

Test report

Number: T251-0808/18

Project file: C20173327

Date: 2019-02-15

Pages: 66

Product: SMART Check Point

Type reference: SCP v1.0

Ratings: 100-240 V~; 47-63 Hz; 1,35 A
(SMART Check Point supplied from approved power supply with special connector)
Operating clock frequency: 13,56 MHz
Protection class: I

Trademark: SMART Check Point

Applicant: GPI SAS
17 rue Jacques Germain, FR-21420 Savigny les Beaune, France

Manufacturer: GPI SAS
17 rue Jacques Germain, FR-21420 Savigny les Beaune, France

Place of manufacture: GPI SAS
17 rue Jacques Germain, FR-21420 Savigny les Beaune, France

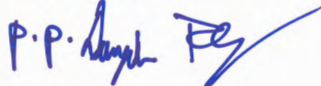
Summary of testing

Testing method: 47 CFR Part 15, Subpart C

Testing location: SIQ Ljubljana, Mašera-Spasićeva ulica 10, SI-1000 Ljubljana, Slovenia

Remarks: Date of receipt of test items: 2018-01-08
Number of items tested: 1
Date of performance of tests: 2018-07-04 - 2018-10-18
The test results presented in this report relate only to the items tested.
The product complies with the requirements of the testing methods.
/

Tested by: Andrej Škof



Approved by: Marjan Mak



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1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2019-02-15	T251-0808/18	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

SMART Check Point

Type: SCP v1.0

Equipment marking plate

{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.}

SMART Check Point



AC/DC adapter



1.1.1 General product information

Product	Smart Check Point
Type / Model	SCP V1.0
Supply voltage of transmitter	24 Vdc via AC/DC adapter
Operating frequency	13,56 MHz
Antenna type	Internal PCB antenna
Modulation type:	Amplitude modulation
Hardware version:	V1

EUT is anti-counterfeiting solution for gaming tables powered with SELV voltage via separately approved Power Supply. EUT is intended for building-in (only top part with display is user accessible in end product).
The final position of the unit:



1.2 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.

1.3 ANSI C63.4 Subpart selection

Subpart C: Intentional Radiators

1.4 Class statement requirements

- The Class B statement offers several suggestions for minimizing interference to radio or TV receivers, including reorienting the receiving antenna and moving the Class B device farther away from the receiver.

1.5 Occupied bandwidth measurement

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

1.6 Quasi-peak detector

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	Full range (wideband)
10 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz

1.7 Peak, rms, and average detectors

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	10, 100, 1000 Hz
10 kHz to 150 kHz	1 and 10 kHz
150 kHz to 30 MHz	1 and 10 kHz
30 MHz to 1 GHz	10 and 100 kHz
1 GHz to 40 GHz	0.1, 1.0 and 10 MHz

2 LIMITS

2.1 Subpart C: Intentional Radiators

2.1.1 Section 15.207, Conducted emission limits:

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.

2.1.2 Section 15.209, Radiated emission limits:

Limits:

Frequency Range (MHz)	Limits (dBμV/m)		Test distance (m)
	VERTICAL	HORIZONTAL	
0,009 to 0,490	$20 \cdot \log(2400/F(\text{kHz}))$	$20 \cdot \log(2400/F(\text{kHz}))$	300
0,490 to 1,705	$20 \cdot \log(24000/F(\text{kHz}))$	$20 \cdot \log(24000/F(\text{kHz}))$	30
1,705 to 30,0	30	30	30
30 to 88	40**	40**	3
88 to 216	43.5**	43.5**	3
216 to 960	46**	46**	3
Above 960	54	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.

Additional provisions to the general radiated emission limitations – Section 15.215: In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emission as per clause 15.209.

Intentional radiators operating under the alternative provisions to the general emission limits 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.

3 ALL TEST EQUIPMENT AND THEIR DESCRIPTION

3.1 General information

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2017-11	2019-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU26	100428	2018-02	2020-02	24 months	X
Rohde & Schwarz, Artificial main network	ESH2-Z5	106899	2017-05	2019-05	24 months	X
Rohde & Schwarz, Artificial main network	ENV216	109818	2017-09	2019-09	24 months	X
Comtest Engineering, Semi Anechoic Chamber SAC 1	SAC 3m	NPS001	2017-05	2019-05	24 months	X
Comtest Engineering, Semi Anechoic Chamber SAC 2	SAC 3m	NPS003	2017-05	2019-05	24 months	
Rohde & Schwarz, Horn Antenna	HF907 (SN 102508)	102508	2018-05	2020-05	24 months	
Rohde & Schwarz, Ultra Broadband Antenna	HL562E (SN 100842)	100842	2017-07	2019-07	24 months	X
Rohde & Schwarz, Horn Antenna	HF907 (SN 102494)	102494	2018-05	2020-05	24 months	
Rohde & Schwarz, Ultra Broadband Antenna	HL562E (SN 100843)	100843	2017-07	2019-07	24 months	
Maturo, Turn table (2 m diameter)	TT 2.0 SI	/	N/A	N/A	N/A	X
Maturo, Bore-sight antenna mast	BAM-4.0-P	/	N/A	N/A	N/A	X
Maturo, Multi-channel positioning equipment	Maturo NCD	/	N/A	N/A	N/A	X
Schwarzbeck, Biconical antenna	VHBB9124 (SN 9124-317)	105112	2016-11	2018-11	24 months	X
Rohde & Schwarz, Loop Antenna	FMZB 1519 B	/	2016-08	2018-08	24 months	X
Fluke, Digital Multimeter	179	108102	2016-11	2018-11	12 months	X
Kambič, Temperature chamber	I-190 CK	107298	N/A	N/A	/	X

3.2 Other instrument information and auxiliary equipment

Description	Model No.	Bandwidth	Detector functions	Antenna factors	Cable loss	Range
Rohde-Schwarz, AMN	ENV216	/	/	/	/	9 kHz – 30 MHz
Rohde & Schwarz, Artificial main network	ESH 2-Z5	/	/	/	/	9 kHz – 30 MHz
Rohde-Schwarz, RFI receiver	ESU8	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 8 GHz
Rohde-Schwarz, RFI receiver	ESU26	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 26.5 GHz
Hewlett Packard, RF Spectrum Analyzer	8593E	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	9 kHz – 26.5 GHz
Comtest Engineering, Semi Anechoic Chamber SAC 1	SAC 3m	/	/	/	/	30 MHz – 18 GHz
Comtest Engineering, Semi Anechoic Chamber SAC 2	SAC 3m	/	/	/	/	30 MHz – 18 GHz
Rohde & Schwarz, Horn Antenna	HF907 (SN 102508)	/	/	See section 3.2.2	/	0.8 GHz – 18 GHz
Rohde & Schwarz, Ultra Broadband Antenna	HL562E (SN 100842)	/	/	See section 3.2.2	/	30 MHz – 6 GHz
Rohde & Schwarz, Horn Antenna	HF907 (SN 102494)	/	/	See section 3.2.2	/	0.8 GHz – 18 GHz
Rohde & Schwarz, Ultra Broadband Antenna	HL562E (SN 100843)	/	/	See section 3.2.2	/	30 MHz – 6 GHz
Schwarzbeck, Biconical antenna	VHBB9124 (SN 9124-317)	/	/	See section 3.2.2	/	30 MHz – 300 MHz
Rohde & Schwarz, Loop Antenna	FMZB 1519 B	/	/	See section 3.2.2	/	9 kHz – 30 MHz

3.2.1 Cable loss and attenuation of radiated emission

3.2.1.1 Conducted emission cable (SIQ-K024)

Point	Frequency (9kHz-30MHz)	Cable length (meters)	Loss (dB)
1	190 kHz	1	0,4
2	530 kHz	1	0,26
3	2,53 MHz	1	0,16
4	5,19 MHz	1	0,07
5	11,05 MHz	1	0,03
6	22,01 MHz	1	0,06
7	24,03 MHz	1	0,04

3.2.1.2 Radiated emission attenuation

Point	Frequency (30 MHz – 26,5 GHz)	Attenuation (dB)
1	30 MHz	0,501
2	150 MHz	1,174
3	400 MHz	2,034
4	800 MHz	2,995
5	1 GHz	3,416
6	1,363	1,666667
7	2,686	3,58333
8	5,332	5,25
9	7,978	6,25
10	10,624	7,5
11	13,27	8,333333
12	15,916	9,166666
13	18,562	9,833333
14	21,208	10,66667
15	23,854	11,5
16	26,5	12,16667

3.2.2 Antenna factors

3.2.2.1 Antenna VHBB9124

Frequency (MHz)	Antenna factor VHBB9124 (SN 9124-317)
20	15,3
21	15,1
22	14,8
23	14,5
24	14,3
25	14,1
26	13,8
27	13,6
28	13,3
29	13,1
30	12,6
31	12,4
32	12,2
33	12,0
34	11,8
35	11,7
36	11,4
37	11,3
38	11,1
39	11,0
40	10,8
41	10,7
42	10,5
43	10,3
44	10,2
45	10,1
46	9,9
47	9,9
48	9,7
49	9,7
50	9,5
51	9,5
52	9,3
53	9,3
54	9,2
55	9,1
56	9,0
57	9,0
58	9,0
59	9,0
60	9,0
61	9,0
62	8,9
63	8,9
64	8,8
65	8,8
66	8,8
67	8,9
68	8,9

69	8,9
70	8,9
71	8,9
72	8,9
73	8,9
74	8,9
75	8,9
76	8,9
77	8,9
78	8,9
79	9,0
80	9,0
81	9,0
82	9,1
83	9,0
84	9,0
85	9,0
86	9,1
87	9,1
88	9,2
89	9,2
90	9,3
91	9,3
92	9,3
93	9,3
94	9,3
95	9,3
96	9,4
97	9,4
98	9,5
99	9,5
100	9,6
102	9,7
104	9,7
106	9,9
108	10,0
110	10,2
112	10,2
114	10,3
116	10,4
118	10,5
120	10,5
122	10,7
124	10,7
126	10,8
128	10,9
130	11,0
132	11,1
134	11,2
136	11,4
138	11,5
140	11,6
142	11,8
144	11,8
146	12,0
148	11,9
150	12,0

152	12,1
154	12,4
156	12,6
158	12,8
160	12,9
162	12,9
164	13,0
166	13,0
168	12,8
170	12,8
172	12,9
174	13,0
176	13,2
178	13,3
180	13,4
182	13,5
184	13,5
186	13,5
188	13,6
190	13,7
192	13,8
194	13,8
196	13,9
198	14,0
200	14,1
202	14,2
204	14,3
206	14,4
208	14,3
210	14,4
212	14,7
214	14,6
216	14,5
218	14,5
220	14,6
222	14,4
224	14,6
226	14,8
228	14,9
230	15,0
232	15,0
234	15,0
236	15,0
238	15,2
240	15,3
242	15,3
244	15,4
246	15,3
248	15,2
250	15,2
252	15,2
254	15,4
256	15,4
258	15,5
260	15,6
262	15,7
264	15,7

266	15,8
268	15,9
270	15,9
272	16,0
274	16,0
276	16,2
278	16,2
280	16,4
282	16,7
284	16,8
286	17,0
288	16,9
290	16,9
292	17,2
294	17,4
296	17,6
298	17,9
300	18,2

3.2.2.2 Antenna FMZB 1519 B

Frequency (MHz)	Antenna factor (dB)
0,009	-30,60
0,010	-30,80
0,020	-31,80
0,030	-32,00
0,040	-32,10
0,050	-32,20
0,060	-32,20
0,070	-32,20
0,080	-32,20
0,090	-32,30
0,100	-32,30
0,150	-32,30
0,200	-32,40
0,300	-32,40
0,400	-32,40
0,500	-32,40
0,600	-32,40
0,700	-32,50
0,800	-32,50
0,900	-32,50
1,000	-32,50
2,000	-32,50
3,000	-32,50
4,000	-32,50
5,000	-32,50
6,000	-32,50
7,000	-32,50
8,000	-32,50
9,000	-32,50
10,000	-32,50
11,000	-32,50
12,000	-32,50
13,000	-32,50
14,000	-32,40
15,000	-32,40
16,000	-32,40
17,000	-32,40
18,000	-32,30
19,000	-32,30
20,000	-32,20
21,000	-32,10
22,000	-32,10
23,000	-32,00
24,000	-31,90
25,000	-31,80
26,000	-31,70
27,000	-31,60
28,000	-31,50
29,000	-31,40
30,000	-31,30

3.2.2.3 Antenna HL562E

Frequency (MHz)	Antenna factor HL562E (SN 100842)	Antenna factor HL562E (SN 100843)
30	18.12	18.17
32	17.08	17.07
34	16.01	16
36	14.91	14.94
38	13.76	13.75
40	12.64	12.61
42	11.43	11.4
44	10.17	10.15
46	8.86	8.81
48	7.42	7.44
50	6.01	5.96
52	4.59	4.56
54	3.38	3.37
56	2.84	2.85
58	3.06	3.14
60	3.78	3.76
62	4.44	4.4
64	5.36	5.32
66	6.19	6.18
68	6.96	6.92
70	7.56	7.52
72	8.04	8.01
74	8.38	8.35
76	8.67	8.64
78	8.88	8.85
80	9.04	9.03
82	9.14	9.09
84	9.2	9.14
86	9.22	9.16
88	9.22	9.17
90	9.21	9.17
92	9.22	9.15
94	9.22	9.16
96	9.21	9.16
98	9.22	9.17
100	9.33	9.05
105	9.38	9.39
110	9.67	9.74
115	9.55	10.33
120	10.51	9.88
125	10.15	9.87
130	9.23	9.13
135	8.79	8.71
140	8.4	8.4
145	7.93	7.82
150	7.74	7.75
155	7.68	7.76
160	7.86	7.78
165	8.47	8.33
170	9.83	9.66
175	10.29	10.3
180	7.86	7.93

