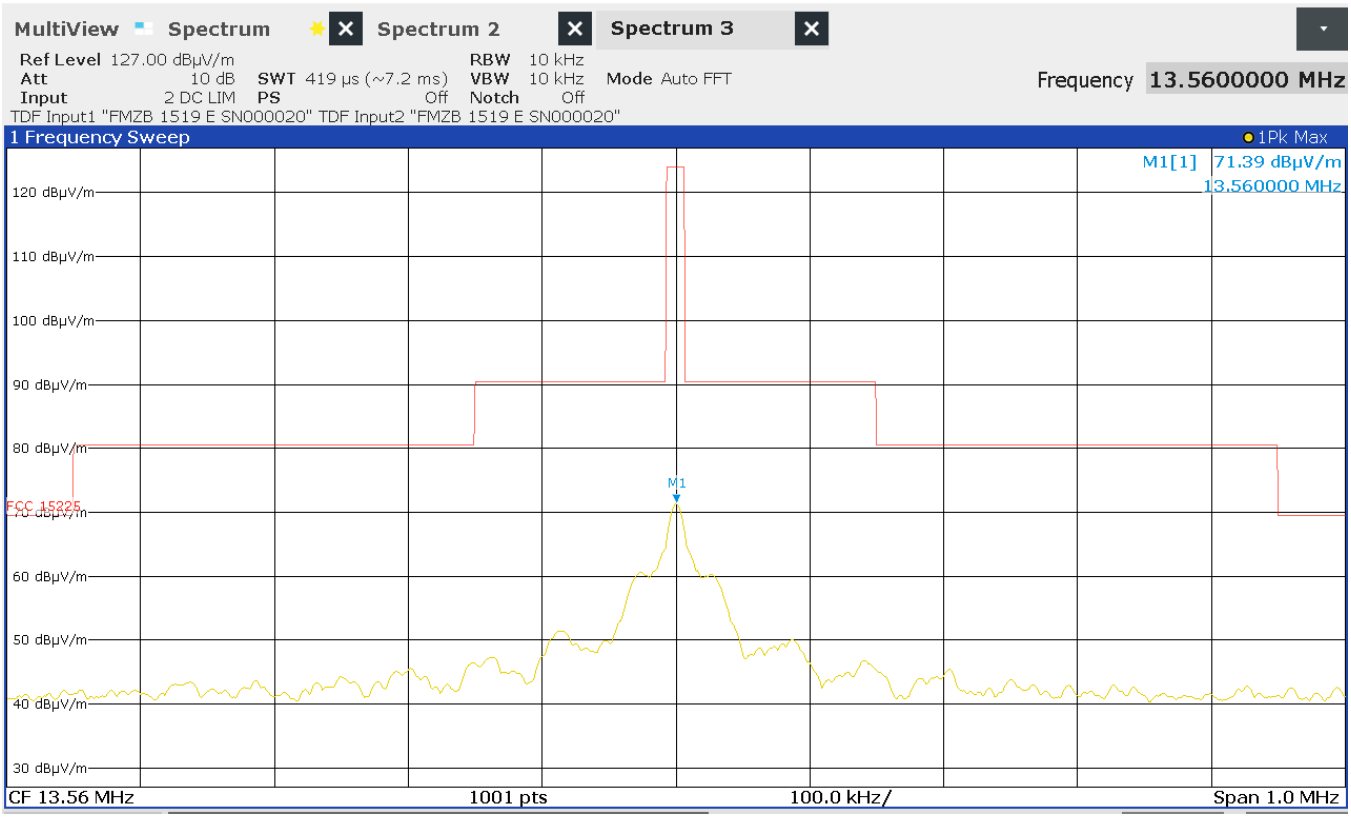
4.6.2 Test procedure

1. As per clause 6.4 from ANSI C63.10-2013
2. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
3. The EUT was set 3 m away from the interference-receiving antenna.
4. Frequencies with maximum emission were retested on OATS.
5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

