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Test report

Number:	**T251-0619/18**	Project file:	C20173169
		Date:	2018-08-14
		Pages:	73

Product: **RFID Reader**

Type reference: **Metra WBC-WBI RFID ISO MODULE**

Ratings: EUT: 24 Vdc (Powered via AC/DC adapter)
Operating clock frequency: 13,56 MHz
Protection class: III

Trademark: Metra MEW System

Applicant: **Metra inženiring d.o.o.**
Špruha 19, IOC Trzin, SI-1236 Trzin, Slovenia

Manufacturer: Metra inženiring d.o.o.
Špruha 19, IOC Trzin, SI-1236 Trzin, Slovenia

Place of manufacture: Metra inženiring d.o.o.
Špruha 19, IOC Trzin, SI-1236 Trzin, Slovenia

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: 2018-01-24
Number of items tested: 1
Date of performance of tests: 2018-03-01 - 2018-06-15
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
2018-08-14	T251-0619/18	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

RFID Reader
Type: Metra WBC-WBI RFID ISO MODULE

FCC ID: 2ABT80006P1429
Tested SIQ sample number: S20180760

Picture of Type label

Picture of EUT

1.1.1 General product information

Product	RFID Reader
Type / Model	Metra WBC-WBI RFID ISO MODULE
Supply voltage of transmitter	24 Vdc (powered via AC/DC adapter)
Operating frequency	13,56 MHz
Number of channels	1
Antenna type	Passive antennas tuned to 13,56 MHz
Hardware version:	1201 - MEWSMR v 1
Software version:	Test software covers worst case scenario, all hardware resources active and all communication ports active.

‘’Metra WBC-WBI RFID ISO Module” is designed to be built in different Metra specific final products that manipulates (moves) the RFID media, normally Metra RFID Wristbands. For that purpose it contains specific electronic parts that enables construction of the RFID electromechanical devices: RFID reader and special shape antenna; Two Stepper Motor drivers; LED and audio signalisation; Hall proximity sensors; Metra MEW communication interface.

Processor Used:
NXP1769 Cortex-M3
Quartz oscillator 12MHz

LIN communication:
19200 Baud. Maximum length 60m
3wire cable 0.25 mm2 – 0,75 mm2

RFID Reader:
NXP CLRC663 RFID Reader Chip.
Quartz oscillator 27.12 MHz divided by 2 to obtain RFID operating frequency 13.56 MHz.

1.1.2 Auxiliary equipment used during testing

AC/DC Adapter: Mean Well, Model: GS90A24; Input: 100-240 V~; 50/60 Hz; Output: 24 VDC; 3,75 A
Metra MEW Controller
Temperature chamber, Kambič, I-190CK, SN 12064024

1.2 ANSI C63.4 Subpart selection

Subpart C: Intentional Radiators

1.3 Class statement requirements

- The Class A statement cautions that operation of the device in a residential area is likely to cause harmful interference.
- 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.

1.4 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

1.5 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

1.6 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 FOR ALL SUBPARTS

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*log(2400/F(kHz))	20*log(2400/F(kHz))	300
0,490 to 1,705	20*log(24000/F(kHz))	20*log(24000/F(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 – Section15.215: 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	106765	2016-09	2018-09	24 months	X
Comtest Engineering, Semi Anechoic Chamber SAC 1	SAC 3m	NPS001	2017-05	2019-05	24 months	
Comtest Engineering, Semi Anechoic Chamber SAC 2	SAC 3m	NPS003	2017-05	2019-05	24 months	X
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	

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 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
Class B	3 m	3 m	/
Class A	10 m	3 m	20dB/decade

5 GENERAL AND SPECIAL CONDITIONS DESCRIPTION

5.1 General condition description

Interconnect and power cabling (or wiring)

5.1.1 Test arrangement for conducted emissions

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground-plane.
All other equipment powered from additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
LISN at least 80 cm from nearest part of EUT chassis.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground-plane.

5.1.2 Test arrangement for conducted emissions- floor-standing equipment

Excess I/O cables shall be bundled in the center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling shall not exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, the ground-plane.
All other equipment powered from a second LISN or additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

5.1.3 Test arrangement for radiated emissions tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

No vertical conducting plane used.

Power cords drape to the floor and are routed over to receptacle.

5.1.4 Test arrangement for radiated emissions floor-standing equipment

Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling not to exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground plane.

Overhead cable trays and suspended ceilings

5.1.5 Test arrangement for floor-standing equipment

Only one vertical riser may be used where typical of system under test.

Excess power cord shall be bundled in the center or shortened to appropriate length.

EUT and cables shall be insulated from ground-plane by up to 12 mm. Where the manual has specified or there exists a code of practice for installation of the EUT, the test arrangement shall allow the use of this practice for the tests.

Power cords being measured connected to one LISN. All other system power cords powered through other LISN(s). A multiple receptacle strip may be used for other power cords.

For *conducted* tests, the LISNs may be placed on top of or immediately beneath and bonded directly to the ground-plane. For *radiated* tests, the LISN(s), if used, should be installed under, with the receptacle flush with the ground-plane.

5.1.6 Placement and manipulation of interconnect cabling (or wiring) of tabletop equipment

LISN(s) may have to be positioned to the side of the table to meet the criterion that the LISN receptacle shall be 80 cm away from the EUT. LISN(s) may be above ground-plane only for conducted emission measurements.

Accessories, such as ac power adapter, if typically table-mounted, shall occupy peripheral positions as is applicable.

Accessories, which are typically floor-mounted, shall occupy a floor position directly below the portion of the EUT to which they are typically connected. T

Table length may be extended beyond 1.5 m with peripherals aligned with the back edge. The table depth may be extended beyond 1 m. The 40 cm distance to the vertical conducting plane shall be maintained for conducted emission testing.

Placement of wall-mounted equipment

5.1.7 Test configuration/arrangement for combination floor-standing and tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., have to be placed as for normal use.

Non-EUT components of EUT system being tested.

I/O cable to floor-standing unit drapes to the ground-plane and shortened or excess bundled. Cables not reaching the metal ground-plane are draped to the height of the connector or 40 cm, whichever is lower.

Power cords and signal cables shall drape to the floor. No extension cords shall be used to the power receptacles.

The floor-standing unit can be placed under the table if its height permits.

5.2 Special condition description

If for some reason the above measurement conditions can’t be met, the description below should be used as an appropriate measurement condition and placement.

(Description is written additionally as the measurements differ – all is within test procedure)

6 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

6.1 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	120 V; 60 Hz

7 EMISSION TESTS

7.1 Conducted emission measurement (15.207)

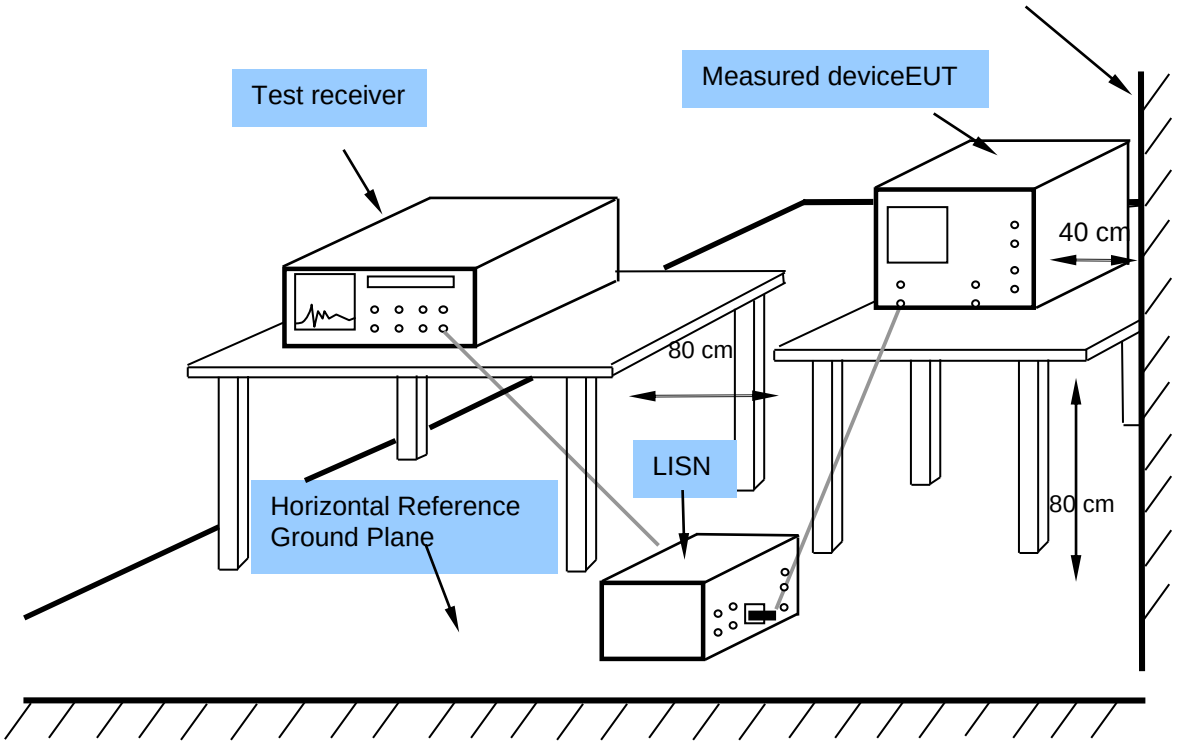
7.1.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
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

7.1.2 Test procedure

- 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. Bandwidth is set to 9 kHz.
- If applicable functions are changed (data transfer speed, clock speed,…) it should be noted in the test report.

7.1.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4 Test results

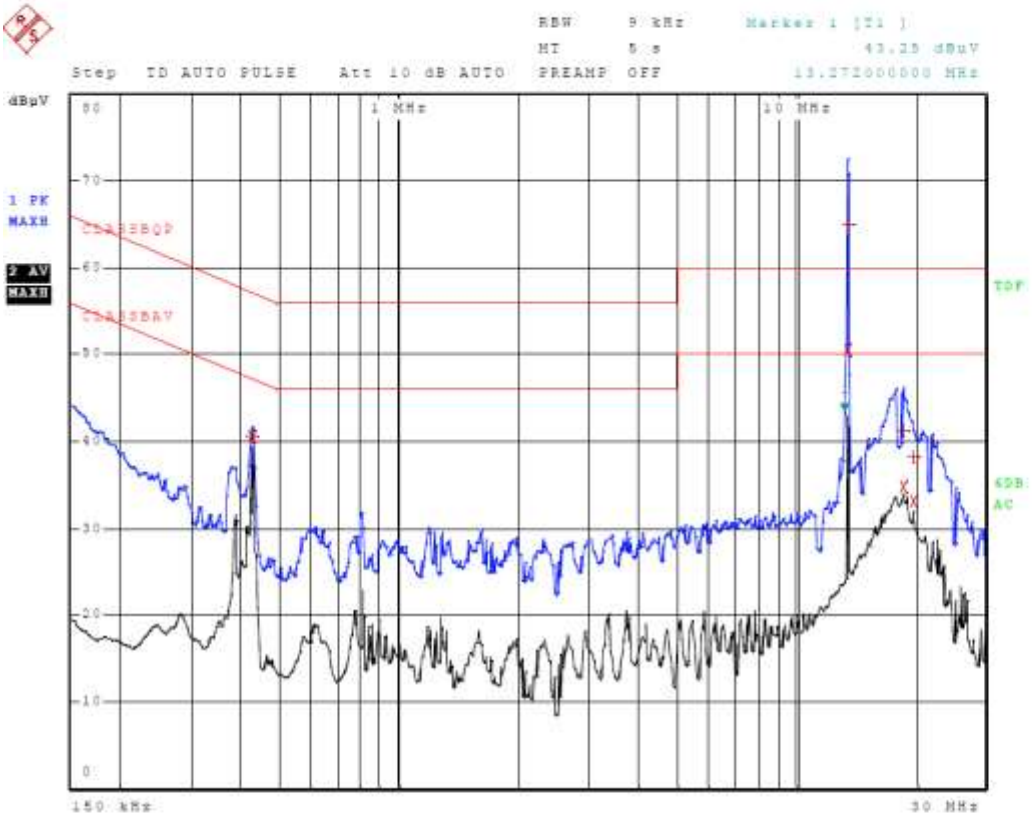
Device passed the requirements stated in FCC part 15, Subpart C, Section 15.207