185	7.19	7.27
190	7.54	7.21
195	7.32	7.2
200	7.56	7.49
205	7.56	7.68
210	7.71	7.95
215	8.68	8.29
220	8.43	8.49
225	8.51	8.62
230	8.85	8.82
235	9.1	9.05
240	9.31	9.29
245	9.33	9.33
250	9.5	9.45
255	9.71	9.64
260	9.86	9.81
265	9.95	9.9
270	10	10.02
275	10.15	10.15
280	10.37	10.36
285	10.58	10.61
290	10.76	10.8
295	10.84	10.9
300	10.83	11.12
305	11.38	11.37
310	11.36	11.32
315	11.53	11.48
320	11.7	11.67
325	11.84	11.81
330	11.98	11.94
335	12.32	12.13
340	12.19	12.22
345	12.29	12.35
350	12.43	12.47
355	12.59	12.61
360	12.72	12.73
365	12.83	12.81
370	12.99	12.99
375	13.08	13.1
380	13.12	13.11
385	13.21	13.2
390	13.38	13.33
395	13.54	13.5
400	13.65	13.63
405	13.74	13.73
410	13.84	13.83
415	14.14	13.96
420	14.1	14
425	14.13	14.08
430	14.24	14.2
435	14.4	14.4
440	14.55	14.49
445	14.7	14.65
450	14.82	14.79
455	14.89	14.91
460	14.9	15.09
465	15.16	15.19

470	15.24	15.22
475	15.31	15.25
480	15.38	15.32
485	15.48	15.43
490	15.58	15.52
495	15.66	15.6
500	15.72	15.7
505	15.74	15.75
510	15.83	15.82
515	16.05	15.92
520	15.95	15.93
525	15.97	15.97
530	16.05	16.01
535	16.09	16.07
540	16.16	16.15
545	16.21	16.21
550	16.29	16.3
555	16.38	16.41
560	16.51	16.53
565	16.67	16.68
570	16.78	16.85
575	16.87	17.02
580	17.03	17.11
585	17.06	17.08
590	17.1	17.09
595	17.15	17.13
600	17.22	17.18
605	17.28	17.25
610	17.35	17.33
615	17.42	17.37
620	17.41	17.42
625	17.48	17.48
630	17.56	17.55
635	17.67	17.65
640	17.8	17.79
645	17.94	17.95
650	18.08	18.13
655	18.16	18.12
660	18.18	18.03
665	18.12	17.99
670	18.13	18.01
675	18.19	18.09
680	18.26	18.24
685	18.42	18.41
690	18.56	18.56
695	18.62	18.61
700	18.67	18.67
705	18.7	18.74
710	18.74	18.79
715	18.81	18.86
720	18.89	18.95
725	19.09	19.09
730	19.22	19.26
735	19.17	19.23
740	19.19	19.14
745	19.14	19.1
750	19.13	19.09



755	19.17	19.1
760	19.19	19.15
765	19.24	19.21
770	19.34	19.29
775	19.37	19.36
780	19.36	19.36
785	19.43	19.41
790	19.51	19.48
795	19.59	19.56
800	19.7	19.66
805	19.83	19.79
810	19.98	19.95
815	20.07	20.04
820	20.1	19.96
825	20.11	19.92
830	20.09	19.94
835	20.09	19.96
840	20.14	20.05
845	20.19	20.11
850	20.27	20.2
855	20.36	20.29
860	20.42	20.37
865	20.46	20.44
870	20.5	20.51
875	20.52	20.55
880	20.59	20.61
885	20.7	20.69
890	20.82	20.77
895	20.89	20.83
900	20.88	20.92
905	20.83	21.08
910	20.93	21.21
915	21.19	21.17
920	21.22	21.1
925	21.09	21.03
930	20.98	21
935	20.95	21
940	20.96	21.01
945	21	21.04
950	21.05	21.06
955	21.09	21.07
960	21.15	21.13
965	21.23	21.2
970	21.27	21.26
975	21.31	21.3
980	21.36	21.37
985	21.43	21.44
990	21.52	21.53
995	21.63	21.64
1000	21.73	21.73

3.2.2.4 Antenna HF907

Frequency (GHz)	Antenna factor HF907 (SN 102508)	Antenna factor HF907 (SN 102494)
1	24.36	24.36
1.01	24.34	24.38
1.02	24.53	24.55
1.03	24.6	24.63
1.04	24.46	24.51
1.05	24.35	24.41
1.06	24.48	24.49
1.07	24.51	24.56
1.08	24.32	24.37
1.09	24.26	24.29
1.1	24.33	24.35
1.11	24.38	24.44
1.12	24.23	24.25
1.13	24.18	24.19
1.14	24.23	24.24
1.15	24.35	24.38
1.16	24.3	24.3
1.17	24.23	24.26
1.18	24.37	24.4
1.19	24.56	24.57
1.2	24.52	24.55
1.21	24.39	24.42
1.22	24.51	24.52
1.23	24.66	24.7
1.24	24.64	24.68
1.25	24.51	24.54
1.26	24.53	24.55
1.27	24.69	24.72
1.28	24.65	24.65
1.29	24.46	24.47
1.3	24.48	24.52
1.31	24.66	24.68
1.32	24.64	24.65
1.33	24.49	24.5
1.34	24.53	24.53
1.35	24.75	24.75
1.36	24.73	24.76
1.37	24.62	24.65
1.38	24.74	24.76
1.39	24.96	24.99
1.4	25.02	25.05
1.41	24.94	24.95
1.42	25.02	25.03
1.43	25.31	25.37
1.44	25.39	25.43
1.45	25.27	25.29
1.46	25.37	25.42
1.47	25.7	25.7
1.48	25.77	25.76
1.49	25.66	25.67
1.5	25.76	25.77

1.51	26.04	26.03
1.52	26.12	26.12
1.53	26.01	26.03
1.54	26.06	26.03
1.55	26.29	26.29
1.56	26.35	26.36
1.57	26.25	26.25
1.58	26.27	26.27
1.59	26.41	26.45
1.6	26.51	26.5
1.61	26.37	26.36
1.62	26.33	26.33
1.63	26.48	26.52
1.64	26.58	26.57
1.65	26.42	26.44
1.66	26.35	26.37
1.67	26.51	26.53
1.68	26.64	26.59
1.69	26.46	26.47
1.7	26.36	26.34
1.71	26.52	26.5
1.72	26.7	26.7
1.73	26.54	26.53
1.74	26.4	26.38
1.75	26.62	26.64
1.76	26.85	26.83
1.77	26.72	26.73
1.78	26.59	26.57
1.79	26.75	26.8
1.8	27.08	27.07
1.81	26.92	26.92
1.82	26.77	26.76
1.83	27	27
1.84	27.26	27.23
1.85	27.09	27.06
1.86	26.92	26.88
1.87	27.17	27.14
1.88	27.4	27.35
1.89	27.27	27.22
1.9	27.14	27.12
1.91	27.43	27.38
1.92	27.72	27.71
1.93	27.59	27.56
1.94	27.55	27.52
1.95	27.9	27.9
1.96	28.25	28.24
1.97	28.13	28.1
1.98	28.06	28.04
1.99	28.43	28.44
2	28.67	28.63
2.01	28.5	28.45
2.02	28.37	28.39
2.03	28.67	28.63
2.04	28.76	28.76
2.05	28.48	28.46
2.06	28.37	28.36
2.07	28.49	28.48

2.08	28.52	28.51
2.09	28.31	28.29
2.1	28.16	28.14
2.11	28.24	28.23
2.12	28.28	28.27
2.13	28.15	28.13
2.14	28.01	28
2.15	28.1	28.09
2.16	28.22	28.21
2.17	28.14	28.1
2.18	28.02	28
2.19	28.11	28.08
2.2	28.29	28.28
2.21	28.24	28.21
2.22	28.11	28.08
2.23	28.21	28.18
2.24	28.37	28.36
2.25	28.31	28.28
2.26	28.16	28.13
2.27	28.21	28.19
2.28	28.4	28.38
2.29	28.37	28.35
2.3	28.21	28.19
2.31	28.28	28.25
2.32	28.46	28.43
2.33	28.47	28.44
2.34	28.35	28.33
2.35	28.41	28.38
2.36	28.56	28.54
2.37	28.62	28.59
2.38	28.54	28.49
2.39	28.56	28.55
2.4	28.73	28.71
2.41	28.77	28.74
2.42	28.72	28.69
2.43	28.74	28.72
2.44	28.86	28.85
2.45	28.9	28.89
2.46	28.86	28.84
2.47	28.89	28.88
2.48	29.02	29.01
2.49	29.08	29.07
2.5	29.05	29.03
2.51	29.1	29.09
2.52	29.3	29.29
2.53	29.39	29.39
2.54	29.38	29.35
2.55	29.39	29.38
2.56	29.58	29.57
2.57	29.74	29.73
2.58	29.65	29.62
2.59	29.54	29.52
2.6	29.71	29.68
2.61	29.9	29.87
2.62	29.71	29.68
2.63	29.53	29.5
2.64	29.67	29.65

2.65	29.87	29.84
2.66	29.72	29.66
2.67	29.5	29.48
2.68	29.6	29.58
2.69	29.82	29.79
2.7	29.71	29.69
2.71	29.51	29.48
2.72	29.59	29.55
2.73	29.77	29.76
2.74	29.72	29.68
2.75	29.56	29.51
2.76	29.59	29.56
2.77	29.74	29.71
2.78	29.69	29.63
2.79	29.53	29.48
2.8	29.54	29.51
2.81	29.65	29.61
2.82	29.6	29.55
2.83	29.44	29.42
2.84	29.49	29.47
2.85	29.63	29.6
2.86	29.6	29.56
2.87	29.49	29.47
2.88	29.59	29.57
2.89	29.79	29.78
2.9	29.79	29.77
2.91	29.73	29.71
2.92	29.88	29.86
2.93	30.1	30.09
2.94	30.16	30.14
2.95	30.08	30.06
2.96	30.23	30.21
2.97	30.54	30.52
2.98	30.57	30.55
2.99	30.46	30.43
3	30.58	30.56
3.05	31.17	31.18
3.1	31.68	31.64
3.15	31.58	31.55
3.2	31.75	31.72
3.25	31.89	31.85
3.3	31.71	31.68
3.35	31.64	31.6
3.4	31.7	31.67
3.45	31.84	31.83
3.5	31.95	31.91
3.55	32.01	31.96
3.6	32.09	32.07
3.65	32.32	32.29
3.7	32.52	32.48
3.75	32.62	32.57
3.8	32.85	32.8
3.85	32.93	32.89
3.9	32.94	32.91
3.95	33.02	32.98
4	32.97	32.91
4.05	33.07	33.01

4.1	33.21	33.17
4.15	33.33	33.31
4.2	33.48	33.43
4.25	33.71	33.66
4.3	33.87	33.83
4.35	34.02	33.99
4.4	33.83	33.82
4.45	33.57	33.53
4.5	33.61	33.58
4.55	33.61	33.59
4.6	33.51	33.49
4.65	33.44	33.39
4.7	33.6	33.58
4.75	33.93	33.92
4.8	34.06	34.05
4.85	34.13	34.13
4.9	34.27	34.25
4.95	34.38	34.36
5	34.38	34.34
5.05	34.19	34.17
5.1	33.99	33.97
5.15	33.93	33.93
5.2	33.97	33.96
5.25	33.92	33.91
5.3	33.93	33.93
5.35	34.17	34.18
5.4	34.37	34.38
5.45	34.43	34.44
5.5	34.38	34.38
5.55	34.42	34.42
5.6	34.45	34.45
5.65	34.28	34.28
5.7	34.05	34.04
5.75	34.04	34.05
5.8	34.2	34.2
5.85	34.31	34.31
5.9	34.35	34.35
5.95	34.47	34.49
6	34.69	34.7
6.05	34.87	34.86
6.1	34.82	34.82
6.15	34.75	34.75
6.2	34.78	34.79
6.25	34.77	34.79
6.3	34.68	34.69
6.35	34.66	34.68
6.4	34.84	34.87
6.45	35.03	35.07
6.5	35.13	35.14
6.55	35.13	35.13
6.6	35.26	35.26
6.65	35.36	35.36
6.7	35.29	35.29
6.75	35.17	35.16
6.8	35.16	35.15
6.85	35.26	35.28
6.9	35.37	35.38



6.95	35.35	35.36
7	35.44	35.45
7.05	35.59	35.61
7.1	35.74	35.76
7.15	35.73	35.74
7.2	35.61	35.63
7.25	35.65	35.66
7.3	35.65	35.67
7.35	35.64	35.64
7.4	35.63	35.64
7.45	35.71	35.74
7.5	35.89	35.9
7.55	35.99	36.01
7.6	36.09	36.1
7.65	36.18	36.21
7.7	36.23	36.25
7.75	36.26	36.29
7.8	36.21	36.22
7.85	36.2	36.2
7.9	36.14	36.16
7.95	36.16	36.17
8	36.14	36.15
8.05	36.19	36.19
8.1	36.3	36.32
8.15	36.46	36.47
8.2	36.5	36.5
8.25	36.51	36.53
8.3	36.51	36.5
8.35	36.48	36.48
8.4	36.46	36.45
8.45	36.4	36.39
8.5	36.41	36.4
8.55	36.45	36.45
8.6	36.56	36.58
8.65	36.7	36.71
8.7	36.71	36.7
8.75	36.79	36.83
8.8	36.85	36.88
8.85	36.88	36.85
8.9	36.79	36.75
8.95	36.79	36.81
9	36.87	36.84
9.05	36.82	36.75
9.1	36.85	36.81
9.15	36.9	36.88
9.2	36.89	36.9
9.25	36.92	36.91
9.3	36.97	36.97
9.35	37.07	37.07
9.4	37.11	37.11
9.45	37.14	37.16
9.5	37.2	37.19
9.55	37.1	37.08
9.6	37.06	37.03
9.65	37.04	37.05
9.7	36.96	36.97
9.75	36.93	36.93

