



Test report

Number: T251-0279/19
Project file: C20182568
Date: 2019-04-19
Pages: 54

Product: RFID Low Frequency Reader Module

Type reference: HTRM1100

Ratings: 12-18 Vdc
Protection class: III

Trademark: Therion

Applicant: Frequent froschelectronics GmbH
Moserhofgasse 60/I, AT-8010 Graz, Austria

Manufacturer: Frequent froschelectronics GmbH
Moserhofgasse 60/I, AT-8010 Graz, Austria

Place of manufacture: Frequent froschelectronics GmbH
Moserhofgasse 60/I, AT-8010 Graz, Austria

Summary of testing

Testing method: FCC Part 15, Subpart C: §15.203, §15.205, §15.207, §15.215

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

Remarks: Date of receipt of test items: 2018-09-03
Number of items tested: 1
Date of performance of tests: 2018-10-15 - 2019-02-13
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
2019-04-19	T251-0279/19	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 Low Frequency Reader Module

Type: **HTRM1100**

Note: HTRM1100 was tested with two antennas:

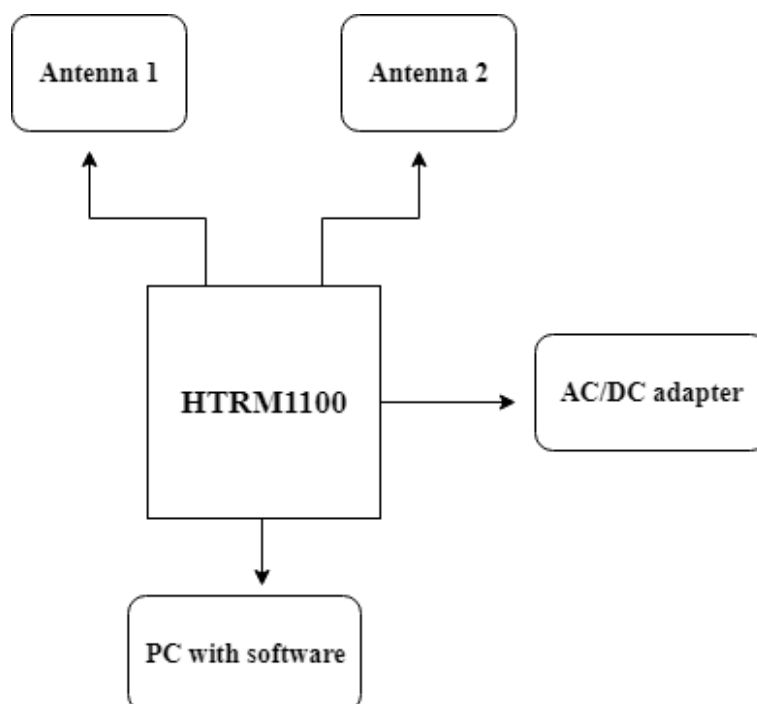
- Antenna 1: 83 cm x 55 cm
- Antenna 2: 15 cm x 8 cm

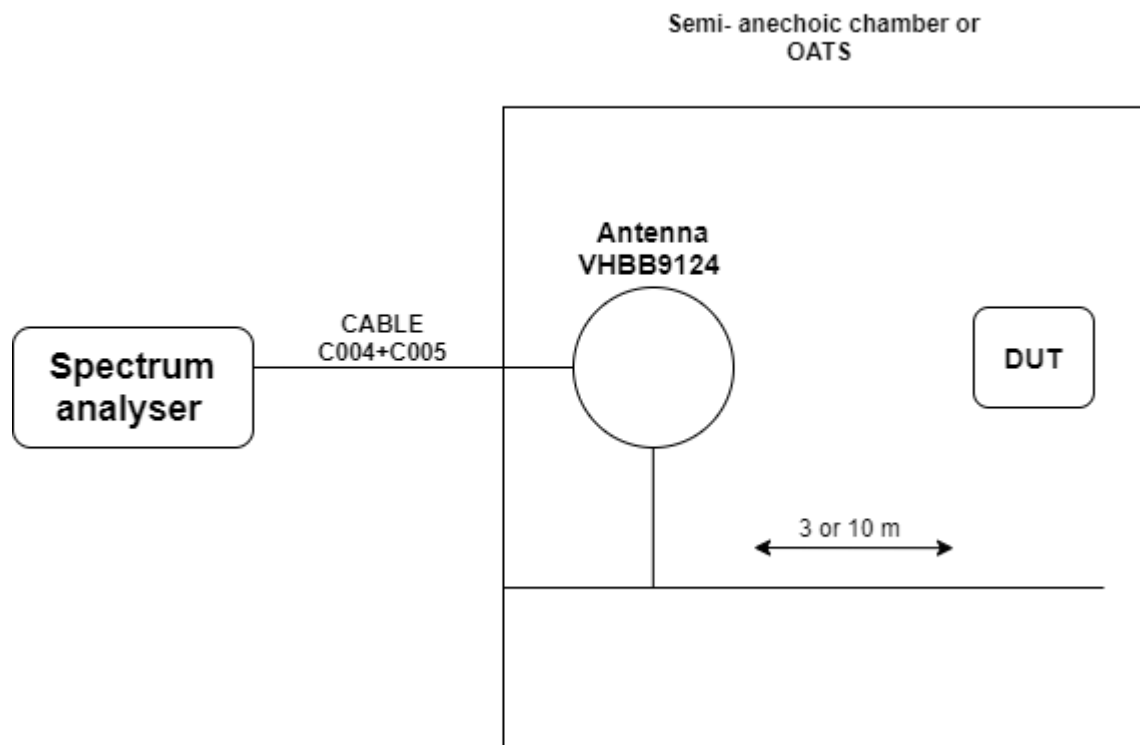
HTRM100 was tested with two tags labeled as HDX and FDX (no difference between tags).

Auxiliary equipment used during testing:

- AC/DC Switching Adaptor, MEAN WELL, Model: GS25A12, SN: OYB7B32086
- AC/DC Switching Adaptor, MEAN WELL, Model: GST25A15, SN: EB7BL62166
- AC/DC Switching Adaptor, MEAN WELL, Model: GST25A18, SN: EB65L39467
- Laptop, HP, EliteBook 8560p, SN: 4CZ1370P5G

Configuration:



Block diagrams of the test setups:

2 TEST SUMMARY

STANDARDS (details on first page)	Tested		Sample	
	yes	no	pass	not pass
ANSI C63.10-2013; FCC Part 15, Subpart C: §15.203, §15.205, §15.207, §15.215	☒	☐	☒	☐

Test	Section within the report	Conclusion
§15.203 Antenna requirements	3.1	N/A
§15.205 Restricted bands of operation	3.4	PASS
§15.207 Conducted emission	3.2	PASS
§15.209 Radiated emission limits; general requirements	3.4	PASS
§15.215 Additional provisions to the general radiated emission Limitations, 20 dB bandwidth	3.3	PASS

2.1 Operating voltages/frequencies used for testing

Test	Operating conditions
§15.205 Restricted bands of operation	120 V; 60 Hz
§15.207 Conducted emission	120 V; 60 Hz
§15.209 Radiated emission limits; general requirements	120 V; 60 Hz
§15.215 Additional provisions to the general radiated emission Limitations, 20 dB bandwidth	120 V; 60 Hz
§15.205 Restricted bands of operation	120 V; 60 Hz

MEASUREMENT UNCERTAINTY:

- The measurement uncertainty is calculated in document EN208
- All antenna factors and cable losses are included in the measurement results.



3 EMISSION TESTS

3.1 Antenna requirements (§15.203)

Requirement

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

Conclusion:

Requirements from 15.203 do not apply to intentional radiators that must be professionally installed.

Note:

HTRM1100 must be professionally installed and installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.2 Conducted emission (§15.207)

Requirement

Frequency Range (MHz)	Limits (dB μ V)	
	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 μ V within the frequency band 535-1705 kHz, as measured using a 50 μ H/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

Test procedure:

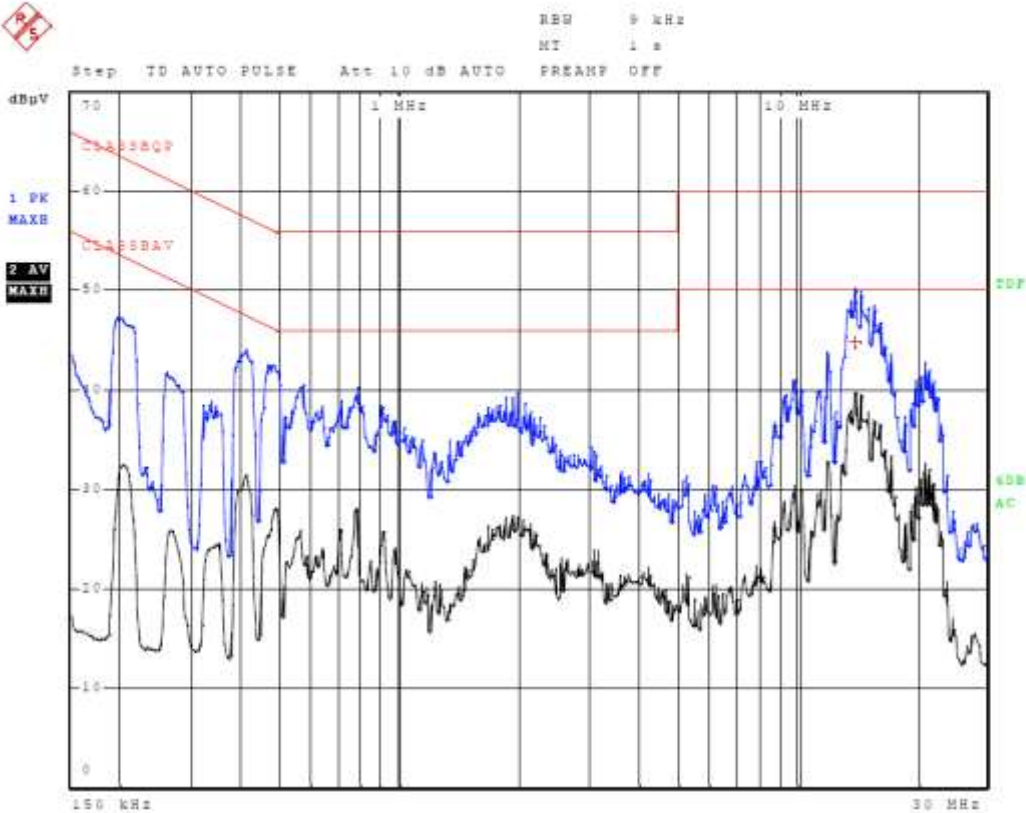
As per clause 6.2 from ANSI C63.10-2013.