10.May 18 14:40

Meas Type	CONDUCTED EMISSION
Equipment under Test	WBC-WBI RFID ISO Module
OP Condition	WAITING FOR A TAG

Test Spec

PHASE, Uin: 120 V, 60 Hz



Final Measurement

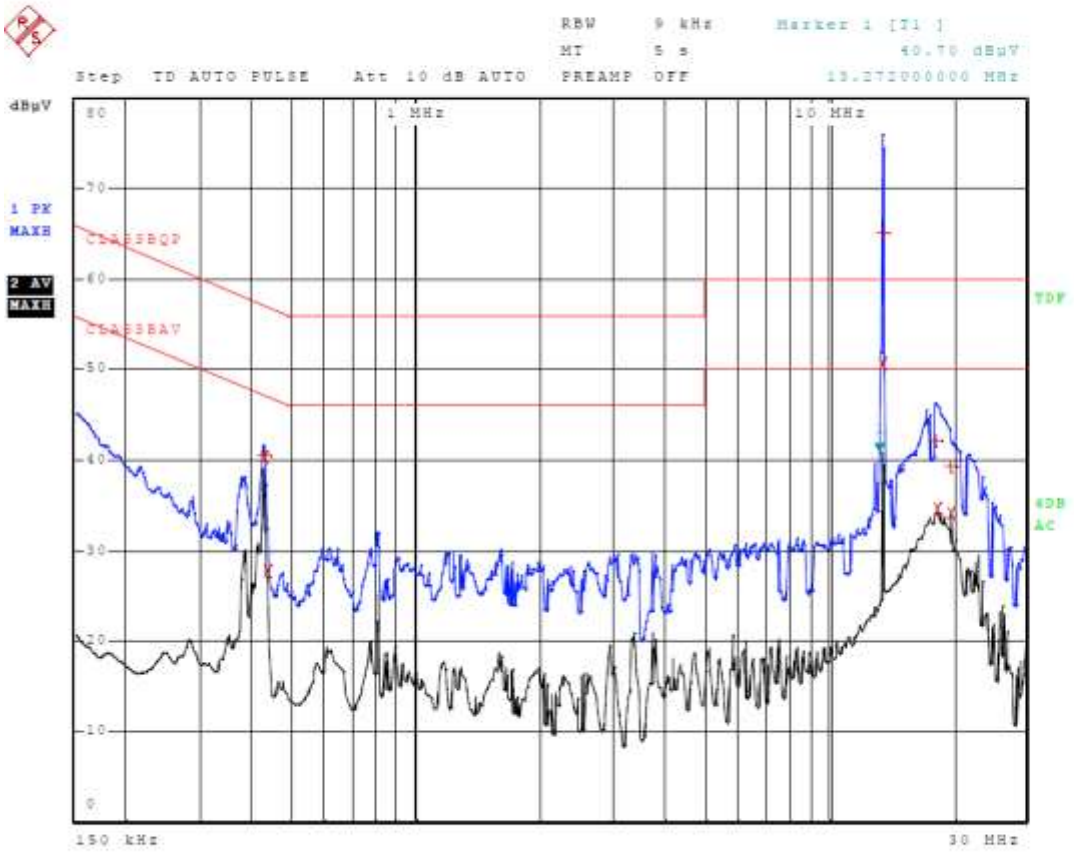
Meas Time:	5 s
Margin:	20 dB
Subranges:	8

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	13.560000000 MHz	65.02	Quasi Peak	5.02
2	13.560000000 MHz	50.51	CISPR Averag	0.51
2	424.500000000 kHz	40.54	CISPR Averag	-6.82
2	18.622500000 MHz	34.75	CISPR Averag	-15.25
1	424.500000000 kHz	40.64	Quasi Peak	-16.72
2	19.754250000 MHz	33.02	CISPR Averag	-16.98
1	18.618000000 MHz	41.32	Quasi Peak	-18.68
1	19.756500000 MHz	38.32	Quasi Peak	-21.68

10.May 18 14:33

Meas Type CONDUCTED EMISSION
Equipment under Test WBC-WBI RFID ISO Module
OP Condition WAITING FOR A TAG

Test Spec
NEUTRAL, Uin: 120 V, 60 Hz



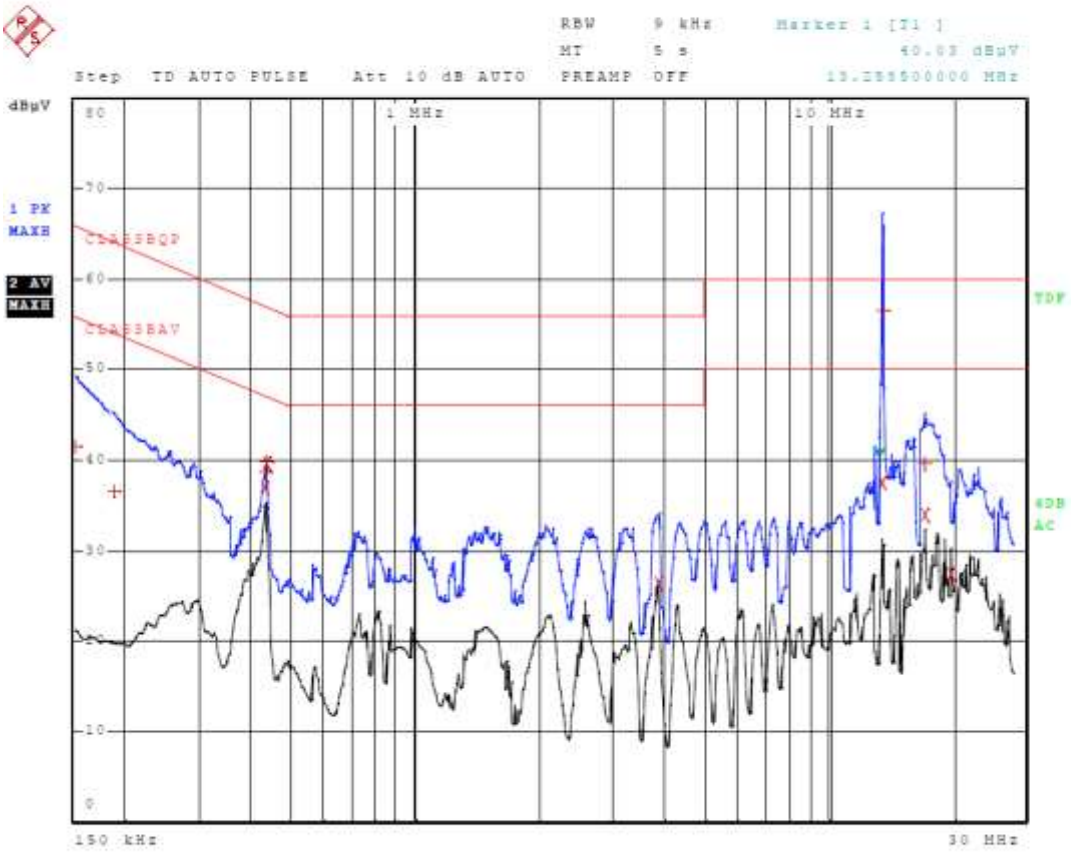
Final Measurement

Meas Time: 5 s
Margin: 20 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	13.560000000 MHz	65.19	Quasi Peak	5.19
2	13.560000000 MHz	50.63	CISPR Averag	0.63
2	426.750000000 kHz	40.24	CISPR Averag	-7.08
2	18.258000000 MHz	34.61	CISPR Averag	-15.39
2	19.749750000 MHz	34.06	CISPR Averag	-15.94
1	426.750000000 kHz	40.45	Quasi Peak	-16.86
1	18.249000000 MHz	42.08	Quasi Peak	-17.92
2	435.750000000 kHz	27.64	CISPR Averag	-19.51
1	19.749750000 MHz	39.31	Quasi Peak	-20.69

10.May 18 14:19

Meas Type CONDUCTED EMISSION
Equipment under Test WBC-WBI RFID ISO Module
OP Condition READING A TAG
Test Spec
PHASE, Uin: 120 V, 60 Hz



Final Measurement

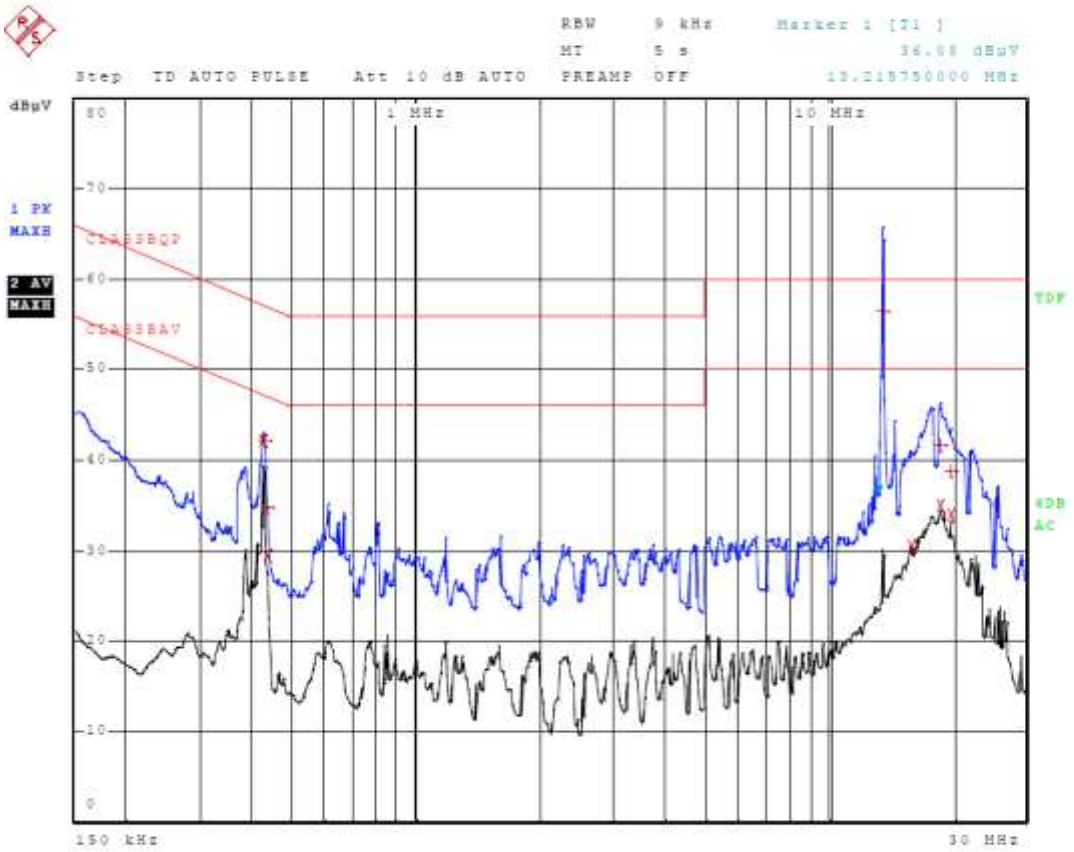
Meas Time: 5 s
Margin: 20 dB
Subranges: 12