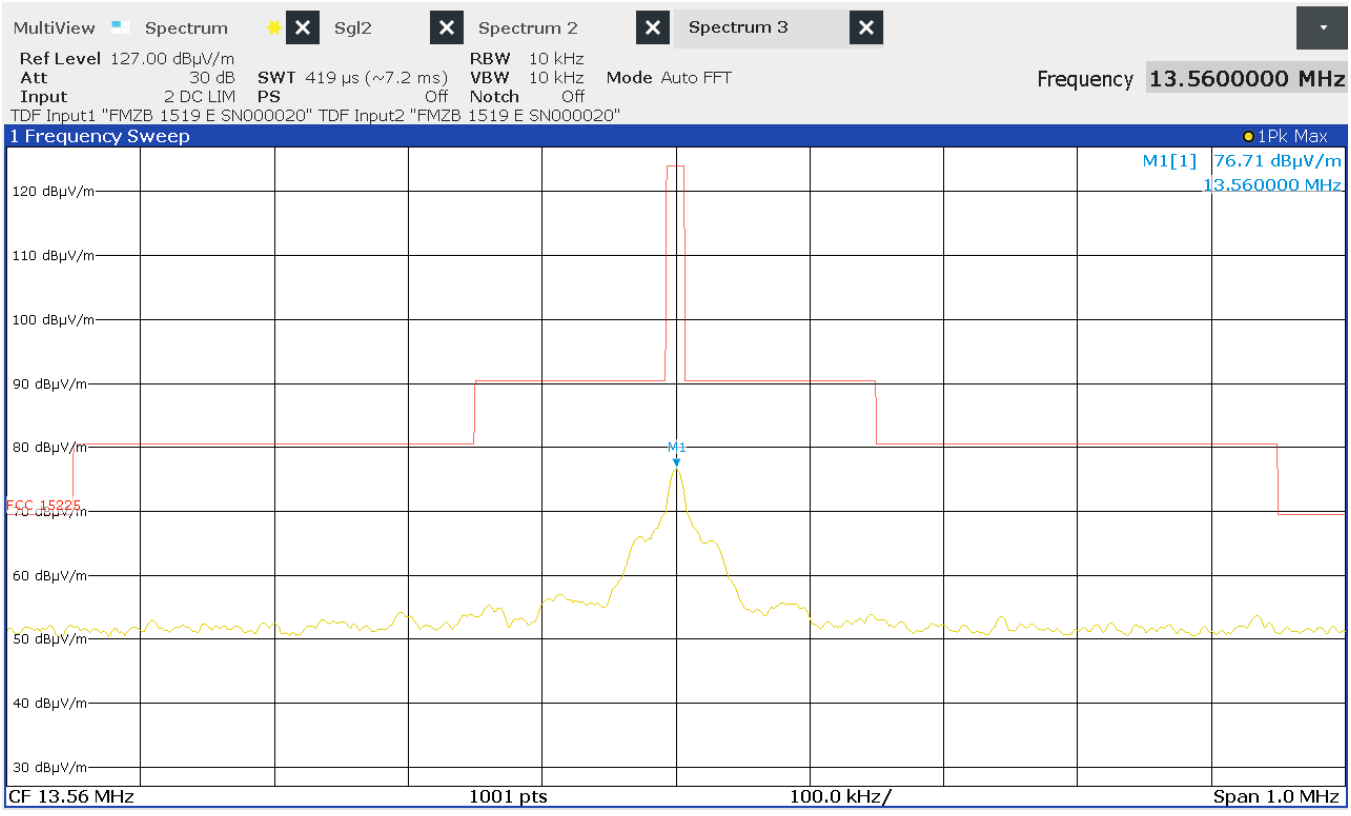
4.6.3 Test results

Device passed the requirements stated in 47 CFR Part 15, Subpart C, Section 15.225