Conclusion: PASS



3.2.1 Test results

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, STANDBY
Test Spec
PHASE

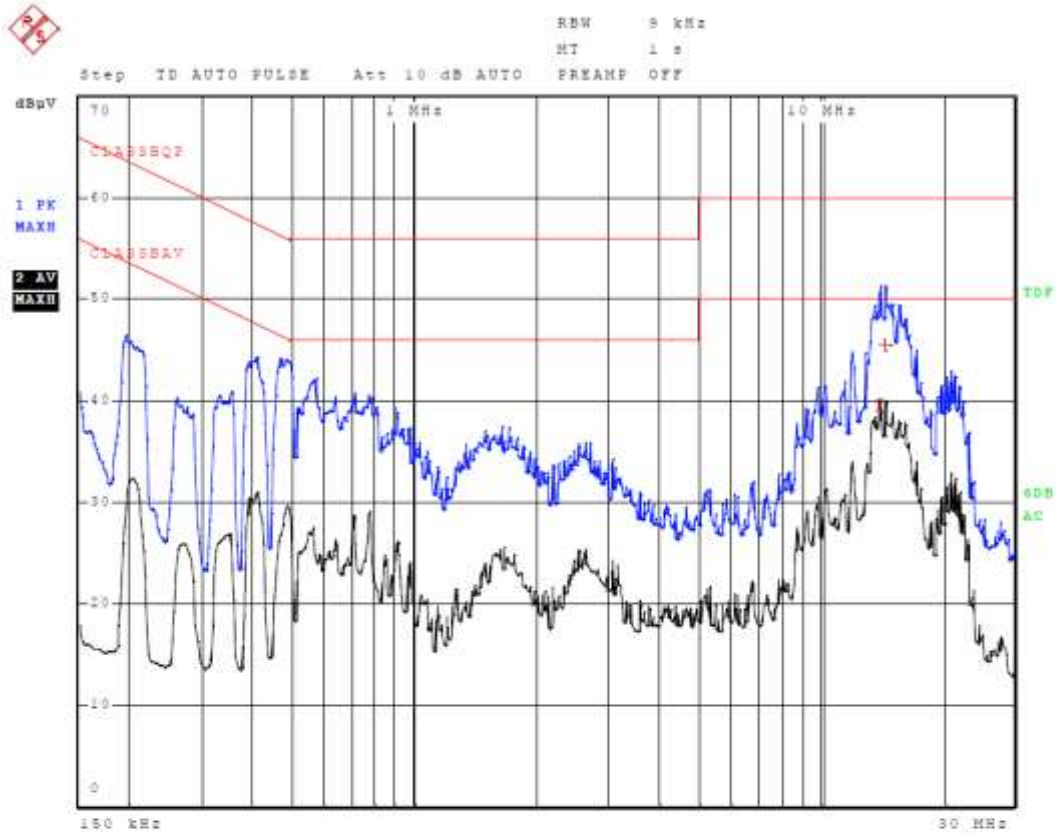


Final Measurement

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

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	13.976250000 MHz	44.75	Quasi Peak	-15.25

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, STANDBY
Test Spec
NEUTRAL



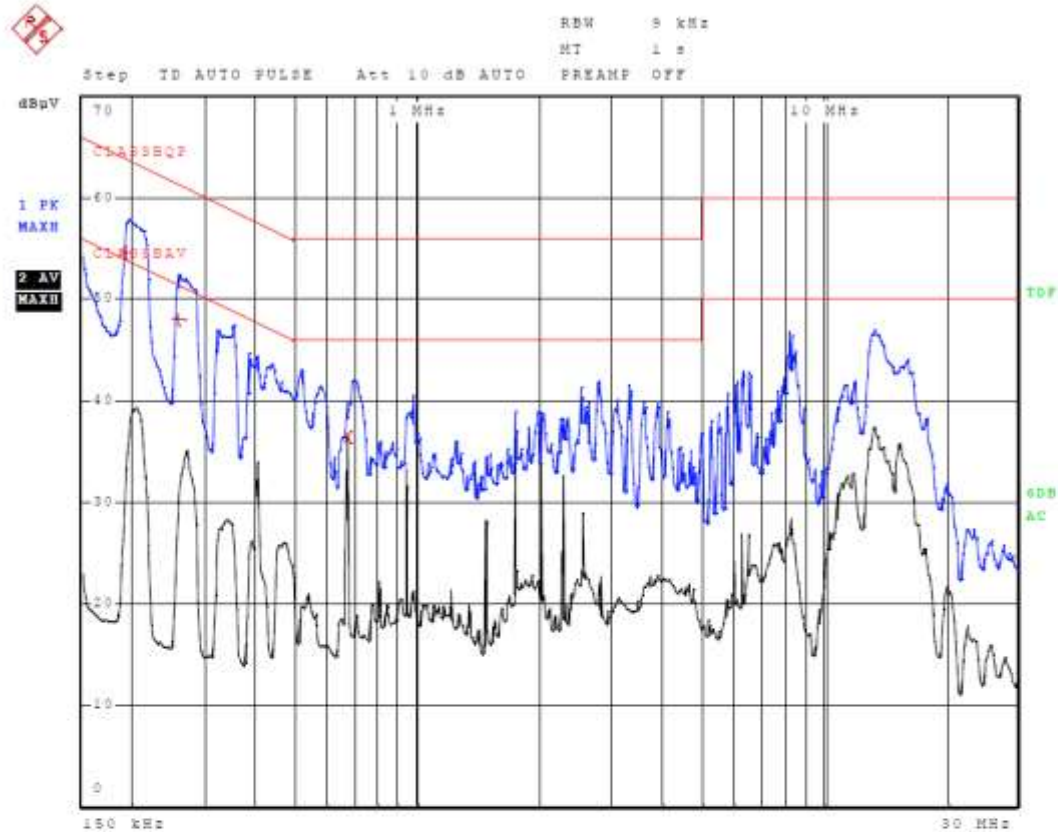
Final Measurement

Meas Time: 1 s
 Margin: 10 dB
 Subranges: 2

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	14.028000000 MHz	39.56	CISPR Averag	-10.44
1	14.498250000 MHz	45.58	Quasi Peak	-14.42

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, ANTENNA 1

Test Spec
 PHASE

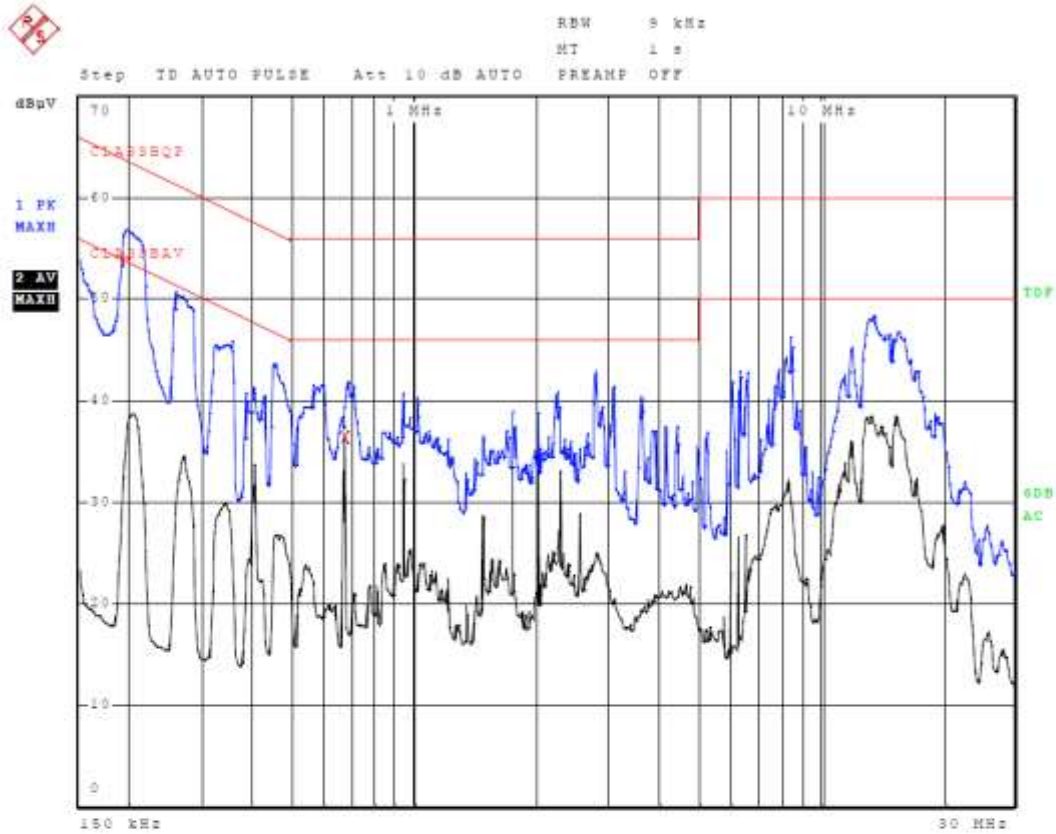


Final Measurement

Meas Time: 1 s
 Margin: 10 dB
 Subranges: 3

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	192.750000000 kHz	54.57	Quasi Peak	-9.35
2	672.000000000 kHz	36.45	CISPR Averag	-9.55
1	255.750000000 kHz	47.97	Quasi Peak	-13.59

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, ANTENNA 1
Test Spec
NEUTRAL



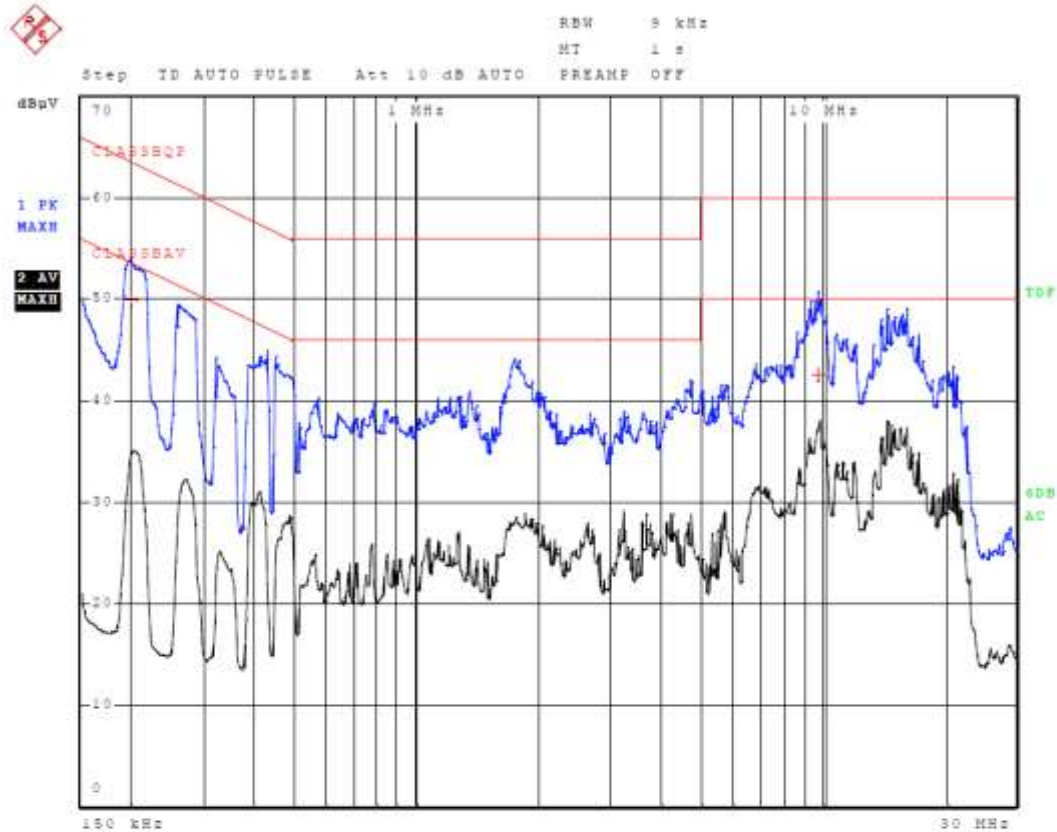
Final Measurement

Meas Time: 1 s
Margin: 10 dB
Subranges: 2

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	672.000000000 kHz	36.45	CISPR Averag	-9.55
1	192.750000000 kHz	54.07	Quasi Peak	-9.85