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	13.560000000 MHz	56.56	Quasi Peak	-3.44
2	433.500000000 kHz	39.54	CISPR Averag	-7.65
2	431.250000000 kHz	36.89	CISPR Averag	-10.34
2	13.560000000 MHz	37.31	CISPR Averag	-12.69
2	17.137500000 MHz	33.87	CISPR Averag	-16.13
1	433.500000000 kHz	39.82	Quasi Peak	-17.36
1	431.250000000 kHz	38.53	Quasi Peak	-18.69
2	3.858000000 MHz	26.31	CISPR Averag	-19.69
1	17.121750000 MHz	39.53	Quasi Peak	-20.47
2	19.740750000 MHz	27.28	CISPR Averag	-22.72
1	150.000000000 kHz	41.37	Quasi Peak	-24.63
1	186.000000000 kHz	36.60	Quasi Peak	-27.61

10.May 18 14:27

Meas Type CONDUCTED EMISSION
Equipment under Test WBC-WBI RFID ISO Module
OP Condition READING A TAG

Test Spec
NEUTRAL, Uin: 120 V, 60 Hz



Final Measurement

Meas Time: 5 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
1	13.560000000 MHz	56.46	Quasi Peak	-3.54
2	424.500000000 kHz	42.13	CISPR Averag	-5.23
2	18.622500000 MHz	34.96	CISPR Averag	-15.04
1	426.750000000 kHz	42.04	Quasi Peak	-15.28
2	19.749750000 MHz	33.79	CISPR Averag	-16.21
2	433.500000000 kHz	29.33	CISPR Averag	-17.86
1	18.620250000 MHz	41.62	Quasi Peak	-18.38
2	15.801000000 MHz	30.40	CISPR Averag	-19.60
1	19.747500000 MHz	38.74	Quasi Peak	-21.26
1	433.500000000 kHz	34.76	Quasi Peak	-22.42

15.Jun 18 11:56

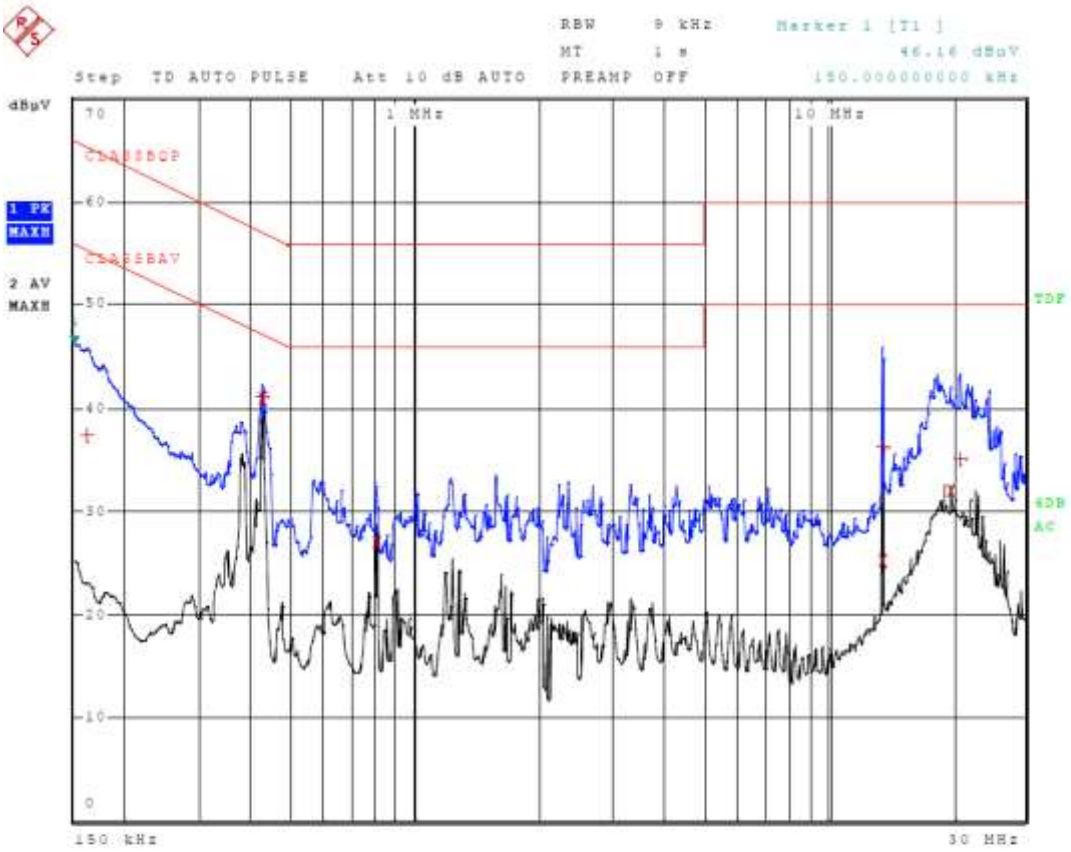
Meas Type	CONDUCTED EMISSION
Equipment under Test	METRA WBC-WBI RFID ISO MODULE
OP Condition	Uin: 120 V, 60 Hz

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	50 ms	Auto	0 dB	INPUT2



15.Jun 18 11:56

Meas Type CONDUCTED EMISSION
Equipment under Test METRA WBC-WBI RFID ISO MODULE
OP Condition Uin: 120 V, 60 Hz

Test Spec
PHASE

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	424.500000000 kHz	40.96	CISPR Averag	-6.40
1	424.500000000 kHz	41.04	Quasi Peak	-16.32
2	19.756500000 MHz	32.04	CISPR Averag	-17.96
2	804.750000000 kHz	27.05	CISPR Averag	-18.95
1	13.560000000 MHz	36.19	Quasi Peak	-23.81
2	13.560000000 MHz	25.17	CISPR Averag	-24.83
1	20.827500000 MHz	35.03	Quasi Peak	-24.97
1	161.250000000 kHz	37.41	Quasi Peak	-27.99

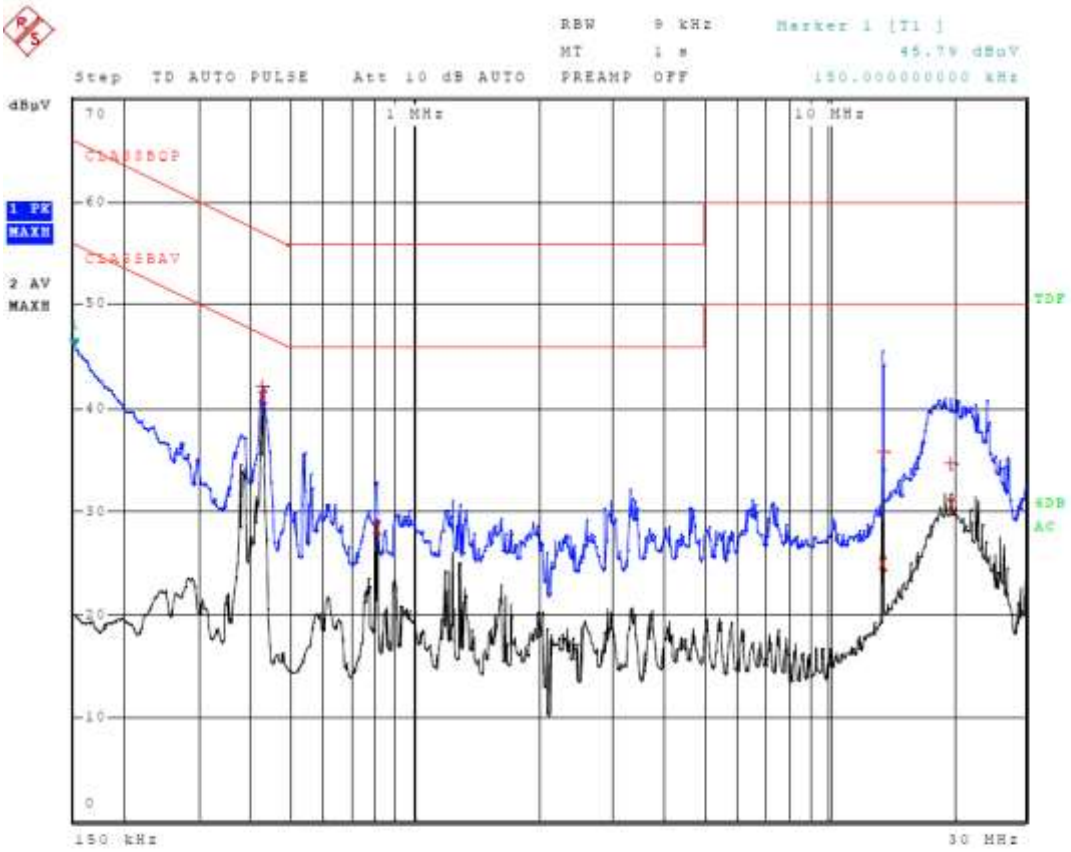
15.Jun 18 12:12

Meas Type	CONDUCTED EMISSION
Equipment under Test	METRA WBC-WBI RFID ISO MODULE
OP Condition	Uin: 120 V, 60 Hz
Test Spec	
NEUTRAL	

Time Domain Scan (1 Range)

Scan Start:	150 kHz
Scan Stop:	30 MHz
Detector:	Trace 1: MAX PEAK Trace 2: Average
Transducer:	ESH2-Z5

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	50 ms	Auto	0 dB	INPUT2



15.Jun 18 12:12

Meas Type CONDUCTED EMISSION
Equipment under Test METRA WBC-WBI RFID ISO MODULE
OP Condition Uin: 120 V, 60 Hz

Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	424.500000000 kHz	41.13	CISPR Averag	-6.23
1	424.500000000 kHz	42.13	Quasi Peak	-15.23
2	804.750000000 kHz	28.41	CISPR Averag	-17.59
2	19.754250000 MHz	30.70	CISPR Averag	-19.30
1	13.560000000 MHz	35.80	Quasi Peak	-24.20
2	13.560000000 MHz	24.94	CISPR Averag	-25.06
1	19.754250000 MHz	34.68	Quasi Peak	-25.32

7.2 Radiated emission measurement (15.209)

7.2.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2017-11	2019-11	24 months	
Rohde-Schwarz, RFI receiver	ESU26	100428	2018-02	2020-02	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)	102842	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)	102843	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