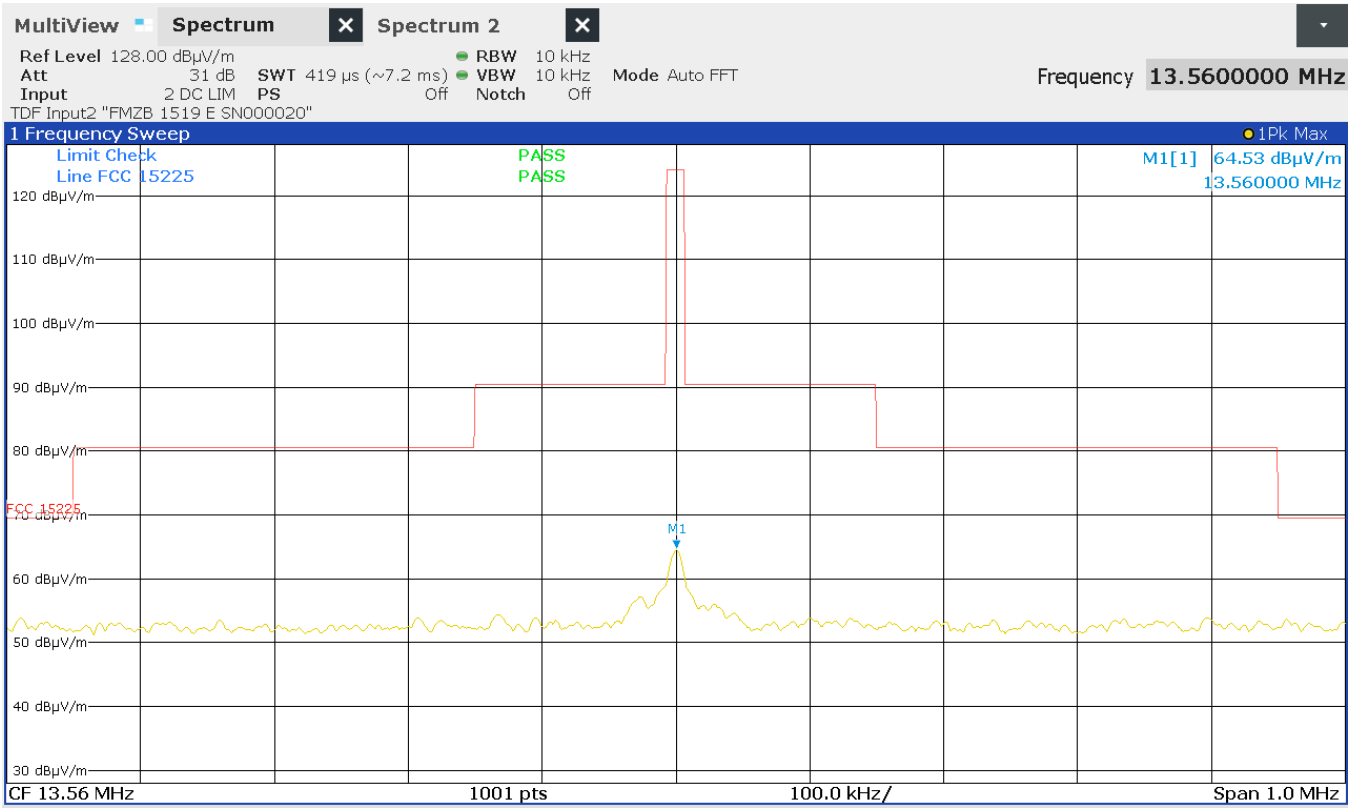
Only primary pad active, antenna at 0 deg:



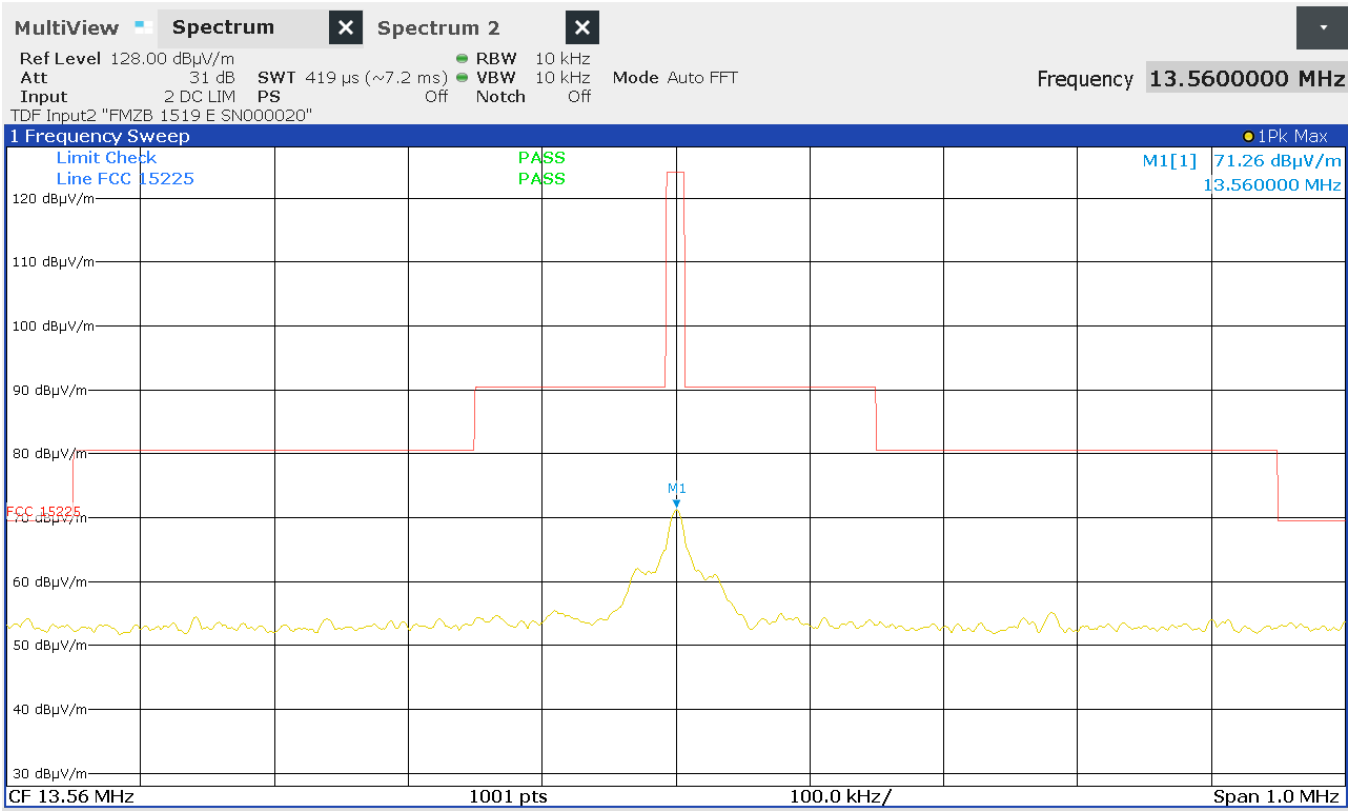
Only primary pad active, antenna at 90 deg:



Primary and secondary pad active, antenna at 0 deg:



Primary and secondary pad active, antenna at 90 deg:



4.7 Frequency tolerance of the carrier signal (§15.225 (e))

4.7.1 Requirement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.7.2 Test procedure

1. As per clause 6.8 from ANSI C63.10-2013.
2. The frequency tolerance of the carrier signal is measured over a temperature variation of -20 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 °C.
3. If the EUT provides an antenna connector the spectrum analyzer is connected to this port. In cases where the EUT does not provide an antenna connector a test fixture is used.
4. The peak detector of the spectrum analyzer is selected and the resolution bandwidth as well as the video bandwidth is set to values appropriate to the shape of the spectrum of the EUT.
5. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized.

4.7.3 Test results

Device passed the requirements stated in of FCC 47 CFR 15, Subpart C, Section 15.225