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, ANTENNA 2

Test Spec
 PHASE

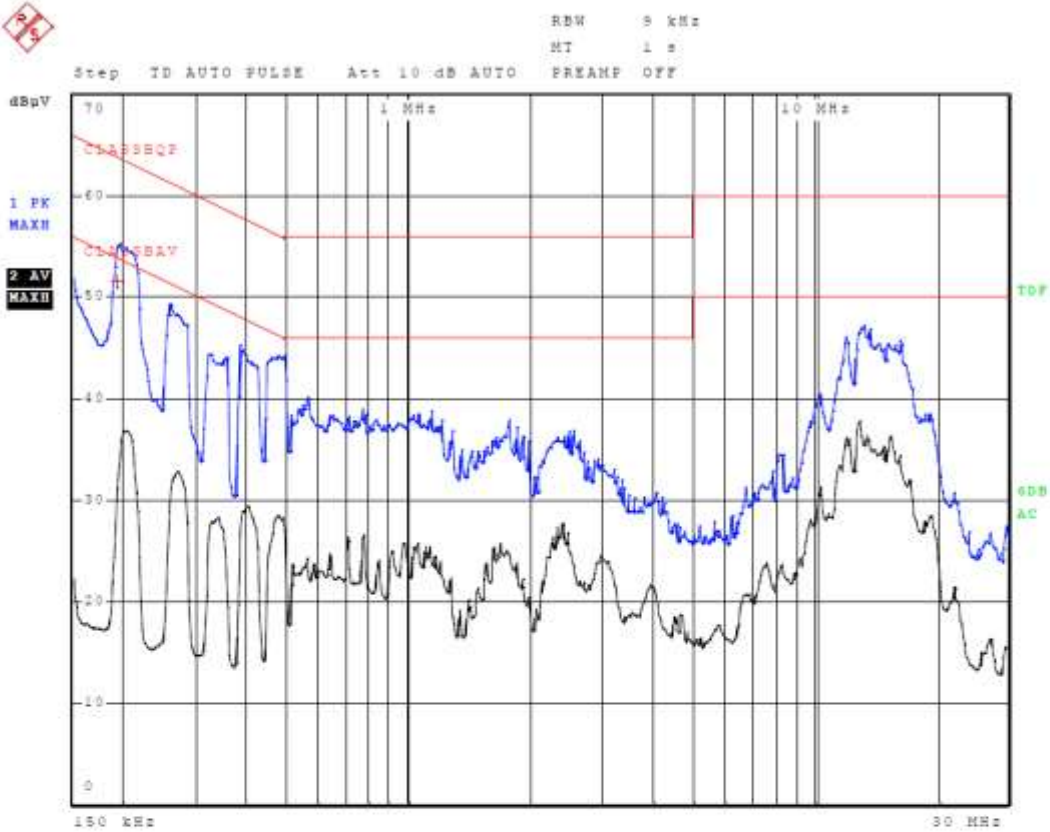


Final Measurement

Meas Time: 1 s
 Margin: 10 dB
 Subranges: 2

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	197.250000000 kHz	49.89	Quasi Peak	-13.84
1	9.771000000 MHz	42.59	Quasi Peak	-17.41

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 12 V CHARGER
OP Condition Uin 120 V, 60 Hz, ANTENNA 2
Test Spec
NEUTRAL

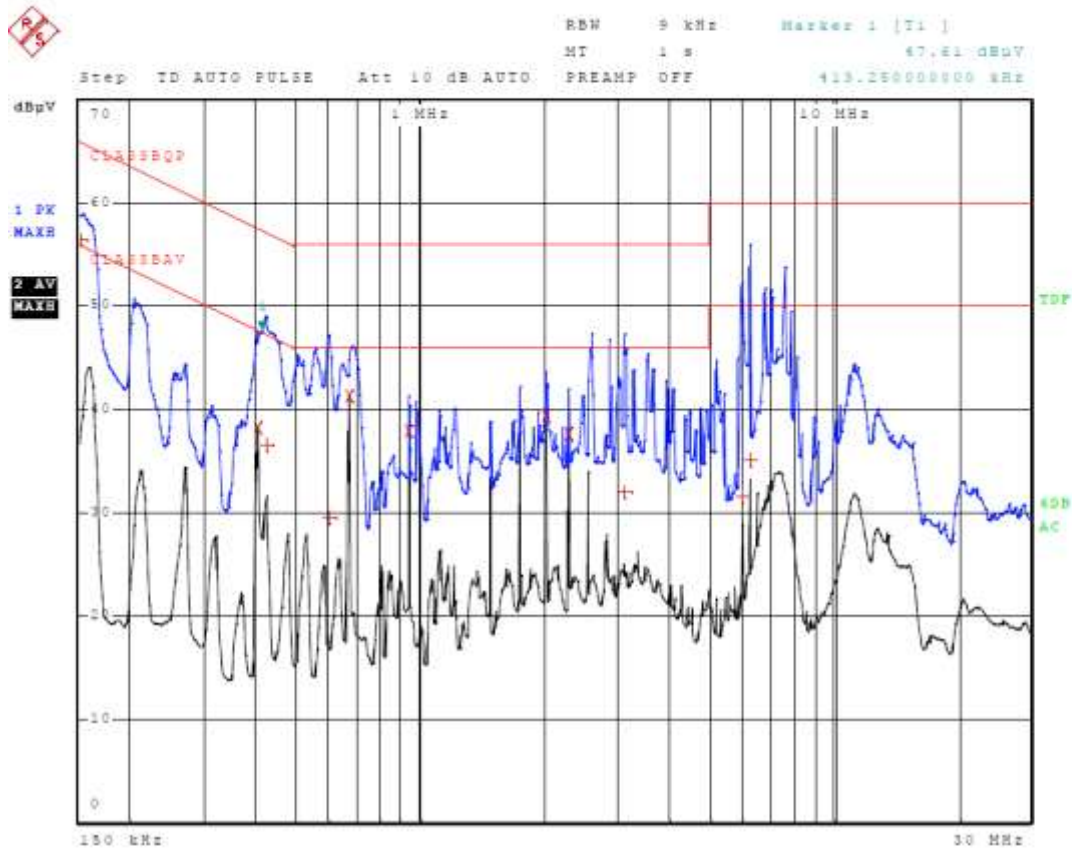


Final Measurement

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

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
1	192.750000000 kHz	51.60	Quasi Peak	-12.32

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 15V 25W
OP Condition Uin 120V/60Hz, ANTENNA 1
Test Spec
PHASE

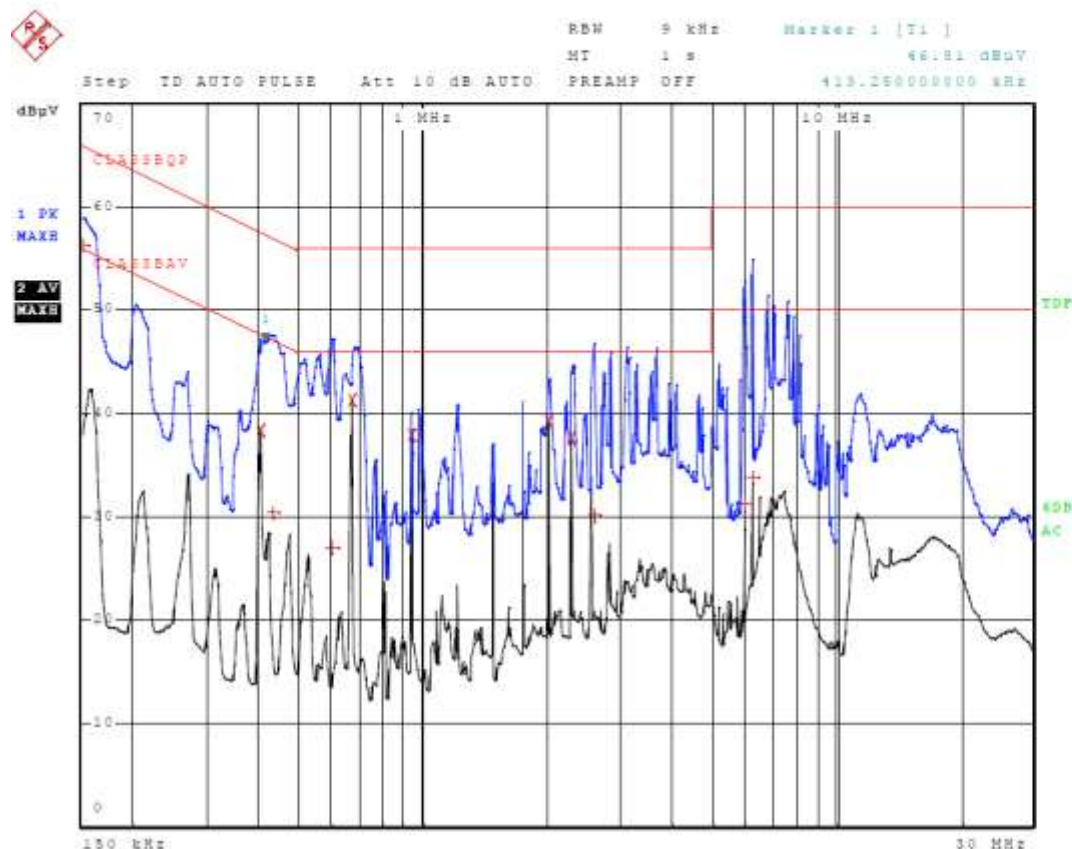


Final Measurement

Meas Time: 1 s
 Margin: 10 dB
 Subranges: 11

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	672.000000000 kHz	41.27	CISPR Averag	-4.73
2	2.013000000 MHz	39.32	CISPR Averag	-6.68
2	939.750000000 kHz	37.81	CISPR Averag	-8.19
2	2.280750000 MHz	37.58	CISPR Averag	-8.42
1	152.250000000 kHz	56.38	Quasi Peak	-9.49
2	402.000000000 kHz	38.23	CISPR Averag	-9.59
1	422.250000000 kHz	36.55	Quasi Peak	-20.85
1	3.140250000 MHz	32.03	Quasi Peak	-23.97
1	6.283500000 MHz	35.04	Quasi Peak	-24.96
1	602.250000000 kHz	29.44	Quasi Peak	-26.56
1	6.009000000 MHz	31.58	Quasi Peak	-28.42

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 15V 25W
OP Condition Uin 120V/60Hz, ANTENNA 1
Test Spec
NEUTRAL