9.8	37	37
9.85	37.15	37.16
9.9	37.23	37.24
9.95	37.25	37.22
10	37.31	37.3
10.05	37.31	37.3
10.1	37.23	37.2
10.15	37.15	37.13
10.2	37.11	37.13
10.25	37.11	37.15
10.3	37.11	37.13
10.35	37.15	37.19
10.4	37.21	37.24
10.45	37.25	37.27
10.5	37.27	37.28
10.55	37.24	37.24
10.6	37.18	37.18
10.65	37.17	37.19
10.7	37.19	37.19
10.75	37.16	37.17
10.8	37.16	37.18
10.85	37.26	37.26
10.9	37.32	37.32
10.95	37.33	37.32
11	37.36	37.35
11.05	37.34	37.33
11.1	37.34	37.36
11.15	37.35	37.34
11.2	37.34	37.33
11.25	37.29	37.29
11.3	37.28	37.29
11.35	37.34	37.31
11.4	37.31	37.3
11.45	37.32	37.33
11.5	37.38	37.39
11.55	37.41	37.42
11.6	37.44	37.43
11.65	37.44	37.42
11.7	37.43	37.42
11.75	37.48	37.48
11.8	37.39	37.38
11.85	37.4	37.38
11.9	37.45	37.39
11.95	37.45	37.43
12	37.48	37.47
12.05	37.51	37.5
12.1	37.54	37.51
12.15	37.58	37.58
12.2	37.59	37.6
12.25	37.62	37.6
12.3	37.62	37.6
12.35	37.61	37.62
12.4	37.61	37.65
12.45	37.65	37.63
12.5	37.67	37.66
12.55	37.71	37.71
12.6	37.8	37.76

12.65	37.86	37.82
12.7	37.89	37.86
12.75	37.92	37.9
12.8	38	37.98
12.85	38.05	38.02
12.9	38.06	38.02
12.95	38.09	38.05
13	38.14	38.1
13.05	38.21	38.19
13.1	38.29	38.24
13.15	38.36	38.35
13.2	38.44	38.47
13.25	38.57	38.55
13.3	38.63	38.59
13.35	38.68	38.67
13.4	38.77	38.73
13.45	38.84	38.77
13.5	38.9	38.8
13.55	38.92	38.88
13.6	39.03	39
13.65	39.15	39.11
13.7	39.3	39.23
13.75	39.42	39.33
13.8	39.53	39.49
13.85	39.66	39.59
13.9	39.74	39.65
13.95	39.81	39.7
14	39.89	39.83
14.05	39.96	39.92
14.1	40.02	39.96
14.15	40.08	40.04
14.2	40.16	40.11
14.25	40.25	40.18
14.3	40.33	40.27
14.35	40.37	40.28
14.4	40.44	40.32
14.45	40.5	40.4
14.5	40.62	40.56
14.55	40.7	40.61
14.6	40.77	40.64
14.65	40.83	40.71
14.7	40.86	40.77
14.75	40.83	40.72
14.8	40.79	40.65
14.85	40.76	40.65
14.9	40.84	40.76
14.95	40.87	40.77
15	40.89	40.79
15.05	40.95	40.85
15.1	41.03	40.94
15.15	41.08	40.96
15.2	41.02	40.93
15.25	40.99	40.88
15.3	41.01	40.91
15.35	41.04	40.88
15.4	41.08	40.92
15.45	41.12	40.96

15.5	41.15	40.97
15.55	41.18	41
15.6	41.14	41.01
15.65	41.05	40.99
15.7	40.99	40.95
15.75	40.99	40.92
15.8	41.03	41
15.85	41.14	41.11
15.9	41.18	41.15
15.95	41.27	41.22
16	41.34	41.33
16.05	41.4	41.36
16.1	41.39	41.34
16.15	41.33	41.32
16.2	41.31	41.31
16.25	41.4	41.37
16.3	41.47	41.43
16.35	41.53	41.52
16.4	41.66	41.66
16.45	41.77	41.75
16.5	41.82	41.77
16.55	41.84	41.87
16.6	41.83	41.95
16.65	41.85	41.94
16.7	41.91	42
16.75	42.09	42.2
16.8	42.23	42.35
16.85	42.36	42.39
16.9	42.5	42.49
16.95	42.61	42.59
17	42.63	42.6
17.05	42.63	42.57
17.1	42.64	42.54
17.15	42.76	42.58
17.2	42.82	42.63
17.25	42.86	42.75
17.3	43.02	42.9
17.35	43.15	42.98
17.4	43.28	43.1
17.45	43.3	43.17
17.5	43.32	43.16
17.55	43.37	43.19
17.6	43.39	43.23
17.65	43.5	43.35
17.7	43.52	43.41
17.75	43.62	43.49
17.8	43.74	43.6
17.85	43.89	43.69
17.9	43.92	43.81
17.95	44.02	43.89
18	44.18	43.98

4 TEST SUMMARY

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

Test	47 CFR Part 15 section	Section within the report	Conclusion
Conducted emission	15.207	7.1	PASS
Radiated emission	15.209	7.2	PASS
Bandwidth of the emission	15.215	7.3	PASS
Spectrum mask	15.225	7.4	PASS
Frequency tolerance of the carrier signal	15.225	7.5	PASS

4.1 Operating voltages/frequencies used for testing

Section	Test	Operating conditions
7.1	Conducted emission	120 V; 60 Hz
7.2	Radiated emission	120 V; 60 Hz
7.3.	Bandwidth of the emission	120 V; 60 Hz
7.4	Spectrum mask	120 V; 60 Hz
7.5	Frequency tolerance of the carrier signal	90 V; 60 Hz
		120 V; 60 Hz
		264 V, 60 Hz

5 CONVERSION FACTORS AND ALL OTHER FORMULAS

Unit	Conversion unit	Formula of conversion
$\text{dB}\mu\text{V}$	$\text{dB}\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m} = \text{dB}\mu\text{V} + \text{AF}$
$\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m} = 20\log(X(\mu\text{V}/\text{m})/1\mu\text{V})$

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)

6 EMISSION TESTS

6.1 Restricted bands of operation (§15.205 of FCC 47 CRF 15)

6.1.1 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			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

6.1.2 Test results

See Radiated emission results under 6.3 Radiated emission and 6.5 Spectrum mask.

6.2 Conducted emission measurement (§15.207 of FCC 47 CRF 15)

6.2.1 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.

6.2.2 Test procedure

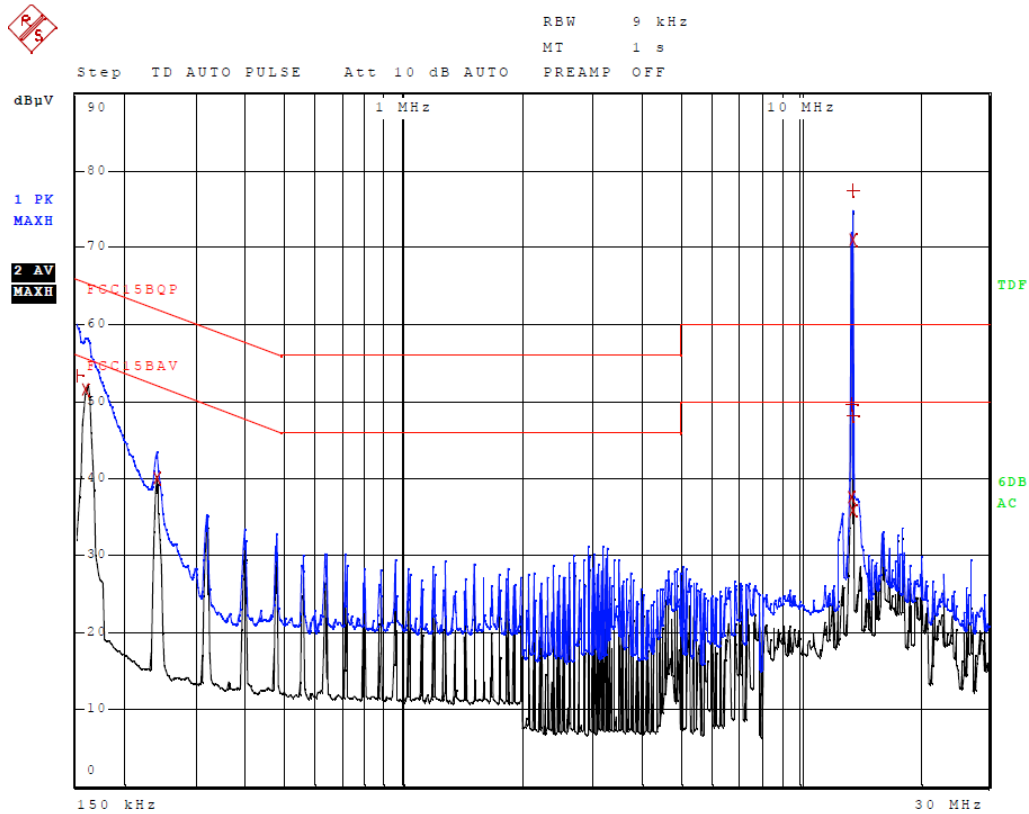
- As per clause 6.2 from ANSI C63.10-2013.
- The EUT is placed on a non-conductive 0.8 meters high table, 0.4 meters from the vertical conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). LISN provide 50 Ohm / 50 μH + 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.

6.2.3 Test results

Device passed the requirements stated

11.Jul 18 15:21

Meas Type CONDUCTED EMISSION
 Equipment under Test SCP V1.0
 OP Condition Uin: 120 V, 60 Hz WAITING FOR CHIPS
 Test Spec
 PHASE



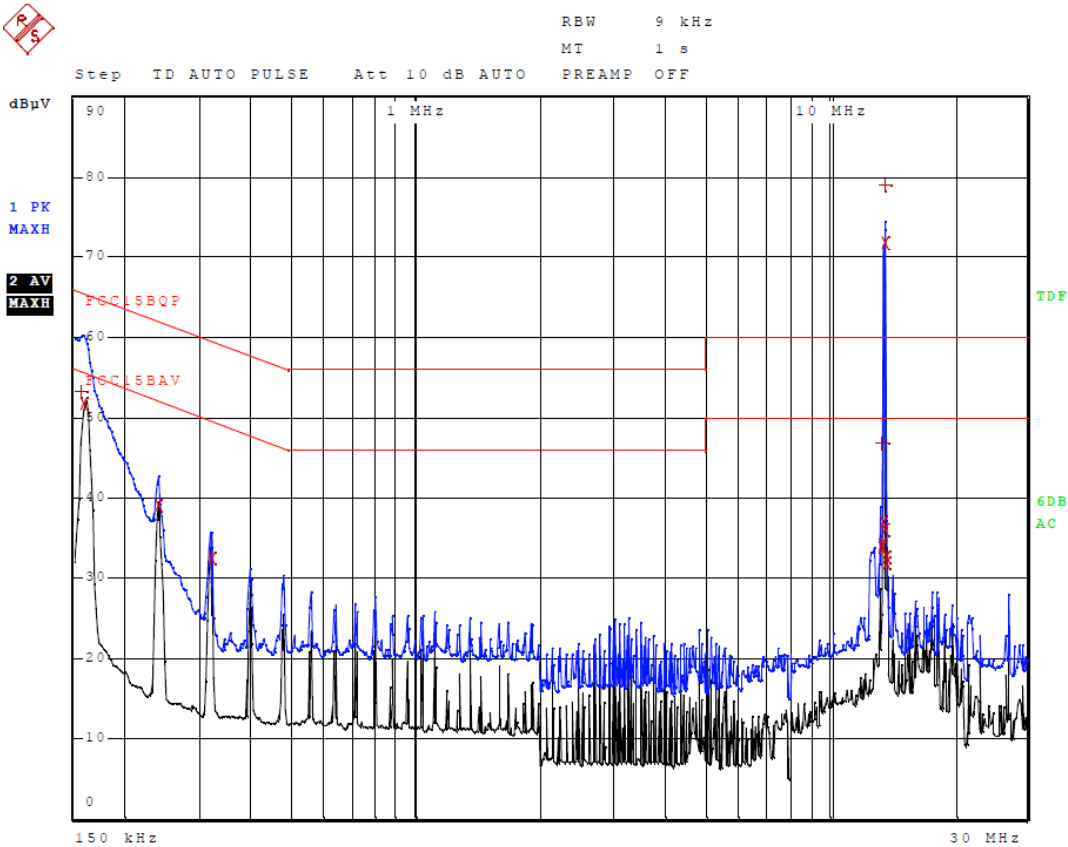
Final Measurement

Meas Time: 1 s
 Margin: 18 dB
 Peaks: 9

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	13.562250000 MHz	70.91	CISPR Averag	20.91
1	13.562250000 MHz	77.51	Quasi Peak	17.51
2	159.000000000 kHz	51.51	CISPR Averag	-4.00
1	13.515000000 MHz	49.72	Quasi Peak	-10.28
1	13.611750000 MHz	48.14	Quasi Peak	-11.86
2	237.750000000 kHz	40.05	CISPR Averag	-12.13
2	13.508250000 MHz	37.61	CISPR Averag	-12.39
1	150.000000000 kHz	53.40	Quasi Peak	-12.60
2	13.618500000 MHz	35.85	CISPR Averag	-14.15

11.Jul 18 15:26

Meas Type CONDUCTED EMISSION
 Equipment under Test SCP V1.0
 OP Condition Uin: 120 V, 60 Hz WAITING FOR CHIPS
 Test Spec
 NEUTRAL