FREQUENCY STABILITY						
Temperature	Supply voltage (V)	Minutes after switch on	Measured Frequency (MHz)	Allowed tolerance (kHz)	Measured tolerance	RESULT
50	240	0	13.560101	Fref±1.356 kHz	0.000000	PASS
	240	2	13.560072	Fref±1.356 kHz	-0.000029	PASS
	240	5	13.560058	Fref±1.356 kHz	-0.000043	PASS
	240	10	13.560043	Fref±1.356 kHz	-0.000058	PASS
40	240	0	13.560130	Fref±1.356 kHz	0.000029	PASS
	240	2	13.560101	Fref±1.356 kHz	0.000000	PASS
	240	5	13.560087	Fref±1.356 kHz	-0.000014	PASS
	240	10	13.560072	Fref±1.356 kHz	-0.000029	PASS
30	240	0	13.560145	Fref±1.356 kHz	0.000044	PASS
	240	2	13.560116	Fref±1.356 kHz	0.000015	PASS
	240	5	13.560101	Fref±1.356 kHz	0.000000	PASS
	240	10	13.560101	Fref±1.356 kHz	0.000000	PASS
20	276	0	13.560116	Fref±1.356 kHz	0.000015	PASS
	276	2	13.560101	Fref±1.356 kHz	0.000000	PASS
	276	5	13.560101	Fref±1.356 kHz	0.000000	PASS
	276	10	13.560101	Fref±1.356 kHz	0.000000	PASS
20	240	0	13.560116	Fref±1.356 kHz	0.000015	PASS
	240	2	13.560109	Fref±1.356 kHz	0.000008	PASS
	240	5	13.560109	Fref±1.356 kHz	0.000008	PASS
	240	**10**	**13.560101**	**Fref**	0.000000	PASS
20	204	0	13.560116	Fref±1.356 kHz	0.000015	PASS
	204	2	13.560101	Fref±1.356 kHz	0.000000	PASS
	204	5	13.560101	Fref±1.356 kHz	0.000000	PASS
	204	10	13.560101	Fref±1.356 kHz	0.000000	PASS
10	240	0	13.560101	Fref±1.356 kHz	0.000000	PASS
	240	2	13.560087	Fref±1.356 kHz	-0.000014	PASS
	240	5	13.560087	Fref±1.356 kHz	-0.000014	PASS
	240	10	13.560087	Fref±1.356 kHz	-0.000014	PASS
0	240	0	13.560145	Fref±1.356 kHz	0.000044	PASS
	240	2	13.560116	Fref±1.356 kHz	0.000015	PASS
	240	5	13.560116	Fref±1.356 kHz	0.000015	PASS
	240	10	13.560116	Fref±1.356 kHz	0.000015	PASS
-10	240	0	13.560174	Fref±1.356 kHz	0.000073	PASS
	240	2	13.560174	Fref±1.356 kHz	0.000073	PASS
	240	5	13.560174	Fref±1.356 kHz	0.000073	PASS
	240	10	13.560174	Fref±1.356 kHz	0.000073	PASS
-20	240	0	13.560217	Fref±1.356 kHz	0.000116	PASS
	240	2	13.560203	Fref±1.356 kHz	0.000102	PASS
	240	5	13.560203	Fref±1.356 kHz	0.000102	PASS
	240	10	13.560203	Fref±1.356 kHz	0.000102	PASS

5 Annex I – Additional data

Cross-reference table				
Test	**47 CFR Part 15 section**	**IC requirements**	**Section within the report**	**Conclusion**
Antenna requirements	15.203	RSS-Gen Issue 5 §6.8	5.1	PASS
Restricted bands of operation	15.205	RSS-Gen Issue 5 §8.10*	5.2	PASS
Conducted emission	15.207	RSS-Gen Issue 5 §8.8	5.3	PASS
Radiated emission	15.205 15.209 15.225	RSS-Gen Issue 5 §8.9* RSS-Gen Issue 5 §8.10* RSS-210 Issue 3 Annex B.6	5.4	PASS
Bandwidth of the emission	15.215	RSS-210 Issue 3 Annex B.6	5.5	PASS
Spectrum mask	15.225	RSS-210 Issue 3 Annex B.6	5.6	PASS
Frequency tolerance of the carrier signal	15.225	RSS-210 Issue 3 Annex B.6	5.7	PASS
*Note: Radiated measurements performed in laboratory recognized by ISED Canada: – CAB identifier: SI0001 – ISED#: 21434				

5.1 Occupied bandwidth (99% emission bandwidth)

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

5.1.1 Test procedure

According ANSI C63.10-2013:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyser marker to the highest level of the displayed trace (this is the reference value).