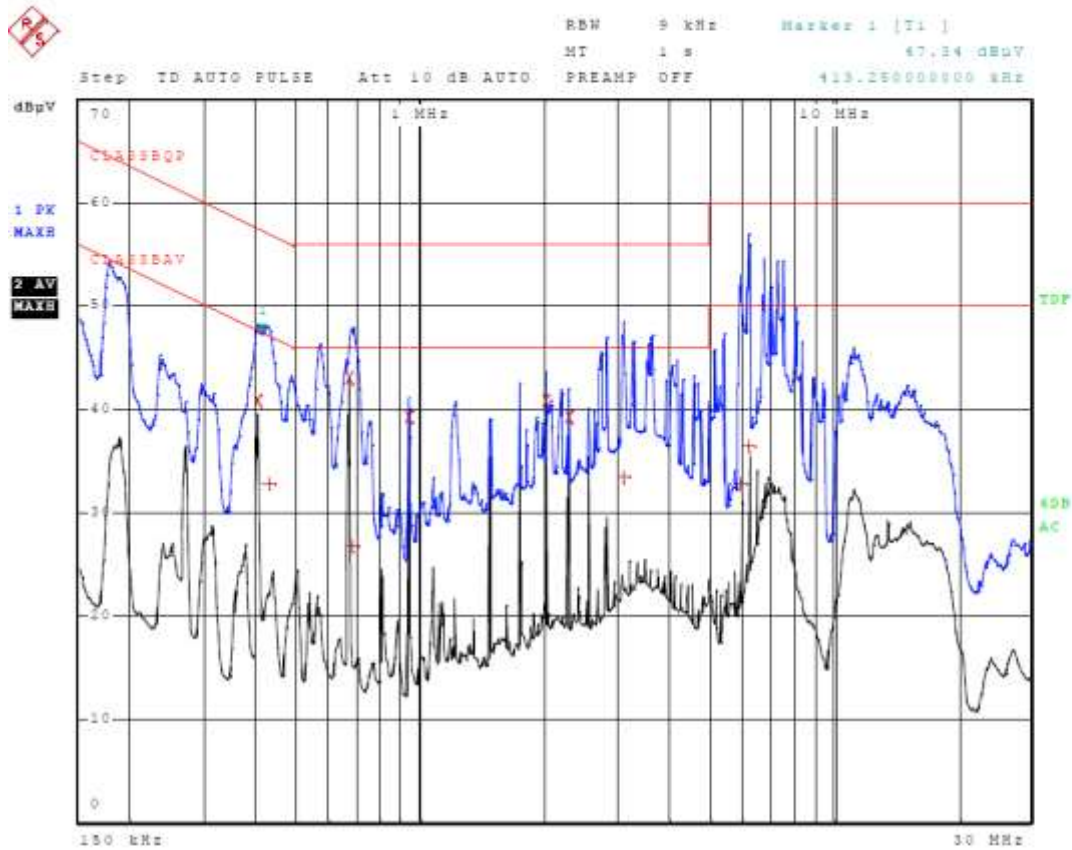


Final Measurement

Meas Time: 1 s
Margin: 10 dB
Subranges: 11

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	672.000000000 kHz	41.28	CISPR Averag	-4.72
2	2.013000000 MHz	39.21	CISPR Averag	-6.79
2	939.750000000 kHz	37.84	CISPR Averag	-8.16
2	2.280750000 MHz	37.53	CISPR Averag	-8.47
2	402.000000000 kHz	38.30	CISPR Averag	-9.51
1	150.000000000 kHz	56.19	Quasi Peak	-9.81
1	2.604750000 MHz	30.08	Quasi Peak	-25.92
1	6.288000000 MHz	33.77	Quasi Peak	-26.23
1	431.250000000 kHz	30.43	Quasi Peak	-26.80
1	6.011250000 MHz	31.05	Quasi Peak	-28.95
1	602.250000000 kHz	26.97	Quasi Peak	-29.03

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 18V 25W
OP Condition Uin 120V/60Hz, ANTENNA 1
Test Spec
PHASE

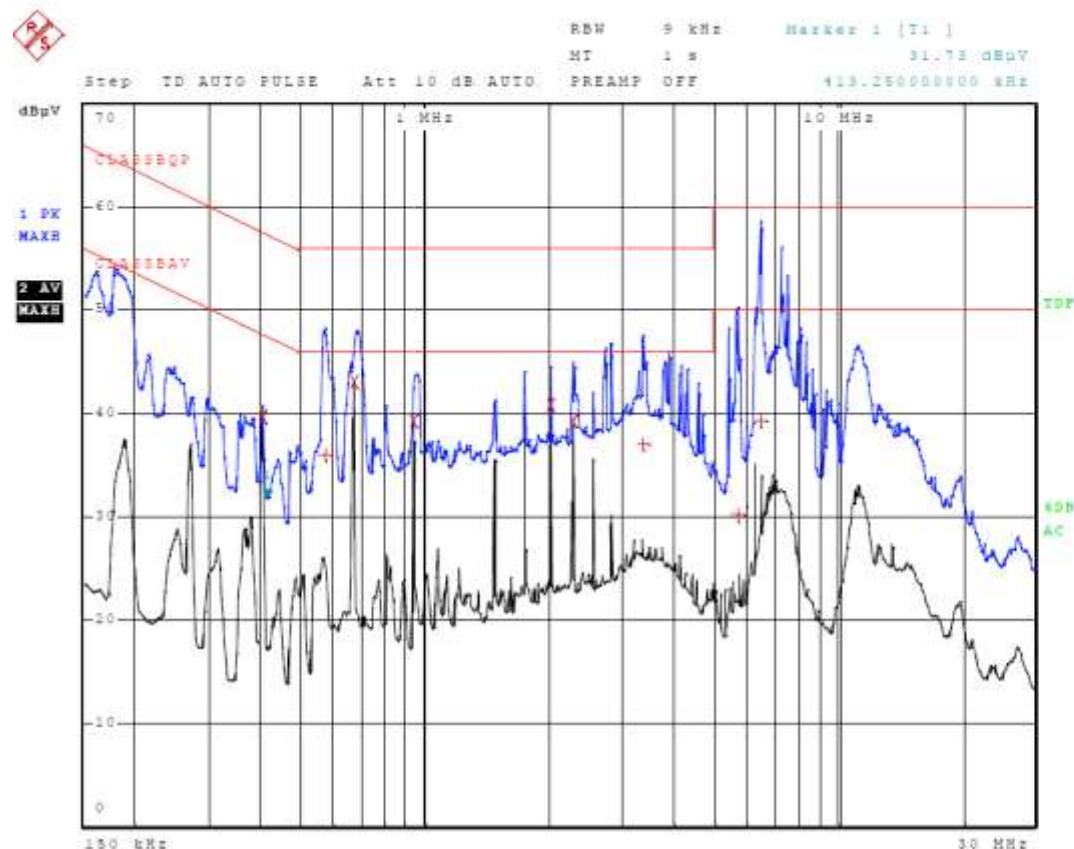


Final Measurement

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

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	672.000000000 kHz	42.94	CISPR Averag	-3.06
2	2.013000000 MHz	40.77	CISPR Averag	-5.23
2	2.280750000 MHz	39.15	CISPR Averag	-6.85
2	939.750000000 kHz	39.13	CISPR Averag	-6.87
2	402.000000000 kHz	40.75	CISPR Averag	-7.07
1	3.106500000 MHz	33.45	Quasi Peak	-22.55
1	6.240750000 MHz	36.34	Quasi Peak	-23.66
1	426.750000000 kHz	32.69	Quasi Peak	-24.62
1	5.973000000 MHz	32.69	Quasi Peak	-27.31
1	685.500000000 kHz	26.76	Quasi Peak	-29.24

Meas Type CONDUCTED EMISSION
Equipment under Test HTRM1100 18V 25W
OP Condition Uin 120V/60Hz, ANTENNA 1
Test Spec
NEUTRAL



Final Measurement

Meas Time: 1 s
Margin: 10 dB
Subranges: 9

Trace	Frequency	Level (dBμV)	Detector	Delta Limit/dB
2	672.000000000 kHz	42.97	CISPR Averag	-3.03
2	2.013000000 MHz	40.86	CISPR Averag	-5.14
2	2.280750000 MHz	39.20	CISPR Averag	-6.80
2	939.750000000 kHz	39.17	CISPR Averag	-6.83
2	402.000000000 kHz	39.69	CISPR Averag	-8.12
1	3.367500000 MHz	37.00	Quasi Peak	-19.00
1	570.750000000 kHz	35.99	Quasi Peak	-20.01
1	6.513000000 MHz	39.23	Quasi Peak	-20.77
1	5.721000000 MHz	30.14	Quasi Peak	-29.86

3.3 20 dB Bandwidth (§15.215)

Requirement

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E, 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test procedure:

As per Clause 6.9.2 from ANSI C63.10-2013

Tabulated test results

Frequency (kHz)	Antenna	Occupied bandwidth (kHz)	Conclusion
134	Antenna 2	2,64	PASS
134	Antenna 1	2,56	PASS