Meas Type CONDUCTED EMISSION
Equipment under Test SCP V1.0
OP Condition Uin: 120 V, 60 Hz WAITING FOR CHIPS
Test Spec
 NEUTRAL

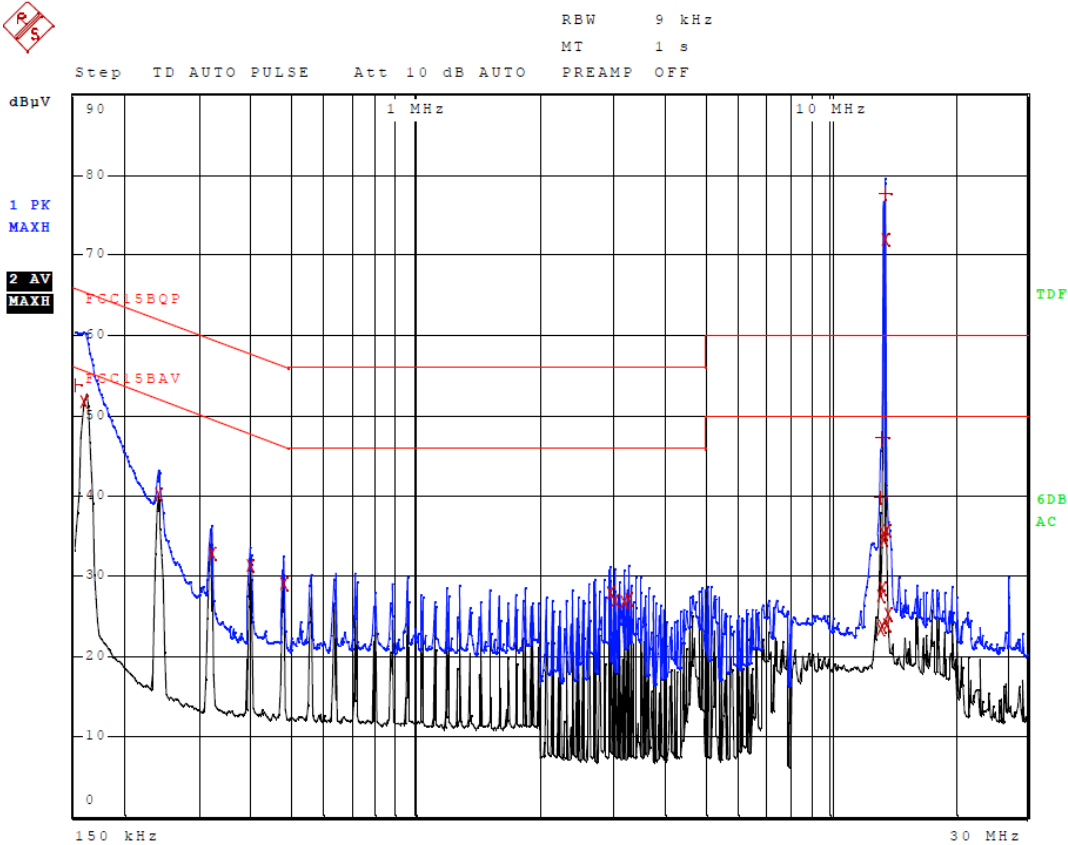
Final Measurement

Meas Time: 1 s
Margin: 18 dB
Peaks: 13

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	13.562250000 MHz	71.68	CISPR Averag	21.68
1	13.562250000 MHz	79.02	Quasi Peak	19.02
2	159.000000000 kHz	51.78	CISPR Averag	-3.73
1	156.750000000 kHz	53.20	Quasi Peak	-12.43
2	13.515000000 MHz	36.96	CISPR Averag	-13.04
2	237.750000000 kHz	39.04	CISPR Averag	-13.13
1	13.474500000 MHz	46.85	Quasi Peak	-13.15
2	13.611750000 MHz	36.11	CISPR Averag	-13.89
2	13.497000000 MHz	34.05	CISPR Averag	-15.95
2	13.465500000 MHz	33.76	CISPR Averag	-16.24
2	318.750000000 kHz	32.48	CISPR Averag	-17.26
2	13.629750000 MHz	32.59	CISPR Averag	-17.41
2	13.661250000 MHz	31.85	CISPR Averag	-18.15

11.Jul 18 15:30

Meas Type CONDUCTED EMISSION
 Equipment under Test SCP V1.0
 OP Condition Uin: 120 V, 60 Hz READING CHIPS
 Test Spec
 PHASE



Meas Type CONDUCTED EMISSION
Equipment under Test SCP V1.0
OP Condition Uin: 120 V, 60 Hz READING CHIPS
Test Spec
PHASE

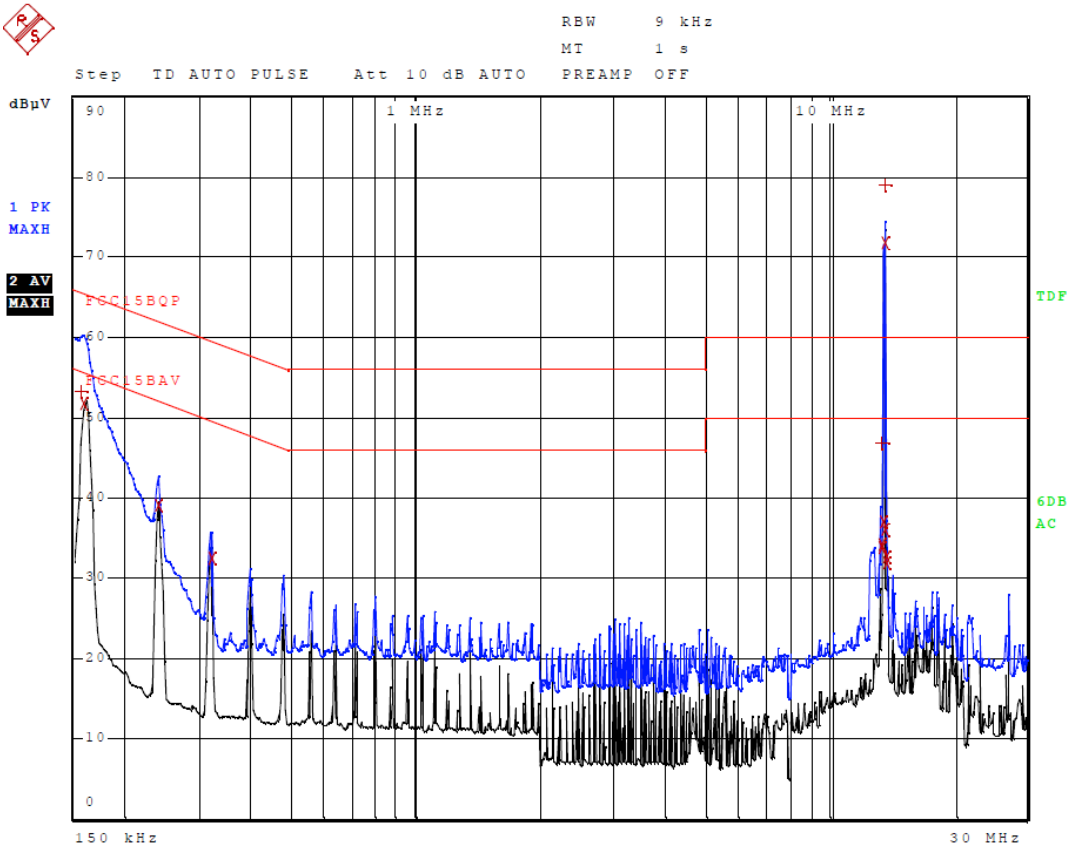
Final Measurement

Meas Time: 1 s
Margin: 18 dB
Peaks: 23

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	13.562250000 MHz	71.95	CISPR Averag	21.95
1	13.562250000 MHz	77.65	Quasi Peak	17.65
2	159.000000000 kHz	51.62	CISPR Averag	-3.90
2	237.750000000 kHz	40.10	CISPR Averag	-12.07
1	150.000000000 kHz	53.74	Quasi Peak	-12.26
1	13.474500000 MHz	47.09	Quasi Peak	-12.91
2	13.661250000 MHz	35.69	CISPR Averag	-14.31
2	13.465500000 MHz	35.22	CISPR Averag	-14.78
2	13.497000000 MHz	34.43	CISPR Averag	-15.57
2	397.500000000 kHz	31.22	CISPR Averag	-16.69
2	318.750000000 kHz	32.74	CISPR Averag	-17.00
2	476.250000000 kHz	28.94	CISPR Averag	-17.46
2	2.940000000 MHz	27.87	CISPR Averag	-18.13
2	3.257250000 MHz	27.19	CISPR Averag	-18.81
2	3.018750000 MHz	26.85	CISPR Averag	-19.15
2	3.178500000 MHz	26.78	CISPR Averag	-19.22
1	13.303500000 MHz	39.88	Quasi Peak	-20.12
2	13.416000000 MHz	28.49	CISPR Averag	-21.51
2	13.303500000 MHz	27.45	CISPR Averag	-22.55
2	13.823250000 MHz	25.18	CISPR Averag	-24.82
2	13.710750000 MHz	23.98	CISPR Averag	-26.02
2	13.362000000 MHz	23.75	CISPR Averag	-26.25
2	13.267500000 MHz	23.40	CISPR Averag	-26.60

11.Jul 18 15:26

Meas Type CONDUCTED EMISSION
 Equipment under Test SCP V1.0
 OP Condition Uin: 120 V, 60 Hz WAITING FOR CHIPS
 Test Spec
 NEUTRAL



Meas Type CONDUCTED EMISSION
Equipment under Test SCP V1.0
OP Condition Uin: 120 V, 60 Hz WAITING FOR CHIPS
Test Spec
 NEUTRAL

Final Measurement

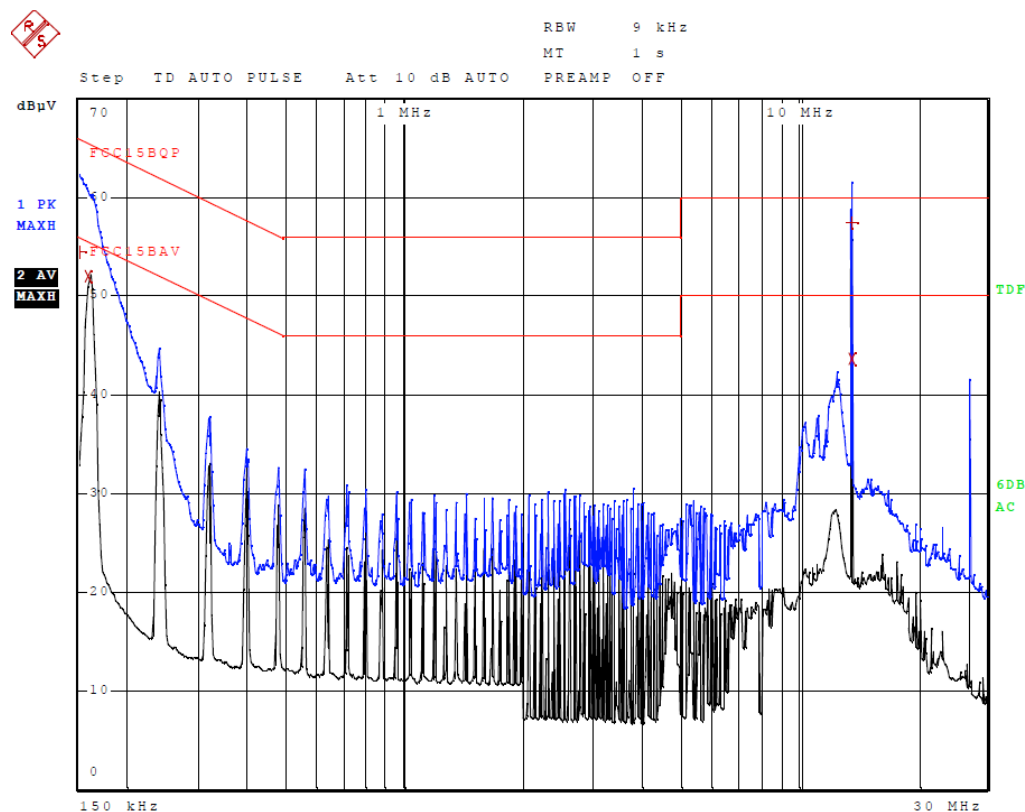
Meas Time: 1 s
Margin: 18 dB
Peaks: 13

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	13.562250000 MHz	71.68	CISPR Averag	21.68
1	13.562250000 MHz	79.02	Quasi Peak	19.02
2	159.000000000 kHz	51.78	CISPR Averag	-3.73
1	156.750000000 kHz	53.20	Quasi Peak	-12.43
2	13.515000000 MHz	36.96	CISPR Averag	-13.04
2	237.750000000 kHz	39.04	CISPR Averag	-13.13
1	13.474500000 MHz	46.85	Quasi Peak	-13.15
2	13.611750000 MHz	36.11	CISPR Averag	-13.89
2	13.497000000 MHz	34.05	CISPR Averag	-15.95
2	13.465500000 MHz	33.76	CISPR Averag	-16.24
2	318.750000000 kHz	32.48	CISPR Averag	-17.26
2	13.629750000 MHz	32.59	CISPR Averag	-17.41
2	13.661250000 MHz	31.85	CISPR Averag	-18.15

Measurement with a dummy load in lieu of the antenna:

Meas Type CONDUCTED EMISSION
Equipment under Test SCP V1.0
OP Condition Uin 120V 60Hz, DUMMY LOAD