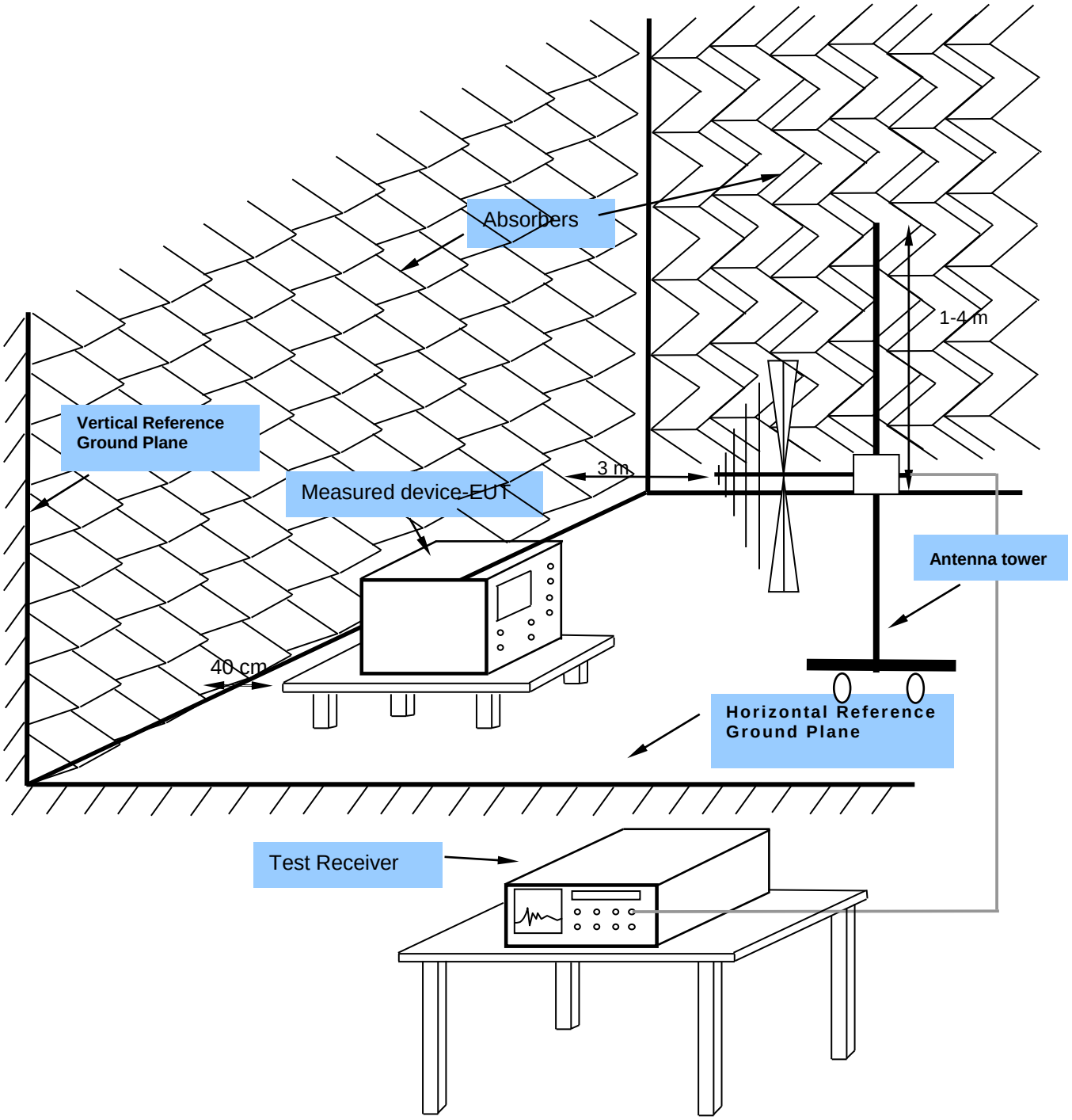
7.2.2 Test procedure for measurements from 9 kHz to 30 MHz

1. Radiated emission in the frequency range 9 kHz to 30 MHz are measured Active loop Antenna.
2. First preliminary measurements were performed in Semi-anechoic chamber at a distance of 3 m using active loop antenna.
3. 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.
4. 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).

7.2.3 Test procedure for measurements from 30 MHz to 1 GHz

5. 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.
6. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
7. 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.
8. 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.
9. The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
10. The highest points would be re-tested one by one using the quasi-peak method.

7.2.4 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5 Test result

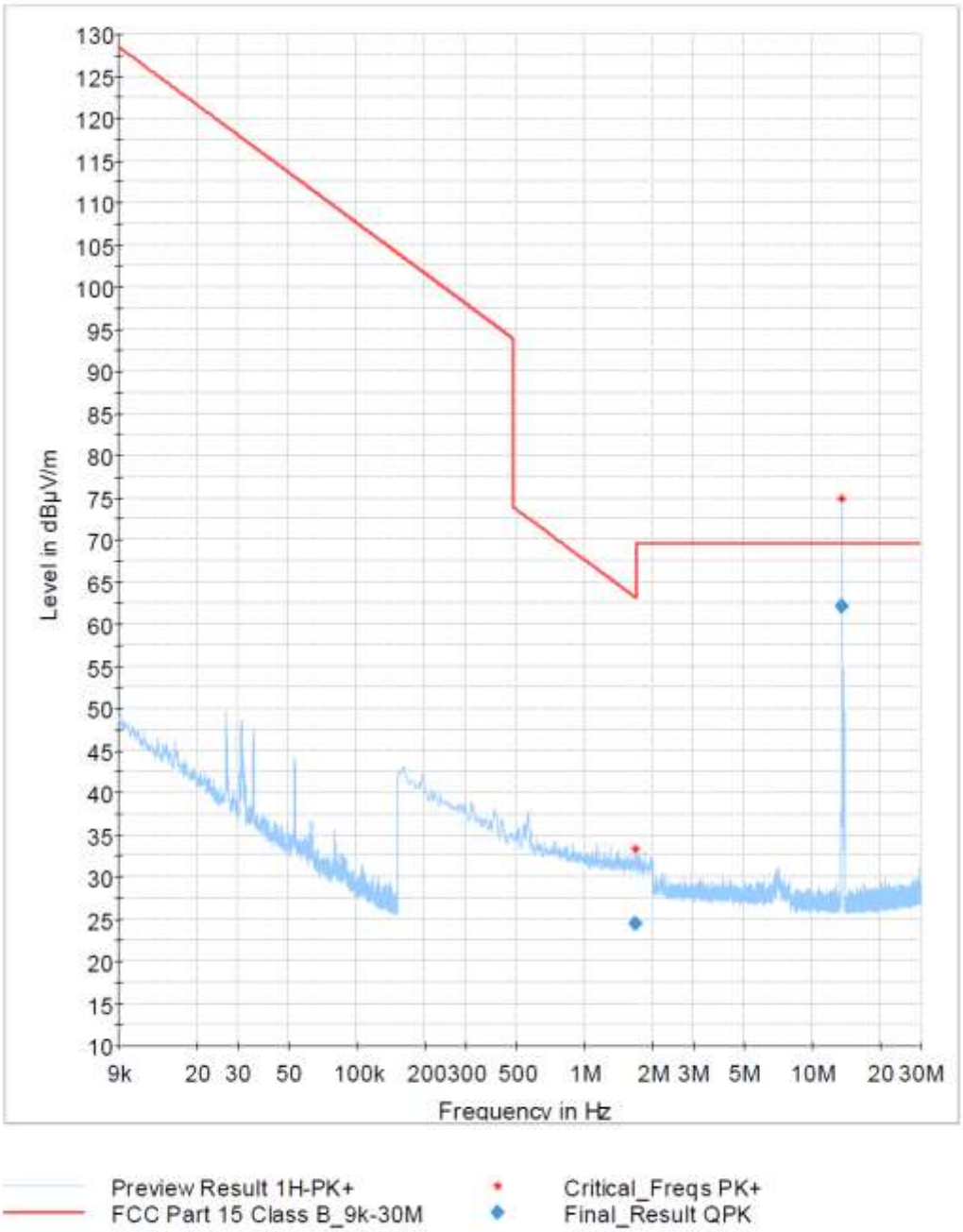
Device passed the requirements stated in FCC Part 15, Subpart C, Section 15.209

1 / 2

EUT Information

EUT:	WBC-WBI RFID ISO Module
Operating condition:	Waiting for a Tag, 0 DEG

Full Spectrum



6.3.2018 9:40:13

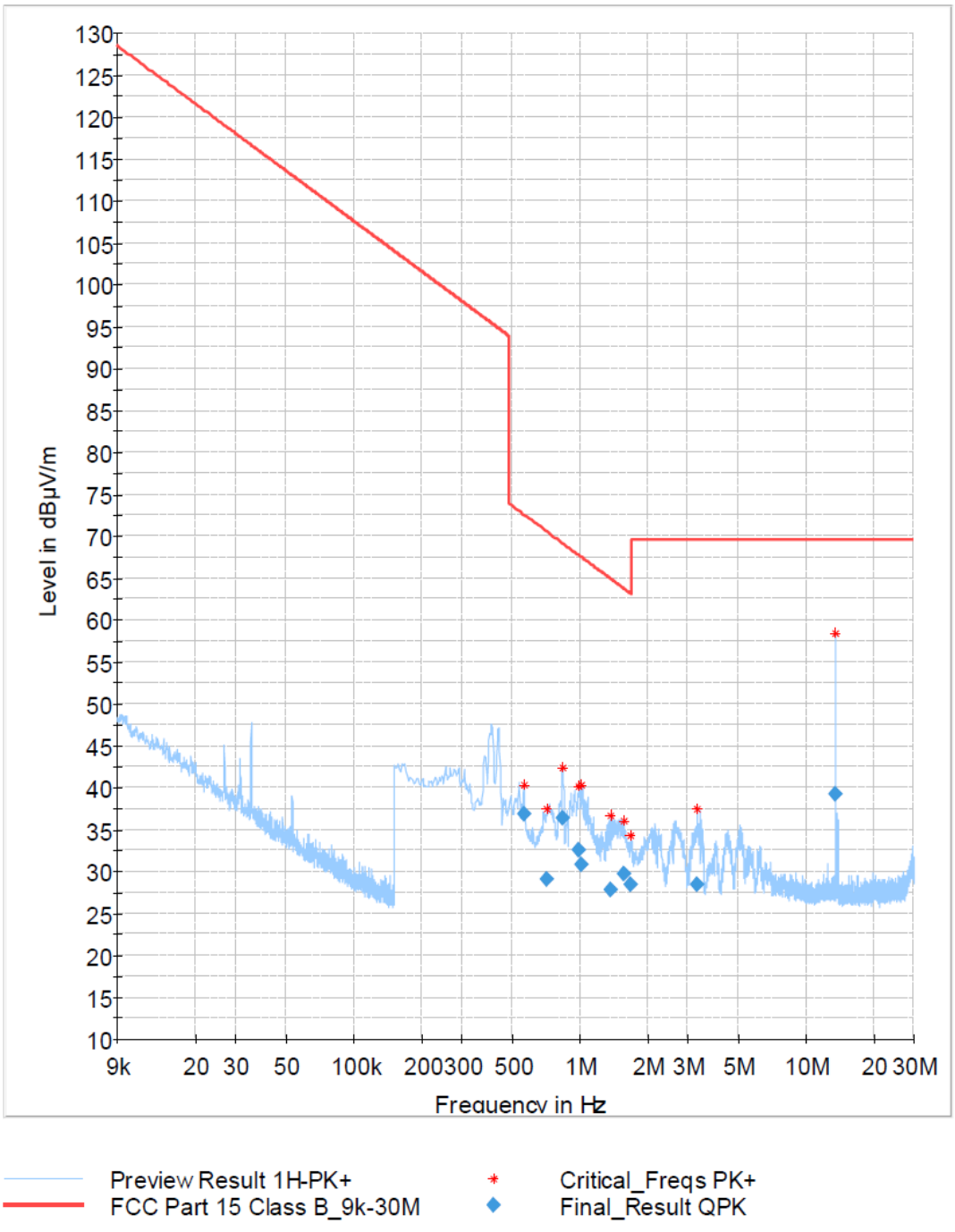
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (deg)
1.673250	24.47	63.16	38.69	355.0
13.560000	62.05	69.50	7.45	8.0