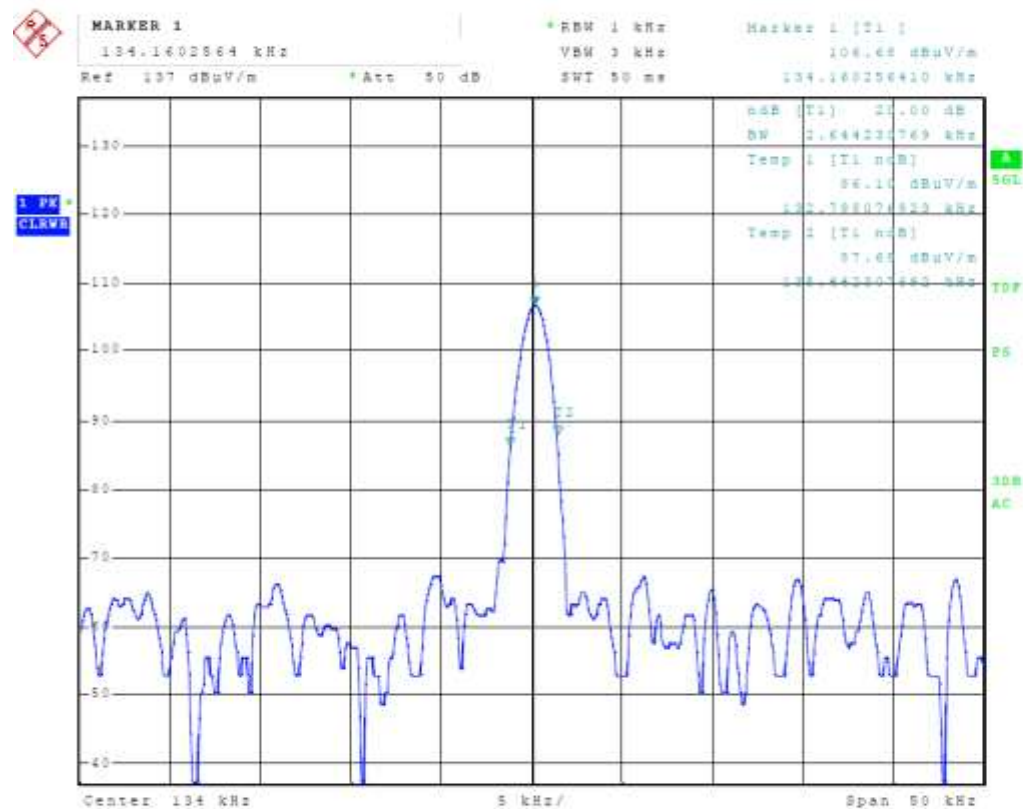
Conclusion: PASS

3.3.1 Test results (§15.215)

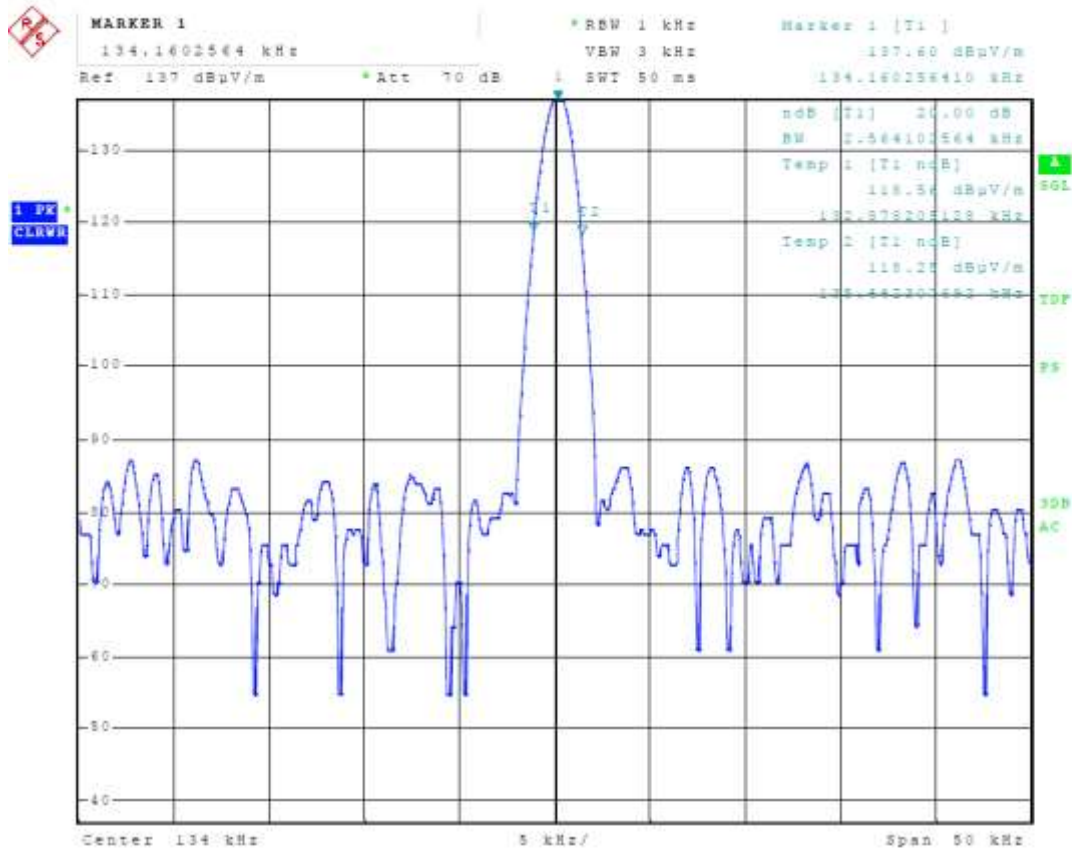
Meas Type	-20 dB BANDWITH
Equipment under Test	HTMR1100, HDX, 15X8
OP Condition	CONT. TX

Test Spec

Sample: 0 deg Upward



Meas Type -20 dB BANDWIDTH
Equipment under Test HTMR1100, HDX, 83X55
OP Condition CONT. TX
Test Spec
Sample: 0 deg Upward



3.4 Radiated Spurious Emissions (§ 15.209, §15.205)

Requirements

§15.35 Measurement detector functions and bandwidths

(b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

§15.209 Radiated emission limit

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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 (g), 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. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.



§15.205 Restricted bands of operation

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

Test procedure

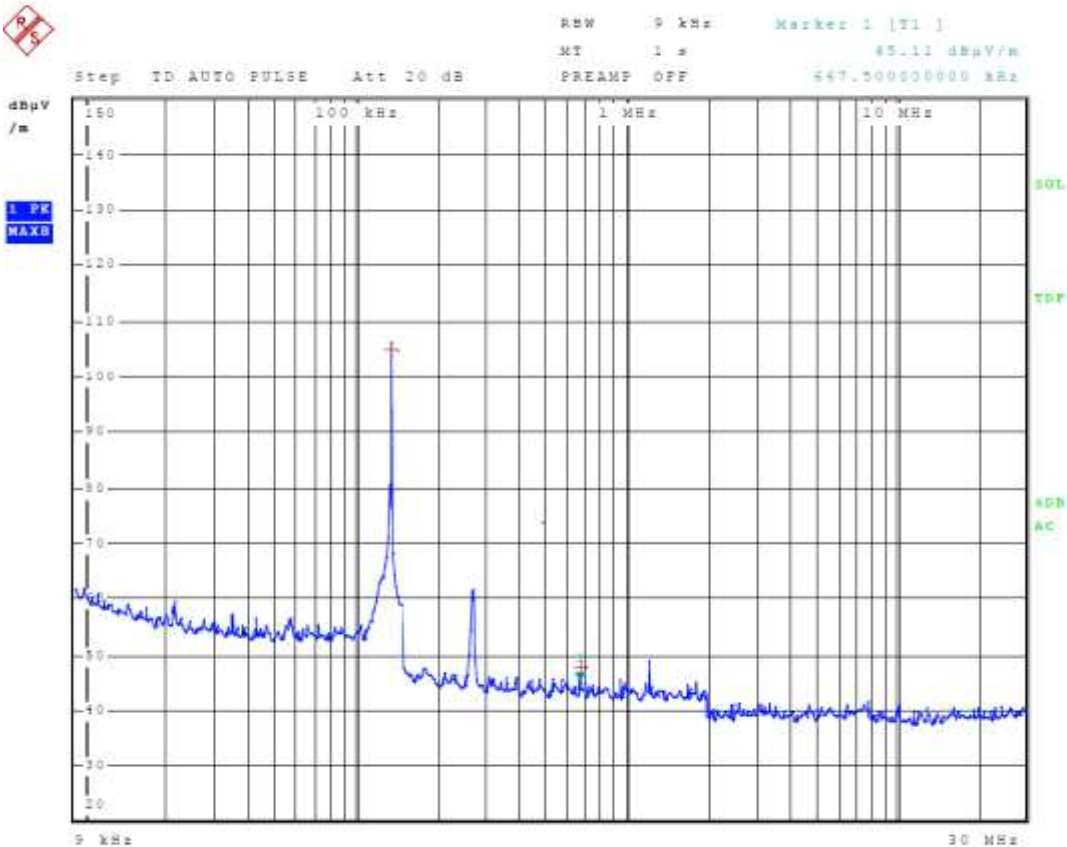
As per Clauses 6.3, 6.4, 6.5 and 6.6 from ANSI C63.10-2013

Conclusion: PASS

3.4.1 Test result (15.209, 15.205)

Preliminary test results, 9 kHz – 30 MHz at 3 m distance

Meas Type RADIATED EMISSION
 Equipment under Test HTMR1100, HDX, 15X8
 OP Condition CONT. TX
 Test Spec
 Sample: 0 deg Upward

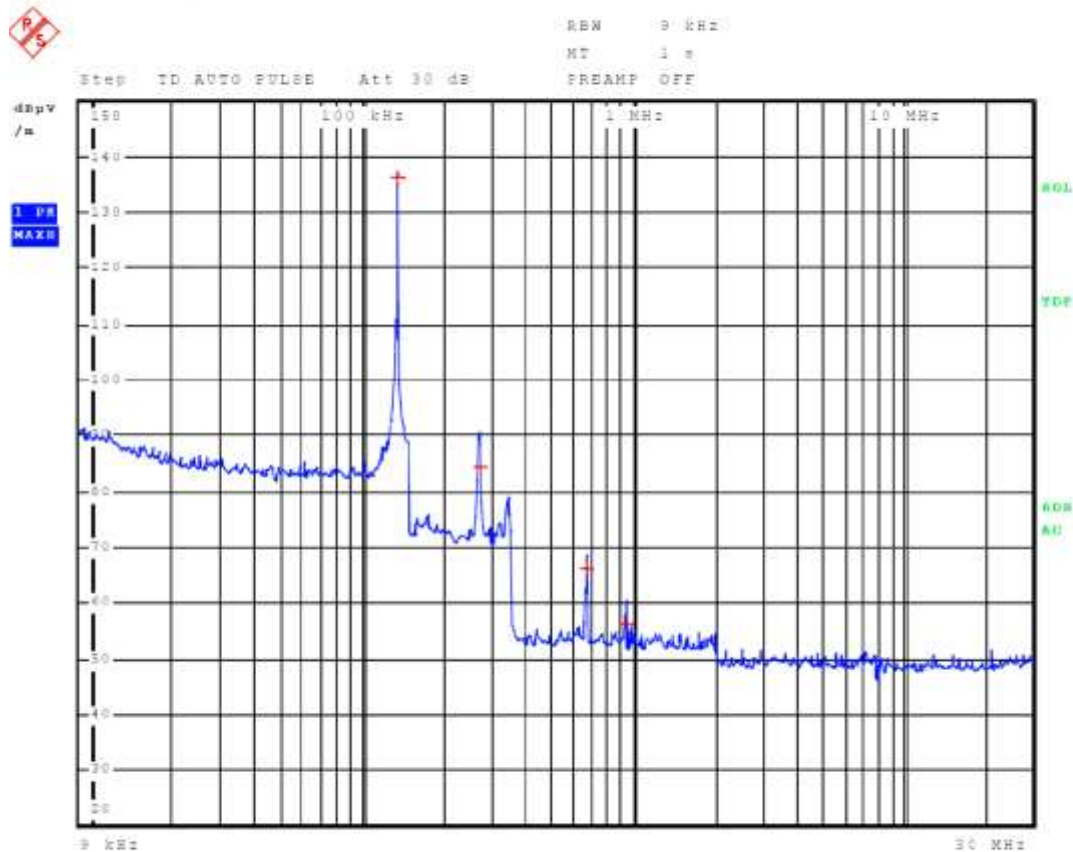


Final Measurement

Meas Time: 1 s
 Margin: 20 dB
 Peaks: 2

Trace	Frequency	Level (dBμV/m)	Detector
1	134.200000000 kHz	104.94	Average
1	672.000000000 kHz	47.65	Average

Meas Type RADIATED EMISSION
Equipment under Test HTMR1100, HDX, 83X55
OP Condition CONT. TX
Test Spec
 Sample: 0 deg Upward



Final Measurement

Meas Time: 1 s
 Margin: 12 dB
 Peaks: 4

Trace	Frequency	Level (dBµV/m)	Detector
1	134.200000000 kHz	136.22	Average
1	672.000000000 kHz	65.89	Average
1	939.750000000 kHz	56.10	Average
1	269.250000000 kHz	84.20	Average

Final test results, 9 kHz – 30 MHz at 10 m distance

Configuration	Frequency (kHz)	Measured Level at 10 m (dBμV/m)	Conversion factor	Calculated level at 300 m (dBμV/m)	Margin (dB)	Limit at 300 m (dBμV/m)	Verdict
HTMR1100, Antenna 1	134,2	113,05	-88,6	24,45	0,55	25	PASS
HTMR1100, Antenna 2	134,2	88,02	-88,6	-0,58	25,58	25	PASS
HTMR1100, Antenna 1	269,25	59,87	-88,6	-28,73	47,73	19	PASS
HTMR1100, Antenna 2	269,25	45	-88,6	-43,6	62,6	19	PASS

Recalculation based on the ANSI C63.10-2013, Clause 7.7.2

$$FS_{limit} = FS_{max} - 60 \log(d_{limit} / d_{measure})$$

Where:

FS_{limit} is the calculation of field strength at the limit distance, expressed in dBμV/m