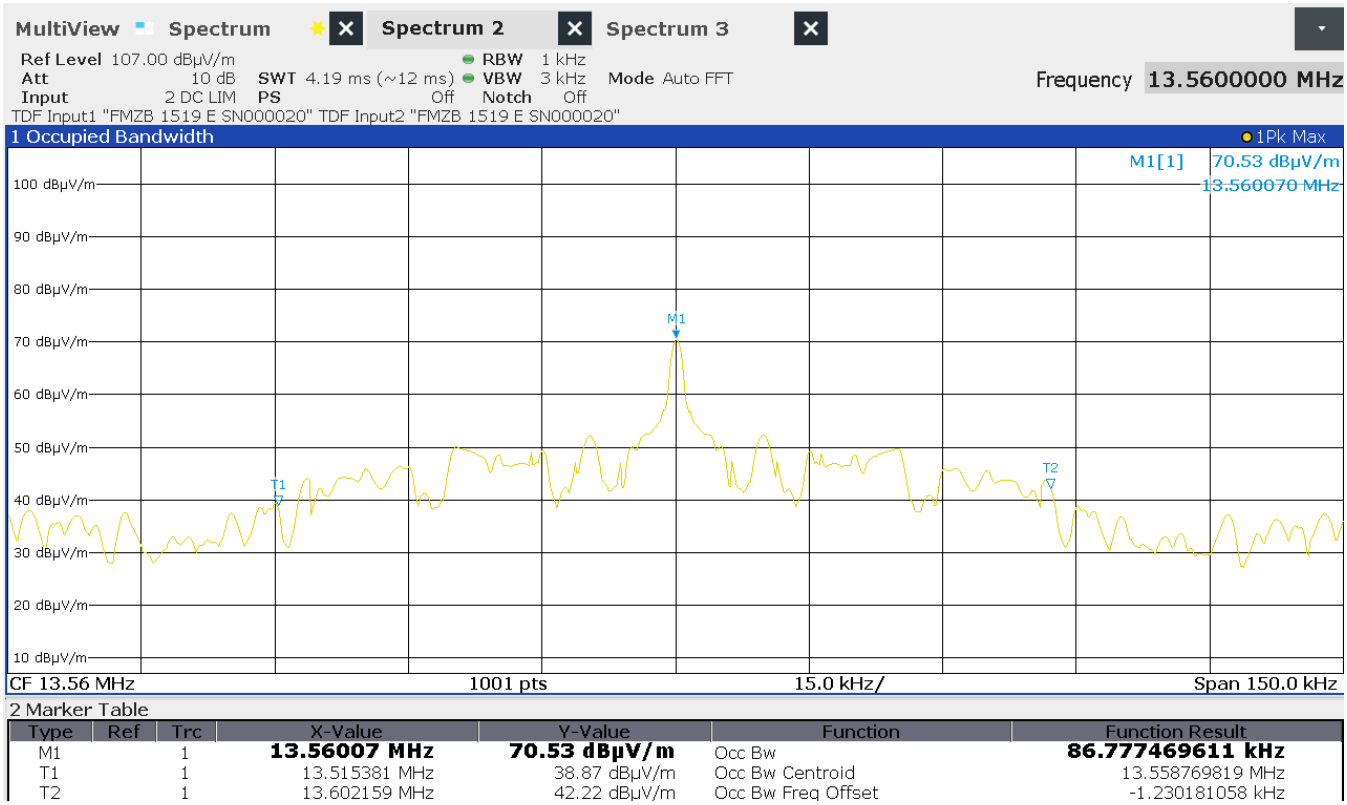
h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyser and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