EUT Information

EUT:	WBC-WBI RFID ISO Module
Operating condition:	Waiting for a Tag, 90 DEG

Full Spectrum



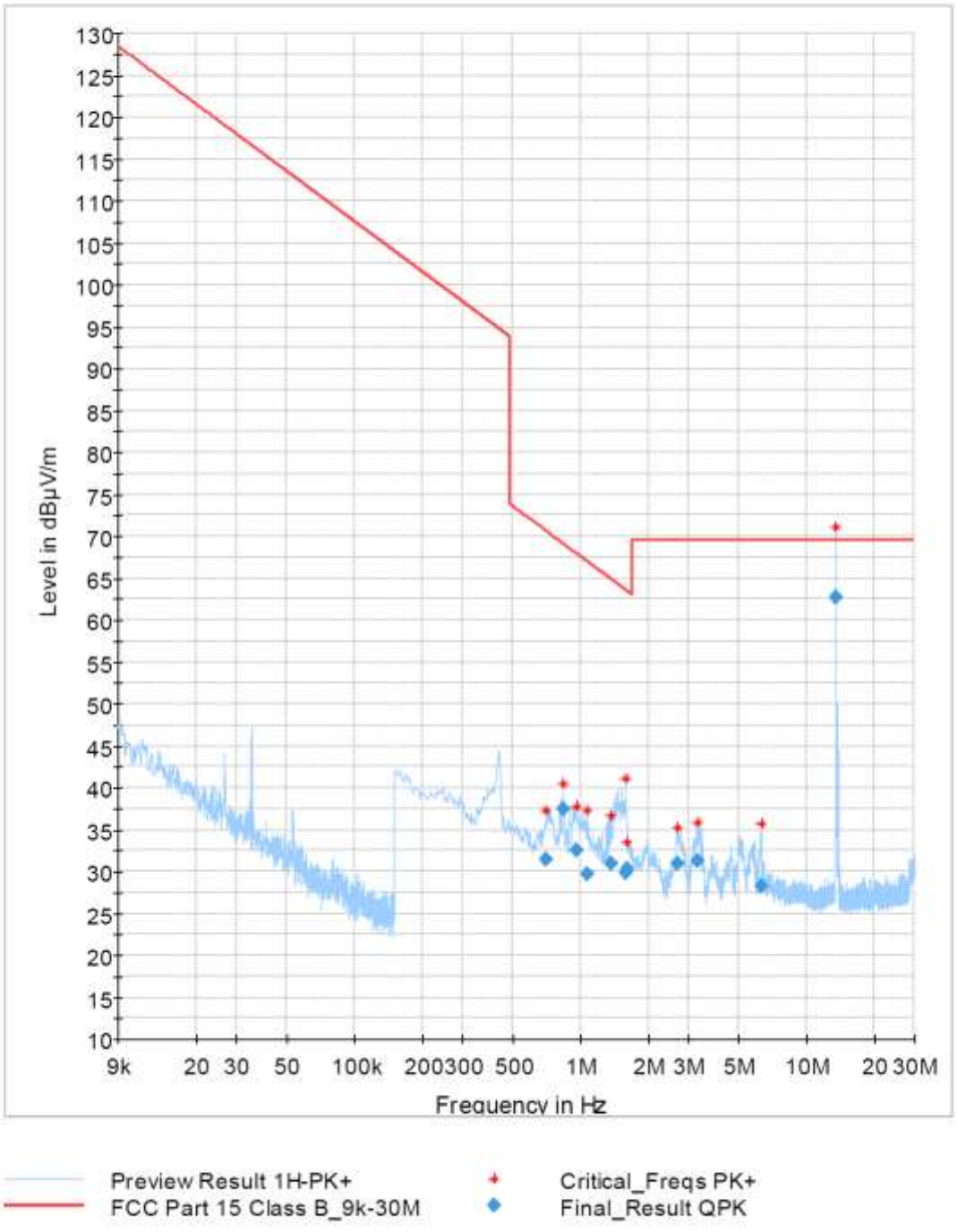
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (deg)
13.560000	39.20	69.50	30.30	349.0
0.838500	36.38	69.15	32.77	180.0
1.558500	29.67	63.78	34.10	349.0
1.675500	28.42	63.15	34.73	6.0
0.991500	32.48	67.70	35.21	180.0
0.564000	36.75	72.58	35.83	180.0
1.016250	30.79	67.48	36.70	180.0
1.374000	27.80	64.87	37.07	349.0
3.300000	28.43	69.50	41.07	349.0
0.712500	28.97	70.56	41.59	6.0

EUT Information

EUT:	WBC-WBI RFID ISO Module
Operating condition:	Waiting for a Tag, 90 DEG sample, 95 DEG

Full Spectrum



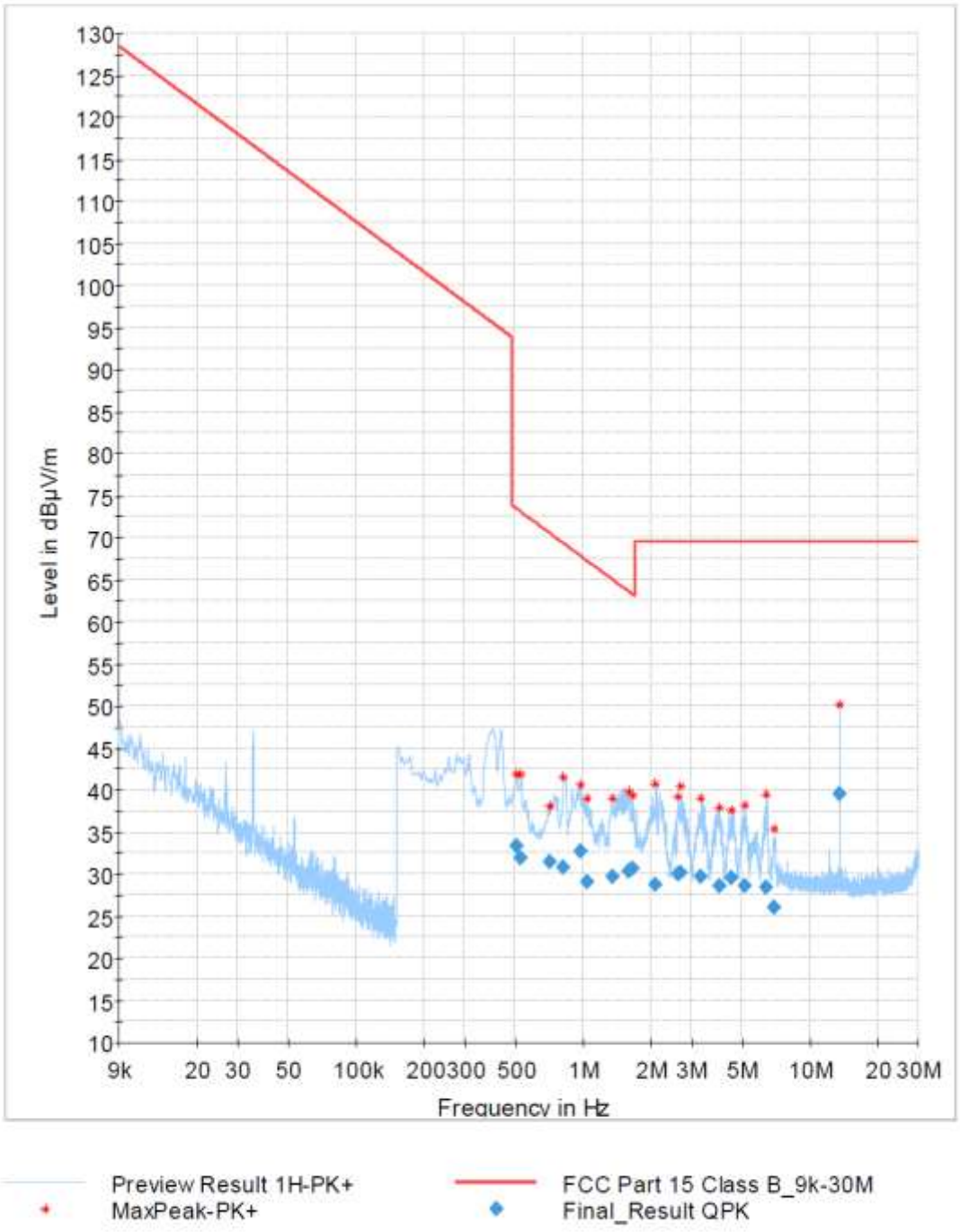
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (deg)
13.560000	62.73	69.50	6.77	95.0
0.840750	37.50	69.12	31.62	95.0
1.619250	30.25	63.45	33.20	95.0
1.590000	29.77	63.61	33.84	95.0
1.369500	31.03	64.90	33.87	95.0
0.960000	32.57	67.98	35.40	95.0
1.070250	29.64	67.03	37.39	95.0
3.311250	31.33	69.50	38.17	95.0
2.692500	30.93	69.50	38.57	95.0
0.705750	31.43	70.64	39.21	95.0
6.281250	28.18	69.50	41.32	95.0

EUT Information

EUT:	WBC-WBI RFID ISO Module
Operating condition:	Reading a Tag, 90 DEG sample, 95 DEG

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (deg)
13.560000	39.54	69.50	29.96	95.0
1.648500	30.63	63.29	32.66	95.0
1.590000	30.35	63.61	33.26	95.0
0.973500	32.71	67.85	35.14	95.0
1.351500	29.70	65.01	35.31	95.0
1.045500	29.03	67.24	38.21	95.0
0.820500	30.72	69.34	38.62	95.0
0.717000	31.51	70.50	39.00	95.0
2.701500	30.18	69.50	39.32	95.0
2.622750	30.01	69.50	39.49	95.0
3.295500	29.66	69.50	39.84	95.0
4.492500	29.47	69.50	40.03	95.0
0.512250	33.35	73.42	40.06	95.0
2.094000	28.74	69.50	40.76	95.0
3.968250	28.58	69.50	40.92	95.0
5.138250	28.57	69.50	40.93	95.0
6.450000	28.46	69.50	41.04	95.0
0.532500	31.94	73.08	41.14	95.0
6.987750	26.05	69.50	43.45	95.0

Final measurement at 10 m in OATS

Results with measuring distance of 10 m				
Mode	**Frequency (MHz)**	**Measured value (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
WBC-WBI reading	13,56	34,09	104,00	69,91
WBC-WBI waiting	13,56	47,29	104,00	56,71