FS_{max} is the measured field strength, expressed in dBμV/m

$d_{measure}$ is the distance of the measurement point from the EUT

d_{limit} is the reference distance or the distance of the $\lambda/2\pi$ point

EUT Information

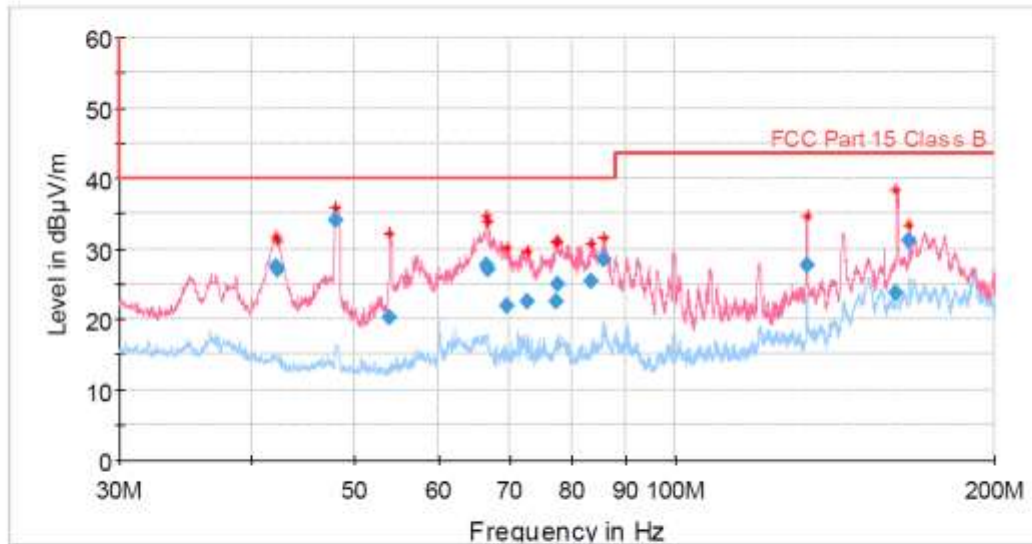
EUT:

HTRM1100

Test condition:

Antenna 15X8, FDX, Cont. reading

Full Spectrum



— Preview Result 1H-PK+
— Preview Result 1V-PK+
★ Critical_Freqs PK+
◆ Final_Result QPK
— FCC Part 15 Class B

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
47.970000	33.93	40.00	6.07	100.0	V	316.0
85.890000	28.52	40.00	11.48	100.0	V	91.0
165.990000	31.19	43.50	12.31	100.0	V	226.0
66.420000	27.67	40.00	12.33	100.0	V	0.0
42.120000	27.51	40.00	12.49	100.0	V	271.0
66.630000	27.06	40.00	12.94	100.0	V	0.0
42.270000	27.03	40.00	12.97	100.0	V	271.0
83.460000	25.45	40.00	14.55	100.0	V	0.0
77.610000	24.98	40.00	15.02	100.0	V	0.0
133.260000	27.65	43.50	15.85	100.0	V	136.0
72.720000	22.57	40.00	17.43	100.0	V	0.0
77.400000	22.53	40.00	17.47	100.0	V	0.0
69.600000	21.78	40.00	18.22	100.0	V	0.0
161.640000	23.74	43.50	19.76	100.0	V	271.0
53.910000	20.19	40.00	19.81	100.0	V	271.0

EUT Information

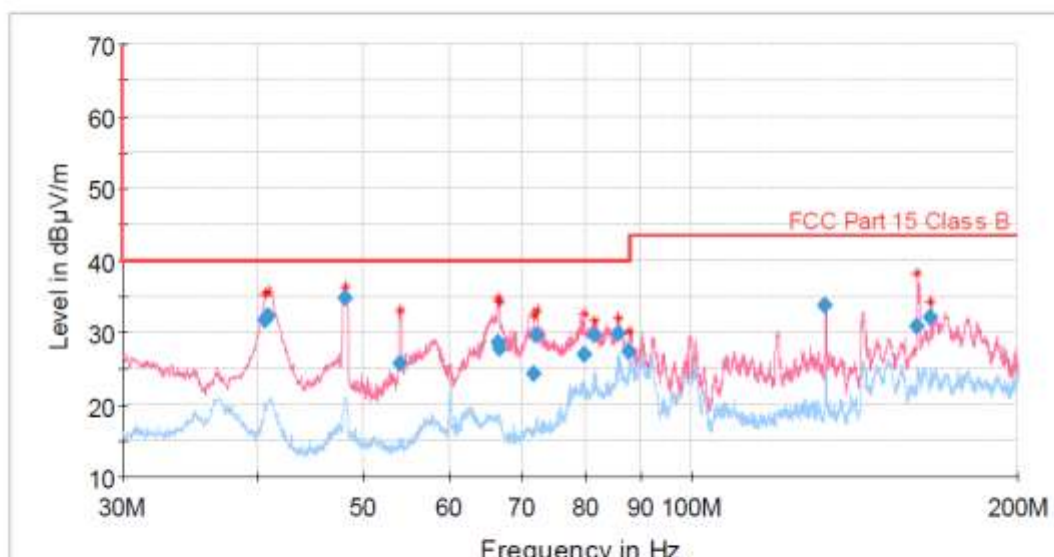
EUT:

HTRM1100

Test condition:

Antenna 15X8, FDX, Cont. reading, Upward

Full Spectrum



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

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

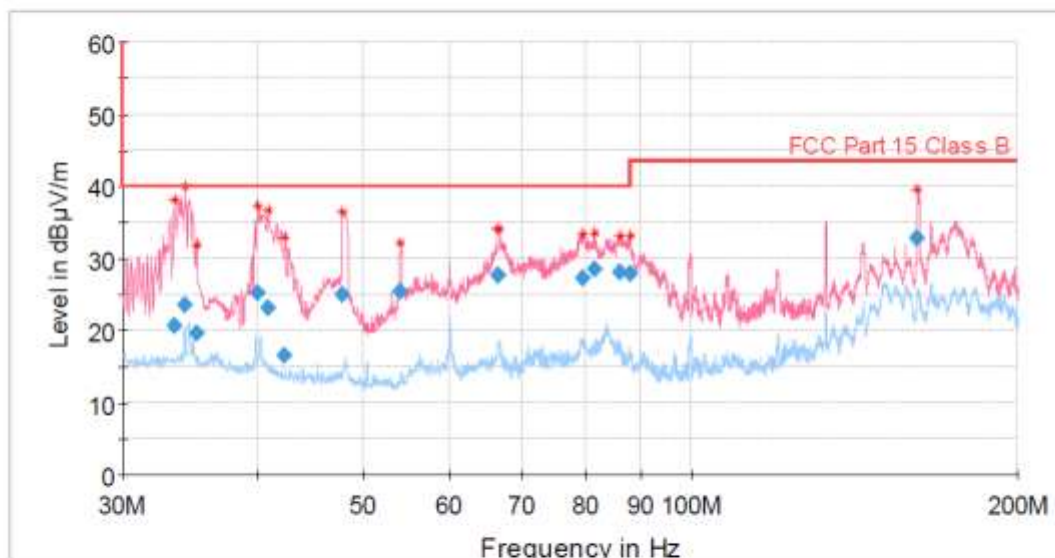
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
48.030000	34.68	40.00	5.32	100.0	V	316.0
40.770000	32.33	40.00	7.67	100.0	V	0.0
40.620000	31.68	40.00	8.32	100.0	V	0.0
132.810000	33.81	43.50	9.69	100.0	V	137.0
85.890000	29.89	40.00	10.11	100.0	V	92.0
72.150000	29.62	40.00	10.38	100.0	V	47.0
81.600000	29.53	40.00	10.47	100.0	V	47.0
66.420000	28.65	40.00	11.35	100.0	V	0.0
165.990000	32.08	43.50	11.42	100.0	V	226.0
66.630000	27.63	40.00	12.37	100.0	V	0.0
87.780000	27.33	40.00	12.67	100.0	V	92.0
161.640000	30.74	43.50	12.76	100.0	V	271.0
79.740000	26.81	40.00	13.19	100.0	V	0.0
54.060000	25.70	40.00	14.30	100.0	V	0.0
71.790000	24.21	40.00	15.79	100.0	V	0.0

EUT Information

EUT: HTRM1100
 Test condition: Antenna 83X55, FDX, Cont. reading

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)
161.640000	32.85	43.50	10.65	100.0	V	270.0
81.600000	28.46	40.00	11.54	100.0	V	0.0
86.190000	27.98	40.00	12.02	100.0	V	0.0
87.900000	27.88	40.00	12.12	100.0	V	0.0
66.600000	27.72	40.00	12.28	100.0	V	0.0
66.450000	27.57	40.00	12.43	100.0	V	0.0
79.560000	27.11	40.00	12.89	100.0	V	0.0
54.060000	25.30	40.00	14.70	100.0	V	270.0
39.990000	25.06	40.00	14.94	100.0	V	316.0
47.760000	24.94	40.00	15.06	100.0	V	0.0
34.260000	23.49	40.00	16.51	100.0	V	0.0
40.800000	23.17	40.00	16.83	100.0	V	316.0
33.480000	20.56	40.00	19.44	100.0	V	0.0
35.070000	19.66	40.00	20.34	100.0	V	0.0
42.270000	16.42	40.00	23.58	100.0	V	0.0

EUT Information

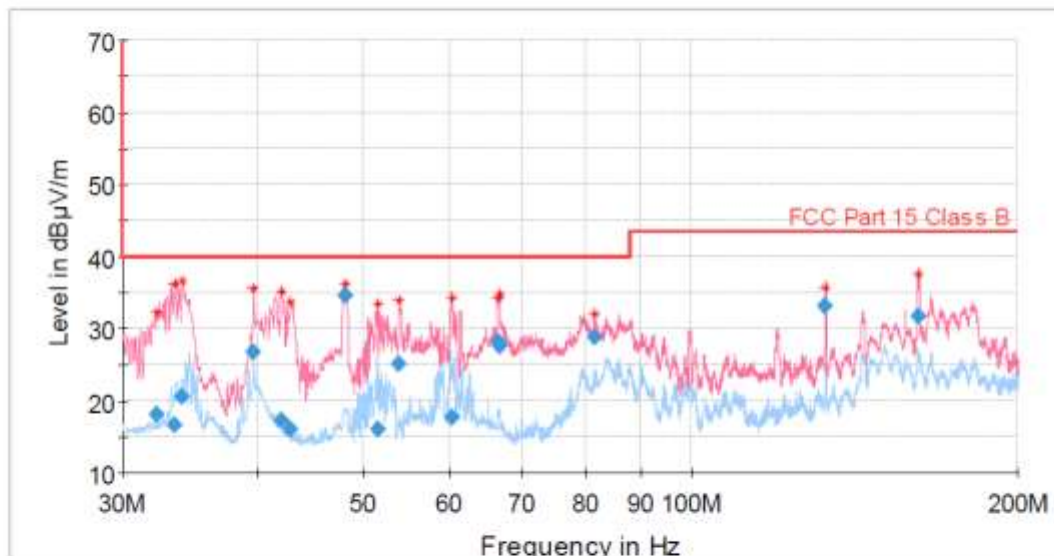
EUT:

HTRM1100

Test condition:

Antenna 83X55, HDX, Cont. reading, Upward

Full Spectrum



+ Preview Result 1H-PK+
 Critical_Freqs PK+
 ♦ Final_Result QPK
 — Preview Result 1V-PK+
 — FCC Part 15 Class B