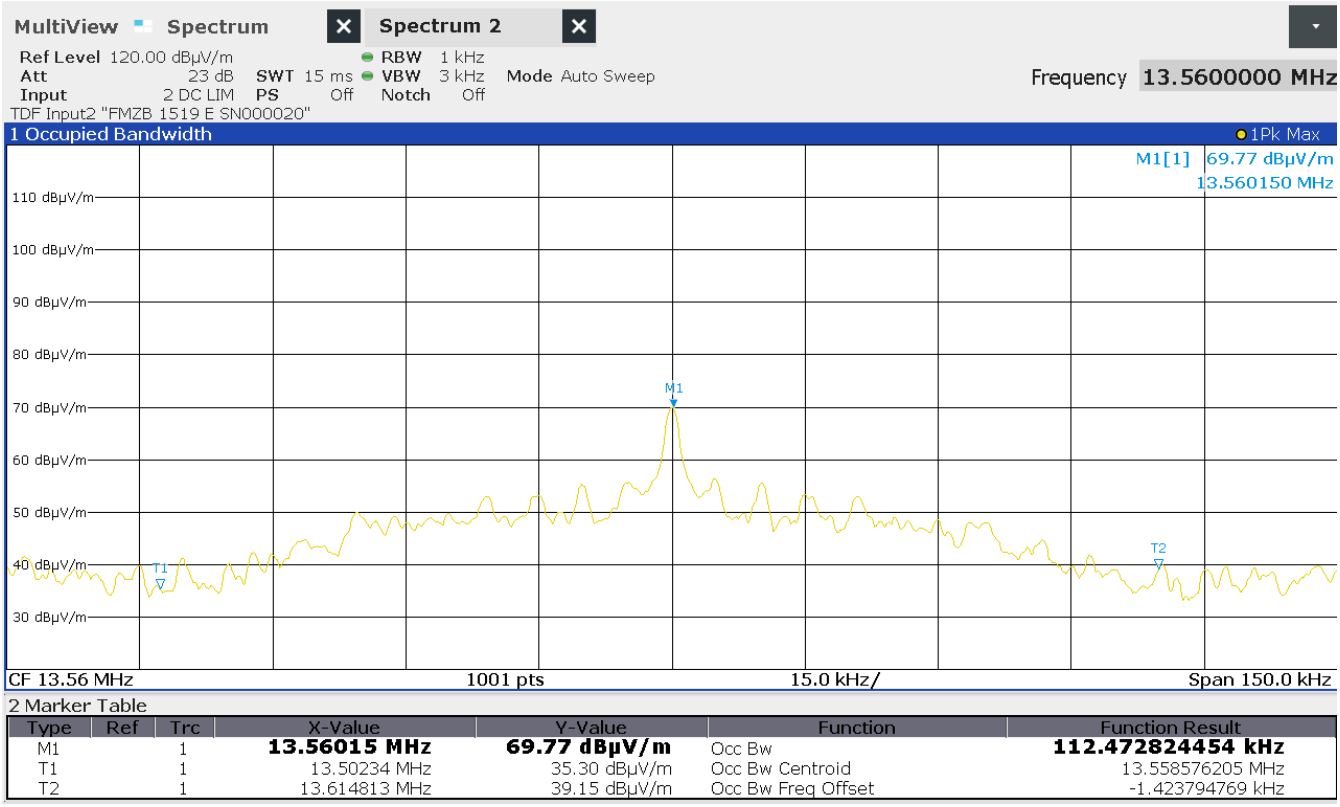
Only primary pad active, antenna at 0 deg:



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**13.56007 MHz**	**70.53 dBµV/m**	Occ Bw	**86.777469611 kHz**
T1		1	13.515381 MHz	38.87 dBµV/m	Occ Bw Centroid	13.558769819 MHz
T2		1	13.602159 MHz	42.22 dBµV/m	Occ Bw Freq Offset	-1.230181058 kHz