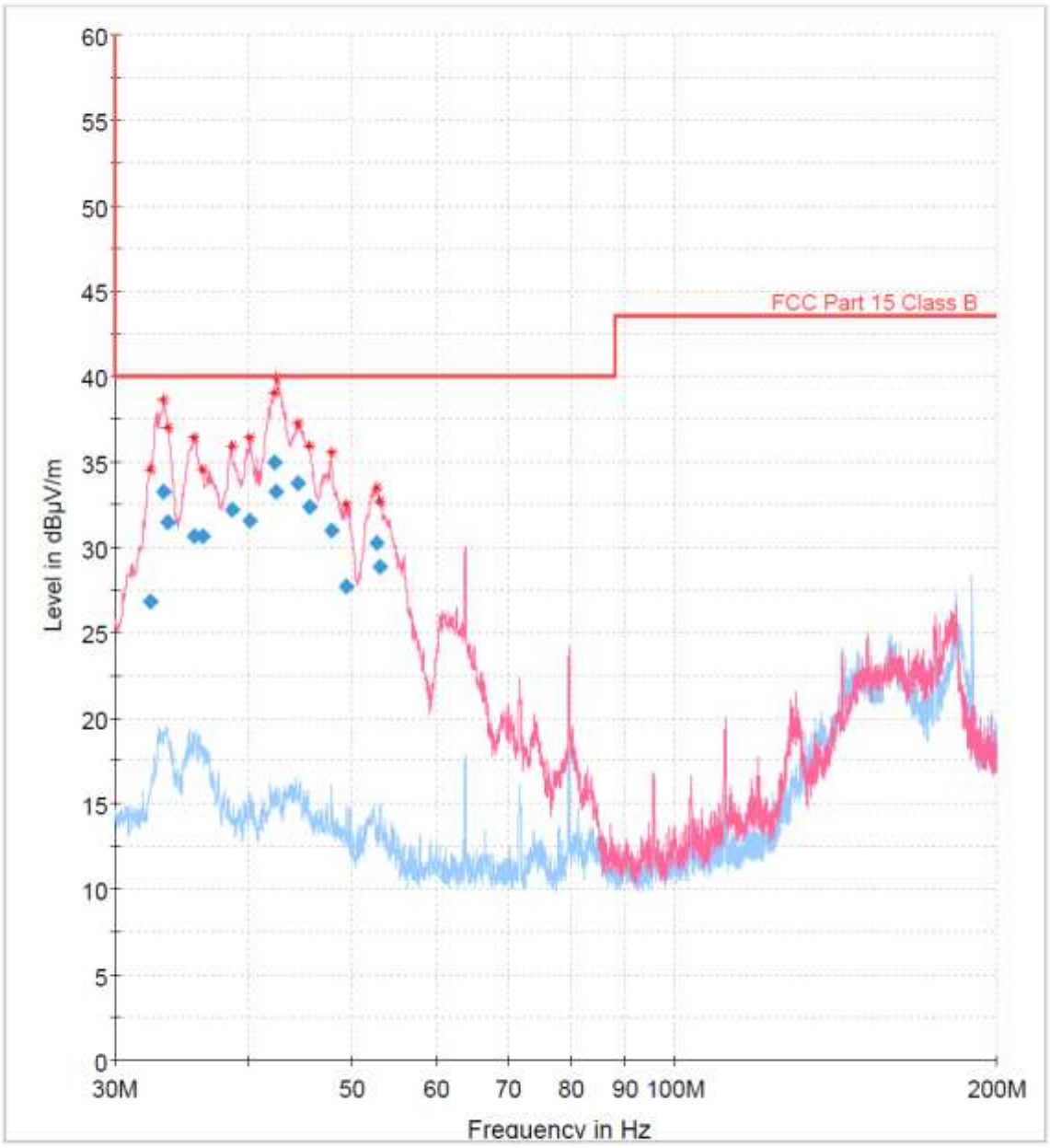
Calculated value from 10 m to 30 m						
Mode	**Frequency (MHz)**	**Measured value at 10 m (dBµV/m)**	**Correction factor from 10 m to 30 m (dB)**	**Calculated value at 30 m (dBµV/m)**	**Limit at 30 m (dBµV/m)**	**Margin (dB)**
WBC-WBI reading	13,56	34,09	20	14,09	84,00	69,91
WBC-WBI waiting	13,56	47,29	20	27,29	84,00	56,71

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

EUT Information

EUT:	WBI
Operating condition:	Waiting for a Tag

Full Spectrum



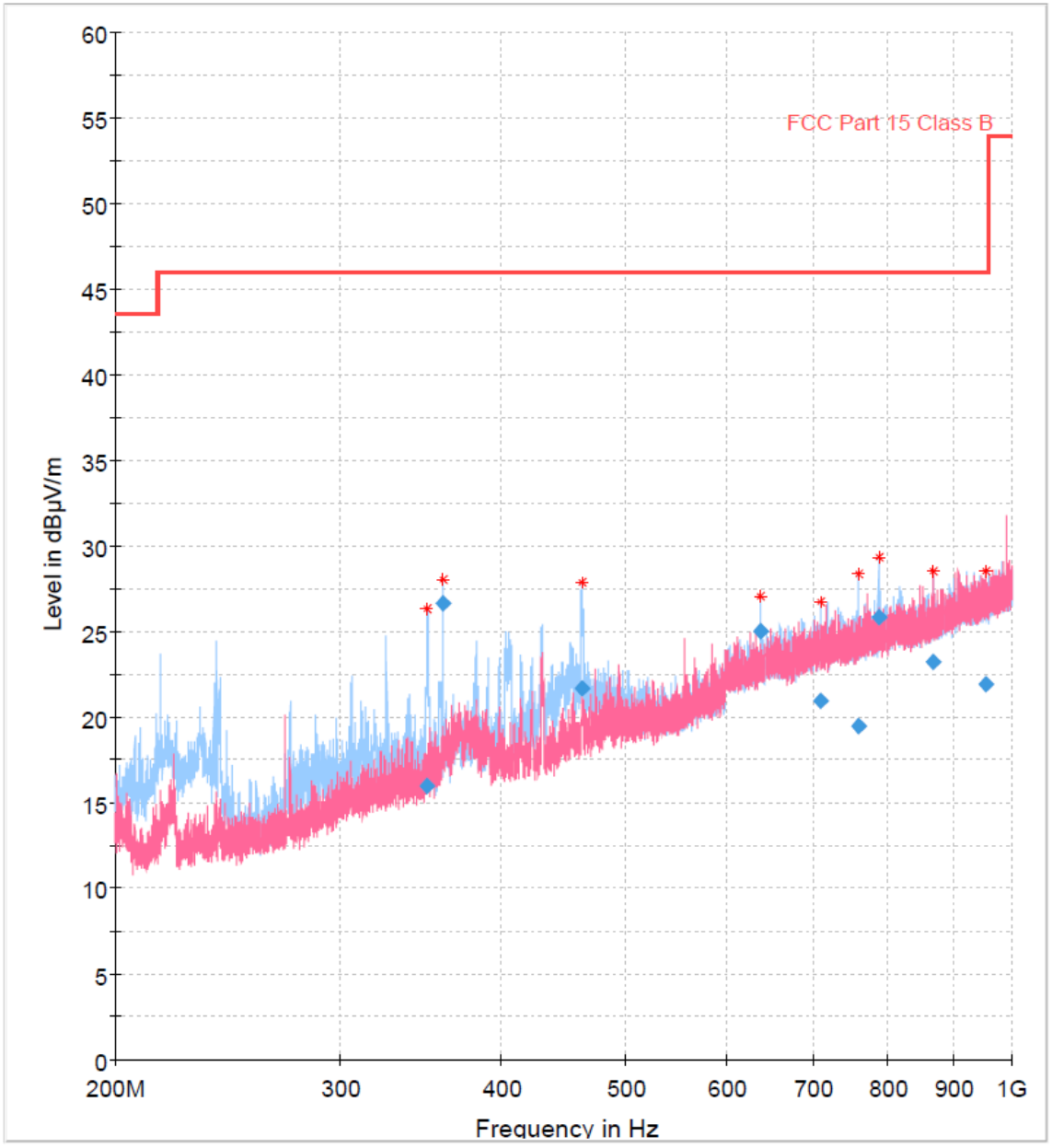
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
42.210000	35.01	40.00	4.99	109.0	V	348.0
44.430000	33.77	40.00	6.23	100.0	V	32.0
33.300000	33.29	40.00	6.71	106.0	V	169.0
42.390000	33.24	40.00	6.76	108.0	V	18.0
45.540000	32.40	40.00	7.60	107.0	V	32.0
38.550000	32.17	40.00	7.83	100.0	V	39.0
40.110000	31.59	40.00	8.41	106.0	V	290.0
33.630000	31.47	40.00	8.53	125.0	V	118.0
47.820000	31.01	40.00	8.99	122.0	V	32.0
36.270000	30.68	40.00	9.32	100.0	V	177.0
35.550000	30.63	40.00	9.37	104.0	V	177.0
52.680000	30.27	40.00	9.73	100.0	V	46.0
53.040000	28.90	40.00	11.10	109.0	V	25.0
49.380000	27.73	40.00	12.27	115.0	V	46.0
32.340000	26.83	40.00	13.17	113.0	V	4.0

EUT Information

EUT:	WBI
Operating condition:	Waiting for a Tag

Full Spectrum



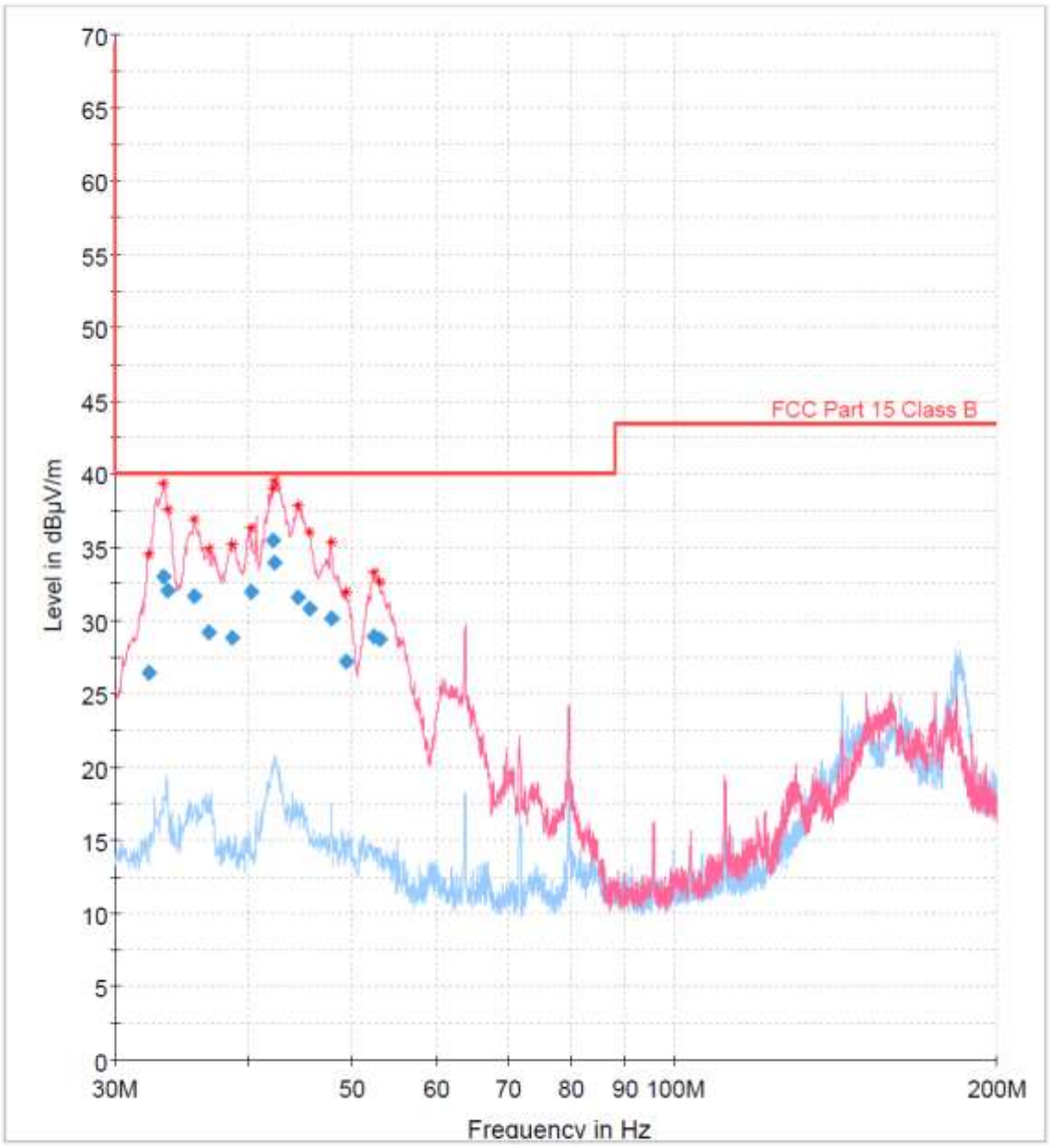
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
360.000000	26.66	46.00	19.34	100.0	H	169.0
786.480000	25.83	46.00	20.17	103.0	H	0.0
637.320000	24.99	46.00	21.01	123.0	H	244.0
867.810000	23.19	46.00	22.81	103.0	V	119.0
954.480000	21.92	46.00	24.08	234.0	V	0.0
462.600000	21.66	46.00	24.34	216.0	H	231.0
709.050000	20.94	46.00	25.06	104.0	H	282.0
759.360000	19.52	46.00	26.48	173.0	H	306.0
350.010000	16.01	46.00	29.99	100.0	H	356.0