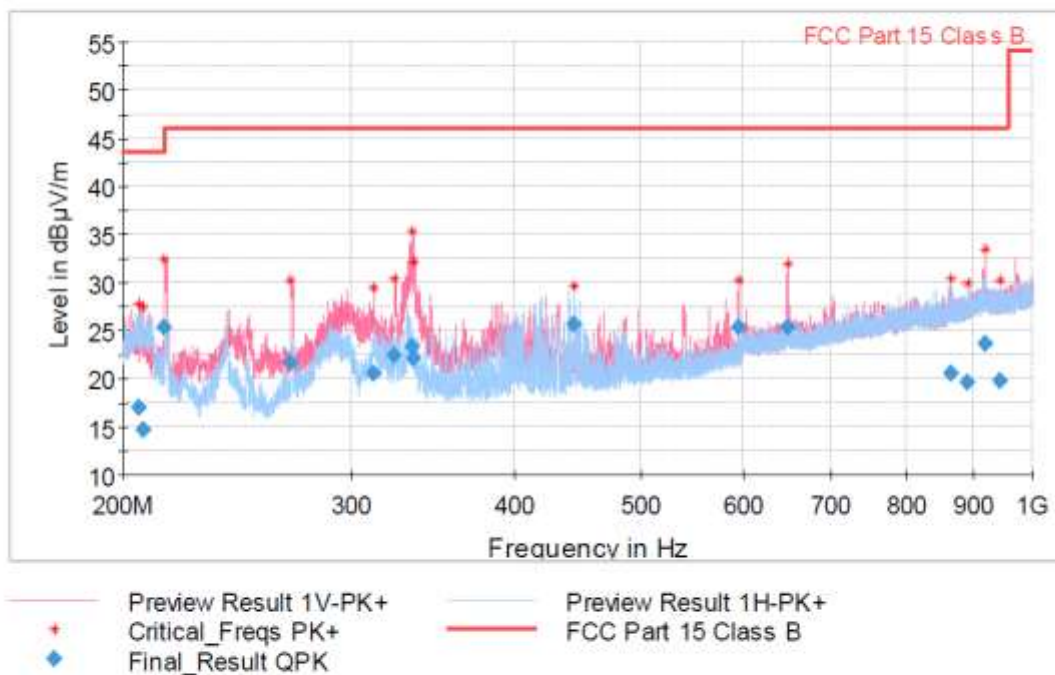
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
48.030000	34.54	40.00	5.46	100.0	V	272.0
132.810000	33.06	43.50	10.44	100.0	V	137.0
81.600000	28.67	40.00	11.33	100.0	V	49.0
162.240000	31.62	43.50	11.88	100.0	V	272.0
66.420000	28.10	40.00	11.90	100.0	V	0.0
66.630000	27.56	40.00	12.44	100.0	V	0.0
39.630000	26.67	40.00	13.33	100.0	V	0.0
53.850000	25.05	40.00	14.95	100.0	V	272.0
34.050000	20.44	40.00	19.56	100.0	V	0.0
32.220000	18.04	40.00	21.96	100.0	V	0.0
60.270000	17.54	40.00	22.46	200.0	V	88.0
42.000000	17.28	40.00	22.72	100.0	V	0.0
33.480000	16.68	40.00	23.32	100.0	V	0.0
51.480000	16.01	40.00	23.99	100.0	V	316.0
42.870000	15.98	40.00	24.02	100.0	V	316.0

EUT Information

EUT: HTRM1100
 Test condition: Antenna 15x8, FDX&HDX, Cont. reading

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
215.520000	25.30	43.50	18.20	100.0	V	258.0
444.630000	25.56	46.00	20.44	100.0	H	315.0
649.050000	25.33	46.00	20.67	100.0	V	130.0
594.960000	25.24	46.00	20.76	100.0	V	173.0
919.500000	23.59	46.00	22.41	100.0	V	0.0
333.690000	23.32	46.00	22.68	100.0	V	301.0
323.280000	22.41	46.00	23.59	100.0	V	301.0
334.920000	22.05	46.00	23.95	100.0	V	301.0
269.430000	21.66	46.00	24.34	100.0	V	44.0
865.410000	20.58	46.00	25.42	100.0	H	0.0
312.030000	20.47	46.00	25.53	100.0	V	0.0
942.690000	19.79	46.00	26.21	100.0	H	101.0
891.240000	19.60	46.00	26.40	104.0	V	3.0
206.100000	16.92	43.50	26.58	100.0	V	301.0
207.300000	14.63	43.50	28.87	188.0	H	0.0

EUT Information

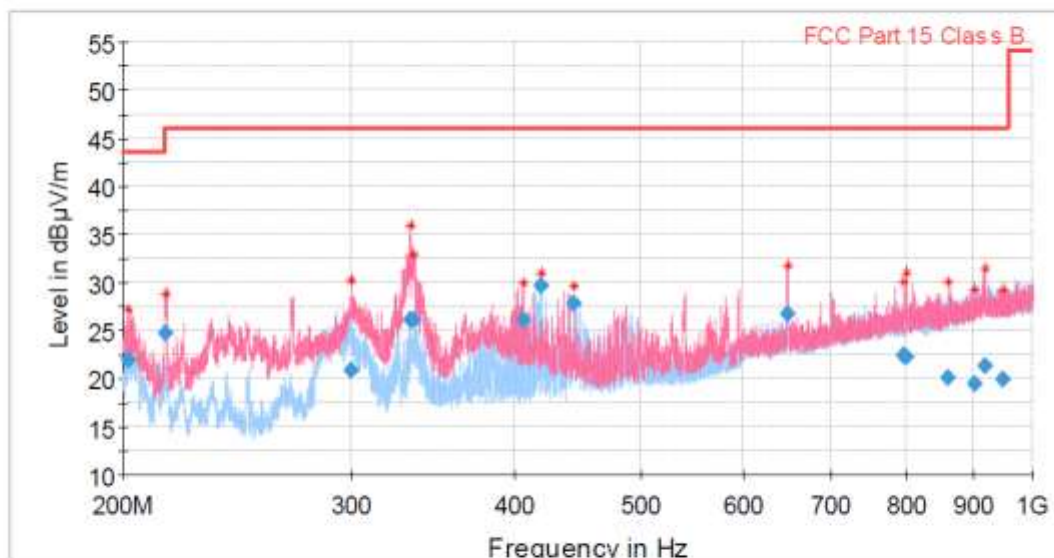
EUT:

HTRM1100

Test condition:

Antenna 15X8, FDX, Cont. reading, Upward

Full Spectrum



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

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

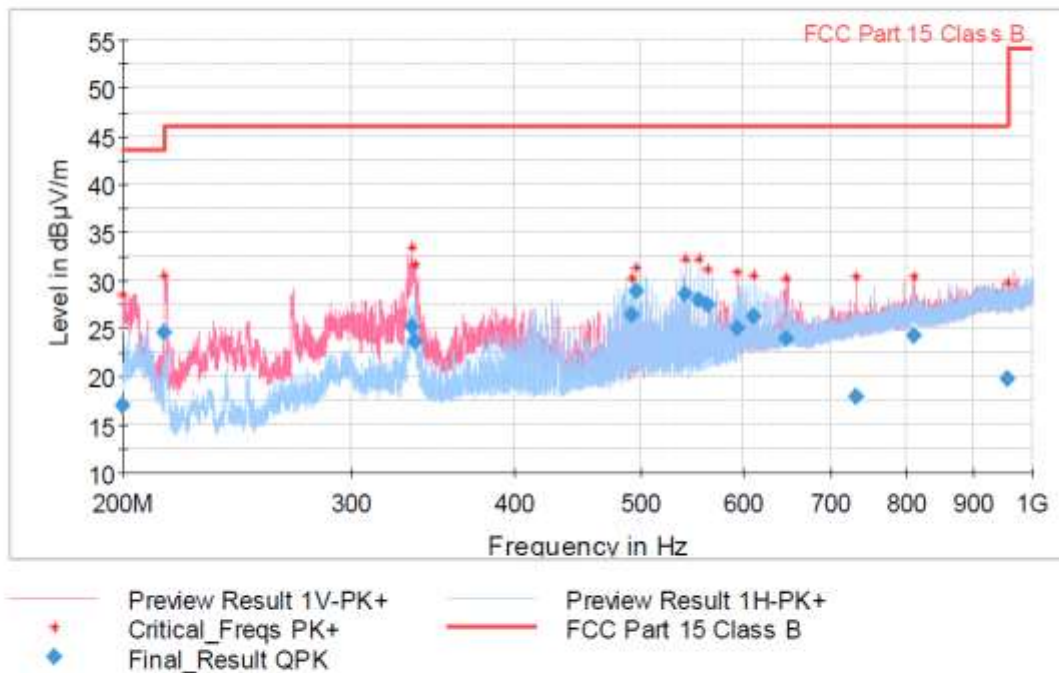
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
418.860000	29.58	46.00	16.42	100.0	H	0.0
444.360000	27.76	46.00	18.24	100.0	H	344.0
215.550000	24.64	43.50	18.86	100.0	V	102.0
649.050000	26.72	46.00	19.28	100.0	V	187.0
334.890000	26.08	46.00	19.92	100.0	V	0.0
405.960000	26.06	46.00	19.94	100.0	V	273.0
332.430000	26.06	46.00	19.94	100.0	V	0.0
201.960000	21.88	43.50	21.62	100.0	V	316.0
796.650000	22.32	46.00	23.68	100.0	V	0.0
799.740000	22.15	46.00	23.85	100.0	V	0.0
919.500000	21.25	46.00	24.75	100.0	V	0.0
299.910000	20.85	46.00	25.15	100.0	V	0.0
861.990000	20.00	46.00	26.00	100.0	V	187.0
948.510000	19.92	46.00	26.08	100.0	V	273.0
902.700000	19.46	46.00	26.54	100.0	H	0.0

EUT Information

EUT: HTRM1100
 Test condition: Antenna 83x55, HDX, Cont. reading

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
496.170000	28.82	46.00	17.18	100.0	H	44.0
541.380000	28.51	46.00	17.49	100.0	H	301.0
554.010000	28.01	46.00	17.99	100.0	H	301.0
562.590000	27.52	46.00	18.48	100.0	H	301.0
215.520000	24.47	43.50	19.03	100.0	V	273.0
491.580000	26.35	46.00	19.65	100.0	H	130.0
609.840000	26.23	46.00	19.77	100.0	H	0.0
333.390000	25.21	46.00	20.79	100.0	V	0.0
592.590000	24.92	46.00	21.08	100.0	V	187.0
811.320000	24.29	46.00	21.71	100.0	V	58.0
646.590000	23.99	46.00	22.01	100.0	V	187.0
335.340000	23.65	46.00	22.35	100.0	V	0.0
956.220000	19.82	46.00	26.18	200.0	V	217.0
200.010000	16.93	43.50	26.57	200.0	V	303.0
732.120000	17.88	46.00	28.12	100.0	V	0.0