Test Spec
PHASE



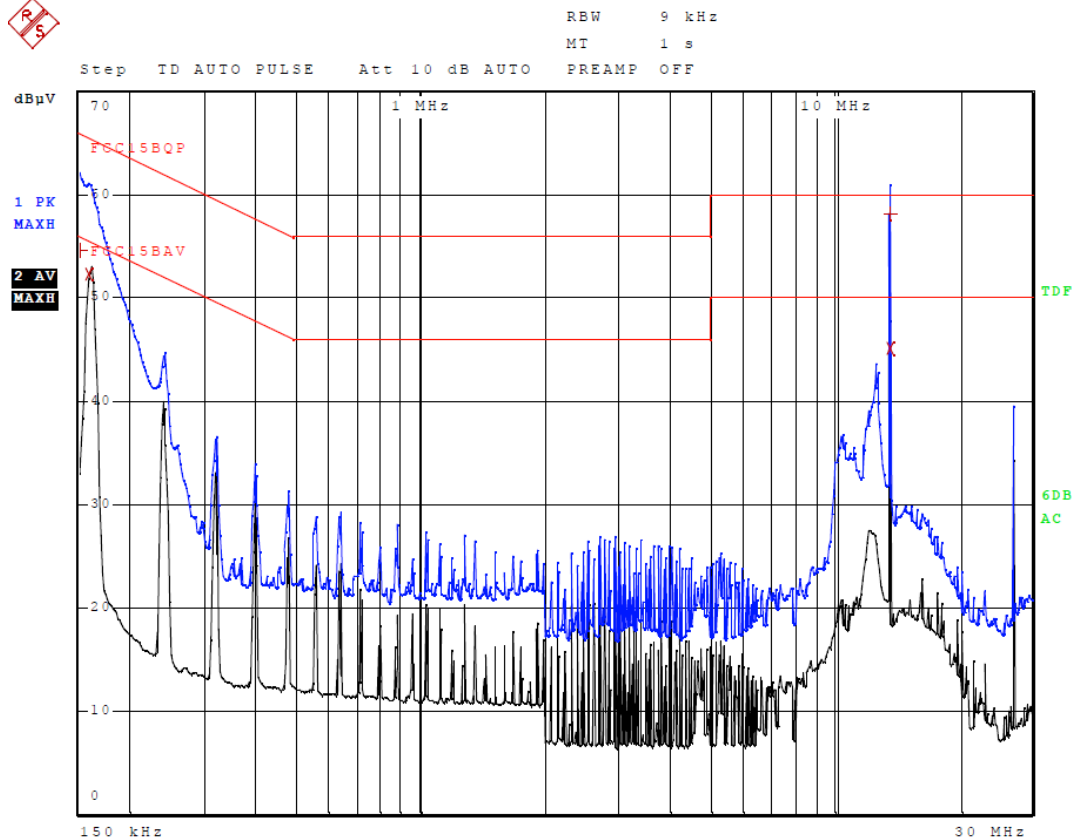
Final Measurement

Meas Time: 1 s
Margin: 10 dB
Subranges: 4

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	13.562250000 MHz	57.50	Quasi Peak	-2.50
2	159.000000000 kHz	51.98	CISPR Averag	-3.54
2	13.564500000 MHz	43.63	CISPR Averag	-6.37
1	150.000000000 kHz	54.55	Quasi Peak	-11.45

Meas Type CONDUCTED EMISSION
 Equipment under Test SCP V1.0
 OP Condition Uin 120V 60Hz, DUMMY LOAD

Test Spec
 NEUTRAL



Final Measurement

Meas Time: 1 s
 Margin: 10 dB
 Subranges: 4

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	13.564500000 MHz	58.21	Quasi Peak	-1.79
2	159.000000000 kHz	52.27	CISPR Averag	-3.25
2	13.562250000 MHz	45.12	CISPR Averag	-4.88
1	150.000000000 kHz	54.57	Quasi Peak	-11.43

6.3 Radiated emission measurement (§15.209 of FCC 47 CRF 15)

6.3.1 Requirement

Frequency Range (MHz)	Limits (dBµV/m)	Test distance (m)
0.009 to 0.490	$20 \cdot \log(2400/F(\text{kHz}))$	300
0.490 to 1.705	$20 \cdot \log(24000/F(\text{kHz}))$	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

6.3.2 Test procedure

Measurements from 9 kHz to 30 MHz

- As per clause 6.4 from ANSI C63.10-2013
- Radiated emission in the frequency range 9 kHz to 30 MHz are measured Active loop Antenna.
- First preliminary measurements were performed in Semi-anechoic chamber at a distance of 3 m using active loop antenna.
- 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.
- 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

- As per clause 6.5 from ANSI C63.10-2013
- 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.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
- The highest points would be re-tested one by one using the quasi-peak method.



Measurements from 1 GHz to 18 GHz

13. As per clause 6.6 from ANSI C63.10-2013
14. The EUT was placed on the top of a rotating table 1.5 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
15. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
16. The antenna is a horn 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.
17. 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.
18. The test-receiver system was set to AVERAGE Detect Function and Specified Bandwidth with Maximum Hold Mode.
19. The highest points would be re-tested one by one using the AVERAGE detector.

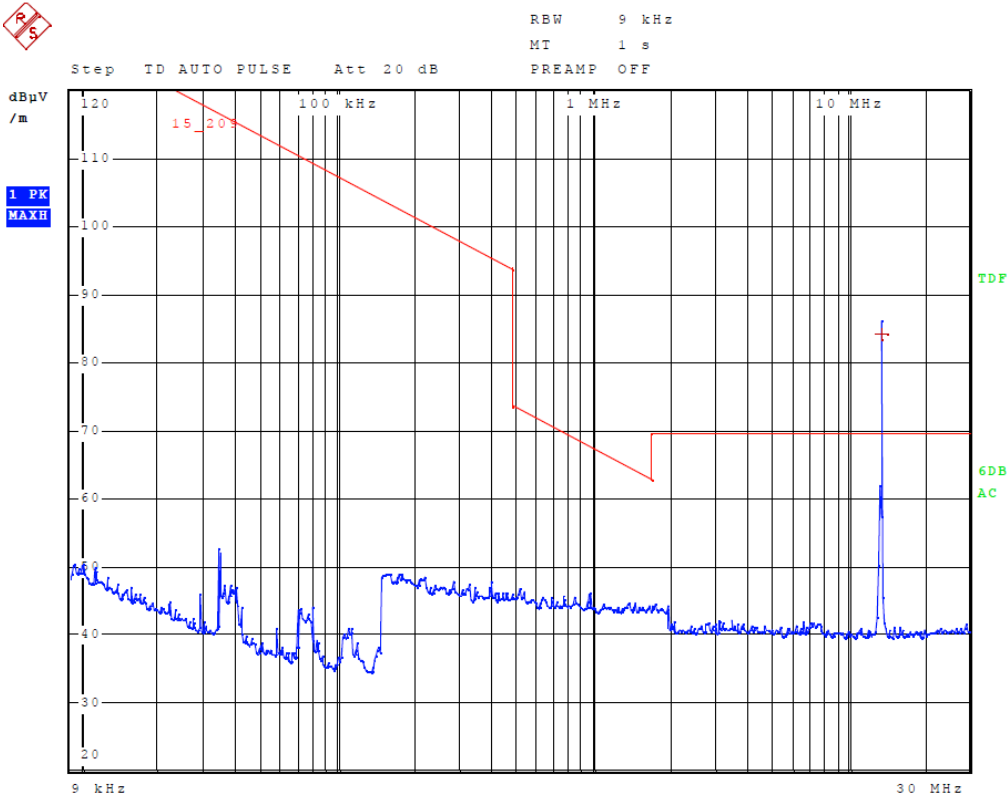
6.3.3 Test results

Device passed the requirements stated
Preliminary measurements at 3 m:

Meas Type RADIATED EMISSION
Equipment under Test SCP V1.0
OP Condition WAITING FOR CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg



Final Measurement

Meas Time: 1 s
Margin: 25 dB
Peaks: 1

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	13.562250000 MHz	84.19	Quasi Peak	14.69

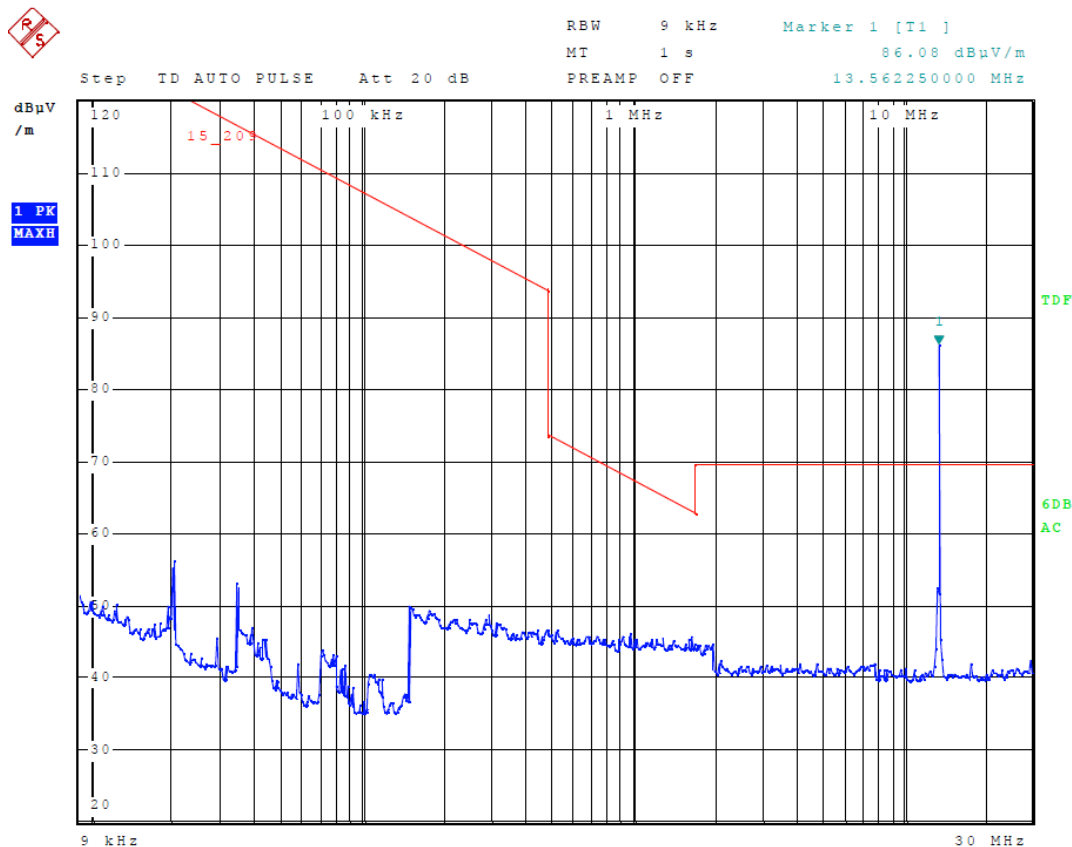
Meas Type RADIATED EMISSION

Equipment under Test SCP V1.0

OP Condition READING CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg



Final Measurement

Meas Time: 1 s
Margin: 25 dB
Peaks: 1

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	13.562250000 MHz	84.19	Quasi Peak	14.69

Final measurement at 10 m on OATS

Results with measuring distance of 10 m				
Mode	Frequency (MHz)	Measured value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Reading	13.56	69.12	104.00	34.88
Waiting	13.56	68.84	104.00	35.16

Calculated value from 10 m to 30 m						
Mode	Frequency (MHz)	Measured value at 10 m (dB μ V/m)	Correction factor from 10 m to 30 m (dB)	Calculated value at 30 m (dB μ V/m)	Limit at 30 m (dB μ V/m)	Margin (dB)
Reading	13.56	69.12	20	49.12	84.00	34.88
Waiting	13.56	68.84	20	48.84	84.00	35.16

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

Final measurements from 30 MHz to 1 GHz

1 / 2

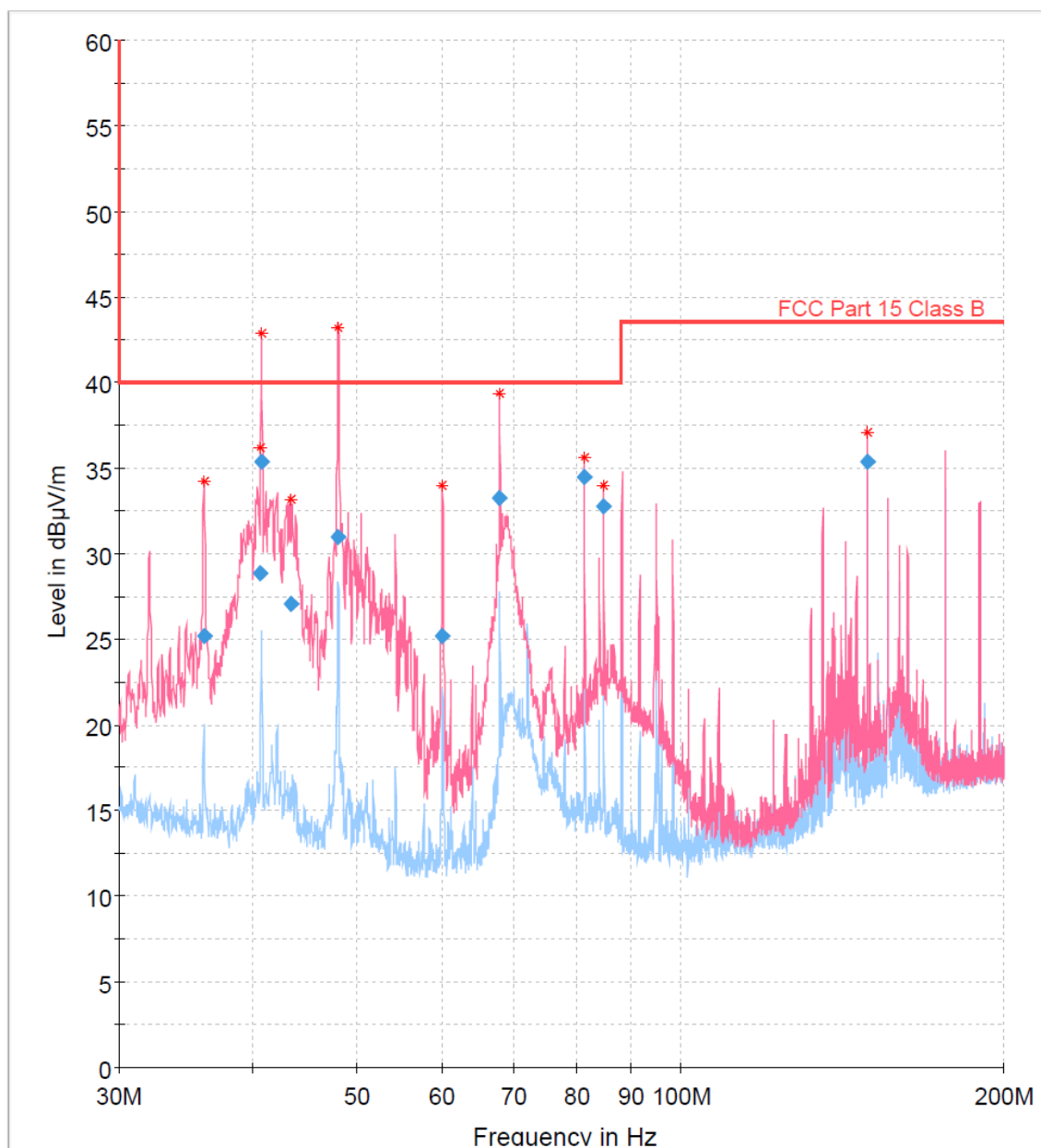
EUT Information

EUT:

SCP V1.0

Test condition:

WAITING FOR CHIPS

Full Spectrum

— Preview Result 1H-PK+
* Critical_Freqs PK+
◆ Final_Result QPK

— Preview Result 1V-PK+
— FCC Part 15 Class B

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
40.680000	35.37	40.00	4.63	100.0	V	278.0
81.390000	34.45	40.00	5.55	100.0	V	119.0
67.830000	33.24	40.00	6.76	100.0	V	264.0
84.780000	32.80	40.00	7.20	100.0	V	94.0
149.190000	35.36	43.50	8.14	100.0	V	225.0
48.000000	30.97	40.00	9.03	100.0	V	0.0
40.620000	28.88	40.00	11.12	100.0	V	278.0
43.290000	27.06	40.00	12.94	100.0	V	356.0
60.000000	25.20	40.00	14.80	100.0	V	139.0
36.000000	25.15	40.00	14.85	172.0	V	230.0

EUT Information

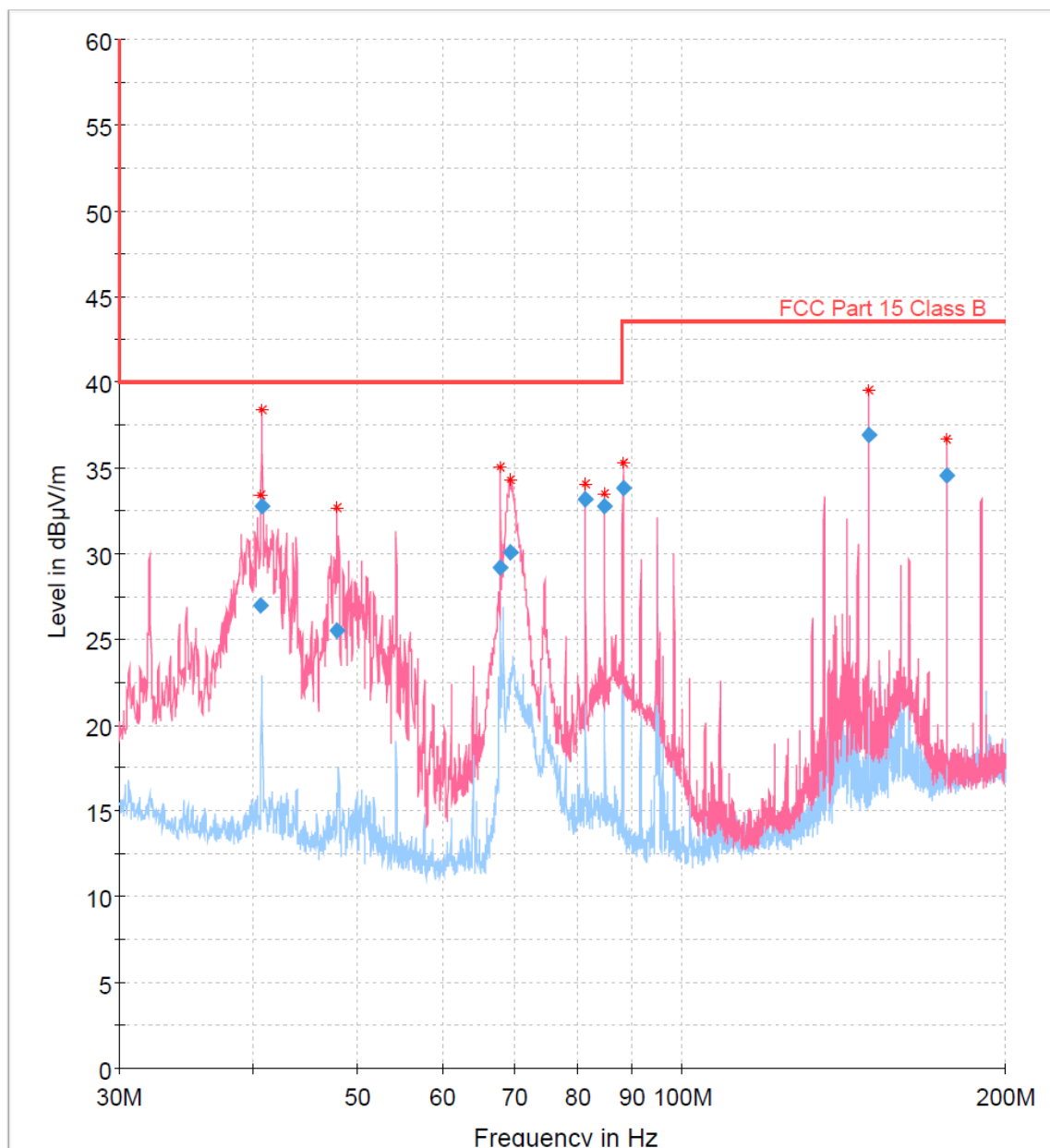
EUT:

SCP V1.0

Test condition:

READING CHIPS

Full Spectrum



Preview Result 1H-PK+
Critical_Freqs PK+
Final_Result QPK

Preview Result 1V-PK+
FCC Part 15 Class B

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
149.190000	36.92	43.50	6.58	100.0	V	187.0
81.390000	33.21	40.00	6.79	100.0	V	121.0
40.680000	32.78	40.00	7.22	150.0	V	343.0
84.780000	32.78	40.00	7.22	100.0	V	95.0
176.310000	34.56	43.50	8.94	100.0	V	29.0
88.170000	33.82	43.50	9.68	100.0	V	68.0
69.180000	30.08	40.00	9.92	100.0	V	291.0
67.830000	29.16	40.00	10.84	150.0	V	245.0
40.620000	26.99	40.00	13.01	150.0	V	343.0
47.820000	25.53	40.00	14.47	104.0	V	135.0

EUT Information

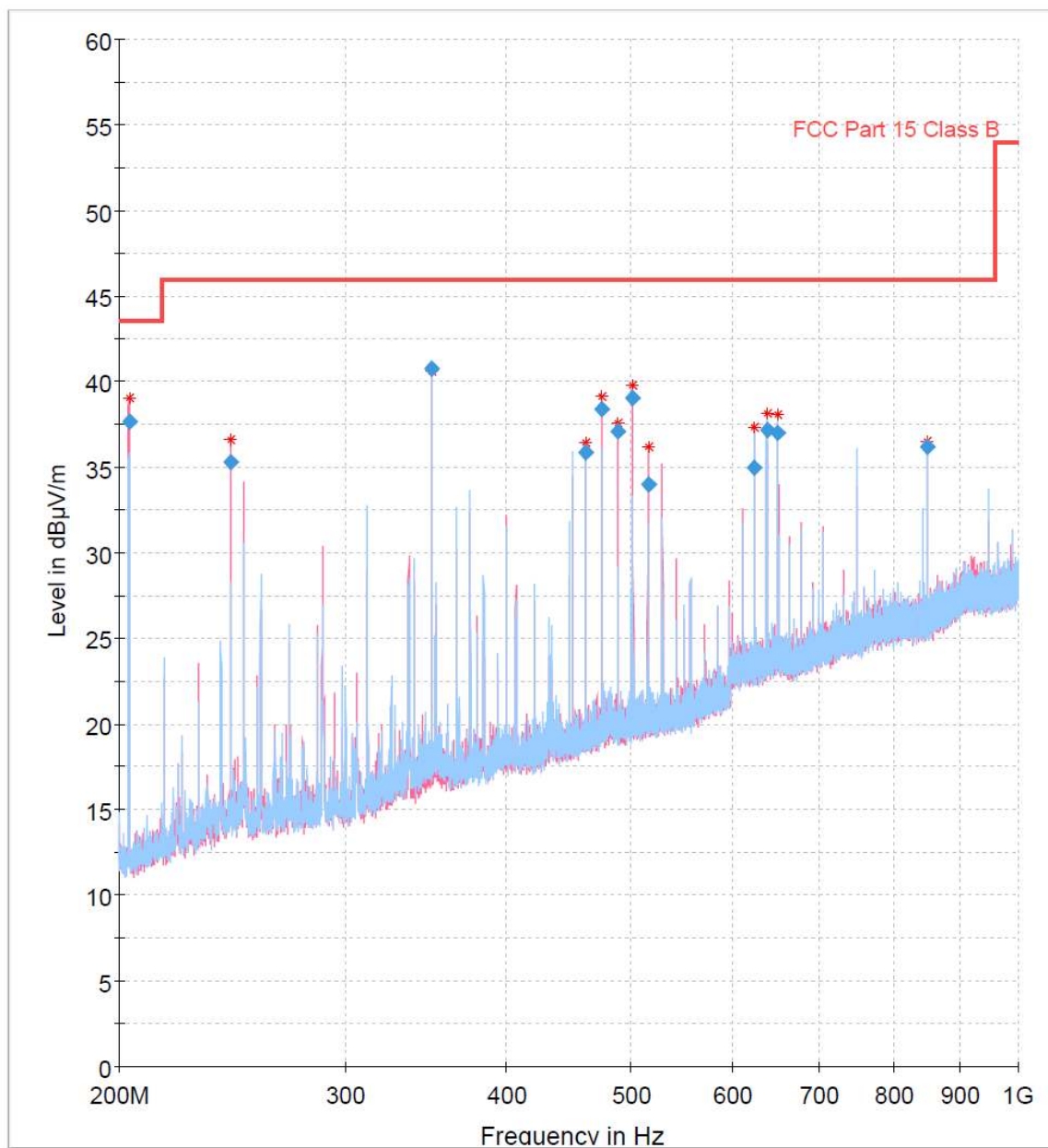
EUT:

Test condition:

SCP V1.0

WAITING FOR CHIPS

Full Spectrum



* Preview Result 1V-PK+
Critical_Freqs PK+
◆ Final_Result QPK

— Preview Result 1H-PK+
— FCC Part 15 Class B

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
350.010000	40.76	46.00	5.24	100.0	H	283.0
203.460000	37.69	43.50	5.81	100.0	V	77.0
501.840000	39.06	46.00	6.94	104.0	V	351.0
474.720000	38.37	46.00	7.63	103.0	V	4.0
637.470000	37.13	46.00	8.87	104.0	H	46.0
488.280000	37.07	46.00	8.93	100.0	V	4.0
649.980000	37.03	46.00	8.97	104.0	H	63.0
849.990000	36.17	46.00	9.83	176.0	H	23.0
461.160000	35.89	46.00	10.11	103.0	V	59.0
244.140000	35.28	46.00	10.72	100.0	V	0.0
623.910000	35.01	46.00	10.99	103.0	H	63.0
515.400000	34.02	46.00	11.98	122.0	V	333.0