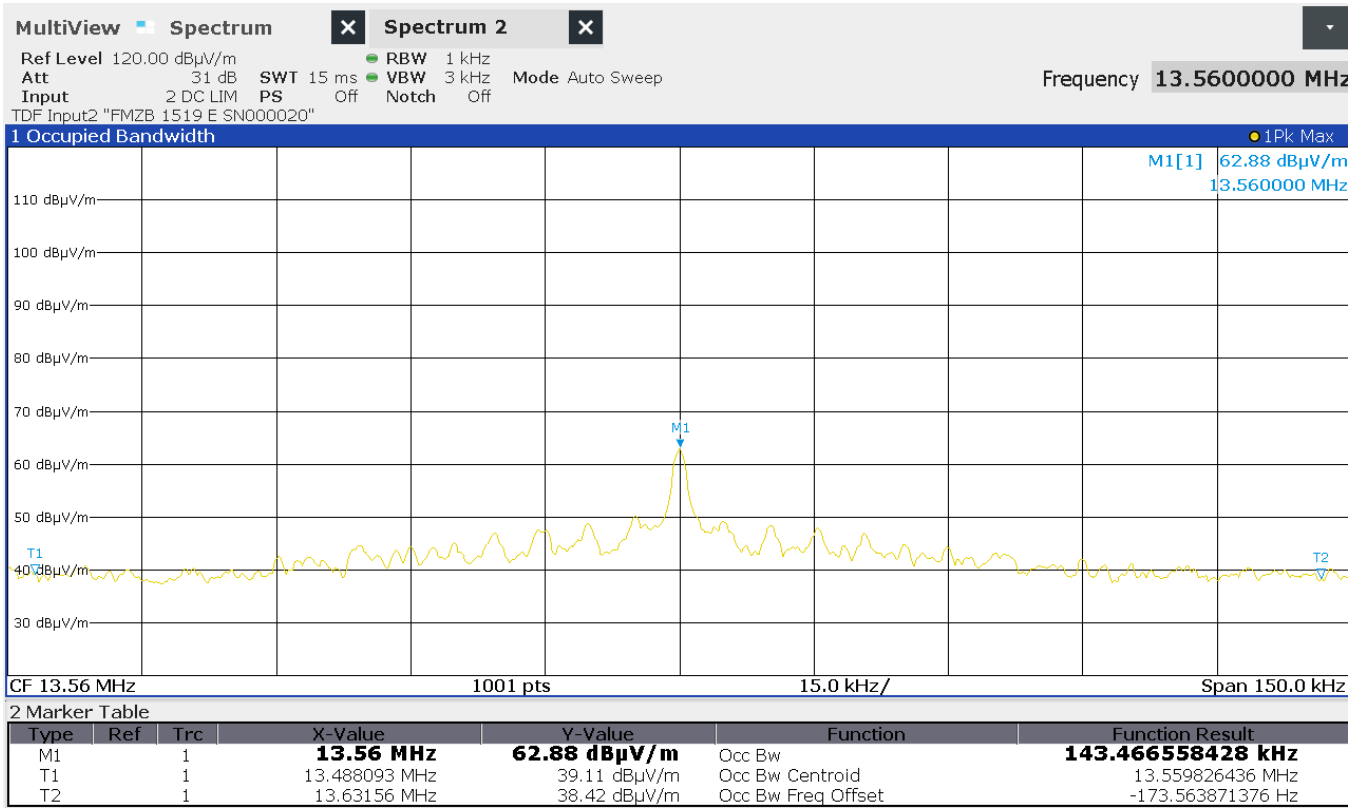
Only primary pad active, antenna at 90 deg:



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**13.56015 MHz**	**69.77 dBµV/m**	Occ Bw	**112.472824454 kHz**
T1		1	13.50234 MHz	35.30 dBµV/m	Occ Bw Centroid	13.558576205 MHz
T2		1	13.614813 MHz	39.15 dBµV/m	Occ Bw Freq Offset	-1.423794769 kHz

Primary and secondary pad active, antenna at 0 deg:



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**13.56 MHz**	**62.88 dBµV/m**	Occ Bw	**143.466558428 kHz**
T1		1	13.488093 MHz	39.11 dBµV/m	Occ Bw Centroid	13.559826436 MHz
T2		1	13.63156 MHz	38.42 dBµV/m	Occ Bw Freq Offset	-173.563871376 Hz

Primary and secondary pad active, antenna at 90 deg:

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**13.56 MHz**	**77.50 dBµV/m**	Occ Bw	**83.771616634 kHz**
T1		1	13.517828 MHz	48.27 dBµV/m	Occ Bw Centroid	13.559714028 MHz
T2		1	13.6016 MHz	50.29 dBµV/m	Occ Bw Freq Offset	-285.971587986 Hz

----------END OF TEST REPORT----------