EUT Information

EUT:	WBI
Operating condition:	Reading a Tag

Full Spectrum



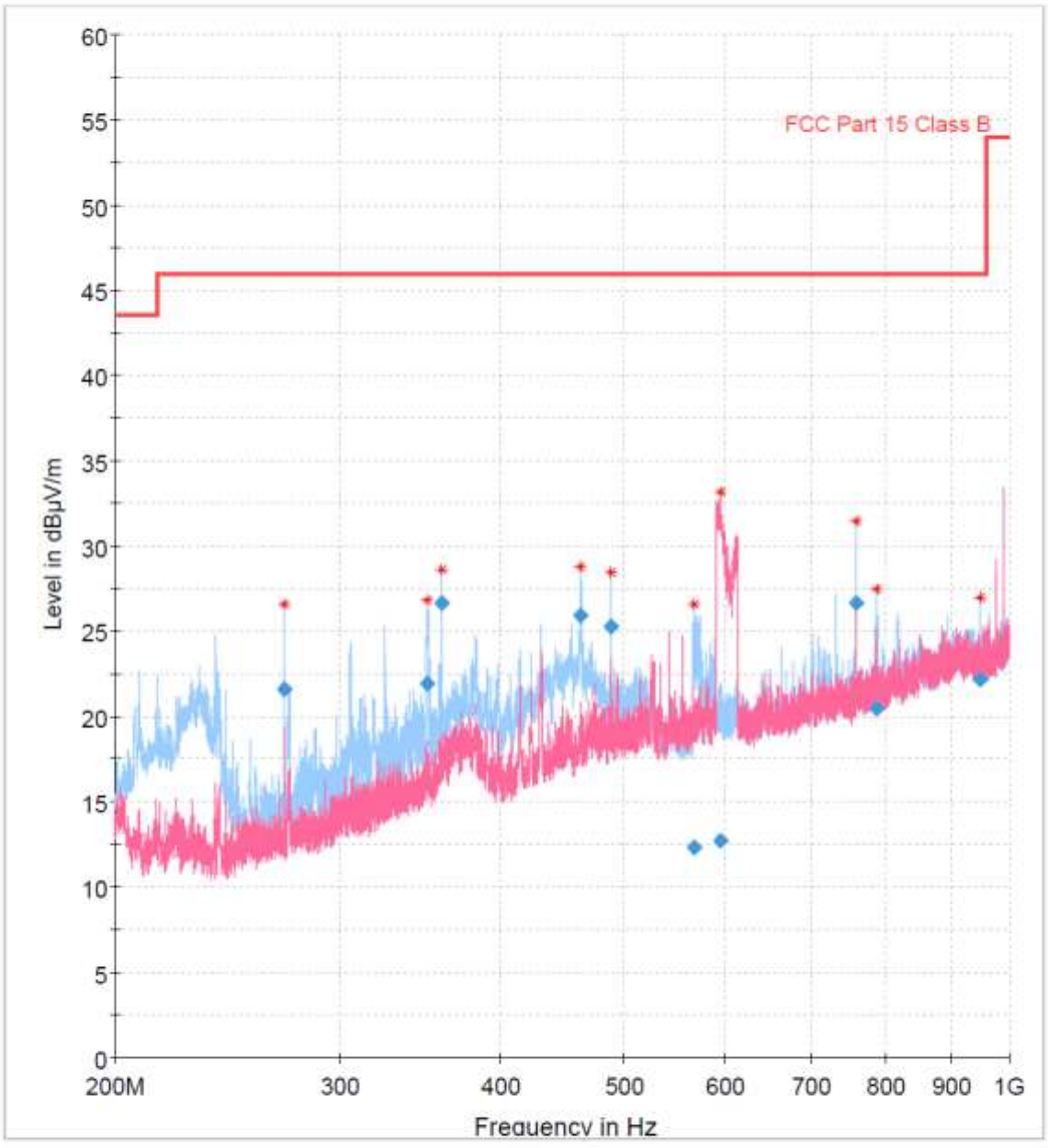
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
42.090000	35.45	40.00	4.55	103.0	V	0.0
42.330000	33.94	40.00	6.06	106.0	V	0.0
33.300000	32.99	40.00	7.01	130.0	V	7.0
33.630000	32.05	40.00	7.95	150.0	V	200.0
40.140000	31.95	40.00	8.05	100.0	V	242.0
35.520000	31.63	40.00	8.37	100.0	V	146.0
44.460000	31.59	40.00	8.41	107.0	V	0.0
45.540000	30.77	40.00	9.23	108.0	V	0.0
47.760000	30.14	40.00	9.86	107.0	V	7.0
36.690000	29.24	40.00	10.76	100.0	V	135.0
52.380000	28.91	40.00	11.09	108.0	V	7.0
38.610000	28.83	40.00	11.17	104.0	V	72.0
53.010000	28.68	40.00	11.32	105.0	V	7.0
49.260000	27.21	40.00	12.79	105.0	V	72.0
32.280000	26.44	40.00	13.56	108.0	V	7.0

EUT Information

EUT: WBI
Operating condition: Reading a Tag

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
360.000000	26.67	46.00	19.33	100.0	H	175.0
759.330000	26.64	46.00	19.36	100.0	H	221.0
462.570000	25.89	46.00	20.11	173.0	H	292.0
488.160000	25.28	46.00	20.72	155.0	H	301.0
949.200000	22.16	46.00	23.84	178.0	H	0.0
351.030000	21.92	46.00	24.08	100.0	H	318.0
271.200000	21.62	46.00	24.38	100.0	H	345.0
787.500000	20.48	46.00	25.52	100.0	H	213.0
594.000000	12.71	46.00	33.29	100.0	V	115.0
567.600000	12.31	46.00	33.69	153.0	H	179.0

7.3 Bandwidth of the emission (15.215)

Section 15.215 Additional provisions to the general radiated emission limitations

7.3.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2017-11	2019-11	24 months	
Rohde-Schwarz, RFI receiver	ESU26	100428	2018-02	2020-02	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)	102842	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)	102843	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	

7.3.2 Test procedure

1. 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.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Resolution bandwidth is set to a value greater than 5% of the allowed bandwidth. If no bandwidth specifications are given, the guidelines in Section 1.4 are used

7.3.3 Test results

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

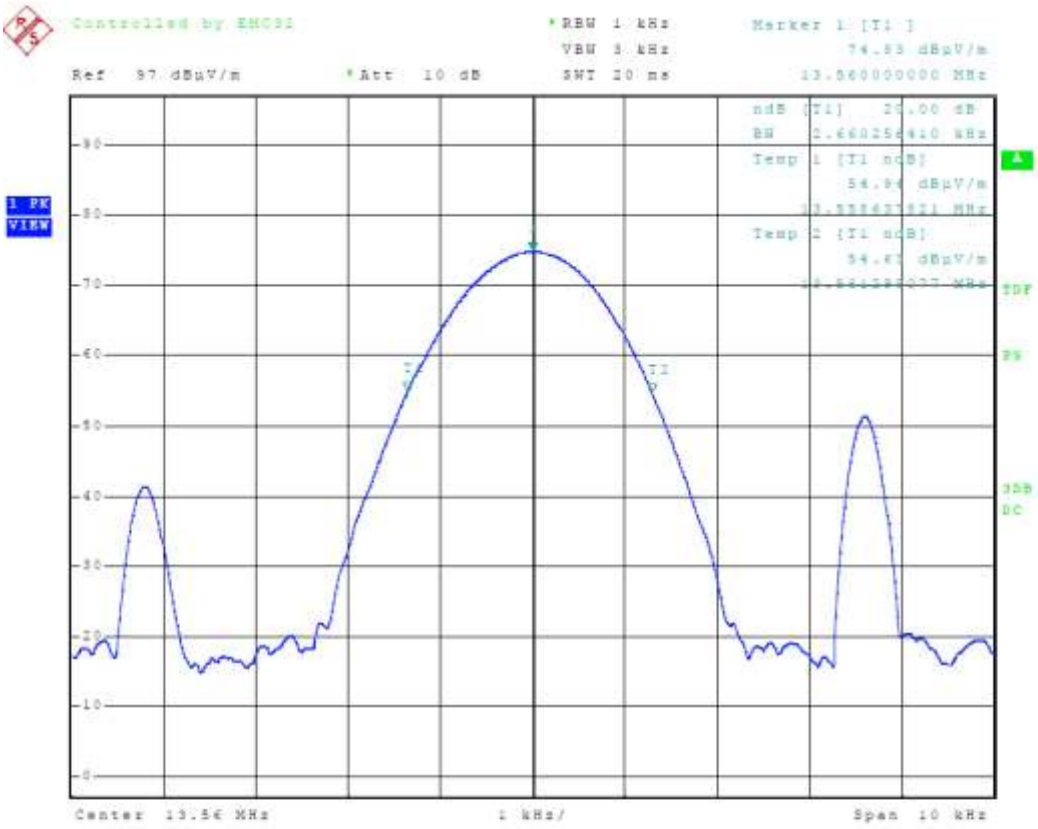
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	WBC-WBI RFID ISO Module
OP Condition	Waiting for a Tag

Test Spec

Antenna: 90 deg, Sample: 95 deg

Sweep Settings **Screen A**

Center Frequency	13.560000 MHz	Ref Level	97.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	100.000 dB
Stop Frequency	13.565000 MHz	RF Att	10.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



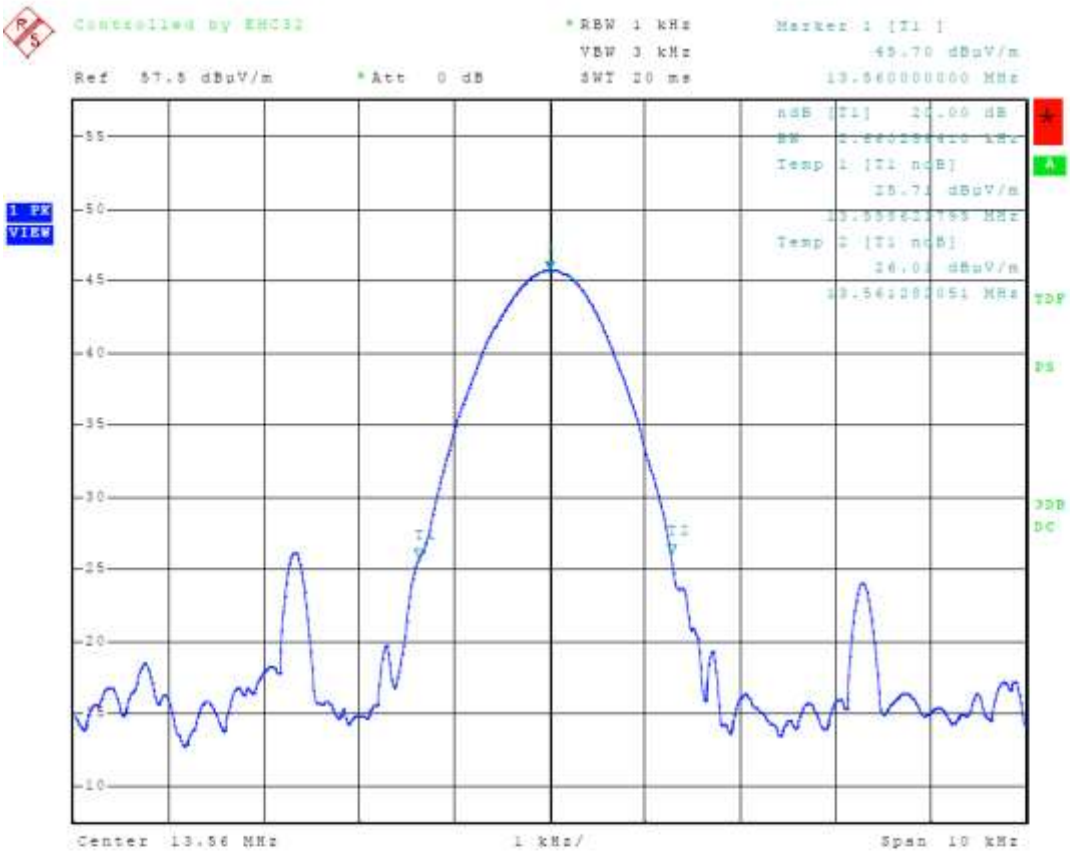
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	WBC-WBI RFID ISO Module
OP Condition	Reading a Tag

Test Spec

Antenna: 90 deg, Sample: 95 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	57.500 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	10.000000 kHz	Ref Position	100.000 %
Start Frequency	13.555000 MHz	Level Range	50.000 dB
Stop Frequency	13.565000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	20.00 ms	Y-Axis	LOG



Frequency (MHz)	Permitted frequency band (MHz)	20 dB bandwidth (kHz)	PASS/FAIL
13.56	13.110 – 14.010	2.66	PASS

7.4 Spectrum mask (15.225)

Section 15.225 Operation within the band 13.110 – 14.010 MHz – clause a – clause d

7.4.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2017-11	2019-11	24 months	
Rohde-Schwarz, RFI receiver	ESU26	100428	2018-02	2020-02	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)	102842	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)	102843	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	

7.4.2 Test procedure

1. 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.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Frequencies with maximum emission were retested on OATS.