EUT Information

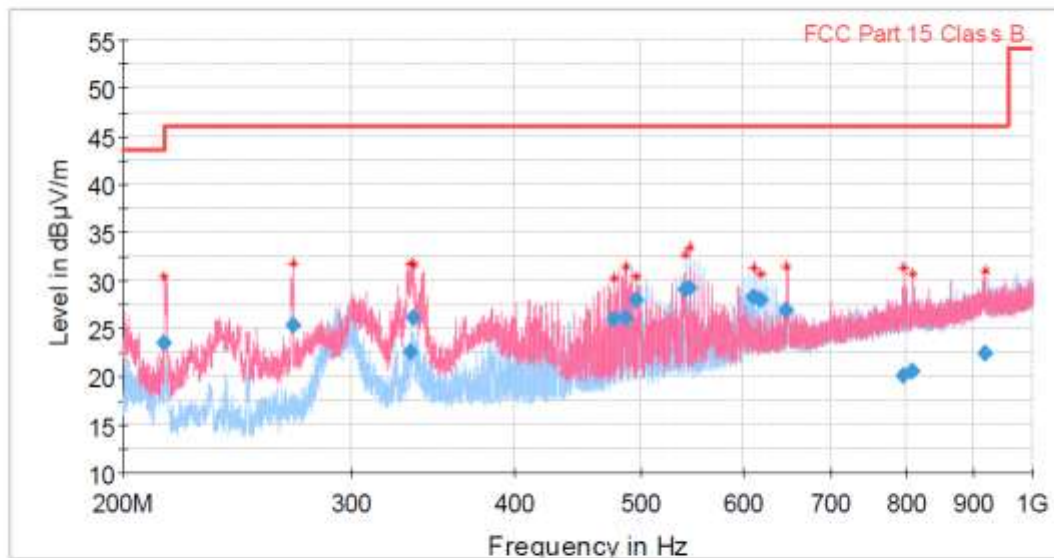
EUT:

HTRM1100

Test condition:

Antenna 83x55, HDX, Cont. reading, Upward

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)
545.400000	29.15	46.00	16.85	100.0	H	302.0
541.380000	29.04	46.00	16.96	100.0	H	302.0
610.110000	28.28	46.00	17.72	100.0	H	0.0
618.420000	28.00	46.00	18.00	100.0	H	0.0
495.870000	27.97	46.00	18.03	100.0	H	0.0
646.500000	26.93	46.00	19.07	100.0	V	186.0
334.770000	26.14	46.00	19.86	100.0	V	0.0
487.290000	26.08	46.00	19.92	100.0	V	316.0
215.490000	23.48	43.50	20.02	100.0	V	273.0
476.700000	25.96	46.00	20.04	100.0	V	316.0
270.390000	25.32	46.00	20.68	100.0	V	273.0
332.550000	22.60	46.00	23.40	100.0	V	186.0
919.440000	22.39	46.00	23.61	100.0	V	0.0
808.110000	20.56	46.00	25.44	100.0	V	186.0
796.650000	20.00	46.00	26.00	100.0	V	15.0



Calculation of final measurements:

Final Measurement (dB μ V/m) = Receiver Reading (dB μ V/m) + AF (dB) + CL (dB) + Atten (dB) + Preamp (dB)

where:

Final Measurement = Final measurement result

Receiver Reading = Uncorrected amplitude measured by the receiver

AF = Antenna Factor

CL = Cable Loss

Atten = Attenuator correction

Preamp = Preamplifier correction

4 ALL TEST EQUIPMENT AND THEIR DESCRIPTION

4.1 General information

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2017-12	2019-12	24 months	
Rohde-Schwarz, RFI receiver	ESU26	106897	2018-10	2020-10	24 months	X
Rohde & Schwarz, Artificial main network	ESH2-Z5	106899	2017-06	2019-06	24 months	
Rohde & Schwarz, Artificial main network	ENV216	106765	2018-09	2020-09	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	NPS002	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	2018-11	2020-11	24 months	X
Rohde & Schwarz, Loop Antenna	FMZB 1519 B	/	2018-09	2020-09	24 months	

5 CABLE LOSS AND ATTENUATION OF RADIATED EMISSION

5.1.1 Conducted emission cable (SIQ-070)

Frequency (MHz)	Loss (MHz)
0,009	0,0
1	0,0
5	0,1
10	0,2
15	0,2
20	0,2
25	0,3
30	0,3

5.1.2 Conducted RF emission cable (LU7-133-1000, ID 002)

Frequency (GHz)	Loss (MHz)
0,001	0,0
0,053	0,2
3,975	0,6
8,003	0,8
11,987	1,1
18,020	1,3

5.1.3 Radiated emission cable (104+105)

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
0,009	0,01	2600	3,77	5600	5,83	8600	7,48	13000	9,77
5	0,17	2700	3,85	5700	5,88	8600	7,48	13200	9,82
10	0,29	2800	3,93	5800	5,94	8700	7,56	13200	9,82
30	0,40	2900	4,01	5900	6,00	8800	7,63	13400	9,91
50	0,50	3000	4,07	6000	6,06	8900	7,69	13600	10,04
100	0,69	3100	4,15	6100	6,13	9000	7,73	13800	10,15
200	0,96	3200	4,23	6200	6,19	9100	7,77	14000	10,23
300	1,20	3300	4,30	6300	6,23	9200	7,81	14200	10,30
400	1,40	3400	4,38	6400	6,28	9300	7,85	14400	10,39
500	1,57	3500	4,45	6500	6,33	9400	7,89	14600	10,55
600	1,72	3600	4,53	6600	6,39	9500	7,93	14800	10,72
700	1,86	3700	4,59	6700	6,45	9600	7,99	15000	10,83
800	2,00	3800	4,66	6800	6,52	9700	8,06	15200	10,91
900	2,13	3900	4,72	6900	6,57	9800	8,14	15400	10,98
1000	2,25	4000	4,79	7000	6,63	9900	8,21	15600	11,05
1100	2,37	4100	4,86	7100	6,69	10000	8,28	15800	11,16
1200	2,48	4200	4,93	7200	6,74	10200	8,38	16000	11,29
1300	2,59	4300	4,99	7300	6,80	10400	8,48	16200	11,40
1400	2,70	4400	5,06	7400	6,84	10600	8,60	16400	11,51
1500	2,80	4500	5,12	7500	6,88	10800	8,69	16600	11,61
1600	2,89	4600	5,19	7600	6,92	11000	8,77	16800	11,70
1700	2,99	4700	5,26	7700	6,96	11200	8,88	17000	11,78
1800	3,08	4800	5,33	7800	7,02	11400	8,99	17200	11,87
1900	3,17	4900	5,39	7900	7,08	11600	9,09	17400	11,97
2000	3,26	5000	5,45	8000	7,15	11800	9,18	17600	12,09
2100	3,35	5100	5,50	8100	7,21	12000	9,22	17800	12,31
2200	3,44	5200	5,56	8200	7,26	12200	9,28	18000	12,80
2300	3,52	5300	5,63	8300	7,31	12400	9,42		
2400	3,60	5400	5,70	8400	7,36	12600	9,57		
2500	3,68	5500	5,77	8500	7,42	12800	9,69		

5.1.4 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

5.1.5 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

5.1.6 Antenna VHBB9124 (SN0317)

Frequency (MHz)	Antenna factor	Frequency (MHz)	Antenna factor	Frequency (MHz)	Antenna factor	Frequency (MHz)	Antenna factor
20	15,3	61	9,0	104	9,7	186	186
21	15,1	62	8,9	106	9,9	188	188
22	14,8	63	8,9	108	10,0	190	190
23	14,5	64	8,8	110	10,2	192	192
24	14,3	65	8,8	112	10,2	194	194
25	14,1	66	8,8	114	10,3	196	196
26	13,8	67	8,9	116	10,4	198	198
27	13,6	68	8,9	118	10,5	200	200
28	13,3	69	8,9	120	10,5		
29	13,1	70	8,9	122	10,7		
30	12,6	71	8,9	124	10,7		
31	12,4	72	8,9	126	10,8		
32	12,2	73	8,9	128	10,9		
33	12,0	74	8,9	130	11,0		
34	11,8	75	8,9	132	11,1		
35	11,7	76	8,9	134	11,2		
36	11,4	77	8,9	136	11,4		
37	11,3	78	8,9	138	11,5		
38	11,1	79	9,0	140	11,6		
39	11,0	80	9,0	142	11,8		
40	10,8	81	9,0	144	11,8		
41	10,7	82	9,1	146	12,0		
42	10,5	83	9,0	148	11,9		
43	10,3	84	9,0	150	12,0		
44	10,2	85	9,0	152	12,1		
45	10,1	86	9,1	154	12,4		
46	9,9	87	9,1	156	12,6		
47	9,9	88	9,2	158	12,8		
48	9,7	89	9,2	160	12,9		
49	9,7	90	9,3	162	12,9		
50	9,5	91	9,3	164	13,0		
51	9,5	92	9,3	166	13,0		
52	9,3	93	9,3	168	12,8		
53	9,3	94	9,3	170	12,8		
54	9,2	95	9,3	172	12,9		
55	9,1	96	9,4	174	13,0		
56	9,0	97	9,4	176	13,2		
57	9,0	98	9,5	178	13,3		
58	9,0	99	9,5	180	13,4		
59	9,0	100	9,6	182	13,5		
60	9,0	102	9,7	184	13,5		

5.1.7 Radiated emission cable (C004+C005)

Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)	Frequency (MHz)	Loss (dB)
0,009	0,29	2600	3,77	5600	5,80	8600	7,43	13000	9,60
5	0,40	2700	3,85	5700	5,86	8600	7,50	13200	9,65
10	0,49	2800	3,93	5800	5,91	8700	7,58	13400	9,74
30	0,68	2900	4,00	5900	5,98	8800	7,63	13600	9,88
50	0,96	3000	4,08	6000	6,04	8900	7,68	13800	9,97
100	1,21	3100	4,14	6100	6,10	9000	7,71	14000	10,04
200	1,40	3200	4,22	6200	6,16	9100	7,75	14200	10,12
300	1,57	3300	4,30	6300	6,21	9200	7,78	14400	10,20
400	1,73	3400	4,37	6400	6,26	9300	7,82	14600	10,35
500	1,86	3500	4,45	6500	6,31	9400	7,86	14800	10,52
600	2,00	3600	4,52	6600	6,36	9500	7,92	15000	10,61
700	2,13	3700	4,59	6700	6,43	9600	7,99	15200	10,68
800	2,25	3800	4,65	6800	6,49	9700	8,07	15400	10,75
900	2,37	3900	4,71	6900	6,55	9800	8,14	15600	10,83
1000	2,48	4000	4,78	7000	6,61	9900	8,21	15800	10,94
1100	2,58	4100	4,85	7100	6,67	10000	8,29	16000	11,07
1200	2,69	4200	4,92	7200	6,73	10200	8,39	16200	11,17
1300	2,79	4300	4,98	7300	6,78	10400	8,50	16400	11,26
1400	2,89	4400	5,05	7400	6,82	10600	8,59	16600	11,35
1500	2,98	4500	5,11	7500	6,86	10800	8,67	16800	11,44
1600	3,08	4600	5,18	7600	6,90	11000	8,76	17000	11,51
1700	3,16	4700	5,24	7700	6,95	11200	8,85	17200	11,61
1800	3,26	4800	5,31	7800	7,00	11400	8,95	17400	11,73
1900	3,34	4900	5,37	7900	7,05	11600	9,04	17600	11,88
2000	3,44	5000	5,43	8000	7,11	11800	9,07	17800	12,11
2100	3,52	5100	5,48	8100	7,16	12000	9,13	18000	12,41
2200	3,60	5200	5,54	8200	7,21	12200	9,26		
2300	3,68	5300	5,61	8300	7,25	12400	9,40		
2400	0,29	5400	5,68	8400	7,30	12600	9,51		
2500	0,40	5500	5,74	8500	7,36	12800	7,43		

5.1.8 Loop antenna FMZB 1519

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

6 CONVERSION FACTORS AND ALL OTHER FORMULAS

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

	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