EUT Information

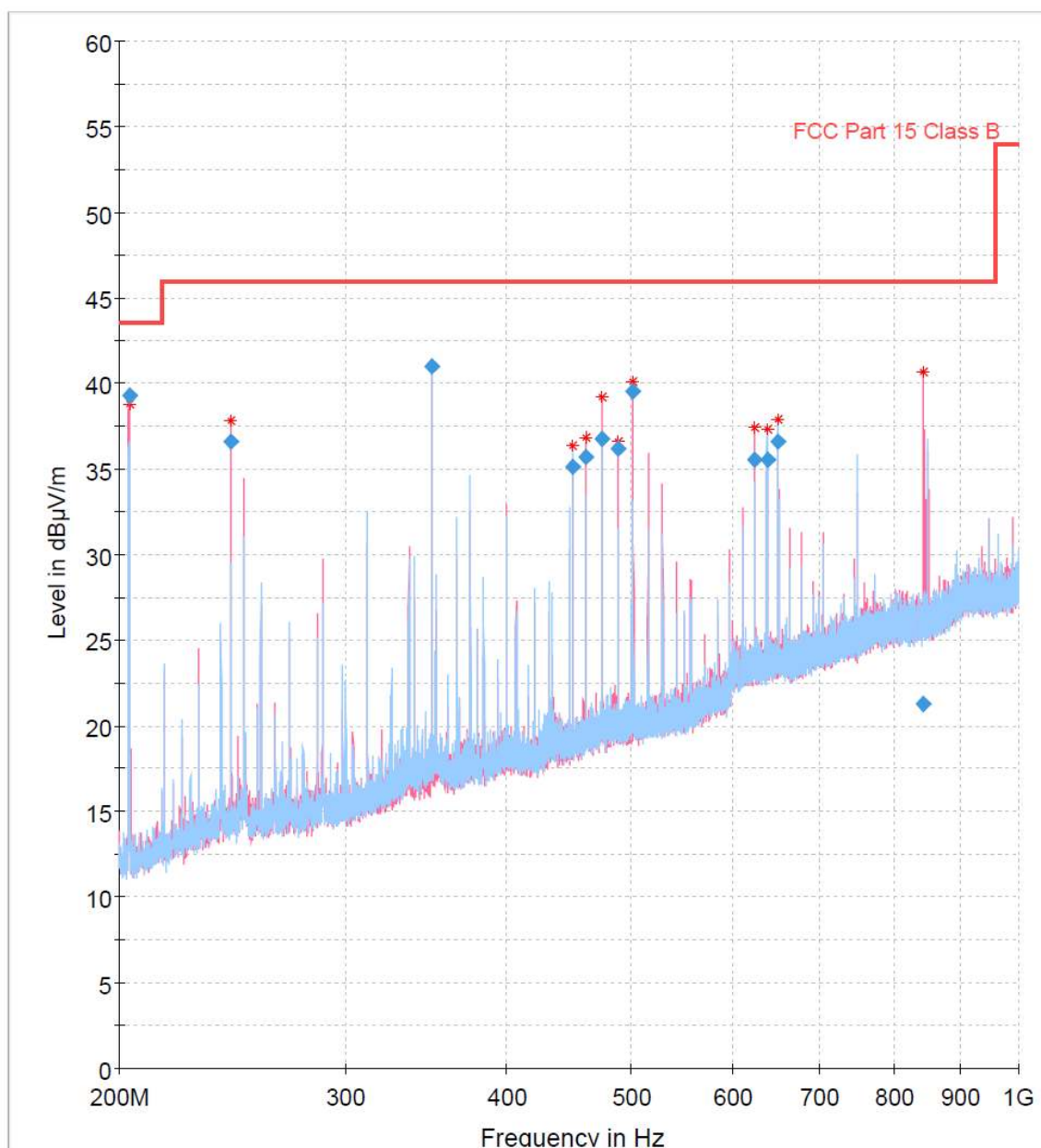
EUT:

Test condition:

SCP V1.0

READING CHIPS

Full Spectrum



Preview Result 1V-PK+
Critical_Freqs PK+
Final_Result QPK

Preview Result 1H-PK+
FCC Part 15 Class B

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
203.460000	39.26	43.50	4.24	100.0	V	188.0
350.010000	41.02	46.00	4.98	100.0	H	283.0
501.840000	39.56	46.00	6.44	103.0	V	351.0
474.720000	36.77	46.00	9.23	104.0	V	188.0
649.980000	36.63	46.00	9.37	104.0	H	65.0
244.140000	36.57	46.00	9.43	100.0	V	315.0
488.280000	36.18	46.00	9.82	104.0	V	351.0
461.160000	35.67	46.00	10.33	103.0	V	0.0
637.470000	35.56	46.00	10.44	148.0	H	47.0
623.910000	35.55	46.00	10.45	100.0	V	297.0
450.000000	35.13	46.00	10.87	100.0	H	83.0
843.630000	21.30	46.00	24.70	123.0	V	151.0

Final measurements from above 1 GHz

1 / 2

Radiated emission

EUT Information

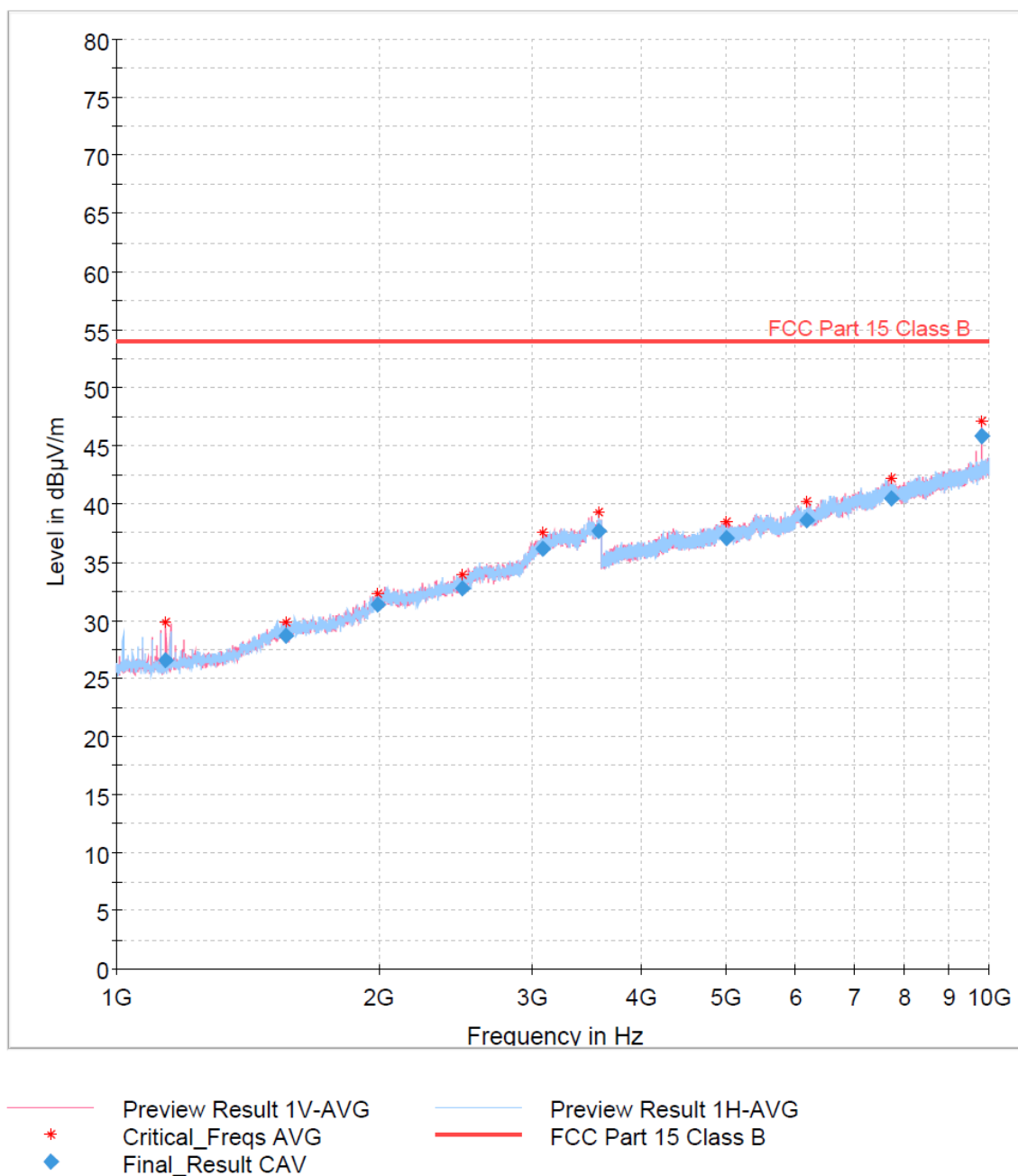
EUT

Operating condition:

SCP V1.0

WAITING FOR CHIPS

Full Spectrum



Final Result

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1139.250000	26.57	54.00	27.43	150.0	V	96.0
1565.750000	28.61	54.00	25.39	150.0	H	125.0
1995.250000	31.29	54.00	22.71	150.0	V	142.0
2493.000000	32.77	54.00	21.23	150.0	V	96.0
3082.250000	36.11	54.00	17.89	150.0	H	172.0
3573.500000	37.63	54.00	16.37	150.0	H	357.0
4994.000000	37.07	54.00	16.93	150.0	V	328.0
6179.250000	38.56	54.00	15.44	150.0	V	328.0
7729.000000	40.47	54.00	13.53	150.0	H	265.0
9828.000000	45.83	54.00	8.17	150.0	V	142.0

Radiated emission

EUT Information

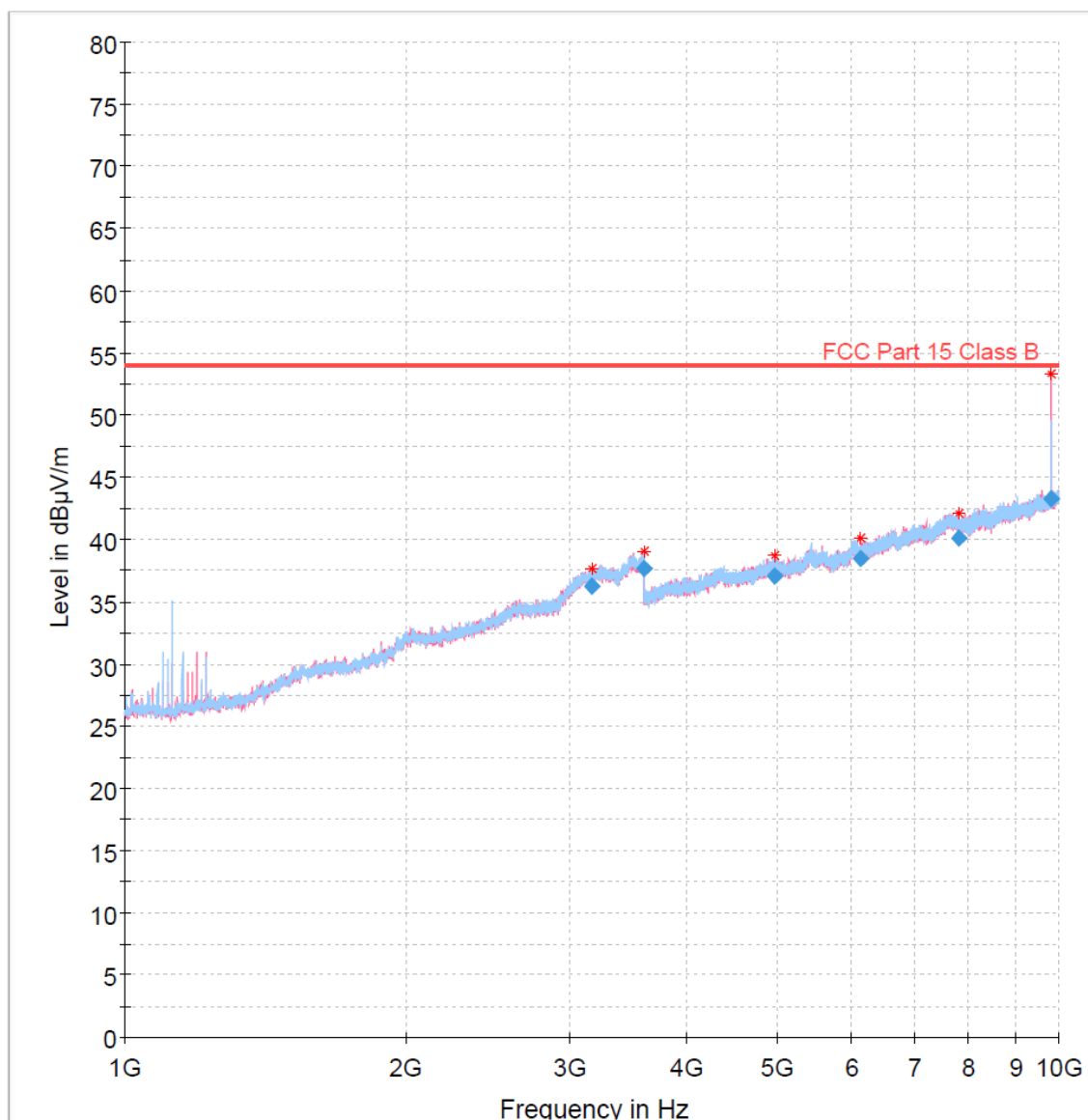
EUT

Operating condition:

SCP V1.0

READING CHIPS

Full Spectrum



Preview Result 1V-AVG
Critical_Freqs AVG
Final_Result CAV

Preview Result 1H-AVG
FCC Part 15 Class B

Final Result

Frequency (MHz)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
3157.500000	36.28	54.00	17.72	200.0	V	190.0
3596.750000	37.62	54.00	16.38	125.0	H	263.0
4955.250000	37.09	54.00	16.91	175.0	V	4.0
6138.000000	38.49	54.00	15.51	175.0	V	329.0
7830.750000	40.10	54.00	13.90	125.0	H	143.0
9828.000000	43.27	54.00	10.73	179.0	V	50.0



6.4 Bandwidth of the emission (§15.215)

6.4.1 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.

6.4.2 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.