4. 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.

7.4.3 Test results

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

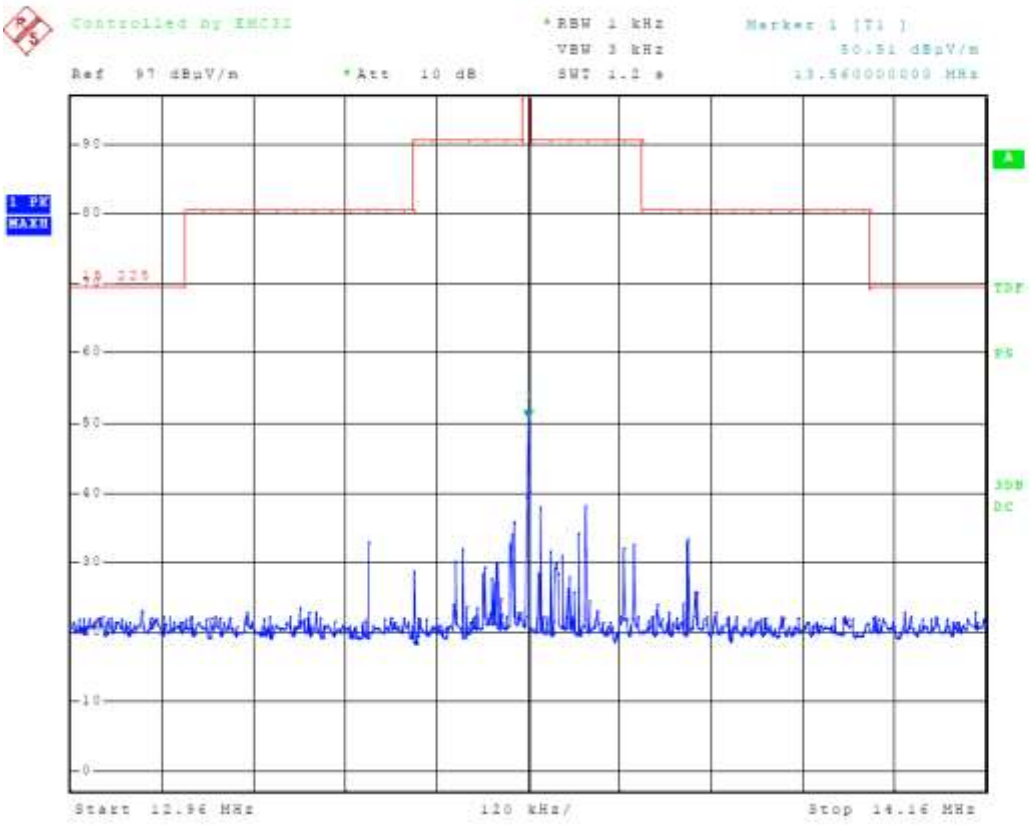
Meas Type	SPECTRUM MASK
Equipment under Test	WBC-WBI RFID ISO Module
OP Condition	Waiting for a Tag

Test Spec

Antenna: 90 deg, Sample: 95 deg

Sweep Settings **Screen A**

Center Frequency	13.560000 MHz	Ref Level	97.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	10.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



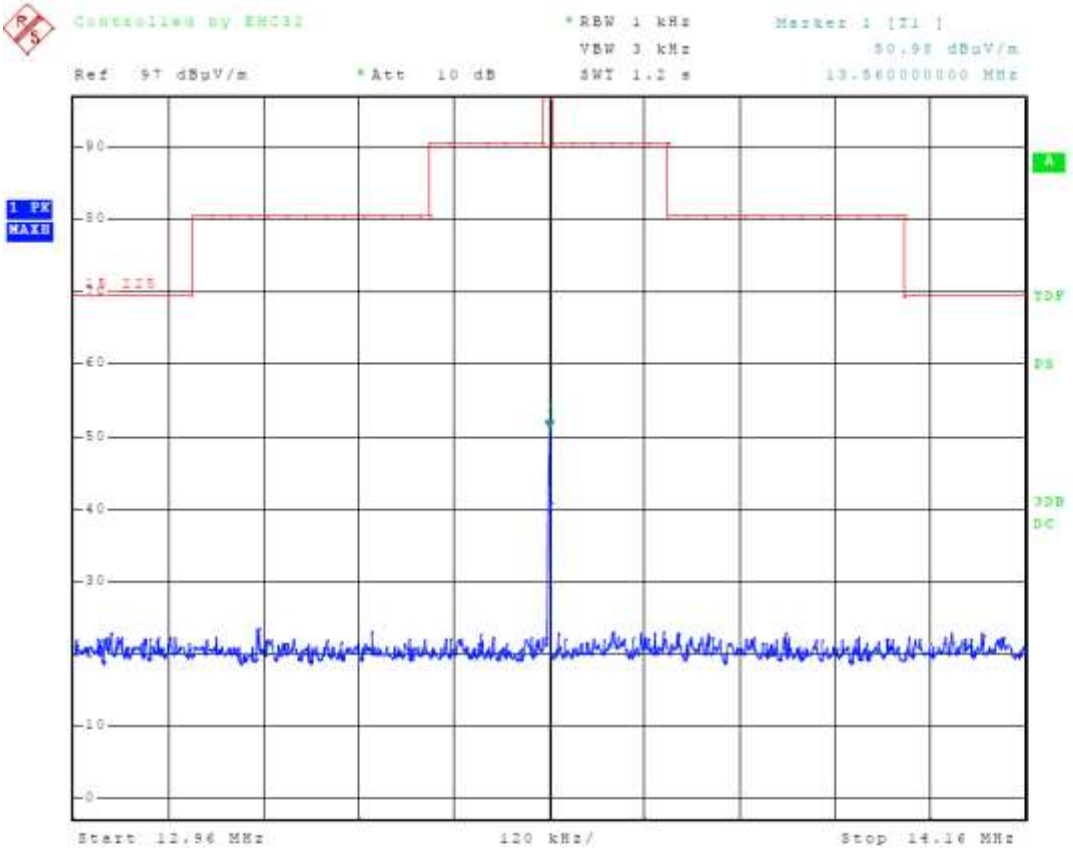
Meas Type	SPECTRUM MASK
Equipment under Test	WBC-WBI RFID ISO Module
OP Condition	Reading a Tag

Test Spec

Antenna: 90 deg, Sample: 95 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	97.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	10.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



7.5 Frequency tolerance of the carrier signal (15.225)

Section 15.225 Operation within the band 13.110 – 14.010 MHz

7.5.1 Test instruments:

Description & Manufacturer	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, Loop Antenna	FMZB 1519 B	/	2016-08	2018-08	24 months	X
Fluke, Digital Multimeter	179	106728	2016-07	2018-07	12 months	X
Kambič, Temperature chamber	I-190 CK	107298	N/A	N/A	/	X

7.5.2 Test requirements:

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.

7.5.3 Test results

Device passed the requirements stated in FCC Part 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	24,00	0	13,559961300	Fref±1.356 kHz	-0,087	PASS
	24,00	2	13,559941300	Fref±1.356 kHz	-0,107	PASS
	24,00	5	13,559948000	Fref±1.356 kHz	-0,100	PASS
	24,00	10	13,559934700	Fref±1.356 kHz	-0,113	PASS
40	24,00	0	13,559986700	Fref±1.356 kHz	-0,061	PASS
	24,00	2	13,559986700	Fref±1.356 kHz	-0,061	PASS
	24,00	5	13,559973300	Fref±1.356 kHz	-0,075	PASS
	24,00	10	13,559956000	Fref±1.356 kHz	-0,092	PASS
30	24,00	0	13,560032000	Fref±1.356 kHz	-0,016	PASS
	24,00	2	13,560017300	Fref±1.356 kHz	-0,031	PASS
	24,00	5	13,560010700	Fref±1.356 kHz	-0,037	PASS
	24,00	10	13,559989300	Fref±1.356 kHz	-0,059	PASS
20	20,40	0	13,560056000	Fref±1.356 kHz	0,008	PASS
	20,40	2	13,560061300	Fref±1.356 kHz	0,013	PASS
	20,40	5	13,560041300	Fref±1.356 kHz	-0,007	PASS
	20,40	10	13,560046700	Fref±1.356 kHz	-0,001	PASS
20	24,00	0	13,560073300	Fref±1.356 kHz	0,025	PASS
	24,00	2	13,560049300	Fref±1.356 kHz	0,001	PASS
	24,00	5	13,560056000	Fref±1.356 kHz	0,008	PASS
	24,00	**10**	13,560048000	**Fref**	0,000	PASS
20	27,60	0	13,560072000	Fref±1.356 kHz	0,024	PASS
	27,60	2	13,560057300	Fref±1.356 kHz	0,009	PASS
	27,60	5	13,560048000	Fref±1.356 kHz	0,000	PASS
	27,60	10	13,560041300	Fref±1.356 kHz	-0,007	PASS
10	24,00	0	13,560080000	Fref±1.356 kHz	0,032	PASS
	24,00	2	13,560084000	Fref±1.356 kHz	0,036	PASS
	24,00	5	13,560081300	Fref±1.356 kHz	0,033	PASS
	24,00	10	13,560082700	Fref±1.356 kHz	0,035	PASS
0	24,00	0	13,560110700	Fref±1.356 kHz	0,063	PASS
	24,00	2	13,560105300	Fref±1.356 kHz	0,057	PASS
	24,00	5	13,560110700	Fref±1.356 kHz	0,063	PASS
	24,00	10	13,560106700	Fref±1.356 kHz	0,059	PASS
-10	24,00	0	13,560106700	Fref±1.356 kHz	0,059	PASS
	24,00	2	13,560100000	Fref±1.356 kHz	0,052	PASS
	24,00	5	13,560109300	Fref±1.356 kHz	0,061	PASS
	24,00	10	13,560110700	Fref±1.356 kHz	0,063	PASS
-20	24,00	0	13,560065300	Fref±1.356 kHz	0,017	PASS
	24,00	2	13,560065300	Fref±1.356 kHz	0,017	PASS
	24,00	5	13,560088000	Fref±1.356 kHz	0,040	PASS
	24,00	10	13,560086700	Fref±1.356 kHz	0,039	PASS