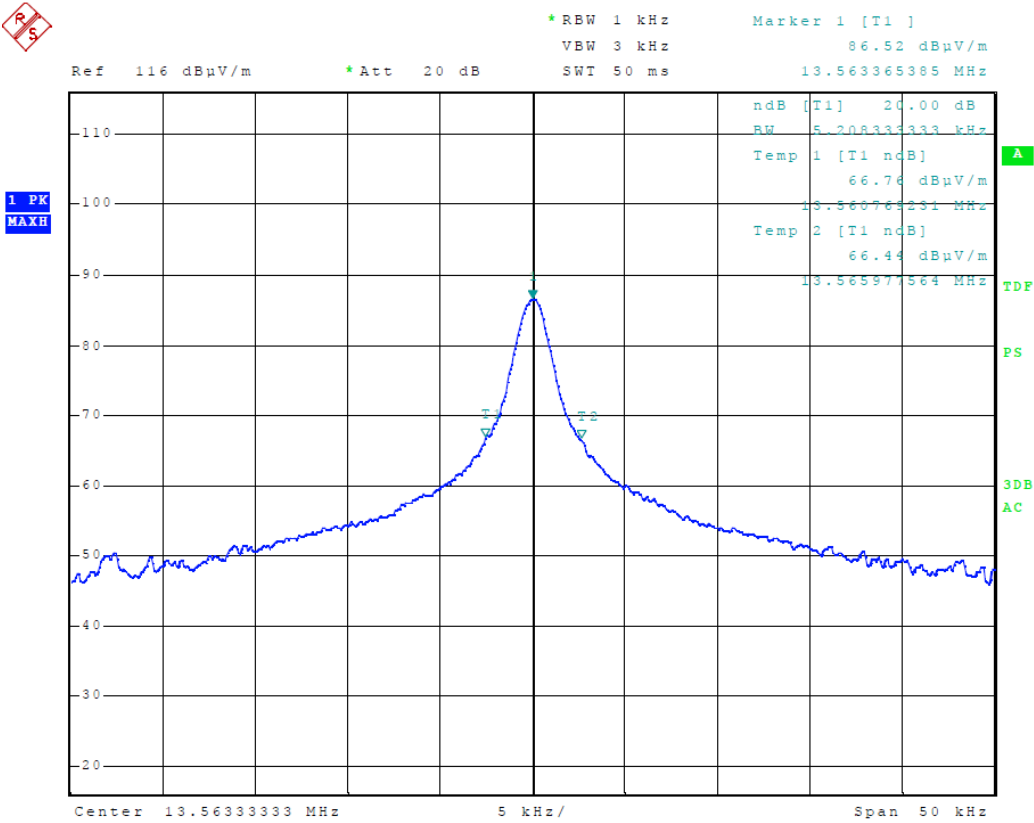
6.4.3 Test results

Device passed the requirements stated

Meas Type OCCUPIED BANDWIDTH
Equipment under Test SCP V1.0
OP Condition WAITING FOR CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg





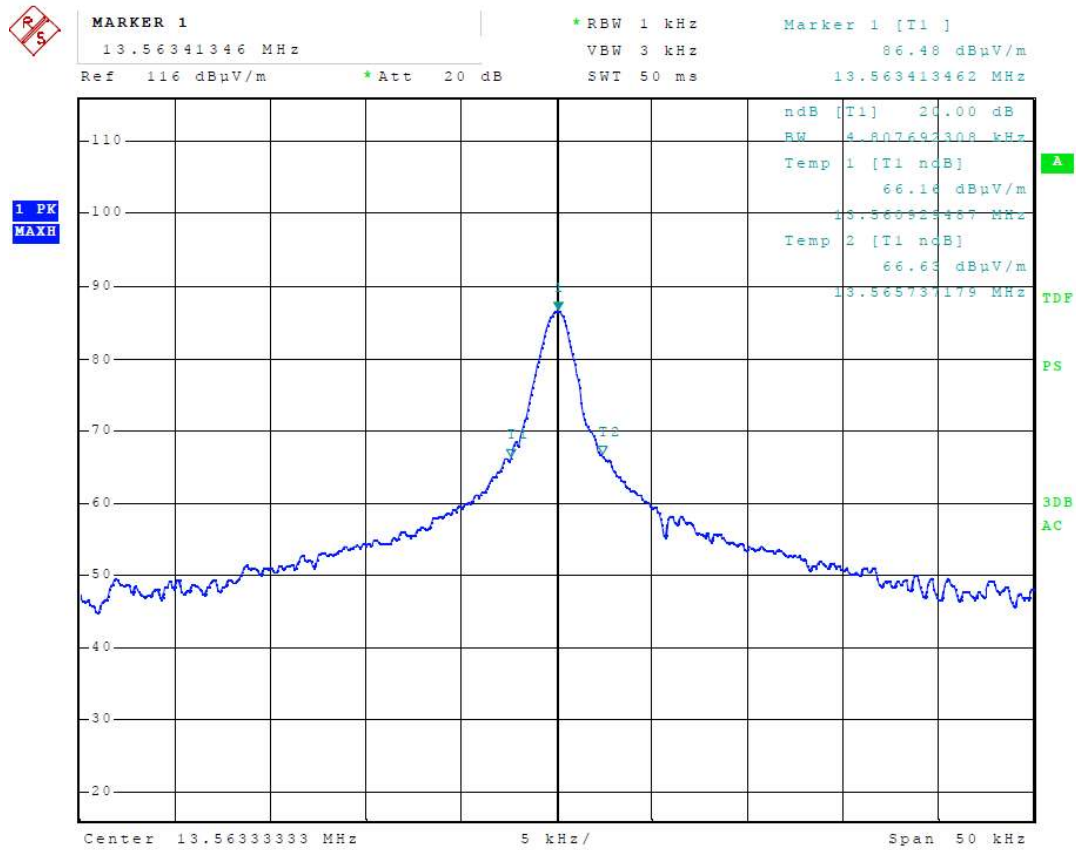
Meas Type OCCUPIED BANDWIDTH

Equipment under Test SCP V1.0

OP Condition READING CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg





Frequency (MHz)	Permitted frequency band (MHz)	20 dB bandwidth (kHz)	PASS/FAIL
13.56	13.110 – 14.010	5.21	PASS



6.5 Spectrum mask (§15.225 (a)-(d) of FCC 47 CRF 15)

6.5.1 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.

6.5.2 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.

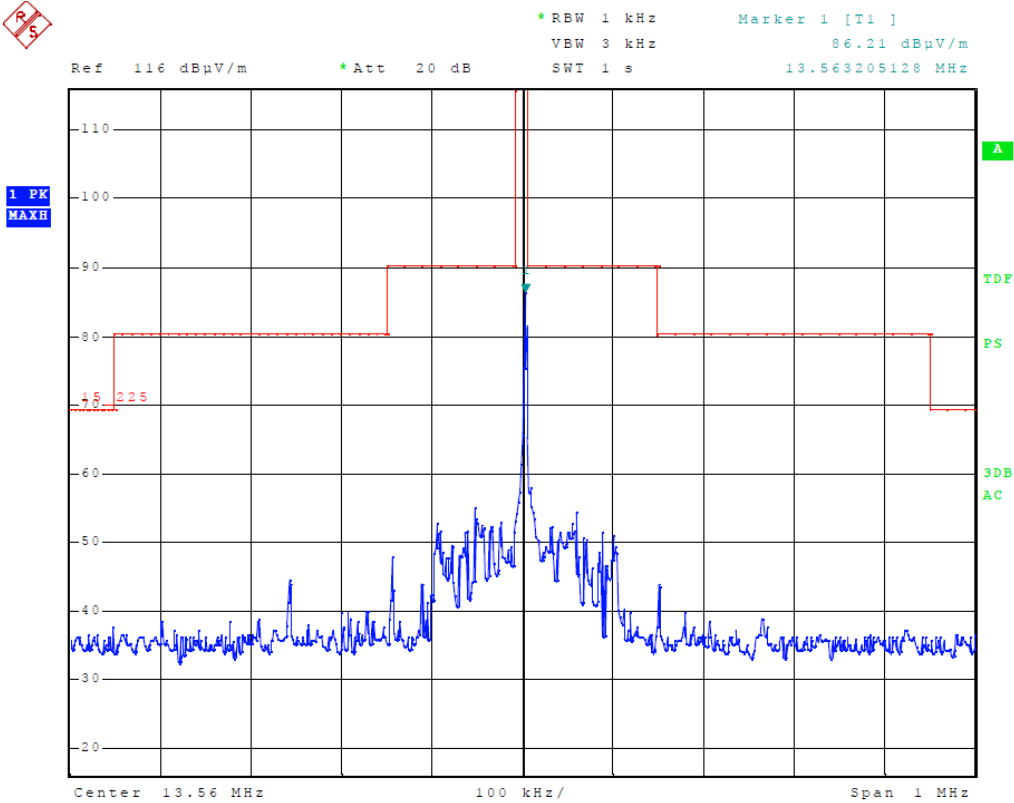
6.5.3 Test results

Device passed the requirements stated

Meas Type SPECTRUM MASK
 Equipment under Test SCP V1.0
 OP Condition WAITING FOR CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg





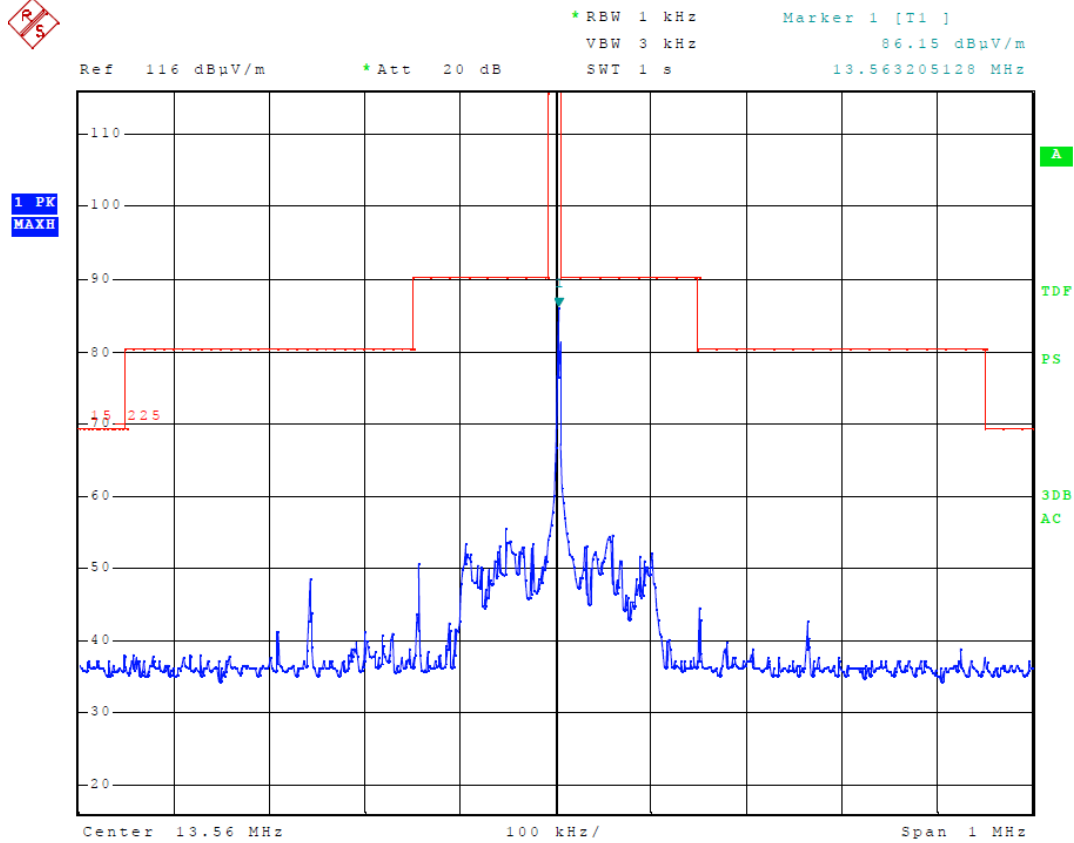
Meas Type SPECTRUM MASK

Equipment under Test SCP V1.0

OP Condition READING CHIPS

Test Spec

Antenna: 10 deg, Sample: 210 deg



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

6.6.1 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.

6.6.2 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.

6.6.3 Test results

Device passed the requirements stated

Temperature	Supply voltage (V)	Minutes after switch on	Measured Frequency (MHz)	Allowed tolerance	Measured tolerance	RESULT
50	120,00	0	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	2	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	5	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	10	13,563620513	Fref±1.356 kHz	0,321	PASS
40	120,00	0	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	2	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	5	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	10	13,563300000	Fref±1.356 kHz	0,000	PASS
30	120,00	0	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	2	13,563941026	Fref±1.356 kHz	0,641	PASS
	120,00	5	13,562979487	Fref±1.356 kHz	-0,321	PASS
	120,00	10	13,563300000	Fref±1.356 kHz	0,000	PASS
20	264,00	0	13,563525641	Fref±1.356 kHz	0,226	PASS
	264,00	2	13,563205128	Fref±1.356 kHz	-0,095	PASS
	264,00	5	13,563205128	Fref±1.356 kHz	-0,095	PASS
	264,00	10	13,563846154	Fref±1.356 kHz	0,546	PASS
20	120,00	0	13,562979487	Fref±1.356 kHz	-0,321	PASS
	120,00	2	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	5	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	10	13,563300000	Fref		PASS
20	90,00	0	13,563205128	Fref±1.356 kHz	-0,095	PASS
	90,00	2	13,562884615	Fref±1.356 kHz	-0,415	PASS
	90,00	5	13,563846154	Fref±1.356 kHz	0,546	PASS
	90,00	10	13,562884615	Fref±1.356 kHz	-0,415	PASS
10	120,00	0	13,562979487	Fref±1.356 kHz	-0,321	PASS
	120,00	2	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	5	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	10	13,563620513	Fref±1.356 kHz	0,321	PASS
0	120,00	0	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	2	13,562338462	Fref±1.356 kHz	-0,962	PASS
	120,00	5	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	10	13,563941026	Fref±1.356 kHz	0,641	PASS
-10	120,00	0	13,563941026	Fref±1.356 kHz	0,641	PASS
	120,00	2	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	5	13,563941026	Fref±1.356 kHz	0,641	PASS
	120,00	10	13,563941026	Fref±1.356 kHz	0,641	PASS
-20	120,00	0	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	2	13,563620513	Fref±1.356 kHz	0,321	PASS
	120,00	5	13,563300000	Fref±1.356 kHz	0,000	PASS
	120,00	10	13,563941026	Fref±1.356 kHz	0,641	PASS